Innovating for and by users

edited by Jo Pierson, Enid Mante-Meijer, Eugène Loos & Bartolomeo Sapio

foreword by Janez Potočnik
> European Commissioner for Science and Research

What is the role of the public in the development of digital media? What are the enablers and constraints in the appropriation and diffusion of broadband technologies and services in Europe? In what way do technological innovations become part of everyday life of the general population? What are the best methods and approaches to identify the creativity and optimal experience of ICT users from a bottom-up perspective? These are just some of the issues being addressed in this book.

The book looks at socio-technological transitions and shifting roles of users in the design and innovation of broadband technologies and digital media. The different chapters aim to shed more light on the 'black box' of design and use of ICTs. In this way we hope to contribute to the empowerment of people in their relationship(s) with new media and - through this - to increase the quality of their social life. The title 'Innovating *for* and *by* users' refers to insights on how to innovate *by* involving users more intensely in the design of technological innovations, which can lead to innovations that create more benefits *for* these users.

The different authors deliver a timely reality check on the current broadband society in Europe from a users' perspective, in a general (theoretical) sense as well as in specific domains (digital television, e-publishing, care sector...). The approach is an interdisciplinary one, integrating social science views and engineering approaches. It offers innovative insights based on state-of-the-art academic and industry-driven digital media research in various European countries.

The book will appeal to industry and academic researchers in media and communication studies, social studies of technology, digital media marketing and other domains that investigate the mutual relationship between media technologies and society.

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COST - the acronym for European COoperation in Science and Technology - is the oldest and widest European intergovernmental network for cooperation in research. Established by the Ministerial Conference in November 1971, COST is presently used by the scientific communities of 35 European countries to cooperate in common research projects supported by national funds.

The funds provided by COST - less than 1% of the total value of the projects - support the COST cooperation networks (COST Actions) through which, with EUR 30 million per year, more than 30.000 European scientists are involved in research having a total value which exceeds EUR 2 billion per year. This is the financial worth of the European added value which COST achieves.

A 'bottom up approach' (the initiative of launching a COST Action comes from the European scientists themselves), 'à la carte participation' (only countries interested in the Action participate), 'equality of access' (participation is open also to the scientific communities of countries not belonging to the European Union) and 'flexible structure' (easy implementation and light management of the research initiatives) are the main characteristics of COST.

As precursor of advanced multidisciplinary research COST has a very important role for the realisation of the European Research Area (ERA) anticipating and complementing the activities of the Framework Programmes, constituting a 'bridge' towards the scientific communities of emerging countries, increasing the mobility of researchers across Europe and fostering the establishment of 'Networks of Excellence' in many key scientific domains such as: Biomedicine and Molecular Biosciences; Food and Agriculture; Forests, their Products and Services; Materials, Physical and Nanosciences; Chemistry and Molecular Sciences and Technologies; Earth System Science and Environmental Management; Information and Communication Technologies; Transport and Urban Development; Individuals, Societies, Cultures and Health. It covers basic and more applied research and also addresses issues of pre-normative nature or of societal importance.

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IBBT - the acronym for Interdisciplinary institute for BroadBand Technology - is an independent research institute founded by the Flemish government in Belgium to stimulate ICT innovation. The IBBT team offers companies and organisations active support in research and development. It brings together companies, authorities, and non-profit organizations to join forces on research projects. Both technical and non-technical issues are addressed within each of these projects.

Web: www.ibbt.be

CHAPTER 14

A systemic evaluation of obstacles preventing the wider public benefiting from and participating in the broadband society

Yiannis Laouris, Marios Michaelides and Bartolomeo Sapio1

Introduction

According to the Memorandum of Understanding, the objectives of the Cost 298 Action were defined as follows:

(1) to examine the modalities in which users actually use information and computer technologies (ICTs), to discover their current forms of creativity;

(2) to look ahead to technology related developments in the more medium term;

(3) to suggest new approaches and methodologies for constructing a more user-driven model of innovation in order to overcome the limitations of current models of 'user-centered' development;

(4) to produce a new phase in interdisciplinary cooperation.

To achieve these goals, the Cost 298 community must ensure that the public at large uses broadband technologies widely and effectively. To achieve that goal, a co-laboratory has been organised to define possible obstacles that prevent meeting this target.

