

INTERNATIONAL TELECOMMUNICATION UNION



**ITU WORKSHOP ON
UBIQUITOUS NETWORK SOCIETIES**

ITU NEW INITIATIVES PROGRAMME — 6-8 APRIL 2005

**Document: UNS/06A
April 2005**

Original: English

SURVEY

UBIQUITOUS NETWORK SOCIETIES

THE CASE OF THE ITALIAN REPUBLIC

©ITU
April 2005

ACKNOWLEDGEMENTS

This survey has been conducted by Maria Cristina Bueti <crisrina.bueti@itu.int> and Marco Obiso <marco.obiso@itu.int> of the International Telecommunication Union (ITU). “Survey on Ubiquitous Network Societies: The Case of Italy” is part of a series of Telecommunication Case Studies produced under the New Initiatives programme of the Office of the Secretary-General of the ITU. The Ubiquitous Network Societies case studies programme is managed by Lara Srivastava <lara.srivastava@itu.int>, under the direction of Tim Kelly <tim.kelly@itu.int>. All materials relating to this survey and the Ubiquitous Network Societies Workshop in general can be found at <http://www.itu.int/ubiquitous/>. In particular, the authors wish to thank Mr Paolo Rosa, Head of Workshops, SDO Coordination and Promotion Division of the Telecommunication Standardization Bureau of the International Telecommunication Union (ITU) for his invaluable assistance in providing information. In addition, they extend their gratitude to all respondents for having donated some of their valuable time, in order to share their insights and information.

TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	STRUCTURE OF THE SURVEY:	4
3	SURVEY RESULTS.....	6
3.1	MAURIZIO GASPARRI: ITALIAN MINISTER OF COMMUNICATIONS.....	6
3.2	ROBERTO VIOLA: GENERAL SECRETARY OF ITALIAN COMMUNICATIONS AUTHORITY.....	8
3.3	MAURO PAISSAN: COMMISSIONER OF THE ITALIAN DATA PROTECTION AUTHORITY	12
3.4	GUIDO SALERNO: MANAGING DIRECTOR OF FONDAZIONE UGO BORDONI.....	16
3.5	LUIGI BATTEZZATI: PROFESSOR OF POLITECNICO OF MILAN	20
3.6	RICCARDO RUGGIERO: CHIEF EXECUTIVE OFFICER OF TELECOM ITALIA	25
3.7	TOMMASO POMPEI: CHIEF EXECUTIVE OFFICER OF WIND-INFOSTRADA	28
3.8	MARCO DE BENEDETTI: CHIEF EXECUTIVE OFFICER OF TIM.....	32
3.9	PIETRO GUINDANI: REGIONAL CHIEF EXECUTIVE OFFICER OF VODAFONE	34
3.10	VINCENZO NOVARI: CHIEF EXECUTIVE OFFICER OF TRE.....	37
3.11	SILVIO SCAGLIA: CHAIRMAN OF FASTWEB	39
3.12	DARIO CALOGERO: CHIEF EXECUTIVE OFFICER OF UBIQUITY.....	42
3.13	ELIO LANNUTTI: PRESIDENT OF ADUSBEP	43
3.14	MARK THATCHER: SENIOR LECTURER, LONDON SCHOOL OF ECONOMICS, WITH THE ASSISTANCE OF FRANCESCO SALERNO, DOCTORAL RESEARCHER, LONDON SCHOOL OF ECONOMICS.....	47
4	CONCLUSION	48
	ANNEX: RESPONDENT BIOGRAPHIES	50

1 INTRODUCTION

In recent years, the concept of "technological ubiquity" has been receiving increasing attention from both the public and the private sectors. With mobile phones and the Internet already having a huge impact around the world, the next step of "always on" communications, with its world of networked and interconnected devices, will provide relevant content and information, whatever the location of the user. The convergence of broadband and ubiquitous networks with mobile services may well emerge as the key aspect in providing the users with better communication capabilities.

From 6 to 8 April 2005, an International Telecommunication Union New Initiatives Workshop on "Ubiquitous Network Societies" (<http://www.itu.int/ubiquitous/>) will be held in Geneva, Switzerland. The workshop will address a number of key issues concerning technological developments, the key sectors, public policy mechanisms and corporate strategies. It will examine the impact of new technologies on the telecommunication industry and on society in general and deal with the issues of social inclusion, diversity, user protection and security. In preparation for the Workshop, a number of country-specific case studies were prepared, on Singapore, Korea, Japan and Italy. In preparation for the Italy case study and the New Initiatives Workshop¹, a series of interviews was conducted with a dozen of the most important players in the Italian telecommunication market. The interviews were held between 17 and 22 October 2004 in Rome. Italy was chosen as a case study and a survey candidate, because, according to ITU World Telecommunication Indicators, its citizens own more mobile phones per head of population (101.76 mobile subscribers per 100 inhabitants) than the citizens of almost any other country and has one of the highest rates of SMS use in the world. Recently the BBC reported² that Italians send over 27 billion SMS per year, with an average of 465 per capita. The liberalization of the Italian telecommunication market in 1994 precipitated an unprecedented period of growth in this sector and this continues today. It has been estimated that by 2007, around 80% of Italian adults will be using mobile phones, with the lion's share of the market going to GPRS/EDGE and 3G technologies. It has also been predicted that by 2007, some 21% of homes in Italy will have broadband access, with the ADSL share being 80% (compared with 27% of homes in Europe, of which the ADSL share will be 70%). By 2006, digital terrestrial television, with its mould-breaking interactive and single-theme channels, will have replaced analogue television completely; Italy will be at a particular advantage here, given that the current level of cable infrastructure is lower than in many other European countries.

The aim of these interviews has been to bring together diverse observations and opinions on the emerging Italian ubiquitous network society from experts at the leading edge of the new "anytime, anywhere" technologies and thus assess the prevailing situation, in particular the opportunities, challenges, risks and threats within the ubiquitous network societies and along the path leading towards them.

2 STRUCTURE OF THE SURVEY:

A total of twelve leading Italian telecommunication experts were selected for interview; they represented a cross-section of public and private sector players, as well as the academic world. The individuals were chosen on the basis of their broad experience in various sectors of the telecommunication world, in addition to their specific insights on the advance towards the ubiquitous network society. To provide an outside view, an expert from the London School of Economics (LSE) was also invited to contribute his opinions and he was assisted by a doctoral researcher from the same institution.

- Maurizio Gasparri, Italian Minister of Communications;
- Roberto Viola, General Secretary of Italian Communications Authority;

¹ Information about the *Ubiquitous Network Societies Workshop* can be found at: <http://www.itu.int/ubiquitous>.

² See: <http://news.bbc.co.uk/1/hi/world/europe/4009637.stm>.

- Mauro Paissan, Commissioner of the Italian Data Protection Authority;
- Guido Salerno, Managing Director of Fondazione Ugo Bordoni;
- Luigi Battezzati, Professor of the University of Milan;
- Riccardo Ruggiero, Chief Executive Officer of Telecom Italia;
- Tommaso Pompei, Chief Executive Officer of Wind-Infostrada;
- Marco De Benedetti, Chief Executive Officer of TIM;
- Pietro Guindani, Regional Chief Executive Officer of Vodafone;
- Vincenzo Novari, Chief Executive Officer of Tre;
- Silvio Scaglia, Chairman and Chief Executive Officer of Fastweb;
- Dario Calogero, Chief Executive Officer of Ubiquity;
- Elio Lannutti, President of ADUSBEF;
- Mark Thatcher, Senior Lecturer, Department of Government, London School of Economics;
- Francesco Salerno, Doctoral Researcher, Department of Government, London School of Economics

Seven questions were devised, each one addressing a key aspect of the move towards the ubiquitous network society, including the identification of the main tasks and methods, the state of progress, the impact, the potential hazards, the security aspects and the Italian perspective. The semi-structured format enabled the respondents to give free rein to their opinions, expertise and imagination. Dr Thatcher and Francesco Salerno, from the LSE, answered two of the key questions, as well as a third specifically devised for them.

- *What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?*
- *What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?*
- *What is the likely impact of ubiquitous technologies on the overall telecommunication industry?*
- *What, in your view, are the main factors that could stall the development of a ubiquitous network society?*
- *What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:*
 - a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?*
 - b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?*
- *What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?*
- *What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?*

3 SURVEY RESULTS

3.1 Maurizio Gasparri: Italian Minister of Communications

3.1.1 What does a “ubiquitous network society” mean in an Italian context? What is your vision of the global “ubiquitous network society” of the future, and Italy’s place within it?

Ubiquitous wireless networks, and next generation Internet, global knowledge and ubiquitous services, high-quality software intensive systems, etc., have a strategic relevance in the ICT R&D programmes proposed by public and private Italian organizations. We believe that in future, people could have the opportunity to be connected “anytime/anywhere”. The project to move us towards such a society is attracting considerable attention and interest in all counties, but still appears more as a dream than as a project. We have to work to make it happen. And Italy is deeply involved in these activities, the development of which, planned by various actors, will be based on interaction and cooperation with the vast and qualified academic communities within the ICT sector (both public and private) and also with the large number of companies operating in the ICT sector in Italy; from the small and medium high-tech enterprises, whose innovative, economic and occupational potential is one of the strong points of Italy, to the multinational companies operating at excellence levels.

3.1.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

The ubiquitous network is a single, integrated ICT system that covers a full range of key elements including network infrastructure, digital equipment with communications capabilities and digital platforms; it represents the environment for ICT utilization. This means that many different standards are involved and an effort should be made to simplify the interoperability among different networks and terminals, to facilitate the convergence between fixed and mobile networks, to deploy digital broadband technology, and to promote policies that pave the way for the finest broadband environment, not only for wired networks, but also for wireless networks.

In the development of a network infrastructure, digital terrestrial broadcasting is an important innovation, in which we have invested deeply and the switch over from analogue to digital TV must be completed as soon as possible. When this goal has been achieved, such a network will be capable of providing links capable of overcoming many technological and geographical boundaries typical of the digital divide, of supplying interactive communications, of increasing the market of cellular phones and of interacting with car navigation devices. Furthermore, multimedia interactive service is also a fundamental key for ubiquitous networks. Users are becoming increasingly familiar with multimedia interactive services and now demand such services everywhere; therefore the diffusion of wireless technologies and their integration into different platforms are both important and necessary. On the other hand, the proposal for novel services can only serve to strengthen the need for ubiquitous networks.

3.1.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

While the ICT complex system of the ubiquitous network will take root in Italy as the goal of the next-generation ICT utilization environment, the process of ubiquitous networking itself will provide a business opportunity for the telco and ICT industries, and industries using ICT. In this context, it is important to draw attention to the role that Digital Terrestrial Television (DTT) could play in providing TV entertainment and interactive services anywhere/anytime, such as using interactive communications, linking with cellular phones, collaborating with car navigation devices, t-commerce, etc.

3.1.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

Your question prompts me to think once again of our popular conceptions of the future, particularly as they relate to technology, and to contrast those historical conceptions with the realities. George Orwell’s vision of

the world, for example, was of a “bare, hungry, and dilapidated place” ruled by the mysterious Big Brother. Party members were controlled through the omnipresent telescreen, which not only broadcast propaganda, but also enabled the continuous video monitoring of all activities. When Orwell wrote his book in 1948, television broadcasting was already a regular service, but only recently have Orwellian fears been raised over the increasing ubiquity of inexpensive, embedded cameras and sensors on the Internet. From a technology perspective, we have now made possible what has been called the “transparent society”: if Big Brother were around today, he would have his technology. Threats to the successful development of the ubiquitous network society could arise not only from Orwellian fears, but also from technological problems. The complexities of implementing some of the services envisaged in the ubiquitous society are much deeper than most of us realized.

3.1.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?

Economic European operators can act within a scenario of defined rules and predictable public decisions. Now that it is easy to access the market in a free way, it is mandatory to guarantee competition. Attention must be paid to the fact that the TLC world is evolving continuously, as regards technologies, services and social utilization. Without the new market platforms, this world would soon reach saturation point, thus destabilizing the market and provoking economic effects that are all too easy to imagine. In any case, some crucial problems, which cross the broadband digital platforms horizontally, remain to be solved.

To be neutral in technologies, the political decisions cannot afford to be indifferent to the evolution of technology, and more; in Europe, it can sometimes show the lack of a technology management policy. Furthermore, crucial questions arise about spectrum management. This means, for example, the method of assigning the frequencies; if in exclusive use (licensed frequency bands) or evolving towards the concept of shared spectrum, including unlicensed frequency bands. And more about the reasonable prospect of re-using huge parts of frequency bands, presently assigned to TV services, when the switch-off is completed. On the other hand, the extension of the TV service is going to be a new potential market, integrated with telco nets, evolving step by step with the digitalization of the net, the development of new contents and new services. The ability to predict the next steps is typical of the technological world; the economic rationality is (or should be) typical of both entrepreneurs and end-users. The stability in assuring development and market is the continuous challenge typically faced by public managers in charge of taking decisions.

b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

Reconstructing the commercial and public infrastructure through ubiquitous networks will be a major challenge, offering the potential to provoke the economic rebirth of the telco market. Measures aimed at achieving the wider use and acceptance of ubiquitous commercial and public applications might include: a private-sector approach for building and managing the proposed system, facilitating the competition and giving simple rules to new technologies applications (this means services at lower cost), structural innovation within each of the specific considerations, and the development of systems and applications based on time-transition scenarios. To promote the development and formation of ubiquitous applications, an intelligent policy of service rate, as flat rate and tariffs devoted to particular categories of users, is needed.

3.1.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

In 1996, in response to growing public concern over possible adverse effects on health from exposure to a rising number and diversity of EMF sources, the World Health Organization (WHO) launched the International EMF Project. All health risk assessments will be completed by 2006. If large uncertainties remain after this date, more research will be needed. The International EMF Project brings together current knowledge and the available resources of key national and international agencies and scientific institutions,

in order to assess the health and environmental effects of exposure to static and time-varying electric and magnetic fields in the frequency range 0-300 GHz. The Project has been designed to follow a logical progression of activities and produce a series of outputs to allow improved health risk assessments to be made and to identify any environmental impacts of EMF exposure.

As regards electromagnetic field exposure, the Italian regulator adopted a more cautious stance than most other governments. The rationale behind it is to take into account the possible unknown effects of long-term exposure, even to relatively low field levels, despite the fact that no direct cause-effect connection between exposure and pathologies is known to date. The adopted choice is based on the prudent avoidance principle, stating that it is advisable to avoid, or at least reduce as far as possible, exposure to an external agent, when there are doubts about its innocuous nature.

3.1.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

Business models based on ubiquitous networks contribute greatly to the structural and economic reform of society. Ubiquitous commercial and public infrastructure applications will yield substantial economic effects, including lower public spending and social costs. The proliferation of ubiquitous health and security concierge services will improve public life and convenience and so bring about a reduction in the cost of medical care. Furthermore, people will be able to meet and interact in new ways, and networked technology will allow people to experience things they cannot at present, so that reality will be something we can create, rather than people just being consumers who have content and programmes pushed at them.

Means of communication that use mobile phones are becoming more advanced by the year. E-mail, for one, has already become an indispensable tool for millions of users. And today, with camera functions built in, mail attachments, such as pictures and moving images, are becoming the rule, rather than the exception. Furthermore, the combination of mobile with Internet and IP-based technologies, and the integration of fixed and mobile technologies, raises a host of possibilities for innovative applications and new ways to interact. Wireless applications of pervasive or ubiquitous technologies conjure up images of intelligent homes and always-on human monitoring. Already, location-based technologies can help police and parents protect children from abductions and other forms of crime. When combined with customized advertising, such location technologies can be a boon to retailers wishing to promote their products to potential buyers passing by.

Multimedia messaging services (MMS) and streaming mobile video are opening up more exciting person-to-person services and customized entertainment. Although predicting the future is a risky business in the telecommunication industry, an understanding of the key technologies for "everywhere, anytime" mobiles that are being developed can allow us to have some grasp on the shape and direction of the future mobile information society.

3.2 Roberto Viola: General Secretary of Italian Communications Authority

3.2.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

In Italy, the current concept of "ubiquity" is focused mainly on network access, in particular the Internet, through fixed and mobile networks. The ubiquitous network could refer to an environment in which network connection is possible "always, in any place and with any terminal". The future global "ubiquitous network society" depends on how the above paradigm "always, in any place and with any terminal" is implemented through the national regulatory framework and the telecommunications operators' business models. In the Italian context, the concept "at any place" may be seen as the opportunity for a user to connect to the Internet by a desktop PC (at home, in the office, in a conference room or in reception rooms, etc.), or by a portable PC equipped with an IEEE802.11b or Bluetooth card (outside the home and office, in airports and railway stations, at the stadium, etc.), or by a mobile GPRS or UMTS terminal (in a vehicle, such as a car; on a train and on board an aircraft, etc.). Thus, it is only the convergence of fixed and wireless coverage that makes the realization of this paradigm possible. The concept "always" could mean a service that is "always on", in a

similar way to many ADSL offers launched by some fixed operators for fast Internet access, but extending this concept to include portable and mobile access. However, the paradigm “always” can be realized only when the previous one, “at any place,” can be assumed to be realistic, which means that the wireless and wired coverage for wideband access has reached most of the population. The concept “with any terminal” could, in the Italian context, mean the use of a variety of equipment to connect to the Internet, such as a PC (desktop or portable), a cell phone, car navigation equipment, a TV set-top-box, etc. As far as the activity of the AGCOM (the Italian NRA) is concerned, the objective of ubiquitous networks is being pursued with a “bottom-up” approach, separately tackling the various regulatory themes (e.g. regulation of different networks - fixed, mobile, WLL, etc.- definition of the spectrum management aspects, regulation of digital content and consumer issues) involved in the concept of “ubiquitous network” The pace of technological evolution and the changes of the communitarian regulatory framework require a case-by-case review of the existing regulations or the introduction of new regulations (for instance Radio LAN and digital television).

3.2.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

The proliferation of standards may be a *de facto* barrier to the rapid deployment of ubiquitous networks and related services. To remove these barriers, it is essential to harmonize national standards through EC legislation requiring adherence to the EC standards. Standards can help to create and ensure interoperability and hence contribute to avoiding the fragmentation of markets. This is of particular importance in rapidly evolving markets, with ever changing technologies, notably in the ICT area, due to the liberalization that has brought competition between sectors and created a technically heterogeneous environment. Technological changes have also caused the substitution of traditional forms of standardization with systems that have short-term development and exploitation cycles. Moreover, telecommunications and IT are converging and the markets have become global, leading to new market structures and global industry partnerships. As a result, consortiums and forums are playing an increasing role in the development of standards, challenging the role and structures of the ESOs, as well as the intervention of public authorities at the EU level. As a consequence, the way in which standardization supports the legislation in the ICT sector should be reviewed. In particular, considering this new scenario, all stakeholders (public authorities, standardization bodies, manufacturers, communication operators, etc.) should make an effort to provide a better, and timelier response to the changed market requirements.

