

To gain a long-term perspective, we must inevitably rely on available data. There are however one-of-a-kind, unreproducible data given by the climate and its related variables or by its peculiarities. To summarize the situation, to monitor the perception of climate changes in the population is however difficult and it is necessary to adopt a precise and in-depth approach.

The ClimChAlp project, developed over time according to a precise program, has married together environmental sentiment and communication. The importance of environmental monitoring through the knowledge of population has enabled the creation of an ad hoc communication model.

The significance of the project and research was to sensitize the territory to an environmental listening.

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## INTRODUCTION

### 1.1. Foreword

When speaking of the “perception” of a given event – of any kind of event – the starting point is first of all assessing if that particular situation really occurred and, should this be the case, assessing the level of intensity of the analyzed fact.

In our specific context, the questions to be asked are manifold: “Have climate changes really occurred?”, “What is their intensity?”, “Is it a cyclic phenomenon or an out-of-the-ordinary occurrence?”, “What will be the consequences on the day-to-day life?”, “Is mankind responsible for it, or is it a natural phenomenon?”. Of course, more questions can be asked, as many as the depth of the analysis and study of the examined phenomenon increases. However, if we consider for a moment the above questions, a problem immediately arises: there are no measurements of climate changes dating back to a few hundred years ago, and even when there are some, these are hard to compare. What does this mean? It means that data that are exact in absolute terms can be insignificant on a time-related scale. For example, if, with reference to the last one hundred years, the temperature has increased by 1.7 centigrade, we do not know if over the millions of years of earth life this was a recurrent event – maybe a temperature variation occurred every 50,000 years – or if it is a totally accidental variation possibly caused by human activity.

However, it is neither our task nor our intention to analyze the problems connected with the value of the so-called “scientific data”, but to verify the effectiveness and usefulness of “scientific communication” on the population and create a communication model to be applied to this specific field, even though at the same time the structure of the “communication project” should be built in such a way as to allow it to be applied later on also to different areas and issues, still within the European context.

This research therefore might take the form of an elaboration of the analysis concerning the perception of the “scientific piece of news”, whose main characteristic is the design and verification of communication activities pertaining to, or containing, “scientific elements.” The purpose of the research is to provide an exhaustive amount of data in order to verify the quantity, and quality, of the scientific information on climate changes that has reached the population of the area in question. In addition, a second purpose of the research consists of setting up an adequate communication plan that might develop in parallel with the processing of gathered “scientific data” – whose credibility can be verified – on issues regarding real or alleged climate changes.

### 1.2. Research project

This on-the-field research has been carried out in the FVG region as part of the ClimChAlp Project - Interreg III B dedicated to the alpine area. The “Permanent Committee for the organization of conventions on communication and education sciences” and the “Master in communication analysis and management” of the University of Studies of Trieste are the main contributors to the research.

A prerequisite condition to operate on the social structure, as in this case, is the knowledge of the peculiar characteristics expressed by the population residing in the area under investigation. Therefore, once the appropriate samples for the research were

identified, we selected for the analysis a number of tools that ease the gathering of the data useful to examine the typical characteristics of the research object. The theoretical approach as well as the results are illustrated below.

The first phase consisted of gathering the official data provided by Osmer-Arpa on climate changes occurred in the area of interest (provinces of Trieste, Udine, Gorizia, Pordenone and the area bordering with Slovenia). The research went on with the recording of interviews, the “testimonials” of the privileged subjects (35 people, among whom mayors of mountain municipalities, managers in the sectors of transportation, tourism, agriculture and local administration, journalists, ministers of religion, etc.). Later, the data provided by Osmer-Arpa have been compared with the data of the interviews, in order to obtain the level of “perception by the population of the climate changes that have already occurred.” The aim therefore was to assess through the interviews the trends of the perception of locally transmitted information. Readers should be reminded in fact that even though we live in the technological mass media era, communication – and the opinion on the authenticity of the information – mainly occurs through verbal and non-verbal channels (in a face-to-face relationship) with a few exceptions that are not relevant in the investigated area.

The first data come therefore from the questionnaire/interview administered to the privileged subjects, such as mayors of mountain municipalities, managers in the sectors of transportation, tourism and local administration, journalists, etc.

The questionnaire contained a number of open questions in order to obtain qualitative data to be used to design the following investigations. The research method included the update of the investigation tools based on the data gathered during the previous phase. This is due to the fact that we are dealing with a particularly delicate subject, fraught with unknown elements and most of all scarcely investigated. The following are the basic questions of the interview:

- Do you believe that significant climate changes are occurring in the area where you hold your institutional post?
  - Regarding rainfall, temperature increase, types of air pollution, variations in sea level, do you believe that these have an effect on the economic, tourism, transportation, artisan activities or, more specifically, on the resident population?
  - Do you believe that measures are being taken regarding the resolution of environmental problems and that adequate information activities are being carried out towards the citizens?
  - In your opinion, which actions should be taken to solve such problems?

Questions were asked after the answers were given, in order to allow the interviewed subjects to tell their experiences, thus reducing the suggestion effect. Answers were recorded and then transcribed by female researchers.

The first gathered data give the impression of poor knowledge of the problems connected with climate changes, with the exception of a few cases, due to the fact that the subjects professionally involved in particular contexts (e.g., scientific journalists, a mayor geologist with a personal interest in climate changes, etc.).

Is the misinformation due to a failure to spread news on the matter?

In most cases, we recorded subjective perceptions of casual events, such as “sudden temperature changes during the summer”, “there is no absolute certainty with climate”, “people are much more meteoropathic than before”, “rainfall is more intense and heavier”,

“it is much more windy”, “ seasons are changing”, while in other instances exact observations of the territory were given, such as “increased vegetation in the mountainous region”, “presence of new moulds on tree trunks that did not exist before”, “persistent fog phenomena that never occurred before”. Some people took the stance of a clear rejection of the hypothesis of climate changes, although these were only a minority.

Overall it is possible to outline some common elements, such as increased and irregular rainfall and temperature increase, coupled with additional factors extremely scattered in the perception of the interviewed subjects.

Regarding information to citizens, there is agreement (except in one case) on the scarcity of sources that spread information on climate changes, as well as of researches and measures that deal with any climate “emergency” or the mere programming of an effective environmental strategy.

Such perceptions are also confirmed by the data gathered on the territory (through agencies such as Osmert-Arpa) – which are often hard to consult due to the fragmentation of the agencies and archives that keep them –, by the different types of cataloguing in the course of the years, by a lack of researches that stretch over the long term, beyond the nearest past, by a lack of prospective studies and by the fact that territorial agencies are only competent for a mere collection and not processing and comparison of the data on climate.

At the same time, a new webpage has been created and introduced in the site of the “ClimChAlp” project of the European Academy of Bolzano (EURAC) dedicated to the research, with links to partners of the project to allow all those interested to register on-line. The page also includes a brief overview of the project, a summary of local European climate data, a list of possible types of environmental risk and most importantly a short questionnaire<sup>2</sup> to assess the perception of climate changes. The on-line questionnaire includes ten questions on climate changes and uses the same parameters – although not the same number of questions – of the qualitative questionnaire administered during the interviews with “privileged witnesses.” Formulation is different since the sample is numerically higher and distributed by country of origin, profession, education, etc. Questions are mainly closed to ease compilation and receive in real time the update of the numerical situation, since the system is connected with a statistical program that will automatically update the tables relative to the entered data. Some additional open questions will allow to deepen and verify the data entered at an earlier time. The questionnaire is translated in the languages of the project (Italian, English, French and Slovenian).

The second phase of the project took place between November 2006 and March 2007. This phase was characterized by the administration of interview materials and the subsequent collection of data in the same areas of the previous phase. The phase was based on the focus group method proposed in various sectors of society with a total of 117 participants distributed over 27 focus groups. The examined subjects belonged to the areas of municipalities (local administrators and staff of the Office for Relations with the Public), mountain communities, the agricultural and farming sector, tourism, forests, craftsmanship, transportation, education and local mass media. The focus group method provides that each group be composed of at least 4 people and 10 people at the most, in addition to a

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<sup>2</sup> [www.climchalp.org](http://www.climchalp.org). From the website, it is possible to access the first page “Climchalp”, then click on “focus group” (top right) to use the questionnaire.

moderator and some facilitators. The task of the moderator is to administer investigation material, to provide and follow the group during discussions and the proposed practical activities, intervene if the debate reduces in intensity, collect the produced material (written, recorded on audio tape or video) and then transcribe it in a comprehensible form. Regarding the organization of this research, it is common opinion that types, local behavioral models and played roles were adequately represented, with the creation of 27 groups based on sample types from the four provinces of the FVG Region and the Slovenian proximal area.

The third phase was conducted between April and September 2007 and included processing of collected data and design of a communication model of the “climate change” event that can be applied to any European context.

In the final phase of the project, the “communication model” will be verified updating the site with the results of the research, and (online) questionnaires filled out by a pilot sample in the school will be collected, after the distribution of a volume with the research results. Elaboration and comparison with input material will then be carried out in order to assess the effectiveness of the applied “communication model.”

Within the research, the online questionnaire, the questions for the interviews, the questions to be asked to the focus groups, besides the gathered data, have been autonomously elaborated. A total of 152 people have been investigated (117 in the focus groups and 35 by interview). From a technical standpoint, the following tasks have been performed: drafting of the online questionnaire, preparation of questions for the focus groups, specific training for the hosts of the focus groups, with specific language skills (one bilingual – Slovenian and Italian), recruiting of the 117 participants in the focus groups, recruiting of 35 participants in the interviews, collection of written and taped answers and debates and related transcription, transfer of data onto PCs, processing and analysis of collected data, drafting of an interpretation report.

Since the purpose of this research is to create a communication model that can be applied to any European context, it would be helpful to administer similar interviews and questionnaires to the highest possible number of geographical locations to compare any difference in the perception of the information relative to climate changes.

Moreover, it would be useful to carry on the proposition of information on climate changes through a “communication model” where pyramidal “discussion groups” will be the leads, subdivided into small groupings representing the categories of the social fabric, towards which action should be taken in order to determine the methods for the transmission of information. Once the characteristics most adequate to the information to be transmitted have been determined, a communication mechanism should be started on a wider scale, through both traditional channels, as a reinforcement and maintenance of the newly acquired elements, and a widespread presentation of the results obtained from the “discussion groups” to larger communities, such as schools, religious centers, social centers, sport associations, cultural associations.

## **CLIMATE CHANGES IN THE FRIULI-VENEZIA GIULIA REGION?**

By Stefano Micheletti

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### **1. Introduction**

You will frequently hear discussions about climate changes both in the media, as well as among people during their everyday conversations. We, the meteorologists, were used to answer to a manual like question: "Will it rain? When? How much?" Nowadays questions like those are followed by remarks on the on-going climate changes, whether they are true or not - remarks ranking from the most common one about how seasons have changes, to the observation on rising temperatures, decreasing rainfall and snowfall. After a day or two of rain, snow or cold, collective remarks become completely inverted and the population starts complaining about the severity of the weather and imminent disasters. Despite the often contradicting remarks, the most cautious ones continue uttering curious questions expressing their concern on the medium-far future: "Do climate changes really exist? Is it mankind's fault? Where are we heading?"

Answers to such questions are obviously difficult, mainly because people are not satisfied with technical explanations applied on climatology. Everything shows how relative things are in this world – people ask or demand undeniable and absolute certainties, whether the answers are positive or negative. Climatology is not a science – if it has to be science anyway – that has to provide eschatological certainties or safe future investment programmes.

However, the international scientific community that studies climatology has been constantly urging every possible effort in trying to put into perspective the most plausible future climate evolution scenery. If we want to look towards the future, we need the most accurate and exhaustive reconstruction of what happened in the past as a starting point. That is why paleoclimatology – that studies climate variations occurred in the past geological eras – and "historical" climatology – that studies climate changes since mankind has been leaving in actual fact available proofs – have confirmed and put into perspective through very interesting details a basic truth that should not be forgotten: Earth's climate has always been and is still evolving, due to completely natural causes (continental drift, volcanic activity, axial movements, solar activity variations, natural mutations in the chemical composition of the atmosphere, etc.). Earth's atmosphere modifies continuously, like a living being, as it is part of a complex system that allows the planet to live.

Proven the fact that climate has always been changing naturally from the furthest to the nearest past, scientists have been concentrating on reconstructing recent climate variations; they have tried to picture the climatic trend of the last few decades through physical-mathematical simulations (based on a large database of scientific observations gained through modern methodology). That is when things became quite surprising compared to natural trends. According to the majority of experts, the most obvious results show that it is impossible to simulate or reconstruct on computer a historical series of Earth's surface temperature variations over the last decades by inserting only natural climate changes causes as forcing factors. A realistic simulation is only possible if we introduce into the model the known anthropogenetic climate variation causes, meaning only those that are a product of human activity (as first, green house gases increase). This is

the only way to make a model, rotating on the last decades, simulate accurately what has happened. The second stunning discovery showed that the increase in temperature could be compared to large climate variations that have been occurring throughout Earth's history. Furthermore, the speed of these changes is something extraordinary and unprecedented in Earth's history. There have been similar increases in temperature before, but they were never that quick (decades instead of thousand or tens of thousands years) or imputable to non-natural causes.

Talking about the future. According to the simulation models projection that is considered to be the most reliable forecast for the future, the majority among the international scientific community – that recognizes its-self in IPCC work, scientific consent of the UN – largely agrees that the on-going climate changes head towards a further global warming that could be appointed to the effects of human activities on the climate system its-self. There are many possible outcomes; they depend on how accurate the natural phenomena reproduction is and on the forecast of the socio-economic development of mankind in the next decades. Outcomes rank from end-of-century warming to about 2 °C compared to today's temperatures (with dramatic global consequences), to catastrophic forecasts of a 5 – 6 °C warming that would modify significantly our planet. To cast away any hope of a safe future, the majority of scientists confirm that climate changes are already in progress, due to the modifications that were introduced in the atmospheric system over the past decades and can not be stopped. So, even if mankind would stop suddenly, shutting down all engines and letting nature take its course, the changes would still continue. The climatic system inertia would not allow a new natural balance to restore its-self before several centuries have passed.

Nevertheless only a majority among the international scientific community has this opinion; a minority values sceptically the responsibility of human activities for the on-going climate changes and believes in the positive outcome of the changes, at least partially positive outcome for most of mankind.

Taking for granted what is currently going on – the global increase of temperature, net variations of measurement instruments and where they are located (especially due to urbanisation effects) – it is still quite uncertain how the increase will spread over Earth's surface and what will be its' collateral effects, like important rainfall variations, on a continental or sub-continental level. It seems quite reasonable to think that the effects of temperature increase will be lesser in equatorial and tropical areas and will have a maximum impact in polar areas (with all known consequences on Arctic and Antarctic ice); in the intermediate areas, at medium latitudes, the effects of climate changes will be influenced by local conditions, making uncertainty hold sway. And Europe is located exactly in this intermediate area.

## **2. What happened in the Friuli Venezia Giulia region?**

In order to try and give an initial evaluation of the possible effects of the climate changes that occurred over the last decades at a regional level (Friuli-Venezia Giulia), OSMER (the Regional Meteorological Observatory of ARPA – the Regional Environmental Protection Agency of the Friuli-Venezia Giulia region) collected several series of historical data coming from different sources, which are heterogeneous both in terms of measuring procedures and instruments used. They also vary in the way the territory was drawn on, so

the climatic reconstructions, which may be obtained from them, are affected by this intrinsic differentiation and any possible confrontations among them would be strongly influenced by these limitations. To simplify matters in terms of layout, temperature trends have been discussed first, followed by precipitations.

The longest historical series present in our region are those recorded by the stations of the former National Hydrographic and Mareographic Service (which have now been moved to regional level); an initial analysis regards the stations of Trieste and Udine, for which the historical series date back more than a century.

Starting from the recent forty-year period between 1961 and 2000, average annual temperatures show a highly erratic flow with no clearly observable trend. The year 2000 is an outstanding year for the city of Trieste, unrivalled in terms of heat in the entire series, followed by 1994, while in Udine the hottest year was unquestionably 1976, with no close competitors either, followed by other two/three years, evenly distributed within this study period.

By extending the analysis back in time and taking into account the average values between 1840-1940, the data referring to the thirty-year periods 1901-1930, 1931-1960, 1961-1990 and finally shifting by only a decade to enclose the more recent years 1971-2000, a constant temperature increase can be observed in the city of Trieste, with a rise of about 0.5 degrees centigrade concentrated in the last thirty years (and therefore largely imputable to the last decade); in Udine there is a slight decrease (-0.2 °C) until the middle of the XX century, then an abrupt rise, also in this case of 0.5 degrees centigrade, which remains substantially stable at the end of the century.

By briefly broadening our time spectrum, the graphs relative to the average winter temperatures in various areas of the Alps show a seesawing trend from the middle of the 18<sup>th</sup> century to the middle of the 20<sup>th</sup> century, followed by a sudden increase of about one degree centigrade until the end of the century. It appears that this increase is most highly detected by the stations situated more than 1500 m above sea level, or at least that those stations are more subjected to intense interannual variations.

In order to avoid the possible effects of the expanding urban heat island, which could affect the series pertaining to the region's capital cities, OSMER took into account the data of two stations of the Hydrographic Service provided with a sufficiently long historical series (the requisite was at least 50 years), situated in non-urban zones, representing two different areas of the region and close to Osmer's weather stations so as to be able to – at least approximately – complete the series with the most recent data, up to and including the year 2004. The stations selected were those of Bonifica Vittoria (Municipality of Grado) and Maniago, joined, for the last years, by the Osmer stations of Fossalon di Grado and that of Vivaro, respectively. In both cases, we have overlapping data for a period of four years (1991-1994) between the Hydrographic Service's and Osmer's series: in other words, for those four years we are provided with the data collected by both services.

At first sight, the visual observation of the minimum and maximum mean annual temperature graphs for the years 1939-2004 provided by the station of Bonifica Vittoria and Fossalon do not highlight any relevant phenomena. On the contrary, the analogous series collected by the stations of Maniago and Vivaro for the period 1938-2004 show a major discontinuity, with sudden jumps during the years 1963-1965 and 1984-1986, approximately. It has not been possible to retrieve the information necessary to justify this

type of discontinuity (transfer of the Maniago station, change of instruments or of their seats, etc.); this invalidates this specific historical series, which is thus considered scarcely reliable.

Nevertheless, in order to try – at least in the Lower Friuli area – to obtain a more homogeneous series through the course of the years, the mean difference (for minimum and maximum temperatures) was calculated from the temperatures recorded both at the Hydrographic Service and at the Osmer stations during the four years for which we had overlapping data; this difference was then applied to the values recorded by the Osmer stations in the those years and in the following years until 2004, so as to “bring” those values closer to the ones that could have hypothetically been recorded at the Hydrographic Service stations in the last few years. A mobile average over 10 years was then applied to the thus obtained new series of data 1938/9-2004. Through the observation of this new series, including the graph indicating the deviation from the average in the period 1961-1990, it can be noticed that in Bonifica Vittoria (Fossalon), in terms of both minimum and maximum annual mean temperatures, there is a decreasing trend from the forties to the sixties, which becomes stationary until the decade of the eighties and then increases by the same order of magnitude as it had previously decreased, with a particularly significant rise of minimum temperatures (almost 2°C), slightly more contained for maximum temperatures (1°C), but in any case extremely relevant in terms of planetary trends. The hottest years were the ones marking the beginning ('40-'50) and the end ('90-'00) of the series; the coldest years were the ones in the middle. The particularly high values recorded for the years 2002 and 2003 match the ones returned for the years 1945, 1946, 1950 and 1951.

The precipitation analysis is perhaps even more interesting: actually it seems that within the continental context, in the future our region could find itself on the border between the Mediterranean area (with less precipitations) and the Alpine area, which a set of simulations indicate as the most favoured in terms of precipitations. Through an observation of data similar to the one performed for temperature analysis, in the period between 1961-2000 a slight decrease in the amount of total yearly precipitations may be noticed for the city of Trieste: there is a maximum value in 1965 and the lowest values in the years 1983, 1988 and 1999. In Udine, the maximum peak of 1965 is even more discernible and stands out from the rest of the series, which does not show any particular trends. The second highest value was recorded in 1996 and the lowest values in 1983 and 1986.

By comparing the one hundred year period between 1840 and 1940 with the thirty year periods 1901-1930, 1931-1960, 1961- 1990 and 1971-2000, a constant decrease in precipitations may be observed in the city of Udine during the XX century, equivalent to almost 10% of total precipitations. In Trieste, minimum values are recorded for the period 1931-1960, with an increase in the next period, followed by yet another decrease in the most recent period analyzed. Also in this case the reduction between the beginning and the end of the XX century amounts to about 10% of the total.

In the case of precipitations, the annual trends detected by the Hydrographic Service station situated in the Tagliamento river upper basin (Carnia) have also been analyzed. Eighty years of available data (1922-2002) confirm that there has been a decrease in precipitations also in this area, limited here to approximately 6%. In the thirty years between 1922-1951 and between 1973-2002, the absolute value average decrease

was of approximately 100 mm per year, from a yearly average of nearly 1900 mm to slightly more than 1800. The mobile average shows a fluctuating trend, which could bring some surprises. Of course, the examination of each location's data also shows peculiar occurrences, with a decrease of up to 16% between the 1923-1943 and the 1961-1990 precipitation means (in Paularo).

The data series for the years 1930-2004 recorded at the stations of Bonifica Vittoria and Fossalon, Maniago and Vivaro were also used to examine total annual precipitations, by applying the same procedures used for temperature analysis. In this case the discontinuities detected for temperature in the Maniago series are non as clearly detectable, therefore the analysis of precipitations in carried out in this location could be more reliable than the one referred to temperature, although, as we shall see, some uncertainties remain.

In Lower Friuli, the mobile precipitation average over 10 years remained substantially stable for the entire period, except for a maximum value detected between the fifties and the sixties. The years with the greatest amount of rainfall (in decreasing order) were 1958 and 1955, followed by 1937, 1957, 1965, 1995 and 1996. There have been many dry years, well distributed throughout the period: the driest were 1945 and 2003.

In the Upper Pordenone area, after a period rich in precipitations in the thirties and forties, there was a clear decrease and a dry period between the end of the forties and the fifties, followed by another sharp increase (more than 20% - maybe due to the fact that the station had been moved?), leading to a stationary period of high rainfall in the seventies and the eighties, which is still ongoing, except for a fall of approximately 10% between the end of the eighties and the beginning of the nineties. The two years with the heaviest rainfall were 1937 (very rainy also in Lower Friuli) and 1935, followed by several evenly distributed rainy years (approximately equivalent) from 1941 to 2002. The driest years were 1955, 1957 and 1958, followed by the years around 1945 and then by 1983 and 1986 (as in Udine) and 1993.

It is curious to notice that 1965, a record year both for Trieste and Udine, was a rainy year in Bonifica Vittoria (third ex equo in the series), but not in Maniago (only slightly above average).

Finally, it should be noticed that in the case of precipitations, where the parameter analyzed was the total annual sum, it is possible that single episodes of a few days of extremely heavy rainfall in an otherwise non-exceptional year, had a strong influence in determining such total sum. The worst floods recorded in Friuli were caused by episodes of rain lasting two days: the analysis of the maximum annual value on the overall amount of rainfall in two days from 1922 to 1995 in 9 stations of the Tagliamento river upper basin show a slight decrease (appr. -10%) in line with that of the yearly total sum, but with strong swings (amounting to 100%) from one year to the next. In the area of Tolmezzo and Ampezzo alone, the decrease between 1922-2002 is even more striking (appr. -20%) apparently contradictory to theory by which climate change should be accompanied by more violent phenomena. Nevertheless, the same statistical reservations are to be applied as above, linked to the high inter-annual oscillations. This type of historical series demands a deeper statistical analysis, proved also by cases like that of November 2000, when in vast areas of the region, from the plains to the Pre-alpine zone, precipitations were from 3 to 4 times higher than the average measured for the years 1961-1990. It could therefore be misleading to draw rapid conclusions.

### **3. Conclusions**

The observation of the historical series related to temperature and precipitations recorded in several regional locations, seems to confirm – or even strengthen – at a local level, some of the tendencies outlined at a planetary level. With regard to certain other aspects, it casts some doubts. In Lower Friuli, for example, the recent temperature increase appears to be higher than in the cities, while the decrease in precipitations appears more evident in the mountains and is present in the cities also, whereas in the plain region its appearance is questionable.

The results obtained with this initial, simple, superficial analysis can be both clear and contradictory signals; they must therefore lead us to be cautious and to carry on with our meticulous and incessant work of meteorological data collection, day after day, year after year, so as to avoid future doubts on the historical series' validity and enable us to have an ever-greater knowledge of the reality in which we live. It is also with this commitment in mind that OSMER manages its network of weather stations, which is currently monitoring our regional territory.

## **SECTION I - THEORETICAL APPROACH**

### **1. Scientific communication and the communication system**

The first level of communication, i.e., interpersonal communication, is characterized by a direct relation and therefore by the personal participation of those who communicate. The structure of such communication is the simplest one, since it is composed of the two persons communicating and the channel, and imply a cultural process based on codes and the message generated by a biological source. If we consider scientific communication, the first level includes communication between scientists and the direct communication between scientists and ordinary people. This last instance rarely occurs through a direct encounter.

The introduction of special tools in interpersonal communication leads to the second level of the communication system. The tool, irrespective of its type, transforms a direct and ephemeral message into a message that is indirect and fixed in space and, consequently, time. This second level of cultural communication detaches communicators from each other. A typical example of this type of communication is the writing, which, once it has been done, takes on an individual life and allows the sedimentation of knowledge, which is no longer verbally handed down and forms the so-called "social memory". At this level, a detachment occurs from the author or producer of the message, and the message is being fixed to a support, thus becoming an artifact accessible by users that are able to decipher it. However, to use the messages it is necessary to belong to a world of common expectations, that is, those of the producer. In order to produce and understand scientific messages, it is first necessary to go through an adequate literacy process, where the school usually plays the dominant role.

The third level is brought about by cutting-edge technological development (publishing, radio and TV broadcasting) which alters communication structure and process. The structure is represented by a centralized source (editorial office, direction, newspapers), communication channels and an audience, or a wide and usually heterogeneous public, even though the audience tends to reappear as homogeneous publics.

#### **1.1 The scientific language**

Language plays a critical role also in science. A scientific operation must consist of several stages that include observation, analysis of the observations and formulation of hypotheses, calculation, prediction and verification of predictions during subsequent observations. This is science's circular process. Such stages are primarily linguistic and among them the first and the last one are indirectly so. Scientific results as a whole are therefore composed of the recording of specialist linguistic expressions. A scientist is able to express in a concise way that which in the common language would require a great wealth of words, while his/her listeners respond with utmost precision to his/her questions. The specialist use of the scientific language, along with systematic observation, sets scientific activity apart from other activities (Bloomfield,1980).

Scientific languages therefore rely on the language but unlike this, whose main characteristic is to act as a mediator of action (Braga, 1974), they have a rather developed operational function. The dependence of common language is often polluting, so much that

each science strives to build specific linguistic and symbolic codes, consistent with its axiomatics (Guiraud, 1970). However, no one can deny that verbal language is the sign system through which the content of any other system can be expressed. A common example is the multiplication table, which can be learned only through verbal language (Kondratov, 1968). Any natural language is able to express anything, even though this is not always convenient, as with the reading of a binomial and its mathematical writing. Replacing linguistic signs with strictly mathematical signs for example makes an expression easier.

The problem of scientific language has been associated with that of scientific theories. Therefore, a linguistic specification emphasizing the importance of the first aspect over the second lacks. Logical positivism, Carnap (1977) in particular, considers as meaningful concepts those that are formed by private experiences. Conversely, Wittgenstein (1964) speaks of language in an explicit way in an effort to prove how private language does not exist and that it cannot always be inferred from experience but it is rather a game where roles must be learned (execution and expectancy). The importance of a proposition depends not as much on its more or less close correlation with the empirical reality as on the observations that can be used to disprove the theory. According to Popper, science is not made of systems but of problems and, as a consequence, it is the problem that defines language and not the other way around. The context of the logic of discovery is emphasized and the linguistic importance of the problem fades behind the priority method issue. As a consequence, establishing a significance level with other sign-related issues is delegated to the psychological and semiotic disciplines.

Science, according to Cassirer (1972) and Piaget (1950), corresponds to the last stage of human intellect, the most meaningful conquest of humankind. According to Kant, experience is the first product of the intellect although, it is something complex since it has a matter and a form: the former made of sensorial perception data, the latter of scientific concepts that, as concepts of the pure intellect, give phenomena a concise unity. In fact, it is possible to say that we know an object only when such concise unity is formed. Science began with the search for simple concepts. "*Simplex sigillum veri*" (simplicity is the seal of truth) seems to have been one of its main axioms. Such simplicity however constitutes an end goal and not a starting point (Cassirer, 1972, p. 345). In fact, almost all natural sciences had to go through a mythical stage. Suffice it to mention alchemy as a predecessor of chemistry and astrology as a predecessor of astronomy. Piaget's genetic epistemology also stresses the methodological importance of questions in the construction of the scientific experience. Questioning in fact becomes the essential moment of research: any scientific experience always implies an implicit or explicit question, an answer provided by facts and an interpretation.

The quantitative aspect of numerical language marked the start of the modern concept of science. Numbers are not absolute but relative and it is the very discovery of irrational numbers that freezes their logic. To restore harmony, it took centuries of philosophical and mathematical thought, which led to stress the symbolic character of numbers. A more abstract symbolic language was introduced by quantum mathematics<sup>3</sup>.

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<sup>3</sup> However, mathematics ceased in ancient times to be intelligible by a public with a generic culture. The history of sciences could be told as a continuous going out of the scene of human knowledge and as the advent of progressive inaccessibilities.

The stasis/mutation dialectic typical of science occurs in a context that is defined only in relation to the “normal science” phase that follows that revolutionary phase of inverting old paradigms. Kuhn (1969) does not conceive a space between the search for information and its manipulation, that is, all the processing phases of theory. The problem of the legitimization of the meaning of the used lexicon is accentuated since a gap is being generated between a language that tends to have a linear dimension and a reality that has a multidimensional aspect. The linguistic component and the sense of communication are made explicit neither at the time of creation of the theory nor at the time of the semantic reorganization subsequent to the results confirming such theory or not. The fundamental linguistic alternative for each scientist consists, according to Northrop (1966), of the need either to invent a new technical terminology or to select out of known terms those that more precisely adapt to the intended meaning. In fact, given that “a concept is a term to which a meaning has been attributed” (p. 82), such meaning must be clarified, assigning it to the scientific language using the processes of logical deduction<sup>4</sup>.

## **2. Written scientific communication**

### **2.1 Communication between scientists**

The level of cultural communication takes into consideration written messages and anything that has a form fixed in the space with graphical signs that contribute to the formation of a text. It is important therefore the time when thought and scientific discovery become communicable and not the time of intuition, even though sometimes reference is made to this. The problems concerning the “clean slate”, the selective attention on elements or aspects of phenomena that may respond and therefore satisfy the curiosity of the observer do not belong, when not written, to this level. All knowledge forms consist of establishing a system of relations between the elements that form the field of an experience and these relations, once observed and postulated, must be signified and therefore included in a semiological system that makes them communicable (Guiraud, 1971). The persons carrying out a specialized activity develop a common language with technical terms and expressions that make answers more accurate. Correct answers and the often complex calculations of scientific disciplines reinforce a highly precise style.

Scientific language is presented by an arbitrary and a figurative type of signification. The former can be exemplified by a numerical notation, the latter by geometrical representation using figures. The characteristic of these two codes is the extremely rigid convention, which they are subject to and, besides being coercive, is also explicit (Guiraud, 1971).

Homology seems to be the strongest need of scientific codes, since there is a correspondence between the structure of signifiers and that of the signified, even though no analogy exists between the elements of the former and the latter. The arbitrariness which these codes are subject to serves to protect from analogical confusions and provide some help to memory. It is fair to say that there are two types of scientific language, i.e., informal and formal. The first type of language, which can also be understood by a qualified

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<sup>4</sup> Scientific language may be identified in the language used in communications between scientists, generally rich in specialty technical terms that to the eyes of non-scientists look like real jargons (scientific jargons). Besides this, there is also another scientific language that should be learned at school and leads to a practical organization of knowledge.

listener, adopts the common language with the addition of technical words and phrases subject to syntactical and stylistic restrictions that tend to generate standardized answers. The second type, the formal scientific language, uses a rigidly set vocabulary and syntax and moves inside conventional rules. Usually, it can be developed only in writing also because written signs do not always have a verbal correspondence. At an advanced level, the need to present data and make complex calculations leads to linguistic forms and, even more so, to written speeches that go beyond scope of common language (Bloomfield, 1980)<sup>5</sup>.

With regard to formal and informal written communication, it is interesting to consider the famous notes and articles by Millikan. Millikan's experiment is an example of communication between scientists and it is interesting just because it shows how the stages of scientific "discoveries" are not linear and that the various levels of communication are important for the purpose of advancing the theory. The researches of the American scientist concerned determinations of the elementary charge, previously studied by Townsend, Thomson and Wilson. The publication of Ehrenhaft's scientific reports led Millikan to experimentally disprove them through the publication of the results that he had obtained. However, even Millikan's first important publication had some critical aspects, first and foremost the subjectivity of the classification of the measurements divided into "very good", "good" and "fairly good". Finally, in his writings the affirmation has been found that he would have discarded some observations were they not in agreement with the others (Pelli, 1990, p. 31)<sup>6</sup>. Ehrenhaft replied defending his results with a publication of a revised experiment. The scientific debate went on from 1909 to 1914, when Millikan was finally able "against any expectation" to offer a direct experimental proof of the validity of Einstein's equation. Such Millikan's statement, included in his notes, show how even in science the personal opinions of scientists can sneak in.

It is interesting to analyze the linguistic expressions on which the content of scientific language rests. The research on the use of precautionary expressions points to the open character of contemporary technical-experimental sciences and makes it potentially interesting to extend the research on the frequency of the use of such expressions in everyday, or extraprofessional, expression styles of scientists in relation to other figures or social roles. It has been shown that the use of precautionary expressions is higher among disciplines where the high level of difficulty of the matter at hand is associated with methodological equipment of proven rigor such as the medical sciences. Caution when making a statement helps alert the scientific community on the level of plausibility attributed to one's own intuitions and to predict and prevent possible failures (Bertasio, 1981)<sup>7</sup>.

At the level of cultural or written communication, it is possible to highlight the structural and cultural difference of the scientific communication between scientists and other initiates with a different type of education and between scientists and the general

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<sup>5</sup> For a long time, scientific observations were made using common language and only in more recent times, with the development of mathematics and algebra, scientific calculation departed from the usual language.

<sup>6</sup> Even scientific communication can be scammed. Some examples of fraud are "trimming", "forging" and "cooking". Trimming is the elimination here and there of a few data from the observations that depart too much from the average value, in order to make a measure appear more precise. Not all scientific frauds are however equal: if the "fraudulent" results are correct, like in the case of Millikan's trimming operations, it is fair to say that no problem for science results from there (Pelli, 1990, p. 94).

<sup>7</sup> Behavioral, animal or human sciences use these precautionary forms relatively less frequently.

public. The language of an article published in a scientific, and therefore specialized, magazine will be understood by a specialist that participates in what is being written. Therefore, there are no comprehension and readability problems in this case, but rather those who view the written text can in turn “answer” becoming promoters of different communications means, such as for example a verbal discussion of the results or another article or similar researches.

Certain scholars (Crane, 1972) piece together communication networks in science, in an effort to identify the factors that influence each other in scientific development. The interest of scientific literature goes far beyond a reconstruction of communication styles: the publication and therefore the introduction of a scientific contribution in a formal communication channel is only the end behavior of a series of formal communication actions, which are however considered irreplaceable in the scientific information networks and consist of contacts with other scientists belonging to the same scientific field. Publication is the final stage of the communication process and may act as a reliable and standardizable indicator of previous communication contacts (papers, reprints and personal communications) which may be considered as a real process of social “negotiation” of the cognitive content of scientific knowledge. The reliability and validity of the quotations made by scientists and studied by scientometry should keep into account that such quotations may be relative to wrong evaluations made by the author, of whom the quotation techniques does not differentiate the quotations in favor of a given theory from those against it. Not even the different meaning that a quotation may have based on the “excellence” of the quoting person is highlighted (Cannavò, 1984). The quantitative analysis of the quotations obtained from a text is an indicator of significativeness that tends to reconstruct areas of scientific research (Gilbert et al., 1983)<sup>8</sup>.

### **3. Scholastic communication**

Scientific communication, in the second level of the communication system, also includes scholastic communication, which appears complex since it is based both on the interpersonal and cultural relation, where the former carries the latter. In scholastic communication, a teacher must be able to transmit scientific knowledge through a form that is suitable for the children’s age. The evolution in teaching scientific disciplines should go from a descriptive character (middle school) and to a scientific character (high school).

The complexity and difficult comprehension of the scientific language goes from simple systems to more complex systems, that is, from physics to chemistry, then biology and finally natural sciences. Without the basic elements of physics and chemistry however it is not acceptable that it is possible to scientifically study problems that are scientific or correlated with natural sciences.

Any school that really teaches to understand scientific language is even more necessary if we think that it is in scholastic teaching that a person builds his/her knowledge, sometimes the one and only in this sector. Since scholastic learning is based on a system of prizes and sanctions (grades), it is subject to control and a student may pass onto higher education levels only if he/she passes over certain barriers.

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<sup>8</sup> The trend of co-quotations is able to grasp the alternating periods of scientific revolution.

Chemistry books used in high school show that in this sector there is substantial diversity in presenting basic chemistry. It is possible to see that often a lot of attention is paid to nomenclature and formulas, the methods for the preparation of entire classes of compounds which students can hardly link to reality. Moreover, there is a tendency to incorporate the whole of chemical phenomena within a generalizing theory that leaves aside the practical aspects of chemistry. Besides redundancies there also are unjustified absences: the positive aspects of chemistry in the day-to-day life and in the social environment are neglected, and when they are mentioned, only the negative aspects are stressed (Brancaleoni, Cervellati, 1988). Many texts are also difficult to read and do not keep into account the age and therefore the cognitive development of the students for which the books have been written.

### **3.1 Scientific divulgation through books**

The unrelenting scientific progress and often amazing results are often accompanied by an ever-increasing need for knowledge on the part of the large public. However, the ever richer editing production and the journalistic debate often do not meet the requirements of serious divulgation, contributing to increase disorientation and confusion rather than knowledge. In fact, not always the success of a divulgation book is guarantee for quality (Rigutti, 1989). Good scientific divulgation must be able to overcome linguistic obstacles, basic education deficiencies and a clear separation between scientific and liberal culture. According to some, science loses much of its content in divulgation. However, for the enthusiasts, divulgation despite its limits is a tool of cultural elevation. The task of scientific education so far has been relegated mainly to the school system and it is estimated to remain that way. It is hard to believe that other systems based on large communications means may take the place of school, at the most they may play the very secondary role of updating trainings and supports, aiming at raising the knowledge level of already educated population. In order for education to prove effective, it is necessary a continuous teaching work adequate to the level of the students. Scientists and divulgators writing books "for everyone" often do not use the same precautions and care they use when writing articles for their colleagues.

A written article may include highly professional books as well as those that trivialize the same subjects. Among the divulgation books intended for the large public there are also works of indisputable value wishing to find a possible communication channel between experts and the large public, although there are also other books of no value and others that are even harmful (Rigutti, 1988). Divulgation works are usually intended for the large public to present the results of researches, and often do not carry novel elements.

However, magazines for men and women behave differently. The former take for granted that readers are already informed, for example, on cancer, and only provides scientific updates. Magazines for women instead present a fully-fledged organization. Oftentimes in news magazines the role of experts in topics such as cancer serves to stir up emotions and catch the attention. Divulgation not only must keep into account how journalists should communicate things, but also wonder if emotionality and sensationalism are really necessary when talking about certain subjects. Magazines and weekly publications are also important for the creation of specialist knowledge, suffice it to think of healthcare information (Ellul, 1989).

Scientific communication is connected with the publication of results, a fact that enacts the imperative of “making common” the scientific work presenting at the same time the proof of the internalization of rules. Merton (1959) notes that scientific advancement not only depends on discoveries, but on the fact that this must be communicated to other people: “Science is a whole of socially shared and validated knowledge”.

Based on an analysis of the public recipient of scientific communication (Storner, 1968), he makes a distinction between specialized public, recipient of the research per se, and the public for which the applied research is intended. The communication of a scientific result is addressed to a public of scientists and experts that know the problem area where a discovery has been made. In this case, the public is an active party in the communication. This is not casual since even Kuhn states that “one of the binding rules of scientific life is the absolute prohibition to poll (...) the large public on scientific matters” (Vergati, 1978, p. 202).

#### **4. Mass communication and scientific communication**

The third level of the communication system includes communications characterized by the use of advanced technologies and detachment of source from the audience. The latter is not, in the case of scientific communication, composed of a heterogeneous public, but by several publics with similar interests and education. An audience is heterogeneous when the mass communications means deals with a scientific subject connected with a tragic event.

In the scientific communication transmitted by the mass media, science becomes an “artifact” and artifacts are placed by the media within a world of socially defined objects. An individual acquires an approach towards such artifacts through experiences that are usually shared with the others, thus generating collective phenomena. The distribution of knowledge, time and intentionality are difficult elements to place since these are concepts that are important as far as the cognitive aspects are concerned, each of them regarding the information or the knowledge in a conventional sense. Among the main activities of communication means are gathering of news, a differentiated focus on problems such as the “agenda setting” and distribution of opinion and information in the society, which may have the potential effect of generating knowledge “gaps”. These three activities produce effects that have a single neutral label of “distribution of knowledge”, since knowledge achieved through the media can be expressed in terms of statistical distribution.

Terms such as “control” or “management”, when used, would imply a direct and aware effect and the proof of the existence of manipulation would be disclosed, which in any case would not be conclusive and demonstrable. The diffusion of news, intended as collection and incorporation into an individual knowledge, is a short and medium term problem. The sources of communication means usually believe that their audience is generally interested in the events, but no channel tries to educate its audience on the real content of news. Studies have been conducted on the ability to remember certain events where four main variables have been found, which are the amount of knowledge of a given event, the relevance of such event, the amount of transmitted information, the source of the knowledge of an event transmitted by mass media or interpersonal communication (Greenberg, 1980). The ratio of those who believe to have been influenced by the media to those that instead believe to have been influenced by personal contacts has proved that

when an event is known by everybody, a higher percentage of people have learned about it through interpersonal contacts. Conversely, when events are known by the population it seems that the influence of mass communications increases (McQuail, 1988).