Method

The Structured Design Process (SDP) methodology was chosen to serve the needs of the COST 298 community. An SDP co-laboratory is specifically designed to assist inhomogeneous groups to deal with complex issues in a reasonably limited amount of time (Banathy, 1996; Warfield and Cardenas, 1994). It enables the integration of contributions from individuals with diverse views, backgrounds and perspectives through a process that is structured, inclusive and collaborative (for a complete review see Christakis and Bausch, 2006). A group of participants, who are knowledgeable of the situation are engaged in collectively developing a common framework of thinking based on consensus and shared understanding of the current state of affairs. The SDP promotes focused communication among the participants in the design process and their ownership of and commitment in the outcome. In sum, an SDP co-laboratory provides an excellent opportunity for experts, to not only expand their shared understanding of

[1] The authors would like to thank Aleco Christakis and Patrick Roe for their valuable comments and contributions during the preparation of this chapter and Christakis along with CWA Ltd. (www.LeadingDesign.org) for providing their proprietary software Cogniscope for use in this co-laboratory.

the current *problematique*, but moreover to develop a roadmap for their future work and achieve a consensus as to how to move forward.

The first two authors have extensive experience in the method and have used it in many other analogous forums to facilitate organisational and social change (Hays and Michaelides, 2004; Laouris, 2004; Laouris and Christakis, 2007; Laouris and Michaelides, 2007, Laouris et al. 2007).

The specific objectives set for this Cost 298 co-laboratory were:

(1) to create a shared understanding regarding the obstacles that prevent the general public exploit broadband technologies (referred to as the *problematique*);

(2) to build commitment within the COST 298 community to an action agenda for collaboratively addressing the 'system of obstacles;

(3) to serve as a model for other European networks working on complex problems.

A slight variation of the methodology was applied, inspired by previous work (Laouris and Michaelides, 2007; Laouris and Christakis, 2007), in which the authors attempted to exploit virtual communication technologies to reduce the time required to obtain results. This involved the following steps:

The third author, in consultation with other experts of the Cost 298 community, formulated a *triggering question* three weeks before the face-to-face phase of the co-laboratory. The triggering question was sent by email to all participants in order to stimulate their interest and encourage them to begin generating their ideas before the actual co-laboratory. It also served to reduce the time required to explain the methodology at the onset of the workshop. The triggering question was: *What are the obstacles to the wider public benefiting from and participating in the broadband society?*

During the following weeks and until the day just before the workshop, participants were allowed to forward their ideas in writing by email sent to the authors. All ideas were recorded by the authors, entered into the Cogniscope program (see below), and a compilation mailed back to all participants just before the actual co-laboratory. The face-to-face part of the co-laboratory took place in a spacious conference room equipped with comfortable chairs, screen, computer, and beamer. The space, the surrounding walls (where messages can be posted) and the overall structure and organisation of the room was carefully chosen to meet the standards set by Christakis and Bausch (2006). Further details of the method are explained in connection with the presentation of their corresponding results.

Results

The results presented here stem from a co-laboratory, which took place in Larnaca, Cyprus on the 29th (4 hours) and 30th (4 hours) of September 2006. A total of 26 experts produced 82 factors in response to the triggering question. Table 14.l lists all factors perceived by the Cost 298 experts[2] as the most important obstacles, which

[2] Participants of the Cyprus (Larnaca, 29-30 September 2006) co-laboratory.

prevent the wider public benefiting from and participating in the broadband society. Participants have generated a total of 82 factors.