3.2.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

Because of the need to develop new network infrastructures, utilization infrastructures and services, ubiquitous technologies will increase the business opportunities of the telecommunication industry as a whole. The development of network infrastructures will involve:

- The updating of current wired networks to increase the bandwidth devoted to new ICT services.
- The development of wireless networks, such as UMTS networks, wireless LANs, wireless MANs.
- The adoption of solutions e-network access in vehicles moving at high speed.
- The digitalization of broadcasting networks, realizing higher quality broadcasting, improved efficiency in frequency allocations and interactivity.

The creation of a utilization infrastructure involves the development of:

- Ubiquitous terminals enabling short-range communications, such as Bluetooth and infrared data transmission, in addition to Internet access via wireless LANs and VoIP communications. Moreover, TV sets will also serve as ubiquitous terminals, enabling Internet access via the remote control, thanks to the introduction of interactive TV services.
- A digital platform for authentication, charging, payment, copyright management, security and privacy management.

The development of new services is the key element in the stimulation of the market. New services could originate in the area of digital content, medical care/health, safety/security, employment, education/training, traffic safety, environmental management, etc. It is also worth mentioning the new Voice over IP services. VoIP is one of the many technologies that will affect the electronic communication sector over the coming years. It offers the potential to increase competition, stimulate new and innovative services for citizens and reduce operator costs.

For the user, the likely benefit of ubiquitous technologies will be the opportunity to use different networks and services, with a plurality of services, offers and tariffs, along with increased information pluralism and a narrowed digital divide. On the other hand, the problem of communications security and privacy will create new challenges, requiring constant surveillance by the public authorities.

3.2.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

One factor that could hinder the development of a ubiquitous network society is related to the lack of investment in broadband architectures. Nowadays, there are many broadband access technologies, which are available commercially or currently under development, although, due to the current low coverage of other commercialized technologies, ADSL has a dominant position. Thus, one of the main points to be considered is the control of European DSL networks by the incumbent telecom companies. Unless new broadband access infrastructures are launched successfully and widely in the short term, ADSL could become the winning technology, as it takes advantage of the existing legacy infrastructure that only requires an upgrade, leading to important roll-out speed and investment savings. The lack of investment in broadband architectures and the consequent slow down of broadband development may, in some cases, be worsened by the vicious circle of high wholesale prices for broadband possibly delaying the take-off of broadband demand. This slow growth could, in turn, reduce the incentive for new entrants to deploy alternative infrastructures. For example, in Italy some companies have reconsidered their LLU strategies, preferring to rent instead of develop their own infrastructure. This reinforces the dominant position of the incumbents, enabling them to maintain their high prices. The Italian regulatory framework aims to avoid this vicious circle, to foster increased competition by supporting the deployment of alternative networks in the local loop. This competition would eventually lead to a reduction in broadband prices, ideally to a level that encourages market development, whilst generating sufficient incentive for various players to keep operating and investing. The second impact would be the development of more services and applications, which would facilitate the spread of broadband to all sectors of society.

Another factor is the risk of a proliferation of standards, bearing emerging services that may form a *de facto* barrier to the rapid deployment of ubiquitous networks and related services. To remove these barriers, it is essential and in keeping with the current EC trend, to harmonize national standards through EC legislation requiring adherence to the EC standards. An additional factor that could slow down the development of ubiquitous services is the lack of public policies aimed at promoting new broadband services, stimulating user demand and increasing competition between telecommunications operators. Finally, the lack of constant monitoring, by TLC operators, of the user prospective and the adoption of wrong business models must be mentioned.

3.2.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**
- b) **What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

The main factors that could assist the development of ubiquitous services are, on the one hand, the public policies aimed at promoting new broadband services and increasing the competition between telecommunications operators and, on the other, correct monitoring, by TLC operators, of the user prospective and the adoption of coherent business models. Amongst the public measures adopted in Italy are a number of governmental political initiatives to promote broadband services and the pro-competitive

regulation of TLC services. As an example of public measures, the government has devolved funds to finance the purchase of about 700,000 DTT set-top-boxes (150 Euro per set-top-box), in order to stimulate user demand, in view of the switch-off from analogue television to digital terrestrial television, which, according to law 66/01, is to be carried out in 2006. At the same time, the Italian NRA is constantly involved with the adoption of fair competition rules between the incumbent dominant carrier and the new operators. At present, many new players are providing telecommunication services, resulting in an increase in the offer for users and a reduction of tariffs (e.g. current prices of ADSL fast Internet access have already been reduced to a level accessible to most of the consumers).

Concerning the user prospective, public policy in the information society needs to focus not only on bridging the digital divide, but also on stimulating the demand for ICT and encouraging technologically innovative activities on a broad scale. The main aspects of the innovation policy are: innovation in the public sector (e-government), innovation policy in the private sector (fostering technological innovation) and innovation policy in the people sector (building an all-inclusive information society). Recognizing that the government has the largest client base and that the public sector can serve as a leveraging platform to demonstrate how ICT can meet needs more efficiently, the development of an e-government can act as a catalytic force by stimulating a demand for ICT and creating a "market" for ICT applications. On the private side, business models should take into account the qualitative changes in demand for better connections and the need for flat rate and more flexible tariffs. In addition, the services offered by TLC operators should fit the network infrastructure being used: wired networks should focus on services with features different from the services offered on wireless networks, in order to avoid competition focused only on prices of similar Internet services. In addition, an effort should be made to create original content and applications. Finally, the production of high-quality ubiquitous terminals equipped with functions that meet the users' demands for "better connections" and improved services accessibility plays an important role in the process of ubiquitous networking.

3.2.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

Consumer protection safeguards involve various aspects, including Universal Service Obligations, Quality of Service requirements, privacy and health. When the market does not meet end-users' needs satisfactorily, DIRECTIVE 2002/22/EC – on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) – defines the minimum set of services of a specified quality, to which all end-users have access, at an affordable price according to specific national conditions, without distorting competition. Quality of Service safeguards provide a legal framework that obliges all TLC operators to meet, by way of example, specified timeframes to connect services, repair reported faults and keep appointments, subject to limited exceptions. The NRA encourages network and service providers to improve the quality of their services to safeguard residential and small business consumers against poor performance.

The ubiquitous network concept, that includes fixed telephone networks, mobile networks and the Internet, amplifies the problem of communication security and privacy of personal information. Although advanced technology can create problems for the protection of privacy, it can also provide many of the solutions. Networks, hardware and software can and should be designed, or redesigned, to put the user in control of his personal information and his private sphere. But given the considerable commercial and state interest in the collection of personal data, this will only happen within a clear, enforceable legal framework guaranteeing the individual's right to privacy and regulating the measures to achieve it. The new Directive 2002/58/EC deals with the processing of personal data and the protection of privacy in the electronic communications sector, including provisions on the security of networks and services, the confidentiality of communications, access to information stored on terminal equipment, the processing of traffic and location data, calling line identification, public subscriber directories and unsolicited commercial communications. The Privacy and Electronic Communications Directive applies to the processing of personal data in connection with the provision of public electronic communication networks and service and so requires the Member States to create obligations for anyone involved in the forms of processing addressed by the Directive.

3.2.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

Ubiquitous technologies, as part of the Information and Communication Technologies (ICT) sector, are not only a significant factor in the performance and growth of economies – the importance of which is growing continuously – but they also represent a novel and effective tool to help advance sustainable human development (SHD). Ubiquitous technologies will enable faster delivery and better adapted technical assistance in various sectors, ranging from long-distance education, telemedicine and environmental management to the strengthening of participatory approaches and the creation of new livelihoods. Ubiquitous networks can involve more people, hitherto un-reached or under-served, and achieve deeper geographic penetration, especially into rural areas, than traditional means and modalities. Ubiquitous networks will also simplify access to information sources worldwide, regardless of language and culture.

Wireless networks play an important social role because they bring the power and connectivity of computer networks into everyday life, outside our home or our office. Given the rapid adoption of cell phones and their recent transformation into mobile Internet terminals, portable voice and data devices are likely to merge, while their price is going to drop, making them available to a remarkably large number of users. Groups of people using these terminals will gain new forms of social power, new ways to organize and coordinate their interactions. In this context home and commercial property owners using wireless LAN technologies, cellular networks, and satellite services will collectively provide a heterogeneous offer of wireless Internet access at different price, capacity, and reliability.

Software controlling these networks provides flexible access control, bandwidth, and fee structures, whilst the adoption of harmonized standards avoids interoperability problems. Broadband or cost effective wireless, local or metropolitan, area networks could rapidly become ubiquitous in most households and wherever people gather in commercial or municipal spaces, while the devices that will be used to access these networks, already available in the consumer electronics market, will quickly become smaller, cheaper and faster, and have greater capacity, better displays, and improved man-machine interface.

3.3 Mauro Paissan: Commissioner of the Italian Data Protection Authority

3.3.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

First, let me say that my answers will take into particular account the issues related to the safeguarding of personal rights, specifically the right to privacy, as I am providing them in my capacity as member of the Italian Data Protection Authority. Italy has been an active participant in the development of the new network based on the so-called ubiquitous computing and its various applications. Our country has also become increasingly aware that these technologies are currently indispensable for ensuring social development; in their absence, there would be a risk of exclusion from the global communication and production processes. However, there is a growing awareness that the implementation of such technologies ought to be accompanied by a framework to safeguard the rights of the data subjects. In particular, it has been realized by the actors involved that safeguards will have to be universal, because the current technological scenario goes beyond national borders. For instance, the spamming issue has clearly highlighted the need to develop "integrated" protection strategies. If, as is often the case, spam messages were to be delivered from servers located in countries where no regulations are in place, national laws setting out limitations and punishing, these practices would be totally ineffective. With this in mind, in May 2003, the Italian Data Protection Authority decided to recognize that national legislation does not apply to e-mails sent from abroad; however, it pointed out that this did not imply the absence of remedies and/or safeguards. Indeed, the user may always request the competent national data protection authority, if such a body exists in the country in which the message originates, to investigate the case at hand. Furthermore, if sending e-mail messages for advertising purposes is unlawful under the laws of other countries, users may also request the competent public authorities in these countries to consider the prosecution of those involved in unlawful activities.

This is just one example of the countless issues related to protecting rights in ubiquitous networks; however it shows that really effective safeguards lead to the establishment of sound, continued co-operation between the individual countries. This applies to both legislation and collaboration between the authorities – such as the Italian Data Protection Authority – working to safeguard personal rights. From this standpoint, Italy's

participation in European and non-European forums aimed at establishing common rules is proof of its willingness to pursue a global protection policy, which overcomes narrow national borders; this must be done, particularly in view of future developments.

3.3.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

As for standardizing the system, I would like to highlight a specific feature that is also related to the viewpoint from which I am considering this issue. There is little doubt that the development of ubiquitous networks requires the adoption of common standards. This view is shared both by industry actors, who appear to be willing to co-operate, despite the understandable difficulties of the usual competition mechanisms, and by regulatory authorities, which are tackling the development of common technical rules in this area. However, I stress that in doing so, we should keep in mind that standardization may actually expose individuals, and their rights, to additional risks, even though it is undoubtedly beneficial, especially with regard to the dissemination of technologies.

Just consider, for instance, RFID-based technology: these days, tests are being undertaken to implant under-skin microchips containing multifarious personal information, including data related to specific diseases. In this context, system standardization does provide considerable benefits. Patients with an RFID implant will carry their own medical history with them, and this history may also be read in emergency situations by anyone called upon to provide timely medical assistance or care. At the same time, the adoption of standardized labels and readers makes it considerably easier for unauthorized people to access data subjects' information for the most diverse purposes, as well as increasing the risk of data manipulation. This example clearly shows that, in order to cope with the risks resulting from standardization, safeguards, including stringent security measures, should accompany standard protocols.

As for convergence, I believe that it can be appreciated by considering technological evolution over the past few years, and that, in view of developing and disseminating technology itself; it is actually a key target. Indeed, it is also through convergence that technologies can draw mutual nourishment and create new opportunities for users and consumers. System convergence has clearly also affected the development of the existing European user protection policies that have been implemented by national lawmakers. For instance, the most recently enacted data protection instruments – such as EC Directive 2002/58 – show that convergence has actually contributed towards the adoption of a “technologically neutral” regulatory approach. The adoption of this legislative policy is grounded on the application of flexible principles that should not be appropriate for just a single technology. This is partly to prevent the relevant legislation from becoming obsolete immediately and is fully in line with the requirement to set up a system, in which personal rights are upheld to the same degree, irrespective of the specific technology implemented.

3.3.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

The technologies based on ubiquitous computing are bound to produce deep-ranging effects on the telecommunications sector. The need to adopt common standards has already been referred to. However, homogeneity of standards, which is pursued to facilitate system dissemination, should go hand-in-hand with the capability afforded by ubiquitous computing to “diversify” the offer of services, so as to meet each user's specific requirements. Driven by the growing interactivity of systems, which actually allows users to express their individual preferences, ubiquitous computing is heading towards enhanced customization of services, as well as putting pressure on suppliers to pay increased attention to the individual consumer's preferences and habits. The assumption underlying all these phenomena is a more wide-ranging, more pervasive processing of users' personal data. In my opinion, these developments are raising several privacy protection issues. Users of new technologies must be able make their choices freely, particularly with requested services and their preferences and habits must not be monitored without their knowledge. In this context, data protection legislation provides major safeguards. First amongst them is the obligation for any entity processing personal data to provide an adequate information notice, explaining the features and purposes of the processing to the subject of the data. Secondly, there is the rule whereby the data subject's consent is a prerequisite for

processing personal data, without prejudice to specific exceptions. This is actually a valuable tool to allow data subjects to remain masters of the information about them.

Additionally, a feature of the telecommunications sector is the possibility of “locating” users. Again, it should be pointed out that if this allows the provision of undoubtedly useful services to the users requesting them, there is also the risk that it may seriously endanger the data subject’s freedom if it is not regulated properly. That a user is enabled to get the “right” service at the “right” time and place should not lead us to overlook the obvious dangers in the practice of systematically monitoring that user’s movements. In pursuance of EC Directive 2002/58, the Italian Parliament has introduced specific rules applying to location, to reinforce the tools already made available by the framework data protection legislation. For instance, more specific provisions are laid down as regards information notices and data retention periods if the processed data entail (or allow) the location of a data subject. In addition, more stringent rules apply to obtaining the data subject’s consent, which may be withdrawn at any time, whilst users and subscribers are entitled to request the temporary suspension of the processing of their data also after having given their consented.

3.3.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

Users’ trust in new technologies plays a key role in technological development. As shown amply by our experience of the Internet and e-commerce, a poorly secured technological environment engenders fears that might hamper the application potential of a technology considerably. Indeed, new technologies are especially liable to be exploited for fraudulent purposes. Several examples of this can be cited: from the online dissemination of viruses, worms, trojans, etc. to the activation of unsolicited services and/or dialler mechanisms on the Internet which, without the user’s knowledge, connect a telephone line with international premium numbers. Reference can also be made to the identity theft issue – i.e. via the so-called phishing –, which, given its scale, is becoming increasingly alarming.

To cite another instance, the Italian Data Protection Authority has received many reports concerning the failure, by providers of home banking services, to implement security measures. In some cases, the lack of such measures has allowed unauthorized people to access users’ bank accounts freely. It is obvious that these, and similar, episodes can ultimately keep users off new technologies and the services they provide. From this standpoint, not only is ubiquitous computing no exception, it is indeed a sector in which consumers’ resistance appears to be stronger. The very fact that the underlying technology is often deployed quite close to the data subjects – also in physical terms – and actually allows them to communicate with possibly quite remote places by means of a wide-ranging, diverse network of services, is bound to raise increased expectations in users, regarding the security of their data. Given this, we may reasonably argue that the failure to take account of security issues in ubiquitous networks would probably end up being prejudicial to the development of this sector.

3.3.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**
- b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

There is little doubt that appropriate competition policies should be developed, in order to foster ubiquitous services, and that spectrum management issues should be taken into account, as suggested in the questionnaire. However, I would like to point out that an equally pivotal role should be played by the development of privacy policies that can “reassure” data subjects about the protection of their rights, in order to enable more widespread applications of the technologies in question. This is related not only to the security issue mentioned above, but to the whole system of safeguards and rights set forth in data protection legislation.

Also, in making available customized rates and discounts, which is often based on the processing of data about users, the fundamental privacy-related principles must be taken into account. For instance, the Italian

Data Protection Authority has repeatedly questioned the lawfulness of some online services offered free of charge, where they actually envisaged the collection and processing of users' personal data, as well as the monitoring of their Net surfing. Here, the Italian authorities made it clear that data subjects should be in a position to choose, freely and knowingly, how their data is used. And without prejudice to the need to respect citizens' and consumers' willingness to accept the disclosure of identification data and/or data concerning their tastes, preferences, and interests, in order to be provided with certain services for free. This illustrates, once again, how to ensure that production requirements do not thwart the rights of individuals.

3.3.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

As explained above, protecting privacy is vital in ubiquitous networks. In Europe, EC Directive 95/46 – providing the general data protection framework – was followed by specific regulations to protect personal data, specifically electronic communications, which are currently set out in EC Directive 2002/58. It should be pointed out that Europe is not the only place where data protection legislation has been introduced with regard to the electronic sector. In countries such as the USA, which have traditionally been less keen to legislate on data protection matters, there has been a proliferation of legislative instruments over the past few years in exactly this area. This shows that the need to counterbalance the development of electronic networks – which may impact on users' rights even though they make available unprecedented opportunities – that is felt worldwide.

In the European context, data protection laws recognize several rights of data subjects, requiring them to be informed and to give their consent. For example, data subjects have the right to access the data about them, to object to the processing on lawful grounds, and to object to the processing of their data for the purpose of sending advertising materials, without having to specify the relevant grounds. Major importance is also given to the need for adopting the appropriate security measures to eliminate, as much as possible, the risk that the data get lost or are disclosed to unauthorized people. That these measures play a key role in ubiquitous computing, as also related to consumers' trust (an issue I mentioned before), is crystal-clear. Indeed, being aware of the increased potential threats to privacy resulting from the new technologies, lawmakers have often set forth more stringent measures applicable to the processing of data via electronic networks. Finally, I would like to reaffirm that the ubiquitous communication environment should take due account of the specific provisions set out in data protection legislation with regard to (geo-) location and electronic networks.

3.3.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

The dissemination of ubiquitous technologies is producing increasing major effects on the evolution of society and social behaviour. On the one hand, the development of these technologies is undoubtedly beneficial; communications are made easy, services are quickly available, and customization to individual requirements is made possible. The ability to locate individuals is introducing new space parameters. The same technology that has geographic proximity a relative issue, and somewhat non-influential, by allowing communication between remote places, can now identify the area where the user is located, so as to “re-discover” the importance of physical proximity to, for instance, some services we may require or individuals with whom we may wish to interact. This applies to the services that provide information via mobile phones and other devices at cultural events and demonstrations, in shops, and targeted offers of goods and services that are located or available in the area close to the user requesting them. Reference can also be made to the services – currently in an advanced testing phase – whereby an individual who has signed up to a “List of Pals” can be located by third parties who know his or her phone number. However, we should be aware of the changes – not all of them for the better – that these technologies may entail, as regards both society and individuals.