There is however a category of events known by definitely small portions of the population and scientific messages can be considered elements belonging to these categories. The value attributed to television as a source of knowledge can be overestimated and many common production and distribution practices often thwart an adequate comprehension of the news by the audience.

It has been a common opinion for a long time that the press and then television had significantly contributed to the flow of public information to the point that they have caused a change in knowledge differences resulting from differences in the level of education and social status. Studies on political campaigns, in the short term, have shown how a reduction can occur in the differences between social groups. There are however elements proving to the opposite effect, which show that an attentive minority of intellectuals obtains more information thus widening the difference in knowledge. The demonstration has been made by several parties that different media work in different ways and that the press is more prone to widen the gap than television since it is the favorite source of privileged classes. The theory of knowledge gap seems to indicate an increase in the differences since those who are rich in information, with higher knowledge capacity and greater resources, tend to depart even more from the lower information layers and, therefore, divulgation, considered in this case vulgarization. If we consider however that communication means have to a certain extent both a model and constancy over the long run, the assumption can be made that there is an initial knowledge effect and that media provide the elements useful to recognize and interpret reality beyond personal experience (McQuail, 1988). This occurs even if the programs have a tendency to perform some major functions such as "novelty", "entertainment" and "culture", and then to enter into the popular phase where a common denominator requires a medium-high level of education that may make appear specialist programs dedicated to an elite. The last level of the specialist phase can be divided into three stages. The first one includes the professional and cultural specialization of the population that generates a large diversity in the interest level; the second includes a fairly numerous population to justify the financial effort for the publication and programs of limited interest and, finally, the third considers the reduction in production costs correlated with an increase in the number of channels.

The problem of the education of the public is always present in scientific communication through mass media. Transmission models of mass communication include the transmissive model of limited effects and the model based on simplification or the accumulated effects model.

In the first model, of a sensational kind, the message takes on a strictly playful function, while in the second model it takes on an "educational" function. In this sense, media play a role of construction of reality, of a "second-hand" reality since there is no direct participation, but participation occurs through the medium. The ability of the media to influence results therefore from their ability to "structure" the image of social reality in the long period and to organize new messages, to form new opinions and beliefs (Roberts, 1972; Wolf, 1985).

At the center of the problem of the effects is the relation between mass media action and the whole of knowledge on social reality which shapes a given culture. In this

relationship, the characteristics of accumulation, consonance and ubiquity are relevant (Noelle-Neuman, 1973). Accumulation is the ability of media to create and sustain the relevance of a given subject, which derives from the information covered by the mass communication system. Consonance concerns instead the information production processes where similarities are more numerous than differences. Finally, ubiquity is both the quantitative diffusion of the media and the whole of knowledge, opinions and behaviors diffused by mass communication, i.e., “public knowledge” that is “publicly” known (Wolf, 1985, p.142).

#### **4.1 The culture of the audience and its inference ability**

Cultural preparation does not particularly influence the human inference ability. Social psychologists have been interested over the last years in the representations concerning the common sense and the learning process of disciplines that also have a scientific statute. In this case, it is not appropriate to call the subject “intuitive”, “naïve scientist”, since he/she is not free from prejudices and has a degree of knowledge, even if a superficial or “hearsay” one. When subjects are not impartial towards the reality or information they deal with, they can be said to be mistaken and accused to be erroneously influenced by previous theories and to make wrong generalizations. Inference is a long and difficult process and common people is not able to infer following scientific rules (Moscovici, Hewstone, 1989). On the other hand, a scientist endowed with the same intellectual capacities of the layman still makes mistakes that are similar to those of the latter, who is called “incompetent scientist” or dilettante since certain activities that he/she carries out cannot be considered naive. The incompetent scientist forms as a public consumer of scientific information and discoveries, and reads magazines and books covering scientific subjects (Moscovici, 1976). Information is acquired through several means even if in an unsystematic and confused way. The question may arise therefore of how science is used to produce the practical knowledge of the common sense. Individuals process information through recognition and classifying pieces of information that come from the external world.

To keep stable his/her vision of the world, a subject must put his/her knowledge in order and make inferences that allow him/her to attribute causes and make predictions. Failing a training, an incompetent scientist is prey to systematic errors and the source of these imperfections can be found in the patterns and other conceptual systems that govern the processing of the information owned by the subject. However, the theories concerning the epistemology of lay science and the causal attributions that are based on the so-called image of the cognitive activity are disputed by Moscoviti, who notes that cognitive elements become important only with reference to a theory or an idea that varies from one subject or group to another, so much that it becomes important to know how these social systems have formed in society. Mankind has the ability to learn, store and classify through habit and sensory knowledge, to replace a mobility with another and to represent the various fragments of material world. Such observations lead to parallel the information processes that retrace the sensory events of perceptive observations etc. and the transformation processes that are strictly individual. Social representations, as well as data revision, are connected with transformation processes, a fact showing that stable and widely diffused representations cannot be explained by inference rules. “That which is in the

mind of individuals is not information as it is presented, but rather a change in perspective, or how information is represented" (Moscovici, Hewstone, 1989, p. 153).

In this regard, external and internal processes can be studied. External processes can be divided into three stages extrapolating a concept from its specific context and reintroducing it in a general context, thus enabling assimilation. These are the three stages:

- Personification of knowledge through the identification of theories such as "relativity", "conditioning", "psychoanalysis", etc.
- Figuration – even if abstract – which is the replacement or overlapping of images, metaphors and concepts.
- Ontologization of logical and empirical relations, i.e., the tendency to prolong an image, enlarge and deepen it and creating a place for it in the common sense.

As a result of the external transformation processes, a science that has spread in society takes on a structure, rationality and impact that are different from those that were typical of it in the science world, which leads to deformations in scientific knowledge. Internal processes are mainly of a psychological kind. Both processes are present in the information of the incompetent scientist transforming informative thought into representational thought, each with a distinct rationality. Informative thought – where the "how" prevails – is characterized by the use of concepts and signs and by a focus on empirical validity, while the representational thought – where the "why" prevails – uses images and it is based on consensual validity (Moscovici, Hewstone, 1989). Science associates a theory with various causes and effects. Conversely, the social representations approach is dominated by automatic explanations where causes are chosen and proposed before the available material is thoroughly screened and before effects are examined.

Social information therefore follows a path of adaptation to a preexisting scheme of the common sense. Information notions are transformed into representational knowledge and descriptive content into explicative content. The task at hand is to see how a concept becomes an image, an abstraction, a reality and an objective theory or a conventional representation: people play at the science game because they want to include it in the common sense game (Moscovici, Hewstone, 1989).

The revolution in communications has allowed to spread images, notions and words that science is inventing and that become an integral part of the intellectual knowledge of common people. Today everybody has a more or less accurate knowledge of economic theories, inflation, psychological concepts and most frequently used terminology. Science is constantly diffused by education, conversation, books and magazines and permeates the knowledge of common sense, teaches new things and enriches knowledge common to everyone or, rather, to those with a fairly good level of education. Common sense is based on the spontaneous consent of the members of a group and it is similar to the "first-hand" knowledge that gave birth to science. It can also be considered as a "second-hand" knowledge that spreads and constitutes in a firm way a new consent on recent discoveries and theories. The old common sense is still predominant in everyday language and the new common sense prevails among the media.

The notions that characterize incompetent scientists can be found in the teaching of scientific disciplines where teachers find among students certain erroneous scientific beliefs, which usually live on even after the corrective action of the teacher. It is as though correct scientific answers are scarcely credible, in any case abstract and far from everyday experience if not even in contrast to the affirmations experimented in the surrounding

environment (Debegnac, 1990). Students are the first to ignore to have such dual explanation channel, which makes it even harder for teachers to intervene in the causes of some delays and disturbances in the learning processes. These seem unexplainable, while they are the direct consequence of the existence of pseudoscientific beliefs, also known as “misconceptions”. For example, a student studying the mass conservation law, who is convinced that matter can disappear or that a mass can be attributed to the heat, will certainly meet insurmountable obstacles in accepting the balancing of a chemical reaction that presupposes both mass permanence and heat weightlessness<sup>9</sup>.

## 4.2 Media scientific language

Press is the only cultural communications tool. In order to access its content, literacy is necessary. Visual media are a real transformation of the methods for access to visual documents, which causes deep transformations at the level of public behaviors also in terms of the impact of TV programs. Recorded programs moreover are a real data bank, a social memory that increases the potential for individual knowledge and education. A program in a scientific subject cannot be carried out at a highly specialized level, but it must be vulgarized and therefore simplified. Programs may cover various disciplines, from politics to sociology, from economy to cultural information and proper science. The difference between economic, political and social programs and scientific programs is that in the latter journalists do not play a liaison role between scientists and audience. Their purpose is to simplify knowledge that without their contribution would remain incomprehensible.

When wishing to make the public aware of a problem, the press, radio and television start an inquiry during which selected experts are convened to give explanations. The contribution of experts to programming however is minimal. Journalists only mediate specialist knowledge and their role should not be confused with that of experts. In this regard, it should be noted that the concept of *scientific divulgation* must be applied to a wider domain of scientific, technological and medical discoveries and this concept must be extended to all journals and cultural programs.

Journals use images as a documentation means – according to the reportage model – and the use of specialized journalists privileges interpretation and limits images to an illustration function. Different forms of audiovisual journalism can be considered, in particular “examination journalism”, which consists of no researches on the field and the sensational representation of reality. In this case, the knowledge to be divulged is produced by experts just like the one stored in the archives. Journalists aim at “producing the invisible” with the help of charts, animations and debates. Images are invented and chosen according to their educational power to make abstract concepts “talk”. Examination journalism is close in many aspects to proper scientific results because science is the obligatory source of reference and the style can be more or less scientific or more or less journalistic.

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<sup>9</sup> In a research by Debegnac on misconceptions in chemistry, the following beliefs have been found, very similar to the beliefs or inferences of incompetent scientists:

- Chemical reactions exist that are able to destroy matter
- A transformation occurring as an effect of the heat must necessarily go through a “fusion” phase (doughiness)
- It is possible to see what happens in a reaction using a microscope
- A concentrated material is heavier than a scarcely dense material
- A material may weigh less after it has taken in air
- A combustion may destroy matter

In “inquiry journalism”, scientific knowledge instead is apparently absent. An inquiry does not need experts since facts are shown without the need to explain their causes. Such kind of journalism carries out a form of scientific divulgation less apparent than the other one. It usually selects a procedure consisting for example of the analysis of a case and follows the methodology of the “narrative scheme”. However, in this case, credibility is low.

Regarding the problems of the diffusion of technical language, the study of the language of journals represents a privileged observation point. The sectors of technology and science that most frequently appear in the pages of newspapers are the medical terminology – which is the most widespread maybe for its immediate interest among the public – followed by physics and chemistry. Moreover, unrelenting scientific advancement and psychological innovations offer a continuous change in the size of scientific vocabulary available to the public.

Leaving aside the actual education of readers and therefore the way in which certain lexicon choices are greeted, it is interesting to show some of the most used means in journalistic writing to clarify and comment on technical terms introduced in divulgation<sup>10</sup>. One of the fundamental tasks of information means should be the introduction and diffusion of terms corresponding to the acquisition of new knowledge in a specific context, i.e., to perform an active divulgation effort. Usually, a term is used in an article with an improper, metaphoric meaning, with an extrinsic purpose to the information and therefore with a tendency to make and form a “brilliant” speech. The choice of technical terms used improperly is influenced by the quality of the content, while the choice of technical terms used in a metaphorical way is also part of the fashion club and the “privileged spheres of thought”. It is interesting to note that the things that interest the most become a sort of magnetic poles that attracts synonyms, as shown by the so-called principle of synonymic attraction which is confirmed even today by the fact that new words, expressions and images are always borrowed from the world of science and technology, a world that influences most part of human experience (Dardano, 1976)<sup>11</sup>.

### 4.3 Divulgation

The concept of divulgation developed during the Age of Enlightenment when the hope was cherished that the world could be illuminated by the light of reason, liberating mankind from many centuries of prejudices and dogmas. The task of an enlightened intellectual was to orient public opinion towards a greater and deeper cognizance and reflection on knowledge, taken outside universities and academies.

The ability and willingness to address two types of recipients is one of the most important characteristics of the cultural climate of the mid-eighteenth century. This can be considered as the beginning of the increasingly more impelling need of the public for a more agile and direct knowledge communication form, which is expressed at its best exactly in the mass communication destined to a large diversified target.

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<sup>10</sup> Dardano (1976) quotes two articles. The first one is entitled “Earthquake in Pozzuoli triggers hours of anguish”, showing how two discourses are mixed. The first is a brilliant one with animation techniques (“Endogenous forces imprisoned in the bowels of the earth” or “Population sitting on the cap of a gigantic volcano”) and another technique opening up a scientific point of view where phenomena are looked at with further specifications and clarifications (p. 211).

<sup>11</sup> The subcode of science and technology is one of the most exploited scientific poles not only by political and local news, but also by advertising and sport.

Scientific and technological knowledge has seeped into our everyday life. The accumulation of new knowledge has accentuated the need to increase one's personal education and knowledge to comprehend and master evolution. "If we wish to save ourselves in a world not made of robots, we need that everyone, and for the time being, as widely as possible, be given the humbleness to repeat, the patience to combine, the courage to expand the experiences that human species and cultures have conquered" (De Mauro, 1982). Traditional scholastic institutions appear to be no longer able to meet alone the ever-increasing need for knowledge of the large public. The need therefore has arisen for a series of activities of scientific divulgation that involve the press, mass media and also the multiuniverse of education (Margiotta, Salatin, 1992). Good divulgation should be able to transmit knowledge and information outside the close circle of experts and be conveyed through a comprehensible language (Tessarolo, 1991); and spread to a larger and fairly educated public the results of scientific and technical researches producing easily digestible messages (Schiele, 1986). To define divulgation is no easy task: many authors have undertaken this effort using synonyms, paraphrases or more appropriate metaphors. Divulgation is a set of phrases, a summary, a paraphrase or "a good story" to tell.

Besides the various general definitions, there are also different views. Some believe that, in divulgation, science loses most of its content since the message in any case is incomplete and included in a framework that is different from the original one. According to others, instead, the strength and pertinence of divulgation are to be found not so much in allowing a deep comprehension of a phenomenon as in placing scientific discoveries in a social context, showing consequences and application in everyday life (Cloitre, Shinn, 1986).

Apart from the various positions, the task of a good divulgation is to overcome linguistic obstacles and basic educational deficiencies, to clarify the datum which the public is interested in, to situate it relating it to common knowledge and showing how it modifies and integrates it and how such knowledge develops (Moscovici, Hewstone, 1989). The purpose of divulgation therefore is to present to a hypothetical user the information that allows him/her to access to key principles of selected scientific sectors and that contributes to the acquisition of new knowledge considered relevant and indispensable. It should not be forgotten however that such hypothetical user is not a single recipient, but a highly differentiated public. The need therefore is apparent for a "large and precise information necessarily anchored to a sector-specific and specialized use of the language" (De Mauro, 1994).

It would be appropriate to know the level of education of the recipient public to evaluate the linguistic obstacles and, most of all, basic educational deficiencies. Very often people have superficial knowledge acquired in a confused and hear-say manner which may hinder or in any case influence the learning of new material. By relating the new information to common knowledge, the latter can be modified and thus trigger an altered learning process (Moscovici, Hewstone, 1989).

Within scientific divulgation there are however several diffusion models of knowledge which correspond to the translation into practice of choices determined by different reasons.

Divulcation can be used in various ways<sup>12</sup>. The contrast between educated and lay man still exists as found in the divulgation practices that waver between the high levels of specialized magazines and the simple levels of some daily newspapers or TV programs striving for sensationalism, often risking to trivialize the content of information.

Divulcation includes communications between specialists as well as education, diffusion, simplification and entertainment (Bettetini and Grasso, 1988). *Divulcation intended as communication* between specialists allows the diffusion of research results to all those employed in a specific sector or related areas, thus fostering interdisciplinarity. Within a scientific community, this role is played by high-level divulgation magazines that have the specific task of informing researchers on what goes on in the scientific and technological field (Angela, 1987). *Divulcation intended as education* implies continuing relations between the players of the communication exchange in order to make them aware of the need for an education of the scientific method. In *divulcation intended as diffusion*, scientific news undergoes a process to become public both inside and outside the scientific community: "It is not important that everyone understands, but that everyone is able to create a certain relation with the universe of sciences" (Bettetini, Grasso, 1988). In fact, to hope to condense in a few pages researches of many years is risky because the error can be easily made to trivialize information. For this reason, divulgation intended as diffusion may also be a "reference", simply pointing to the occurrence of certain facts without the need to fully describe them. It is therefore also important just to "suggest" to the reader that certain things today are possible and certain ideas thinkable (Piattelli Palmarini, 1988). *Divulcation intended as simplification* aims at translating scientific concepts into terms that are accessible by a larger portion of the population through the preventive choice of subjects and the use of a common language. As for *divulcation intended as entertainment*, the diffusion of scientific knowledge is handled like any other type of competence or information and it is therefore subject to the rules of spectacularity.

In any case, transmission of knowledge outside specialized sectors must necessarily occur through the use of a comprehensible language and through the reconstruction of the scientific reality anchoring specialist uses to the everyday environment (De Mauro, 1994)<sup>13</sup>. The opportunity afforded by communication means to spread knowledge, to bring the public close to the secrets of science, to introduce them to laboratories and plants, to make them watch artificially reproduced natural phenomena is a factor of indisputable social relevance and importance: it is also essential to beware of science divulgation as a "positivistic vision, a sort of cure-all for social problems" and try to find new strategies for the presentation of scientific results that allow to specify the univocal and sector-specific meaning of the terms used, the key based upon which such meanings should be read and used and approved or not. All of the above with the purpose

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<sup>12</sup> The eighteenth century became the century of the Encyclopédie, as well as the century of popular periodicals and the first daily newspapers. Pietro Verri (1728-1798) presented his theories both in treaties, intended for the lovers and experts on the matter, and articles published in the "Caffè", destined to a larger public with an unspecialized background.

<sup>13</sup> This means to reallocate scientific discoveries in a social context where the consequences and application in the day-to-day life are shown in the most faithful way to reality in order not to run the risk, as in the specific case of medically assisted procreation, to spark vain hopes in sterile couples wishing to have a child. Looking at sensational and almost miraculous results only, at record births reported by newspapers, one might run into the error of simplifying the problem without being minimally aware of what goes on behind the scenes and of the medical, psychological, legal and social consequences of that particular procedure.

of guaranteeing the quality of divulgation that is not trivialization and misunderstanding (Leoni et al., 1994).

#### **4.4 Scientific divulgation**

The problem of transforming a communication between experts into a communication between non-experts is particularly interesting. Ordinary people must have certain information to favourably act towards themselves and the surrounding environment. Communication structure changes when this type of education goes from scholastic to mass communication. In the latter, however control over learning and therefore over the effects on the audience becomes difficult.

Media participate in the reconstruction processes of reality forming or helping to transform social representations. The whole of knowledge relative to the object, i.e., information, and its field of representation, is arranged in a hierarchical organization of the elements composing it.

Media offer is articulated into expressive areas, categories and subcategories that constitute a component of utmost importance of the context where objectivation and anchoring processes form originating and consolidating representations. Media in fact tend to provide new information and to reproduce already available information relative to the object of a social representation, attributing to it a sense within organized schemes, on the basis of an explicit and/or implicit value reference point.

Scientific divulgation tends little by little to become an autonomous research domain. The whole of diversified diffusion practices and the presentation are linked on one hand to the communication field and on the other hand to the education field (Jacobi, 1988). This is true if we think that media rarely act as communication “producers” or agencies, but they rather operate on the “material” they find.

The effort has often been made to answer the questions concerning the motives that make people follow the media, and from time to time reference was made to the types of content, the satisfaction that one expects and receives and how the consequences of the attention given to communication means are used. A series of gratifications, satisfactions and uses with some degree of regularity and structural predictability has emerged (Mc Quail 1988). It appears therefore that information satisfies the desire to search for relevant events and conditions, as well as for suggestions on selected subjects and/or practical opinions to make decisions. Curiosity and general interests are also satisfied, together with the wish for self-taught learning and education, which lead to the security offered by knowledge. The media message also leads to strengthened personal identity, integration and social integration since through it subjects of conversation, interaction and entertainment are acquired. As for the cultural quality of information, related to the entertainment and not informational content, despite the fact that the opinion is generally held that some types of culture are better than others, and that a scarce culture is better than a total lack of it, it is less easy to find consensus on the criteria to make the necessary distinctions (Mc Quail, 1988).

Media prefer news on great, clear and unambiguous events occurring during the 24 hours, events that are easy to record, describe and recognize and that have a commonly accepted importance. Media have a liking for events that meet pre-existing expectations of

the audience, i.e., a consonance with news of the past and a tendency for what is unexpected or new<sup>14</sup>.

The public has an active role in communication. For this reason, the receiver of the message should be a specialist or at least an informed person. Communication in fact is valid if the principle of cooperation between the two communicators exists.

An example of misunderstanding – maybe in bad faith – that was largely echoed in many specialized magazines all over the world, is the interview given by scientist Ames to the American TV program “60 minutes”, broadcast in 1989. The scientist accused the producer and the interviewer to have blatantly distorted the presented scientific arguments, dishonestly discrediting him. In the letter sent by Ames to scientific magazines, it is written that the program treated in an incompetent way a scientific subject. It was the scientist’s opinion that the program mistreated in such a disproportionate way the presented scientific subject to give a greater credibility to a previous report on Alar, a report that was scientifically insufficient, instead of searching for the truth. The gist of the dissertation in the interview was that the fear for cancer, caused by Alar’s degradation products, was based on a wrongful interpretation of the meaning of the proofs of cancer in animals. After a presentation of the thesis, Ames listed the most blatantly misunderstood items such as the contestation of the statement that the scientist allegedly made “stating” that 99.9% of all carcinogens come from natural food. This obviously wrong statement has never been made by the scientist, but by the interviewers. What had been said was that 99.9% of ingested chemical products are natural. At the end of his letter, the American scientist noted that there are many important cancer-related subjects that “60 minutes” could have treated without “making apple farmers go bankrupt and dishonestly convincing the public that the apples produced by them were toxic” (Ames, 1992).

A similar incidence happened to Rita Levi Montalcini, who on 16 October 1990 spoke at a TV program on drugs, and saw some of her statements interpreted as the affirmation of the existence of a link between genetic disposition and drug dependency, which instead has no proven genetic factor. The scientist obtained airtime on the following day during the evening news, where she clarified the wrong interpretation of her statement which had already been a cause for discussion in the Italian newspapers. Despite the public clarification, some people still believe – and publicly declare it – that they understood right, advocating a possible genetic factor. This happens because not all those who received the first piece of information have then heard the rectified piece of counter-information. The advantage given to the Italian scientist compared to Ames is well apparent. In fact, she spoke to the large public on both occasions, while the American scientist was able to “correct” his interview only within a specialized sector and therefore towards a public that already knew the real message. This shows how specialty subjects are hard to understand even by educated people, such as journalists and are also easy to manipulate since they are adapted to preconceived mental schemes, if not deceitfully modified.

Examples of misunderstanding or poor professionalism can also be found in the emphasis given by the Italian press to the study conducted by the Academy of Sciences on alternative agriculture, defined as a group of farming methods that do not cause environmental damage. According to the accounts given by major Italian newspapers, the Academy has allegedly found that the farms in question have been able to reach

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<sup>14</sup> To be well-informed is a characteristic of the opinion leader.

production outputs that do not vary significantly from those obtained with intensive cultivation methods. Based on this, the study group allegedly concluded that chemicals-free farming is a guaranteed successful system, already experimented and ready-to-use. From the examination of the document produced by the Academy, read in its entirety, different information emerges. First of all, the statement or suggestion to give up pesticides has never been made. Moreover, the document states that profitability has not been proven yet and points to the need to carry on research and experimentation, even if it clearly states that the shift towards methods that are more environmentally-friendly is based not so much on the expectation of important discoveries, as on a correct use of the already available methods.

Even if the importance of transmitting scientific information to the public is recognized, attention has been paid only recently to the reliability and accuracy of scientific information spread by the mass media. The first research case concerns the presentation of medical discoveries and it was found that 24% of interviewed people considered mass communication means as the major source for latest findings (O'Keefe, 1970). Also other researches carried out on a sample of scientists whose works had been published in that period defined the type of most frequent errors in newspapers articles. Finally, the variables that supposedly affect the accuracy in the scientific sections of newspapers were selected. The newspapers selected for the research were 167, subdivided into four categories, based on their circulation. A scientific article was defined as a journalistic report of empirical results obtained checking experiments and observations. To be included in the study, an article should also deal with preliminary information received by a researcher or researchers, the report and the results must be new and the quoted sources must be identified by their name or that of the main researchers and finally the article must give enough information on the address of the source. These are some of the main detected errors listed by frequency:

- Omission of relevant information on the study method and/or relevant information on the results
- Researcher reduced in importance and/or omission of restrictive conditions of results
- Continuity with other previous researches ignored
- Too short stories
- Omission of relevant information on inferences made and/or exaggerated causal inferences
- Emphasis on the non-scientific aspects of the study
- Speculations treated like facts and/or facts treated like speculations
- Definitions of technical terms omitted or wrong
- Value of the contribution overly emphasized or underestimated
- Imprecise and/or incorrect title
- Comic vein in scientific reports
- Exaggerated or discounted applicability of the discovery

Questions have been asked on how scientists view scientific divulgation. These are the findings:

- Scientific reports have been really important for the public and, although to a smaller extent, also for other scientists

- The importance and emphasis given by newspapers to scientific reports is considered exaggerated and oftentimes titles that are essential for the comprehension of the results are omitted
- Frequent errors and short articles
- Scientific news is often reported in a comic vein.

#### **4.5 Divulcation in newspapers: information or news?**

To recount science is one of objectives of our cultural world. Divulging knowledge contributes to the evolution of an informed society in order to make it aware of advantages, acceptable or deniable risks and the responsibilities implied by scientific progress.

Scientific divulgation is a serious commitment in today's world where individuals live immersed in a unceasingly and rapidly evolving scientific and technological reality, of which they must be able understand at least a few basic aspects to avoid being culturally and psychologically overwhelmed. In this scenario, therefore it is necessary to take care of the promotion of the use of scientific and technological information on the part of several users, involving for this reason mass media and communications means that can reach a vast and homogeneous portion of the population.

In contemporary society – at least initially – most people do not have the possibility to obtain a factual and direct knowledge of the main applications of the technological progress, and can only absorb what is transmitted by social information agencies, which make known a universe that otherwise would remain unknowable (Zamperini, Gius, Collini, 1999).

Journalistic information is gathered from the top of the agencies that seek news and when it gets to communications bodies, it undergoes a selection and elaboration process (*ibidem*). Selection is the substance of the information process and consists of the choice and related cancellation of events giving to those selected the possibility to be known. The presence of a piece of news, obtained through a careful selection, is always the result of the encounter between the fact itself and the personal reprocessing of the broadcaster that decides to make it public. The elaboration process is the revision of the news in a format that follows in a stereotyped way the categories prefixed by ideology and the mainstream of that particular newspaper. Such preset schemes are useful to the producer and consumer, since they represent a reading a comprehension key for most mass production, since they model the very perception of reality (Tessarolo, 1999). Selection and elaboration of the news, therefore, are *per se* indicators of implicit judgments and productive practices, and interpretation inevitably twists reality. Sometimes the descriptions made by the press may be false and misleading and create twisted images of the outside world, although they do not always deliberately do so. Press accounts, as well as scientific divulgation in newspapers, are subject to an inevitable decontextualization and recontextualization (Tessarolo, 1991). Only the core of the news is extrapolated – more interesting and appealing – and reported in the newspapers, cleansed of its original trimmings. Theories, conceptual models and references are removed from the theoretical and empirical context in which they have been applied and developed, to be later placed in a different framework, i.e., inside the format of the divulgation product (Petrella, 1998).

Divulgence selects therefore from a set of theses circulating in the technical-scientific world, theory fragments, partial results, real or future applications to cut and reorganize them based upon its objectives, disciplinary constructs, preliminary knowledge and interest of the recipients as well as the specific form required by the broadcasting (Schiele, 1986). Information construction experiences a reprocessing that slants and modifies its original meaning. Based on the study of scientific divulgation phenomena within the psychosocial sector, it has emerged how the common sense is continually transformed by the information that comes from the diffusion of science and technology and how at the same time a new social consensus is being built around scientific theories and recent discoveries (Moscovici, Hewstone, 1989). Press and TV contribute in this way to the construction of the social representations relative to major current topics through *ad hoc* information strategies, selecting the topics to be brought to the public's attention (Wolf, 1985). The environment, pollution, recycling, medically-assisted procreation therefore become social phenomena also thanks to the press.

It is fair to say that all communication means are not neutral and the persuasion and manipulation strategies subtly and inevitably live in any information body and, as mentioned throughout this chapter, scientific divulgation is no exception to this practice which is treated just like any other type of news and forced to be subject to the rules of sensationalism. The various forms of influence directly or indirectly exerted by mass communication means on the individuals, groups and social systems – and that concerns psychology – are phenomena that arouse a great interest in sociology for their effect on society (Tessarolo, 1999).

Media are not an isolated universe but rather a system belonging to a set of social practices – of which all possible interrelations should be considered – which led to a proliferation of theories on the effects.

It is common opinion that the greater the accord among all media in treating a given subject, the greater the impact produced by it also in terms of attitudes and behaviors (Theory of the Spiral of Silence). Media are attributed the ability to influence public opinion giving greater or smaller importance to a given topic (Agenda Setting), and to influence perception of reality, providing a universe of symbols, beliefs, attitudes, roles and well-defined behavioral models (Theory of Cultivation). All history prior to the discovery of the Agenda Setting and the Spiral of Silence (Noelle-Neuman, 1973) therefore can be summed up in the defeat of the hypothesis of the great power of media and in the consequent success of the theory of limited effects.

“We are experiencing today a phase of reconsideration of the influencing power of the media and in addition the study of the effects has shifted its attention towards long-term influences, especially those exerted no longer on a single individual but on the entire social system or parts thereof” (Wolf, 1992,). The awareness has been acquired that “communications do not directly mediate explicit behaviors, but they rather tend to influence the way in which recipients organize their view of the surrounding environment” (Roberts, 1972). In other words, influence is not direct, but works somehow like barometric pressure that envelopes us without us realizing it.

Shifts in conduct, as well as changes in opinions, values, behaviors and attitudes are no longer investigated, but rather the cognitive effect. The influence on the system exerted by the knowledge that an individual forms as a result of the use of media is observed. The temporal framework also changes. The temporal effects linked to the

exposure to a single message are no longer examined, but the cumulative effects, settling over time (Wolf, 1985). One might say that the interest of the media has shifted towards a "media" culture, a term introduced by Hans Mattias Keplinger (1975), as an environment created by the media that affects the cognitive system of the individuals (social representations), other social subgroups and the entire social system.

In particular, in the relation between the repetitive and unceasingly action of the media and all the knowledge on the social reality of a single individual, three factors should be considered, which are *cumulation*, *consonance* and *ubiquity*.

- *Cumulation* is the repetitiveness of information on a given topic, which makes it become relevant and present in the media agenda and, consequently, in the public agenda (Dearing, Rogers 1996).
- *Consonance* is the similarity among the media in treating "issues" as a result of numerous factors.
- *Ubiquity* is related to the concept of "opinion climate", where the public ends up knowing what is publicly known.

What media make visible in the world, becomes the very world of individuals. This hints at the enormous indirect power of the media. It appears that the media culture intertwines with the subjective world of the individuals to the point that it is no longer possible to tell them apart. "The more we study the issue, the harder it gets to assess the effects of communication means (...). The influence of the communication means is mostly unconscious. People are not able to make inquiries as to what goes on, but rather mix their direct perceptions with the perceptions seen through the "eyes" of the communication means as in a continuum, which seems to originate from their thoughts and experiences" (Noelle-Neumann, 1973).

#### **4.6 Divulcation and trends of mass communication**

Marketing, with special reference to social aspects, has recently shown interest in communication. The so-called social marketing can in fact concern a large variety of problems and seems to be appropriate for specific situations such as for example the divulgation of new information or new practices on which the public needs to be informed to improve their life quality. The most difficult problems have been found in developing countries, where basic situations, such as boiling water, have become topics of difficult persuasion. Also in industrialized countries social marketing experts often have to divulge new information obtained from scientific research, like for example significant changes in the healthcare sector (e.g., hypertension treatment), children immunization, cancer prevention and diets. An effective although rather lengthy way is to give scientific, healthcare, ecologic information during the compulsory education period. This approach however is rather lengthy and leaves aside a large part of the adult population. It is therefore necessary to transmit information more widely and rapidly facilitating the process with low prices and incentives that encourage and strengthen new behaviors. An experiment has been conducted through an information campaign on the prevention of heart diseases, with the purpose to assess the effectiveness of social marketing. The research took place in three communities. The first one was the target of a mass media campaign, the second received a mass media campaign plus personal instructions addressed to high-risk individuals, while the third received no treatment. The vast

campaigns carried out towards the first two communities consisted of radio and TV spots, medical and nutrition sections in local newspapers, information pamphlets, calendars and posters on walls and public transportation vehicles. In the end, the observation was made that the program did produce long-term changes in habits when using the mass media. The most significant results were obtained with the joint use of mass media and direct instructions.

Among scientific information with social purpose there are also pollution-related issues. Pollution can also be characterized as a behavioral problem which includes several elements such as the comprehension of the processes in question, the real concern for the environment and the wish to “do something”. Many magazines report on scientific or technological researches carried out in specific sectors, such as waste disposal or energy production. Researches dealing with waste-disposal issues from a social sciences or behavioral perspective are rare. On the other hand, the magazines that do so tend to deal with the issue in generic terms and few studies have been conducted for example on the attitudes towards waste disposal, whose problems are considered technical and not behavioral, so much that even though it is easier and less costly to save rather than produce energy, and even though production has the effect of polluting the environment (Gibson, Chandler, 1981), administrators prefer technological solutions. This means that the scientific prestige of technicians is higher than that of social scholars. It should not be forgotten however that even inside scientific disciplines both strong and weak positions exist (Sjoberg, 1988), even though such ambiguous attitude counteracts the effort to solve problems. Sjoberg includes among possible solutions a direct action on behaviors through a system of prizes and punishments, a method that is however rejected for moral reasons because considered manipulative, even though codifications in the form of law do exist. Cognitive psychology shows, analyzing incompetent scientists, that the human ability to treat information is gravely limited. The typical study by Miller (1956) on the “magic number seven” showed that people are rarely able to retain more than seven mental units at the same time in activities of the short-term memory. Other studies (Slovic et al., 1971) showed that people rarely retain more than five informational factors even though they are experts. As individuals acquire new information, they become more self-confident even though information tends to exceed very rapidly the limits of their mental capacity thus lowering judgment quality.

The second possible solution is personal experience, which is often useful to acquire expert knowledge (Anderson, 1981). Sometimes it can be harmful and dangerous since it gives too much credit to factors that are mere superstitions (Chapman, Chapman, 1969). Expert knowledge is useful when it is necessary to quickly recognize complex structures. Experts however have a hard time in explaining their approach method, so much that one might agree with Garfinkel when he states that people “expect that everything would go on as usual” underestimating the possibility of rapid transformation, or exponential growth, due to new knowledge. The first impression is what counts most, coupled with the tendency to “take wishes for reality”. Happy occurrences are considered probable and the others improbable. Cognitive psychology has also shown that distortions exist that can be exclusively attributed to cognitive factors, of which the most famous are three types of “heuristics”: representativeness, accessibility and anchorage (Sjoberg, 1988).

In representativeness, a subject attributes too much importance to the particulars of a case without keeping into account general contextual data and information. Slow and

progressive transformations and their effects appear only later even though they are caused by pollution (such as for example cancer).

Accessibility implies instead a tendency to exaggerate the importance of that which is new and sensational and draws the attention, often due to detailed accounts of the media. Effects are less clear; in fact, in a country where the media keep a close watch on the signs of environmental degradation, the inhabitants are aware of this problem. However, the accessibility to this kind of information may distract them from other important events, shifting their attention towards those aspects that politically are less important.

Representativeness and accessibility may excessively emphasize facts scarcely known by direct experience to the detriment of more abstract knowledge even if available to everyone. It should be reminded that researches on the inference methods show that people are more interested in what their neighbors tell than in real facts, and that a negative experience told by a friend is enough to deny the validity of statistical data proving such experience wrong (Nisbett, Ross, 1989).

Finally, anchorage consists of basing one's judgments on a prefixed value exerting an influence on other judgments. In the theory of information integration, results showed that original opinions rarely change ("primacy" effect) even in the face of the evidence. This confirms that the world must be safe and stable for the subject that tends to overlook even threatening information and also that individuals act as "theoreticians" each time they deal with a piece of information coming from the material and social world. In fact, first-found information serves as raw material to make inferences on what the object is, and such inferences bias the interpretation being given on the following information. Individuals do not challenge their theories, not even when they realize the inconsistencies of later information with original data (Jones, Goethols, 1972; Nisbett, Ross, 1989).

Judgment is also influenced by the way problems are presented (Kahneman et al., 1982). In relation to identical options, people may have different opinions depending on whether these are presented in terms of profits or losses. The perception of globality implies another very important illusion, scenarios are considered more probable than their components and, even if this is assumed from a regulatory standpoint, subjects are very impressed by consistent "scenarios" that seem to work as informal theories and that falsify the treatment of new information. Moreover, negative information tends to translate into a whole positive expression when the new information is less negative than the initial impression. If the new information is positive, the positive aspects must be really important to improve the initial impression since subjects tend to relate everything to an average level of normality. Another elements of the distortion of information are an exaggerated confidence in one's self. Individuals as "scientists" believe that they know all the answers to new information. Under the effect of emotions, moreover, individuals tend to see things in a more restricted way, since they tend to take into account a lower number of elements.

The role of cognitive structures of social and political decisions is unknown, although the little available knowledge show the vulnerability of human rationality in these circumstances (Janis, 1972). A group making a decision when it feels threatened has a tendency to slant reality and get confused, "taking wishes for reality". Finally, it seems that an early interest in technology leads to consider weak the risks for the environment.

Even if politicians tend to see most social problems as information problems, everyone knows for example that smoking is not good, even though they keep doing it.

People declare to be in favor of environmental protection, but only 10.15% of them enact the measures proposed by a recycling policy (Stern, Oskap, 1987)<sup>15</sup>. Media campaigns aiming at modifying the behavior of the public in general have only a marginal effect (Mc Guire,1985) and do not really modify behaviors, especially if the new behaviors imply sacrifices or renunciations (Syme et al, 1987)<sup>16</sup>.

Some important questions can be posed at this point in view of an information policy: Does a demand for information really exist and if so of what kind? Do people believe that their individual actions have no far-reaching consequences? What are the priorities of the audience?

Regarding the risks, media can in no way believe that only a lack of information exists. Chernobyl showed that information was even too much, even though some information on how to protect from radiations was hard to find and it was difficult to understand who to trust, since statements were inconsistent.

The alleged impartiality claimed by experts does not withstand an empirical analysis. In fact, even they have values, and therefore their judgment is not always independent. Indeed, it seems that experts show an interest in extremely small sectors so that their knowledge is by definition subtle and the possibility that two experts come to the same conclusion is really low. On the other hand, if all agreed on a given topic there would not be a debate and no need for expert opinions. Based upon some researches, it seems that scientists express more differentiated opinions, in their field of specialization, than common people do (Hayes-Roth,1977). To have an expert knowledge generally goes with a reduced ability to generalize and with a poor ability to transmit knowledge in the sense of ability to teach. Information policy in conclusion must take into account that it is difficult to influence attitudes through information campaigns carried out through the mass media and that practical personal experience and the exchange of interpersonal opinions play a critical role.

## **5. The effects of technical-scientific communications**

The cognitive structure of individuals makes it hard to inform not just through mass communication means, but also at an interpersonal and cultural level. Mass communication however also presents the additional difficulty of having a centralized structure and attributable to various converging factors.

A mathematical piece of information can be communicated with no misunderstanding and very little loss, but it cannot be transmitted in its essential form to people that do not have an adequate education and that cannot integrate it with the knowledge they have. Those who do not have a mathematical education will experience a total loss of information. Rigorous and scientific information that might be transmitted for example in the economic field is of this kind. Even if individuals are not competent enough to make considerations and draw conclusions, they may have some ideas in relation to the economic sector. Education of individuals includes a vast array of situations, from those who understand, to those who have little understanding. Information therefore can be given at different levels, and it is wrong to believe that when received through the opinion,

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<sup>15</sup> It is interesting to consider the fact that such low percentage has been recorded all over Europe.

<sup>16</sup> Let us take the seat belts example whose use has increased only after it has become mandatory by effect of the law. The example is taken from Sjoberg, but it also applies to Italy.

it is at the same level of scientific information. This is not the case. There are two communication forms with different schemes, i.e., structural and existential. In scientific and technical information, the usually applied scheme depends on a pursuit for a scientific analysis of what is communication and information and presents itself as structural. The second scheme is the information on current life, opinions, sentiments, ideas and it is therefore existential. If an ordinary person listens to a political speech, overall he/she knows what it is about, even though he/she does not understand everything. When information is technical or scientific, divulgation, even if it is well presented from an educational standpoint, does not sufficiently inform its receivers because the message is incomplete and belongs to a context that is different from the original one. Therefore, information reaching the individuals can be more or less received and certainly will not be entirely and completely received.

We can think of a scale where the continuous flow of information shows at the top the received information, as it has been emitted, and at the bottom completely "burnt" information, with a continuum of different positions in between. Information is qualitatively different and its reception depends on whether its qualification corresponds or not to that of the recipients. It is a mistake to believe that a message is similar to another (Ellul, 1989). It has been proved (Flores D'Arcais, 1988) that even apparently similar pieces of information, such as those regarding traffic conditions and weather forecasts, pose several difficulties. In a society differentiated by organizational competencies and specialty structures, the problem often arises of how to transmit information to a vast audience of users with a poor knowledge of the sector in question. User's manuals of devices, warnings on the use of drugs and the transmission of technical data are typical situations where a group of known elements and information must be transmitted outside the close circle of specialists using a comprehensible language for non-experts. Problems arise concerning the adaptation of the poor knowledge of users to a complex system of new knowledge, carried by specialty languages. Researchers have also investigated on which information is forgotten first and which misinterpretations occur. According to findings, the reproduction of a message is better if this is formulated in a redundant way. Moreover, by grouping information in congruent areas, selective listening is fostered and clarity is higher, when measurement values are indicated as percentages.