#	Factor	#	Factor
1	Inadequate definition of universal service	42	Poverty in the new Central and Eastern EU countries
2	Lack of infrastructure	43	Lack of self confidence in mastering the technology
3	Lack of consistent broad band knowledge	44	Too much time consuming and risk of addiction
4	Low level of digital literacy	45	Moral panic regarding the Internet
5	No attention on micro-barriers	46	Inertia
6	Lack of ease of use	47	Lack of user friendliness
7	Absence of specific services oriented to user needs	48	Poor interface design
8	Lack of time to adopt new technologies	49	Fear of techno-mafia
9	Existence of social inequalities (low income high costs)	50	Lack of software design capacity
10	Low educational level	51	Difficulties to choose between service packages
11	High cost of service	52	Fear of being watched by the Big eye
12	Lack of digital content in the mother language	53	Short-term national political decisions
13	General negative attitude against computers	54	Frustration because of the lack of reliability of the content
14	Lack of access in the personal formation process	55	Snobbism
15	Lack of competence towards ICT	56	Not having a computer
16	Social resistance to pay the broadband cost	57	Telecom focusing on 3G, whereas people on WiFi
17	The obstacles for the new Eastern and Central EU members are different from those of the Id members	58	Non use as deliberate lifestyle
18	Lack of interest	59	Age
19	Fear of intrusion and risk of falsification of personal data	60	Lack of understanding of advantages
20	Lack of awareness among politicians	61	Predictable male domination among users
21	Slow ubiquitous adoption on mobile phones	62	Fragility if IT systems
22	Underdevelopment of the ISP market in Eastern and Central European countries	63	Technological determinism
23	Flaws of technology in terms of hardware and content	64	Lack of consensus to fight against technological domination
24	Lack of user participation in ICT design	65	Bad software design
25	Lack of confidence in data security	66	Lack of organization of promotion activities
26	Fear of new technologies	67	Spam
27	Badly designed intellectual; property systems	68	Technology pushed (and not demand-pulled) services
28	Low perception of user relevance	69	Slow absorption of new technologies within organizations
29	Inability to predict benefits for individuals	70	Viruses
30	Inadequate promotion of its importance	71	Interference of health and safety regulations
31	Weakness of European coordination	72	Lack of understanding of the need to define the digital citizens rights
32	Lack of legal framework on broadband issues	73	Viability of existing technologies
33	Weakness of regulatory implementation of the legal framework	74	Lack of standardization of quality issues
34	Overestimation of the potential risks of the Internet	75	Ivory tower of humanist sociologists
35	Inadequate government policies on services to the public	76	Lack of interoperability between systems
36	Low individual interest about the content available on broadband	77	Other preferences, e.g. sports, TV, etc.
37	Bad prioritization: First technology, then content	78	Lack of open design interfaces
38	Lack of political organization of users and non users	79	Neo-phobia, the fear of the new
39	Resistance to learn new practices	80	Bad spam filters
40	Technophobia, the fear of technology	81	Fear of globalization
41	The too big power of technologists	82	Ethics

Table 14.1 List of factors

The next phase was implemented by a small number of four experts during the break. They were requested to cluster the factors in categories, using common attributes. They came up with 12 categories as shown in Table 14.2. The table was printed and handed over to all participants. They were given a few minutes to discuss and study the table. Subsequently, they were asked to choose the five factors they considered the most important. Their votes were counted and inserted into the Cogniscope software. Table 14.3 documents the prioritisation of factors, which resulted through this voting process. Using the method as explained above, participants were encouraged to engage in a

structured dialogue with aim to develop a 'map of obstacles'. The items were projected on the screen in pairs with the following Relational Question: *If obstacle X was successfully addressed, will that SIGNIFICANTLY support addressing obstacle Y?* During each comparison, the participants were engaged in a focused dialogue aiming to explore the particular relationship as it was projected on the screen. This usually presents an opportunity for participants to refine the meanings, uncover relationships and dependencies and generally to develop a much better understanding of the situation. This discussion also serves as an educational exercise, because it helps all participants achieve the same level of understanding and knowledge about the particular field.

The technique uses the simple mathematical concept of 'If A>B and B>C then we can safely assume A>C', to minimise the number of combinations needed to examine the influence interrelation between a number of statements in a reasonable amount of time. The fact that we are not dealing with quantities, but with ideas makes it necessary to go deep into the meanings of the statements thus supporting the process of creating a common knowledge base.

After going through all the necessary pair comparisons, a schematic presentation of the 'obstacles map' was created automatically by the Cogniscope™ software and projected on the wall. This inter-relationships diagram is given in Figure 14.1. This particular tree has six levels. The items shown at the top of the chart are those with the lowest influence. The ones with the greatest influence or the 'deep drivers', as they are usually referred to, are gathered at the bottom of the tree. This method of presenting the results makes the interpretation of the outcome of the participants' observations easy and visual. The deepest drivers are Factors 30 i.e., the inadequate public promotion of its importance and Factor 47, i.e., the lack of user friendliness. These are the obstacles, which must be addressed with priority. Their resolution will significantly help address all other obstacles.

The way to 'read' this map is by using the direction of the arrow: Resolving obstacle A – lower level – significantly enhances the possibility of addressing and resolving obstacle B – higher level. Items at the bottom of the tree must therefore be given higher priority and are usually easier to resolve. Their resolution has the greatest impact. The experts of COST 298 generated this tree partly during their co-laboratory in Cyprus in September 2006 and partly during their Lisbon meeting October 2007.

Discussion

The greatest value of this methodology lies in its power to identify the root causes of a problematic situation and to highlight the ideas that are most influential when one attempts to achieve progress. We will therefore begin the interpretation of the results with a discussion that focuses on the 'deep drivers', i.e., the items that appear at the root of the map.