Ubiquitous computing can lead to hidden surveillance activities, by both public and private entities, in a considerable portion of our lives. This raises several issues. Firstly, there are risks for individual freedoms, since the appropriate safeguards to be implemented with regard to the surveillance enabled by the new technologies have not yet been fully thought out, given that this is a totally different kind of surveillance compared with more conventional types of control (just consider telephone wire tapping). In this context, there is little doubt that a person's life may be affected significantly; the mere fact that individuals are aware

that they are being monitored continuously might affect the expression of their freedoms and spontaneous reactions. And it should be considered that our system is open to an ever-increasing range of new technologies, which challenges an individual's capability to "plug off" and get out of reach.

I referred to the ease of collecting data on consumer preferences via ubiquitous networks. It is appropriate to take into due account the risks related to the excessive customization of services based on monitoring individual choices. Indeed, this results in users often being offered customized products and services on the basis of the preferences they indicated a long time before – so that they become, in a sense, "slaves" to those preferences. In conclusion, highly sensitive issues are raised, such as with the most recent developments in nanotechnologies, including the possibility to implant under-skin chips in the human body. It is really necessary for us to consider in depth what impact they may produce on personal integrity and respect for the principle of dignity.

3.4 Guido Salerno: Managing Director of Fondazione Ugo Bordoni

3.4.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

As a consequence of the rapid diffusion of broadband and mobile technology, the network society is preparing to enter an age in which everyone can enjoy the benefit of "anytime/anywhere" network access; this is known as the "Ubiquitous Era". The large diffusion of several wireless techniques (2G, 2.5 G, 3G, WLAN, PAN) shows that the Italian telecommunications system represents a valid pillar of support to a "ubiquitous network society".

Telco operators in Italy provide a comprehensive line-up of services, from the Internet to fixed, mobile communications and more. Based on the high-quality communications networks and advanced technology that supports these services, they are working to build a communications environment that offers fast, smooth exchanges of moving images and other large-volume data anywhere, at any time. The ubiquity of information and communications will have a significant impact on the current telecommunications landscape and business practices. It will also raise a number of public policy questions, in particular privacy, security, consumer protection and social inclusion. For this reason, any new R&D projects have to focus on the impact of the ubiquity on these aspects, proposing integrated solutions that encompass areas such as formulation of a security policy, in addition to construction, operation, and monitoring of the security system.

The study of such integrated solutions is part of the research that public and private companies in Italy are planning as activities to be developed in the immediate future. The Ministry of Communications has indicated the high importance it devotes to this research and is paving the way for emerging technologies by introducing fast regulation and, with the support of Fondazione Ugo Bordoni, leading experimental trials to carry out results useful for fixing some technical features (frequency bands, range of applications, etc.) more appropriate to the EU and Italian markets, as happened with the introduction of Wi-Fi tech in Italy, and presently with WiMax.

3.4.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

I want to reply just by mentioning a service that should be available in the ubiquitous society, namely the nationwide emergency service number 112 (in Italy it corresponds to Carabinieri). This service is currently available only on wire-line telecom networks, but since July 2003, both wire-line and wireless carriers have legally been required to deliver location information on Enhanced 112 (E112). There is no accuracy or technology mandate in delivering this capability; carriers need only do whatever is technically and economically feasible for their network. So most EU wireless carriers will use Cell-ID positioning to fulfil these requirements. Presently, there is a very basic form of location technology and the level of accuracy depends on the size of the cell site's coverage, and varies from hundreds to thousands of meters. With an improvement in current technology, anyone sitting in their car can easily use the cell phone to get localized

traffic updates, weather reports, street-by-street navigation assistance, etc. and, at the same time, have a more detailed 112 emergency service. This improvement is just one of many examples.

An important issue regarding access to ubiquitous networks is the adoption of IPv6 (Internet Protocol version 6). It is one of the core technologies for the realization of the ubiquitous environment. In the future, IPv6 network and new IPv6 applications will be expanded into fields like communications devices, information appliances and ITS. Next-generation Internet Protocol Communications specialists are looking at IPv6 as the technology to expand the possibilities of new network services. For instance, IPv6 provides a virtually unlimited number of IP addresses, solving the depletion issues that IPv4 is currently facing. It is also the enabling technology for dramatic security improvements and direct peer-to-peer communications between information appliances that do not require servers to facilitate communication.

While network society's advancement is rapidly clearing the path towards further convenience, it is also true that threats to security are increasing at a profound rate. In today's world, these issues must be addressed if we are to establish a true social environment, in which anybody has access to a secure network. A security solution that resolves the vital issues involved in creating a truly ubiquitous environment has to be defined.

3.4.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

The concept of "technological ubiquity" has been attracting increased public sector and industry attention over the last two or three years. Mobile phones and the Internet have already permeated all aspects of human life in many parts of the world. A next step in "always on" communications, new ubiquitous technologies (such as RFID) promise a world of networked and interconnected devices (e.g. fridge, television, vehicle, garage door, etc...) that provide relevant content and information whatever the location of the user. In particular, the convergence (and future scalability) of broadband Internet and ubiquitous networks with current mobile services may emerge as the key means for providing communication and monitoring capabilities to users.

A ubiquitous network society needs a communications environment that offers large-volume data anywhere, any time. The next-generation network will aim at terabit class (1 000 000 000 000-bit) transmission, as the backbone network, and will provide further broadband integration of access networks with the introduction of Fibre To The Home (FTTH), which connects offices and homes directly with high-speed optical fibre. From the standpoint of promoting ubiquitous networking, in addition to wired networks, the progress in broadband technologies applied to wireless networks for which active technological innovations are expected will become increasingly important. These include network access via the third and subsequent generations of cellular phones and wireless LANs, such as IEEE802.11 (wireless LAN standards defined by the Institute of Electrical and Electronics Engineers) and ZigBee (wireless network standards jointly defined by companies in the United States, Japan and Europe) and UWB (ultra wideband radio technology).

In the ubiquitous network society, the role of the mobile phone will also go far beyond that of a communication tool. The models of the not-so-distant future will feature wallet, credit card, key and commuter pass functions, not to mention remote-control functions to control electrical home appliances and other electrical products. According to the previous considerations, the impact on the overall telecommunication industry could be enormous. In particular, this ITC revolution will require the development of a network infrastructure, the development of a utilization infrastructure, and the evolution of utilization solutions.

3.4.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

The technologies supporting the ubiquitous network society must, of necessity, encompass such areas as security and privacy. As regards security, a ubiquitous network, accessible through wireless and wired equipment, is vulnerable to attack, which means that the security issue could be the most serious bottleneck to stall the ubiquitous network society. As far as privacy management is concerned, all the benefits offered by the ubiquitous technology will cost the users some privacy. In particular, in the case of object tracking, which is a potential service carried on the ubiquitous network; this could be substantial and potentially intrusive where "personal" objects, such as cell phones are concerned, as, these are used by people on a daily and reserved basis.

Furthermore, another important issue that affects the development of ubiquitous technology is the public policy question of the “digital divide”. In Italy, this question deals primarily with the development of ICT in depressed areas, that is the potentially different development of the ubiquitous network society in the different Italian regions.

3.4.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?

Albert Einstein, asked to explain radio, is reported to have replied: “You see; wire telegraph is a kind of a very, very long cat. You pull his tail in New York and his head is meowing in Los Angeles. Do you understand this? And radio operates exactly the same way: you send signals here; they receive them there. The only difference is that there is no cat.”

In any wireless communications system, there are only three elements: transmitters, receivers, and electromagnetic radiation passing between them. The waves do not ride on any medium; they are the medium. In information theory and engineering practice what lies between transmitter and receiver is called a channel. A channel is just another convenient way to describe the interaction of transmitters, receivers, and electromagnetic waves. It does not exist outside those interactions. Without reaching this extreme vision of spectrum management, typical of “commons theory”, a light-free approach to make frequency bands partially unlicensed, or, even better, shared under a “predefined” number of (licensed) users, could be an innovative way of assigning the same frequencies, in order to permit greater competition amongst different operators. In fact, reduced licence costs, attributable to greater participation in frequency auctions, can increase the number of service providers, even though the quality of service could be preserved.

We should abandon the vision of spectrum as a common property resource that, like oil or fisheries, must be subject to administrative regulation or exclusive property rights to avoid over-use and depletion. In other words, spectrum is a resource because it is subject to interference. Today’s technology enables a different position to be taken.

b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

Obviously, cost reduction is always the key to generating demand for services. More realistically, a flat rate could be an attractive way of catching the market; as for flexible tariffs, their success depends on the offer and the service proposed.

To promote the use of the ubiquitous network, it is important to look for ways to vitalize the creation and distribution of the highly diverse and profuse digital content in such categories as on-site, individual and household, and governmental information. To sponsor ICT utilization, specific activities in areas such as: medical services, food safety, secured daily life, finance for small and medium sized enterprises, education, employment, work and e-government can be promoted. Incentives for broadband connections were an important initiative that permitted an explosion of broadband in Italy last year. Incentives are also foreseen for next year. The operators offer flat rates and flexible tariffs. Particular incentives should be introduced for wideband communications in disadvantageous areas.

3.4.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

It is undeniable that security risks continue to increase in proportion to the network's transformation towards "ubiquitous," but why are these risks increasing? The answer lies within the ubiquitous network itself. Whether broadband, wireless, or mobile PC, an increasing number of vulnerable spots are emerging as the user environment expands and these are the areas that are falling victim to attacks. Until now, the main threats to security were the "hackers" who break into computers out of personal interest, but with networks becoming the foundation of society, con artists, forgers, stalkers, and even a new genre of enemies called “cyber terrorists” are emerging. From an internal perspective, finding methods to prevent corruption amongst

members within a corporation has become another serious issue. When users save confidential data on externally connected servers, or open unrecognizable e-mail, their carelessness creates additional risk.

Companies that lose social trust because of information leakage, data falsification, or abuse of individual information, must expend a tremendous amount of time, labour and money to recover that lost trust. Forestalling such a situation through the implementation of information security measures becomes an absolute imperative. As the paramount element in network security protection, the foremost purpose of encryption technology is to prevent information from leaking to a third party. High-reliability user information management and security guarantees, including authorization, payment, streaming and other platform services, are necessary in providing advanced solutions. Another important topic is the influence of wireless networks on health, since radio devices emit radio frequency electromagnetic energy. Countries set their own national standards for exposure to electromagnetic fields. However, the majority of national standards are based on the guidelines set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). This non-governmental organization evaluates scientific results from all over the world. ICNIRP produces guidelines recommending limits of exposure, which are reviewed periodically and updated as necessary.

The Italian regulatory framework on exposure to radio-frequency electromagnetic fields has, for a long time, been based on Ministerial Decree number 381, issued on 10th September 1998. The regulatory body has been updated and completed after the issuing of the "Framework Act" (number 36, 2001). This "Framework Act" univocally establishes the main principles and the specific duties necessary for the protection of the environment and of the health of the general public and workers. The new regulation is based on multi-level protection. The protection against acute sanitary effects is defined through exposure limits that are "values of electric, magnetic, and electromagnetic field that shall never be exceeded in any exposure condition". The protection against long-term effect is sought by defining the attention threshold, i.e. "values of electric, magnetic, and electromagnetic field that shall not be exceeded in homes, schools, and other environments where people may have a prolonged stay". The above approach, recommending prudent avoidance, finally implies the adoption of quality targets, i.e. "values of electric, magnetic, and electromagnetic fields, emitted by all equipment, that management of the environmental impact of electromagnetic fields in Italy".

3.4.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

Many companies are already developing networked DVD recorders and players, TVs and other devices that enable people to watch, record, download and otherwise control various gadgets in different rooms. But the switch from watching analogue TV, together with the increasing willingness to download digital content, is now also driving a move for more people to treat their home PCs as TV-centric entertainment devices. The latest trend is "bro-dra," or watching broadband drama on PCs. Digital broadcasting will also drive new functionality in mobile phones. As MPEG-2 digital content is broadcast to mobile phones, these devices will become more useful clients, providing new entertainment and interactive features. A single, unified remote control will be the key interface linking household appliances, audiovisual equipment and home servers. Outside the house, a single client, most probably based on the mobile phone, will allow remote control, and remote monitoring of household systems. IC (integrated circuit) tags will become the hidden network fabric to wirelessly link objects as diverse as vegetables bought in the supermarket to what has been thrown in the garbage.

Wireless applications of pervasive or ubiquitous technologies conjure up images of intelligent homes and always-on human monitoring. Already, location-based technologies can help police and parents protect children from abductions or other forms of crime. Combined with customized advertising, such location technologies can be a boon to retailers wishing to promote their products to potential buyers passing by. Multimedia messaging services (MMS) and streaming mobile video are opening up more exciting person-to-person services and customized entertainment. Although predicting the future is a risky business in the telecommunication industry, an understanding of the key technologies for "everywhere, anytime" mobile that are being developed can give us some concept of the shape and direction of the future mobile information society.

The question raised is whether we are well equipped, as a society and as individuals, to live in a world of technological ubiquity; a world in which an intelligent microwave warms up your dinner before you get

home, or your mobile phone tells you that your husband is still at the supermarket. Consider the use of tiny Radio Frequency ID tags embedded into clothing to help retail businesses track inventory. Will these remain active once the item has been purchased and what kind of information will be collected? The new generation of always-on, anytime, anyplace technologies may allow for levels of convenience, but also of surveillance, unknown and unimagined by earlier generations. At the dawn of this new age, it is important to consider what effect these technologies are having on the way we grow, interact, socialize and learn.

3.5 Luigi Battezzati: Professor of Politecnico of Milan

3.5.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

The ubiquitous network society is a social definition, so we must analyse the impact of existing and future ubiquitous networks on individual, competitive and cooperative behaviour.

We have different types of ubiquitous networks with different performances:

- The telecommunication networks (e.g. phone, mobile phone and Internet) allow an active relationship to be maintained between individual partners. The cost of such a relationship is constantly falling
- In the same way, satellite and digital television allow the broadcast of a great number of channels that can spread the opinions, cultures and languages of many different social and national groups
- Finally, the smart tag, or RFID systems, a fully controlled supply chain possible. This increases product speed and the service level, whilst reducing inventories and transaction costs.

In any case, the real effects of the "ubiquitous network" are not the same everywhere, but are determined by the economic and social structure of the country in question. The Italian economic system is not based so much on great enterprises, but rather on a network of small manufacturing enterprises (SME), which are specialized in a specific activity. For this reason, the value chain is fragmented into many small parts, which must be coordinated amongst each other. Whereas the great enterprises are able to coordinate their activities through their organizations and the integrated informative systems (e.g. ERP), the SMEs are coordinated by geographical proximity. From this, they have formed industrial clusters.

The development of the communication technologies reduces the distances between the various actors in the value chain and enables the reduction of transaction costs inside it. In this way, the industrial clusters can overcome the constraints of geographic proximity, without increasing their transaction costs. In this way, Italian SMEs are already able to manage outsourced activities in more competitive areas thousands of kilometres away (for instance in Eastern Europe). However, the relationship with the final clients is also greatly facilitated by the availability of low-cost tools. The simple creation of a site Internet allows the easy introduction of products and services. RFID tagging reduces the transaction cost and it allows the flow synchronization between different customers and suppliers of same value chain. The Italian social structure is changing. In fact, Italy is, and will increasingly be, a country with an aging population and growing immigration from new EU countries and extra-EU countries (mainly North African). From a social point of view, the communication technologies increase the opportunities to create and maintain different cultures and languages of original social groups, so reducing the need for integration. In fact, today, immigrants to Italy have at their disposal many tools with which to maintain communication with their countries of origin, both with family (telephones, internet etc) and with the original culture and language (satellite TV, etc.).

The future of a global "ubiquitous network society" will follow an evolution model, based on scale-free, random network, where the role of network hubs will be crucial. It is evident in telecommunication and TV businesses, but it is also true in smart tag (or RFID) evolution. Some important players, contact points of different actors, will bring about the evolution of RFID application: the hubs or leaders of communication and decision processes. For example Wal-Mart is, and will remain, a hub in the worldwide RFID evolution of Fast Moving Consumer Goods businesses. IATA has the same role on RFID application for air transportation.

3.5.2 What is the best method for strengthening current technological development, and

overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

The evolution of the of the ubiquitous networks is determined by two factors:

- The value for customers is determined by the level of ubiquitous network diffusion, which is possible only with a cooperative effort of the suppliers
- The opportunities in a new market push the suppliers to try to build barriers to the competitors' entrance. This competitive behaviour in ubiquitous networks is the battle to push their standards.

The users eventually choose to purchase and use a service if it is diffused, standard and economically acceptable. So ubiquitous networking is the tool with which to offer unique services for existing or future markets: i.e. real-time synchronization of logical and physical flows through the supply chain. The network and service convergence are necessary to achieve the successful economic development of the ubiquitous networks. But the players (suppliers, retailers and users) are not the same in all ubiquitous networks. During the life' cycle, the key players change. For instance, the players of new Mobile Phone networks, Wi-Fi, Digital TV or RFID are completely different. And the best method is not unique, but follows the features of the business model. Basically we have two different models:

- Migration of existing ubiquitous networks: few suppliers, few retailers and many users. The best method is a cooperative effort amongst a few technical players to negotiate a common standard. In this case, the best approach will require the following steps:
 - Player council (extra International Standards Organization/ISO) for developing an agreed proposal of standards: so the players have to define the common standards in the shortest time
 - The players have to define some testing areas for improving the standard value
 - Submission of the a.m. proposal to ISO working group for the public issue.

The Wi-Fi standards development follows the above approach: usually Institute of Electrical and Electronic Engineers (IEEE) is the industrial council and finally the IEEE standards are accepted by major players and submitted to ISO working group.

- Deployment of new ubiquitous networks: Many suppliers, many retailers and few users. The best method is a cooperative effort between the players of the same industrial sector to negotiate a common standard and develop a real diffusion in the same homogenous processes. In this case, the best approach would require the following steps:
 - Industrial councils (extra ISO) for developing an agreed proposal of standards, so the players have to define the common standards in the shortest time
 - The players have to define some testing areas for improving the standard value on the industry processes
 - Submission of a.m. proposals to ISO working group for coordination between the needs of different industries, driving general standard negotiation and publishing the accepted releases of standards.

The Fast Moving Consumer Goods (FMCG) standard development follows the above approach. For example Auto-id Center and EPCGlobal was the industrial council for developing and testing RFID standards for FMCG. Now EPCGlobal are negotiating with ISO working group the final released of EPC accepted by the ISO organization.

3.5.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

The major impacts of ubiquitous technologies on the overall telecommunication industries are twofold: structural and infrastructural. The most important structural impact is the integration among different ubiquitous technologies, e.g. telecommunication, GPS and RFID. For example, the possibility of realizing

wireless networks of RFID readers distributed around the geographical area, allows real-time tracking of the flows of tagged objects by RFID and the potential customers by mobile phones. In this way, the integration of Telecom+RFID allows additional services to be offered to improve the utilization of tagged goods by potential customers: e.g. the identification of the nearest required goods and booking. Today the same Telecom providers offer a special service to identify the presence within the same geographical area, of a person belonging to a default group, who agrees to be contacted. In both cases, the value of the impact of ubiquitous technologies on the overall telecommunication industry is given by the integration of different technologies in realizing a new and unique service.