In order to be read, newspapers, or TV news, must skillfully "show" its own pieces of news and tell "a tone higher" really occurred facts. There are also deontological problems, which focus on the boundaries within which a newspaper is allowed to manipulate real facts to make them more agreeable and appealing, and practical problems relative to the readers, which determine up to which point readers will be willing to accept the transformation of real events that might recall images of future collective dangers. Oftentimes facts are "denatured" as shown by the titles of certain articles. An outdated although meaningful example concerns nuclear fission which appeared in "Il corriere lombardo" in the second post-war period: "Let sleeping atoms lie". In such title the beliefs of the reporter as well as the public are implied. In other articles a new contraceptive method was presented with a photograph of a woman showing six "matches".

For many decades psychologists have studied the influence and the effects of mass communications on the public. Researches stress in particular the influence of such means in creating prejudices and beliefs. Programs conducted in the Seventies denounced the disastrous consequences – unexpected, although parallel to the industrialization

process – caused by people’s awareness of water pollution in wells, rivers, lakes and the sea. The possible pollution of the air in cities and the countryside has also been learned and people have been informed on the manipulation of harmful chemistry which comes into contact with human beings through colorings of debatable safety, insidious additives, artificial feedstuff, detergents, pesticides, etc, used by the food industry. In 1990 information was already correct and maybe appropriate to a population prepared to the big shock. The effects produced by the piece of news that the world “after millions of years has been seriously messed up” caused intense stir, rage but most of all fear, which caused the generalization and exaggeration of stereotypes and unjustified platitudes. The apocalyptic description of nuclear energy and chemical pollution alarmed the population on all activities of science and technology, without however determining a renunciation of the enjoyed conveniences, even if some of them may come from polluting elements.

On the day of the Seveso disaster, there were rumors that the wave of dioxin was moving towards Milan and the near-by Switzerland. Produce coming from Lombardy was sent back. The ecological disaster that occurred in Seveso was caused by a leak of dioxin from the Icmesa. It was an event that, for its tragic consequences on the population and for the attention that it received, made real and not only a possibility the industrial pollution problem, translating into a fact fears, dangers and anxiety. The problem inevitably shifts towards the acceptability of industrial development, the validity of the current model of technological and scientific development. The pollution and, more in general, the ecological problem touches and stirs up anxieties and deep fears of death and damage, and has a very strong emotional aspect. In the eyes of the public opinion, thanks to a sort of halo effect, pollution has become a symbol of a much more complex and pervasive reality of which it is only one of the components. Researches on the consequences of natural disasters (Quadrio,1989) have found that the level of anxiety in the face of industrial pollution phenomena decreases when there is a high level of information that leads to the ability to make suggestions. When the Seveso fact occurred (May 1976) there was a tendency to become aware of the problem and therefore inquiries on the sources of pollution in Italy were conducted. Despite this, the most important debate, i.e., the debate on decontamination, remained confined to council chambers, denying to the interested parties the possibility to “manage” their existence. It was easy therefore to impose the lawfulness of poison, disserting on the acceptability of a substance that the science declares intolerable at any dosage. Such situation repeats itself in relation to atrazine in the water, whose admissible values have been increased by the law in order to face contingent situations. In this way the health of the population becomes less important than a technical issue.

The problem of the social information policy re-emerged one more time in 1987 with Chernobyl. Mass media, due to a lack of specific information channels, had to perform the task of major reference point for the citizens, for central and local authorities that had to provide to citizens the information on the measures to be taken and for the official and dissident scientists that were consulted (Liberatore, 1990). The fundamental role played by the media, in the case of Chernobyl, caused a disaster “constructed” by the media themselves. Experts disagreed on fundamental issues, such as the hazardousness of radiation thresholds called “small doses”, and even on the definition of “small dose”, and were not able to determine such threshold. Media reported all the different opinions of experts and politicians, who were accused of causing confusion, alarm and distrust towards

science and progress. Media however only made known, reporting them, scientific controversies and political conflicts. The model of a science that keeps everything under control collapsed, and many newspapers and TV networks transmitted inexact and at times false information on what was going on in the nuclear plant. Journalists and editors finished their usual work, selecting news, opinions of experts and politicians to be highlighted or excluded, based on political trends, negotiability criteria of the news as well as external constrictions. There was a climate of full and dangerous freedom and confusion.

From the analysis of how a certain number of newspapers have covered the Chernobyl disaster, it emerged that not even the titles of the articles were clear and that most of them were written in a metaphorical style. The only "honest" articles towards readers were those that afforded the advantage of an immediate comprehensibility without being sensational<sup>17</sup>. There were also newspapers that took care in explaining in real terms the atomic issue, carrying out far-reaching inquiries, using a clear and comprehensible language analyzing the differences existing between the blown out plant and those built in Italy. Almost no newspaper however was concerned with explaining to people the core issues of the nuclear dilemma. In this sector it is difficult to retrieve data which are not always easily available, to correctly interpret them and divulge them using a comprehensible language. However, the fact that the task at hand is difficult is no good reason to avoid it. No one said for example that the available data are not certain because nuclear technologies are in these case relatively new and that in these case it is the experience that shapes knowledge.

In short, in the Chernobyl case, *super partes* inquiries, explanations and reports were lacking. The proof of a lack of a close influence relationship between press and readers was given by the referendum on nuclear energy in 1987. The press did not agree with the opinion expressed by the ballot box, a fact whose explanation may be sought in the manipulativity of the public. In the case about nuclear energy, readers had already made up their mind, scared by pollution, confused by the press and TV information that dealt with the issue mainly from a political standpoint. The trust relationship between readers and public therefore was lacking. In other words, the nuclear problem was not covered from a scientific standpoint, but an emotional one, not only due to ignorance but also and foremost because political interests have been projected onto it (Fossi, 1989).

Mass communication means prove inadequate to decode, describe and interpret the havocs wreaking the world<sup>18</sup>. Also regarding the AIDS, drugs, ozone hole and mucilage, communication means have proven inadequate to report, describe and explain what happens, highlighting the uncertainty that to this regard also affects science. To be able to understand natural disasters, we would need statistics, previous time series which however are not available. No one is able to tell for instance if the ozone hole is or not a cyclic phenomenon. When a catastrophe strikes, many give rise to debates against hypothetical adversaries and newspapers add to the confusion and disinformation (Zucconi, 1989). Such confusion is often also due to sensational scoops such as announced catastrophes. An example of this is given by a wrong and incomplete reading by some scientific divulgators

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<sup>17</sup> The only newspaper that could afford being clear was "Il Sole 24 Ore" which basically has no competitors, since it is an economic journal (Fossi, 1989, p. 327).

<sup>18</sup> The Chernobyl disaster was not the only case certainly hard to communicate, just like for example the air pollution problem in Milan, where the first prevention measures were taken in 1989, and of all those facts that show the split between new events and communication.

on global warming. Their articles featured phrases like: "All coastal cities in a few decades will be submerged by the sea (..) The cause is global warming due to the greenhouse effect". Going from one quotation to another, it was found that the increase of 4-6 °C in the global temperature over the first half of the next century is an opinion based on an article published in 1977 in an American physics magazine. The contribution on the same subject published in 1989, by two American geophysicians who measured the extent of infrared radiations trapped in earthly gases and clouds, has not been proposed again by each and every journalist, since it did not make disastrous predictions, but it simply was a serious contribution. It will not hit the headlines until "we agree that telling a false or construed fact is less interesting than presenting an idea that really works" (Vacca,1990, p.26).

At other times confusion and panic are caused by news leaks, just like in the case of a group of German specialists responsible for the safety of nuclear reactors. Such technicians conducted an official estimate of the vastness of biological problems connected with contamination sources. Their report became public due to indiscretions. As a matter of fact, given the seriousness of the scenarios depicted by it, the report was to remain confidential and not be transmitted to the public authorities. This is a very common practice which should serve, in the opinion of those concerned, to avoid alarm among the public opinion and therefore disturbance of the peace which is indispensable to assess problems. The confidential report, too catastrophic to be made public, in reality is not exaggeratedly pessimistic because for example the effects of radioactive material ingested through the food have been totally overlooked. Only in 1988 the EEC adopted a directive on the information to the population on the measures to be taken to protect human health.

### **5.1. Diffusion vs. divulgation**

In modern world, where the societal relationships are based on the complex structures of a fragmented society, it is necessary to spread knowledge. The diffusion of scientific knowledge is possible only if culture is distributed at a medium-high level and therefore if a scholastic scientific education is pursued. In today's society, this fact seems to be of secondary importance since mass media are attributed – rightly or wrongly – the ability to make available, to a large amount of people, knowledge which otherwise they would never access. In this way, the TV means is taken for an education tool, while in reality it is only a broadcasting means, sometimes trivialized, of knowledge. If educational programs are transmitted, this certainly means that there is a public following them. To evaluate the diffusion of the knowledge produced by the media one should assume that this latter presupposition is true and investigate on what happens. Scientific research, as far as it is concerned, makes sense if its results are publicized and to this regard two types of relevance can be stressed, the first being of a technical kind, or internal to the discipline, and the second external, or social. It is these two criteria that should determine the level of importance and legitimization of a scientific work. However, the type of publication to which scientists resort concerns first of all the scientific magazines and only in the case of special discoveries, TV broadcasting<sup>19</sup>. Internal relevance reflects on the significativeness of

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<sup>19</sup> Over the last few years, the cold fusion issue has been sponsored by mass communication means.

the empirical results, the external relevance tends to assess how useful knowing the results of the science is for the outsiders.

According to Livolsi, divulgation consists of a communication on communication problems that must be considered at a diffusion level, since the idea of those interested in scientific analyses and discoveries expands, and at a divulgation level, which presupposes a sort of communication model from top to bottom. In divulgation, a message with strongly innovative content and high theoretical relevance is simplified through the use of non-technical languages, suitable for a vast and inhomogeneous public with a low knowledge and only interested in the end value of a "discovery" and its possible consequences.

This does not keep into account that today there can be different message broadcasting centers and that the messages can be broadcast with different ends. Also the public of possible recipients is not homogeneous. Therefore instead of falling from the top, information spreads in a radial pattern since the sources reaching the audience are diverse (Livolsi, 1990). It should be remarked that there are no different culture levels but different cultures and different types of information. In diffusion, that which has been elaborated in a specialized sector is translated in comprehensible terms maintaining the same level of cultural information. Diffusion is therefore the correct version of divulgation and tends to reach a large audience. When diffusion is carried out by the researcher him/herself, he/she can run the risk of trivializing his/her work. The mass divulgator has always been an actor different from the subject producing, in an original and creative way, the message that for some reason must be divulged.

The structure of a diffusion program can be found in a program where a scientist is invited or whose host is a specialized journalist. In both cases the public is the TV audience with its lack of homogeneity. TV public is subject to a secondary orality, where the participative element lacks and therefore also the possibility of a direct contribution. The orality is however important for the knowledge and opinions being transmitted.

Environmental issues and the opinions that emerge about them, for example, constitute a fundamental point of current debates both in the scientific community and in the political and administrative context. Environmental perception has developed, which is viewed as a system of relations with which mankind and technologies must be compatible. Concepts like prevention, clean technologies and recycling are widely accepted. It is necessary therefore to divulge such new culture, make it evolve from the intuitive and emotional aspects into aspects that are rational and programmers of correct behaviors. For this reason it is necessary to stress the fundamental role of the school whose educational space cannot be filled in by a correct consideration of the relationship between the disciplines being taught and the overall cultural framework of society. School therefore must take on the task of ordering, making sense of and give a basis to what has been worked out in society. The school way is the longest although the safest way. This should not mean however that the already adult public cannot be, or try to be, educated to the scientific problems that interest it the most, such as healthcare and the environment. In the education of an adult person, mechanisms of resistance to persuasion, based on consistent "vaccination" methods, should be kept into account. It seems that "resistance" to persuasion is in relation to the vaccination and pre-treatment of the strategies of the message that seems to be counterproductive. Resistance to persuasion would be just an

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extension of the persuasion process and therefore an already happened (negative) persuasion (Miller, Burgoon, 1979). It would be therefore useful that initial persuasion be provided by scholastic learning which would lead to the activation of the counter-argument in order to make scarcely considerable factors of violation or satisfaction of the expectations of appropriate behavior and the context in which persuasive communication is introduced (Festinger, 1971).

In order to safeguard the environment, cultural goods, etc., the public demands to be educated also through informational campaigns. The strategies of social campaigns must have a few criteria based on the type of audience and on the object of the campaign (Dervin, 1990). Models should be based on the assumption that the information is true and consider how much individuals already know about the subject. A piece of information of the "construction model" kind is appropriate to certain communication situations, more than an information model as "description". This model presupposes the information as a truth value, as a knowledge that can be verified in its relationships with reality and that can be separated from the observers. The information model as construction, instead, presupposes that the information comes from the observations relating to the product and cannot be separated from the observer that has created it. From a communication standpoint, the information model as description implies the transmission of communication relations by a source that lacks specialized observers but that however takes on the responsibility of transmitting the information that people need. The receiver is described as a bucket where information can be deposited. It is an inappropriate model. Communication can be conceived not as a transmission, but as a dialogue and therefore collaboration.

Consensus is not liable to error and mass media tend to raise awareness and also knowledge through the agenda setting of the subject. However, when it comes to persuasion, and changes in behavior are caused, interpersonal communication is indispensable<sup>20</sup>. This implies substantial difficulties in the organization of social communication programs because, if interpersonal networks are not organized as well, mass communication is not very effective. It is not the subjects and relevant implications that lead communication to success and not even the belief that technological means, such as TV, can be potential substitutes for teachers. Some researches show that a message is rarely learned if it is mainly of a technological origin. Mass media are very important for the cognitive scene, but the interpersonal channel is more decisive in the persuasive structure in the decision-innovation process (Hornik, 1990). The unmistakability of this statement rests on the fact that interpersonal channels offer a circular communication, and therefore an immediate exchange and control on the effect of communication, and that interpersonal contacts occur between alike persons, and therefore credible, with the consequence that also their messages will be credible. Finally, the interpersonal channel averts selective exposure, since it is easier to pay attention to a message within direct relationships between subjects, than through the media.

Mass media play a relevant role in the diffusion of processes due to the amplitude of the audience and the vast and efficient diffusion of the new information (Hornik, 1990), as well as in the attention and minimization of the distortion of messages. However, even if

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<sup>20</sup> The American model, theorized by Pye (1963), does not include an intermediate communication level.

the usefulness of mass communication is universally accepted, the actual diffusion of messages, and therefore of persuasion, mainly occurs at an interpersonal level. The results reached by the mass media must be validated and confirmed by the influential people (Katz, Lazarsfeld, 1968). Some criticism to this theory is based on the similarity that doubts interpersonal credibility compared to media credibility, on the social support that is indispensable in order to accept new practices and that does not necessarily turn to influential people, and on interpersonal communications that naturally spread without paid people incrementing it<sup>21</sup>. Moreover, also resistance to innovation should be taken into account, whereby if an individual draws a benefit from the solution of the problems, the information will be independently accepted by the source that has carried it. Finally, it should be considered that competition between channels is debatable and it is particularly apparent in developing countries, where cultural communication means lack. The problem however concerns not so much the channel preference as which channel can be practically used.

Also the fact that mass media play a social exchange role that enables individuals to become on their turn a reliable source of information should not be underestimated.

## 5.2 Experts and incompetents

Conceptualization of technological risks must be subject to the analysis carried out according to traditional scientific parameters, and not just in terms of prediction and even in terms of description. Such tirade moreover brings to the fore the issue of the relationship between specialized competence and inexpert competence (Wynne, 1996). The first to study the risk approach were Luhmann (1989; 1993), who elaborated it within the increasingly more refined framework of his systems theory, Beck (1992; 1995) and Giddens (1990; 1991), who closely relates it to the theory of modernity, thus receiving a much wider consensus (Pellizzoni, 2000).

The issue of technocracy and crisis of the trust relationship between science and society, between experts and incompetents, expresses other positions that are different from those of Giddens and Beck. The trust towards the expertise in fact would be a distinctive trait of late modernity that reinforces the structural ambivalence of the relationship between scientists and incompetents (Wynne 1996).

The comparison between incompetent knowledge and expert knowledge has a political and cognitive value, since it can improve knowledge. Local communities in particular should be legitimized to participate in discussion, not just in the name of a democratic principle, but because they have a specific competence, a different cognitive knowledge that cannot be substituted with that of experts. Those who have lived for years in a given place, who are directly involved in a certain problem, might be able to catch aspects that experts overlook and give them greater emphasis than that attributed by technicians when they apply to each single case their general and abstract knowledge. The expansion of the *peer community* implies the expansion of relevant facts and the extension of *peer communities* and relevant facts is necessary in order for science to offer a valid support to decision-making.

Communication between social parties is very important so that experts and

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<sup>21</sup> An agent, even if paid, can be an expert and therefore credible.

ordinary people may meet and join their knowledge and understand each other. The experts should manage to make people become aware of the moral implications of technical choices, to be able to enhance all ethical-cognitive horizons. The problem is that knowledge disparity excludes from the democratic debate a few subjects: the disparity in the decisional power connected with the supremacy of science excludes the potential contribution of individuals who are neither technicians nor scientists. Experts know *more* than incompetents in the sense that they know *different things*. In the first case, scientific knowledge is the only form of valid knowledge. The problem is that it is ill-distributed. In the second case, scientific knowledge appears as one of the various possible forms of knowledge, of which some are legitimate and others are not. These cannot contribute to direct decisions. Knowledge is power, even to impose onto others one's own goals and visions of the world.

It is therefore taken for granted that even if there is communication between experts and non-experts, such communication is asymmetrical because incompetents do not have things to say that are different from those of the experts. The goal of communication should not be equality between communicators. Incompetents do not "have to" reach the level of scientists, and experts that of incompetents. In reality, for example regarding technological risks, there is no foregone cognitive supremacy of experts, but instead sometimes local incompetents may know more about a subject<sup>22</sup>.

However, communication is the power to include or exclude from communication, because the legitimacy to participate in the discussion is not recognized. "Often delegitimization occurs through the disavowal of a competence, of the ability to fix a discussion. In other cases, the access is conditioned by requisites of a different kind (..)" (Pellizzoni, 2000, p. 235).

The definition of the competence necessary to discuss is linked to the hierarchization of cognitive systems where the formal aspect (earning a degree or belonging to a social class) sparks a chain of regulatory evaluations. Power means to establish not just who is entitled to speak but also how he/she can speak. Some studies (Wynne, 1996) have shown that technical-scientific knowledge is often simply unable to recognize the known contribution coming from incompetent knowledge. In order to be considered, the latter must adapt to the language and argumentative style of the former (Pellizzoni, 2000).

The talk of the other (the incompetent) has no meaning for those who know. To have meaning, it must agree and be just like that of the other. Otherness is not recognized,

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<sup>22</sup> Some sociologists tried to prove that the risk perceptions of ordinary people are based on knowledge sources that are as relevant and rational as the foundations of the evaluations of experts and scientists. Indeed, it is the evaluations of the latter that, not rarely, turn out to be grounded on "optimistic illusions on how the real world works" (Wynne 1989, 391). The theses of such authors tend to reject the alleged "irrationality" of the reaction to risk of the incompetents and to claim instead that what might look like "irrational" is actually based on well-grounded judgments. Wynne, for example compared the conviction of British farmers, according to whom herbicide 2,4,5-T (Agent Orange) damages the health, with the opposite contention of the producer and scientists, according to whom when "adequately used" the chemical product does not pose any danger. Wynne showed that the opinion of the farmers was founded on daily experience and in particular on the awareness that it is impossible oftentimes to prepare and use the herbicide strictly following the instructions of the producer, due to numerous and inevitable unpredictable events in their work. When assessing the risks of the herbicide, scientists based their evaluation of assumptions made in relation to an ideal world without considering that most farmers do not prepare and use the herbicide according to the instructions (Lupton, 2003, p. 118).

discussion is not allowed (Lyotard, 1981; Tessarolo, 2007). To deny to someone the right to speak and participate in a discussion means to deny the relevance of what he/she has to say, and to debase a certain subject means to deligitimate and exclude the interlocutor. The power of communication consists of the capacity of an argument to impose by its own will. It is the power of the best argument, of the soundest idea, most suitable for solving the problem, the most convincing explanation for everyone (Pellizzoni, 1999).

Arguments twisted in various ways can remain incomprehensible for ordinary people. This shows that the democratic potentials of information technologies may lead to more freedom and a faster information exchange, but also to a higher chance of manipulation. Information is hard to control, and the very fact to involve individuals in a formally equal dialogue may lead to an overestimation of one's own judgment ability.

Individuals seem to have difficulties in carrying out deduction operations, while they use often and incorrectly induction, generalizing individual cases. Moreover, they privilege the information coming from a few real cases, overlooking data on sample representativeness and, when faced with contradictory evidence, overestimate the information in agreement with their ideas, considering more serious and valid the researches confirming such ideas (with a tendency to persevere in their own convictions) (Volpato, 1996).

### **5.3 Social dilemmas**

The choice of individuals to unselfishly "participate" and behave in a useful way for the collectivity highlights the theories relative to social dilemmas, which are a category of situations where two or more parties must choose between personal and collective interest<sup>23</sup>. A decision that promotes personal interest (called defection) reduces the wellbeing of others. A decision that promotes collective interest (called collaboration) reduces personal wellbeing. A choice poses a dilemma, because if all parties were to take the road of personal interest, everyone would get worse as opposed to taking the socially responsible road. "The unilateral pursuit of what is best for each individual creates a situation where everyone suffers" (Batson et al., 1995).

It is fair to say that a social dilemma can be defined as a situation where:

- To behave in an anti-collective way (non-collaboration option) implies a better personal outcome than the collective way (collaboration option), irrespective of the choice of others.

- However, if most individuals choose the non-collaboration option, the outcome for all involved individuals is worse than if all or most people had chosen the collaboration option (Hamburger, 1979; Messick e Brewer, 1983).

The best known example of the second type of social dilemma is the so-called problem of the "common pasture" (Hardin 1968). An individual has a very strong personal incentive to restrain from participating in the realization of a given good, if he/she can in any case enjoy the benefits even if he/she behaves selfishly. In the case of the common

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<sup>23</sup> To this regard, it is important to define the concept of selfishness, which is a domineering behavior on the part of an individual. Acting like this, a better personal outcome is guaranteed without preoccupation for the others. To be selfish, in fact, is a prevailing choice. Selfishness produces in the long run an outcome that is less desirable than the outcome that would be obtained if the parties engaged together in cooperative behaviors (Parks and Komorita, 1992).

pasture, instead, each individual has a very strong incentive to exploit as much as he/she can a given common resource, making all others pay the cost of the inevitable lack of such resource. To this purpose, let us take a group of farmers who have a common pasture to let their cattle graze. Each farmer has an interest in having the highest possible number of animals graze on the common pasture. However, this implies that the land will soon be spoiled with not enough pasture left for everyone's cattle. Each farmer draws a personal advantage in increasing the number of his/her animals grazing on the common pasture, while the cost is born by all farmers. However, if all farmers were to reason like this and continue to let increasingly more animals graze on the common pasture, the collective outcome will be a rapid depletion of the pasture whose negative consequences will affect everyone.

The problem of "common pasture" is typical of situations like for example air pollution caused by the exhaustion fumes of automobiles. In fact, one might rationally calculate that the cost that he/she would have to bear as a result of the environmental pollution personally caused by him/her is lower than the cost that he/she would have to bear if he/she decided to reduce the use of the car, using public transportation or commuting to work with other colleagues in a car pool. At a collective level, the aggregation of similar, individually rational considerations and behaviors creates disadvantageous situations for everyone. In short, each individual acts within a system where one ends up harming him/herself.

This type of situations poses a question regarding the issue of collective action or decision: is collective or social rationality compatible with individual rationality? A collective decision should be ideal not just for collectivity but also for each single individual belonging to it, even if the two things sometimes clash with each other<sup>24</sup>.

#### **5.4 Trust as expectation**

The encounter between expert and non-expert leads to question again the trust issue. In the daily interactions of social actors, a series of expectations come into play that the individuals take for granted. These expectations are relative not just to past experiences but also to future ones, thus sparking a trust dimension. Trust in the social and natural world will continue to manifest as it always has up to this moment.

What happens however when the expectations taken for granted are shattered? The answer to this question can be found analyzing Schutz (1979), who in his studies on the stranger and veteran talks about how it is possible to identify what happens when the knowledge taken for granted suffers a crisis. In certain situations, in fact, social actors are forced to question their naïve trust in their knowledge system. Also Goffman analyzes the fiduciary constitution of daily life (Goffman, 1981). According to the American sociologist, social interaction is based on the mutual confidence of social actors. Each individual must present him/herself to others under a "normal" appearance, must continue to sustain his/her self-image to which he/she attached. Individuals feel that they have the moral right to rely on such normal appearances, which consequently also

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<sup>24</sup> Not always individual rationality is matched by social rationality because, even though individual preferences do not vary according to the order of votes, the collective result of votes depends instead on it.

become the usual and right appearances. Questioning normal appearances based on fiduciary expectations would generate suspicion and mistrust.

Expectations consist of a cognitive dimension and a moral dimension. The familiarity of daily world takes on the form of a regulatory order complied with by social actors. Those who doubt, who more or less intentionally break off this order must have particular reasons for it, or else they will be considered unreliable persons. Through a series of experiments, Garfinkel (1963) constructs inconsistent situations compared with the expectations that regulate the natural attitude of individuals. These experiments usually cause two types of reactions based on who incurs in the situation and who provokes it. Those who incur in the situations usually become outraged and ask for explanations, while those who provoke it feel embarrassed and most of the times feel relieved when the experiment is over. This means that the “normal” attitude is related to a special social status called by Garfinkel *bona fide* member status, i.e., those who show that they do not question the expectations taken for granted by collectivity. Individuals who do not comply with this common sense are defined eccentric, immoral, criminal, sick, etc. The rupture of obvious expectations is defined as a pathological behavior, incompetence or inability to know the world.

The analyses carried out so far show how it is possible to relate the trust concept to the expectations taken for granted by social actors. That which is familiar can be analyzed through different dimensions, more specifically in the following terms: a common sense universe rooted in culture that allows to interpret the social world; a whole of typified knowledge enough to achieve the goals of social actors; sharing of a backdrop knowledge that implies a sentiment of belonging to collectivity; a system of beliefs regarding values such as honesty, moral integrity, compliance with rules and personal reliability, which is a prerequisite condition in daily social relations. Such aspects make it possible, and are made possible by, a generalized and latent confidence between individuals. Only when such expectations are no longer enough to guarantee social relations the trust issue arises, intended as intentionally selected expectation. This may occur in particularly uncertain and risky situations, where a common regulatory orientation lacks and where rules are ambiguous and can be interpreted in various ways (Prandini, 1996).

Individuals may concede or trust for a large variety of reasons. Irrational reasons – as indicated by the term itself – are those that concern feelings and emotions. Rational, or interest, reasons instead are precisely based on rational calculations. Luhmann draws a further distinction, i.e., one between emotional trust and strategic trust. In the first case, trust is given because it is cauterized by social objects, in the second case trust is given because it is useful to give it to receive it back (Luhmann, 1979).

In reality, trust can be given for the most diverse reasons, and therefore the phenomenon is multidimensional. In some situations, one might decide to give trust because few information is available and the possibility to acquire more is not allowed. In this case, trust is intended as a means to maintain open action possibilities. Trust can be given because trusting allows to do certain things which otherwise could not be done. In this case trust is intended as a strategy to act. A further reason may be a sense of belonging to a certain community. In this case trust is relative to the group solidarity. Moreover, trust can be given because a certain relation would no longer be the same if it didn't contain a fiduciary bond. In this case, trust is intended as a non-negotiable value

(Prandini, 1996; Tessarolo, 2000).

Some researchers have inquired into the possible existence of differences between the individuals that give trust more easily and those who instead are less inclined to trust others. The general predisposition towards trust typical of an individual has thus been studied. The human beings more inclined to give trust to others are probably also worthy of trust since it is less likely that they will lie, deceive or steal. Moreover, they are less unhappy or ill-adjusted and are more appreciated by friends and colleagues.

## **6. The environmental risk**

The right of citizens to be informed on environmental matters is still an open issue, both in terms of environmental laws and the difficulties at a scientific and juridical level regarding comprehension and receipt by users. The word “environment” today has several meanings and is interrelated with largely diverse dimensions, such as agriculture, artistic and historical goods, energy choices, urban and territorial planning, administrative organization, public expenditure, specific regulatory norms, etc. The problem at hand is the analysis of the major difficulties that can be faced when wishing to inform on the environment. In any case, it is necessary to deal with the risks that the environmental information by its own nature implies.

Any public administration acting today at a national, regional or local level providing information on the environment manifests its inability both at an information level – for example, informing citizens on the nitrogen dioxide level in the atmosphere or on water pollution rate – and in relation to an adequate and operationally effective possible measures to remedy and solve the problem.

It is necessary therefore to see how citizens are allowed to access information and consequently make the right choices and actions based on such information. The data of the information cannot be rigidly circumscribed by the information system once and for all. It is hypothesized that the transmission of information, as the diffusion mechanism of knowledge, starts from scientists and arrives to “laymen” without retroaction. The science world would seem therefore a totally closed knowledge world, an autonomous and self-subsisting *province of significance*, without the possibility to accept inputs coming from the external world of incompetents. The hierarchy of knowledge proves itself to homologize to that of social actors. Scientists are superordinate both because they have an autonomous knowledge and because – since they are specialists – hold rights of speech but not an obligation to listen, which in any case is believed – first of all by the scientists – not to affect the content of their knowledge.

Even the position of the “divulgator” is subject to this mono-directionality, at least towards scientists. When a divulgator acts instead as a mediator towards the way of the daily life of the recipients of the messages transmitted by him/her, he/she finds himself subject to complex retroaction phenomena, since for his/her translation function, he/she shares not just the knowledge of the world of daily life of his/her “lay” interlocutors, but he/she is enmeshed in it (Guizzardi, 2002)<sup>25</sup>.

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<sup>25</sup> From the perspective of a reporter, a scientist is precisely what a guinea-pig is for a scientist. He/she looks through a microscope trying to describe scientists. Ultimately, what scientists do and not what they say about what they do should be reported (Nelkin 1987, 163).

In other words, in case of conflict, a possible reaction of the divulgator is to take refuge behind the ideology of the *media neutrality* and therefore his/her own neutrality. This is increased by the use of a sort of dual positivistic code used by scientists, however accepted by the journalists and transformed in the moment of importation into his/her sector of specialization. This operation has the important effect of founding an autonomy of the knowledge and standard reporting practice which on one hand prevents the divulgator from entering the construction process of the scientific truth-reality and on the other hand prevents the scientist to enter into the construction of the reporting reality-truth. Scientists and journalists therefore apparently produce facts that are mutually inaccessible by observation and consequently mutual criticism. Moreover, media allegedly produce facts over the facts, which are unquestionable just like the media accept that the former are unquestionable. A journalist may be considered as a power mechanism in the hands of the media, hidden behind the hypothesis of his/her translator position further complicating the scientific communication situation.

The role of the media becomes critical because the (emitting) scientist is in turn the recipient and takes on him/herself part of the translation work being ahead of the comprehension of recipients, using a new kind of code that reduces complexity of the subject and linguistic specialization, but also unrest and uncertainties relative to the construction process of the original scientific knowledge (Latour 1998).

The recipient in turn finds him/herself in a new position, i.e., the “well-informed citizen” position, illustrated years ago by Schutz (1979, p. 404) and later expanded by Guizzardi (2000). At a linguistic level, he decodes mainly by analogy and he is scarcely sensitive to communication by metaphors, but most of all, he knows well controversiality in any scientific work, even if he partially reduces it in favor of a consensus that concede to the source of its knowledge: the scientist that has spoken and the communication means. In this way, recognizing one’s own knowledge of the quality of “socially derived knowledge” is the first step to attribute, even though in different ways, to the content, the source of the communicated knowledge and the used channel the statute of “highly approved knowledge” (Schutz 1979, 415-417). The communication process implied in the “well-informed citizen” position transfers legitimization both to the emitting subject and the channel, and the relevance of such legitimization increases as the well-informed citizen in turn is a scientist, who already enjoys legitimization and authority (Guizzardi, 2000).

This type of communication is based on a consensus exchange. The consensus transferred to the expert is wider than that that the user of the communicated knowledge acquires for him/herself through its use. In fact, there is an accumulation of authority by the source each time it is used (Latour 1998; Hilgartner 1990), but also an accumulation of general consensus towards science, and its products, as such. It is a process of construction of a *consensus capital* that can be defined abstract since it is detached from the specific situation where it originated, but also because it can be used as a heritage of general authority by the scientific field. Such capital originates through the use of the communicated scientific knowledge, and it is as high as the authority enjoyed by the user, as well as the authority enjoyed by the media. Such process brings the controversial fact towards the scientific fact (Neresini, 2000; Chevalier 1999). At times, there is a retroaction effect of scientific communication on the very source of the original scientific communication, since the scientist reorients his/her positions, for the purpose of the

research that he/she conducts, based on the same knowledge divulged by him/herself (Cloitre and Shinn 1986).

The “well-informed citizen on him/herself” takes on a significant dimension and can be a source of ambivalence. In part, this is the condition where an expert can find him/herself in a television debate, inside a controversial situation. After his/her initial stance based on the authority of his/her specialist knowledge, he/she goes outside the context of scientific knowledge that he/she knows well. When taking the floor after that, he/she reacts not just to the stances of other participants – whose point of view belongs to non-scientific sectors and whose interests are conflicting – but also to his/her own stances taken shortly before.

Each science contains a narrative component that allows it to expand beyond its own realm to enter into the world of everyday life. Volpato (1996) notes that people give more credit to the information that is consistent with their own ideas. They seem to have a sort of positive prejudice towards the relationships between individuals and not the relationships between groups. Moreover, they consider more valid the most predictable results, an indicator of a widespread diffidence to accept conclusions that question consolidated opinions and attitudes. The underestimation of scientific results that do not confirm the original ideas might be intended as a particular instance of the tendency to overlook the consensus dimensions and therefore others' experience.

## **SECTION II - METHODOLOGY**

### **1. The Focus Group**

A focus group is a discussion of a topic of interest among subjects led by a well-prepared moderator. Subjects have certain characteristics in common, linked to the topic that is being studied (Greenbaum, 1988). It is a qualitative technique of data revelation under the form of a group interview. As early as in 1946, Merton proposed a similar technique of data gathering from groups of people. The term "focused", used by Merton, regards specifically market researches in order to understand the motivations that stand behind certain buying behaviours. By combining Focus group and enquiry, we understand that "Focus group is a research method and, as any other method, it aims at collecting and analyzing useful data to obtain answers to the researcher's questions (Zammuner, 2003), especially those regarding motivations. The focus consists of a group discussion which is its main particularity and main feature.

In focus groups, stress is given to the interaction within the group, based on topics offered by the researcher which assumes the role of a moderator; the objective here is revealing, through the group interaction, the experiences, prospects, perceptions, representations, sensations, attitudes, opinions and viewpoints of participants. This method enables the researcher to collect qualitative data (through a discussion registration) from a small group which, by interacting, offers an abundance of information. Group sessions which are entirely transcribed constitute the material to be analysed. Focus groups are therefore a special type of group in terms of the objective given, dimensions, composition and procedure.

Each group session lasts approximately two hours and has one pause; there are normally between 6 and 12 participants, chosen according to specific characteristics they have in common, defined according to the topic discussed. The group discussion allows for a relaxed, permissive environment to be created, an environment that favours the expression of different points of views.

#### **1.1 The projecting phases of a Focus group**

The phases of a research process on which the focus groups methodology is based are divided according to the description of the four phases of qualitative research: the planning phase, the conduction/observation phase, the analysis phase and the draft of a final report (Kirk & Miller 1986). The main principle of a qualitative interview is providing a structure within which all interviewees may express their opinion as naturally as possible.

The Planning phase. The first phase – the planning is the most complex and important one, since this is the moment which most distinguishes focus groups from other usual practices in other qualitative methods; this phase envisages a series of operations, as shown in Table 1.

**Table 1. The projecting phases of a Focus group<sup>26</sup>**

<b>THE PLANNING PHASE</b>
<b>1. Definition of Objectives</b>
<b>2. Composition of Groups</b>
<b>3. Definition of a Number of Participants</b>
<b>4. Definition of a Number of Focus Groups</b>
<b>5. Selection of Participants</b>
<b>6. Selection of a Moderator</b>
<b>7. Preparation of an Interview outline</b>
<b>8. Selection of Location, Incentives and Incentivating Material</b>
<b>9. Conduction Phase</b>
<b>10. Analysis Phase</b>
<b>11. Presentation of Results</b>

Definition of Objectives. It is of crucial importance to identify and define precisely the problem to be studied, reasons for the research, questions which the research is to answer and information that is expected to be obtained: in this way the aims and objectives of the study are determined. The topic of discussion is put forward and discussed, thus obtaining a functional feedback to improve and define the research objectives. This confrontation is useful in order to obtain the input of other persons involved in the project, improve the quality of the research and define the joint objectives before starting the preparation of sessions. Furthermore, it enables all interested parties to participate in the project and be informed on it, by sharing the research plan. Once the problem has been defined, in order to continue the planning of the study, the budget and available time limitations need to be taken into consideration. The budget is usually less "severe" for the researches carried out in the social sciences area than in the marketing area.

Researches in the social area are generally more time-limited than those in the marketing area, since the latter ones tend to resort to use of summary reports which are faster and are often provided orally, while social researches analyze the gathered data more precisely and widely.

Composition of groups. The following step is defining who are the persons which can most adequately provide the needed information. Then, the composition of groups is to be identified and defined precisely. The group composition regards the description of socio-demographic characteristics of participants. Other characteristics relevant to the research are to be added, such as the use of a certain service or product (in the marketing area), the participation in certain social programmes or attitude towards a certain issue (in the area of social sciences research). The main socio-demographic variables taken into

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<sup>26</sup> This table and the focus group description were prepared by Mrs Mazzoni Roberta (1998).

consideration for the group composition are: gender (although certain studies (Thorne and Henley, 1975) state that, in case the discussion topic is not linked to the participants' gender, gender differences do not influence the gathered information), age (among elder and younger subjects there can be difficulties in communication, the usual age difference among participants is 15 years), social class (subjects belonging to different social classes may not feel at ease during the discussion), race (that may cause problems especially as regards specific topics), geographical collocation.

The characteristics to be taken into consideration are to be selected by compromise. Namely, since population of reference may be divided into many sub-groups, it is best to identify those characteristics which will most probably influence the decisions taken on the basis of the focus groups results. Such characteristics are defined in function of the situation and the objectives of the study. It is possible to use homogeneous or heterogeneous criteria that are to represent in terms of quality the situation to be studied. The criteria, however, must not be too generic (which would gather less useful information), nor too specific (which could entail the difficulty and elevated costs in finding the adequate persons). The population of reference is to be defined operationally, so that the "sample" taken reflects approximately the population of interest. Although it is possible to use heterogeneous criteria, maintaining a reasonable homogeneity in groups is important in order to promote discussion. What is presumed is that, in order for the participants to feel able to interact, too broad differences in the social background or lifestyle need to be removed since they would hamper communication and could result in inhibiting the group dynamics; furthermore, in case the subjects are homogeneous, it is easier to explore the discussion topics without polarizing the discussion, subsequently evaluating the session data (Greenbaum, 1988). The decision whether to create heterogeneous groups according to one or more characteristics, or create separate groups which are homogeneous within the group, but vary one from another according to one or more characteristics, shall depend on the aims and objectives of the research.

Definition of a number of participants and groups. After having defined the characteristics of the sample, it is timely to define the number of focus groups that are to be formed, as well as the number of participants in each group, always bearing in mind time and budget restrictions, as well as research objectives. Usually there are between 6 and 12 participants: groups containing less than 6 people are, on the one hand, easy to organize and may lead to obtaining more "profound" information, but on the other hand limit the overall number of experiences and therefore the quantity of information relevant to the study; groups containing more than 12 persons limit the possibility for individual members to intervene during the discussion, cause an excessive dispersion of attention and a formation of sub-groups which subsequently lead to changes in the interaction dynamics, hence hampering an effective group management and causing information losses.

Smaller groups are usually chosen when the discussion topics are complex or when the group consists of participants who are experts in the topic enquired. Smaller groups, however, may be less productive and entail greater costs. Also, the possible presence of "special subjects" may cause problems in the group dynamics. Furthermore, in case the overall number of participants in small groups needs to be increased, the costs will significantly rise. Larger groups are used when we are interested in discovering the degree of perception, reactions of a certain audience on certain issues, as well as in explorative

studies. In fact, larger groups enable us to collect clear information on a certain topic relatively fast.

Furthermore, establishing a number of focus groups is necessary in order to reach the objectives and gather the necessary information. The number of participants is inferior than in quantitative researches. According to the general rule, new groups shall continue to be formed while they continue to provide new information or up to a point in which the moderator can anticipate what will be said within the group (Calder, 1977). In most cases, it is the first two groups that provide plenty of information, while the third and the fourth group provide much less: the behaviour of the third group is, therefore, crucial for our decision.

The number of groups also depends on the topic discussed and on the number of characteristics used for comparisons within the sub-groups of population. If the research is more complex and the number of sub-groups of population requested is higher, there will be more focus groups. It is advisable to form more than three groups where there are heterogeneous groups or a wide sample from the population subject to study. There may be less than three groups when the subjects are homogeneous in terms of their background and other variables defined, or when the objective is collecting information that lead to the final decision. When the population is rather homogeneous and the research is simple, even one focus group may suffice.

The selection of a number of groups, however, depends mainly on the research objectives: if we are dealing with an explorative research and certain contents of the discussion can be anticipated, then the information collected may be sufficient; on the other hand, if the research requires a thorough analysis of the problem, more groups will need to be formed.

On the basis of the number of focus groups envisaged, the number of moderators will be decided. Opinions of the Authors on this matter are quite different: according to Greenbaum (1988), it is preferable to use only one moderator, since the study is of qualitative nature and the number of variables that might influence the results should be diminished as much as possible. The moderator is one of these variables. Furthermore, with time, the moderator gets to know better the topic of discussion and learns to recognize better the reactions of participants. According to other authors, it is better to resort to more than one moderator since in this way it is more likely that the study topic will be explored more thoroughly and the approach will be "more reinvigorated and less monotonous".