According to the collective wisdom of the COST 298 community, the deep drivers, or the root-causes that prevent the wider public from benefiting from and participating in the broadband society are four from Level VI:

Factor #35: Inadequate government policies on services to the public
Factor #78: Lack of open design interfaces
Factor #24: Lack of user participation in ICT design
Factor #41: The too big power of technologists

Three from Level V:

Factor #30: Inadequate public promotion of its importance
Factor #33: Weakness of regulatory implementation of the legal framework
Factor #48: Poor interface design
Then if we can consider Level IV as deep factors:
Factor #19: Fear of intrusion and risk of falsification of personal data
Factor #15: Lack of competence towards ICT
Factor #52: Fear of being watched by the big eye
Factor #47: Lack of user friendliness

This result helps the COST 298 community focus its activities towards two directions. One, approach and work more with the designers and developers of new technologies in order to encourage them pay more attention to user friendliness. The second direction involves public bodies, media and decision makers to promote more enthusiastically its importance and benefits. This map is not to be considered as a rigid map. Moreover, the map must be seen as the collective consensus mapped on paper in ways that enable the stakeholders discuss and plan their action. The stakeholders have the right and the possibility to review issues, re-do some of the structuring and place more elements on the map. For example, in some cases it is possible that elements in one of the clusters have not received any votes and are therefore not included in the map. If the group feels that they are still important factors, they may add a few elements in the system and continue the structuring process to place them in their map. The stakeholders remain always in control and they are the owners of their data.

Placement of factors with highest votes in the influence map

The experts in the COST 298 community perceived factors 4, 9, 18, 7, and 26 as the most significant. During the voting process, these factors received 12, 9, 9, 8, and 7 votes respectively. It is interesting to analyze where these factors that were identified as being the most important, were finally placed in the influence tree of obstacles. The instinctive expectation is often be to think that they will prove to be root causes and would therefore be the first issues that need to be addressed. This is clearly not the case: of the five factors that received the most votes, three are in the third layer (factors 9, 18, and 26); two are in the first layer (factors 4 and 26). This means that during the structuring phase of the SDDP, the 'collective wisdom' of the experts favored other factors as having priority to be addressed first. Herein also lays a particular strength and value of this methodology. It yields a structured road map, that none of the individual experts could have foreseen, let alone drawn up, showing the order in which the obstacles need of be tackled in order to address the triggering question. The preliminary results of this co-laboratory were presented by Laouris, Patrick and Sapio at the trans-disciplinary conference organised by COST Action298 in Moscow in 2007.