The most important infrastructural impact is given by the need to manage new typologies of performance that require new network architectures and completely different response times. In the existing communication network, we mainly have two types of services: voice and data. Video communication is increasing its weight on band utilization, but, as yet, represents just a small load. The integration of new ubiquitous technologies (e.g. RFID) requires two new performance needs:

- The management of local networks for the machine to machine (M2M) communication
- The management of data base distribution for large quantities of data (e.g. EPC), to reduce the traffic on the networks and through the critical hubs.

Finally, the integration of different ubiquitous technologies by the telecommunication networks accords a strong role to telecommunication providers. The performance of telecommunication systems is crucial to obtaining the final performance of the integrated services. So the definition of performance standards, as well as the creation of an independent authority for controlling it, is necessary. The a.m. conditions are able to guarantee the service quality for the customer and effective competition for the service suppliers.

3.5.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

The main potential constraints in the development of the ubiquitous network society are of three types: technological, economic and political. The technological constraints are caused by the incorrect use of the limited resources of the transmission band and by the interference problems between the radio devices. The criteria currently used (frequency and power) are suitable for the management of systems traditional radio of systems only but they are not. For example Bluetooth, by RFID and by microwave ovens, can use the 2,45 GHz band, so we often have problems of local interference and channel saturation.

The economic constraints are determined by the relationship between the cost of the ubiquitous network and the cost acceptability for the users. The real users are not rational decision makers, although they do have a limited rationality and asymmetric information, so whilst their decision is not optimal, it is acceptable. For instance, the value of existing and defined unique standards is important for the decision makers who do not have deep technical know how (normally 99% of decision makers). In fact, they believe that standardization itself reduces the decision risks and the costs of innovation. Usually the costs are reduced when the volume of equipment is increased, but there is always a least value, due to learning and the efficiency of the production processes. You must understand if it is acceptable for the users. For example, the existing RFID transponders are manufactured using silicon technology, so you can never have costs that push to replace the actual bar codes on the finished products, independently of the possible volumes. Probably, in the near future, the new RFID transponder will be manufactured by new polymer technologies and we believe that new technologies could quickly reach the right level of cost acceptability for the users.

Finally the political constraints are determined by the behaviour and the decisions of the social groups. The social values of the ubiquitous network society are often conflicting, even if important:

- Group benefits versus individual benefits: e.g. satellite TVs maintain the cultural identity of North African people, but also increase the conflicts caused by the differences in behaviour between Italians and foreigners
- Safety versus privacy: e.g. RFID increases the security of travelling by tagging baggage and people, but reduces the individual privacy level

- Cost of the change versus benefits: e.g. today RFID on finished products doesn't add value for users so the users don't want pay for it.

Anyway, the constraints are due to the conflict between the different decision making processes with different actors and their objectives (suppliers, users, groups etc). The role of independent organizations (authorities, universities, ISO, ITU etc) is helping the ubiquitous network society development to remove the constraints in the following ways:

- Increasing the symmetry of information on the ubiquitous technologies
- Developing a common approach for understanding the real constraints and defining and removing them
- Looking for, and publishing the best practices
- Establishing working groups involving suppliers and users (or user representatives).

3.5.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**
- b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

The factors for facilitating the development of ubiquitous services are not homogenous, but the key policy is always increasing the diffusion of ubiquitous services, because the diffusion level is the value driver of the service (the Metcalfe rule). The required diffusion is due by the type of ubiquitous services:

- B2B services require industry diffusion: e.g. EPC between supplier and retailers
- B2C services require diffusion in the same value chain: e.g. pharmaceutical database of drug suppliers for doctors
- C2C services require diffusion in the same user community: e.g. the SMS service for young communities.

The public policy mechanisms must be focused on pushing the diffusion of services and increasing the users. Market competition will follow when the diffusion level allows the ubiquitous services. So, at the beginning, you have to build the infrastructures: the investments and the availability of transmission bands are obviously crucial anyway.

The user communities are not homogenous. You can find big companies, PME and individual consumers. The decision-making processes are obviously different, as are the business models:

- Usually the companies are able to take more rational decisions than individual users. The cost-benefits ratio can be defined and the business model can be selected from amongst the different options
- The individual users know the service cost, but are not able to evaluate the real benefits (quantitative or qualitative). So the model to encourage the take up of services will be based on free test or really low-cost tariff.

3.5.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

People should be involved early on, in order to understand how ubiquitous communication environment could change processes and improve the performances and their quality of life. The approach must be focused, because the relationship between culture, knowledge and power is impossible to disentangle. The "big brother" idea is due to the risk of malicious use of the ubiquitous technology. We have to distinguish amongst the EU and national regulations on privacy and the user's perception that his own privacy is being

violated. The existing laws are already available for several ubiquitous technologies: but the user's perception is different: he rejects a technology if he doesn't believe that its advantages outweigh the risks. For example, mobile phones and credit cards are used worldwide without problems of privacy, because the advantages perceived by the users are superior to the risks. The problem of lack of advantage for the user is typical of RFID, because the tag can be hidden and can work without a human decision (e.g. bar code requires a human action). The first critical application is tagging goods at item level:

- Linking personal information with transaction or location-based information raises the concern of a potential risk about privacy, without any advantage
- If item-level tagging is used and the tags are not de-activated by the retailer, consumers could potentially raise privacy concerns
- So suppliers contemplating item-level tagging should prepare to understand the benefits of RFID to the consumer and not just to the enterprise
- When the tag costs decrease and item-level tagging becomes feasible, the consumer will want to understand the benefits and limitations of this technology and people will want to be able to choose whether they want to use it.
- These concerns are not only privacy concerns due to item level tagging, but also human tagging:
- RFID tags could become an imposed requirement, such as national ID cards in the US, raising fears of the invasion of personal privacy and freedom among workers
- Chips, which can be implanted underneath the human skin, have already been developed
- Malicious use of the technology could result as deliberate disabling of tags or other type of system sabotage.

The required actions are the following:

- Potential opt-out features could be added, so that the tags could be de-activated at checkout
- Media policies should be in place to answer concerns.

3.5.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

The major impacts of exiting and new ubiquitous technologies on the evolution of society and social behaviour are the following:

- **Economics**
 - **Market and Hierarchies**
 - The fragmentation of the value chain will increase, due to the reduction in transaction costs for managing outsourced activities
 - The growth of virtual clusters for managing the different activities of the value chain: new product development and product fulfilment
 - The reduction of time-to-market and the augmentation of product variety, due to the real-time synchronization of ubiquitous technologies
 - The ownership of goods and processes by ubiquitous technologies will increase the incidence of renting as opposed to buying.
 - **Decision making and negotiating power**
 - The information will be less asymmetric for customers and the transaction cost will be reduced for the same product/service level
 - The individual customer will be able to build stronger virtual groups for negotiating better services and prices.

- **Social Behaviour**

- **Social Responsibility versus individual freedom**

- The difference between working time and free time will be reduced
- Children's autonomy will increase more slowly due to parental and hierarchical control
- Conflicts between privacy and social security will increase

- **Social fragmentation versus social integration**

- "Digital divide" between "ubiquitous" people and "non ubiquitous" people in the same country
- "Digital divide" between "ubiquitous" countries and "non ubiquitous" countries
- The immigrants will not be integrated into the hosting countries, but will maintain the customs and habits of their mother country
- The "ubiquitous" people will be world citizens, independent of the mother country

Given the differing public policies, the possible impacts will be of differing values: the ubiquitous technologies can create different futures; our values and our choices will define our future.

3.6 Riccardo Ruggiero: Chief Executive Officer of Telecom Italia

3.6.1 What does a "ubiquitous network society" mean in an Italian context? What is your outlook on the global "ubiquitous network society" of the future, and Italy's place within it?

The definition of "ubiquitous network society" will probably change over time, as new technologies are researched and introduced into the market and new applications are developed. Right now, we can think of a society in which infrastructure enables "easy, customizable always-on access to communication, information and entertainment services, independently of where we are and what terminal we are using". Network infrastructure alone is not sufficient; it needs to be rich in content and services and there must be widespread knowledge, amongst the public at large, of how to derive the maximum benefit from its use.

The evolution towards a "ubiquitous network society" will not be linear and will require many different elements to fall into place, as time and technology progress. In this respect, there are no crucial differences between the Italian context and a European or global context, although Italy has shown a couple of interesting trends. The first trend is the probably unexpected ease that Italians have shown, and continue to show, in accepting new ways of interacting through the new technologies, either amongst themselves or with public or private entities. An example of this is the spreading of mobile phones and DSL solutions. The second trend is the leadership role, in terms of innovation, that companies like Telecom Italia and TIM or other Italian players, like Fastweb, have been able to play over the last few years; they were the first to introduce, on a large scale, tariff schemes, products, services and solutions that satisfy specific customer needs and represent further steps towards the "ubiquitous network society" (prepaid mobile cards, the wireline videophone, and the no-upfront-costs broadband, to name but a few).

However, it should be noted that creating a "ubiquitous network society" is an achievement that is not solely related to technology or infrastructure. Other factors will contribute to shaping the kind of network society we will be able to establish, including the quality of the contents, which will circulate on those networks and the type of demand preferences, as well as the cultural and social trends that will emerge in the future. How businesses and consumers will tend to use those networks is an issue that involves our societies at large. An important challenge, not only for the industry, but also for our society as a whole, is to get the maximum benefit from ubiquitous networks, the use of which is - and will increasingly be - a mirror, both of consumption models and of global social and economic trends.

The industry is obviously interested in getting the best return from its investment. However, we all hope that ubiquitous networks will help our societies to become more informed, more culturally active, open, productive, and so on, but this achievement is not so obvious. 'Quality of use' is one of the great challenges

facing us. The Telecom Italia group is aware of this important goal and is doing its best to make a significant contribution.

3.6.2 What is the best method for strengthening current technological developments and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

Strengthening current technological developments and overcoming standards battles in order to facilitate the rapid deployment of ubiquitous networks and related services, seems obviously appealing. However, although theoretically a “top down” setting of standards appears feasible, the complexities involved in this evolution are immense; we are moving in uncharted territory (we must remember that ten years ago, mobile was NOT, in any form, considered a mass technology) and that setting standards takes an awful lot of time.

The “battle” for setting technological or service standards is an inevitable consequence of the differentiation policies that are a natural and crucial element of fair competition. This struggle neither new, nor exclusive to this industry, and it obviously characterizes the start-up or initial phases of any new technology development. Furthermore, the initial co-existence of different standards is a sign of health, of research and development activities, as well as of competition regulation. We must hope that in the evolution process, the best standard will naturally “win” the battles (GSM for instance), where “best” means more efficient, more user-friendly, more flexible, more scalable, etc. In this respect, I would like to add that the Telecom Italia Labs are an extremely valuable resource for our research and development efforts, and a strong support to the group in terms of anticipating and keeping up with the technology and standards evolution. I believe at this time convergence is more a hardware-manufacturer and service-supplier issue than an end-user issue.

Users neither know nor care about network technologies; they are only interested in simple use, security, convenience and usefulness, i.e. solutions that meet their needs and maximize reliability and minimize costs along the individual’s various utility curves. The success of new convergent platforms or services will be decided in the marketplace. However, non-converged telecommunication networks have shown to perform well, as they have generated buoyant growth and fair competition between fixed and mobile services, thus stimulating innovation and efficiency. Therefore, I believe convergence is certainly an opportunity to be explored, although the final word will be up to the end-customers. From an industrial perspective, what we envisage is a fair and competitive environment, where all players can benefit equally from the opportunities linked to convergence. Achieving a balance is not easy, as investment and risk must be given adequate consideration and rewarded. There is no doubt that convergence will add complexity to an already complex framework.

3.6.3 What is the likely impact of ubiquitous technologies on the overall telecommunications industry?

Generally speaking, ubiquitous technologies will generate two opposing forces that will drive the industry over the next few years. The trend towards new applications and services will continue unabated, in areas that have already been explored - like broadband and mobility - and areas that are emerging for telcos, such as fixed-mobile convergence, instant messaging or location-based services. This should provide an opportunity to serve customers better, become more efficient, facilitate tasks that were complex to do because of time or space constraints, etc. In other words, from a telecommunication operator’s perspective, there is room for creating business opportunities and generating growth.

However, ubiquitous technologies might also generate opposing trends. To put it bluntly, the risk is that the “new” ubiquitous market will be “smaller” than the sum of the previous ones. Every time services and/or products are bundled there is an expectation of improved efficiency and therefore cost reduction: “If I buy product A from you and product B from your competitor, I pay a given price, but if I buy both A and B from you, I expect to be rewarded for being a better customer and pay less than the simple sum of the two.” Balancing this act will be a challenging task for the telecommunications industry, and incumbent operators have both a lot to gain and a lot to lose.

3.6.4 What, in your view, are the main factors that could stall the development of a ubiquitous

network society?

Many obstacles could get in the way of the development of the ubiquitous network society: inadequate offers, excessive complexity underlying the offers, lack of knowledge on the user side, costs unable to match expectations or perceived value, possible widening of the digital divide among different geographical areas, etc.

As the telecommunication industry has had years of incredible productivity and efficiency gains, over time dramatically lowering the cost of communicating with voice and data and the cost of transporting information over great distances, there is a general expectation that the cost reduction process will never end and will enable cheap services over any network and any technology. This generalization is obviously dangerous. As costs have been decreasing, so complexity has been increasing. What was once an industry handling one service over one network (carrying voice calls dialled on a numerical disk over a circuit switched network) is now an industry handling multiple services over multiple networks. Competition exists today at different layers of the value chain, including convergent solutions or business models in both national and international environments. As technology needs time to progress, demand is also evolving and it is essential to keep up with what the marketplace requests. There are many examples in recent years of trials and often errors in pushing into the market services that were either too advanced for the available terminals, or too complex for the users to use; or even too complex to set-up. For example, think about unified-messaging solutions. The industry is, therefore, under pressure, both in terms of investment decisions and of service offers. In this respect, policy makers have an important role to play in ensuring appropriate regulatory and policy measures to stimulate investment ubiquitously, as well to ensure access to contents.

3.6.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?

Public policies in the telecommunications industry should foster fair competition and ensure adequate return on investment to facility-based operators. Policies should encourage innovation and investment and the latter needs returns. Both spectrum management and competition policy tend to show the level of maturity that a regulatory regime has reached in a certain country.

In Italy, for instance, competition is particularly lively. After the liberalization phase, and after many licenses had been awarded, the industry went through a natural consolidation phase. Currently, more than 20 operators are competing actively in the telecommunications market. As competition progressed, the incumbent lost around 55% of its market share in the mobile market (in terms of lines) and around 30% of market share in the fixed services market (in terms of retail voice traffic volumes). In Italy, fixed telecommunications are particularly competitive and the regulatory regime is fostering innovation, while customers can enjoy choice and competitive offers. For instance, Italy has the lowest Local Loop Unbundling prices in Europe, and this is also fostering facility-based competition. The next challenge policy makers have to face is ensuring a harmonized and pro-competitive environment across Europe. Life for other licensed operators is much easier in Italy than in France or Germany, for instance...

b) What business model has been adopted and what could be in your opinion a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

As mentioned above, the issue is how well the offers match users' needs and perceptions of value. Innovation is king, and involves all product aspects, from service creation to service delivery, from customer care to billing. Take mobile services and think about the boost that the pre-paid service has given to mobile penetration take-off. Take wireline broadband services and think about the boost that the elimination of entry fees and the creation of pay-per-use tariffs have given to broadband take-up. In other cases, flat tariffs might be the answer, as users prefer to know in advance the amount they will pay. Other successful business models include the triple play and the i-mode. Innovation is very closely linked to segmentation, which essentially means knowing the customers and being able to understand their needs and preferences.

3.6.6 What consumer protection safeguards are required in a ubiquitous communication

environment, for instance privacy and health concerns?

There are no safety or health concerns, which have not already been addressed by the existing regulations. As far as privacy is concerned, strict standards have already been set, allowing the user to control what personal information is available and to whom. This process must be continuous and strictly enforced, because technology is evolving fast and does not wait for regulations. Take, for instance, RFIDs: the risk of serious privacy breaches is enormous, as, potentially, it implies the tagging of every possible item, the placement of hidden readers, massive data storage relating to the purchases and assets of individuals, the tracking and profiling of social behaviour, etc.

If you think about network communications, any user, when communicating, reveals his location to the network, as well as some form of billing identity. Once he is connected there, information flows into and out of the network entry point and of various repositories where the user places and retrieves information. The user must, in all possible instances, be protected against unlawful – or simply unwanted – use of any of this information. Another important challenge is represented by cyber-crime. Therefore, policy makers need to ensure that an appropriate balance is reached between the protection of privacy on one hand, and the creation of a secure and enforceable legal environment on the other.

Regulators should also acknowledge the costs associated with the implementation of those regulations and standards. Moreover, with ubiquitous and faster networks, challenges and protection measures will inevitably tend to increase.

3.6.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

Over the last few years, the telecommunications industry has experienced a revolution, which was probably broader than expected. Just think about e-mail and its impact, for instance, on voice services, fax services, paper mail, or how it helped redesign operating processes inside many industries, and how deeply it has changed our daily life. Think about SMS and the way they not only displace voice in many situations, but how they created new ways of interacting especially among young generations, even creating new language expressions. Think about videoconferences.

It is very difficult, if not futile, to try to summarize in a few words what we can guess about the profound implications of ubiquitous networks. Who knows what innovations and services will be available in the future? Probably in a few years' time, the average network connection speed to the home will be ten times faster than today; people will be able to meet and interact in new ways, or to experience things they cannot experience now.

The industry is naturally part of the game and the private sector will continue to operate in accordance with its business goals, investing when and where adequate return can be reached, pursuing growth and profit. However, there is also something 'bigger' that I like to consider. A ubiquitous network society cannot fail to comply with more ambitious achievements, such as sustainability, true cultural and social growth, and new opportunities to protect the environment. Ethics and social responsibility are very important principles, which should increasingly permeate our societies, and the corporate world has a role to play, along with the many other stakeholders.

3.7 Tommaso Pompei: Chief Executive Officer of Wind-Infostrada

3.7.1 What does a “ubiquitous network society” mean in an Italian context? What is your vision of the global “ubiquitous network society” of the future, and Italy’s place within it?

The concept of “technological ubiquity” has been receiving increasing public sector and industry attention over the last two or three years. In many parts of the world, mobile phones and the Internet have already permeated all aspects of human life. New ubiquitous technologies promise a world of networked and interconnected devices that provide relevant content and information, whatever the location of the user. In particular, the convergence (and future scalability) of broadband Internet and ubiquitous networks with current mobile services may emerge as the key means for providing communication and monitoring capabilities to users. The ubiquitous network is positioned as a goal of the development of the next-generation information and communication technology (ICT) infrastructure under the e-Italian Strategy, as it

is indicated in the Government Programmes, and the systemization of policies toward this goal is moving forward also in Italy.