During the planning phase, other two crucial elements have to be taken into account: selection of a moderator and preparation of an interview outline. These two operations are intertwined (and may be carried out at the same time with the participants selection, which will be explained in the following chapter) since it is the moderator who coordinates group sessions by following the pre-defined interview outline.

Selection of the moderator. When selecting the moderator, what needs to be taken into account is, in addition to his/her ability to coordinate the group dynamics and obtaining interviews, is also the possible interaction between the demographic characteristics of the moderator (age, gender and race) and those of participants which could be relevant for the group's success. These characteristics influence directly the nature of the group interactions, thus influencing the quality of the discussion; "compatible" characteristics are important so as to put the participants at ease and to

allow them to participate freely. The gender issue it to be taken into consideration especially when tackling sensitive issues, in which the gender of the moderator and participants may influence the outcome of the discussion. Even the moderator's clothes may influence the outcome of the focus group, especially during the first minutes of the session, which are decisive for the atmosphere that will be created during the course of the session: clothes especially should be adequately chosen, they are to put the participants at ease. Also, the moderator should be and seem genuinely interested in the topic and in the participants, by posing further questions in order to spur discussion and study thoroughly the expressed comments and ideas. The moderator should also be adequately prepared on the topic so as to be able to pose suitable questions and make comments, understanding better the participants' viewpoints. The moderator is an extremely important figure in the data acquisition process. He/she is to more or less direct the discussion towards the objective of the study.

The Interview outline. As was already seen, the focus group research may be organized in a way that goes from one extreme to the other, from a maximum to the minimum structuring. Depending on the goals to be reached and the type of information to be obtained, the structuring level of the Interview outline will be decided upon, as well as the discussion and the grade of moderator's involvement in the discussion, i.e. the style of the interview. Generally, the interview scheme contains the guidelines that will streamline the group coordination during the discussion. The guidelines represent an overview of topics to be tackled during the discussion and include general questions that the moderator will use to coordinate and lead the discussion, with the possibility of discussing some interesting subjects that may arise during the discussion which have not been foreseen.

The style of the interview varies according to the research objectives and determines the grade of directivity of the moderator within the group. In case in which the general approach is of explorative kind and the aim is favouring new ideas and interaction within the group, the interview outline shall follow a less directive approach and the moderator shall adapt the style of the interview as well as his/her level of participation in the discussion. The moderator participates in the discussion only at its very beginning when introducing the topic and during the discussion only if necessary in order to keep the discussion on the tracks; such approach ensures greater opportunities for group interaction, leaves more space to creativity and to the group dynamics and leads to a more vivid expression of participants' viewpoints. It is furthermore possible to clearly seize the ways in which the participants perceive a determined problem and its dimensions. The disadvantage of this approach is the fact that it is more difficult to analyze the gathered data and to make comparisons between the groups, since the content of various groups is often organized in a substantially different way. Also, by applying a less directive approach, there is a risk of not managing to tackle topics relevant to the research during the discussion.

If the general approach is confirmatory and the objectives of the research are very specific and defined, the interview outline will be more precise and detailed, with more specific questions on all topics to be tackled. The interview style will be more directive and the moderator shall constantly monitor both the sequence of the foreseen topics and the dynamics of discussion, as well as discuss the answers of participants more in depth. This approach allows for a more detailed analysis of topics and a simpler comparison among

the groups. Nevertheless, in such an approach, role of the moderator is very important. He/she must be able to interrupt unproductive parts of discussion and direct the discussion towards areas of greater interest, without imposing his/her own viewpoint. The moderator monitors the work of the group and must be able to change, move and interrupt the discussion, while maintaining or creating the enthusiasm and interest for the discussion within the group, following as much as he/she can the interview outline.

As was already mentioned, the interview outline consists of a list of questions relevant to the topics to be explored during the discussion. When the structuring level of the discussion is higher, the interview outline includes additional, more specific questions for each topic. Questions serve to thoroughly explore the participants' comments and viewpoints.

Although questions in the interview outline follow a logical order, the scheme does not necessarily need to be followed strictly during the discussion. The interviewer should adapt the moment and the way in which the questions is posed to the context and the general flow of the discussion. A prepared outline leads to a good time management and helps obtaining more systematic interviews and information.

The questions in the interview outline should seem spontaneous, even though they were prepared in advance with great attention; the maximum of about 12 questions should be posed during one group session, although the number of questions depends on the questions themselves, on the nature of the cognitive processes and the dynamics created, on the topic tackled and on the group itself. Homogeneous groups pass from one topic to another more easily than the heterogeneous groups which are more set in their ways. Furthermore, more complex the topic, the greater the emotional involvement of participants, as well as the heterogeneity of viewpoints. The number of topics to tackle and questions to pose is lower, though.

The interview outline is usually divided in various parts the importance of which varies according to the structuring level defined for the interview (Krueger, 1994). The interview should begin with the opening questions on which everybody is to answer (these are normally invitations to introduce oneself); these serve to obtain quick answers in order to put the participants at ease and introduce them to others. Introductory questions follow, introducing the general topic of the discussion. They aim at stimulating the conversation and the interaction among the group members by gathering ideas, experiences and examples. Then there are the transition questions which lead the conversation towards the key questions (of fundamental importance to the study) and serve as a logical link between the introductory and key questions, helping the participants at the same time to see the topic in a wider and more complete context. Finally, the conclusion questions lead to gathering and summarizing various viewpoints. The moderator gives a brief summary of the main elements revealed in the discussion and invites the participants to assess the importance of remarks emerged. Sometimes the interview outline contains the time framework foreseen for each topic and for possible interruptions during the session. The interruptions may serve to stimulate discussion or allow for an exchange of information between the moderator and the observers. If any interruptions are foreseen, it is best to determine in advance the exact time, so as to avoid any complications (it is advised that the communication is to occur between rather than during group sessions, since they are a moment of distraction for the moderator).

It is important that the moderator knows how to use two techniques: a 5 second-

pause and prompting questions (“probes”). If used after a comment made by one of participants, the pause may be seen as an invitation for others to intervene. The prompting questions serve to clarify the answers and comments provided. In fact, very often the participants tend to make vague comments or simply show agreement or disagreement with other people’s stances. Good prompting questions elicit further information without suggesting specific answers and without inducing the participants to “defensive behaviour”. If the questions are used adequately since the very beginning of the discussion, the participants understand what level of depth and precision is requested in the answers.

In order to answer adequately as well as to balance the participation within the group, the moderator must be sensitive also to the non-verbal aspects of communication. Subjects often communicate their intention of intervening in the discussion through non-verbal signals which the moderator must be able to grasp, avoiding at the same time shaking head in denial or approval.

## **1.2 The Analysis phases**

The analysis of results is also driven by the research objective. Although a unique way of carrying out the analysis does not exist, it always includes the transcription of group discussions, based on recordings made during the sessions. Sometimes the transcriptions are incomplete because the participants do not finish their sentences, speak in digressions, express their thoughts or incoherencies with pauses. The researcher decides to what extent the transcriptions are to be corrected or modified. To this end, Krueger (1994) suggests that the grammar corrections often may be appropriate, provided that they maintain the meaning that the discussant intends to communicate.

Transcriptions do not contain any information on non-verbal communication, tones or emphasis of comments, on feeling of the group, or the mood of the discussion. These information should be contained in the moderator’s notes (and the assistant’s) taken during the discussions and should be integrated with the transcriptions so as to achieve a clear and thorough report.

One way of enhancing the reliability of analysis is by repeating it by more than one researcher: analysis made individually by more people increases the reliability of interpretation. In case in which divergent remarks should emerge, it is possible to discuss further so as to better understand the comments that cause disagreement. In order to improve the analysis, it might be useful to request a feedback. This can be provided by various sources: other co-operators in the research, experts who have not participated in the focus group, observers or participants themselves who can be asked to comment on the sent analysis results.

In order to carry out a good analysis, it is often recommendable to comply with certain important suggestions:

- 1 – The analysis has to be above all practical, i.e. apt to the situation. Therefore, environment and a specific situation shall indicate the time framework requested for the analysis. First the notes of the data gathered during the group sessions are registered, then the discussions are transcribed and, finally, the entire material that has emerged is integrated. The analysis needs to be verifiable, i.e. it needs to enable others to come to similar conclusions by using the available documents and the overall material.

2 – It is time-consuming to analyze with same precision all the questions posed during the discussion, so it is better to focus on key questions. The main questions are those present in the interview outline (which is more or less detailed according to the structuring level of the discussion). It may happen that the topics which have not been included in the interview outline emerge regularly during the discussions. Should this happen, some of the topics which are relevant to the research objective, may be included in the analysis. Other topics, which had been envisaged in the outline, but have not proved useful for the discussion, can be excluded from the analysis.

3 – Finally, the analysis is to represent a level of interpretation adequate to the study objective (or the requests of the client) and to the possibilities of the analyst. It is possible to describe the levels of analysis that are to be taken into consideration over a continuous lapse of time: on the one hand, the analysis consists of the transcription of all the participants' answers divided into categories; then follows an intermediate level of a more descriptive analysis, characterised by a summary of statements made during the group sessions: the researcher prepares a description of gathered information followed by examples, under the form of quotations. On the other hand, there is a different level of interpretation analysis in which it is not the summary of the data that matters so much as the interpretation of their meaning. It includes wider reflections than those obtained during the discussions.

Sometimes comments may be gathered after the official closing of the focus discussions. It is important to decide whether these information should be included in the analysis. In order to interpret them correctly, the circumstances in which they were obtained, i.e. the reason for their delay, need to be taken into consideration: sometimes these may be thoughts and comments that occurred to the participants only following the conclusion. Other times they may come from the participants who feel too inhibited or intimidated to share their controversial opinions with the group and would rather share their views with the moderator alone, in a less anxiety-inducing situation.

### **1.3 Types of approach**

In the focus group data analysis procedures there are two basic approaches: a qualitative approach, also called ethnographic approach, and the content analysis which offers a quantitative approach.

The first type of analysis is mainly based on identification of analytical codification categories and on the quotations obtained from transcriptions. The analysis is based on the notes and impressions of developed summaries, reflections or interpretation hypothesis according to the desired analysis level. It is also possible to identify structures within and between the various categories so as to achieve relevant results.

During the entire analysis and codification procedure, it is important to bear in mind certain rules. First of all, what counts is the context in which certain reflections are made – not only the mere words used by the participants, but the meaning they attribute to these words: different words, used by different persons or even by the same person, may often be attributed the same meaning. It is timely to consider the intensity and the tone used to express certain ideas since this aspect too may provide hints as to the meaning of that specific problem or topic. The specificity of answers needs to be taken into account: specific answers based on personal experiences are usually more relevant

than vague, impersonal answers.

Finally, it is timely to identify the changes of opinion occurred during the discussion. These may depend on what has been said during the group interview. It may therefore be useful to try and go through the moments in which these occurred and seek for the elements or statements which might have caused them.

The content analysis is also made on the grounds of a codification of the material obtained from the focus group transcriptions. Computer programmes that are currently available allow us to identify a set of items which may then be systematically counted (Weber, 1985). Should there be, upon the conclusion of the codification, too high a number of codes, it is possible to reduce the number of identified categories by eliminating the smallest ones or by arranging them into larger groups. Advanced computer programmes which allow us to put each topic into one or two categories defined by codes are quite useful in ethnographic approaches, but are of fundamental importance in a systematic content analysis (Popko, 1980).

Content analysis has a rich history in the framework of social sciences and has been widely applied to various phenomena such as the propaganda, literature and TV programmes. More recent approaches are based on artificial intelligence researches and cognitive sciences. In these works the main belief is that the associations between the words may often be relevant to identify the meaning and that the meaning may be linked to the frequency of associations of certain words, to the distance between two words or concepts and to the number of associations. The basic assumption is that the way in which individuals use language may offer crucial indications on the way in which people organize their impressions, information and their way of thinking (Mervis and Rosch, 1981).

Systematic analysis applied to the data obtained from focus groups is a disputable topic. As regards the market researches in particular, this is the clearest way of developing summaries, reflections or interpretation hypothesis according to the desired analysis level. Identifying various structures within and between various categories is also possible so as to achieve clearer and more complete conclusions. During the analysis and codification procedure it is important to bear in mind certain rules. First of all, the context in which statements are given is fundamental. It is also important to take into account not only the words used by the participants, but also the meaning they attribute to them: it often happens that different words, used by different or even same persons, have the same underlying meaning. Taking into account the intensity and the tone used to express certain ideas – an aspect which may also provide further indications as to what the meaning of a specific problem or topic is. The specificity of answers needs to be taken into account: specific answers based on personal experiences are usually more relevant than vague, impersonal answers.

Finally, it is timely to identify the changes of opinion occurred during the discussion. These probably depend on what has been said during the group interview. It may therefore be useful to try and go through the moments in which these occurred and seek for the elements or statements which might have caused them.

#### **1.4 The Conclusion report**

The drafting of the final report mainly depends on the type of approach chosen for the analysis. If a theoretical approach was followed in the analysis, the report needs to

balance the summary, quotations and discussion interpretations. If a content analysis was used, we should not use too many tables, trying to insert the simple ones that summarize basic information linked to the research questions instead. Each table generally presents and clarifies a fundamental topic of the discussion.

The report has to be clear and comprehensive. In order to achieve this, it is important to take into account the characteristics of the public it is destined to (education level, age, profession) and the nature of the report which can be written or spoken. An oral report is appropriate when there isn't much time or when it is easy to unite audience for a presentation.

The written report always includes a general description of the study structure and may vary according to the levels of the analysis carried out. It may include questions followed by the comments made by the participants; this type of report is useful since it offers a detailed overview of comments, but it is very long. It may contain a summary of comments made and descriptions of the main reactions that emerged in the group, as well as quotations. This is a report which offers an advantage of reducing the quantity of data. It may include a complete report which, in addition to containing a summary of all sessions with various quotations, also gives an interpretation and an attribution of meanings to the data. This report is valid since it reduces the overall quantity of data and offers an in-depth analysis.

### **1.5 Validity of Focus Groups**

As regards the predictive validity of the focus groups, (the extent to which, on a basis of information gathered during the discussion, we can predict future behaviours), Reynolds and Johnson (1978) refer to a comparison between focus group discussions and a quantitative enquiry (a mail questionnaire). The questionnaire was sent to 2000 women by mail and it achieved a feedback of 90%. It was then compared to 20 focus groups. By comparing the results of the two researches, they appeared to match by 97%. Also, further comparisons with subsequent studies showed that the focus groups proved to be more predictably valid than the quantitative researches.

Since focus group sessions constitute a communication event, it is important to understand in what way this communication process influences the nature and the quality of the data produced, and in what way can the group opinion-making process be avoided during the group sessions.

From the communication point of view, the focus groups method has certain external validity, since focus groups reflect a human tendency to discuss problems and ideas within a group. In fact, opinions are often formed through group interaction and are not directly drawn from external sources to be subsequently elaborated individually (Rogers and Shoemaker, 1971).

Communication problems are also important to preserve the internal validity of the data obtained in focus groups. Even though social interaction is a particularity of this method, the communication processes in a group environment may influence the validity of the data collected. When interpreting the focus group data, we should take into account the whole context of the group interview and bear in mind that answers and reactions of participants are subject to a social influence phenomenon, which serves as an instrument for developing shared meanings. Kelman (1961) states that group opinions develop

through three processes, each of which may exist in focus group interactions too, reducing its validity. The three processes identified by Kelman are the following:

a) compliance, where an interviewee answers in a way he/she presumes the interviewer expects him/her to answer;

b) identification where an interviewee expresses his/her stance on an issue which is similar to that expressed by somebody the interviewee himself admires or seeks solidarity from. Within a focus group, interpersonal attraction among members may lead to this type of attitude; certain participants may in fact wish to affiliate with the group members (often with the moderator or another socially attractive member). Studies have shown that identification processes, when they appear, have a strong inhibiting effect on the defence of opinions (Connolly, Jessup and Valacich 1990; Gallupe, DeSanctis and Dickson, 1988).

c) internalization, which is linked to communicating extremely personal opinions. It is a process which is influenced, to a great extent, by the order of intervention in group situations: the participants speaking last tend to agree with opinions expressed previously, without making any effort to communicate their own, personal opinions.

Krueger (1994) suggests certain methods to increase the validity of data obtained by the focus groups. He underlines the fact that it is easier to avoid the processes leading to the formation of group opinions by starting a discussion with an individual, yet parallel approach: it is possible to start by making the participants put their opinions in written. In focus groups, participants may be asked to write down notes so as to answer a certain question, and then individually explain their stance more in detail; in this way the moderator will more likely obtain a larger number of "original" answers (Steiner, 1972) and recognize more easily possible conformity and identification effects. Another option is to collect the written answers and read them out loud in front of all participants, without revealing the real authors; this will allow the participants not to worry about possible judgements within the group and will enable the participants to discuss the answers in a more critical way, since they will feel greater freedom to express their critical comments.

Greenbaum (1988) also suggests that brief reflections on key areas are to be written before the discussion, thus reducing the social pressure and offering the participants the possibility to reflect on their stance before expressing it. Higgibotham and Cox (1979) advise to add to the remarks and transcriptions brief questionnaires which are to be handed out during the group interview: questionnaires both regarding participants' background information (to be filled at the beginning or at the end of the sessions, so as not to interfere with the discussion), and reactions to specific topics proposed in the discussion.

## **2. Techniques of qualitative data analysis**

The first level of communication in which spoken communication prevails and is carried out face-to-face, implies an immediate participation. All other conversations are negotiations between two persons, where each of the two has the power of veto as to certain topics. Conversation is capable of creating subjective realities and social relations. What is being negotiated actually includes, in addition to the cognitive reality of the

moment, personal relations between those who take part in conversation. Intellectual discussion is a specific type of communicational interaction occurring between two experts who discuss books, ideas, the world of nature and social events with the mere purpose of establishing what is “real”, performing a ritual of specific conversation focused on content. In fact, what matters here is the speech, not the practical result or political appearances: the attention drawn to the actual verbal act of interaction minimizes the rest. A “pure” intellectual discussion is the one that flows between scientists or experts who tend to introduce to others or present more clearly their area of expertise. The two participants may at times be ordinary persons, although this happens very rarely since in the world of private sociality, intellectual discussions tend to intertwine with ideology and turn into a dispute in which non-verbal elements prevail (Collins, 1980, p.122). As regards the verbalism present in groups, we can distinguish between conversations among scientists, conversations among scientists and ordinary persons and, in the educational area, conversations between a teacher and a pupil.

As a research technique, the focus group has the characteristics which render it the best method to gather information in determined circumstances. Focus group is especially useful when:

- motivations and complex behaviours are studied;
- differences of opinion and behaviour are to be understood and interpreted;
- information is to be obtained in an informal way (Zammuner, 2003, p. 54).

Group discussion facilitates the expression of opinions and information and leads to a partial creation of new opinions or changes of opinions during the discussion. It is an ordinary process of opinion making. What needs to be taken into account is that there are no discussions which equal other discussions and that their meaning can only be interpreted based on the situation and context in which the discussion took place.

## **2.1 In-depth interview**

**Interviews may be subject to content analysis even though they are a qualitative method.**

Remarks are never objective. Instead, they are linked to the observer or the observed person’s point of view or the meaning they attribute to the object of their observation. Therefore, data can not be generalized neither for the focus group nor for the interview. The data analysis in an ethnographic approach, which is more inductive than deductive, aims at simply describing “accurately what the participants have stated, attributing to the gathered data an explanation that is necessarily subjective. Yet, subjectivity, in this process, represents a means for greater comprehension and interpretation of data, rather than a restriction to it” (Zammuner, 2003, p. 231). The main objective of the content analysis is reducing large variety of “non-quantitative” information present in a transcription of a verbal document which, in our case, belongs to a group discussion.

## **2.2. Content Analysis<sup>27</sup>**

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<sup>27</sup> A part of this paragraph refers to Tessarolo, 1981.

Numerous analysis techniques have been applied to the communication content studies. Not only do these techniques guarantee stable relations between mass communication (and not only) and the receiver, but they also allow us to locate both the dynamic relations between prejudices and stereotypes which tend to exist and the influence exerted on them through specific techniques of mass communication.'

They may be used in many ways and allow for an adequate analysis of the most important forms of human behaviour.

First applications of the Content Analysis (C.A.) carried out in the mass communication sociology sector referred to the political language, however many researches regard situations drawn from the mass media and messages produced in any communication act.

Theoretical scheme proposed by Lasswell (1927) has become the classical formula: who says what, what he/she says, to whom and with what effects. This formula is a way to put the available information in order. Nevertheless, even though it is generally valid, this scheme is temporary and incomplete. The «who says» element does not only concern the production process, but also the organization of the production, which implies a vast series of problems from quality and quantity of programmes to the management of the decision-making power. The «what he/she says» element raises the problem of content because it is the content that is subject to the C.A.. Here too, numerous problems arise which, for instance, regard the way in which the producer conceives the content and in which it arrives to the receiver. The question «to whom» raises the problem of audience which is linked to the persuasive effects of the message. These effects imply the modalities in which the message is presented and good knowledge of perception, exposure and selective memorization mechanisms.

In the typical C.A., only the evident content of the message is analyzed. Therefore, a specific situation is analyzed with repeatable and valid C.A. methods in order to make specific inferences about one text or another or other circumstances or source properties. It is nevertheless quite difficult to decide what is relevant and make assumption as to the source, since these assumptions may often be arbitrary. This is why it is important to create typologies or theoretical models within which to work.

### **2.2.1 Models of messages**

Krippendorff (19 ) makes a distinction between three prototypes of models of messages: an associative model, a discursive and a communicative model. These models do not exclude one another since a communicative model, for instance, often implies and incorporates information which is envisaged by the associative or even discursive model.

The associative model of messages uses contents in statistical correlation with observable variables. The discursive model considers the content as a sort of linguistic reference and it uses it under form of connotations and denotations. The communicative model attributes to the content that became evident a scrutiny process through a dynamic interaction system.

The first model is in concept simpler and is linked to the statistical idea of association in case of repetitive events. This type of message can be used in the literature problems to identify an author of a document (stylistic analysis) and may be also used in

enquiries on mass communication means to study the diversity of political symbols, for instance.

The discursive model is put to use when a text may be presumed as referred to rather than correlated with, and when the contents of the message are new, in a certain way. A typically discursive message is, for instance, a political message which is semiotically based on a linguistic reference system.

The communicative model often implies and comprises information foreseen both by the discursive and the associative model. This model is compatible with inferences of the researcher and statistical operations of the associative model that may be applied as an algebraic operation to a logical speech. Nevertheless, the analytical function of the communicative model is expressed through the control of the consequences caused by interaction.

These three prototypes have certain fundamental differences regarding:

- the type of assumption made about the source;
- the kind of information relevant for the analysis;
- the structure set initially for the data recording;
- the type of inference;
- the type of evidence that verifies the inference made.

What is significant in the representative approach is what «can help indicating the validity of circumstances in the message (what the analyst sees in the message)». Such approach once again regards the evident content.

What the instrumental approach underlines as important is not so much what the message clearly says, but what the message implies based on the context and circumstances in which it is communicated.

The type of communication is linked to the means of communication. As regards the communicative aspect, communication may have both the representational aspect and an instrumental aspect, depending on the way it uses the identification terms. The type of analysis in which the frequency with which a name appears is considered to be its index, is in line with a representational model which presumes that the text stands for the author's mood.

On the other hand, a message is communicative when it serves mainly to inform and when it covers all those researches based on information and narrative content theories.

### **2.2.2. Categories**

According to Holsti (1969) there are three essential rules for a good research:

- a) definition of research in terms of categories,
- b) classification of types of unit of the content analysis,
- c) measurement system that is used.

As regards the first issue, the selection of the C.A. categories is based on the idea of putting textual elements in order (words, sentences, paragraphs), according to the agreed analysis unit, in a certain number of pre-established categories. The category is in fact a generic notion that represents a set or a class of meanings and is strictly connected to the identification of the research objective. Categories allow for a classification of all textual elements in a series of drawers, so that the text is characterized by the quantity of

elements put in each drawer. The nature of categories depends on the specific issue that is the object of the research. However, it is possible to determine certain general principles concerning the construction of categories, which can be summarized as follows: - categories must be pertinent to the analysis objectives; - they must be thorough (all sense units must be distributed in categories); - they must be mutually exclusive (the same element must not belong to more than one category at the same time); - they must be objective.

The validity of C.A. depends largely on the selected categories.

The problem concerning the content analysis units is also relevant to the analysis outcome. The units of analysis may be classified in two groups: elements in grammatical order and elements in semantic order. Various categories may not be used at the same time. At the most, two content analyses may be used on the same text but on a basis of two different elements. Identification of units therefore entails an overall framework that refers to the hypothesis underlying the research. «This overall framework is determined by the categories of analysis, i.e. by items that include more content units which mediate specific quantitative revelations and inferences about conclusive remarks, significant concerning the hypothesis which is to be verified» (Lasswell, Leites, 1940, p. 163).

Lasswell believes that it is impossible to create categories which are valid for all contents, only those useful to the specific purposes of the research. Berelson (1971), for his part, defines a series of categories which are to reappear all the time since they concern the elements «what is said» and «how something is said». It is evident that the main characteristic of the Berelson's theory is the need for a precise and adequate formulation of categories. His hypotheses are valid as methodological hypotheses, especially as regards the identification of content units. The need for objectivity pre-established by the Author is not complied with, since the used categories reveal to be subjective, since the researcher continues expressing his ideology and his culture”.

The third issue which was envisaged by Holsti (1949) regards the measurement system. There are numerous forms of measurement but they can all be divided in two streams represented by quantitative and qualitative methods. The qualitative stream measures the text units and determines the frequency of items and their interdependence. The quantitative methods have the advantage of being easily applicable and repeatable due to their dichotomization (presence/absence of a certain content unity).

The qualitative methods do not assume a linear relation between the frequency and the importance of the content attributes, since the measurement carried out by these methods is of nominal type.

In conclusion, the C.A. methodology enables us to distinguish between messages that can be studied as a whole and messages that are disassembled into elements. The methodology diversity depends on different hypotheses that researchers use as their starting point when analyzing the message, hypotheses that are linked both to the type of message and to the consideration of objectives set by the researcher.

## PART III – RESULTS

*“Man has lost the ability to foresee and forestall.  
He’ll end up by destroying the earth”*  
(comment made by Schweitze as the dedication  
in Rachel Carson’s volume – 1973)

### 1. Interest in the “climate”

Modern society’s interest in climactic changes in has diverse aspects among which variations in lifestyle and economy are the most notable. Every day experience involves all those phenomena which are felt to be “strange”, “unusual” or “unexpected” and that are easily interpreted in a dramatic way. Man has always observed natural phenomena and tried to find patterns. So much so that calendars themselves were created to divide time into days, seasons and years. Almanacs even offered farmers with indications of weather forecasts on the basis of the signs that nature provided according to the day in which they were observed (hence the coining of proverbs).

Putting together all these “clues” had and have still today the primary purpose of reducing doubts rather than defining certainties. For this reason much of man’s conversation revolves around the weather. And, even if today we know much more about the weather with respect to the past, we still do not know enough and we refer to “experts” in the hopes that they will share their knowledge with the final outcome of giving us the sensation of knowing more and therefore being in some way in control. Our serenity lies in the hands of science and what it can say to us. Political decisions as well as personal ones are all linked to climactic change: we hope to have power over and manage both nature and society. Uncertainty increases not in spite of but because of our greater understanding, since this offers (we believe) a wider range of choices (Pellizzoni, 2007).

What we currently see are changes in lifestyle which were in no way foreseeable 40 or 50 years ago. Holiday pay allows people to organise vacations alone or in groups which along with general prosperity also permits people to take advantage of long weekends and festivities to get away from it all and relax. All this, in turn, has even changed our perception of time, our need to know weather forecasts and, therefore, have “precise” weather information about our places of sojourn. In the past this was not so. It was the farmer who was primarily interested in the weather and needed to be informed from almanacs as what to expect the following day. There was no national nor private weather service intent on informing him. Nowadays, instead, almost every newspaper and news service offers weather reports for people of all walks of life<sup>28</sup>.

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<sup>28</sup> Talking about the weather is common among people, also because every one of us has an everyday knowledge of it and are as a result competent.

## **2. Results of our studies: Perceiving climactic changes in Friuli Venezia Giulia**

### **2.1 Foreword**

Different to other “global” problems such as the use of GMOs or chemical substances, the political activists and everyday citizens who took part in our focus or study groups show similar points of view with regards to climactic changes believed to be currently underway. Their views tend towards the position of uncertainty. Policies that have been to date adopted have not been able to respond adequately to the contrasting feelings of certainty and uncertainty held by public opinion. It is, however, this particular situation of perplexity which helps keep discussions alive. It appears that, in this situation, the biggest contribution our research has to offer is to discover the possible existence of either homogeneous or diverse representations of the climactic issue.

The public’s understanding of the matter is quite different to that offered by the scientific world which tends to assume that citizens need the specific type of knowledge available and important to scientists to better defend the environment and, hence, one’s health and survival. Nonetheless, there is a general awareness that human activity can not be totally controlled, that it is unclear even from a scientific point of view and, finally, national and regional laws and regulations (where they exist) may be enforced only with difficulty.

### **2.2 Analogies in focus group results**

An amazing likeness of results was found amongst the different focus groups. These can be attributed to the sameness in media coverage which has for quite a while supported a one-sided view of the debate, largely ignoring dissenting opinions.

Our studies have revealed that choices made by the media, in favour of a particular point of view, were mostly identical be they regarding the issues to be treated or topics of debate posed to participants. At times even the language used was the same which, in part, derives from regional uses.

An important result must be highlighted. This consists in the correlation between the public’s perceptions of the issue at hand and the intensity of public debate.

An equivalent series of elements may be identified as factors present in the public’s responses towards climactic change. The similarity in the results obtained amongst the different focus groups and within the same bring us to believe that social and economic factors identified in the initial phases of our investigation mirror those relevant elements pertaining to everyday life which are fundamental in the forming of attitudes towards climactic change.

The principal “myths and platitudes” expressed by public opinion with regards to climactic

change emerged as a result of the following questions:

are the variations that can be observed the result of “natural” oscillations or do they, rather, signal a structural change;

what is man’s contribution;

which are the most important manmade and climactic phenomena;

scope of phenomena: are these observed processes reversible or not;

which changes are held to be the most worrisome;  
what will be the immediate consequences in terms of economic and social costs;  
better information;  
definition of the problem (Pellizzoni, 2007).

It must be remembered that the debate which surrounds an established topic has the purpose of gleaning information on the same. In this way, opinions and subtleties may be gathered as may differences amongst the participants. Methodology requirements were satisfied by the proposed topic matter of “climactic change” as it revealed people’s complex rationale and behaviours. Further, our research is founded upon the desire to understand existing differences between diverse opinions, behaviours and ideals.

We chose not to comment too extensively on the participant’s statements as their words expressed their stand, the problems at hand, what has been understood and the behaviours they intend to undertake quite clearly.

### 2.3 Answers to the first question:

**“Do you feel that relevant climactic variations can be observed throughout the area in which you live? If so, can you give examples?”**

The participants of every focus group agree on the fact that the territory is experiencing climactic variations. However, there is always at least one person who doubts these statements or does not wholeheartedly agree with them. The change most cited was that of seasonal change, its lack of uniformity, the fact that autumn and spring seem to have disappeared. A calendar of expectancy exists in which spring is accompanied by mild weather, summer by hot, autumn by a cooling down of temperatures and then winter. All that does not satisfy these expectations is important. Climactic uniformity in the different seasons offers people the possibility of planning their work and, importantly, their holidays. We will start by looking at the answers offered by Osmer, a body dedicated to the study of climactic variations:

*... Climactic variations have always occurred on Earth and can be regarded as a constant. Of course, the time span in which these happen is, on average, quite long (even if in this sense we shouldn’t forget catastrophic events that have changed climactic conditions on earth in a violent manner, such as, the impact of major meteors). The answer is, as a result, affirmative. To distinguish meteorological episodes which are, in some way, tied to climactic change is much more difficult. In fact, variation in the weather may be vast and a single episode may seem exceptional where, instead, it falls in the norm of climactic variability. (Osmer)*

*... Yes, in Friuli Venezia Giulia (FVG):*

a) *glacial recession, that is the major reduction and/or total disappearance of existing small glacial formations or snowy glaciers present on the Friulian Alps – this is an effect of a decline in rainfall on the whole and a general increase in summer temperatures.*

b) *An increase in average temperatures, in particular of maximums in both winter and summer.*

c) *Longer and more frequent periods of torrid heat in summer.*

d) *More frequent periods of drought. Broadly compared to the last 30 years.*  
(Osmer)

Following the above scientific response are more personal answers to the question based upon impressions:

*... On the basis of the meteorological measurements currently examined by me and common analyses undertaken of the objective meteorological data available and, taking into account the definition of climate and its variations, I am not able to state that, currently, there are relevant climactic changes occurring within the territory in which I live. Further, I am unable to deny such a hypothesis. This uncertainty derives from the complex nature of the climate and the identification of its variations in the short term and, that is, in a few decades. (Osmer)*

*... With respect to 50 years ago, from what we hear from the elderly, it seems that it snows much less in winter nowadays. I definitely know from the data I have on hand that the amount of snowfall has declined dramatically in the last 200 years. This because we have both wet weather in winter and on average the temperatures are higher. Rainfall in the mountains has decreased by approximately 5% in the last century as so has flooding which fill the great water basins. As far as local flooding is concerned we can say that there has been a probable slight increase. Very hot summers are becoming more frequent, especially in the month of June. To say that these changes are relevant, however, is difficult (as is evaluating them) because this depends on what is involved (work related issues, security, tourism, etc..) (Osmer)*

*... It depends on what you mean by "significant"; it depends on the period that is under examination. In recent decades there has been the tendency to note a redistribution of rainfall in the spring and summer months. The month of June has appeared more summery than springlike, it rains less and less frequently. The temperatures in this month are also higher. As far as the longer period is concerned, the frequency of snowfall and its intensity has declined the plains. These events have been observed from historical data dating from the end of the 1700s and it seems to be a tendency that has been reinforced in recent years. (Osmer)*

Confirmation of climactic variation was expressed by every focus group. The group belonging to the Council of Comeno lists them as follows:

*... We're experiencing a reversal of the seasons (for example, in spring we have weather conditions which are similar to those once seen in winter and in winter is more like autumn once was).*

- *Winters are increasingly milder.*
- *Periods of drought are ever more frequent.*
- *Fogs are more recurrent on the coast.*
- *The native trees are drying up.*
- *Summer temperatures are extremely high.*

What appears to affect people most of all is the increase in temperatures, even if it is still unsure what the outcome will be. This insecurity is expressed although media coverage on the meltdown of polar ice caps is evident. Often the changes that are observed happen because of the climate or pollution. Further, the weather varies, is unstable, is never the same: it is too difficult to say what has changed or is changing, but changes are apparent:

*... Climactic conditions change yearly, even if there is a common occurrence and, that is, hotter winter seasons. (Slovenian farmers)*

*... Warmer winters, less rainfall, grapes mature earlier, periods of drought are more frequent. The resting period for plants in winter is shorter which isn't comforting. (Slovenian farmers)*

*... On the other hand, it is also true that as a result of these climactic changes we are now able to cultivate crops that were once unsuitable. (Slovenian farmers)*

..Nevertheless, you can note that memories, even if contextualised in the past: not just the ice itself but even the troughs where ice once formed have disappeared without leaving in their place other objects which could show us frozen water. (Slovenian farmers)

... We're not used to all these changes, and it won't be easy to get used to them. (Slovenian farmers)

The importance of being farmers and having contact with nature surfaces at a certain point, and distinctions in periods of years are further highlighted ( periods which can be identified as if single years) as are their peculiarities (wine of higher alcoholic content, early ripening periods for fruit, crops unheard of in previous decades):

... With respect to the past, grapes have a higher sugar content. This is a result of the fact that it is hotter and there are more sunny days. Fruit trees ripen earlier which forces us to change the type of tree to cultivate. For example, mandarins currently grow well even on our lands; the plants flower all year long. It's probable that, if conditions do not change, **soon we will be picking grapes twice a year even if this means twice the work load". (Slovenian farmers)**

... Lately the summers have been much hotter and the winters quite mild. It rarely rains and it is very dry. Sunlight is stronger. You can't go out into the vineyard in summer without some sort of protection, without a cap. In some days the sunlight is so strong that it burns you. I don't know why, if it's normal. **Maybe it's due the hole in the ozone layer** or maybe not. But this is what we are experiencing. (Farm)

**Transporters' group: a single person is unsure about the veracity of climactic change:**

... In my opinion there are some changes, but I'm not sure that they are truly so radical. These are: inadequate seasonal variation, higher temperatures. (Transporters Nova Gorica)

... I believe that currently there are some climactic changes occurring. I'm not able to state, however, whether these are "significant" in the sense that they are definite or belonging to a certain period. You can notice that in recent years the average temperatures have increased with milder winters (on average) and that there has been a shift in the seasons ( Natisone)

... I haven't noticed any significant climactic changes. I do have the sensation that there has been a slight increase in temperatures with certain moments of extreme weather conditions, in particular regarding to rainfall which occurs increasingly as storms and irregularly within the period. I also feel the same about the temperature which also has its acute moments. As far as frosts are concerned (those in spring and autumn), there has been no change. (Natisone)

... Let me give you an example, because, according to me, you should always give interested people the facts. It is true, for example, if we speak about this last winter that has in fact been warmer than usual, but it would be sufficient to travel around the world and you can see that this has been the coldest winter in recent years. We forget that, for example, the first snows on Matauire, fell in October and the last snows fell in June so, practically, there has been an extremely short winter. But, these are my sensations. Last year there was such a quantity of snow on the Matauire unseen for years. This year, instead, snowfalls have been insignificant. (Natisone)

... Yes, for me too, I think that there are changes happening on our lands, but they are not that evident. That is, in my opinion, this has happened **gradually and over a time period**

**which spans ten years.** There is a break between winter, and with spring sudden hot weather usually arrives. What I have noticed instead is that rainfall has remained the same. (Natisone)

... I'd like to draw attention to what is meant by significant; there is a tendency yes. However there is a seasonal variation, which is natural, which makes it difficult to spot what the change is with respect to the average and so it is difficult for me to identify the specific phenomena on our territory. (Carnia)

... By "current" I mean in the span of a decade; by significant I mean final; according to me there isn't such a clear division between what was happening before and now... a gradual increase in temperature yes but, let's say that, a part from this winter which has been unusual (last winter was colder, it snowed), the summer we've just gone through has been hot but not as hot as the one two years ago; what we see happening, in these last few years, is a gradual increase in the temperatures but not so dramatic and final in my territory. (Carnia)

... the greater risk, is also a result of human activity on the territory which also increases the probability of something happening; man has invaded areas that he shouldn't have. (Carnia)

Facts and figures are always mentioned. Much personal knowledge comes from the mass media:

... But let me say that this is my personal feeling, obviously if I watch the television or listen to the radio it's clear that if with 15cm of snow we are at alarm levels, it is easy to be influenced. So it's clear that, according to me, something is happening, but I think that this is cyclical. What happened a 100 years ago can happen again. (Natisone)

... talk about climactic change is on every newspaper and on the television and seems evident; at a local level, I wouldn't know if this year's temperature increase is due to a natural but incidental phenomenon or if it is instead a structural change. (Carnia)

... "Significant" I don't know, but definitely I've been aware of objective changes especially as far as the climate in our city/region is concerned: microclimate, torrid heat, lack of rainfall, reduction of the bora (north-east wind). (Public Relations Office, hence PRO)

... There are some changes but I'm not sure that they are really so radical. Perhaps it is "us" who are paying more attention and are obsessed, maybe it's just a cyclical change. (PRO)

... Yes. It is evident that there have been variations in the weather patterns. One example can be found in the decrease in rainfall in general (with consequences – increasingly lower water levels in the rivers) and in snowfall in particular. From shrinking **ice caps**. And the increase in summer temperatures. From a "Nordic" climate softened by the presence of the sea and an almost inexistent dampness because "driven away" by the bora, long winters, tolerable summers, we have, in recent years, ended up with a "continental" climate. (Journalists)

... On average, as far as **Osmer's** forecasts for the following day are concerned, they're always expressed in percentages, or the following two or three days, a part from this, let's say that for the city of Trieste, I can't see a great correlation between what is forecast and the weather we actually experience. I watch the forecast, I'm not a weather fanatic, however I've noticed that generally there is no match. This makes me feel that there are, and I know they exist, I perceive it too, a number of microclimates, that is, the weather that has been forecast happens in very restricted areas. (PRO)

... What really makes me feel that climactic change exists are days of **foggy** weather, a muggier climate, that I don't remember experiencing very much. (PRO)

... What we've been experiencing in the last few weeks is very humid weather. I always say: "Ah, where is **the bora** that cleans the sky?" I'm like an old woman: "Where is the bora?"

But, to tell the truth, this is becoming more and more severe, with the passing of the years the problems related to pollution increase, that keep particulate matter low in the sky. (PRO)

... There is greater attention with respect to these matters. In my memories the weather, years ago, was a particular concern of those who worked the land and of others directly influenced by it: I'm talking about farmers and other things. Now it's an issue which regards everyone, in this sense, we're all a bit of "know it alls", that is from the niño to the rains(..) we certainly need more information...(PRO)

It is interesting to note the effects of one participant's comment on the group who confirms his statement and widens its scope offering predictions about the future:

... I can say that there is another aspect that I've noticed and that the sun is brighter; I mean, I think that there is more light. When it's sunny it is much more brighter than years ago. Blinding really.

... Yes, I hadn't thought about this, but I see that at times it changes. It's true.

... I've spent three quarters, I believe more than eighty percent of my life without using sunglasses. Now it's become second nature for me to look for them (to put them on), because out in the sun, in my opinion, it's brighter.

.. It's really true. It's true. There's both more pollution and more sunlight. . .