According to this scenario, it is possible to offer value added services, where interactions between people “think” and the information infrastructure are addressed in an integrated way. Technological ubiquity is a medium to long-term perspective: in the meantime, it is necessary to prepare the new context using the new available technology opportunities offered by the “Triple Play” solution and by the MobileIP on the new IPv6 networks. These “tools” should offer the different Telecom operators the opportunity to increase the possibilities right now, and to address innovation and increase their business stability. In particular, Wind is going to offer innovative solutions based on Triple Play architecture, according to market expectation, such as the IP-TV, that means television with xDSL broadband access, and as electronic services based on IP functionalities. This approach allows the gradual introduction of certain new opportunities to reach the final target represented by a convergent architecture, as suggested by the ubiquity model. The division between the classes of service will be overcome; the telecom operator, with his network and services, will allow the user to choose the best way to access and use the services, according to the degree of mobility, the terminal used, the external conditions, etc...

Wind is the only Italian telecommunications operator capable of providing convergent fixed-line, mobile and Internet services. The Wind trademark applies to mobile and convergent services, the Infostrada brand to fixed-line telephony, whilst Libero is the brand used for the group’s Internet services. After acquiring the UMTS licence in November 2000, Wind's target is to become the convergent Multi-Media Mobile operator in Italy. In order to reach this target, Wind is in an advanced stage of implementing the UMTS services to be launched during 2004. Moreover, Wind interfaces with the EU research activities, to assess new services and network opportunities, as suggested by emerging technologies.

3.7.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

I think that it could be important for strengthening current technological development to state that the ubiquitous network is a new total ICT paradigm, offering new business opportunities and related strategic issues, based on the trends that have become clear since the last period. In the following paragraphs, a few of the elements are presented.

In the advance toward ubiquitous networking in Italy, various network infrastructures have to be developed, in order to acquire compatibility and interoperability. These infrastructures include wired networks, with their focus shifting from high-speed to super high-speed network access, wireless networks, aiming to be the world's most advanced networks, transportation system networks with their links being closer, broadcasting networks undergoing digitization, and physical object networks that will emerge soon. Wind is in a highly competitive position, with respect to the development and dissemination of ubiquitous solutions. Favourable results in this field will lead to the growth of ubiquitous electronics, and will give birth to the possibility of facilitating the growth of clusters of diverse ubiquitous service solutions, with a new set of ubiquitous home appliances, ubiquitous cars and ubiquitous offices. The standardization process should allow the convergence among the different contributors coming from the various companies involved, taking into account the fact that the new services should, according to the ubiquitous model, be more “electronic” than those available up to now. According to the Wind vision, in the realization of these business opportunities, approaches aimed at the development of original content and solutions from the user perspective are important at the development stage of a network infrastructure. At the development phase of the ICT utilization infrastructure, a vision for the realization of a strategic module, vertical evolution model is needed. In evolving utilization solutions, the “industry-consumer reversal” phenomenon must be fully recognized: Wind should be a leader in this process.

3.7.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

The present scenario of the new wired and wireless networks is quite rich and diverse: the second generation cellular systems are reaching maturity, with the addition of packet data services to the traditional digital

voice circuit services, the third generation cellular systems have recently become operational in some countries (Japan, Italy, UK); wireless LANs are achieving a long-awaited popularity, in both the US and Europe. The wide range of available wireless technologies can be exploited to offer a quite diverse set of services. The wealth of technologies available in the wireless and wired networks field offers a number of tools for the project; the feasibility and usability of the proposed solution will have to be investigated. As we indicated before, broadcasting networks are undergoing digitization, and physical object networks will soon emerge. The Italian companies should be in a highly competitive position: favourable results in this field will lead to the growth of ubiquitous electronics, and will lead to the opportunity to facilitate the growth of clusters of diverse ubiquitous service solutions.

The Portable Internet is one of the more important new developments to test the emergence of high-speed wireless Internet access, together with the proliferation of portable devices and some new market potential and future impacts will be analysed. The technologies for the portable Internet provide a technical overview of high-speed mobile and wireless networks underlying the system. These technologies should be used as a tool to bridge the digital divide and should, therefore, be considered a very important aspect for the overall telecommunication industry. According to this vision, Wind should have a positive role in the development of the information society and to extending within Italy, the benefits of new information and communication technologies, such as portable Internet solutions, in line with Resolution 101 of the ITU Plenipotentiary Conference to “fully embrace the opportunities for telecommunication development that arise from the growth of IP-based services”. The ubiquitous technology will allow personalized and interoperable secure communications, in particular for these services classes: Presence, which captures the dynamic context (including location, status, disposition, etc.) of a person or a sensor at a certain time; Availability, which refers to inclination to share information about itself or to communicate with others. Being based on factors such as the type of communication requested, the identity of the calling entity and the preferences and policies associated with the recipient, it includes permission and location-based features. Last, but not least, Personalized, context-based user interface to ensure the safety of each service provision phase

Another important programme useful for introducing the new paradigm, according to my vision, would be the test of new wearable systems for mobile multimedia communications. In particular, the focus is on real-time communication and processing of visual information for context-aware applications, such as augmented reality, high bit rate communication, architectural issues and performance optimization for heterogeneous communication and computation systems. Above all, these aspects are important for consolidating the ubiquity network paradigm; the low power for the final systems. The new systems should be more than the concatenation of individual components; they should be the union of their components.

3.7.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

I believe that the main factors are the costs and the new rules to be adopted. For the network structure upgrading, according the new paradigm introduction, an important investment will be required. For the new rules, it is important to guarantee a good trade-off between the “public” interfaces approach and the business profits for all the involved actors, according to the new business models allowed by the new framework.

3.7.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

a) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?

The ubiquitous network framework will be getting input from and generating output to several different sources, but potentially will also provide output to a variety of sources, such as standardization activities and forums. It could be necessary to promote all the standard solutions, in order to guarantee that both companies are in a position to provide end-to-end services, in co-ordination with major telecom operators beyond communication scenarios. As a final result, Wind trusts in supporting and defining an exploitable architectural framework and structured commercial services, stimulating the provision of new types of services and applications. In particular, the definition, design and implementation of open, integrated and secure standards in the ubiquity context will contribute to the work of a number of standardization bodies, in order to harmonize the final network and application framework based on the ubiquity concept. It could be

important for the public policy role, in this new context, to give guarantees to the non-incumbent operators, in order to avoid a possible “de facto monopoly” by the incumbents, as was the case with ADSL access, in the Italian context.

b) What business model has been adopted and what could be in your opinion a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

The main factors that could facilitate the development of ubiquitous services should be related to the openness of a new business model perspective; with the advent of 3G UMTS (Universal Mobile Telecommunications System), the mobile Internet service market is expected to boom in Europe. According to the European Information Technology Observatory (EITO), there will be over 400 million European mobile subscribers in 2006, with a 160 billion euro turnover and UMTS becoming the dominant standard bearer in 2007. According to this new service context, both public policy mechanisms and the efficient business model definition have fundamentally to encourage the take up of services and acceptance by user communities.

3.7.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

The policy and regulatory aspects, dealing with the challenges faced by regulators and policy-makers in an increasingly portable environment, must be addressed, in order to maintain the personal policy and safeguards for each of the personal aspects, including health. In accordance with its corporate responsibility vision, Wind considers this to be a very important point, which must be addressed.

3.7.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

The ubiquity of information and communications will have a significant impact on the current telecommunication landscape and business practices. It will also raise a number of public policy questions, in particular consumer protection and social inclusion. Pervasive computing is the next generation computing environment, with information & communication technology everywhere, for everyone, at all times. Information and communication technology will be an integral part of our environments. The new model, based on ubiquity, contributes to the development of pervasive computing, using new concepts, technologies, products and services, as well as innovative interaction methods and a strong future basis for educating IT specialists through “excellence networks” situated within universities and companies. In a nutshell, the ubiquitous model is expected to promote technological breakthroughs in the context of generalized, wireless access networks. It specifically addresses the emerging context-aware methodology, based on the key technologies: localization, reconfigurability digital video broadcasting for mobile energy-constrained devices, Distributed Sensor Networks (fixed and mobile) and profiling techniques and service customization.

The new model can leverage the future development of “novel workplace designs and methods of work organization that enable the collaboration of multi-location and mobile workers”. It will also enhance the “creativity,” thanks to the infrastructure flexibility, strictly related to its reconfigurable nature, modular and expandable features. They also enhance “productivity,” thanks to the possibility of optimizing the delivered services by applying the context awareness concept. The new model will cover research, development, and provisioning on multi-service, large-scale systems, thanks to the modular system and interoperable architecture. The expected outcome will be a variety of efficient, intelligent and easy-to-use systems covering all sectors of the economy, public life and society (enterprise, healthcare, transport, social participation, learning and cultural assets). This will make sharing and evaluation, as well as the creation of knowledge, both easier and more efficient. Other new services will provide emergency and breakdown assistance, adaptive speed limitation, real-time traffic information, traffic management, parking aids, route guidance, information services helping the driver in vehicle control, real-time vocal direction guidance, interactive 3D maps and open a dialogue with a selected service provider.

3.8 Marco De Benedetti: Chief Executive Officer of TIM

3.8.1 What does a “ubiquitous network society” mean in an Italian context? What is your vision of the global “ubiquitous network society” of the future, and Italy’s place within it?

Nowadays, any modern society is fully aware of the growing importance of communications among individuals or companies and how it affects social wealth. Any means of support designed to help people avoid isolation is a good thing. Just take a look at what Al Gore was proposing as long ago as ten years, with his “information highways,” or even at what is happening today, with China’s development of its telecommunication networks. Italy is aware of the importance of the communication issues and is now playing its role in this process. In the last few years, there has also been a growing awareness by the institutions, at both a national and a European level. The main thing is the opportunity individuals now have to get connected to the world. Internet has the huge and powerful ability to break down barriers and increase knowledge, but we are just at the beginning of this era. In Italy, we started quite late compared to other countries; in broadband, for example, although we are making progress on that. Think about the mobile telephone; it already represents a sort of ubiquity. It is a first step towards ubiquity, as it embodies the claim of “anytime anywhere”. We can say we already have ubiquity with voice and we are making that possible with data now. Italy is at the forefront of this industry. It is the most advanced market among the most advanced countries and we are the leading company on this market. Now the turning point stands in broadband related to mobility and TIM will lead this path in the coming years.

3.8.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

In the future, technological development should be more market-driven. User-centric research and early cooperation in the R&D field amongst the main mobile industry players represent a fundamental issue. Early, pre-competitive and wide-scale collaboration in a user-centric driven research domain will prevent the standard battles, which often arise because of conflicts amongst mobile operators’ priorities (set by the market) and the interests of infrastructure vendors (focused on technology evolution). Some recent initiatives, like the Mobile Platform and the Framework Programmes within the European Commission, seem to be going in the right direction, putting together, at an early stage, the technological evolution main drivers, in order to reach adequate level of economies of scale and scope. The resulting standards will be crucial for mobile operators to be able to provide final end users with quality of service at lower costs.

Service and network convergence seem to be a natural consequence of all this, thus helping a fast roll out of ubiquitous, network-based services. Nevertheless, recent experiences in our industry have shown that successful services rely on both maturity and market demand more than upon strongly performing technological enablers. The convergence of services and networks (e.g. the fixed/mobile convergence) will create new value for operators, when it can rely upon real market demand and not exclusively on the technological feasibility.

3.8.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

Technologies play an important role in any industry, but they are particularly important in our industry. If we were to take a look back into the past, when GSM was not yet in place, we would see that no interoperability was possible. The creation of a common standard, such as GSM, has placed Europe ahead of the others. Mobile telephony is the only industry that has made Europe more advanced compared to Japan or the USA. This standard does guarantee ubiquity and seamless services, anytime and anywhere. That is why it is extremely important to evolve in this direction, trying to get less technological fragmentation and more convergence. Advantages as well as disadvantages are no longer related to the technological component, since customers do not buy technologies, but services and applications.

3.8.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

I think that in the end we will see a ubiquitous society, but the question is how to get there and how fast to travel. I reckon that it is just a question of speed. The technological factor affects everybody and we all know that technology needs time to mature. The main differences will arise from the different policies put in place and the main driving force is public demand. Brazil - which is not amongst the most developed countries - applies an electronic voting system, where final results for the elections can be released in a few minutes. I am not particularly worried by the technological variable; the real differentiator is in the public policies in the different countries. In my view, a clear regulatory framework can push up demand.

3.8.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**
- b) **What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

In my view, the market counts on the entrepreneurial initiative. The role of institutions is to make rules and provide us with a clear and stable regulatory framework. Clear rules are necessary for those willing to invest, with all the related risks, which form part of any entrepreneurial activity. Spectrum is important; it is the scarce resource in our industry. What we need is a certain amount of stability, a clear regulation framework for the future. It represents a necessary condition for those willing to make investments. If the industrial policy considers the development of infrastructures an important factor I personally do not think subsidies are required. Look at the USA, for instance, where there are no subsidies at all. They are unnecessary because their public administration is in line with their industrial policy. The US experience should be an example to follow. We should be moving in this direction. In the last 10 years, our institutions have started to become aware of that and so far, many steps have been taken. Further evidence that this is the right direction, lies in the number of times you hear people talking about this industry. A lot has been done, but there is still a long way to go. It is important to raise awareness and the policies being set up should reflect this vision.

Honestly, I do not think that there is just one correct business model. We have segmentation in the market; different offers for a great number of individuals; therefore there will be a series of different business models. The market should be the winner, as only in this case will a broad variety of services be available. If we look at the trend of the last ten years, we see that mobile telephony in the ISTAT (Italian Institute for Statistics) product items is the only industry that is always characterized by a minus, meaning that in the last 10 years, prices in our industry have always been lowered. Different nuances imply different business models. I think it is wrong to try to imagine just one business model, since the market itself will reward the winning strategy.

3.8.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

The implementation in the mobile and wireless networks and the level of integration among them produce growing public concerns upon health issues on one side and privacy, for instance, on the other. In Italy, electro wave related issues are strongly regulated with very strict limitations on base station antenna emissions and recent studies have shown that current emissions are still at a considerable low level. On the other hand, new network technologies, a higher level of interconnection and widespread mobile access to Internet is producing more concerns related to the user's identity in electronic communications. We have to bear in mind that security and privacy topics will become even more relevant in future, since new services such as m-commerce or m-banking will be accessed ubiquitously by a larger number of customers. To protect content and save users' privacy, technology alone cannot do enough if not supported by a clear regulatory framework. Crimes over the network should be recognized and punished and here again we need clear rules.

3.8.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

Mobile communication has already changed the way we live. SMS experience is probably the best example of the impact mobile communications has on people's social behaviour. 3G networks introducing live images and broadband access capabilities are likely to produce an even deeper impact on both personal and business communications.

Ubiquitous technologies will consolidate the aforementioned impacts in a new technological framework, characterized by new features, such as video communication and the permanent availability of wireless connectivity. Mobile users will probably convert to "always on" and connected customers and service delivery models will be more "push" oriented. Peer to peer communications will help to establish ad hoc mobile communities, based on specific profiles (e.g. music preferences), while the availability of ubiquitous broadband capabilities will help enterprises access their corporate systems in mobility, with the best quality/speed/cost tradeoffs. Mobile communication is already personal communication. The transmission of images and emotions over the networks other than voice will have a greater impact on our way of communicating and therefore, of living.

3.9 Pietro Guindani: Regional Chief Executive Officer of Vodafone

3.9.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

The definition of "Ubiquitous Network Society" still presents some level of uncertainty. Given that it is a complex new paradigm, a single point of view is, by definition, not exhaustive. The ubiquitous network society is the natural evolution of a society in which the demand for communication and connectivity has historically been extremely strong and are currently still growing. This fundamental trend has driven the huge success of mobile communication. In particular Italy, as one of the largest and most developed countries from a telecom point of view, claims to have played a leading role in the promotion of, and the evolution towards a new and better communication model, based on technologies and infrastructures that enable the delivery of customer-centric services, built around people's needs.

3.9.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

The key elements for strengthening technological development and the creation of a real "ubiquitous network" are cooperation and focus on customers needs. Cross-industry cooperation is fundamental to this type of social transformation; the key problem, in this case, is to trigger the right trade-off between the risk of deploying a capital-intensive infrastructure, and the possibility of controlling the levers, to ensure an adequate return on capital invested. "Ubiquitous network" should not imply that networks become a "commodity," over which value added services are delivered. The emergence of cooperative, cross-industry models is, therefore, critical for standard and protocol development. To facilitate full interoperability; this model should be supported and granted by the appropriate service level agreements. Each part of the value chain should focus on the components where its specific capabilities can make a real difference for the user, leaving other opportunities to competitors. In other words, the various players of the telecom and its adjacent industries should enlarge the size of the whole pie rather than their individual share of it.

Focus on customer needs should be the key driver to pilot "ubiquitous network" deployment and services definition. The success of "ubiquitous networks" lies in the capacity to avoid technology-driven developments and the proliferation of standards. The key lever of success will be the capability to deliver easy-to-use, seamless and useful services, based on a "naturally" accessible environment. The role of cross-industry coordination and interoperability assurance, as described above, should, therefore, belong to industry-led international bodies and to those players that are closer to the customers and better positioned to interpret their needs. All players have a commercial interest in interoperability to develop new markets: different models may evolve in different regions and some degree of rivalry between regions may be helpful to drive market experimentation.

3.9.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

In general, the net impact of ubiquitous technologies will enlarge the revenue pie for the telecommunications and adjacent industries: the "Ubiquitous Network Society" needs to be able to satisfy existing and emerging needs via a ubiquitous way-in to information, contents and connected machines. In particular, the primary layer of the ubiquitous network model is the capacity to ensure constant broadband and location-independent access, and the telecommunication industry is, per definition, claimed to be playing a key role in this development. Moreover, the telecommunication industry, and the mobile one in particular, has some key skills and assets that are difficult to replicate, which allows it to be quite confident about the ubiquitous network impacts on the industry:

- The capacity to manage and take care of large customer bases
- The knowledge of customers' preferences and of the best tools/methodologies to support them, using complex services
- The experience in managing the billing of large volumes of small transactions.

3.9.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

The major risks in this multi-industry complex environment are related to the lack of cooperation and the presence of free-riding behaviours. The "ubiquitous network" model requires a clear distinction to be made between:

- The Technology Layer, where it is necessary to avoid wars on standards, driving to the proliferation of protocols, access technology and platforms;
- The Service Layer, where it is important to focus the competition on the delivery of original services with a distinctive capability to satisfy customers, over a standard and common environment.

In this cooperation game, a clear role will have to be played by industry-led bodies, able to stimulate the convergence of interests of the various players and prevent the emergence of dominant positions. Other key elements which, if not managed proactively, could stall the development of ubiquitous networks, are related to privacy limitation acceptance, data security and intellectual property rights protection: this model, with its constant interaction between the customer and the machines, locations and people connected to the network, implicitly leads to a more pervasive technology presence in the day-to-day life of customers. This proliferation of personal information and exchange of contents requires a high degree of attention to customers' personal privacy, and the enhancement of complex security and control policies, extending them to the whole network, devices software and services arena. For instance, in content-based services, a robust Digital Rights Management system will be crucial.

3.9.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**

We believe that the general public policy paradigms that have contributed so much to the success of the mobile industry in Europe over the last ten years represent, from the normative perspective, the best guarantee that ubiquitous services and technologies will be developed. Technologies and standards should have the opportunity to compete fairly on a global level. That is why European regulatory frameworks have recently adopted the principle of technology neutrality as essential to facilitate the introduction of new, advanced communication services that guarantee a level playing field. Secondly, competition law should, as far as possible, regulate services offered to the public by authorized operators, with a regulatory burden inversely related to the competitive level of retail markets.

As regards frequencies management policies, we think that private applications would be better to use shared spectrum bands allocated for non-protected, low-emitting radio transmissions. Specific band ranges defined at global level, as for IMT2000 systems, would facilitate the development of ubiquitous networks. On the

other hand, public services require the exclusive use of spectrum ranges and national allocation policies able to manage the access of a limited number of entities, in order to ensure the necessary levels of quality of service, the efficient use of spectrums and to promote infrastructural investments.

b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

The emerging business model of a ubiquitous network environment could be based on the “ubiquitous infrastructure” (networks, terminals and enabling platforms) and the world of ubiquitous services that can be implemented over it. In particular, there are some key enabling platforms that should guarantee full interoperability and SLAs, in order to avoid asset duplication and complexity in the fruition of services; authentication, security, billing, privacy management are good examples of these enabling platforms. Over this common architecture, all service providers should be able to propose ad hoc services targeted to people’s needs and developed in a kind of “plug and play” approach.

This business model should be based on a revenue sharing basis, between the access/platforms and the contents/services providers. These revenue sharing formulas should take into account the competence brought by the parties and the level of capital invested. On the other hand, the value propositions towards end-users should adopt the most appropriate pricing models (pay per use, monthly fee, flat-rates) according to service characteristics and usage patterns.

3.9.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

In the last 15 years, we have experienced, at the global level and in particular in Europe, an extraordinary development of radio technologies. It is, no doubt, the second revolution in the communication society, after that generated by radio and television broadcasting. As radio and TV have had profound societal implications, so radio communications are having a similar effect on behaviour patterns and structures in all societies. It is also clear that ubiquitous technologies might potentially open a new, third frontier, with enormous benefits and impact on the lifestyles in developed countries. As always, handling such new technologies requires that responsible and wise attention be paid by all entities, private and public, to every single possible consequence.

As regards privacy and health concerns over radio communication technologies, since broadcasting communications involve non-transmitting terminals and use broadcast stations that are often located outside urban areas, these were not raised until the massive start-up of mobile services. Obviously these issues become more important in the ubiquitous network society, because, if used improperly, the new technologies have a greater potential to jeopardize consumer privacy and threaten civil liberties. From this perspective, and related to health concerns in the discussion of potential public and corporate policy approaches to mitigate potential risks, it is essential to promote, as far as possible, an objective and scientific viewpoint. We think it is necessary to adopt policies that deal with the risks to health and safety that may arise from radio frequency fields. These issues could, in principle, be managed efficiently through a proper technology assessment process and according to the guidelines of the most respected international scientific and medical bodies developing research in the field of non-ionizing radiation protection. In the case of privacy, we must pay continuous attention to ensure that we respect all the principles governing the protection of private life, as developed by the best-run legislations (e.g. European directives on privacy protection). These guidelines, if interpreted well and applied properly in the new contexts opened by recent mobile and ubiquitous technologies, will form a solid basis for the secure development of services and applications. In particular, transparency on the presence of personal data collection procedures, databases, and the type of use or treatment of collected data, must be always ensured. These considerations stress that the proper consumer protection and legal framework is fundamental for to the success of ubiquitous networks.

3.9.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

The potential impacts of such a paradigm are very wide and difficult to predict; a lot depends on the success of the services that will be implemented and the type of needs they will satisfy. However, the full deployment of the ubiquitous network model should strive to create:

- An easier way of living, with facilitated access to the widest world of solutions, without physical, space and time limitations
- A different and more efficient working style, with the opportunity for a real, “ubiquitous and interactive” office concept.

The emergence of new commercial models, based on micro-marketing approaches, aimed to stimulate and facilitate personal services customization and consumption. Big changes are expected, even if the transition phase is going to be long, from both the supply and the demand side.

3.10 Vincenzo Novari: Chief Executive Officer of Tre

3.10.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

We believe that the ubiquitous network paradigm enables you to “enjoy service wherever and whenever you want,” even though there is no common definition of it. The Tre (3) experience proves that UMTS is the first technology to be deployed that fully represents this paradigm, bringing, as it does, the dimension of mobility to IP/broadband delivery of integrated services.

The ubiquitous network society has already come to life in Italy, thanks to the launch, in 2003, of the first UMTS service by 3. From a service that simply combined mobility and voice (GSM), UMTS has given to Italian society, mobility, together with broadband capacity and transparent content delivery. We know that the UMTS network enables the distribution, through the broadband radio network, of large-volume content, such as video news, health care services, security services, streaming, sports video, traffic information and mobility services. UMTS does so with an improved and diversified network connection, i.e. handsets and devices such as the newest technology 3G multiband handsets, as well as devices compatible with common IT interfaces. These are the devices that offer a new relationship between the user and (UMTS) network.”

In Italy, “ubiquitous network” gives end users (private and corporate) simultaneous access to all the available resources. And through its UMTS network and services this is what 3 has been doing ever since its commercial launch. Therefore, taking into account the specific development of its market, we believe that Italy is leading the progression toward the ubiquitous network society; playing an essential role in operating the first UMTS network.

3.10.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

On the one hand, we have UMTS; this is real and is already delivering services, introducing into our lives a ubiquitous network society, driving us towards the most integrated access to content. UMTS is the European solution for the third generation mobile cellular system, or IMT-2000, based on the W-CDMA standard. Other hypothetical solutions for the delivery of a pervasive network may be posited. However, we believe that UMTS has already achieved the widest consensus as the only possible method of delivering ubiquitous (mobile) networks. At the same time, the maturing nature of UMTS protects players from the battles over standards that have now been overcome by the effective launch of 3G commercial services.

Still, we have a long way to go to ensure that what has been started in the last two years will keep growing. Therefore, to facilitate and strengthen current UMTS technological development, measures to enhance and guarantee the widest deployment of UMTS ubiquitous network should be considered. Regulatory certainty in spectrum availability, free of interference, is needed, in order to ensure broad-based industry commitment to research and development. On network and service convergence, UMTS already delivers integrated/converged services (video, internet, differentiated and customized content), and the future integration with digital TV will further expand the existing capabilities.

3.10.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

The traditional telecommunication industry, consisting of the separation of voice, mobility and data, will gradually be absorbed into the new ubiquitous network environment. Pure voice, or SMS, will become just a part of the wider range of services already offered by UMTS. The same applies to data access, whether it is Internet, or customized content. In other words, the relationship between end-users and the network will be completely “twisted”. The new environment being created these days expands the traditionally network-related industry into a more complete and advanced structure, comprising, for instance, media, television and all the social or administrative service/functions that can be accessed by end users, without hindrance by obstacles.

In addition, this is leading to an enormous growth in the number of devices connected to the network, thus enhancing the growth of the offer to match the increasing demand and so triggering a “virtuous circle” for society to become “ubiquitous”. An important result is that new business models can be identified and will emerge, thus enlarging the range of available services, whilst absorbing the more “traditional” TLC industry. For each target customer (individual, corporate, public entity), new customer value and markets can be created, exploiting the “portability” of content and the degree of broadband, combined with the specific demand/need of the target customer himself: for example, self education, self ticketing, fleet management, online databases, self health care, traffic management, remote security devices, will be available everywhere, whenever they are needed.

3.10.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

Barrier-free access to content should be granted to network operators providing ubiquitous technologies in the new markets; for instance the media (i.e. the hold-back rights, aimed exclusively at denying access to competitors). Any form of required authorization or licensing process that could reduce the possibility of offering content to the end user, might strongly undermine the development of new services roll out.

Failure by regulators and governments to maintain their commitment to UMTS could stall its development. In many jurisdictions, the principle of technology neutrality is adhered to. Neutrality should mean just that. Policies designed to grant more favourable conditions to other technologies – even those not yet deployed – would reduce the incentives for investors to continue to invest in UMTS. This would reduce commitment to network rollout and hinder the development of new UMTS available features. Of course, in addition to this, it must be ensured that there is a stable framework for operations; this could be done by setting clear and manageable rules regarding the principles of data protection and privacy handling.

3.10.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

b) What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?

In general, the development of ubiquitous services requires the application of non-discriminatory policies (as set out in my response to Q4, above). Regulatory certainty is the key. The competitive outcomes of the 3G licensing process should be maintained. As mentioned in Q4, above, certain policies aimed at protecting existing players might negatively affect the deployment of UMTS ubiquitous technologies. This, for instance, is the case with “hold back rights” that nowadays permit the withdrawal from the market of certain media contents, with the sole aim of damaging competitors by reducing the distribution of such a content on alternative media devices, such as 3G handsets.

As far as spectrum management is concerned, 3 believes that frequency refarming should not be allowed in Italy. Should refarming be considered in other jurisdictions, it should not be done in such a way as to distort competition between licensed operators; or in violation of the principles of transparency, objectivity, proportionality and non-discrimination. There are many concerns surrounding the introduction of spectrum refarming: for instance, higher equipment prices due to fragmented standards

b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

The success of a ubiquitous technology such as UMTS, as offered in Italy by 3, is based on the following elements that we believe are necessary to achieve an efficient business model: awareness of the brand, the introduction of all inclusive profiles and subsidized terminal equipment.

In addition, particular care is taken to meet the demands of the market in terms of content, so as to be able to offer the widest range of services with the correct time-to-market. 3 is involved in the introduction of social services, such as health care, as, for instance, in the trial on dermatological follow-up via video telephony (handset to PC), in order to generate a more humane and less stressful context for the patient. The same goes for the city police control service, where the city police department can exchange information with a centralized info system, using UMTS data-transfer features, fast data connection to make fines or notifications easier and faster, or to have image/video transmission and storing of relevant traffic scenarios towards a PD centralized database.

3.10.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

The most urgently required consumer protection rules are those concerning the localization and storage of data. Privacy is one of the few main concerns when it comes to ubiquitous technologies: whether or not these imply localization or video telephony. In any case, nowadays, the importance and necessity of such services cannot be denied when taking into consideration critical/emergency situations. 3 believes that such concerns can be addressed when the customer is offered the tools or features that would enable, or empower him to protect his privacy to the desired degree: this is the case, for instance, of the refusal to receive a video call, accepting it as a simple voice call. Also, concerns on localization services can be solved, simply by allowing customers to deactivate the relevant feature.

3.10.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

The main outcome of ubiquitous technology will be the implementation of the “any content, any time, anywhere, any platform” concept. Therefore, we might expect that a wider range of services, accessible to a wider number of customers, will lead to a better-networked society.

We believe that ubiquitous technologies can drive us to a truly knowledge-based economy. The way in which this transition is managed, in terms of standardisation, protection of players devoted to the spread of new technology, as well as a framework that protects and enhances UMTS, will help determine our quality of life, our working conditions and the overall competitiveness of our industries and services. The concept of the ubiquitous network linking together all customers and devices via a globally integrated, pervasive network promises to empower individuals, as well as public entities, greatly. Turning such a vision into reality requires us to focus on the existing infrastructures already delivering such a service. Therefore, the growth of high-speed, multi-layer networks will integrate traditional automation and control technologies with real-time multimedia applications, such as voice and video. Ubiquitous technology can induce a mass-market revolution that will require a new approach to strategies. Furthermore, this vision requires a simplified consumer-marketing strategy that focuses on customer solutions, in order to be friendly and useful, whenever needed.

3.11 Silvio Scaglia: Chairman of Fastweb

3.11.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

Ubiquitous networks are still more a vision than a reality. We have started to have networks, which allow us to have decent coverage, be it at home, outdoors, or at work, but we are still far from any concept of ubiquitous networks. In most cases, networks are well separated one from the other. We have mobile networks, which are separated from fixed networks; television networks are still, in most cases, separated

from telecommunications networks. Still, the reality is a world where voice goes one way (even more than that, fixed voice goes one way), mobile voice goes another way, data and internet go a third way, television/video connections and so on go a fourth way. But there is clearly a big opportunity to put all this together, realizing an infrastructure which is common, easy to access, easier also to manage and easier for customers to use. Italy has proved itself to be an innovative market, where mobile is again very innovative in the convergence of voice, data and video and now IP and fibre networks. Normally enterprises can be as good as their clients. Enterprises that are active in Italy can benefit from the innovative attitude of the Italian telecommunications marketplace. I do believe that Italian companies will manage to remain at the forefront of this kind of convergence, just as they did with mobile and as we are doing today with the convergence between voice, data and video.

3.11.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

Yes, we are definitely heading there. Convergence is happening on wireline for every kind of communication. Today, the case (and the success) of FastWeb has demonstrated the feasibility of an IP network capable of delivering every kind of telecommunications connection over a fixed line, over wireline. FastWeb's network is just based on routers and these manage, not only voice and data, but also television and DVD-quality video-on-demand, etc. Clearly, this can now be expanded to home, mobile and office networks.

I think IP will probably lie at the heart of all the developments in this industry; around IP there will be different access technologies, standards and protocols. I think fibre optics will continue to coexist with xDSL and with Wi-Fi for some last-metre connections; in specific cases, WiMax will be important; UMTS and 3G (tomorrow 4G) will continue to play an important role in mobility. But I believe that all these technologies will be used to carry packets and that these packets will be based over IP.

What is the likely impact of ubiquitous technologies on the overall telecommunication industry? For me, it is IP, even over mobile. A packet-switched network that can seamlessly and in the same way manage voice, data and video, whether it is wireline or wireless. Certainly, in this scenario IP plays a role. Then we have to bear in mind that mobile will always have to deal with some limitations in terms of bandwidth capabilities. But ultimately this will not hinder the concept of ubiquitous networks: we will use mobile when mobility becomes more valuable, we will use wireline when the economy of the transfer of large masses of bits becomes the main priority.

3.11.3 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

Certainly, it is investment, because all of this is very capital-intensive. The telecommunications industry has not yet emerged from a phase of very heavy investment, on the 3G side, for mobile and is just starting an important investment phase on wireline for real broadband development. So, investments will be certainly a limiting factor; we will have companies that will have to wait to have a decent return on their investments already made, before entering another wave to build new types of networks. The second point will be the attitude of incumbents in different fields; by this I mean that incumbents in wireless, in wireline and in television certainly have very different agendas and priorities. I think that none of these three kinds of incumbents has a real interest in realizing a full convergence. So probably, as usual, the innovation will be left to new competitive forces and to new companies or to new entrants in the market.

3.11.4 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**

b) What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?

There are some good examples. If you just think of the very easy fixed/mobile convergence cases, with mobile phones that behave like a fixed wireline phone, when you are at home, or recognize that there is a close base station to its home base station. This is feasible today. In Europe nobody is doing it, because it is really against the interests of the mobile incumbents who control the handset market today. However, these are frictions, competitive frictions that time will overcome. The most important thing, to my mind, is to ensure a very competitive and very open marketplace, and this is the field where antitrust authorities also need to play in the next few years.

Personally, I do not believe direct intervention of governments in the market, by planning, coordinating and so on, to be very useful. I tend to think that the role of governments can be very important and should focus on two priorities. Firstly, ensuring a competitive and open marketplace is mostly effective when it is done, by us, at the European Union level, because, given the size of this industry and these games, it has to occur at the full European dimension. Secondly, national and even regional governments can play a very important role in ensuring that public money is spent smartly. All over Europe, governments are the biggest clients; government administrations and public agencies are the most important clients for telecommunications. If, therefore, public agencies behave like smart customers, sensible to innovation and keen to pursue their own efficiencies through innovation, the entire industry will receive an important boost to becoming innovative. Once again, it is the old rule that you are only as good as your clients.

I would say: give a very strong input to encourage public agencies to become innovative customers, to spend their telecommunications-devoted resources in an innovative way. If you look at today's situation in most public administrations, they are still buying voice telephony separately from both data connections, and video and television connections. But this phenomenon is not efficient today, because it costs more to buy three separate items and, at the same time, this behaviour is hindering the technological evolution of the industry. Today, private enterprises are much smarter buyers than governments: something that might be, and indeed needs to be changed, in order to transform the government into an innovative force by being a smart buyer. Nowadays amongst all the public agencies I know in Europe, only defence tends to be innovative.

3.11.5 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

I think that technological developments and evolution in this industry must not neglect health-related issues. We need to be aware of, and pay the highest attention to, this aspect of telecommunications; at the same time we must also pay attention that we do not nurture "big (and false) fears" also because it has been proved that, provided certain rules are respected, there are no big risks.

3.11.6 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

At the very end, the more ubiquitous the networks, the smaller the power that every single base station will generate. In mobile telephony, the more clients you have in a city, the more base stations you have in this city and, in order to avoid interference, even less power is added to each one of these base stations. Probably, in terms of health, a more ubiquitous development of networks would simply imply less power from each BTS, with a consequent decrease in the health risk, rather than an increase. Privacy is also an issue. In this domain rules are quite well established; the point is always to make sure not to abuse the system, that is to say, everyone who receives information uses it properly. In this kind of world, it is impossible to avoid giving out private information; it is impossible today with credit cards and, with telecommunications, it will become more and more unlikely tomorrow. The point is to have strict codes, which make it legally impossible for anyone to abuse this availability, along with plenty of information. I think that, from this standpoint, all the actors in the industry have been proving for years that they are serious enough to be relied upon. Moreover, drawing on my previous professional experience, I do not know of a single case in the world, where, for example, a mobile operator has made improper use of its calling records.

3.12 Dario Calogero: Chief Executive Officer of Ubiquity

3.12.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

If we define a "ubiquitous network society" as a society, in which information is accessible to the consumer through a net, at anytime, anyplace and in any way, then Italy, to some extent, differs from other western European countries. Internet penetration (both narrowband and broadband) is historically lower than most of the Nordic countries, whilst mobile line penetration is consistently higher. In the meantime, Italy is forging ahead in the transition to digital terrestrial TV (DTTV), which is potentially a very interesting shell, in which to host interactive services on the TV medium in the households.

Our vision is that our society is getting more and more digital, broadband connected and multi-channel/multi-device. This evolution is progressive, although it is a discontinuity 'per se' compared to the analogical period from which we are moving away. Technology always brings new ways to access traditional services, in the first step. Look at the virtual banking services: first step from the retail network, banks opened up call centre facilities; then they approached Internet banking; most of them are either deploying, or have already introduced mobile banking (i.e. Banca Intesa Mobile). The availability of interactive TV platforms opens up opportunities for the introduction of a new TV Banking distribution channel.