.. Well, it could be, repeating the person who said we're all "know it alls", the fact is that perhaps there are some substances in the air which refract the light and that's why it increases. It could be this or it could be the famous "hole", but I have noticed an increase in **brightness**. (PRO)

A part from the lack of the bora wind, trees flowering "out of season" and snow there are new allergies which accompany the old ones:

... There are also new forms of allergy and this is important of course because a lot of people need to go to the mountains and even the warmer temperatures increase the problem. (PRO)

... This climactic change, apart from the effects on the environment in terms of temperature also promotes air **pollution**; it's a disaster for the city because it causes problems as they have to block off the historic centre. (Tele 4)

.. It has to be emphasised that this change in the seasons is a negative factor for farming; the problem of closing off the city historic centre isn't as important as that for farming. **Farming** is tied to nature, nature to the seasons and the climate; so the hot temperatures we are currently facing won't necessarily continue because if you think about 60 years ago we know that at the beginning of March it froze over and this could kill off all the buds on the trees, **of orchards and vineyards** and so cause great damage that we'll notice in the harvest season. We need to treat the plants against snap cold fronts in periods in which temperatures are lower. (Tele 4)

... There is no doubt that we are facing **great climactic changes** compared to an even recent years: winters are warmer, seasons have taken on new characteristics and we are experiencing an accentuated and abrupt increase in temperatures. Further, many plant species are now extinct and new insects have appeared. (A Slovenian school)

.. According to me **the changes have been minimal**, probably a slight increase in temperatures and some irregularity with the wind and the rain. Anyway, they're only slight modifications that can get worse in the future because of pollution. (A Slovenian school)

.. I think that the changes in the weather we are facing at the moment aren't all because of what man has done, that is, pollution and the impoverishment and deterioration of the

natural environment that results from this: it's the result of different causes. It would be nice to know what the climate was like millions of years ago... maybe we'd discover that the conditions and situations were very similar to the ones we are experiencing today! (A Slovenian school)

...I found out that in the area above Nova Gorica there is one of the biggest holes in the ozone layer of all Europe. Now, I'm certainly not an expert in this field, but I know that some experts predict that in the 21<sup>st</sup> century we will experience natural disasters, the effects of which could be far more graver than those of the two world wars put together, resulting in very serious consequences for the economy. For my part, I can only say that this year I've been able to have my coffee out in the open air for the whole winter. In the past this has never happened and neither could it have happened. (A Slovenian school)

...I think that every year is different. I can't say if there are any significant climactic modifications. It seems that the summers are hotter and the winters milder. It's difficult to say. We hear that even in the past there have been very hot summers. I think it's something cyclic. (A Gorizian school)

... For sure. It seems that the increase in the temperature will cause us to experience a torrid climate with all the effects that result from it (see the summer of 2003). It also seems that the waterways (especially the rivers) will fill up enormously and the many coastlines (such as those of the Adriatic Sea) will disappear (the ice caps are melting). All this is due to what man has done to his environment, in a negative sense, it's one of the causes. I'd certainly say pollution, savage deforestation etc... (Gorizia)

... Some species of insects don't die in winter any more (ticks for example) (Gorizia council)

... I think it's we can't limit the investigation only to our area because we now live in a global dimension and so all the effects that we are registering are because all over the world other things are happening, globalisation is a fact of life and we have to keep this in mind. .. (Gorizia council)

... one thing is interesting, and that it's said that we have to consider everything from ancient times onwards. Certainly, gas emissions have some effects but what struck me was the fact that in a recent television programme **Rubbia** and other experts stated that, on the basis of their investigations, it is doubtful that changes in the climate are caused in the first place by carbon dioxide emissions. These emissions would have a minimal effect, in their opinion, with respect to geological climactic changes so, my impression is that we certainly have to do something about the problem but that perhaps what we're facing are changes that we cannot control. (Gorizia)

...Yes, I hold that we are going through significant climactic variations on our territory, even here in Pinzano al Tagliamento. It doesn't snow as it used to, winters are milder. (Pinzano council)

## 2.4 "Details"

... I agree that **the milder seasons (spring and autumn) don't exist anymore**. The temperature range is vast so we very quickly go from hot to cold. It's harder to breathe and pollution is on the way up, in fact, respiratory illnesses are on the increase. I've also noticed changes in the fauna, for example you don't see **fireflies** or the small mosquitoes that hovered

above puddles anymore. The ecosystem has changed so there isn't a hospitable environment for the flora and fauna. (Fogliano)

... There are changes, but they are not significant as yet. Some trees, such as the pine and the hornbeam are drying up. I think that this is to be linked to the industrial emissions of the paper factory at S. Giovanni al Timavo. The locals say that the bora disappeared (or, anyway, it is less felt) after 1972, the year in which the Postojna-Vrhnika motorway was built. Without a doubt, there is quite a bit more **noise pollution**: you hear more noises and often a real din. To give an example, once, in the village where I live, you could hear the foghorn from the port. Now, you can still hear it sound but it is muffled by other noises. (Comeno Slovenia)

... You can easily see the changes in the vegetation due to pollution caused, among other things, by industries and, in particular, by those

present in the territory of Trieste. Climactic changes also influence the sea (with the appearance of **red algae**), etc (...) To sum up, the major consequences of pollution and the deterioration of the environment seem to be revealed through the changes in the climate and in the vegetation. (Comeno Slovenia)

... I, as an old man, can say that on the Carso **the bora** is less frequent and not as intense as it was in the past. The vegetation on the Carso has changed, I think above all because of industrial pollutants coming from Monfalcone. Unfortunately, with respect to the past, now there are more barriers (so pollution is not blocked). Further, the characteristics of the geography has changed with the traffic on the Trieste Venezia motorway. (Comeno Slovenia)

... In part, yes, **radicchio** grows in January at Villa Santina; rainfall due to storms in January, thunder, in summer you get more flooding. It's true that this year there has been no snow, last year, however, we got a lot." (Carnia)

... Milder winters, warmer and muggier autumns. Rainy periods that are less frequent, but the concentration of meteorological phenomena has increased. We get more foggy days where you experience evident **breathing problems due to smog**. The water temperature of the seas is increasing. In summer it is warmer. In the summer months you get the distinct impression of an increase in humidity. So much so that you now need air conditioning. Not only in cars and in the home but also in public places and in the workplace. (Journalists)

... Yes, there are some perceptible variations: the average seasonal temperatures have gone up noticeably. Snow at Trieste has, strangely, become a rare phenomenon, for example. (...)

... I live in Trieste and its province is **too small an area** to allow serious commenting on such a complex problem. Let's look at the area of the Region, it is clear, from my memories and from being often in the mountains, that the winter season has, in particular changed. In my opinion the average temperatures have increased from 1960 onwards, the quality of the snow is never the same (Journalists).

#### **Subjective observations that, however, cause confusion and not-knowing:**

... I believe that from reading single news items the interesting thing is this: that apart from the general sensation that we are undergoing climactic change worldwide and all the new on the topics, in truth, people have been aware of this for a while, a personal and individual perception of what is going on on the local front and in their own cities and the **places they visit, be they holiday resorts, see for example the summer or the snow**, be they at the seaside and the temperature. So, one of the things that we have to start to highlight is that this big idea of climactic mutation, this enormous thing, so worldwide, so far away has, in reality, already entered as a precise perception of everyday people in their everyday life, in whichever land they find themselves. (Journalists)

### **The influence of climate on dress:**

... But last year I used (my coat) for a few days, so we are progressively using these things less and less. It's like in summer where we traditionally used a jacket to keep the chill out in June evenings. As a child, in June evenings, my mother would make me wear a jacket. Now we no longer need a jacket at the beginning and the end of June. (Journalists)

... I agree. I realise that our clothing is changing because I normally suffer the cold but this year I didn't dress warmly. What I mean is, that things as they are, I no longer can tolerate wearing a vest. I used to always wear one. (Journalists)

### **And health:**

... There's also an increase in influenza type viruses that is due to the stagnating weather. (Journalists)

... What I liked hearing was that they said about the humidity, that it effectively doesn't allow the air to get rid of impurities, there are a lot of bacteria and illnesses that don't go away. So much so, that last night we heard the news of a form of TB that is resistant to all antibiotics which, exactly, if it comes into contact with the HIV virus is catastrophic. This talk about the humidity, that I have always known is not good for your health, causes rheumatic illnesses, arthrosis, **we are all affected by it**. I mean it's all a consequence of it: non only does the climate vary, we do something because it is varied that in our minds is represented as "it shouldn't be like this" but, it has changed all my life, all my habits and the habits of those around me. (Journalists)

### **It brings with it new habits:**

... wanted to highlight, this strange point about air conditioning. It's not rubbish, but it has changed your lifestyle. These were places and areas where air conditioning was never used where, instead, in the rest of Italy, I don't know, Rome, Milan and in other cities air conditioning was quite common. As far as I can remember air conditioning was something strange in Trieste. We've moved from the concept of portable units to air conditioners for the elderly who suffered from the heat and had respiratory problems and for pregnant women to what is now a widespread use. The best thing of all is air conditioning on public transport. What I mean to say is that all our trains and buses are air conditioned now. From this point of view, and everybody knows this, it creates and will continue to create big health problems. (Journalists)

... According to me, the biggest difference with respect to the past is not the increase (or occasional decrease) in the temperature but, the fact that the weather is no longer stable. I mean to say, one it's hot and the following day it could very well be quite cold... I think this is the main problem. (Slovenian Radio)

## **2.5 Answers to the second question:**

**With regards to rainfall, for example, or temperatures, the sea level and/or other forms of air pollution, have you noticed any changes (visible at the moment or regarding this decade) in the region?**

**Do you believe that the effects of such changes have had or can have consequences for people who live in the area and in their activities regarding their work life or for artisans, tourism and transport in the territory?**

The answers given by Osmer were the following:

... The temperature has gone up on average over the last two hundred years (without a doubt) and even with respect to 50 years ago. Rainfall **has fallen on average** (even though only by little) in the last 100 years. With respect to 700 hundred years ago it is much colder nowadays! This is because you have to always consider the time span which is the frame of reference. Changes can greatly influence many tourist activities in the mountains because it snows (on average) less and less. The long hot spells we experience in summer lead us to an increasing use of air conditioning in our cars and homes (with an increase in energy consumption and, indirectly, pollution). The moral of the story is: to build new ski resorts in the mountains is a big economic risk in the long term. (Osmer)

... There are temperature variations from which we can see a growth trend that is measurable even at a local level. In a similar way you can notice differences with regards to rainfall. With regards to the sea level and/or other forms of air pollution I am not able to offer an informed opinion. With regards to this last aspect, the quantity of CO<sub>2</sub> in the atmosphere has increased and this, without a doubt, has side effects on man. However, to be able to pinpoint exactly the entity of these effects is quite difficult especially in a country whose people's ability to adapt to change is quite good (for example cannons for firing snow if there is no snow fall!). The picture is quite different for those countries that do not have the same access to technology. (Osmer)

... rainfall in the FVG region: there's been a probable decrease of about 10% in the last 50-70 years in the mountains, on the plains and along the coast. The data available doesn't offer a clear picture. Temperature: an increase of 1-2 degrees in the maximum readings for summer, and increase also for the winter averages. Sea level: I don't have precise information with regards to this, I believe there to be an increase. Air pollution: at a local level does not depend on the climate but rather on human activity; on the whole the concentration of levels of carbon dioxide is heading towards doubling with respect to levels in pre-industrial times. Snow: I can recall investigations in Friuli that show a sudden fall by more than 50% of fresh snowfalls on the plains in just over a century; it also snows less in the mountains etc. etc. Consequences: without a doubt for tourism (positive in summer, negative in winter), probably favourable as far as transports are concerned generally speaking, health risks due to heat waves in summer, possibly growing problems in water supply, etc. (Osmer)

... we live in a society that is quite evolved and therefore we are able to adapt to change, this is true, but it is also true that at the base of my opinions is the belief that we have become more sensitive to these issues, to the extent of becoming neurotic, it's also true that people are less inclined to tolerate the heat and the cold, my mother for example believes that climactic change doesn't exist and that it's just that people won't put up with it, ... people need to travel more, probably the flood in Val Canale, beyond the fact that it was a unique event, and I don't know if it will become a trend, this we'll see in time, anyway there has been an area of the region that was gravely damaged, and this had repercussions in the media, a little on transports, probably 50, 100, 200 years ago maybe a person living in the south of Italy would never had realised what happened, so we also need to be aware of this, therefore it's true that we know how to adapt but, it is also true that we are more receptive to these problems. (Osmer)

... I **agree as well**, let me specify this, it's true that we are more receptive, but this happens when our wallets are involved, in the sense that, roughly speaking, we don't have survival problems, as is suggested that climactic changes may cause in other parts of the world, the problem of survival here... The changes affect things differently according to the economic sectors involved... to come back to current events, the warmth we experienced this winter harms

winter tourist operators but helps the rest of us because we spend less for central heating... (Osmer)

... I'd like to point out that, even within our community, there are colleagues who deal with what is happening in the atmosphere who are conditioned by the information that comes through from the news or by authoritative commissions or committees who deal with climactic change, to tell the truth I thought the question referred to what is happening in our territory, however the answers that we have given have always been placed in a more general context, for example, we talk about the increase in CO<sub>2</sub>, but I believe that here in our region, detectors measuring CO<sub>2</sub> emissions, except for a few town centres, don't exist, so I'd like to draw attention to the fact that we, like all men, behave and judge certain results, even if we are comforted by a scientific or professional approach, are influenced by information that comes from outside. This is the first thing I wanted to say. **The second**, instead, regards the impact on society and on economic activity, of course if we speak about variations that have occurred in recent years, we may note that each year is different to the next, so one year has witnessed an increase in the sales of air conditioning units, another has seen more and more snow disappearing, in another yet again we pay less heating costs,... however, I believe that a transformation in the economic behaviour of a territory or of a class of operators within that territory, or even any social change may happen only if there are more lasting climactic variations, for example if parts of the globe are submerged, as seems to be happening, by water, we won't be able to continue to live, or if in certain mountain areas it doesn't snow for the next thirty years. This is the case in which operators will have to review their way of thinking. Things being as they are, and also from what my colleagues have said, there could be variations in costs and gains from one year to the next because of climactic differences but not because these have become a trend, as far as significant and lasting changes in social and economic behaviour over the last decades are concerned, for the moment I don't believe there are any signs, I believe that the building of a new road has far greater impact on the economy of an area, or the construction of a new airport as we've been hearing recently. This is what I wanted to pinpoint as far as social and economic impact is concerned. (Osmer)

... as far as the first part of the question is concerned, about which I more or less agree with what my colleagues have said, or written, where everyone declares that there is a change that is greater or smaller according to the opinion... I'd like to stop for a moment to discuss how vague the term air pollution is with reference to climactic change. To lump together both CO<sub>2</sub> and PM<sub>10</sub> seems, quite frankly, unsuitable. I get the impression that this type of question can confuse people, and to say that climactic change may increase the presence of particulate matter and the such like. The way the question is posed could be just an example of the carelessness with which certain issues are dealt with, and understood by people... it seems that you can't use the car, you can't breathe in the town centre of Udine etc... caused by climactic change... and this is something that has to be emphasised; with regards to the effects of climactic change on the population I agree with what Dario said... changes of social and traditional economic types are probably more influential at this stage than those we can identify as being caused by climactic change. (Osmer)

... There are many effects in many areas: agricultural for example, less rain and rainfall in winter, very hot summers, result in early harvests; particularly violent thunderstorm activity is increasing which ruin crops. Tourist: little snow in the mountains, very hot weather at the seaside (need to use air conditioning where it can be). Power consumption: less heating fuels and greater electricity consumption for conditioning units and freezers. Clothing: Spring and Summer

collections come out earlier every year, (there is) uncertainty with regards to winter collections. (Journalists)

... Man can adapt to his environment or else is wiped out. The weather is seen as something to be handled even from an economic point of view. It is, therefore, exploited for tourism (see mountain and seaside resorts) and as a consequence greater numbers of people go to these venues where they are offered a vaster range of services (food, board, transport) which improves the local economy. **Other rules apply** to artisans and the industrial sectors and, that is, those of minimizing business costs. Those areas which are hit by climactic events in a bad way, the local situation will tend to annul any advantages had by the locals. (Journalists)

... what really surprises me is the tendency for people to **overheat** their homes, maybe keep their houses at 24 degrees in winter and also keep the windows open, right? Air conditioners have already been discussed, but there is one element that is very important in my opinion, the filters. (Journalists)

... The weather influences all sectors. The changes are still not extensive so you can only speak about the future. According to me it all depends on two things: man and nature and, that is, on the amount of **pollution** and from the normal historically cyclical character of nature.

... Climactic variation has, without a doubt, brought about a change in the habits of Italians with regards to **tourism**. I think that tourist activity in our Region has suffered in an economic sense. (farmers)

... I can evaluate the presence of smog by myself and so I feel I can talk about it, as far as the rest is concerned we receive contrasting messages. Both newspapers and the television offer opposite opinions about the same issues. For example, I don't know, maybe if I travelled or if I were more interested in what was going on in different places, perhaps then I could form an opinion. From here it's a bit difficult, so, yes, let's say that respiratory problems seem to be the most logical because especially this winter the air quality was really terrible, full of particles. (farmers)

.. Agriculture: greater need for irrigation plants and availability in mountain reservoirs. Water restrictions for civil uses (gardens). Little water in mountain reservoirs. Tourism: no snow for skiing. (Aviano council)

.. Effects on the economy, effects on the people, on work activities: it's clear that the effects, for us who have a medium level ski station, the effects are there. Then, it's also true that if it isn't cold in winter people don't go skiing and in summer it rains, so people don't come up anyway, we can't say that there aren't any consequences for the tourism industry, this for the activities we have here in Abiano. (Aviano council)

.. Mediocre, but not nearly enough, anyway we're at 1200 m. Take for example, smaller tourist towns such as Sauris and things like that, Pontebba, it's the death of those places, in a larger context, or even at the base of the mountains, winter is not that cold and if it isn't that hot in summer, well. In the mountains, not the postcard picture ones, I don't think it's a problem. We're working towards sustainability. (Aviano council)

.. With regards to rainfall, I think that we still get the same quantities, but I'm not sure if, instead, the way in which it is distributed is very different (...) I don't know, I don't think that you can rule out the possibility that sea levels haven't risen because of ice cap meltdown. If this happens, without a doubt there will be repercussions on a vast scale, amongst other things, on tourism and agriculture, that will have to adapt to the change. (Slovenian Farmers)

... Yes, we are certainly always affected by the changing weather patterns: central heating will cost less, but by the same token people will spend more to buy **air conditioning**

**units**, which in turn will increase electricity consumption to make them work... I foresee that, here in our area, but also in general, people will increasingly move up the mountains to find cooler temperatures, clean and fresh air. I also think that there should be more severe plans to reduce the amount of traffic on the roads and industrial activity. (Slovenian Farmers)

...Climactic variations undoubtedly have direct effects on us all, on how we live and in our work life. The diverse occupation types are closely linked to life styles: for example, an artisan's job depends on and grows according to society's needs, tourism is inextricably tied to the weather, commerce depends on both factors and there are still more... (Slovenian Farmers)

Pollution is never considered as the major problem except for farmers and lorry drivers:

... There's no doubt that the fundamental problem is pollution, caused by what people do. The heating up of the atmosphere (greenhouse effect) is linked to industrial emissions as well as those of motor vehicles and household heating plants. (Slovenian Farmers)

... It's always pollution that has formed the hole in the ozone layer, and that's why we are now less protected from the sun's ultraviolet rays. (Slovenian Farmers)

... The weather is fundamental and influences all sectors. Ours is particularly sensitive towards this issue. When there is a lot of wind our lorry has to change route. This costs us more. Locals also feel climactic variations: from their mood onwards... (Lorry drivers, Nova Gorica)

... Road transport, agriculture, the economy, craftsmen etc. The climate is of fundamental importance for many sectors. Apart from road transport, agriculture depends exclusively on what's happening with the weather. If it snows in April, harvests in July will be less plentiful. (Lorry drivers, Nova Gorica)

... We'll have to start thinking about collecting **rain water** and evaluate the possibility of using it in moments of need. I think that the great challenge for the future is how to optimise the use of water (even rain water). Considering the increase in more violent weather phenomena it's necessary to take care of our territory starting from the mountainous areas seen as a whole. (Natisone)

... It's becoming hard to link atmospheric changes to the parameters listed above. Who has verified a change in the sea level? I personally haven't. I don't think that current changes in the climate have a negative effect on the economy in general, if not in the form of less consistent snowfall in the mountains. For the rest the possibility of controlling the weather is at the moment unrealistic if not in the form of limiting **damaging emissions** in general. (Natisone)

... Different to the others I don't believe that there are great effects on economic activity, artisans. The only one could be on tourism, because it can effect periods... It isn't that hot in August etc. you can have a cold August, with abnormal temperatures; or in the winter months if there is a lack of snow in tourist areas. I don't see any other big changes (Natisone)

... it's true that Friuli is a very rainy territory, but we are experiencing increasing periods of drought. So if in the fog, clearly periods of heat lasting two months, but one month is enough, plants, agriculture starts to suffer and to grow crops today without enough good water (is a problem). And so this has changed the way, the methods and the type of crops a bit. For example, in the sense that to grow corn, means having available water, without which you don't even start, you're better off growing other types of grain. There's an increase in pollution, you see it in the city, above all particulates and the rest and so there is also an greater use of fossil fuels. To avoid this you need to work on the public transport system and the rail system, more than this... we're talking about transport here, they should be given incentives, helped. The temperature, rainfall change farming methods, as we were saying, the types of crops and family

vacation habits change, because if there is uncertainty in August in our areas, for example people choose to go to places where they are more sure that it is hot, seeing the availability of low-cost flights, transport, prices abroad. (Natisone)

...I don't think you can notice such a big change in the course of recent years; there is a general tendency however, but this varies a lot from year to year in terms of rainfall or increasing temperatures... so, no, I can't verify any changes. Climactic change could have effects in the future for people and their activities, for example, they say that amount of snowfall will go down and this will cause, especially in our territory, less tourism with **economic consequences** and even **population shift**, of residents; but I can't see any other consequences (Carnia)

... if you think that in 2005 they had to empty Sauris and Garda lakes to irrigate the Padanian Plain, then it leads me to believe that either it didn't snow very much or something's wrong; this can depend on the fact that **farming has become more intensive** and that they use inadequate irrigation systems and waste more water, or perhaps, it depends on the fact that we aren't able to use it. About the higher temperature issue and that pollution exists, they're facts but here in our area we don't seem to see it as a problem, the air and water are clean. (Carnia)

#### **In answer to the above comment:**

... the problem is that in reality our air isn't all that clean at all. (Carnia)

..With regards to refuse collection many families have the habit of burning plastic along with their fire wood and in this case poisons are released into the air.. (Carnia)

.. People burn off hay, leaves, different types of grass in every town but every now and then they also burn off plastic; now there is a fact which has made many people think and that is the incidence of cancer in Friuli and Carnia that probably depend on dozens of factors... radon, industries in many places such as in the area of Sutrio for example; then, there's the question of Chernobyl which is thought to be a cause of tumours; these are all signs that we have to wake up, we have to intervene... now that people are facing situations that were once less frequent they have begun to worry. (Carnia)

.. Many sectors have been affected: for example agricultural, less rainfall and more winter rains, very hot summers, these make crops mature earlier, violent and damaging storms are on the increase which ruin crops. Tourism: little snow in the mountains, **quite high temperatures at the sea** (need to use air conditioning in public places). Energy consumption: less use of heating fuels and greater use of electricity for air conditioning units and freezers. .. Clothing: increasingly earlier spring and summer collections and doubt about winter clothes. (Journalists)

... about energy conservation, that has all in all been stimulated by all this talk about climactic change. Well, I also think that wastage is also due to this change at an economic or work level. It makes me think that, the weather, in its most narrow definition, installing conditioning units on buses, the unit is always on in the bus, and the lady who is cold opens the window. It's all part of economic activity, in the waste of money that can surround the changing weather. (Journalists)

... what strikes me above all is the tendency for people to overheat their homes, maybe keep their houses at 24 degrees in winter and also keep the windows of their homes open, right? We've already touched on air conditioning, however there is an element that, according to me, is very important and, that is the filters. (Journalists)

...The changes will occur in the short term and will influence production, behaviours, habits etc. Every area in life will change, because the weather is fundamental. (Slovenian school)

...The **ice caps** are melting down more and more, and so the level of the seas and oceans is rising. In this area, it didn't snow the whole of last winter, and this, I'm afraid to say, is a clear sign that something is going wrong. The same can be said about the summer, with an abnormal increase in rainfall, that can't not influence the vegetation. It's clear that climatic conditions have changed and in a big way. (Slovenian school)

...There have been no changes up to now. The traffic will influence at a global level. The changes are still subtle, we can therefore only talk about the future. In my opinion it all depends on two factors: man and nature, and, that is, the amount of **pollution** and nature's normal cycle. (Slovenian school)

...As a person who often goes up the mountains I can testify that in the last 30 years almost all the **ice caps** of Canin have disappeared: that the winter seasons are abnormally dry and mild; that summers are excessively hot, rainy, especially in the months of July and August. The negative effects are evident, talking about free time for example, or tourist industry as well as the inconvenience for people who see their holidays ruined by the bizarre climate. (Gorizia)

...It's because it's not programmed. Going back to talk about the **Tagliamento River**, the construction of those famous rings has moved everything to the left. Before we had floods, and they were frequent, and the Tagliamento was used to transport wood from the mountains down to the plains, the water flowed downstream from the river head to its mouth and it took about 14 or 15 hours from the studies that have been carried out. Now it takes 7 hours. So what happened before? As the mayor was saying before, water passed from the left to the right and took up a large area, (the river was) up to 1 km in width, then they put up these panels and the water has moved. When we had flooding it arrived and slowly filled... Now that's it, yes, up until a few years ago the land was worked but now it has grown back into woodland. This is important because the water that stagnated here, did it naturally, without man's intervention: the water filtered through and ever so slowly filtered underneath and also fed the aquifers of the towns on the plains, where once all you needed to do was drill a hole in the ground to get water but now, instead, you have to drill deeper, metres to find it. This is as far as the Tagliamento is concerned is an important point. Now those panels that have been made, I remember when I was small, they were tall, now they are almost at ground level and are very slowly sinking... (Pinzano)

... Before I was talking about the way gravel is spread: the **Tagliamento** is the last European river to have kept the characteristic of the torrent, in the sense that if we were to modify the Tagliamento by these famous great works, we would lose an exceptional habitat, because studies have been undertaken, even here in our town, right here in Pinzano that are searched out by Swiss professors, they are studying the Tagliamento to recreate its habitat on Swiss rivers, that they are trying to "naturalise" them, because they've been channelled. The characteristic of this river, that is, if it were to be changed, we'd have to go outside Europe to study these situations. There are a number of unique conditions, in fact, European researchers come right here to undertake these studies, be they in reference to the habitat, let's say, flora and fauna at the same time, because they're also studying the typical fauna, exactly! What is the characteristic of the torrent? This feature is the spreading of gravel along the river. The panels that Mr Zannier was talking about were put up in the 30s more or less...

... These were as if nature had been programmed and man found himself having to emigrate and the machine arrived to substitute them. You don't know who did the

programming, the fact is that the person who did the scything has gone, but he hasn't only abandoned the hay because winter also meant wood to cut, to clean and, in fact, the woods are closing in on the town. Fields that were once cultivated in different ways and that have lasted for 10-15 years, have now become normal woodland and has been overrun by brambles as well. And, a few years ago, let's say about 20, I noticed that the woods, let's say that the expansion is one thing and the other, added to the type of climate, the air currents and the rest, is the beginning of industrialisation. The trees, thanks to the Locust tree that has suffocated them, the sprouting clusters were narrow and as a consequence fell easily or didn't mature enough to grow well. Other plants, the oak in particular have begun to get diseases, rot and fall and so on. And while this was happening I noticed that **the maple started to propagate, a tree that doesn't exist here, and this hasn't been introduced by man, it was brought by nature, maybe through the storms.** But there used to always be storms, so why has the maple arrived now? Climactic change, the increase in temperatures let's say the minimums, even by only half a degree, was already a determining factor for it to live in an environment that could support it. And now we have big woods of maples. The chestnut gave in, then picked up again but it is still infected with that illness, let's say, it's having trouble thriving. The land, once we were famous for clay, there was even a furnace for roof tiles and bricks, now if you go into the woods it's not the same as it used to be. Clay with the passing of the years, from the 60s onwards, let's say it this way the clean up jobs after the harvest were abandoned so, the leaves remained there, the **leaves above and the clay below** doesn't have the same colour, it has changed. I went to extract some once just for the pleasure of repeating a child's game, but there was nothing that could be done, it was all different. And I discovered that the woods suffer from this, that is, the woods continue in this way, but the climate being what it is with rains of one sort and winters of another, takes it out of sync, the woods have gone crazy and are weak, not as strong as they once were. In fact, when you worked with wood cutting it was incredible, because the wood held out, it didn't need to be treated. Now you can't do that anymore, now there has been a collapse not just for the nature, but also with regards to the climate itself: the plant doesn't have the ability it had to mature as it once did. (Pinzano council)

...I think that there will be a constant increase in the temperatures, there's the risk that the population will suffer because of it. Tourist resources could lessen especially in winter; if for example there were less natural snow the tourist industry would suffer and seeing that for us the mountain is a primary resource, many people, as is already happening, could decide to go away deserting the area even more than it already is. (Pontebba council)

...Concerning the first question... I don't believe that it can influence things very much because the effects that it has had in the mountains is that the **livestock** has been abandoned and the lack of care taken of the respective pastures; which can be the cause of the more significant damages; what we see now is that snow falls only at 1000 m and if the temperature rises further... being here in Pramollo that's between 1500 and 2000 metres, it affects tourism. The inhabitants are slowly leaving the area because the area isn't very well developed from a craftsmanship point of view and so everyone heads towards the cities, towards areas where there is industry and craftsmanship. As a result this what will remain here is a holiday resort with no settled inhabitants. (Pontebba council)

...I'd exclude episodic events or, anyway, those which happen at a distance of a couple of years or even a decade from one another. Pollution is another issue altogether, because this mounts up in time and, probably, in the long run, could create quite serious problems. I'm talking about air pollution and its effects on the land and then the aquifers, etcetera. So I believe

in the short term, in the decades, nothing happens. If these things can build up, above all, pollution can influence both social, work, tourist behaviours etc etc. All we talk about is if it won't snow for twenty years, Piancavallo and Pramollo can close down, if it doesn't snow for a year, like this year, however, it snowed till June last year, so... (Maniago council)

... I think that the increase in temperatures can create the need for more electricity because people turn on their air conditioners and we are all forced to buy one and as a result there is an excessive request for it that can damage businesses because with a blackout or maybe electricity costs increase because of the increased demand and so, without a doubt, firms and all productive activities feel it. (Savogna council)

... in the mountain areas these extraordinary events cause problems for the locals because there are landslides that can't be easily foreseen and contained because people go to the mountains less and less because it is always increasingly abandoned and so the environment definitely becomes hostile. (Savogna council)

... there's an increase in **cancers**; we have discovered only recently that some areas around here near Ronchi, the aquifers are polluted by chlorofluoroethylene by 2,5 mg, if you want some technical data, it's not a lot but it isn't little either; all you need to do is speak with the more important oncology experts to hear that Friuli has been hit by this illness and of a Friuli that is quite polluted. Regarding work related issues, artisans, tourism nothing comes to mind because they are specific sectors, but an example that suggests itself to everyone even the lady who goes shopping every day is that at the fruit stall at least ten different types of apples have disappeared, so, we can understand that something is going wrong; there's less choice and this resounds at an economic level as well, even at industrial and business levels. The amount of dioxins in the air at Trieste has doubled, and now there's the problem of **regasification** that nobody wants; of radio-electrical pollution; let's say that progress won't stop at anything but it should be eco-compatible so the best thing would be to put together technology and the respect for the environment but, usually, these things don't go together and so we have to make choices, those that have least impact on the territory, the environment, on the ecosystem. (Fogliano commune)

... I already gave a partial answer; if in the future rainfall were to drop and therefore less water would be available in the territory and, above all, there were a redistribution in rainfall, we could see a fall in the production of food; contrary to what has been said about the production of apples, the ten types of apples have disappeared from the market because it's not worth while keeping them from an economic standpoint and this I've verified in the area in that, going through the area of Cividale, there is a district dedicated to the production of apples and, just last week, we witnessed the uprooting of an orchard because that type of apple wasn't economically viable anymore; in the mountains however, they're trying to replant these districts, once in the 50s or 60s, in the area of Villanova di Grotte, they used to produce local varieties of apples; something that has been given up. So these climatic changes have already influenced one part of the territory, cultivable land is shrinking more and more. Tourist activities have been touched only marginally, perhaps only in the capital that has been invested. The activities pertaining to the mountains have been affected, yes, there's little snow. Agriculture is what has been hit hardest. (Fogliano council)

... I can add that many varieties of fish that we used to have here in the Adriatic don't exist anymore; we even get tropical fish up here. (Fogliano council)

... To give an example, soon you won't be able to prepare natural products such as small goods here in the Carso because of the elevated temperatures. Take note that I'm talking about important products, that are at present guaranteed by the PDO - Protected Designation of Origin. About wine growing, I foresee that, in the near future, it will be ever more difficult to cultivate vines in the traditional, natural way. I'm afraid that the Carso is destined to becoming increasingly more arid. It's obvious that this sad change will reflect negatively on local agriculture and tourism. (Comeno Slovenia)

... With respect to the past, today we find a whole lot more harmful insects (above all flies), which forces people to use insecticides more often, even for the "new" insects that are much more resistant. If our winters continue to be like the ones we've had recently, the sick (and, in particular, those with pulmonary illnesses) will be penalised. In my opinion, the climate isn't as healthy as it once was: all that has to be said is that – winter – there's more sun in Ljubljana than in the Carso! I've started noticing these differences a long time ago, I'd say ever since 1970... Well, in a certain sense, I'd say that **we are all responsible** for the changes in the climate that we are witnessing.. (Comeno Slovenia)

**The list that the group belonging to San Pietro al Natisone wrote up is the following:**

- more intense storm activity.
- Less rainfall and snow in Spring and Winter.
- Alternating hot summers with rainy summers.
- Summer months generally hotter when not rainy.
- I can not give indications regarding changes to the sea level because I don't go to regional holiday resorts.
- Climactic variations have without a doubt affected the tourist areas that then are subjected to the effects of the changes in the weather (little snow/ rainy summers).
- Possible traffic problems caused by the more intense weather phenomena.
- Fewer mushrooms.

... Going back to the times of the farmers, when there was a downpour in summer that seemed to want to bring hail as well, you said your prayers, you needed to pray so that it wouldn't hail, otherwise you lost your harvest and then times, well, would've been rough. This year we have seen **flooding and a hurricane** in our area, well, it damages the houses in part, but you don't lose your livelihood as you once would have. (S. Pietro al Natisone, council)

... Maybe, here's something, our neighbours who produce wine, I remember one year in particular that it had caused great damage and so we helped them out, seeing that everybody knows quite a few people. Not just the valleys where wine is produced but the eastern Collio also passes right in front of us, we share. For them too, it isn't really for tourism, however they have to suffer from the more intense hailstorms. (S. Pietro al Natisone, council)

I've tried to talk about what everyone has seen, that the winter temperatures have gone up, they are continuing to rise, so have the summer temperatures, there's less rainfall, as a consequence we have a drought problem; a number of different types of insects don't die in the winter this is also a problem for people because these insects continually increase in numbers, they don't go to the warmer regions in winter any more; they don't migrate any more, some **don't even hibernate** any more. There's a general picture of the variations that involves the

*whole world that can be observed. The ice cap meltdown with the subsequent elevation of sea levels which are a danger to large areas of inhabited coastline and, further, the changes that we note in our area with these scarce winter rainfalls and even snowfalls that cause many, even local, glaciers to disappear and as a consequence all the water reserves that are normally used for agricultural purposes; instead we hear talk about creating artificial dams to store water so that it can be used in times of drought, problems that up to recently have been unheard of. (Gorizia)*

## **2.6 Nostalgic memories: I recall**

Personal memories are interesting because they are slivers of real life and because they validate people's beliefs. The elements which make up a person's belief system are not the same in all cases. People may interpret and justify the same situations in a different manner and, in particular, according to their own personal experience.

These systems are based on affective and assessment criteria and, that is, on cognitive and motivational aspects. This implies a distinction between facts or those events that have been judged positively or negatively (for example, environmentalists see refuse and pollution as negative facts, while recycling and taking care of the environment are positively evaluated). Further, beliefs are held to be true in varying degrees. For example, a subject may affirm a belief holding it to be a probable explanation of a specific event rather than another. Belief systems appear just as true as knowledge systems, however, when the single belief is examined individually, it appears less "right" than knowledge does. A model regarding reflective appraisals has been suggested which holds that this is a skill which allows people to analyse, evaluate and solve problems concerning beliefs (King, Kitchener, 1994). These appraisals allow for the formulation of sound judgements and for subjects to take into account the role of context in the evaluations of the problems themselves. This type of reasoning is involved in the analysis and the solving of particular problems said to be "badly defined". These issues do not allow for clear and definite solutions, they cannot be solved through the laws of inductive or deductive logic. Their solving seem to involve other thought processes which activate beliefs about knowledge and on "how to know", beliefs that permit subjects to judge issues on the basis of their idiosyncratic "theories" and opinions. The subject who tries to solve an undefined problem puts himself in a situation of uncertainty. This is the exact situation that has been created when a "solution" to environmental problems (vaguely delineated by definition) has been called for.

*... I remember well, when I was a child, I used to have fun, with my friends, sliding on the ice that formed on the water troughs. Now this wouldn't be possible any more... Once it was commonly held that the months of November and April were wet months. That's not true anymore. It has to be said that all these changes are difficult to observe over a period of a few years (because they are less accentuated, they're gradual); to monitor them, you need a longer time frame. Normally, the grape picking season ended in October, while now grapes are picked in August and September. (Slovenian Farmer)*

*... I've probably noticed some changes relative to the time when I went to primary school. For example, I remember that Springs were warmer and lasted longer, like the winters that were less rainy. In recent winters, for example, we've seen less snow than what I remember from that same childhood period (in the 50s and 60s). Anyway, it's an opinion that isn't supported by hard facts. It's only a sensation. (Natisone)*

... Talking to older people however you get different opinions that state, for example, that it happened that you also got warm winters and colder summers in the past. (Natisone)

... For example, talking to older people, there is the fact that there have always been these inconsistencies and so, it must be cyclic. According to me, above all in recent years, like last year winter was harsh, this last one was. The glaciers are melting, there's always less snow. (Natisone)

... I remember, when I was a boy or youth, the beginning of the school year corresponded with the beginning of Autumn; now, instead, we have an increasingly milder October and it isn't unusual to see people go sunbathing on the Trieste Riviera or at Grado or Lignano, even in October. (Tele 4)

... two aspects: personal and of people who I know here in Trieste. Everyone confirms my impressions and, that, even here in Trieste people noticed winter because there was the Bora, on the highlands it snowed, something that doesn't happen any more or only rarely occurs. As I have already said, before 1960, there were these temperatures that kept at a certain level, so it snowed towards the 15<sup>th</sup> of December and the snow remained until the end of March, even if Feltre, the town where I lived, is only 280 m above sea level. And this happens in Carnia, this happens in Friuli. About the fact, to go back to what I was saying, that this year has been particular, in my opinion we can't even take into account what has happened because, if you go to the Veneto, in winter the fog remained 20 or even 30 days, I remember one November: we had fog from morning to night... (Journalists)

... 20 years for profound climactic change is not enough, as far as I know. And this is what came to me. For example, I remember when I was small at about 5 or 6, we're talking about 20 years ago, well, it snowed in Trieste, practically every winter, and it wasn't a light snowfall, it was the kind of snowfall that forced you to use a lighter to unlock the car door, otherwise it would've remained frozen shut. Recently, however, I can say virtually in the last 10 years, I've seen snow in Trieste just for a couple of days, just a smidgen. So, in twenty years winter has changed dramatically. (Journalists)

... Yes, without a doubt there are, above all, I was born in 1920, so I'm older, above all in my opinion after the 50s, except for example in winter, excluding a couple of years, I think that the winter of '82 there was a biting cold, but for the rest, this difference is noticeable. I recall when I was young, a lack of snowfall was rare in Pinzano... it was rare not to see snow. I remember that, as a boy, when we got up in the morning there was ice. It's also true that you felt the cold more because houses weren't as well insulated as they are now... We're not talking about exceptional colds like in 1928, that I remember well. The lakes that we have here froze over, now you can hardly notice the ice. Above all, I have the impression, the impression? No, I'm absolutely sure that this difference with respect to before is becoming more marked... (Pinzano council)

... And in particular it was in the season of All Saints that we heard this and that happened, but nothing happened any more. And after it started, a little at a time, to change, but not all at once, but haphazardly, as it happens. Then going ahead, everything stopped, maybe the springs had less water and all, the land needed more rain and this here started to concern me, because if the springs disappeared, the small springs, they were important because the yearly cycle was always the same, we used to go to the smallish torrents and you could see something... and after I continued to observe things around me and I discovered that lately it has a calculated strength, yes both in summer and in winter, it has changed everything. When it was time to make hay, when we had to gather wood, you could sense the coming of bad

weather, let's say winter, and it was beautiful: it came on slowly, it brought with it its colours, then it filled with grey, slowly, it was all compact and then it snowed. If it didn't snow, then it meant the clouds were at too high an altitude, otherwise we got those 10, 20, 30 centimetres even three or four times a year, when I was young. (Pinzano council)

... the temperatures are anomalous with respect to the turning of the seasons, in the sense that at a boy, seeing we lived in a farming environment, spring started, then summer came along. At first, the summer gave us moments of good weather in the morning, then it clouded over and we got the usual storm. Now we can get it at 2 in the afternoon and at 5 it's clear again. I've noticed this irregularity, because in the past storms started at 5 and finished during the night, now they're already over at six o'clock and at eight it's sunny again. (S. Pietro al Natisone)

... when I was little more than a boy and we're talking about thirty years ago I went to see the glacier of Canin that had already shrunk but which was quite extensive; I went to see it again two or three years ago and I was shocked to see how much it had withdrawn to a few patches, two or three and this is striking because in my mind I see the images of the past which are of a certain magnificence and now there's little more than nothing at all, so this change is conspicuous. When we were young lads in the 60s, we used to go skiing and the idea that, in only a few decades, the whole snow cannon business, it was unthinkable because nobody would've thought it could've happened, except for maybe a few experts, the possibility of getting to a point in which the situation forces you to impose such a thing as man made snow for business reasons.