3.12.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

I believe that standardization bodies and similar initiatives are of functional value to the development of this emerging segment of the ICT industry. This is generally true and we sustain and endorse most of the ICT open standard initiatives, in their respective segments. For instance, Ubiquity is a founding partner of Ambiente Digitale, an association promoted by Fondazione Ugo Bordoni and sponsored by the Italian Ministry for Communications, to harmonize and facilitate the transition to DTTV in Italy on the interactive services application layer. On another level, in the same industry segment, the work done from the DVB/MHP standard, endorsed by the industry as a whole (broadcaster, chipset manufacturer, head end systems producers, application developers) is fundamental. Network and service convergence is definitely desirable and I would even say necessary, in order to allow the organic growth of this emerging industry.

3.12.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

This is a complex question. The TLC industry is being continuously challenged by the opportunities offered by the value added interactive services, but it is still struggling in the effort to catch a sustainable business model in a segment where the content and service industries are more and more important. As far as the interactive services are concerned, "Content is King". Broadcasters are, in general, better equipped to face this new challenge than traditional telecommunication operators, which are moving fast towards a business model open to third party ISP and content/service partners exploiting the revenue-sharing opportunities offered by the new billing systems (i.e. SMS Premium, or Java Downloads).

3.12.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

The capability to catch the standardization train is critical. The stall could come either from the lock-in caused by incumbent large industry players (as telecom operators have done for many years in the mobile network operators industry), or from the lack, or inconsistency of the standardization initiatives. In a "ubiquitous network society" the openness and the convergence in media and services are critical to success.

3.12.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**

Access to constrained resources is critical (i.e. radio frequencies); moreover, the capability of the governments to rule the competition in the emerging sector is fundamental, particularly in the segments where monopolies will give access to newcomers. Institutions such as Anti-Trust and Authority are necessary and, if we want the industry to take off, they have to be effective.

- b) **What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

The answer to this question is highly dependent on customer segmentation: in the B2B2C services, it is critical to providing the final customer with new services in the new media at the right price, following the 3Uparadigm: applications and services shall satisfy, from the perspective of the customer, the requirements of Utility (the service must be useful), Usability (the service must be easy to use on the specific access channel), Ubiquity (the service must be largely accessible from any standard device on the specific channel). Flat rate and other innovative billing capabilities are more and more important to support this business development.

3.12.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

Privacy is an issue. Permission marketing is somehow invasive. Radio pollution is hopefully under strict control by EU Institutions, local governments and other industry associations.

3.12.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

As we experience everyday in our own lives, digital devices and applications are pervasively entering our homes, cars and pockets and we are quick to adopt them, as long as we perceive the utility (as defined above). But what I think is changing significantly regarding the social behaviour of individuals, is the mobile (tele-)communication opportunity, which is rendering our own programmes and schedules more and more flexible. We tend to define our time schedule as we move towards the place and the person with whom we intend to share our next time slot. In broader terms, a wider access to services and information seems to be a way to improve efficiency and free our time to devote it to other activities, with our relatives and our friends. My take here is that the impact of ubiquitous technologies on the society will depend more on how we use this new free time, rather than on the technology itself.

3.13 Elio Lannutti: President of ADUSBEP

3.13.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

The idea of a "ubiquitous network society" is quite fascinating and surely generates a very exciting vision in our collective imagination. Unfortunately, this potential collides with the hard reality, as well as a series of factual problems, which, fortunately, are not difficult to solve. The knowledge that consumers can, whenever and wherever they so desire, freely dispose of the network and its services is surely a very important fact and of great help. But is this really viable?

Under what conditions and at what cost will all this take place? What kind of limitations and warranties will be applicable? The theme conjures up scenarios, which, at the moment, are neither completely verifiable nor even imaginable. Nevertheless, we must evaluate the prospects according to the state of the art, without

trying Pindaro's flights, as some Telecommunications "gurus" already tried towards the end of the '90s and before the big crisis of the first years of this decade. Inevitably, the creation of a global network must be realized through the "wireless," which, nowadays in Italy, is almost at Year Zero. Wireless is hardly used, except for secondary applications, such as those used inside private enterprises. The reality is that we use it to link our PC to the internal net without using cables. This has allowed Laptop manufacturers to produce commercial ads, depicting managers moving around freely within their companies, whilst all the time remaining "connected". However, the problem is not the desks! Beyond this, Wi-Fi has not yet been applied optimally.

Very rarely do the "hot spots" in the airports or in hotels or stations have connections. In the USA, two 15-year-old boys have recorded their name in *The Guinness Book of Records* by establishing a Wi-Fi connection working 80 km from the source. In Italy, we started talking about Wi-Fi after the tender to assign UMTS frequencies. Operators, who had previously paid 25 000 billion Italian Lira, reacted strongly with an economic boycott of UMTS. And the TLC Minister helped them in this boycott. That is why, today, in Italy, Wi-Fi is conspicuous by its absence.

3.13.2 What is the best method for strengthening current technological development, and overcoming standards battles, so as to facilitate the rapid deployment of ubiquitous networks and related services? Is network and service convergence a desirable outcome in this context, and why?

The development of new technologies is not only up to the private sector, but must also be regarded as the responsibility the State. In Italy, we know that funds for research are reduced to the minimum; that the government does not believe in research, except in its own propaganda spot.

So, research is not efficient. This leaves technological development as the responsibility of the private sector, disseminating the new products according to their marketing strategies. A typical example in TLC would be UMTS: this technology was already available some years ago and in Italy does not get diffused, since the operators have a strong economic interest in exploiting the old GSM technology to the maximum. For political reasons, public authorities (in particular the Minister of TLC and the Communication Authority) should impose the use of new technologies; the reality at the moment, as is widely known, is that they accept the economic arguments of the TLC companies. Public national and international authorities should also define standards, as these are missing among private operators. However, the facts are different and the consumers can only wait for the marketing guru to decide...

3.13.3 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

ADUSBEF is not a TLC company. Nevertheless, from our point of view, the impact of the new technologies will be to allow modifications of the structures, in such a way as to create new industrial costs. And we know very well that today finance and budgets do dominate. Without a public authority to impose the realization of new services - this is possible, as this enterprises are working with administrative authorization - "how" and "when" will always be decided by the private finance managers. Meanwhile, news magazines will send bribed writers to describe, in the longest bla bla bla, future, useless services and, rather than providing information, they will provide misleading publicity.

3.13.4 What, in your view, are the main factors that could stall the development of a ubiquitous network society?

The factors that could stall the set up of "ubiquitous network society" are:

- A. Really efficient set up terminal tools at low cost. Today many users need just one tool, combining telephone, diary, notes, GPS and so on.

Palm and phone industries have not so far been able to create an efficient, easy to use product, which enables the quick gathering and insertion of data, because if a qwerty keyboard is included, either it too big, or it is too small to be used.

Software for managing connections between the palm or cell phones with the PC does not exist, at least not in a standard way.

No comment on the web WAP browser: WAP is very slow and the WAP net was killed before its birth!

Add to this the high cost of buying this technology: a Palm costs three or four times as much as a normal cell phone. Marketing has decided that Palm must be a tool for “pioneer” managers, ready to be exploited in their quest to try out the very latest hi-tech gadget. Meanwhile, the average consumer awaits his turn (which comes when the price has gone down).

B. Education on IT; still missing.

IT knowledge, despite the diffusion of cell phones, is still very limited. In fact, people tend to use cell phones for voice and SMS traffic and nothing more. For example, e-mail traffic is quite easily passed through the web, but as far as cell-phones are concerned, it is still at a primordial stage. We still act within very separated compartments.

In most cases, PC use is limited to office automation (word, spreadsheet, db), Internet browser and e-mails. The use of specific applications (for instance: video audio) remains very limited. There's no comfortable management of the PC, and any new virus is enough to put most people in trouble.

C. At the moment, services are few, useless and those aimed at recreation have no impact, because of the limited objectives of the tools.

Using the palm to watch a football match, or a concert is still a dream, as the displays are very small. Furthermore, many services are extremely expensive: for example news through SMS costs an average of €0,30 for each single message.

3.13.5 What, in your view, are the main factors that could facilitate the development of ubiquitous services? In particular:

- a) **What are some of the important public policy mechanisms, e.g. spectrum management, competition policy?**
- b) **What business model has been adopted and what could be in your view a more efficient business model to encourage the take up of services and acceptance by user communities (e.g., cost reduction, more flexible tariffs, and flat rate)?**

Several factors can help to improve the network, even if, at the moment, a pessimistic approach is more the norm. Just consider that Italy is famous all over the world for its impressive number of cell phones: 52 million GSM (one per citizen. However, if you just take a train on one of the most important routes (Rome – Milan, for example) you might find yourself off-line as soon as you leave the first station! People don't understand why all the tunnels on the highway are connected and yet train tracks are still not covered. Nowadays, in the big European cities, it is even possible to use a cell phone in the metro; however, in Italy, the problem goes right back to basics; we just do not have the metropolitan transport services!

So, first of all, let us define the GSM network as a global communication network for the community. When this has been done, let us diffuse other wireless tools (Bluetooth, Wi-Fi etc.), in order to give everyone quick and cheap connections. Eventually, let us make the existing services more powerful (for example, home banking could become mobile banking; e-ticketing could be extended to health applications). New applications are, in fact, infinite. Some of them are difficult to find, because they have still not been made real, not even on the fixed net. An important step in the development of a wireless system would be the lowering of costs, bringing them down to a popular level. In my opinion, and bearing in mind all the marketing policies of recent years, this must surely be considered a problem of somewhat more than secondary importance. In this context, we must elaborate a commercial strategy, a philosophy, a marketing dogma, according to which the newest and most evolved services must be reserved for an elite, for those prepared to spend a fortune on a few dummies. If a different orientation does not emerge, all the prospective of digital “purification” will sadly be aimed at feeding the already fat area of “possible in the future”

3.13.6 What consumer protection safeguards are required in a ubiquitous communication environment, for instance privacy and health concerns?

A “ubiquitous network society” produces problems too numerous to mention all of them here. Firstly, this is the definitive death of privacy. It must be considered as a negative that everybody can be reached, wherever in the world they might be. In the world of jobs, the “boss” can control the entire behaviour of his or her employee constantly, even selecting personnel not on the basis of their merits, but according to other criteria. Marketing is currently invading all fields. This is why we need to look at these control and data storage tools, like RFID, the so-called intelligent labels.

Recently, we have been using the term “intelligent” in an often unintelligent way. Of course, I could cite the case of the so-called “intelligent” bombs, to which so many innocent civilians have fallen victim, even though these bombs were designed as surgical intervention tools. We could harbour the same suspicion about tools that are able to transmit data in such a way as to violate privacy. We do not think that we can actually block the diffusion of RFID; however, their admission must be regulated and also take into account the privacy laws already in force. I am thinking, in particular, about the definition of the transmission ray, which should be limited to the reception shopping point and must be confined there, in order to avoid shopping bags being scanned by third parties outside. Furthermore, databases will have to be easily accessible and must enable individuals to obtain the cancellation of all the dates, with a strict assurance that these will not be reused or retrieved. If anyone expresses the desire not to be registered, it is fundamental that this desire be respected; we need to create RFID-free areas in shopping centres, where everybody can do his or her own shopping, in full freedom, without being registered. Another important issue is the exposure to electromagnetic fields. It is clear that the admission of new tools requires a serious analysis, with no prejudice, but very strict about the risks for human health caused by the electrosmog, which, at present, is barely controlled, or in some cases not controlled at all.

3.13.7 What will be the likely impact of ubiquitous technologies on the evolution of society and social behaviour?

At the moment, it is too early to make a realistic evaluation of all the possible effects of the “ubiquitous network society”. Nevertheless, in addition to all the other factors, it is sure to be an important issue. For example, in mobile TLC, the consumer is targeted by several advertisements that are very often misleading. Furthermore, in Italy the relationship between consumers and GLS operators is moving from a contractual arrangement to a promotional arrangement. Once we had a contract with its price and clauses: Now there are huge quantities of offers, which vary often and address not just the price, but also the services.

The most outrageous example must be the GPRS connection. The cost is prohibitive: €0,60 per 100KB. 100KB can finish in 12 seconds, representing a total of €3 per minute. Nevertheless, the operator offers a flat rate of €20 per month, limiting it at the end of each month and renewing it at its own choice. So, if you wanted to eliminate the most expensive home phone accepting the offer, you often cannot do it, because the Internet connection at home is always there, whilst the TLC operator can decide to cut the offer whenever it wants. This is simply scandalous.

The marketing executives are creating an increasing number of special offers and it is difficult for the consumers to follow all their fantasies. Having the same careful contract that follows the special offers can ensure better terms and conditions, at the pleasure of the operators. These operators sometimes pretend to be in competition, and they have certainly reduced the costs, even though using cell phones is still expensive. The MNP – mobile number portability – a recent innovation aimed at promoting competition, is often boycotted by the operators themselves. In the ads you read that you can change easily, but the reality is that you risk losing your contract and having the remaining credit still taken by the operator you want to leave.

3.14 Mark Thatcher: Senior Lecturer, London School of Economics, with the assistance of Francesco Salerno, Doctoral Researcher, London School of Economics

3.14.1 What does a "ubiquitous network society" mean in an Italian context? What is your vision of the global "ubiquitous network society" of the future, and Italy's place within it?

In order to answer this question, we have to take into account the fact that mobile telephony is the leading telecommunications technology in Italy. According to the latest report by the Italian Communications Authority, in 2003 revenues from mobile telephony exceeded those from fixed-line telephony. Besides, in the past, Italy has been one of the countries with the highest growth of mobile services. Today, no fewer than 98% of Italians have a mobile; this is up from 7% in 1995 and is one of the highest percentages in the world.

In light of the prominence achieved by mobile telephony in Italy, we suggest that a “ubiquitous network society” in an Italian context means a society, in which people use their mobile phones for an increasing number of applications. That is to say, we perceive the Italian “ubiquitous network society” as a society, in which other means of being connected, such as the fixed-line Internet, are not as popular as the mobile phone. The preference for mobile communications over fixed-line also underscores a more profound point; namely that Italians have developed a taste for more personal communications. A fixed-line number identifies a place more than a person; a mobile phone number, on the contrary, means freedom to call people regardless of their location.

However, mobile communication prices remain relatively high in Italy, especially for international communications and they act as a significant barrier to a truly global “ubiquitous network society”. Such a society should be based on the networks from different countries to come together and affordable price of international mobile communication is an indispensable condition for that.

3.14.2 What is the likely impact of ubiquitous technologies on the overall telecommunication industry?

At present, a small number of operators have market power over the provision of mobile communication networks (although this is much less the case for the development of services). The development of the ubiquitous network society will translate into a higher demand for services. Since this market is potentially open to competition, this should be relatively easy. However, the development of more services goes hand in hand with access provision and software development. In fact, there is a high degree of interdependence between access and services in the telecoms industry, as it is often the case that good ideas can only be implemented if they are network compatible. Thus, we see the potential for a situation where higher demand for services may be restricted by market power in the access and software markets in mobile communications.

3.14.3 Based upon the current state –of –the art in Italian telecommunications, what future actions should be taken by the different actors involved (e.g. government, private sector, regulatory agency) to facilitate the deployment of ubiquitous technologies and the provision of related services?

Market power in high technology markets is a difficult issue to tackle. The construction of the single market for telecoms in the EU or the experience of liberalization in the UK, show that the take-off phase of a market needs strong regulatory guidance. We suggest that the heavy involvement of the European Commission has been one of the keys to the success of telecoms liberalization in the EU. For this reason, we believe that regulatory and competition law authorities need to be very alert in the early phases of the “ubiquitous network society”.

A regulatory strategy for competition should deal with the convergence of different technologies, where action is taken on both access and content. It is undeniable that control over access and software enables firms to condition the type of content that can be conveyed, even if by means of technical standards (see the recent Microsoft case on the bundling of media player and software and its implication for freedom of

speech). Hence regulatory intervention should also encompass the conditions under which content is made available.

As to the roles of government and the private sector, Italy is in a particular position. In spite of many privatizations, the state's presence in the economy still looms large, compared to other countries. State intervention often replaces in full private investors and this, in turn, fosters an unhealthy circle of dependency by the latter on the former. Applying such dependency to the development of a ubiquitous network society would be even more deleterious, because state bureaucracies are slower to respond to the market than private investors. Because of its internal mechanisms, a state department may remain locked in by past choices and continue to support a technology that seemed good at the beginning, but later proved faulty.

Instead, state action should focus on fostering real and effective competition, especially in mobile networks. This is far from easy, since there are well-entrenched interests in the field. However, the potential medium-term gains from the spread and increased use of new services are high.

4 CONCLUSION³

This survey has provided some very interesting and illuminating insights into the prevailing moods and expectations within the Italian telecommunication sector regarding the progress towards the ubiquitous network society in Italy. The respondents replied to the questions with great enthusiasm and were prepared to deal with the key issues in some detail, with the result that the information they provided will prove extremely useful additional information for the Case Study Ubiquitous Network Societies: The Case of Italy (<http://www.itu.int/ubiquitous/>) and the 2005 ITU New Initiatives Workshop, which will be held in Geneva from 6-8 April 2005.

Ubiquitous wireless networks, next generation Internet, knowledge management and ubiquitous services high-quality software intensive systems, have a strategic relevance in the ICT R&D programmes being proposed by the Italian public and private sectors. The general opinion of the respondents was that Italy has been, and will continue to be, an active participant in the advance towards the ubiquitous network society. Several contributors confirmed that in recent years, the Italian academic, public and private sectors have been cooperating closely in this area and with this shared goal. Moreover, the Italians in general have been displaying particular enthusiasm for those new communication technologies, which have already been introduced. Nevertheless, the view of the respondents tended to be that, at present, the truly ubiquitous network society remains more of a vision of the future than a present day reality. Progress towards the achievement of the ubiquitous network society will not be linear and will require the falling into place of many different elements; for this reason, substantial differences can be observed in the strategies adopted by the various players within the Italian telecommunication market.

Highlights are set out below:

1. Providers and ISPs are trying to fill the technological gap, introducing, step-by-step, the technologies that represent the baseline for a ubiquitous network society (UMTS, broadband, wireless, etc.), but on the other hand they have not yet implemented services that can be considered fully ubiquitous-oriented.
2. R&D and small and medium enterprises are acting as content providers and not as network carriers. They have already taken into consideration the possibility of a ubiquitous network society, realizing pilot projects and creating services compliant with the ubiquitous concept.
3. In contrast, the public sector has proved itself slower in providing adequate responses to all market developments, as well as to the changes generated by the ICT market. In order to avoid distorting the

³ The opinions expressed in this conclusion are those of the authors of the *Survey* and the *Case Study on Ubiquitous Network Societies: The Case of Italy*. They are based upon the information provided by the respondents, and do not necessarily reflect the views of the International Telecommunication Union, its membership, or the Italian Government. For the full text of the *Survey and Case Study on Ubiquitous Network Societies: The Case of Italy* (to be published in March 2005).

market, its approach has been to initiate regulation processes only after the technology has been implemented and distributed, or after the service has been already deployed.

However some important results have been obtained in the integration and process of convergence, thanks to the strong presence of the mobile technology and related services, as well as the strategic re-positioning of the players towards broadband. Another significant outcome has been the development of digital terrestrial broadcasting; which should overcome some technological and geographical constraints, linking the services to their distribution and penetration. All these factors, together with new concepts, such as RFID and Domotics, could act as an incentive to achieve a fully-integrated services-network, thus facilitating the spread of an Italian ubiquitous network society. There are some key issues that should be addressed and resolved, including the process of convergence and harmonization:

1. It was acknowledged that convergence is a complex issue, but one that is crucial to success, although, at present, it would be of more concern to the hardware vendors and service providers than to the end users. Nevertheless, if it can rely on real market demand and not exclusively on technological feasibility, the convergence of services and networks may well create new value for operators.
2. It was widely recognized that one of the principal barriers to the rapid deployment of ubiquitous networks could be the proliferation of standards; the best way through this would be to ensure that national standards are harmonized by EC legislation requiring adherence to the EC standards. Of course, this ought to be preceded by a case-by-case review of the existing regulations. These EC standards would create and ensure inter-operability and thus help to avoid market fragmentation. This would be particularly important in rapidly changing markets, characterized by the presence of constant, innovative technologies. Once again, it is important to ensure that in standardizing the regulations, the rights and security of the user are protected.

The respondents were in broad agreement that ubiquitous networks will make a great contribution to the social, structural and economic reform of society, thus increasing the quality of public and private life and reducing costs in many areas. Amongst the sectors most likely to benefit directly are those of health (including long-distance and tele-medicine), security (including anti-crime measures), education, transportation, home entertainment and remote home/office management. Ubiquitous networks will also reach out to include hitherto marginalized people (such as those living in remote and inaccessible areas), increasing their knowledge and with it, their social power. Consumers will be better-informed and thus able to negotiate more favorable services and prices. On a social level, anytime, anywhere communication devices will blur the distinction between office and home and between work and leisure. It is likely that the digital divide between "ubiquitous" and "non-ubiquitous" individuals and corporations will grow, as will the divide between "ubiquitous" and "non-ubiquitous" societies and countries. The respondents were, however, well aware of the inherent risk to individual and corporate security and privacy. Ubiquitous computing can be used and abused for surveillance purposes and the fear, or even the mere perception of being monitored could have an adverse affect on private and corporate life. For this reason, although this technology is dynamic and exciting, many of the respondents stressed the importance of surrounding the technological advances by a protective legal framework, which guarantees respect for the rights (i.e. privacy and consumer protection) and the security of the individual and of academic, corporate, public sector and other users. Another barrier to the ubiquitous network society is the relatively high cost of mobile communication in Italy, particularly for international communication; a reduction in prices is, therefore, a vital element in the advance to the truly global ubiquitous network society.

Nevertheless, the recent revolution in the Italian telecommunications industry suggests that future developments will appear on the scene fast and will be both exciting and difficult to predict. The general mood of the respondents is that the ubiquitous network society must expand and operate within a solid framework of ethical, cultural, social and environmental responsibility.

ANNEX: RESPONDENT BIOGRAPHIES

- **Maurizio Gasparri: Italian Minister of Communications**

Maurizio Gasparri was born in Rome in 1956. Before entering politics, he wrote many publications whilst co-authoring *l'Età dell' Intelligenza*, published in 1984, which carried out an analysis of the information society. Prior to this, Dr Gasparri edited periodicals, such as *Dissenso* and *All'orizzonte*; as befits an executive journalist, he was also appointed as Associate Editor of the *Secolo d' Italia*. Dr Gasparri has always been an enthusiastic promoter of the development of new technologies and of a plan to modernize his country. In 1992 he was elected as a Member of the Chamber of Deputies under the flag of the Alleanza Nazionale and has been an MP without interruption since the 11th legislature. In 1994 he served in Silvio Berlusconi's Government as Undersecretary for International Affairs. In 1996 he was Deputy President of Alleanza Nazionale throughout the period of office of the 23rd legislature: he served as a member of the Chamber of Deputies Defence Committee and was also an important advocate for Calabria, where he was elected. Since 27 May 2001, Dr Gasparri has been Minister of Communications.

- **Roberto Viola: General Secretary of the Italian Communications Authority**

Roberto Viola holds a Doctorate in Electronic Engineering (Dr. Ing.) and a Masters Degree in Business Administration (MBA). From 1985 to 1999, he served in various positions as a staff member of the European Space Agency (ESA); in particular, he was in charge of fixed and broadcasting satellite services. Since 1999, he has been with AGCOM, where he is Director of the Regulation Department and Technical Director. He is currently in charge of, inter alia, the regulation of terrestrial, cable and satellite television, frequency planning, access and interconnection of communication services, cost accounting and tariffs in telecommunication and broadcasting services. Since August 2004, Dr Viola has been General Secretary of AGCOM.

- **Mauro Paissan: Commissioner of the Italian Data Protection Authority**

Mauro Paissan was born in Trento in 1947. In 1973, he graduated in Sociology and embarked on a career as a professional journalist; he has contributed to many newspapers and weeklies, as well as several TV programmes. Mr Paissan served as Director of the daily newspaper *Il Manifesto*. In 1992, after serving as spokesman for the committee in support of the referendum against nuclear power, which was called following the Chernobyl accident, he was elected to the Chamber of Deputies for the Pisa constituency and subsequently re-elected twice for the same constituency. For nine years he served as Vice-President of the Parliamentary Committee supervising Italy's Radio and Television Broadcasting Corporation (RAI) and for five years he served as Chairman of the mixed group in Italy's Chamber of Deputies, one of the largest groups in Italy's Parliament. As an MP, he followed, in particular, issues related to communication, new technologies, and the environment. In 2001, he resigned from office, after being appointed by Parliament as the Commissioner of the Italian Data Protection Authority, this post being incompatible, by law, with the office of MP. Among the books Mr. Paissan has edited, particular reference can be made to *Privacy e giornalismo. Diritto di cronaca e diritti dei cittadini (Privacy and Journalism. Right of the Press and Citizens' Rights)*, published in 2003.

- **Guido Salerno: Managing Director of Fondazione Ugo Bordoni**

In 1978, Guido Salerno was the winner of the open procedure for officials of the Senate of the Republic, since when he has held several high-level positions in various institutions, including those of economic and financial planning and telecommunications regulation and policy: at the Ministry of Post and Telecommunications, as General Secretary; at the Presidency of the Council of Ministers, as Vice-General Secretary; at the Treasury Department and as a Member of the Research Commission on the reform of the state budget and public accounting. Dr Salerno managed the successful liberalization and

privatization process of the telecommunication sector in Italy. He was member of the Inter-Ministerial Committee for Economic Planning for the control of tariffs for public utility services. Since 1998, he has been a National Member of the '2000-2006 Community support framework of the European Union'. Dr Salerno has also served as a top-level manager for Telecom Italia, the first licensed operator for telecommunications in Italy; specifically, he was head of International Operations of Telecom Italia in Argentina and Vice President of Telecom Argentina. He is currently Managing Director of Fondazione Ugo Bordoni, a prestigious Italian independent telecommunications research centre.

- **Luigi Battezzati: Professor of the Politecnico of Milan**

Luigi Battezzati holds an MSc. in Electric Engineering from Politecnico di Torino, Italy, a Masters Degree in Business Administration from SDA Bocconi Part Time Programme, Italy, a Masters Degree in Logistic Management Systems from Swiss Institute of Technology and a PhD in Business Administration from Aix Marseille II University, Logistic and Transport Research Center in France. From 1982 to 1984, Dr Battezzati worked as an Electronic Engineer in the R&D Department of ITT, after which he spent over five years as a Project manager with Philips, Carlo Gavazzi and Fata European Group. In 1991, Dr Battezzati took up a new position as a Manufacturing and Logistic Consultant at Ingersoll Engineers and Coopers Lybrand. And from 1996 until 2003 he was a GEA Associate Consultant. He is currently Visiting Professor of Operations Management at Politecnico di Milano (Italy) and Observatory on RFID Applications at the same institute. Dr Battezzati has worked in the following practices: Strategy, Operation Strategy, Mass Customization, Logistics, Manufacturing System Design, Manufacturing Information System, Warehouse Distribution and Plant Design, RFID. He has worked in the following sectors: Fashion, Energy, Components, Engineering, FMCG.

- **Riccardo Ruggiero: Chief Executive Officer Telecom Italia**

Riccardo Ruggiero was born in Naples on 26 August 1960 and began his career in 1986 as a Sales Manager at Fininvest S.p.A. Between 1988 and 1990 he worked as the Sales and Marketing Manager for AT&T Italia. He joined the Olivetti Group as assistant to the CEO in 1990. In 1992, he became Vice President International Customers and Communications Sales Development worldwide for the Oliservice Organization and in 1994, Vice President Olivetti Telemedia Sales and Marketing Development. In 1996 he was appointed CEO of Infostrada, with responsibility for Market, Infrastructure and Human Resources, before taking over the same position at Italia On Line. He continued in both posts until 2001. In July 2001, Mr Ruggiero joined the Telecom Italia Group as Head of the Telecom France Business Unit, with the brief of managing and developing Group business in the French market, through the company's participating interests. Since 1 October 2001 Mr Ruggiero has been Head of the Telecom Italia Group Wireline Business Unit and since May 2002, General Manager of Telecom Italia S.p.A. On 5 September 2002, Mr. Ruggiero was appointed CEO of the Telecom Italia Group and he currently sits on the Board of Telecom Italia.

- **Tommaso Pompei: Chief Executive Officer of Wind-Infostrada**

Tommaso Pompei was born in Rome on 8 August 1942 and graduated in Economics and Commerce from Rome's "La Sapienza" University. Until 1981 he was head of Alitalia's Information Technology Department, before switching to Sigma, a company specializing in the development of value added services for tourism and transport, as Managing Director between 1982 and 1991. He has acted as a consultant (1991-92) to Olivetti, IBM, CAP Gemini, Finsiel, Pacific Telesis International, STET and other companies. Dr Pompei was the man behind the Wind project, on which he has worked since November 1996. He was previously CEO of the Pronto Italia consortium (1992-1994) and played a key role in obtaining a license for the country's second mobile telephone operator (Omnitel Pronto Italia). Following the award of Omnitel Pronto Italia's license, Dr Pompei played a leading role during the start-up phase as Chief Operations Officer (1994) and Central Director of Corporate Affairs (1995). He then moved to the Olivetti Group, where he was Director of Telecommunications Policy and Strategy and Chairman of Olivetti Telemedia Holding.

- **Marco De Benedetti: Chief Executive Officer, TIM**

Marco De Benedetti was born in Turin on 9 September 1962. After completing his high school studies in Switzerland, he graduated in History and Economics from Wesleyan University (USA) in 1984. Later he

attended the Wharton Business School of Philadelphia (USA), where he obtained a Master in Business Administration in 1987. From 1987 until 1989, he worked for Wasserstein, Perrella & Co., a merchant bank in New York, in the field of mergers & acquisitions. In 1990, he entered Olivetti as assistant to the CEO of Olivetti Systems & Networks, after which he became Director of Marketing and Services Group. In 1992, he was appointed General Manager of Olivetti Portugal. In September 1994, he became CEO of Olivetti Telemedia, with responsibility for telecommunications and multimedia and later also became its President. In October 1996, he became President of Infostrada and in December 1997, he became CEO. In March 1998, he also assumed the position of Manager for Telecommunications Strategy for the Olivetti Group. In July 1999, Dr Benedetti was appointed CEO of TIM.

- **Pietro Guindani: Regional Chief Executive Officer of Vodafone**

Pietro Guindani was born on 11 January 1958. In 1981, after graduating in Economics from the Bocconi University in Milan, Pietro Guindani began his career at Citibank NA, where he was appointed Vice-President Relationship Manager in 1985. In 1986, he became Assistant to the Director of International Finance at Montedison Ltd. From 1989, he was Head of Capital Markets at Enichem S.p.A, and in 1992 was appointed Head of Finance, Budgeting and Reporting at European Vinyls Corporation (Belgium). From October 1995 to June 2004, he was Chief Financial Officer, and in April 2002 also took on the role of CFO for the South Europe, Middle East and Africa Region. Pietro Guindani has been Chief Executive Officer of Vodafone Italy and Regional CEO of the South Europe, Middle East Region (SEMEA) of the Vodafone Group since July 2004. He has been a Director of Vodafone Italy since 2002. Before joining Omnitel (now Vodafone Omnitel), Pietro Guindani spent three years with the Olivetti Group as Vice-President International Finance.

- **Vincenzo Novari: Chief Executive Officer of Tre**

Vincenzo Novari earned his degree in Economics from the University of Genoa in 1985. He began his career working in marketing in the commercial goods sector for companies such as Johnson Wax, L'Oreal and Danone. He moved to the telecommunication sector in 1995 when he joined Omnitel Pronto Italia S.p.A as Marketing Director. After only one year, he became Vice-President of Sales, Marketing and Logistics, sitting on the Executive Committee of the company. Then, in 1999, he was appointed Managing Director of Omnitel 2000 S.p.A. His drive and desire pushed him to seek a new challenge and so, in February 2000, he joined Andala as General Manager, to lead the team to a successful bid for a 3G licence in Italy. In October 2000, he became Managing Director of Andala S.p.A., which became H3G in February 2001. Under his direction, in March 2003, H3G Italy became the first operator to launch 3G services in Europe. In February 2003, he was appointed to the position of Vice-Chairman of Asstel, the Italian Telecom Industry Association. Vincenzo Novari is married and has a twelve-year-old son.

- **Silvio Scaglia: Chairman of Fastweb**

Silvio Scaglia was born in: 1958 and since graduating in Electronic Engineering, he has gained significant experience in the telecommunications sector, as well as in start-up projects. He followed, first as General Manager and subsequently as CEO, the launch and success of Omnitel – Italy's second largest GSM operator, and before that, as Senior Vice-President for non-European activities, the re-launch of Piaggio as Senior Vice President for non-European activities. He also gained managerial experience by working, for more than eight years as a management consultant with both Bain Cuneo e Associati, McKinsey & Co. and Andersen Consulting. In 1999, he founded e.Biscom, now FASTWEB, which was listed at the Nuovo Mercato of the Milan Stock Exchange in March 2000. He is currently Chairman of the Group.

- **Dario Calogero: Chief Executive Officer of Ubiquity**

In 1987, Dario Calogero graduated in Business Administration at the Bocconi University in Milan and subsequently worked for Olivetti, Fiat Auto, PWC, Liberate and Oracle Corp. Today he serves as a Member of the board at Ambiente Digitale, an association endorsed by Ubiquity and promoted by Fondazione Ugo Bordoni and the Italian Ministry of Communications Whilst working for Liberate (Nasdaq: LBRT) and Oracle Corp (Nasdaq: ORCL), he conceived the idea of starting up Ubiquity, focusing the company's aim on the ubiquitous computing paradigm. Dr Calogero has been CEO and Managing Partner of Ubiquity – a little bit forward, since he founded the company, back in early 1999.

He is married, with two children and is an instructor at the famous Italian sailing school, Centro Velico Caprera.

- **Elio Lannutti: President of ADUSBEF**

Elio Lannutti was born in 1949 and worked for almost 20 years in a big lending institution, which he left in 1992. He then started working as a journalist in a weekly newspaper *Avvenimenti*, with key personalities of civil society and culture, such as Sergio Turone, Piero Pratesi, Padre Balducci, Adriana Zari, Claudio Fracassi, Diego Novelli, Mario Capanna, Leoluca Orlando and Alfredo Galasso. Dr Lannutti has written many publications, including three books: *Guida all'uso della banca (Editori Riuniti)*, *Come sfruttare la Banca (Edizioni L'Altritalia)*; *Euro, la rapina del secolo (Editori Riuniti)*. He also collaborated with the most influential Italian newspapers, such as *Il Messaggero*, *la Repubblica* and *Avvenimenti*. In 1987, he founded the independent consumer association, ADUSBEF, in order to ensure a greater respect for consumers' rights. Since then, a lot of controversy has been generated; however, the main goal behind this creation was to protect the weakest. In addition to being the President of ADUSBEF, Dr Lannutti is the Director of Teleambiente.

- **Mark Thatcher: Senior Lecturer in Public Administration and Public Policy, Department of Government, London School of Economics**

Mark Thatcher read Philosophy, Politics and Economics at Balliol College Oxford, before qualifying as a Barrister and subsequently taking his Doctorate at Nuffield College, Oxford. He spent five years researching and lecturing in Paris (Ecole Nationale Supérieure des Télécommunications, Paris III-Sorbonne Nouvelle, Sciences-Po Paris), before joining LSE in 1995. He has also been a Fellow at the Robert Schuman Centre, European University Institute, Florence. His research interests and areas of supervision include: "Comparative Public Policy and Regulation in Europe," "Telecommunications and other utilities" and "Independent Regulatory Agencies". Dr Thatcher's recent publications include: *The Politics of Delegation: Non-Majoritarian Institutions in Europe* (co-ed with Alec Stone Sweet), special issue of *West European Politics*, vol. 25(1) January 2002; *The Commission and National Governments as Partners: EC Regulatory Expansion in Telecommunications 1979-2000*, *Journal of European Public Policy* vol. 8(4) (2001); 'European Regulation' in J. Richardson (ed.) *European Union: Power and Policy-Making* (London: Routledge, 2001); *The Politics of Telecommunications. National Institutions, Convergence and Change* (Oxford: Oxford University Press, 1999); *Regulation, Institutions and Change: Independent Regulatory Agencies in the British Privatised Utilities*, *West European Politics*, 21(1): (1998) pp120-147. Amongst his recent research projects has been the ESRC project on policy transfer in European telecommunications and his study of the creation and role of independent regulatory agencies.

- **Francesco Salerno: Doctoral Researcher, Department of Government, London School of Economics**

Francesco Maria Salerno, who assisted Dr Mark Thatcher in preparing his contribution, is a doctoral researcher at the Government Department of the London School of Economics. Since obtaining his Master's degree in 1996 from the same university, he has worked in the field of telecommunications and anti-trust, both at the academic level and as a practitioner with international law firm Cleary Gottlieb. Mr Francesco Maria Salerno has been a visiting researcher at the University of California at Berkeley and the European University Institute in Fiesole. His publications include "Economia o Diritto? Una scelta tragica," in B. Montanari (ed.), "Spicchi di Novecento" (Torino: Giappichelli, 1998); "Regulation v. antitrust in the Chinese car industry," *Global Competition Review* 1998; "Brevi note sul Decreto d'Alema nel quadro dell'attuazione delle norme comunitarie sulla liberalizzazione del settore elettrico in Italia," *Diritto del Commercio Internazionale*, 2001; "Telecomunicazioni e autorità indipendenti: appunti sullo sviluppo dei rapporti tra diritto comunitario e organizzazione amministrativa interna," *Rivista Italiana di Diritto Pubblico Comunitario* 2004; "Soggetti, funzioni e procedure della regolazione, in Clarich-Cartei (eds.)," *Il codice delle Comunicazioni elettroniche* (Milano: Giuffrè, 2004). Mr Salerno is currently studying the liberalization of Italian telecoms in an historical comparative perspective.