... I recall that when you went to school and they taught you, probably they still do, about the seasons and their differences, you'd used to draw pictures of autumn with falling leaves and mushrooms, etc. etc., with the remaining seasons, it was to all effect an evident situation in that sense. So, over the years, let's say if the 21<sup>st</sup> November marked the passing from autumn to winter, a difference of 10 days was already noticeable, that is you saw it. This last year however, the cold came late or it came 10 days early but, let's say, the seasonal changes were really marked. This situation has changed nowadays. It has changed for both summer and winter, about the cold weather, I remember we used to go every year, even though it wasn't a skiing are, and yet we would ski from the castle every year, and going to school we had snow up to our knees. Over the years it has changes and we don't see the snow anymore, in summer you get violent storms. The intermediate seasons themselves, that is spring and autumn, were distinct, while you once saw fruit trees flower in spring, they would flower and you wouldn't get frost anymore; now there's the risk that you get frost that blocks everything. I don't know if our country is too small a context to use as a comparison, but we have, as I said, the Tagliamento river that for us is extremely important, I mean the upkeep of the Tagliamento to help the water flow, I mean, we were always at risk of severe flooding every hundred years or so and that today, however, we have a Tagliamento that is often dry or more frequent flooding, leaving out 1966 or other extremes, however, if you measure that, however, the fact of having deviated water away from this river to others, this change: you could see the mountains covered in snow in winter, that is, even at low altitudes... you've seen a change in my lifetime, so from the 50s onwards we've noticed this change... (Pinzano)

... There were lots of brooks that flowed into the Tagliamento and in most cases the brooks that there were then held clean water because they (the farmers) hadn't started using copper sulphate for the grapes and also they didn't use the insecticides they do now. The brooks

were clean, they'd go do their washing in the brooks but, quite often they had to break the surface ice. (Pinzano council)

... The seasons don't correspond to their names; the fact that we have these floods and droughts... once it was much hotter in this area, in fact, we had wheat crops we don't get anymore and there were many more floods and much more rain, the rivers would swell for far longer, but there weren't sudden rains, it rained far more slower. I think that the mountain isn't taken cared of as it should, that's why the water from the streams doesn't filter into the ground anymore, it isn't absorbed by the mountain anymore but it goes straight downwards towards the valley causing the banks to overflow, these floods. (Pontebba council)

I agree with what's been said; the fact that the many streams should be taken cared of... we should also take care of the woods to avoid certain types of flooding. We used to get snow from November to March, it was hot in summer. Now we get one snowfall and beyond that, nothing, it rains in summer; the problem is finding a solution. (Pontebba council)

... It's clear that with "major" (variations), if you speak with regards to glaciations, I also think that they're not significant, however the ones I listed I thought were noteworthy in that I am not the only one who has observed them, a whole group of people have, different people with whom I keep in contact. For example, with regards to snowfalls, I refer to about thirty years ago, it's been noticed in our area, for a very simple reason, this isn't a fact that has been observed by the experts, but rather it has arisen spontaneously from the hunters that hunt in the alpine area. Virtually, snowfall in mid October was guaranteed, around mid month, of course. In mid October they have vivid memories of going hunting in the snow: this hasn't happened for at least twenty years. I don't know if twenty years is a period of time that we can consider of note, or not... (Maniago council)

... I have observed this, because I remember that as a child we used to go swimming, here at the Cellina torrent, from the end of March onwards, something that, for example, up to last year was practically impossible to do before mid June. Well, maybe last summer was something exceptional, but this is the tendency. So I've noticed that the two intermediate seasons are disappearing and summer ends up being generally between half June, the beginning of July and half August; and then we start with winter again, if we're lucky, more or less. (Maniago council)

... I recall that even when I was a child (...) snow that doesn't fall regularly any longer, because I remember that we would travel by sled, habitually every year, maybe for about ten days. Now there are winters where there is little snow (...) And, undoubtedly, summers. In the last five or six summers I've become aware of a torrid heat that starts in June, at the beginning of June, a period that I remember very well, the June that marked the end of the school year which were much milder, much more similar to the beginning of summer, let's say. Now, instead, we get summers, there was one in particular, where the heat just didn't let up, even after August. Other times you get alternate moments of heat and storms, but the heat is even more scorching, more sweltering and above all arrives sooner. (S. Pietro al Natisone council)

... I want to pick up what my uncle recently said: on the Mataiur we used to make skating tracks, and I remember how we had races till the 7<sup>th</sup> April. And I told him: "Uncle, you could have practically done it last year as well". "Yes, but last year was the first time in twenty years". And perhaps, nothing better than this can give us the idea of an objective progression. But, objectively speaking, you can't go skating anymore.

... In fact, they dismantled the facility because they thought it was dangerous for the eggs, because some birds build their nests there. And, also, nobody used it.

.. So, you've brought up a childhood memory I wanted to talk about: during winter we would all go to school on foot, there wasn't a school bus service yet. We used to go to school, but for months at a time, along the river-bed, that was a mass of ice. Now, it doesn't exist anymore. (S. Pietro al Natisone council)

...I can propose (a memory), and these were certainly real things, because I can tell you that in 1970 I was in the Marmolada, I was a ski instructor, and at that time the glaciers, I'm talking about the winter glaciers, at that time, in the Marmolada, you could find them down at the pass at 2000 m. You'd go up by the cableway at Marmolada, and you'd reach the Ferraia pass. Let's say I was there till 1977. I went back after twenty years: the Marmolada had withdrawn 700-800 m and this is a fact, that I have verified myself. (Aviano council)

## 2.7 Answers to the third question:

**"Do you believe actions are being taken to solve the problems arising from climate change and/or which measures would it be advisable to undertake?"**

**In case actions are being taken, do you believe that they are supported by an adequate informative campaign towards the citizens?"**

The first answer provided serves to define the problem:

...What I noticed from this question is how complex dealing with matters such as climate change, without setting them apart from all the rest, can be. What emerges from the answers is that we are in the presence of energetic, behavioural and educational problems. I could summarize the comment by saying that these answers have highlighted the fact that the climate changes we are talking about, the ones related to our territory, are part of a much wider problem. It is somewhat like that Chinese game where by moving one stick you move the other sticks also. My second observation...everybody has underlined, as citizens, that people in charge of regulating societal behaviour have long realized that something need to be done for the environment, because everybody has said that something is being done both at a local and at a global level; many have underlined the fact that much more could be done, which means that the problem has not been totally solved, maybe due to its complexity. This is an important aspect, we have recognized that there are certain rules, of course we can discuss about their efficiency and effectiveness, but I believe this is a very important signal already. Third point...the aspect of communication. I believe that everybody has underlined the fact that in terms of quantity there is a lot of information, the citizen is widely informed...others have highlighted the problem of quality...I shall conclude by saying that the training of the citizen or, in any case, the effectiveness of certain rules that are adopted, passes through an optimal information channel, therefore the problem of information is as important as the question of the rules to be adopted or the behaviour to be assumed to preserve the environment. (Osmer)

..yes. I am certain that actions are being taken to solve environmental problems. **The Kyoto Protocol is one of them. If by "action" we also mean the act of understanding what is happening and what could happen, then the actions taken are even more** (this project and questionnaire are an example of it). I think it would be appropriate to raise the population's awareness regarding these matters in order to favour a "sustainable development" kind of mentality. Perhaps we should all implement a better resource management (limit water

wastage, turn off the lights in sun-lit offices, turn down the heating...). I'm afraid there is not enough information regarding the measures being undertaken. (Osmer).

.. Local solutions (incentives for the installation of renewable energy production systems, energy saving initiatives – in public transport, waste recycling, by creating new vehicles and home appliances, initiatives promoting the use of non-fossil fuel energy sources and the contentious nuclear power, etc, etc..). These sometimes interlace with different economic interests. Which of them should be activated? So many alternatives.. I am not an expert in this sector; probably a resolute, clear-cut carbon tax would help a lot (I am saying this as an outsider, I repeat). In general, I believe that the information is there but that it would nevertheless be good to boost it. (Osmer).

.. Italy has adhered to the Kyoto Protocol, but is still not respecting it, while important nations such as the United States haven't even signed it yet. Furthermore, I don't believe that the current energy policy, which basically relies on petrol, is the best possible solution to decrease environmental problems. There should be a far greater exploitation of solar energy, of alternative sources and perhaps substantial incentives to promote hybrid cars. (Osmer)

.. Over the past 30/40 years I have noticed a "destruction" of the farmland system, ditches are being closed, more and more industrial warehouses are being built on "good" farmland, we have been using heaps of chemicals and pesticides! Therefore, "first of all" we should, or maybe I must say, we should have paid greater attention and been firmer when it came to upsetting the environment. It is everybody's fault, from the farmer to the municipality (administration), etc. The truth is that everyone is concentrated on their immediate economic interest but does not have an intelligent, long-term perspective. I know I haven't replied to the question, but what we have witnessed in the Friuli Venezia Giulia region in the indicated time-frame is an environmental disaster, regardless of climate change. (Osmer)

.. I would say that questions of this kind do not reflect a professional type of knowledge. In this moment we are responding as "common people", more or less aware of what the environment actually is. I more or less agree with many of the answers provided, some I find too generic, but this happens because unfortunately the questions are generic also, which leads to give the most varied answers. What I wouldn't want, though, is that this sort of inaccuracies end up producing a generalization of the environment/pollution/climate change issue, so all in all I believe it is better to be slightly more specific and to circumscribe the field of discussion. (Osmer)

.. what has struck me is that on the whole, as a group of six people, we appear to be quite well informed on the initiatives underway, **but we all expressed the need for better information**, which might seem a paradox. My explanation is the following... we all have a medium-high level of education, but when we think about the problem of information quality we do not use ourselves as points of reference but imagine how the problem could be perceived by the "man in the street" instead, or by the population as a whole. This might explain why we provided different answers and expressed different hopes for the future. One last remark... what all this proves though, is that the six people present here today are considerably fertile and receptive from this point of view, both in terms of the initiatives that should be started and in terms of the issue of information. (Osmer).

.. I've been struck by the answer provided by someone who said that there is sufficient information on the actions that have been taken, somebody else, on the other hand, answered that there is not enough information. Supposing that both of them are saying the truth, the

problem is that quite often the information may be there but we are the ones who don't go to look for it.

Maybe we are lucky enough to have the tools needed to retrieve that information (Internet). Maybe the "man in the street" – for example my parents who do not possess this tool - finds it difficult to go out and get the information. Maybe the authorities put the information at the people's disposal but it is then up to the people to go and get this information. (Osmer)

..I am not questioning the problem of information, there is so much of it. **the problem are the journalists; the journalists who involve the population in the informative process**, through the mass media, newspapers, etc. The journalist's need is not only that of giving information a tone of truthfulness, but also that of making it somewhat sensational and this can sometimes modify the information itself or at least deflect it from the course intended for it by the source providing it. This is one of the reasons why we decided to **write the information ourselves and then pass it on to the journalists, so as to perhaps limit the number of mistakes that can be made. The news** provided on the subject of pollution intrinsically isn't very precise because the same scientists not always agree on the causes or the way things are going to end and then the journalist who chooses to highlight one aspect rather than the other does not appear sufficiently objective..what is a possibility becomes a "this is certainly so". So what is the power one holds compared to, for example, Canale 5.. etc. (Osmer)

..Again, everything has already been said..all I wanted to understand is whether perhaps a question thus formulated isn't off the mark. If we are **talking about climate change we can discuss the repercussions it can have on the environment. But a question on climate change gives me the impression of a different approach; I wouldn't want** the person using this work's final results to associate climate change to environmental problems as if all environmental problems derived from it. (Osmer)

.. As to the issue of the quality of water and air and, more generally, the quality of life, it must be said that many researches (particularly those on energy consumption) are conditioned – if not directly financed! – by the world's most powerful multinational corporations, which possess market monopolies and often seek every possible way to obstruct the research of new and less polluting energy sources (the so-called alternative and renewable energy sources), thus discrediting scientific studies. (Farmers Slovenia)

Also non-specialist groups prove to be acquainted with globally implemented measures.

Everybody knows that anti-pollution measures materialize very slowly and are adopted with blameworthy delay. Everybody is also aware of the fact that the world's greatest powers (United States and China in the first place) have not signed the Kyoto Protocol on greenhouse gas emissions. Apparently subscribing to it would entail extremely hefty expenses (purification plants, desulfuration plants, particle elimination plants, etc.), which their Governments are unwilling to bear. (Farmers Slovenia)

...The measures proposed are the ones we know: use of alternative energy sources, return to wood as construction material. Lighting sources: use of LED bulbs, which are more powerful and use up less energy. Industry: have one single shift. (Farmers Slovenia)

..Probably it has not yet been understood that these are not temporary but structural changes; that they are the result of human action; that without a set of large scale corrective measures there is no hope that things will return as they were. (Farmers Slovenia)

...Yes, both the civil protection service and Osmer, which are trained to collect such data, obviously trends and all can be found on the Internet. In any case, I believe that it is in the interest of the citizen that at the regional level we are not conditioned by the ideal trend of logics, they say the ozone layer is deteriorating, but it is more at a global, a worldwide level that the change is taking place. At a regional level it does not have that much of an effect because actually the variations, as we said before, are minimal, there is not – how should I put it – such a striking variation as to make us say: everything is changing here. (Natisone)

...The Regional Government performs its informative activities towards the citizens with great care. Let me mention, for example, the activities carried out by Osmer and how its experts are always at the disposal of citizens in need of information. Informative action could be further improved by introducing it in schools as well, thus creating a true culture of meteorology within the population. I am saying this because if one learns how to interpret data or certain moments or certain climatic events, then one can also avoid to be conditioned by the mass media and by the press where simple reports regarding climatic circumstances, which could be normal for the winter or the summer, create unnecessary alarmisms. So, let's say, let us add meteorology as a subject already at school level and start providing young people and families with the basics and this way create, as I said before, this culture of meteorology. (Natisone)

One thing which struck me is that verdigris has been used for 120 years in viticulture. In the past years, though, experts have learned that verdigris is harmful, so they banned it and other products are being used in its place. But from what I know, these products are also harmful! So at the end of the day I believe that we are often confronted with matters of economic interest: everybody is always trying to sell and to make money and ecology – alas – has become a business also. (Farmers Slovenia)

...Governments should issue more restrictive laws, guaranteeing a greater environmental safeguard, and should commit themselves to see to it that they are in fact obeyed. (Farmers Slovenia)

...I think that effective actions aimed at solving the problems due to climate change are being implemented. Since we know that one of the main causes is pollution, it should be fought much more seriously. The initiative should be taken both at a local and an international level, and should always count on a responsible stance on behalf of the individual citizens. (Nova Gorica)

...With the Kyoto Protocol something is starting to be done with regard to the use of biomasses, the use of renewable energy sources (wind, solar) but we are only at the beginning and there is the need for effective action as to awareness raising and information in schools. (Natisone)

...partly yes. I am referring to artificial snow facilities in winter resorts, for example. As to the more generic aspects of environmental protection, the situation is different. Appropriate actions are being carried out in the field of agricultural activities, which are essentially directed to this sector's operators. Most of the population is not sufficiently informed and prone to ride the wave of sensationalism. (Natisone)

...I think that measures are being taken by the Regional Government... data control and analysis. I believe that the information provided is adequate in terms of data transmitted... to the citizens. (Natisone)

...I believe that our Region is paying due attention to climate-related issues and that it has started an appropriate information campaign on the entire territory. This action could nevertheless be improved, for example by adding specific courses in schools providing

information on climate trends, so as to create a "culture of meteorology" in the younger generations, who will become the future population. (Natisone)

**Almost everybody agrees on the fact that actions are under way to address the problem.**

...Yes, I believe actions are being taken; there are incentives in the Friuli region for vegetal biomass-fuelled plants. We, as a body, also build biomass power plants; then there are also the environmental management systems, which have been activated and are encouraged, too. (Carnia)

..Certainly citizens should be better informed, but not in a hypocritical way. This means that it is useless to see a person solely as a consumer and to constantly push this person to buy futile objects, which are costly to produce from an energetic point of view. Generally speaking, we ought to adopt a counter-policy in response to consumerist society. (Carnia)

...I agree with what has been said up to now: I also believe that certain measures are under way but they are still in an extremely embryonic stage and are not sustained by an adequate informative action. People should be made more responsible: the population and its representatives are changing, perhaps because it is fashionable to do so, but the change is very slow. Only making the population more responsible, through schools, for example, can boost things. In my view, the public administration plays a central role. (Carnia)

..Some important interventions have been made by the Mountain Community: we already mentioned the biomass power plants, then we have six hydropower plants, we are building biomass-fuelled heating systems and have already completed a photovoltaic facility. An analysis of Carnia's energy plan is being carried out, whereas another investment we decided to make, which has not been concluded yet, is the establishment of a company in charge of evaluating energy savings. The first and foremost aim of all these interventions is to guarantee energy savings and to raise the awareness among the population. If, on the one hand, we are taking actions to produce renewable energy or to consume less, it must be said that the communication plan is actually not adequately structured. It is more "saving" rather than "information"-oriented. We are not quite capable to communicate what little we are doing. (Carnia)

..there are various interventions..black certificates, white certificates...

...Yes, a few smaller measures are under way; look, for example, at the Kyoto Protocol. In my opinion they are not supported by an adequate information campaign. Most of all, they have little support when it comes to deciding to act on a large scale. (Journalists)

..yes, undoubtedly some measures are being taken, since we are talking about them and they are being talked about, which, in my opinion, are still very few, also because behind all this there are huge economic and political interests which of course constrain the process. Just to make an example, the famous Kyoto Protocol. In my opinion, people are very little informed, partly because not much is being said, partly, I think, because there still is a large percentage of the population which..is not at all interested..who thinks "this is not my problem, it's something long-term, therefore I won't be bothered"... I don't know..there is the problem of pollution and I see very few people who are eager to use public transport, for example. Many, who could easily take either the car or the bus, quite happily opt for the car without even posing themselves the problem. (Journalists)

...You see, to me the greatest problem is the following: objectively we cannot say that no results are being achieved, but they are not being shown. Earlier Elena exposed what I believe is a very simple and consistent thought: I collect my rubbish separately, but, at the end of the day, has anybody ever shown me the usefulness of my action? Recycling plants exist, and if so, how much has consumption decreased, how much have I improved. All this information is not provided. Probably if nobody provides this information, then it means that it simply is not there or that the percentage is so irrelevant that it can be disregarded. Communities must learn to develop collective habits, that is to say, habits pertaining to entire populations and not to just a handful of scientists. (Journalists)

...because here, we aren't only talking about culture, because already in Italy-without meaning to offend anybody – we see that if we go to certain parts of the country we will find some differences even when it comes to separate waste collection, so we'll have to see who's going to be the winner at the end. Anyway, as I already said, talking about Europe and Italy, I believe that the information and awareness raising campaign towards citizens is only at its very beginning, that is, something is really being done now ... (journalists)

...Recently, during the German Presidency of the European Union, a set of norms regarding the control and limitation of polluting emissions (which will hopefully be reduced by 20% in a few years) has been approved. In order to have tangible results though, these rules should be applied worldwide... We know, instead, that the Kyoto Protocol, for example, is not yet being respected by everyone, starting from the US and emerging industrial powers such as China and India... We must become aware of the fact that there isn't much time left: it is necessary that –the US in the first place, as the most industrialized and most polluting country in the world – we decide to care more about the environment. Information campaigns at a local and at an international level (UN) are still not sufficient. In the Friuli Venezia Giulia region, for example, there is an excellent network of separate waste collection and recycling, but other things may still be improved. (SLO)

...What is being tried to be done is to launch a strategy able to positively solve the problems linked to environmental degradation. I think that in order to do so an international plan is needed – I am thinking precisely of the Kyoto agreements – whose goal is the sustainable development of the industrial sector so that it does not "suffocate" or pauperize natural resources. I also believe that in order to accomplish this we can no longer think in terms of single and restricted geographical areas, but decidedly need a global approach to the matter. In my view, a set of rules need be set which, starting from the citizens, everybody should obey, without distinction. By doing so, the citizens – better informed and aware of the consequences of their behaviour – would also become more responsible. (Slovene information)

...Measures are being taken with regard to particulate matter; traffic plans; advice on energy consumption savings; financial aid for the installation of solar panels; currently there is the problem of the incinerator; in general, I still believe not much is being done. As to information, I think it also depends on how much the single individual watches the news or reads newspapers. (Italian school)

...I believe that in case there had been a climate-related problem, the most immediate measures have already been taken; nevertheless, maybe the population should be made more aware of the existing environmental problems, separate waste collection should, for example, be given greater importance, ecological Sundays should be promoted more often and/or the urban transport network should be intensified (use of ecological vehicles) in order to decrease the level of pollution in our cities. It would also be desirable to introduce, at least in primary and

secondary school, one hour per week of environmental education to increase young people's sense of responsibility towards environmental issues. (Italian school)

..Citizens are not informed enough, greater controls should be carried out in factories on the elimination of their waste, which is generally toxic; some time ago I took several grades to the garbage dump we have..the incinerator..and they told us great things, we are the best, the most beautiful, we don't pollute at all..whereas recently it has been discovered that it is quite the opposite, so one doesn't even know whom to trust. (Italian school)

..I would increase the number of ecological Sundays and at the same time urban transport should be intensified also since -on the whole - it is rather insufficient. Then, as to prevention, I believe it would be better to set off these environmental campaigns, starting precisely with young people, with children, therefore introducing an hour of environmental education per week. Parents have less and less time to dedicate to the education of their children, let alone environmental problems, I believe it is up to schools to give an education in all fields, including respect for others, for our fellow-citizens. (Italian schools)

..An adequate informative activity only takes place during political campaigns then everything becomes silent. Several actions are being taken, such as separate waste collection and incentives for photovoltaic energy, but that isn't enough. (Gorizia school)

..people talk so much about separate garbage collection, but there is not enough information. During every political campaign, there is an attempt to change the system only to win the highest possible number of votes instead of seeing to safeguard nature in the first place. People are not sufficiently informed. (Gorizia school)

..No. No concrete provision has been made, either by the Region, or by the State. I firmly believe that the Italian population should be impelled, through state-imposed obligations, to do something to safeguard the territory. Educating the younger generations is not sufficient; everyone should be pushed (even through penalties) to respect the environment. (Gorizia school)

..Information is missing. Action is missing. The will of the individual citizen is missing. (Gorizia school)

..I will place myself somewhere in the middle, I am neither too pessimistic nor too optimistic, also because I look at the practical side of things: we aren't worse than the children of the future either. I mean, we all have done something good in our homes, so we must...well, two scenarios come to my mind on this issue. That is, a set of situations must persist; industries must find practical solutions, so that they will pollute less. That means finding solutions so that the Trieste iron factory (Ferriera) will pollute less, otherwise it should be shut down, these would be, so to speak, the big solutions. I believe that the small solutions, the ones intended for the families, are the ones which take us back to the past, to forty years ago when there was very little waste, when everything was re-used enough, when all the children had a lot of things anyway, although many were self-made and not ready bought. This certainly implies a huge effort since it is much more difficult to tell a child to draw a picture than to give him a Power Ranger, and I'm saying this because I see it at home. It is harder to get a child to draw a non-polluting picture than to go and buy another piece of plastic. So, in my opinion, there should be a combination between moving on with research and moving back with consumption and this because we all know that we cannot simply hide the dirt under the carpet, because sooner or later we'll find a dune there when we lift it up. I think this kind of information is more widespread, it can lead to, for example, I am fascinated by an advertisement I haven't quite understood: the one where they tell you not to use the washing machine only at night time, but to use this product which will allow you to do the washing with cold water and therefore save a

lot of energy. I don't know whether you still get a clean shirt at the end, but let us examine how to...(URP)

Advertisements also play a particular role and partly act as a warning:

...Actually, I was struck by that ad which talks about people who throw things away, regarding the issue of recycling, separate waste collection, where there is a mother changing her baby's diapers...

..Oh, yes, and she throws them into the future...

..But –good heavens- I ask myself why then, in my home, my parents, I mean, I learned how to collect my waste separately years ago from my mom, at home that is. So I ask myself, I mean, what I want to say is that I still see people which I consider to be a certain kind of people, like Micaela, who confirm to me, as she said, that they do not collect their garbage separately because they haven't got enough space and they are lazy, so I have to ask myself how come something, which is now part of our collective imagery, is not in actual fact widespread. Furthermore, well, it often happens that I reach the recycling collection container with my bag full of bottles and I find it completely filled, so I have to walk back home with my little bag, so that if I were a cartoon I'd probably have a thousand exclamation marks above my head epitomizing all the curses... So, even in this case, all the things we hear about, the legends which tell us: yes, yes, collect your waste separately and then you see people throw everything away, everyone will just put everything together, I've seen them do it, so, you know, it is nice that all these things are been done at school on environmental education, it is wonderful that as parents we are trying to do something about it ourselves, but then if you think about it, at the end of the day something has to be done at a higher level also, a lot should be done there, and for the moment I see nothing. (URP)

...One last remark regarding the separate collection of waste: in 1999, when I went to live on my own, I started off with the idea that I was definitely going to do it with plastic, because I observed my waste production, and I filled three huge black garbage bags with all the different plastic gadgets I had. One day, when my house was exploding, I said to myself, " Well, the time has come to take them away". I looked for a plastic collection container like crazy and didn't find it! And to tell you the truth, I must confess that I got terribly upset because, I mean, next to the standard waste containers they must also place containers for tin, for plastic if they want the citizen to become more disciplined. Because you are great at this, and I admire you for it, but I was in the city centre and I was so angry that I threw a terrifying amount of plastic objects into the general refuse container, which I know was an environmentally abhorable thing to do. (URP)

...I believe that besides an insufficient information campaign, at the root there is very little culture on the subject and not enough climate and environmental education for all age groups and I believe these are issues which are not discussed at school so even while growing up one has very few tools at his/her disposal to be able to cope with this kind of concerns. So on the one hand we have scarce education and on the other we have **fragmentary information** coming from extremely diversified sources having different objectives, so a person working in the tertiary sector, for example, is provided with the tools necessary to assess this information, whereas the general population finds itself slightly unprepared, which means it does not have a day-to-day set of tools to use to face these changes or to give its contribution. (URP)

..I agree, in the sense that we lack a specific education and culture of the individual citizen, which could definitely be provided either through an external information campaign or could be done in schools or even at home. At a general level there is communication but there is

a lot of it when the problem is at its peak, and at that point it becomes aggressive or even catastrophic; but in 15 days the issue will be forgotten just as it happens with other things. There should therefore be a certain consistency in communicating these changes and an accepted source should be identified, because people tend to get confused, because one day they read one thing and the next day they read its precise opposite. (URP)

... During the first episode of the show I went to talk to the people in the street; streets are shut down to traffic but then you see buses, the press, ambulances and police cars pass by. Often controls have not been most appropriate, the local newspaper (Il Piccolo) carried out a survey and 6 out of 10 people that were stopped didn't meet the requirements. So then you close down the streets to traffic without providing a suitable alternative. As we live in a city with a high rate of elderly people, you can't expect them to walk over such long distances. Free buses for all! (T4 Information)

.. As for the spreading of news, my colleague was right when he pointed out to the need of more school instruction on the matter, of more information to the younger citizens, remembering that schools are the place where everything happens. We are nevertheless left with the final consideration, which is that the vast majority of the population is not well informed on what we could call the general meteorological notion, because it is easily influenced by the media on events that, at the end of the day, may well be considered normal. If it snows in the mountains, if the morning after it snowed the roads around Tarvisio and in Carnia are full of snow, it is obvious that we'll have to put snow tires on our car and that salt-spreaders will be running up and down. It is obvious and normal, where else should snow fall? What I want to say is that instead of emphasizing this kind of events we should re-learn how to take care of our territory, which, in the past years, has been rather neglected. I am referring to certain plain areas where ditches and drains are slowly disappearing. As they disappear, the fields easily start to expand. A banal example, which shows how targeted and scrupulous efforts, aimed more towards minor issues, when put together can create a territory as articulate as our Region,. (c.m. Natisone)

.. In the last few years I noticed that some actions have been taken, such as closing the streets to traffic on certain days, closing the historical centres, but their impact on pollution is quite limited as they are limited to a few days only and the rest of the week traffic is as intense as usual so the effect on pollution is not great; public transport should be promoted more, so as to discourage private transport, the number of public vehicles should be increased, their efficiency enhanced, their schedules made more reliable. There should be a firmer control on industrial activities so as to reduce their levels of pollution; the substitution of machines should be encouraged, there should also be different kinds of incentives for household appliances so as to reduce domestic pollution also. It seems to me that at a regional level there is not enough information nor are sufficient actions being taken at the level of the regional administration where we are still in the realm of hypotheses, from what I hear. (c. Gorizia)

.. these policies should be looked at from a supra-regional perspective, in the sense that since these changes are taking place at a global level, the region, which is a smaller, less important territory within the wider Italian and European context, well, I would refer these decisions to a national or even European level, because since we are part of the European Union, I say these policies should be decided there. Practically speaking the region could create a series of services "for the people" since it coordinates and finances the activities of the municipalities, it could provide a whole set of **incentives or assistance to soothe this kind of problems; in practice, these could take the shape of vouchers, contributions, loans** for the purchase of

air conditioners to help the elderly or disabled people, perhaps through mountain stays in the summer period. Basically give small signals, which could come handy in our region. With regard to information, by and large something is moving, I saw the last regional law on town planning, which says that it compulsory for all new dwellings being built to be **provided with photovoltaic solar panels** whereas before only a few contributions were given so this is a strong signal, the fact that the citizens are required to provide themselves with this sort of equipment; perhaps, in my opinion, it is even too strong a signal because one should allow the individual citizen to make a choice by giving incentives. We also find ourselves in an unprepared market; there isn't an adequate competition. (c. Gorizia)

..I would like to underline the fact that in terms of mentality we are lagging behind and will do so by giving an example: several years ago a colleague of ours came back from Munich and told me how they already had these construction systems there, which foresaw the saving of water and that this mentality lead to the common use of these systems. Here in Italy we are far behind, although something is moving. It has been decided that some of our technicians shall participate in a programme at the end of which they should be given some sort of diploma certifying that they are experts in building energetically efficient homes; it is a project that has been borrowed from **Alto Adige, a highly avant-garde region, and which is now becoming a legal obligation.**

...I will reconnect to what they said. Industry funding: there is too much red tape and here nobody knows anything, I had to buy a new heating system and purchased one with a low environmental impact, which cost me 4000 Euro and the Municipality didn't know anything, whether there were incentives or not; the region knew even less, there were incentives for solar panels only so I didn't receive a penny and among other things the technicians don't know anything either. (c. Gorizia)

... Now they are destroying the forests, everybody talks about it, especially in the Amazon and in the East, and this is causing severe problems to our climate. Here, in our own little corner of the world, we are moving in the opposite direction: forests here are growing. And not only: if there is an activity it is also protected, I mean, one positive aspect is that the forest guards are monitoring and protecting the forests. One can no longer go into the woods and chop everything down, because the forest guards come and tell you what you can and what you cannot do. Here, we are moving in the opposite direction. (c. Pinzano)

..I mostly talked about the Tagliamento river, but if I now relate to what is near the Tagliamento river, starting from its mouth, from its sources and moving down, I must talk of the necessity to have a plan. A plan meant primarily for the mountainous area, therefore provided with incentives, which would also help the populations living in the mountains to survive, by providing jobs for the young. By promoting a reforestation plan and not creating slopes; today people want to make ski slopes because they are profitable, but sometimes they also destroy the forests. Forest slopes, which are then abandoned and not "maintained", because one receives the financial contribution to build them and then they are simply left there, ruining the landscape. But through the promotion of certain activities, which, I add, could be youth-oriented, through the promotion of mountain life, the younger generations can be encouraged to create something which will enable people to live in the mountains. By resuming an appropriate territory cleaning, forest activities, etc... At the same time, moving further down towards our areas, there is a lot of talk about biomass and other situations, but this can only be done if one has a job or an incentive, so the consortiums that are being set up now have a hard time starting off, how profitable are they, so one ends up asking themselves: "How am I going to

do this?”. So promotion, programming is needed, then one can start standing on their own feet, but at least everything has been planned already. The main concern is -going back to what was said before - man always creates problems. One example could be – and I will once again refer to these famous works that should be done- I don't know how much this can be scientifically proved, but the process of planning these activities is raising some concerns, which I don't know how scientific they are, really, some people state that there are studies under way: there is also the possibility that the microclimate of these areas could change. San Daniele, for example, is worried for its production of cured ham. They say: if there are microclimate changes in this area, what will happen to our “prosciutto”? There will still be a unique situation in this area, due to the river itself, so on their hills there is a peculiar climate zone, but what they are saying is that if these activities should be undertaken, there would be the risk that their microclimate would change also. I repeat, this might be more an emotional than a scientifically based concern, yet it exists. So, as I was saying the programming activity should use the river as its main parameter, covering all the territory from the mountains to the sea, and should be supported by the Region through incentives and it would also provide a solution for so many activities performed by man. So it would mean going a little back into the past and perhaps re-programming it with upstream to downstream economies, in the cases where they can intervene. So, yes, basically these are the situations, which could and should be activated. Also, the change isn't merely regional but it is more of a global kind. Earlier, a problem as serious as the deforestation in the Amazon was mentioned – what I mean is that these are macro and not micro-changes, as we think. But, in our small way..if this mentality then starts to expand, the return to a sounder environmentalism, precisely on behalf of the institutions. The Region should be the first to set things in motion at our level. (c. Pinzano)

..May I move outside our Region? In other countries, I mean for Pete's sake, in Austria or in France, where I often go, I see that mountain people still live in the mountains, I mean, the land and the forests are kept the way we kept them decades ago. And this apparently, apparently is due to the fact that the State finances the locals in order to allow them – despite the low-income mountains can offer – to make a living. So they keep the mountains clean, there are no floods due to scarce maintenance and all in all, instead of losing, at the end of the game the State possibly gains something. (c. Pinzano)

... The military was here, laws, rules, which didn't allow to make the forests.. how many people left Pinzano because they were unable to build a house there, because there was a whole set of obligations to follow, which really have nothing to do with climate change. Apart from the fact that the Friuli region is one of the places where it is most difficult to make predictions because of the numerous currents we have here. Information should be more factual. Even when it comes to the weather forecast, the information we get says one thing, then another, then the following day we get something completely different. Predictions should be made according to the territory, not just arbitrarily; perhaps they should be studied more thoroughly. Keeping in mind, as I said, that making predictions in the Friuli Venezia Giulia region is extremely difficult. (Pinzano)

... I personally do not know whether any measures are being taken to solve these problems, maybe some regional expert is collaborating at a national level and is carrying out some specific study, but often we hear about these climate changes on television and about how people can protect themselves from ecological catastrophes. (c. Pontebba)

... The information we get is, more than anything, a scoop. Closing streets to traffic can make a good news story, but it doesn't solve the environmental problem, which demands far

more effective initiatives at a national and not at a local level. Locally one can act through the works that are being carried out to fix the damages produced by climate changes that have already taken place, but in order to avoid further variations in the future it is advisable to have a new, global policy, because very little can be done at a local level. In Austria there are facilities using energy produced from waste for heating and lighting; initiatives like these should serve as an example. I know they exist in Italy, in the province of Bolzano, I think. These are the initiatives to be undertaken instead of giving free grants or mounting installations, which immediately become obsolete or are no longer advantageous, not even from an environmental point of view. If there were a targeted and focused campaign at a national level, we would have greater benefits compared to what is being randomly done now, because the contributions exist and nobody knows it. Specific measures should be imposed. (c. Pontebba)

... I don't know: the only measure I am acquainted with is the street closure to traffic, supported by adequate information towards the citizen. Other information is missing. (c. Maniago)

... Information is missing. One of the things that need to be activated is precisely information. A doubt comes to my mind: that there is some other mechanism behind all this, probably of an economic nature, probably linked to the oil crisis, to the natural gas crisis, things like that. So maybe they want to encourage other alternative sources, differentiate them, which is certainly a good thing to do, but I do not believe that they directly or at least predominantly depend on the climate issue. They certainly stem from other circumstances. (c. Maniago)

... Having ascertained that the climate suffers from the negative impact of pollution, as I was saying: alternative energy. This means that what little has been done, has been done badly. We know the road is still long. Nevertheless: the Region had started giving out contributions for solar panels, then it had no money left, then it made a mess! People who started installing them were never paid, there were endless waiting lists... Now it looks like the Government is readjusting the issue of contributions, but nobody really understands how, we shall see the regulations. At the end we know that solar panels – I partly believe this – I mean, all the unburned petrol, all the unburned fossil fuel in general means less old carbon dioxide is being thrown into our atmosphere, that is, the one that should have gone a million years ago. That is why any form of alternative energy should not just be sponsored, but should almost be given for free, knowing that the investments to be made are not at all banal. I will not enter into the issue of photovoltaic energy, as I believe that nowadays, although this data is not certain, I think that to produce 3 kilowatts of energy – the amount necessary to run a normal household – one must spend something like 30 000 Euro in facilities. So it is out of the question and most of all great amounts of energy must be spent to get to have this kind of facility, but at least the solar panel and hot water systems, which with our climate could help us keep warm for seven or eight months – well, I would say that we are extremely behind both in terms of results and of information. And what should we say about all the stories that are being invented on waste disposal, which is an extreme problem. It still isn't quite clear why we sell our waste to Germany and then Germany sells us the electricity produced with our waste, so we pay thrice the price but are unable to do it ourselves. I think the situation here is really bad and I think it's more due to the fact that we're in Italy than to the fact we are in Friuli. (c. Maniago)

... I agree with what you said, that there are economic interests behind all this. We were talking about solar panels: I've had them at home for about ten years, or even longer. I did not receive any contributions and at that time they cost me a lot of money. We're extremely happy with it, the system is such that the water passes through a certain place, so, let's say, the water

coming in, which needs to be heated up, but also in the winter, it never reaches zero degrees but stays at a temperature of around ten degrees, so we save on everything. I am smiling because this year, in these past few months there was this grand propaganda in our region: contributions, contributions! Then, in the end, the contributions vanished. Ten, twelve years ago, when I installed them, surprisingly enough I was not able to deduct anything, because for two years in a row you could, but the third year, when I bought them.. If I'm not mistaken, we are talking about ten million, and that was quite a lot of money, so I am lead to believe that there is a whole set of interests behind. Information is missing, above all towards the elderly people who are very careful about what they keep and what they throw away. There is a lack of information in shops as well, because you go and buy a steak, for example, which should be about 100 grams of meat and then you weigh the paper and find that you've got twenty, thirty grams of paper or cellophane. The same is true when it comes to children: nothing is being taught to them whereas I believe that information should start precisely with them although, what I want to say is that there are many types of material that instead of costing one hundred cost a thousand and before spending a thousand the parents think about it, of course. (c. Maniago)

..I think it depends from the individual person, because if I know that we are in a period of drought, if I have a garden, it also depends a little from the education that one has, of course, because if somebody says: " I pay for the water I use". Ok, but the water is not yours, it belongs to everyone, so why must I use water when I know that you... Yes, it depends from how a person has been educated, for example on waste disposal as well as on a whole other set of things. Public transport, for example, is most welcome, but the prices must be lowered, because paying 90 cents per hour... a student or an elderly person who earns...well, those 90 cents have a certain weight also. (Maniago)

..Something is starting to be done (biomass heating systems, photovoltaic energy, wind, hydroelectric energy). In the past, our Region also gave financial incentives to those who installed alternative energy systems. This is the road we should continue to tread, with more advertisement and more information on this sort of initiatives. (c. Savogna)

..Something has been done in the past and there actually is a regional law, which financed heating – or all types of - alternative energy systems. The problem is that it had insufficient funds and was not advertised enough. They will now proceed with a rural development plan financing alternative energy. What is most important is that it is adequately advertised because a lot of people didn't know anything about it, also because there were insufficient funds available so they made sure not to advertise it too much. (c. Savogna)

...I believe that greater information on behalf of the Region is useful to the citizens but it mustn't be of an alarmist nature because we can see that such phenomena recur through the years. In my opinion, though, it would be important to give more information in schools as well. (c. Savogna)

..National energy and atomic system conversion. Renewable energies for domestic consumption. Decrease CO2 and similar emissions. Make people more responsible, create an energy saving culture. Research, research, research. (c. Fogliano)

...I will confirm what the previous speaker said, that is, the need to convert the national energy system into nuclear energy. Because if the stations break, it will all get here anyway, so it is useless to pay more and pollute more. Renewable energies are ok, but only for domestic consumption, for example geothermal energy under the floors of houses. The reduction of CO2 emissions takes us to the issue of cars, of industries. In Italy we are famous for not really caring

much about these issues, we must therefore invest a lot in awareness-raising, in creating a culture. Lastly, I wrote "research" three times because if research is funded then maybe something will change; the young people in our country study, they have brilliant minds and then they go abroad. (c. Fogliano)

B: "I am not particularly acquainted with regional measures. Research must provide the answers to the problems that are arising. Information is extremely poor, very little is said on the solutions that could be adopted, so the citizens are not informed on the issue and consequently have a hard time understanding what the problem really is. Investments should be made on the future, on research". (c. Fogliano)

...Absolutely no measures are being undertaken. We just follow the dictates parachuted on us from above and, strangely enough, look what happens –only 14 years after the energy plan lapsed we put it into practice because the Region is forced to do it so that it can serve as a reservoir, as a platform for the regasification plants. Hopefully at least the off-shore one will not be built. Fossil fuel must be consumed and so we adapt ourselves at all levels. Maybe some information is being provided by ARPA, but we are far behind if compared to other regions as, for example, Veneto. I hope that with the current Minister some things can move on. But I repeat, we should use nuclear energy. (c. Fogliano)

...We are a relatively small region, influenced by the bigger ones, but the Trentino Alto Adige region, for example, is doing much more than we do. Persisting on the nuclear issue – we have it a few km away from us, in Slovenia, we buy electricity from Slovenia and are ashamed to admit that it is for us. Ours is a special statute region and on certain stretches our trains are extremely efficient but being able to transfer all the existing traffic to the railroad would already be a great success. Other regions have invested a lot on trains; I think people use the train, or the combination train + bicycle, mostly because 75% of our territory is quite flat. On one hand, we encourage young and elderly people to spend more time in the open air and then we pass a law, which favours the use of computers for people who are more than sixty years old, but I think this law is slightly wrong. Another thing I believe to be wrong is the free zone, the special-price petrol ration: we don't want cars to roll on the streets and at the same time we give out petrol at almost half its price. (c. Fogliano)

... Certainly measures are being taken, but I think I can say that the activities carried out by the various local administrations in this field are still insufficient. There should be more "regularisations" and one of the major goals should be the creation of an efficient rural economy. In my opinion citizens are not informed on these issues (or they aren't informed enough) so they are not sufficiently motivated (or stimulated) to solve them. (c. Comeno)

... Something is being done..in particular I am referring to the development of ovine rearing, which has led to increase the number of meadows present on the Karst heights. In my opinion this action is likely to reduce the amount of humidity present on the Karst territory, with a return to climatic conditions similar to the ones originally found in this environment. Yes, I do believe that this small measure could really have a positive effect... (c. Comeno)

... It seems to me that the various Municipalities involved are not adopting any specific, ad hoc measures to solve the problems related to climate change. On the other hand, to solve such problems, one should first of all examine them thoroughly, establish their true and exact nature and their precise cause; perhaps this has not been done yet. (c. Comeno)

... I think that citizens are not well informed and are not appropriately educated on the causes and the consequences of climate change. If we all were more conscious, more aware of the role we can play with regard to pollution and ecological balance as a whole, then we would

also become far more responsible for our actions (being aware of the negative and positive consequences that they can entail). (c. Comeno)

...When going to the mountains or to the countryside one can still see that there are healthy areas (with fireflies) and unhealthy areas. During a bicycle ride on the Karst I happened to see a truck with its valves open, pouring certain substances in a collection basin. Things are slightly better on the hills, on the Collio and surrounding area, but this is due to economic interests, even though I don't know how many and what kinds of pesticides they use. We'll have to see the incidence of liver diseases. (Fogliano)

... Considerable climate changes have been observed in the Karstic area around Brestovica. The cause of such changes are attributed to the polluting emissions of the factories present in the area of Monfalcone and particularly to the presence of the Timavo paper mill. (Komen, Slovenia)

.. I find that the mere analysis of our area is somewhat limiting as we are now part of a global dimension and changes occur because they are occurring worldwide, we live in a globalized world and this is something that cannot be overlooked. I think it is quite certain that the causes lie in a ruthless use of the planet's resources because of all those vehicles travelling around the globe, the factories releasing fumes and exhalations of all kinds and the incapability to find a common policy, a common language able to reduce the amount of emissions that are actually causing all this. The Kyoto Treaty provides a sheer example of this: the United States and China do not want to ratify this treaty because clearly it could lead to economic problems and they selfishly think "let the other countries take care of it now, we will join in later". (Gorizia)

.. Something interesting has been said, which is that everything should be observed from the perspective of ancient eras. Surely emissions have an effect, but I was struck by a recent television show, which saw the participation of Rubbia and other experts, and some of them raised a doubt, on the basis of their research, as to whether climate change is substantially due to carbon dioxide emissions and said that the effect is actually very small if compared to that of geological climate changes; so my impression is that we definitely have to tackle the problem but that the climate changes we're facing are somewhat out of our control. (Gorizia)

.. Progress is perfect, who would want to change? There wasn't all this in-coming and out-going air traffic here at the Aviano air base once. All these airplanes coming and going produce smog, so much, utter smog that sooner or later our mountains will dry out. So now, in the last few years, progress has brought to this. Because I remember what the old people said, that in '64 there had been two years of terrible draught. If we think about it, all of us who are present here today, we will remember what a dry year 1983 was and how in '85 we had a metre of snow on the plains, I was six or seven years old and we had up to 30 cm of snow. Nowadays every family has two or even three cars, and all because we're in a hurry, we always have to run, we are g more and more in a rush, we have more and more things to do, always using the car, because tranquillity is gone, we must do everything hastily. This is what progress brings us. (Aviano)

## **2.8 Social dilemmas emerge**

As we noticed when we talked about social dilemmas, people behave either selfishly or in a collaborative manner, but what is often emphasized, are those behaviours that need an effort to be performed. The excuses on why they shouldn't be done are the usual: it is not

worthwhile, separate waste collection is actually not done, it is better to enjoy the moment, etc...

*...Yes, in my view there is a lack of sensitivity among the general population, I am not referring specifically to the young or the elderly, a lack of sensitivity, because obviously a lot of energy, a lot of ideas are needed to truly deal with these things, in a serious manner. Maybe the consequences cannot be felt or seen, people don't seem to be able to see beyond what is happening now. Nowadays, if I go to the mountains, to a beautiful hotel with air conditioning, I really don't know what I am choosing. I am choosing my wellbeing, but actually it is an entire mentality that I'm choosing. I am conforming to an idea, which does not consider what can happen next. I don't know, I am the kind of person who collects waste separately, I know it is a good thing to do, but I do not know what happens afterwards. (Journalists)*

*...What really impresses me is the exceptional nature of events: they occur more and more often; they are more and more catastrophic (in terms of rainfall); and the temperatures differ more and more from the average temperatures we were used to. For us, who live in Carnia, it is not a bad thing that the planet is heating up, in the sense that we spend less to heat up our homes...(Carnia)*

*..In my opinion, the citizens are sufficiently informed but they are still not sufficiently aware and responsible. (Slovene information)*

*...It is easy for you to be dynamic, because your business has more resources to rely on. But if I were suddenly not allowed to use the only truck I own, my family would be left with nothing to eat. (Nova Gorica)*

*...I think it would be better to substitute the word "consumers" with the word "citizens"*

*...that is, when they purchase a product, make them become precisely aware of the type of pollution they produce when they use it, when they dispose of it. It seems like nobody is thinking of what happens before and after. We are hypocrites: it is useless to go into schools and tell our children that we must be thrifty energy-wise and then keep our heaters running at full blast. This is definitely a cultural issue, which should be everyone's concern. (Carnia)*

*..Currently much is being said, even on the mass media, on the possible solutions to the problems posed by climate change. Nowadays people are more and more aware of the fact that the measures aimed at reducing environmental pollution (which may at times be unpopular) must be accepted..the measures taken at the moment are still scarce and insufficient... It seems to me that the level of awareness regarding the severity of pollution and the disastrous consequences that this can entail is good; now it is time to solve these problems by taking serious, capillary and effective action...I believe citizens are already well informed. The real problem is that very few of them accept to draw the conclusions from this knowledge and commit themselves personally to improve the situations. (Farmers Slovenia)*

*... The truth is that people have become accustomed to ever-greater levels of comfort and therefore find it difficult to agree to consume less energy and make lifestyle choices (to use the bicycle, public transport, solar panels, etc.), which would have a positive effect on the environment..I think that environmental education should start at a very early age so that an ecological mentality and sensitivity can be born in the younger generations, encouraging them to behave appropriately and conscientiously towards nature. (Farmers Slovenia)*

### 3. Interviews

Structural characteristics of the interviewed confirm the usefulness of choice concerning the objective to polarize working stratification as to obtain an index of differences between field workers and the interviewed in general.

The interviews subjected to content analyses have revealed 32 categories (see chart 1). As previously mentioned, categories indicate a more or less shared orientation of the interviewed. The categories were analyzed through contingency tables where presences and absences of the same category were marked. The only possible and useful data processing turn out to be a frequency analysis.

**Chart 1 - Analysis of the interviews content**

Categories	Present		Absent	
	a.v.	%	a.v.	%
<b>Yes, climate changes are occurring</b>	<b>27</b>	<b>77,1</b>	2	22,9
<b>There is no transitional period between seasons</b>	<b>20</b>	<b>57,1</b>	15	42,9
<b>Examples of the current year.</b>	<b>18</b>	<b>51,4</b>	17	48,6
<b>Absence of half seasons</b>	<b>22</b>	<b>62,9</b>	13	37,1
Changes have an impact on the mood	3	8,6	32	91,4
Asphalted background of Karts region	1	2,9	34	97,1
Bora decrease and humidity increase	4	11,4	31	88,6
Climate is changing	8	22,9	27	77,1
Monfalcone chimney and cancer	3	8,6	32	91,4
Changing of seasonal standard values	9	25,7	26	73,4
These are small variations, not climate changes	1	2,9	34	97,1
Now the war is over	6	17,1	29	82,9
Influenced by the scientists	1	2,9	34	97,1
Influenced by the media	6	17,1	29	82,9
Changes are cyclical and not a result of human actions	7	20,0	80	80,0
Changes has an economic impact	6	17,1	29	82,9
<b>Influence on agriculture and tourism</b>	<b>26</b>	<b>74,3</b>	<b>9</b>	<b>25,7</b>
<b>Increasing rainfall, longer summer season and increase</b>	<b>23</b>	<b>65,7</b>	<b>12</b>	<b>34,3</b>

<b>in costs</b>				
<b>Influence on health</b>	<b>15</b>	<b>42,9</b>	20	57,1
<b>Human coastal activity</b>	<b>12</b>	<b>34,3</b>	23	65,7
More fear of disasters than pollution	6	17,1	29	82,9
There are no climate changes	4	11,4	31	88,6
Inadequate information from the authorities	9	25,7	26	74,3
<b>Informed only in case of disaster</b>	<b>28</b>	<b>80,0</b>	7	20,0
It is difficult to know the causes	5	14,3	30	88,7
More control is needed	11	31,4	24	68,6
<b>Citizens will enquire only when they have a personal interest in it</b>	<b>17</b>	<b>48,6</b>	18	51,4
<b>Reproducing energy, recycling</b>	<b>15</b>	<b>42,9</b>	20	57,1
<b>Less pollution</b>	<b>31</b>	<b>88,6</b>	4	11,4
<b>Children education/information</b>	<b>30</b>	<b>85,7</b>	5	14,3
<b>Starting from single households</b>	<b>15</b>	<b>42,9</b>	20	57,1

These are the questions on which the 35 interviewed people had to answer:

1) Question: Do you think that the territory where you hold office is undergoing important climate changes?

2) Q: Taking into consideration the rainfall, increase in temperatures, forms of atmospheric pollution, sea level changes, have you discovered any changes (still in progress or related to the last decades) and do you think that they could have an impact on economic activity, tourism, transport, handicraft or in particular on the standing population?

3) Q: Do you think measures for the solution of environmental problems are being taken and that citizens are adequately informed?

4) Q: In your opinion, which interventions would be most appropriate for solving such problems?

According to the chart, these are the most frequent answers, ranking from the most to the least frequent once:

- Children education/information;
- Less pollution;
- Information given only in case of disaster;
- Climate changes are occurring;
- Impact on tourism and agriculture;
- Increase of rainfalls and drought;
- Absence of half seasons;
- Total absence of seasons;

- followed by the belief that citizens enquire only when health is at stake and the need to produce energy and recycle.

Also in this case we use the group focus method and by doing so, we provide the most significant answer for each question. Given that both interviews and focus groups have similar attitudes to the problem. It is also important to underline the most common protective expressions (granted that I am no expert...) and adverbs of manner (of course, undoubtedly, certainly and others).

### **3.1 Answers to the first question**

*..certainly: There are changes that can be easily observed by analyzing statistical data. During the last years, summer has been characterized by an increasing ozone concentration, making sun exposure ill advised during certain hours of the day. Summers are a lot warmer and longer compared to the past years. The cold comes suddenly: there are no half seasons between the summer and the autumn, or between the autumn and the winter. In just a few days time, temperatures can rise and plummet drastically. (Journalist)*

*... Undoubtedly, there was a summer with high temperatures in the first period and low temperatures in the following phase, but I have data over a long period of time to examine whether these are normal deviations or true climate changes. (Italian press release)*

*...Yes, of course. There have been some unexpected and non-programmed modifications that outstand from the seasonal coding. (Tourist agency)*

*...I work in the sector and my answer could be a bit more complex. In my opinion climate changes are being taken to extremes. A statement about climate variations might result questionable, since such variations should be analyzed over a hundred year's period. I can only say that events are being taken to extreme. For what concerns our perceptions, there have been some modifications related to rainfall and temperature increase, but stating that climate changes have occurred on a large scale, could be a bit daring. (Mayor)*

*...Relaying on the climate has lately become quite a risk. Especially with seasons changing with lots of rainfall in August and extreme heat in July. We have observed that winter is getting longer and has moved everything forward, making everything arrive and end a bit later. Drastic climate changes are frequent, but at the moment there are no clear changes in our territory.*

*While traveling, tourists would like a good whether guarantee. As a matter of fact, caution is needed, when advising clients to travel in certain periods, especially to tropical areas that are better to be avoided or at least clients should be informed about possible storms; during certain months the risk of typhoons in the Caribbean is quite high. However, the client could be extremely lucky and nevertheless have fantastic weather during his holiday. (Travel agency)*

*... I think that if climate changes are happening, they are certainly linked to global climate changes. At least, according to what scientists say. Personally, I could not say; I have not noticed any of the occurring changes. Some changes did occurred, but I am not sure whether they are linked to global climate changes. (Journalist)*

*..First, we should know the appropriate time interval. By looking back over the last 10 or 20 years, changes have not been so important to result in considerable mutations; at least not as much as over a time period of one hundred years. (Prefect)*

*... I have noticed a temperature variation. Seasons have changed a lot. Not to talk about humidity: climate is more humid than ever before. I first experienced humidity and fog at the age of ten or twelve, when I went with my parents to Milan to celebrate New Years Eve; Never*

before have I seen fog, compared to the Venetian region. For what I can recall, the last few summers were much hotter than summers used to be in the past. (Journalist)

...Given that I am no expert, you would probably like to hear my opinion that is to say, how I evaluate and feel about these important changes... I don't know. Changes are quite obvious. Just this year we had four snowfalls, which is something unheard of, at least by my reckoning. These are no statistical data, however if you are looking for them, I'm sure you will find them elsewhere. I can say that it has been a while since we had four snowfalls in a single year, single winter, as well as single spring... or a July as hot as this year. If I am not mistaken, we also had a very hot summer three years ago, while the last two were very rainy and even cold. However, I can not say whether these are climate changes, maybe our perception, or even our memory, is full of gaps. We might have lost memory of those changes. Basically, I could not say whether these are relevant climate changes or a true natural phenomenon. (Town councilor)

...Absolutely, yes. Everyone can see it with their own eyes: half seasons have become a distant memory. As a matter of fact, it is September and it is almost hotter than in July or August. For example, this year July was hotter and August was colder. There have been some changes, I can see them, everyone does; in the sector where I work, going on vacation in August is out of the question. And if you want to go on holiday in August, you will never know what weather you will find. So you would rather choose June or July. As experts say, once bad weather starts in August... you can say farewell to nice weather for good. (Journalist)

...I honestly believe I am influenced by scientists' and experts' opinions, so I won't tell you what I think, being it irrelevant. Instead I will tell you what was already told about climate changes: these are cyclical events with different types of situations... At this point in time, there are no particular proofs. For example, according to some allegations, the intensity of bora in Trieste was fading. Allegations that were proved totally wrong, since last year the wind blew with stunning intensity. It is quite possible that bora is blowing with lesser intensity compared to the past, however it is very likely that data collection was less accurate in the past than it is today. The interest for climate changes is a recent phenomenon. If you speak to scientists extracting and researching polar caps in Antarctica, they will only confirm the cyclical nature of these changes. It is meaningless evaluating individuals' perceptions, because thorough evaluation demands a much larger time period... For what concerns the first question... my answer is no; I do not feel that climate has changed. The only thing changing is temperature... All common places about the lack of half seasons we so frequently use have been proven wrong time and time again. July was very hot, August was terrible and in September we are having true summer; that does not mean that summer lasts up to four months, it is just an isolated phenomenon, with lots of rain in August that made temperatures drop, but now we are back to normal. In my opinion we are not witnessing particular changes... we are just influenced by the media in everything we do, so a queue becomes a mass departure, ordinary rains becomes torrential rains, a whirlwind is devastating... even though these are situations that occur on a cyclical basis.

...In contrast to the very accurate statistical data on rainfall quantity and level of drought, giving a personal answer becomes very difficult, [... in a city like Duino Aurisina that looked like a dessert after the war. If you could see the pictures of the town taken in the '50s, and the pictures of mountain Ermada, now completely green, without a single twig... this was influenced by several factors, forestation happened as late as in the '50s and we must also take into account that in those days people chopped off everything they could, even the smallest twig, since there was no supply of natural gas and wood was used for cooking. Luckily

Duino has been closely looked after, since our prince called foresters every couple of years to clean our beautiful pine forests and by doing so, he saved the forest and gained huge amounts of wood, that were used to supply the local population.

As you shall find out during your investigation, nowadays we face hardly any drought, despite the long periods of drought people had to endure in the past. As a result of drought people were left at the end of August without vegetable gardens or single pieces of land under grass. I believe that your research results will prove that rainfalls must have increased a lot. Although from current data large changes are not evident due to rainfall shifts... spring rains had shifted ... a slight temperature change has occurred... now we find out that the '50s were both very cold and so hot that people were told not to expose themselves to the sun in the afternoon being it extremely hazardous for their health... winters were very cold... schools were closed and people stayed at home for weeks due to polar cold... certainly this could also be the result of the improper clothing used at that time.

Imagining what would happen today with that kind of cold... I came to the conclusion that we are totally unprepared to such eventuality... with all heating systems and plumbing using new types of built-in pipes, unable to withstand  $-10^{\circ}\text{C}$  temperatures lasting more than a week... we would be facing some serious problems... Luckily this kind of low temperature peaks does not hold for a long time. If temperatures dropped below  $-20^{\circ}\text{C}$  all current installations would not even be able to bring temperature close to  $0^{\circ}\text{C}$ , not even to defrost the pipe systems and ensure the cold would not break them. Generally we could say that there was some sort of balance ... Now we don't have so that much heat and cold, although seasons have slightly shifted, classical spring no longer exists. However this situation could only be cyclical.

If there is something new happening in our gulf, it is the humidity phenomenon... such a moderate climate with humid summer and winters could actually be something new (Mayor)

...They might not be important, they are certainly nothing exceptional, but some changes have nevertheless occurred in the past decades. In particular, when it comes to the fall of seasons. We are witnessing "extraordinary" cases that are repeating even too often: longer rainfalls, some of phenomena have been lost (for example the Bora, which was regularly blowing in our area, is now almost gone and if it blows, its intensity is far lower than it used to be). We have long periods of heat and cold: in the past such atypical years occurred once every 30 years, now we witness a new heat or cold record almost every year... In the past seasons were always on the dot. Now winters last longer and summers end in November. Definitely, seasons have changed. (Journalist)

...There are no classical half seasons as we were taught as children: spring, summer, autumn and winter do not follow a regular sequence, shifting slowly and gradually. This definitely influences our wellbeing and work.

The other problem which I noticed is related to climate changes in the Karst: Its rocky background is covered with dense vegetation which is fastly spreading. In my opinion there are many reasons causing this change: firstly, the local population is not maintaining forests and land under grass. Secondly, the bora that was decreasing fog's frequency, dew and humidity in the past has become less frequent and intense. We cannot deny that climate has changed in past fifteen years: in the past, fog was hardly ever seen in the Karts. The bora is not cleaning the air, allowing a thick layer of polluted air to form, thanks also to the Monfalcone "chimney" emissions. An increase in mortality due to cancer might also be the result of this, making the

Karst mortality rate much higher than the average Slovenian rate. To sum up, I believe climate changes are certainly linked to pollution and environmental problems. (Director)

A: the province is under the Chamber of Commerce authority; I could say that in this area they could be important to some extent, if only proven. At this point in time based on my perception, I do not believe that drastic changes have occurred in terms of rain for example. This province has little agriculture and tourism is mainly concentrated on the city. And cultural tourism is little affected by climate changes. (Chamber of Commerce)

.... Yes, we can all see them; seasons are not as static as they were once ... we have large temperature shifts over a period of one week, which I can not recall to have happened in the past. We have hardly any atmospheric pollution, but when it comes to temperatures, with an extremely hot July and a wet and cold August... I see that as a clear change. (Gemona mountain community)

... There is something irregular: For many years the most beautiful month by the lake was August and July was much wetter. However, in recent years things have changes, for example July is drier and for quite a few years now, August has become studded with rain. (Mayor)

... The meteorologists say that these are not big climate changes, however we can perceive and ascertain by our-selves that something is changing: summers are becoming hotter with each passing year, winters ever more cold. In the past years the ozone concentration has been largely discussed, but truth is we really do not know if the ozone concentration has actually increased or decreased compared to the previous periods, since we have no data with which we could compare the results of recent analyses. (Radio Koper)

...Certainly these changes are caused by an increase in summer temperature... There are two extreme peaks: a stunningly hot summer and colder winters... Such a long-lasting skiing season has not been seen for many years, beginning very early and ending very late. It must have given quite a relief to the mountain economy.

It could also depend on the human factor. I do not believe that the green house effect alarm is just a catastrophic environmental utopia. It is a fact, supported also by other elements, like the ozone hole, the permanent cloud over China, large fires in the South-eastern Asia, deforestation is outrageous and the increasing desertification is becoming fast a matter of great concern. (Regional counselor)

...Important climate changes..well, I don't know... I can only tell that if there were a variation, even of one mere grade, repercussions on the environment would be substantial ..I never believed changes had occurred, but now I have to change my mind..I noticed the torrid heat we all had to bear this summer. If this were only an isolated case, we should not give it much importance. But with a recurring event..2 years in a row... I can only come to one conclusion: this event is not normal. (..)(Agriculturist)

### **3.2 Answers to the second question**

..A dangerous, exaggerated increase of temperatures, maybe a rough inclination; thermic changes are much too sudden. Rainfalls have become much more violent and intense. In our area, pollution levels are lower compared to the neighboring areas. There is much wind; obviously rainfall has a great impact on tourism. After 2 days of rain, – given the fact that our city is more popular for walking than sightseeing – a tourist will simply move elsewhere. In a country with craft activity it does not make much of a difference and if it actually would, it

would only jeopardize work in progress. On the other hand, agricultural activities could seriously suffer from these intense rainfalls. Recent alluvial events and summers hailstorms have destroyed many pastures. (Mayor)

... Yes they do have an effect...first of all on people, working month after month with the torrid heat, making work become a burden. It has also an impact on cultivation... I have a broad-leaf plantation, financed by the European Community, but unfortunately some of these broad-leaves have dried out...(Agriculturist)

...For moderate areas such as ours, I could only say no at this point in time. It is especially us who continue going recklessly on...Those who have noticed changes, are obviously influenced by the. In other words, the primary sector of agriculture is strongly influenced by this phases. Production feels the necessity to search for more adequate and modern irrigation systems. (Regional counselor)

...The discussion is about the following: if it rains during the night, there are no problems. However during the day, raining becomes pressing, it basically slows down every activity, till water flows away. Cars must slow down on roads, due to temporary water stagnation, causing all commercial and tourist activities to slow down. This slow down is temporary and is only a matter of fifteen minutes, half an hour; it's nothing traumatic. It only takes a bit of patience; it is temporary slow down. (Mayor)

...However, it is undeniable that climate conditions have an impact on many sectors. One fundamental sector you have not mentioned is the influence of climate changes on regional development. In the past our region had much more meadows, and the overall terrain did not appear as barren and desolate as it is today. The rocky bottom is either gone or covered up, but vegetation is expanding nevertheless. Besides the general influence of climate changes, they have also an impact on local population that is not involved – or works less – with agriculture and livestock breeding. With a situation like this, it would be wise to financially help such sectors, in order to guarantee their survival. Climate changes have also a strong impact on tourism: if the weather is not suitable, tourists either change their destination or simply stay at home. (Radio)

...These variations have not caused problems non among the listed aspects, especially to the permanent population, local authorities are working to guarantee safety in the best possible way by carrying out hydro geological consolidation work. Economic and tourist activities were not influenced by the changes, on the contrary, showing the snowy peak of mountain Mataiur actually brought tourism. Even without chair-lifts the winter season was a success and the number of mountain enthusiasts coming here has increased, so there is also a positive outcome. (Mountain community)

...If we refer to a larger temporary scale, I would say yes. Well, I suppose so. There has been a meteorological change in the Friuli Venezia Giuila region. I don't know, our grandfathers said that it always rained in March and April. Nowadays rain falls for two days and it can also happen in May with the same amount of water. We can say that there have been some changes. We are the one to blame for atmospheric pollution. I can hardly remember the windy days and the bora blowing during my university years. I remember it was very cold and the blowing wind was much more constant. (Mayor)

... Atmospheric pollution has become a regressing phenomenon in Trieste; certain traffic constraints were introduced, pedestrian areas were enlarged, stricter rules regarding households emissions and buses' catalizators were also introduced; As air quality has improved, I can certainly say we are making headway.(Chamber of Commerce)

Definitely yes, but I would still like to constrain the conversation to my sector. My opinion is that climate changes are induced by human intervention on the natural environment. For example, in the near proximity the Solcano dam was build. As a consequence there has been an increase in humidity and fog and these are all factors that have a negative impact on our work. The fog in particular is very harmful for fruit farming: if there is too much fog during the blooming phase, trees will not bear fruits as normal. Climate changes are surely determined also by pollution and pollution is everyone's responsibility, for some is more, for others less. (Agriculturist)

... There have certainly been some general climate changes; we, an outgoing travel agency, have greatly suffered from climate changes in the far away places. These changes have also a profound influence on the voyage successfulness. In the past the period of monsoons in the Orient could be anticipated, in the Caribbean's hurricanes were devastating the islands from October to November. Now we have to start specific preventive measures with which we inform our clients that the weather can change any time. Besides that, climate is also changing in our region. We have not noticed any change, so we can not say whether this modifies incoming tourists' habits. (Travel Agency)

...I have not personally noticed any increase in rainfalls, atmospheric pollution, elements that could negatively influence tourism. Pollution and atmospheric dust were very actual theme last year, but this year...

For what concerns the tourist aspect, nothing seems to have caused a tourist arrival decrease, meaning that the people still choose to travel. I remember that in the '50s, winters were very cold, bora was strong compared to today, now bora support cords are no longer needed ... Something has changed, but in my opinion it is not drastic... (Travel agency)

...I can not say a lot about pollution, but there is definitely more of it now then before. I have noticed the increased "psychical" instability of people that are more weather sensitive than before. They are telling me, that they are hyper stressed and agitated. Things like that did not used to happen. I have also noticed fastly increasing traffic pollution, especially in the Mestre area, due to long unmoving queues of vehicles; nobody has talked about this problem for years. Regional, Province and the State authorities have failed to notice that the road infrastructure has remained the same, despite the steady increase of traffic. Industrial waste dumped in waterways is sure responsible for a lot of pollution. People have also started migrating from cities to rural areas. Many of my acquaintances moved to the countryside. Firstly due to work and secondly due to their life style, especially after retirement, since the countryside is much more relaxing They even moved as far as the low Friulan region, where there is no stress, pollution and noise. (road haulage)

...I believe that normal people do not always have that much common sense. Quite often we refuse even the idea of a far nuisance. We rather think about the present and tend to locate such thoughts in the close future. However the last sudden and violent rainfall phenomena with catastrophic consequences, both in other parts of Italy, as well as all over the world, has insinuate in people's minds (consciously and unconsciously) a deep fear of nature. So, whenever it rains, something happens. Usually people perceive rain as something that lasts for a certain period of time and that does not cause much damage; nowadays rain is very often short and so violent that damage is inevitable, making the whole perception of the atmospheric event quite negative. Not to mention the catastrophic impact of earthquakes, perceived as even more scary, being totally unpredictable. However people usually do not move from places stroke by an earthquake. The approach is different, so they started building

*differently and that is where public bodies must intervene; a person that has experienced such a catastrophic event, would obviously start thinking how to build a better and safer house according to anti-seismic laws. People are far more afraid of the atmospheric phenomena, as well as of all environment polluting elements. But no one seems to know how to really prevent them and like all public bodies they still might not know how to intervene and how to programme their prevention. Something else must be taken into consideration: we, or at least many people say so, have the impression of strong natural changes that have an impact on seasons; truth is, we do not have in-depth studies over a long period of time that would give us real changes criteria; we do not know whether 300 years ago seasons were so altered, with cold summers, short springs and autumns; that does not deny the fact that some natural phenomena can be measured as variation in Earth's temperature, that will inevitably lead to the melt-down of polar ice in the not-so-near future. The polar ice melt-down could be a phenomenon that would influence this type of territory and even the entire globe; this phenomenon is quite possibly the most measured and controlled, given the catastrophic impact it could have. Other phenomena's consequences could be prevented with appropriate and accurate in-depth studies on polluting elements and controllable phenomena; But when it comes to global warming, men can do little, or at least today we think there is little that could be done. (Prefect)*

*....About earthquakes...*

*Recently I went as representative of the Trieste University to Sardinia, where marine geology and coast erosion are being studied in cooperation with the Cagliari University. Poseidonia is an extremely ugly sea plant, that washes ashore, becomes brown after some time and has a very unpleasant odor. This happens primarily during winter and public officials so far tried to remove it and carry it away with tractors, clean up the beach before tourists come in spring and summer. Only later it was discovered that the removal was harmful for the beach, because these plants prevent sea erosion. The natural mixture of plants and sand represents a natural defense against erosion. With the help of satellites shootings, experts found out, that every year a few centimeters of the coast disappears. These data are more ad hoc than specific. Three centimeters this year, three next year, will eventually result in the disappearance of coasts... This would represent a huge economic damage, since the best asset Sardinia has, are its beaches. We must pay a lot of attention to such events, for others maybe less. Obviously some changes have occurred however I do not think they represent an immediate threat to our lives. This is something people have difficulties believing in, since data about our health and life expectancy state the opposite. We are not only a generation living in the most polluted environment, but also a generation living better and longer. These two concepts seem to contradict themselves. Truth is, we pollute a lot, but not as much to represent a threat to the entire system. (Journalist)*

*....In the answer to this question I would like to bring forward a problem that we had not before... the water management problem. This problem has been always promptly solved both in the Karst, as well at shore by using at best water supplies... But by neglecting terraces and agriculture over the last 30 years, everything is falling to pieces. Now we are forced to find solutions. The situation has improved in the high lands due to wine cultivation, in contrast with the lowlands at shore above the railroad track and between the tracks and the coastal road. We are facing a true catastrophe, because containment walls are in a really bad state. As a consequence, no one tills the soil and water is free to have its way. Water is being channeled into a single channel. In the past every terrace had its own drainage and these walls acted as*

protection. Every terrace had smaller intersecting channels that were used to water the terrain. Now terraces are barren and holes have formed at the sides through time, where now water is accumulated. With heavy rain water spills over and ruins everything that stands in its way. (Mayor)

..Climate changes influence different sectors. Some, like tourism, are closely link to meteorological conditions. Tourists visiting Slovenia at the beginning of August were very disappointed, since it rained three weeks in a row. Where as those who went at the beginning of September could fully enjoyed good weather at the sea-side. (Journalist)

...The increase of environmental pollution affects negatively the health of individuals and causes patalogies which were once less frequent than now. The impact on tourism is also important. These changes can affect the choice of holiday destinations and time (the warmest part of the year was at the end of July and halfway through August, but now August has become quite a risky choice, due to strong and frequent rain. (Journalist)

### **3.3 Answers to the third question**

...We, administration officers, use all instruments given by the region and state. We support the gradual fossil fuel abandonment and accept alternative energy resources. This is a very specific path and we have already made the first steps. We want to follow this direction and support it with all our actions.

Now, a campaign is in progress, where we distribute composters in order to decrease the quantity of garbage and use it as a fertilizer after some time. At the moment almost every family has its bio composter which will give them in a few years time the opportunity to fertilize their garden... Beside that, "We love Italia" campaigns are being carried out in schools to inform children about the garbage problem. We are only a small community, so we have distributed 400 energy efficient bulbs, to show our awareness of the problem.

The city population is poorly informed, so we should improve our ways of informing them, we should make data more direct, easier and clearer. Usually we keep repeating the same things over and over again, but nobody listens. An effective type of the information must be achieved, with the purpose of making people more interested and attentive... (Mayor)

... On a local level, something is being done in contrast to the institutions like community of Trieste that washes the streets to decrease dust levels in the air; I am referring to all activities, like for example Servola's ironworks implant emissions, causing industrial pollution; I am referring to initiatives concerning from garbage differentiation to school and alternative education, because something is surely being done.

Awareness level among ordinary people has increased a lot in the last couple of years, in particular about pollution and climate changes; my work gives me the possibility to notice how things have changed – people react to dirty streets and polluted sea, Trieste being a seaside city; like the mucilage invasion that seems to be somehow linked to climate changes. People are much more aware about environmental issues than a few years ago. They keep responding to pollution, because climate changes have become big news, far bigger than in the past. (Journalist)

..in the past years the Civil protection of Friuli Venezia Giulia has invested millions of euros to solve environmental problems and mend river slops, with the purpose of making roads safer. This is not the ultimate protection against upcoming catastrophes. All investments, however

important they are, could control sufficiently the whole territory, especially the very large Friulan region, one of the largest provinces in Italy. I believe it is the second biggest. Regardless of substantial investments to improve safety, such a large territory makes all efforts vain.

If we talk about the Friuli Venezia Giulia region, people living in the valley are very likely not informed and... how shall I put this... are not interested in the situation in the mountains, since they go there only for holiday. But the population living in the mountains, I know that for sure, is very aware and informed and knows of all about potential dangers. So, even without any help from the institutions, they try to protect themselves from possible dangers, by building protective structures to reinforce their houses. Yes, the people who live in those areas are aware of the dangers at hand, while others do not realize this due to their lack of interest.

I can access to this type of information, because I made a lot of news reports from the mountains for the "Il Sole 24 ore" newspaper. I have interviewed many people living in the mountains, authorities, common people, traders, craftsmen and this was the impression I got.

FVG is one of the wettest areas in Europe, particular during some periods of the year... all people living in the mountains pay attention to climate changes and earthquakes, because in this area the seismic threat is far greater than elsewhere. However I don't think that there have been radical climate changes in the last ten years... Personally I do not believe that the raise of sea levels is caused by global warming. Global warming is the result of human activities. This could well be part of a cycle which occurred also in the past and is now eluding our interpretation... I think that no one is that bold to blame ice age on the mammoths... Probably ice age occurred, because it had to... (Journalist)

...In my opinion the population should obviously be informed about the present dangers, how to prevent them and how to act in case of an earthquake or nuclear disaster. Especially in a port city like Trieste, where ships come and go, carrying potentially harmful materials, people must be informed; too often a too much informed population jumps too quickly to conclusions, creating unnecessary panic. So, yes to information, but not excessively; certain situations are quite frequent with people not wanting antennas to be installed, even though they are not harmful for people; we need to make clear distinctions, without losing people's trust. Distrust is strong when it comes to any type of intervention, so the excess of information can lead to excess of fear, even were the phenomenon is not justified. (Prefect).

...Yes, these alarm switchboards are surely a recent invention. I remember drastic measures to contrast pollution, as banning traffic in historical city centers or granting access to the city to alternating plaques. This has been going on for several years. Unfortunately education is still poor among the city folk and inhabitants of the territory. Through conservation, we help ourselves. Even though I use a scooter, I agree completely with the closing of historical centers to traffic and make everyone take a walk. This will clearly increase the use of public transport, which is not as efficient as it should be. But in other smaller cities or smaller province centers, things are probably more agile.

We must start with the education of our children. Environmental projects are being carried out. I noticed that recently some good changes were made in Gorizia regarding water management and pollution. But none in Trieste. There are many projects and studies that involve both cities. I think that the work to be done is more on my or my children's shoulders, even though I have not got any offspring. Children now six to seven years old that have to be educated in a proper manner to correct the unwise and involuntary mistakes we made. I would introduce this concept to younger generations starting from elementary school, or even kindergarten, on. (Journalist)

...It's difficult to see the true reasons for climate changes. I think that one of the main reasons is pollution, especially pollution in industrialized areas. Measures on a global level have already been taken. Certain international agreements bind the undersigned countries to fulfill determined criteria in order to stay below pollution or green gas emissions limits. Nevertheless, I ask myself what is the limit and is it truly respected...

I think that Slovenia, a country with quite a small territory, does not influence a lot global pollution. In my opinion, should look for the responsible elsewhere, like for example in large cities with huge industrial areas.

If we talk about people information; problems are being discussed, only when they appear as headlines in the mass media. Currently information is not spread over many different levels. Common people should have unlimited access to this kind of information, but more importantly their conscience and sensibility should be increased and additionally bolstered by the authorities, especially in the industrialized cities. This is the best way to face and eliminate our problems. (Journalist)

...In Slovenia populations' sensitivity about pollution and environmental problems has increased a lot in the past few years. However the situation has improved very much over the last 10 years, I have noticed that information is still not adequate. (Director)

..Measures have been taken, but this is definitely not enough. For example, the use of chemicals for vineyards in proximity of populated areas has been largely discussed. Truth is, that in our cities we don't have any "real" legislation that would legally define to what extent this kind of treatments are allowed. Finally, when it comes to climate changes and environment pollution, I must add that there is a lack of information. (Agriculturist)

..Yes, I have also been fighting to build installations that run on bio mass and now six of them are being financed by the Carnia region.

Also my municipality and region have inserted in the rural development plan investments in alternative energy resources, like solar panels and biomass also for private users.

Well, two of my private projects were targeting these goals.

People are more than informed. We even have a community bulletin, where I have already published a project on how biomass central will look like and how much energy will be gained from it. All the basic material will be gained at the spot and this will spawn new jobs where necessary materials will be produced. This project isn't anything major, but we will clean the area nevertheless and create jobs, as well as lower the greenhouse gas emissions. (Mountain community)

.. Ok, let's say yes. Currently we have the PAC plans, a first attempt of our legislation to introduce these environmental plans, even if they are introduced only in big city. As long as they are introduced, that is fine: so the legislative attention exists. Information levels are good. The only thing lacking is consistency in the will to act.

Awareness exists. General awareness is better and it acts as catalyst for different behavior patterns, even if they are not proportionate yet; despite realizing that they would feel better talking about the environment, people do not change their behavior; they simply sit in their cars, and say: "Let's go". From this point of view, we are excellent preachers, but we do absolutely nothing about it. Yes, the legislator is cautious; measures, awareness and attention exist. Like also environmental conscience, however the will to act is still lacking. (Mayor)

... In our parts the season ends in August, because the lake is no longer suitable for swimming and there is frankly little to do against it. The 2004 flood allowed us to do some

interventions on waterways, which should be done anyway, regardless of any exceptional events; Intervention is always done after such events. (Mayor)

...This year's drought has heavily influenced agricultural activities all over the region. The population is adequately informed, since our region has precise weather forecast programmes, regularly broadcasted in the mass media... There is no need to be alarmed, if we have 20 days of hot summer, but regardless of that, dramatic headlines appear in the media... "Heat Record"... Later on, after one month, another headline follows: "Cold Record". The best thing to do would be carrying out a whole year round analysis as to show that values are in the average. In my opinion it would be appropriate to highlight just a small change in climate conditions... This should not be based on individual perceptions, but on gathering relevant data. (Mountain Community)

..Some measures have been taken. The point is that we carry them out like amateurs... something is being done, but definitely not enough. The population gives little attention to these topics; unfortunately they are more interested in other things. This is how our society is made. It would be irrational to deny it; the society does not pay much attention or is lacking in interest for the environment. I hope we will eventually become aware of this problem and start acting appropriately... I just hope it will not be too late. Nevertheless, if someone is sensitive to this kind of topics, I don't think he would have any problems find out the correct information. (Journalist)

..No, we are already taking the necessary precautions. Last year we built a water reservoir and road draining channels in front of the station. Now, to remove water from the roads, we should set up pumps that will pump water directly from the Valentinis channel. The problem exists, but we are already trying to correct all critical points. (Civil protection)

..International conferences have been organized where global level choices were determined. But if these choices are not put into practice and developing countries continue desperately trying to breach the GAP between them and the Western countries, like India and China...their main goals becomes breaching that GAP at all cost, the problem will remain, in my opinion, difficult to solve. (FVG Counselor)

... No, information does not exist. If someone is interested, he will follow and get to know this phenomenon on his own. What should be done is increase the level of rain irrigation to save water. We have already done it, but the problem should be spread out, making it an initiative on a consortium level... (Agriculturist)

...These events are very unpredictable and the population already follows the news. The public is eventually being informed by the community or by media; also the tourist office is very active. However damage can not be limited, we can not afford to cover all the pastures. Eventually we intervene with practical contributions to help the parties involved. (Mayor)

### **3.4 Answers to the fourth question**

...These phenomena are larger than us; a passive defense is needed. It is crucial to know well the broadleaf as to choose more suitable plants for this changing climate... If I till corn, I have to water it 3 times during the summer, spending all earnings. So the question is whether we should plant corn or choose something else... It began with GMO. We do not want them, although it would be good to have corn that withstands drought... The decision is clearly hard. (Agriculturist).

... We have to wake up the government, create new kinds of communication, that are very precise, avoid useless exaggerations and alarms over the situation of our planet. Erosion and polar ice melt-down are worrying. ... we are not talking about centimeters but meters. ... Climate changes in the south of Italy have brought an increase in snowfalls. It is hard to tell, whether the population is informed, because information is insufficient. So I can not say how this could determine individuals' actions. The green awareness is still not sufficient. Peoples' behavior is inconsistent with all information that reaches us, one way or the other.

It's not true that we have bad communication or little awareness, because some things have improved (see the fight against smoking, differentiating waste collecting), still everything proceeds slowly. In my opinion we should invest in schools and children, because adults do not give a damn and they are more sensitive to information coming from his own offspring than other institutions. So giving more attention to schools would definitely show more results.

In addition to prevention, education in the schools should start, not in a classical, but rather in a more practical way. We could show rather than tell the difference between before and now... things are definitely changing. So I think, we should invest more in children... (FVG Consultant)

...We can improve roads at the bottom of the problem only with side road drains. Some of these projects are already being financed. Yes, prevention in case of heavy rains and storms is already active and we are making excellent progress. The main problem was water flowing from the Karst containing gravel and rock, but now we have mended it at its core.

Fires in the Karst have a devastating effect. Only in one from a hundred cases, lightning is the cause. We have a department that is on the watch 24/7. Department Karst-Isonzo is composed by six communities; Savogna, Segrato, Doberdò, San Piero, Fogliano and Ronchi. We all work in shifts. When the region or foresters call us, informing us of an existing danger, we make rounds around the Karst without fixed timetables. Even if we are out on the field, when we are called from Palmanova, we can nevertheless promptly intervene. I hope that in a couple of years all critical points regarding water shortage will be eliminated. Furthermore... we have a lot of ENEL's High Tension pylons giving origin to electro-magnetic problems, but that is not that much relevant. (Civil Protection)

...We know that we are facing a period with non-homogenic rainfalls. This is a fact and if you ask me what could be done, I can only reply that the agricultural sector should be more protected. Based on the fact that we have several rainfalls during the year, we should find a system to store water which would be later used for agricultural purposes, to water fields in periods of drought, for example. The only thing that would be desirable, are water management plans for agricultural purposes. (Mountain Community)

...This is quite a big question. Congratulations! I need at least one hour to answer. So, I don't know... here we have everything, also banalities... We could say that this is territory research and could be at maximum expanded to the Friuli Venezia Giulia region. We have two substantial leverages, which could be used as a start: we could call this a people movement policy, because we take the train, plane... and it could be a good solution. From my point of view one thing that could give results is a revision of energy policies on a local consumption basis. Photo voltage and solar panel are great solutions, but people can still afford the price of petrol and that does not stimulate them to make any drastic changes. If we want to make a change, we must make a radical choice, or choose a path leading there. So, policies and specific attitudes are needed to change our points of view. The economical gap between the traditional installations and installations of a certain type has to be breached. Reorganization policies for

the public heritage safeguard, the architectural one, could be carried out through the public budget, putting pressure on a local level to activate alternative energy policies... A banal example to help our reasoning; if we build a thermal water swimming pool and heat it with solar panels, located elsewhere, a great public work would be achieved in proportion to the produced and consumed energy. The public carries out major works, because individuals aim at their own profit, so either you pay them a photo voltage installation or they will never do it on their own. Costs are still too high for them to meet, making it impossible to benefit in a life time from such an investment.

We, the public administration, have the duty to mend everything we can. By connecting a new city district to the sewer system, we have already made quite an accomplishment, even if it has little to do with the climate. But from an environmental quality point of view, this is a huge leap forward. (Mayor)

...The awareness of the city population can also influence companies' economic attitudes. So, if before unfiltered gasoline was used and a more desirable opinion for the filtered gasoline came out, industry and trade adapted to new demands; it's definitely important to continue with informing and raising awareness among young people and in schools. (Chamber of commerce)

...In my opinion the most important pollution factors with the biggest impact for the green house effect, are houses central heating emissions and car exhaust fumes. They are mostly responsible for gas emissions, which influence meteorological and climate conditions. Nevertheless almost everyone uses a car today (also when not necessary), and a lot of people start their central heating as soon as they perceive a slight drop in temperatures. In my opinion the use of private transport should be discouraged, ecological heating by solar panels should be encouraged and promoted from the primary schools on. People should be educated and should live in a more eco-friendly way. (Director)

...As I said before, I'm not an expert in environmental problems, so I'm at a loss to say anything. Certainly good and correct information from institutions and media is very important, especially at school. Love and respect for the environment, without exaggeration, must be entrenched among the young city population and reawakened among adults. Our region could only benefit from an alternative fuel production policy, encouraged railway and public transport... actions that would help fight pollution. We can also add financing of ecological studies and watching over the local administrations, where and how things are built. (Journalist)

...Concerning real environment problems, the first case that comes to mind is the Vajont case. A symbolic case, but should dissuade dam construction in such a particular hydro-geological area. A dam that was built perfectly, since it remained intact. People just kept their eyes closed in front of an imminent landslide disaster. What can be learned from this situation? We should evaluate the real risks, with the help of experts, who have different opinions, summarize the conclusions and later adopt a correct communication policy ...

There the risk was obvious, but it was nevertheless ignored... So, things should be examined as they are. The same goes for the TAV and the dam builders that are trying to build a dam in the Gulf... I am not pro or against, since I must first understand the main point, whether it is good or bad, pollutes or not, bah, I don't know. A lot has been said about the closure of Servola's polluting ironworks and now we build a dam on the sea. What would be the consequences of this action...? These things must be understood... Being a 100% sure, before making an important decision...

Today's La Repubblica newspaper reports the ANSA research, which confirms that we are a European country with most transport problems. So talking about high speed makes a lot of sense, if you want to achieve the set-out goals, but high speed will cross the Karst region. TAV will not go through the mountains, but rather through the Karst, a very special region. Let me say that the tunnel which is currently being built to bypass the letter H crossroads will connect to the motorway coming from Slovenia. In the Karst region a breach through the mountain has been made. They had told me, that they passed close to a Karst cave. The close proximity of the cave was impressive and if the road had passed above the cave, instead of 10 meters aside, all work would have come to a halt. That situation would have been really difficult to solve... Also scientists complain and I can guarantee that our university gave much input to this discussion by spotting the most appropriate areas for building ... They start without any precautions and oppose any proposal, but they say... we should look together where work could be done. In such an issue politics should not favor only one side, no one should be left out, because otherwise... it will cost more time, but the result will be a safer project. This is crucial. Later communication arises naturally. Good communication is very important, but if you try to play tricks in communication, when things go wrong, it becomes a true disaster..."

Climate changes are not a consequence of human activities... Damage is not done in a short period of time. You can spot the first signs with the increase of river levels, expectably when the opposite is being done. When rivers and coasts are purified and quickly mended, they become again usable. It's quite easy to understand if they are being damaged by human activities. (Journalist)

... Nowadays we talk a lot about reducing the use of our cars. I think that the first thing to do is to expand public transport. Secondly, we should make specially designated parking places along the city outskirts, where you could leave your car, since I and people like me, spend a lot of time at the outskirts and cannot afford to use public transport, because I would have to take 3 buses to get there. So, yes, buses should be used in the city centers. I agree with those, who proposed this. Last year it was Forza Italia party. Bus usage was included in a new traffic design study, which would make the Corso Italia Street accessible only to pedestrians. I agree that the city center should be accessible only to pedestrians and maybe also for public transport. In order to do this, the city should plan the necessary infrastructure, equipment... This could be a very effective solution. Using the bicycle... well, Trieste is not very flat, but as long as there are initiatives: jogging, Trieste on bicycle, bicycle in the city, all these things increase people's awareness about these problems. But we are at a stand still: young people do many things, because they are aware of the problem. Older people are more stubborn and very unlike to change. It is already an achievement, if dog droppings are being cleaned, even if this has not got much importance when it comes to pollution... Everything should start from the institutions side, so the city population would have some help and maybe decide to take a different stance. If we don't help them, it's obvious they would rather take a car, since the bus is so uncomfortable. (Journalist)

...car pollution. 25 000 cars pass through my city on a daily basis. A Trieste-Gorizia state road splits the town in two, with 25 to 30000 cars passing through on their daily way, creating a serious pollution problem and changes on a microclimatic level. But I am no expert, so I can not be sure. In this case intervention is needed, moving the road some where else or build a motorway to Lisert zone, although this would not be a solution to the environment problem. (Town councilor)

...I would close many historical city centers to safeguard architectural beauties. So, not only air, but also the architectural heritage would be preserved.

We have also a lot of noise pollution. We have a lot of activities, like congresses, convections, scientific environmental works, etc... but something should be done to educate the civilians. Educate the city population. I am not referring to repressive measures: it's not always good to punish someone, because punishment does not have the desired effect, however it is some needed, since there will always be people who just do not give a damn. We should try to make them understand.

Maybe, even us working in the mass media, should participate more strongly, not only in the presence of environment catastrophes or when certain levels cross acceptable limits. (Journalist)

... The public body that does inform has to be credible. We should achieve a system, through which the population would start to trust public bodies and promptly respond to peril information. So no tricks involved, people must trust them; by planning a correct information form, people will not start irrational panicking and put them-selves in danger; It depend all on the correctness of the public body with the citizens. Often, citizens feel like they are being deceived and decide not to trust anyone; Credibility should be put on the first place; As soon as credibility and correctness in communication are achieved, people will become calmer and more correct. (Prefect)

... Mountain economy rearrangement plans will help to persuade people to go back to the mountain to start working and take every day roads and hairpin bend. However the job will be difficult, since everyone likes to have a job in the valley... I don't know, maybe the only think that can help is tourism.. I don't believe that these changes are part of an Earth circle; nobody can say or support this idea, since we do not have data from a long enough period to say that these climate changes are caused by paper factories or are just a longer natural cycle... The lack of data does not give us the possibility to confirm this hypothesis. (Journalist)

...Intensify education and information about this issue. I am talking about rising people's attention. I will say it again: the correct use of air conditioning, avoid using sprays containing ozone, limit cars usage and raise awareness in the institutions with every licit means. (Journalist)

...The European Euro 1, Euro 2 to Euro 4 standards must be observed by us all. In Italy this is not so common, but in Austria cars with a standard lower than Euro 4 can't go around freely. I think that if we undertake bigger incentives – new cars with low polluting emissions, methane autobus, and better road networks –pollution by transports would certainly decrease. (Road haulage.)

... Those of us, who live in a small state, can make an effort to solve ecological problems in our region. Obviously the biggest effort has to be done by the cities with larger population and industrial areas. Unfortunately, ecology is often in conflict with the interests of big capitalists, who are not interested in long term consequences for our planet or a fair, undiscriminating and eco-friendly economic development. (Travel Agency)

..Like for healthy nutrition, environmental awareness should be taught to children at school. Same goes for the use of energy that is closely linked to climate changes and vast range information campaigns that involve the classical Medias. (Italian communicators)

... We should focus on school, because the adult generations have already made up their minds. If we want to create a sustainable future, we must bet on young generations, especially at elementary schools, since they are more. ..(Mayor)

## CONCLUSIONS

**This research comes to an end by identifying the priority need of a cultural change - on a widened basis - as regards the way in which political representatives perceive the expectations of public opinion on topics such as science, technology, innovation and related risks and benefits. What emerges is the awareness of being unable to “know exactly” (also as far as experts are concerned); however, politicians are asked to intervene and take measures towards the responsibilities derived from some human actions, like for example environmental pollution.**

Our research's primary objective was not that of exploring public perception of media messages, but the results confirm that people - far from being passive actors - are actively involved in interpreting and judging the information to which they are exposed through the media. Furthermore, some subjects turn out to be particularly interesting because of their “dynamism” (meant as a risk tendency), therefore becoming preferential topics for discussing and transmitting interpersonal knowledge in everyday life, not only among friends and acquaintances, but also with strangers.

**In order to obtain consent, and being able to carry out some political actions, it is necessary to live with the doubt deriving from comparing opinions, as well as exchanging pros and cons, as if it were the only possible chance to avoid judgement mistakes, but also to put an end to divisions and incomprehension between supporters of different points of view.**

It is to be remembered that the achievement of new results has an “awakening” function of gained awareness, since it draws the attention to up to then unknown or neglected issues. If new information is not consistent with pre-existing one, some psychological and epistemological barriers could arise. New data will be transformed both in contents and in the form, in order to be adapted to previous knowledge. In this way, hardly will scientific results influence people or modify their behaviour in a significant way (Gergen and Gergen, 1990).

The act of “consenting” can be meant as an individual will of joining with others, by sharing their condition and fate. One tends to converge towards a common judgement which is close to the average of single judgements. “It is as if - not having any reason of divergence - participants avoided disagreement by granting themselves mutual concessions, in order to reach consent. One tends to converge, in order to feel closer to reality” (Moscovici and Doise, 1992, page 17).

Modern man knows a lot, but mainly “by proxy” (that is to say, in a “second-hand” or “second level” way), interpreting social and natural facts that he does not observe directly, but only because it has been *suggested* to him. What is typical in our culture is the socialisation of a discipline, not its popularisation. What happens is indeed the progressive formation of another knowledge type, suitable to particular needs inserted into a certain context. Knowledge exchange implies discontinuity and progressive modification, until conceiving and constructing a new reality (Moscovici, 1976; Volpato, 1996).

**Knowledge possessed by people constitutes a continually modified rich heritage, offering a “grid” for interpreting daily facts. Such knowledge stems from a combination of ideas, opinions, beliefs inherited from tradition and historically sedimented with other knowledge types acquired in life: all these kinds of**

**knowledge follow sectorial belonging and personal preferences (Gergen and Gergen, 1990).**

It is difficult to comprehend all the communication dynamics between experts and laymen: in any case, the solution that is thought to be the best in a specific moment is to be preferred. Such solution follows the rule of universalisation, according to which a precept can be considered valid when all are able to freely accept those consequences and side effects deriving from a universal observance of the rule taken into consideration (Habermas, 1989).

The epistemological uncertainty - typical of many technological, bioethical and environmental issues - makes however the above-mentioned rule impossible to be obeyed, since the consequences of a choice become debatable: the answer depends on different value guidelines implied in the choice itself (Pellizzoni, 1999).

In formulating their judgement on risks, laymen take also into consideration some information previously acquired on controlling bodies as well as on the main industries, in particular as regards attitudes and strategies followed in the past towards dangers (Wynne, 1996). Common people estimate experts' trustworthiness and reliability, recognising the socio-cultural frames which influence their knowledge and underlying interests. Such people understand that frames do not represent a "distortion" of knowledge, but can constitute an important component of judgement relating to dangers. Persons do not limit themselves to comprehend the seriousness of physical risks in the way in which experts present and explain it, but they commit themselves in evaluating just the same risk experts and the same institutions. Laymen's reactions do not consist in rationalistic elaborations and calculations of scientific data, but form part of culture and reflect some different ways of interpreting and representing facts, such as action capacity, predictability, control and values. Finally - since people react to risks because they belong to social groups and networks - their answers derive from private experiences, but also from collective ones (Lupton, 2003, page 119).

As it has already been said, it can happen that laymen reject or contest experts' risk judgements. While working out their own private reflexivity, people try to conciliate different, often conflictual identities and interests: "persons unceasingly complicate their relationship with any type of specialist knowledge, even though informally" (Wynne 1996, page 50). People's daily life could continually question - and therefore create disagreement with - "expert knowledge", also in case of apparently indisputable acquisitions. It follows that laymen relate themselves to the experts' knowledge systems in a complex and ambivalent way: they do not limit themselves to deciding which - among two or more knowledge systems - to rely on when formulating their own risk judgements. They rather elaborate their own expert risk systems, both having recourse to professional knowledge and doing without it (ibidem).

Common people broach debates on risks, while being aware of their own dependence on experts' knowledge. Even knowing that such knowledge is uncertain and conflictual, people also recognize not to possess - since they are just "incompetent" - the means and necessary opportunities to criticise in a fair way (Wynne 1996). However, it is possible that in everyday life, some aspects of scientific knowledge are considered to be insignificant and even misleading.

Opinions on risk are determined by the positions of individuals within society, but in turn they determine them, contributing to develop and reinforce group cohesion, as well as a feeling of “belonging”.

**Difficult conditions become problems only when people consider them as ascribable to human actions (Stone, 1989): environmental pollution, for example, is caused by those who do not care about it.**

Scientific and journalistic knowledge - but also laymen’s knowledge - are different types of knowledge. Journalists “turn ‘primitive and rough’ knowledge into new knowledge, which is more suitable to be comprehended” (Guizzardi, 2002, page 12); if scientists aim at revealing “the truth”, journalists aim at diffusing “truth and novelty” (ibidem, page 42). Information receivers are not only asked to listen, but also to recognise the legitimacy of what is said by specialists, to act rationally by changing some daily behaviours, but “not excessively and not immediately”.

The objective of this research was that of bringing out people’s opinions on climate variations: opinions which have become consolidate in time through general and specific influences, through the exposure to scientific, television and journalistic information, but also through the information going “from mouth to mouth”, narrations passing from a person onto another and transmitted because their gained “social consent” is very strong.

Focus groups and interviews to privileged informers offered the same result: the subject is known and people also bring together all those much-discussed problems relating to a “cleaner world”... topics that one does not know whether they are connected with climate variations or not, but which are significant for respecting man and nature. Therefore, it becomes important for individuals to “participate”: not egoistically, but in a collective and useful way, learning and implementing some balanced choices between personal and common interests: in other words, preferring cooperation to defection. Let us reassert what Batson et al. (1995) affirmed: “Unilateral pursuit of what is best for everyone creates a situation where everyone suffers”.

Modern times turn the relationship between individuals and society into a more mobile, fluctuating and individualistic type of relation. That is why it emerges the need for a wider information level. The oxymoron “individualistic society” expresses very clearly the tension and conflict reflected and produced by the media system and in general by knowledge, placing itself in the core of modernity with its antagonisms and contrasts (Habermas, 1985).

## EXAMPLE OF FULL FOCUS GROUP

**OSMER.** Participants to the focus-group: Andrea Cicogna, Dario Giaiotti, Agostino Manzato, Salvador Marcelli, Stefano Micheletti, Fulvio Stel.

### Question 1

Do you believe there are significant climate changes under way in the territory where you live? If so, please give some examples.

### Written answers

A: Climate changes have been a constant feature in the history of our planet. Of course, the time span over which they occur is usually quite long (although catastrophic events, which bring about abrupt climate changes as, for example, the impact of gigantic meteorites, must not be forgotten). So the question obviously has an affirmative answer to it. Detecting meteorological episodes that are somehow linked to climate change is a much more difficult matter. In fact, climate variability can be very broad and an apparently exceptional episode may actually fit within standards of climatic variability.

B: I am persuaded that over the past 50 years the temperature on our territory has risen. Such an event probably already occurred in the past, but rather than fitting into the natural variability of the Earth's temperature, I believe that the current rise is due to anthropic factors. From this point of view, I believe that a climate change is taking place, having local effects on our territory.

C: After having examined a series of meteorological measurements by applying the habitual objective techniques for meteorological data analysis, keeping in mind the definition of climate and its variations, I am not able to affirm that significant climate changes are taking place on the territory where I live, but I am unable to refute this hypothesis either. This uncertainty is due to the complex nature of climate and to the fact that its variations are detected over short time spans, namely a couple of decades.

D: Compared to 50 years ago, if we listen to what old people say, it now seems that it is snowing much less during the wintertime. I know for certain, and have the data to prove it, that snowfall has decreased substantially over the past 200 years. This is so both because we have perturbations in the winter and because, on average, it is less cold. Mountain rainfall has decreased by approximately 5% in the last century and the same is true for flood-flow deposits in large basins. As to localised floods, they have probably increased slightly and are becoming more and more frequent during extremely hot summers, especially in June. It is difficult to say whether these variations are significant or not. It is difficult because of the different aspects that can be involved in the evaluation process (professional activities, safety, tourism, etc.).

E: It depends on what we mean by the term significant; it depends on the time-period examined. The general trend observed over the past decades has been a redistribution of rainfall during the spring/summer months. June's climate is more typical of summer than of spring, it rains ever less frequently and the temperatures are higher. Looking at a longer time span, the frequency and intensity of snowfalls has decreased on the plain areas. This can be observed from historical data starting at the end of the 18th century, a trend that has become stronger in the last few years.

F: Yes, in the Friuli Venezia Giulia region: a) deglaciation, namely a dramatic reduction and/or total disappearance of the already small glaciers or snow-glaciers present on the Friulian Alps, which is one of the effects of an overall reduction of winter snowfall and a general increase of summer temperatures. b) an average temperature increase, in particular of maximum summer and winter temperatures. c) a greater frequency of prolonged periods of oppressive summer heat d) a greater frequency of periods of drought. All compared to thirty years ago, approximately.

## **Discussion**

A: It seems to me that all expressed opinions are more or less in agreement, in the sense that on the one hand there are some objective data, which are difficult to deny, measurable data, trends indicating that things are changing, whereas on the other hand it is difficult to say that there is a certain kind of summer, a certain moment, a certain rainfall due to an ongoing climate change. It is difficult because from year to year climate variability is high, an episode can be part of what, year after year, the climate brings... the problem maybe lies in the way the question has been asked, in the sense that it is evidently simplistic. I firmly believe that climate variations are a constant factor. It is normal that climate should change with the passing of time, the real question is, to which extent does anthropic action affect all this, and on this point I personally have no certainties. There are some scientists who are absolutely certain there is an anthropic effect, others who deny it most passionately. The situation is definitely unclear.

B: I wish to underline an important remark made by one of my colleagues: the level of significance is evaluated according to the potential impacts of the climate change, which means that the methods of detection and analysis of climate change are functional to impact research, on the kind of impact a particular change will have... From the various answers that have been given it seems to me that there are certain differences between us: some are deeply convinced that significant climate changes are taking place on our territory, others suspend their judgment, others still refer to the fact that in order to define a significant change one should first define its impact, so I would say that in the current state of play we can simply observe the relative changes taking place from year to year, a hotter summer, a cooler summer, a rainy one, a less rainy one, but they definitely are not the index of a significant climate change, which could influence anthropic activities (and not only) for a certain period of time, and would be significant from an economic and a social point of view. This is my impression...

C: Yes, I partly agree, in the sense that this round of answers has highlighted the different existing approaches. I also posed myself the question on what connotation one should give to the term significant, then I decided to make things simple and imagine how the man in the street would interpret it and therefore more or less associated it to terms such as evident or unmistakable. Whereas other colleagues, who are scientifically more rigorous, evidently emphasize the existent uncertainties and precautions to be taken – this kind of reasoning helps to face the problem from a more scientific viewpoint. On the other hand it is true that there are those who suspend their judgment, those who underline the fact that in order to decide whether something is significant or not one must measure its effects, but nobody among us said “absolutely not”, quite the contrary, I don’t know the percentage, but several said: yes, changes are taking place. I do not know which was the role played by the word significant, if it had not been used perhaps the answers would have

been different, but we all take it for granted that climate change exists and is part of the natural system of our planet. So we all know that the real, unspoken question asked during every debate taking place these days is to which extent these changes are due to human action. In some of the answers provided there has been more than one reference, if I'm not mistaken, to the issue regarding the month of June and to the question of winter snowfall, so I think perhaps these are the aspects that should be underlined.

D: Yes I agree with all that has been said. I would like to make a remark on how we answered, on the information we gave. What hit me most, having listened to all of our replies, is the almost total absence of quantifications, apart from the person who mentioned a 5% nobody quantified change, independently from the fact that they might consider it substantial or not. Well, I think this is an important aspect because if someone asks the man in the street how much the television fee has risen, normally a person will know if it is by 5, 6 or 7 euros, whereas when talking about climate change one will say it's hotter, colder, it rains more, it rains less. The thing is that not even we, who should, if only because of our mindset, be able to quantify all this, in the end, not even we, who should be the ones in charge of communicating such information, are able to do so. I think this is a problem, which possibly arises from all the confusion that is often created...the trouble in giving a number. I personally had some trouble, I realized it while I was writing what I wrote because, of course, I more or less do know the trends, but if I were to quantify them...I couldn't think of any figure, so I believe this is something that we, as professionals, should keep in mind.

E: I was thinking about transport, maybe because now we are more wheel-dependant, car-dependant, it becomes difficult for us to make predictions, but it is a problem for them (the carriers)...the main problem in the sector of transport could be fog instead of rain, if it rains you will still travel, so it does not influence your work, fog instead can be very dangerous, I am also thinking of the "meteorisk" project that we are following...among the dangers considered there is, for example, heavy rain, but no mention is made of fog. Unfortunately, now that we depend on cars, fog is considered an irrelevant element of climate change. Instead it is important because the way we move on the territory has changed. Once, if there was fog and you moved with your cart, nothing happened, today, with cars, it can kill you. Perhaps we are not at all interested in 5% less rainfall, but fog becomes a different phenomenon. Other things influence our ways of being and of living, if someone dies because of the fog this is an important fact, but it is scarcely taken into account. Maybe the 2 degree temperature rise is more contemplated because everyone will buy an air-conditioner in the summer and that will have an impact on the entire energy issue.

F: I just wanted to mention the fact that most of the answers have, in my opinion, proved that a trend does exist; it is not yet quantified, but everybody noticed it in the field of temperature, for example. Mention has also been made to rain, snow, etc, there is always a comparison with each phenomenon's natural variability and actually the problem is that many years of data collection are necessary to understand whether the changes detected over the last 50/100 years fit into the so-called natural variability standards or not, for which we would need extremely vast sets of data that we do not have. And this is basically the problem and the reason why at a scientific level, among the experts judging these phenomena, we have different opinions. Had we had safe and monitored weather stations in the same places for the past 3000 years, we would not have this lack of

conformity. So, in my opinion, the problem is hard to solve both on our behalf and at a higher level. I personally wrote that changes are taking place and that they are not due to natural variability because I read some papers published by the Mississippi Research Institute, which studies climate change and whose work I trust, and their common belief is that the changes which have taken place over the last years are not part of a natural variability process but have anthropic origins. If someone then asks me to prove it, well, I am unable to, I trust what they say.

## **Question 2**

With regard to, for example, rainfall, sea level and/or the different types of atmospheric pollution, have you noticed any variations (ongoing or related to the past few decades) on the regional territory?

Do you believe that the effects of such changes have had or will have an impact on the permanent population and/or on the economic, professional, tourist and transport activities linked to your territory?

## **Written answers**

A: As far as rainfall is concerned there actually seems to be a redistribution of precipitations during the various months of the year and this may affect human activities (agriculture, tourism, etc..) In our regions the temperature issue seems more uncertain. Certain months have in fact become warmer but this does not appear to be an overall trend applicable to the entire year, or a trend emerging clearly from the data available.

As to the level of the sea, the situation in our region appears very uncertain. No clear trends become apparent although temporal historical series do exist (for example in Trieste). Variations are limited and in any case almost totally cancelled out by the natural variability of this parameter. During a recent conference I have learned that the Mediterranean seems to be slowly getting warmer but its level seems to be slowly diminishing also.

B: On average the temperature has undoubtedly increased if compared to 200 years ago or even to 50 years ago. Rainfall has diminished regularly (although quite moderately) over the past 100 years. Compared to 700 years ago, though, nowadays it is much colder! This is to say that we always have to understand which time span we must refer to. Climate change may have a strong impact on mountain tourism, since there is less and less snowfall and it is slightly less cold. The persistent summer heat leads us to an ever-growing use of air conditioners at home as well as in cars (increase of energy consumption and, indirectly, of pollution). Moral of the story: building new skiing facilities in the mountains is quite an economic risk, on the long-term.

C: Referring specifically to the territory on which I live, variations of the principal features of the atmosphere and of the sea have been measured and observed but I do not believe that they can have consequences for the population or the activities performed by it on the territory.

D: Temperature variations exist, proving that there is an upward trend, measurable also at local level. Analogously, rainfall variations may also be noticed. As to sea level and/or the different types of atmospheric pollution, I am not able to judge. I can say that the CO<sub>2</sub> content in the atmosphere has changed, there has been an increase of CO<sub>2</sub> in the atmosphere, and the causes are undeniably anthropic. With regard to the effects, they are

very difficultly quantifiable, especially in a developed country with a high capacity for adaptability (e.g. snow cannons if it does not snow!). The situation is extremely different in countries with a lower technological level.

E: Referring to the Friuli Venezia Giulia region, rainfall: probable 10% decrease over the past 50-70 years in the mountain, plain and coastal areas, data do not provide a clear signal. Temperature: an increase of 1-2 degrees of average maximum summer temperatures and also of average maximum winter temperatures. Sea level: I do not have precise information on this point, I believe it is rising. Atmospheric pollution: locally, it does not depend from the climate but from human activities; on the whole, the concentration of carbon dioxide has almost doubled if compared to pre-industrial values. Snow: I remember a series of studies carried out in Friuli, which proved that in slightly more than a century there has been a drop of more than half the quantity of fresh snow on plain areas; on the whole it snows less in the mountains, etc, etc. Impact: definitely on tourism (positive in the summer, negative in the winter), probably an overall positive impact on transport, health risk in the summer due to heat waves, possible increase of problems linked to water supply, etc, etc...

F: Climate trends can be most easily highlighted in the area of temperature. The statistical calculations used to study rain make it highly complicated, due to their own nature, to come up with an opinion on this parameter. I am therefore unable to positively state that there is a visible trend in this area, as there is with regard to temperature. As to sea level, I do not know of any evident trends on our territory although these have been observed at the polar caps. With regard to atmospheric pollution, also in this case I do not have any local data, whereas at a global level it is known that there has been an increase of CO<sub>2</sub>. I believe that local temperature changes alone, can have direct consequences for the habits of the population.

## **Discussion**

A: It seems to me that in this case, too, there are some similar and some divergent opinions; in terms of atmospheric pollution almost everybody has observed an increase in CO<sub>2</sub>, talking about the sea, many said they are not provided with local data or that the data diverge, there is no clear trend, while, for example, with regard to rain, some say they cannot make a judgment and others affirm that it has clearly diminished, so there are some differences, also in terms of the consequences for man. Some say, yes, there are some consequences, due to the fact that there is no snow in the mountains, to the fact that there are potentially dangerous heat waves and then there are those who say no, in my view there are no consequences, so it is interesting that 5 people say 5 things, which are the same and 3, which are different, analyze similar data and translate them into different conclusions regarding consequences.

B: I heard what has been said on carbon dioxide, but this is a piece of information that we all retrieve from the source information they give us, so we must, in a way, trust someone else. The same, I believe, holds true for the sea level, we do not measure it, so probably it is for this reason, also, that a lot of people have not provided an answer to this question. As to the issue of low quantities of snow in the mountains, touched upon by two or three people, from an economic point of view it is risky to invest. Why? Because if it snows too little, even by producing snow with snow cannons, the costs are too high plus there are also risks connected to pollution, since usually this procedure is not precisely

inoffensive. So before making heavy investments in the mountain area, before spending billions and billions in the Friuli region, one should think about it in terms of a period of thirty, forty years.

C: I only want to make a brief reflection regarding the impacts on society. One of my colleagues wrote that we are a considerably evolved society and are therefore able to adapt ourselves; this is true, but it is also true, in my opinion, that we have become more sensitive to these problems; we have entered the realm of neurosis. It is partly true that people now have a harder time enduring heat or cold temperatures, my mother, for example, believes that the climate has not changed but that it is just the people who have less endurance. Or, as Marcello said during the previous question, it is also true that people have a greater necessity to move, probably the Val Canale flood, apart from the fact that it was a unique event and I do not know whether it will be a future trend, time will tell, anyway, the truth is that an area of our region suffered great damage and this had a set of repercussions, partly at mediatic level, partly on regional transportation. Probably 50, 100 or 200 years ago someone living in southern Italy would have never realized what had happened, so this has to be kept in mind also: it is therefore true that we know how to adapt ourselves, but it is equally true that we are becoming more and more susceptible to the various problems.

D: I also agree but maybe I will specify the following: it is true that we are more sensitive when it comes to opening our wallets, by which I mean that basically we do not have survival problems like those that –according to certain hypotheses - climate change might bring to other parts of the world. Here, there is no problem of survival, except for the weaker sections of society in case of heat waves, but on the whole, climate change will not bring us any survival problems here. It is possible though that climate changes can have an impact on certain economic factors, on wealth, and it is from this point of view that maybe we are more sensitive. Besides, climate changes have distinct effects on the different economic sectors, for example, talking of topical events, this winter's heat damages winter tourism operators but is advantageous for all of us because we spend less on heating, so, as often happens, there are the pros and the cons, this with regard to the first part of the question, the one asking whether we are aware of climate variations on our territory...Yes, the same scenario also came out in this case as with the previous question; maybe those of us who, because of their work, have faced these issues directly, exposed themselves a little bit more; those dealing with other things perhaps have had less contacts, less access to information and have taken a more cautious stance, a suspended stance although, once again, there is an acknowledgement of the presence of these changes, be it on temperature, be it - in a slightly more dubious way - on precipitations, on snow, etc, not as much with regard to sea level because we do not deal with this issue directly. So, on the whole there is an acknowledgement of these ongoing variations on our territory, whereas it seems to me that no one has entirely denied the possibility of their existence.

E: I would like to point out how, also within our community, among the colleagues who deal with what is happening in the atmosphere because it is their job, there is a certain conditioning derived from the information obtained from the mass media or from authoritative committees or commissions in charge of evaluating climate change. I think the question wanted to focus on our territory, but the answers we provided were always embedded in a wider contest, for example, we talk about the increase in CO<sub>2</sub>, but I believe

that here in our region, apart from a couple of urban settlements, no CO<sub>2</sub> measurements have been made, so I would like to underline the fact that we too, as all other humans who live, eat and drink, we too behave in a certain way and judge certain results –of course with a professional or a scientific approach – but still conditioned by the information we receive from the outside. This was my first remark. My second remark regards instead the impacts on society and on economic activities. Of course, if we refer to variations that have occurred in the last years we notice that each year is different so that one year sees a rise in the sale of air-conditioners, another year demands more artificial snow, another year less natural gas is used...however I believe that a change in the economic behaviour of a territory or among a group of operators within that territory or, in any case a different kind of social change occurs when the variations are long-lasting. For example, if certain areas of the globe will, as it seems, become submerged, it will no longer be possible to live there or if it will stop snowing in certain mountain areas for the next 30 years, then of course the operators will have to find new solutions. In the current state of affairs, also on the basis of what my colleagues said, I believe there could be variations in terms of yearly costs and gains from one year to the next due to climate variations and not to a climate trend. As to significant, long-lasting changes taking place in the next decades and their effect on economic and social behaviour, currently I do not believe there are any signs, I definitely believe that building a new road or a new air-base has a much greater impact on the economy. This is what I wanted to underline in terms of economic and social impact.

F: As to the first part of the question I want to say that I more or less agree with what my colleagues said or wrote, when they said that there is a change (although differently quantified). I wish to refer to the ambiguity of the term atmospheric pollution when it comes to climate change. Putting the increase in CO<sub>2</sub> in the same pot as PM<sub>10</sub> frankly seems inappropriate to me. I get the impression that this kind of question can create some confusion and lead to say that climate change can raise the amount of particulate matter, things like this. A question thus formulated perhaps arises from a somewhat superficial attitude in posing certain issues to people and on how these issues are perceived. It seems that because of climate change we shouldn't be using cars any more and that it is impossible to breath in the centre of Udine...this is an aspect that must be underlined; as to the effects of climate change on the population, I agree with what Dario said: historical social and economical changes probably have a much greater impact in the phase in which we are now, compared to what we are able to perceive with regard to climate change.

A: Dario's remarks also made me reconsider a couple of things, and undoubtedly I have to admit that we are all influenced by the daily news and by what we hear from the media. But as far as I'm concerned, I replied on the basis of what I know either because I personally studied it or because I read it in papers written by others on the local situation. I therefore did not write that I think there are changes underway because I read it on magazines performing global studies, but because I worked on our data, both with regard to temperature and – partially – with regard to rainfall, I heard about local studies on the snow issue, which may of course be right or wrong, we can definitely discuss about that, but I believe that from this point of view I have been able to express a judgment that is not influenced by what we hear outside our region but precisely referring to the information that I dispose of regarding our region. As I said we can discuss its validity later.

B: I wanted to come back to the issue of developed societies such as ours, which probably will not have survival problems – if it gets hotter more air-conditioners will be sold, ok, but at a global level the fact that more air-conditioners are sold makes the life of those who pay the consequences of it even worse. We use up more energy, emit more CO<sub>2</sub>, so, yes, it is true, we solve our local problem, but at a global level the situation most probably gets worse.

### **Question 3**

Do you believe that at a regional level actions are being taken to solve the problems deriving from climate variations?

Which measures do you think should be activated?

In case actions are being taken, do you believe that they are supported by an adequate informative campaign towards the citizens?

### **Written answers:**

A: Yes. I am certain that actions are being taken to solve environmental problems. The Kyoto Protocol is one of them. If by “action” we also mean the act of understanding what is happening and what could happen, then the actions taken are even more (this project and questionnaire are an example of it). I think it would be appropriate to raise the population’s awareness regarding these matters in order to favour a “sustainable development” kind of mentality. Perhaps we should all implement a better resource management (limit water wastage, turn off the lights in sun-lit offices, turn down the heating...). I’m afraid there is not enough information regarding the measures being undertaken. As to Kyoto, I think that everybody talks about it but only a few (and I am among these) actually know what it foresees or entails for the community.

B: Of course there are certain initiatives, let us just think of the Kyoto Protocol at a global level down to all the other solutions at a local level (incentives for the installation of renewable energy production systems, energy saving initiatives – in public transport, waste recycling, by creating new vehicles and home appliances, initiatives promoting the use of non-fossil fuel energy sources and the contentious nuclear power, etc, etc...). These sometimes interlace with different economic interests. Which of them should be activated? So many alternatives...I am not an expert in this sector; probably a resolute, clear-cut carbon tax would help a lot (I am saying this as an outsider, I repeat). In general, I believe that the information is there but that it would nevertheless be good to boost it.

C: No, I do not believe that sufficient measures capable of preventing or solving major environmental are being taken. In particular I know that Italy has adhered to the Kyoto Protocol, but is still not respecting it, while important nations such as the United States haven’t even signed it yet. Furthermore, I don’t believe that the current energy policy, which basically relies on petrol, is the best possible solution to decrease environmental problems. There should be a far greater exploitation of solar energy, of alternative sources and perhaps substantial incentives to promote hybrid cars.

D: The answer one can give to this kind of question could unfortunately be generic: something is being done but more could be done! It cannot be denied that in the last few decades not many investments have been made to decrease the impact of man on the environment, but it is also true that society is unwilling to give up its comforts and attained economic levels in order to respect the environment. The truth is that despite the fact that

we know that cars pollute, mobility and transport have not changed. We just tried to build less polluting cars! Some measures, although environmentally friendly, are not accepted if they change habits too much or if they generate fears (for example nuclear energy). The information provided on the measures being undertaken is often of a sensationalistic nature and imprecise. Not the quantity but the quality of information should be increased!

E: Actions aimed at solving environmental problems are being taken; some are the consequence of resolutions made at a national or an extra-national level (European Union, UN), others stem from laws issued by regional or local authorities. As to the efficiency of such measures there is no homogeneous judgment: some of them have already produced some important and evident results, for example with regard to the management of urban and industrial waste, while others look more like declarations of intent and are not sustained by any practical actions. The measures aimed at solving the problem of atmospheric pollution are the most difficult to activate, especially on a global scale, whereas at a local level emergency solutions exist, which have proved to be both efficient and effective. Information regarding measures under way or other important social issues is inadequate especially in terms of the quality and the clarity of the messages provided.

F: Over the past 30/40 years I have noticed a “destruction” of the farmland system, ditches are being closed, more and more industrial warehouses are being built on “good” farmland, we have been using heaps of chemicals and pesticides! Therefore, “first of all” we should, or maybe I must say, we should have paid greater attention and been firmer when it came to upsetting the environment. It is everybody’s fault, from the farmer to the municipality (administration), etc. The truth is that everyone is concentrated on their immediate economic interest but does not have an intelligent, long-term perspective. I know I haven’t replied to the question, but what we have witnessed in the Friuli Venezia Giulia region in the indicated time-frame is an environmental disaster, regardless of climate change.

## **Discussion**

A: Professional knowledge is clearly missing in this kind of questions and answer. Right now we are “street people” that are more or less aware of what environment is. Some answers could be shared by many people, some are too generic and due to their generic character, they can only result in a variety of answers. As I fear that such imprecision could result in a generalization of environmental, pollution and climate changes issues, specifying and limiting the field would be a far better choice.

B: Like my colleague Cicogna said, this question has pictured what a complex issue just climate changes are and how difficult it is to deal with this issue. Answers have shown energy, behaviour and education problems. To sum up, these answers have highlighted how climate changes in our territory are part of a far larger problem. It is similar to the Chinese Mikado game, where by moving one small stick, you risk moving all the others. Secondly... everyone has highlighted who among citizens and other elected people have taken note about what should be done for the environment. Some people have said that something has been done on a local and global level. Many have highlighted that more could be done, giving a clear picture that a total solution to the problem has not been found, also due to the problem’s complexity. This is certainly an important aspect, a set of rules has been passed, meaning that the leading class is aware that something should be done, however

we could discuss its' effectiveness and efficiency. Nevertheless this is a strong and positive signal that things are now in motion. Thirdly... concerning communication: we have all underlined that citizens are quite informed, others have underlined the information quality problem.... both citizens formation and accepted rules effectiveness need excellent information, making the information problem just as important as the problem of rules to accept or even as important as the problem of the best behaviour to adopt in order to preserve the environment.

C: I was struck by the fact that the six of us, despite being well informed on the various initiatives, have highlighted the need for better information, which might seem a paradox. My explanation is the following... we all have a medium-high level of education, but when we think about the problem of information quality we do not use ourselves as points of reference but imagine how the problem could be perceived by the "man in the street" instead, or by the population as a whole. This might explain why we provided different answers and expressed different hopes for the future. One last remark...what all this proves though, is that the six people present here today are considerably fertile and receptive from this point of view, both in terms of the initiatives that should be started and in terms of the issue of information.

D: I've been struck by the answer provided by someone who said that there is sufficient information on the actions that have been taken, somebody else, on the other hand, answered that there is not enough information. Supposing that both of them are saying the truth, the problem is that quite often the information may be there but we are the ones who don't go to look for it. Maybe we are lucky enough to have the tools needed to retrieve that information (Internet). Maybe the "man in the street" – for example my parents who do not possess this tool - finds it difficult to go out and get the information. Maybe the authorities put the information at the people's disposal but it is then up to the people to go and get this information.

E: I am not questioning the problem of information, there is so much of it...the problem are the journalists; the journalists who involve the population in the informative process, through the mass media, newspapers, etc. The journalist's need is not only that of giving information a tone of truthfulness, but also that of making it somewhat sensational and this can sometimes modify the information itself or at least deflect it from the course intended for it by the source providing it. This is one of the reasons why we decided to write the information ourselves and then pass it on to the journalists, so as to perhaps limit the number of mistakes that can be made. The news provided on the subject of pollution intrinsically isn't very precise because the same scientists not always agree on the causes or the way things are going to end and then the journalist who chooses to highlight one aspect rather than the other does not appear sufficiently objective...what is a possibility becomes a "this is certainly so". So what is the power one holds compared to, for example, Canale 5...etc.

F: Again, everything has already been said...all I wanted to understand is whether perhaps a question thus formulated isn't off the mark. If we are talking about climate change we can discuss the repercussions it can have on the environment. But a question on climate change gives me the impression of a different approach; I wouldn't want the person using this work's final results to associate climate change to environmental problems as if all environmental problems derived from it.

F: As far as I'm concerned, I think this work has been very interesting. Because it is interesting for us to confront each other, to listen to each other.

## QUESTIONNAIRE

This questionnaire consists of 10 questions which analyse the same parameters than the qualitative questionnaire submitted to the so-called "privileged witnesses". Its formulation differs, since the representative sample is numerically higher and distributed per country of origin, job, level of education etc.

Questions are prevalingly close-ended, in order to obtain a real time updating of the situation: our system is indeed connected to a statistical programme automatically updating tables and charts on entered data. Some additional open-type questions will enable a closer investigation and a confirmative data check.

Gathered details will then be compared to those coming from the first qualitative questionnaire, with focus-groups and a Likert-scale questionnaire.

Online quantitative questionnaire

Age

10-19 20-29 30-39 40-49 50-59 60-69 70-79+

Sex

M F

### Education level

Junior secondary school      Senior secondary school      University degree      Doctor's degree/PhD

Please specify your geographic area of residence

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1. Do you know what climate variation means?  
yes    no

2. Please describe it briefly.

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3. Do you think there are changes concerning rainfall, temperature rise, types of atmospheric pollution and sea level variation?  
yes    no

4. Do you think that some important climate variations are taking place in the area where you live?  
yes    no

5. If they are, do you think they might have some impact on economic, tourist and transport activities?  
yes no

6. If they are, do you think they might particularly affect sedentary and resident population?  
yes no

7. In which way?

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8. Do you think that some useful measures are being taken in order to solve environmental problems?  
yes no

9. Do you think that citizens are being duly informed about the above-mentioned problems?  
yes no

10. In your opinion, which interventions and measures should be taken in order to work out such problems?

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