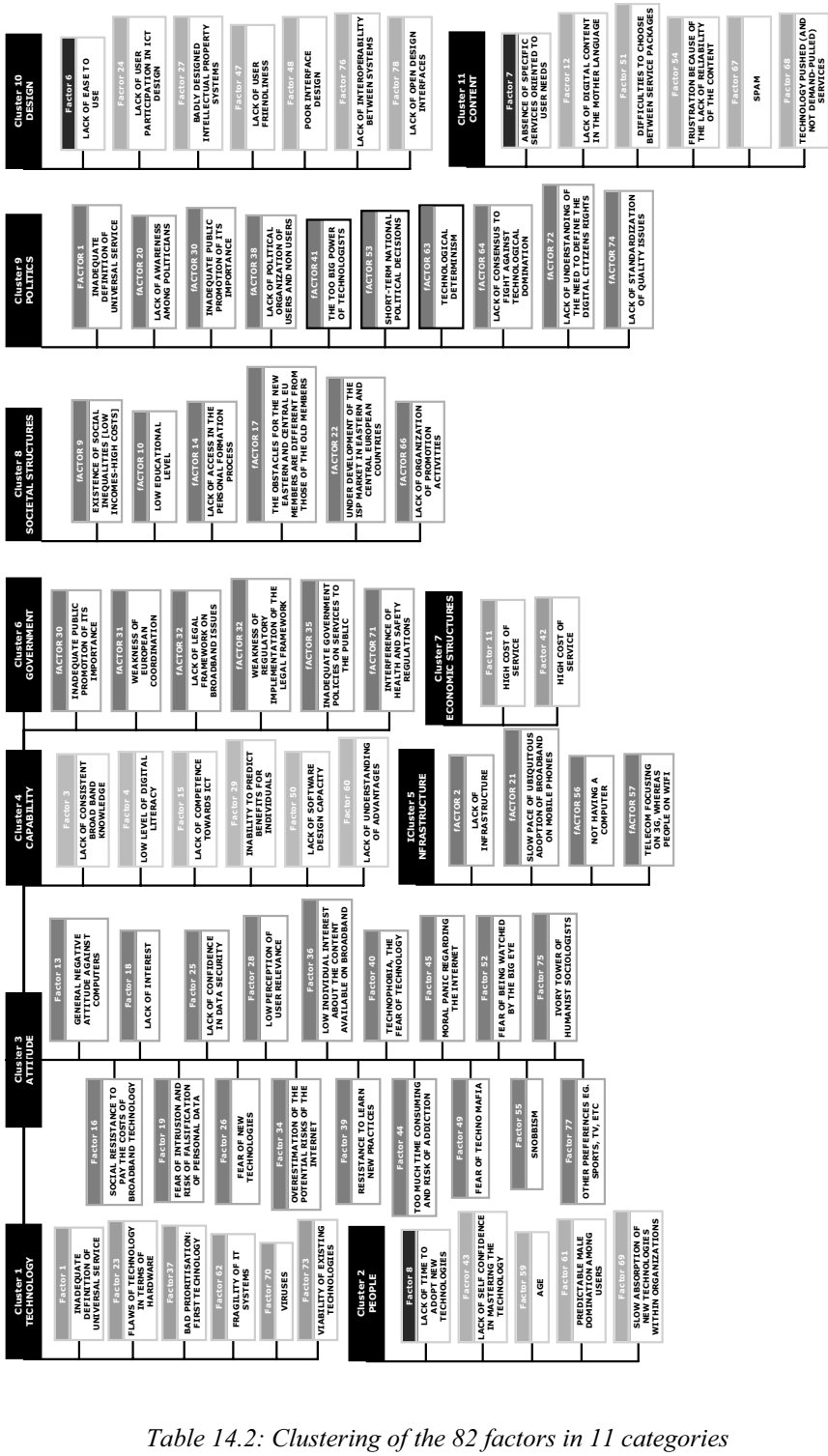

Table 14.2: Clustering of the 82 factors in 11 categories

The numbers in the left column correspond to the numbering performed for the coding of the proposed factors (i.e., same as in Table 14.1). The middle column contains the number of votes each element enjoyed. One element received 12 votes, two received 9 votes, one received 8 votes, one received 7, two received 6 votes, two received 5 votes and three elements received 4 votes each. All factors were used (some in Larnaca, some in Lisbon) to structure the influence map shown in Figure 14.1.

#	Votes	Factor
4	12	Low level of digital literacy
9	9	Existence of social inequalities (low income high costs)
18	9	Lack of interest
7	8	Absence of specific services oriented to user needs
26	7	Fear of new technologies
2	6	Lack of infrastructure
11	6	High cost of service
10	5	Low educational level
47	5	Lack of user friendliness
30	4	Inadequate promotion of its importance
36	4	Low individual interest about the content available on broadband
39	4	Resistance to learn new practices
16	3	Social resistance to pay the cost of broadband technology
19	3	Fear of intrusion and risk of falsification of personal data
24	3	Lack of user participation in ICT design
40	3	Technophobia, the fear of technology
45	3	Moral panic regarding the Internet
48	3	Poor interface design
57	3	Telecom focusing on 3G, whereas people on WiFi
63	3	Technological determinism
12	2	Lack of digital content in the mother language
15	2	Lack of competence towards ICT
17	2	The obstacles for the new Eastern and Central EU members are different from those of the ld members
29	2	Inability to predict benefits for individuals
32	2	Lack of legal framework on broadband issues
33	2	Weakness of regulatory implementation of the legal framework
35	2	Inadequate government policies on services to the public
41	2	The too big power of technologists
43	2	Lack of self confidence in mastering the technology
58	2	Non use as deliberate lifestyle
68	2	Technology pushed (and not demand-pulled) services
77	2	Other preferences, e.g. sports, TV, etc.
1	1	Inadequate definition of universal service
6	1	Lack of ease of use
13	1	General negative attitude against computers
25	1	Lack of confidence in data security
28	1	Low perception of user relevance
44	1	Too much time consuming and risk of addiction
46	1	Inertia
50	1	Lack of software design capacity
52	1	Fear of being watched by the Big eye
53	1	Short-term national political decisions
56	1	Not having a computer
60	1	Lack of understanding of advantages
62	1	Fragility if IT systems
67	1	Spam
72	1	Lack of understanding of the need to define the digital citizens rights
74	1	Lack of standardization of quality issues
76	1	Lack of interoperability between systems
78	1	Lack of open design interfaces

Table 14.3: Prioritization of Factors.

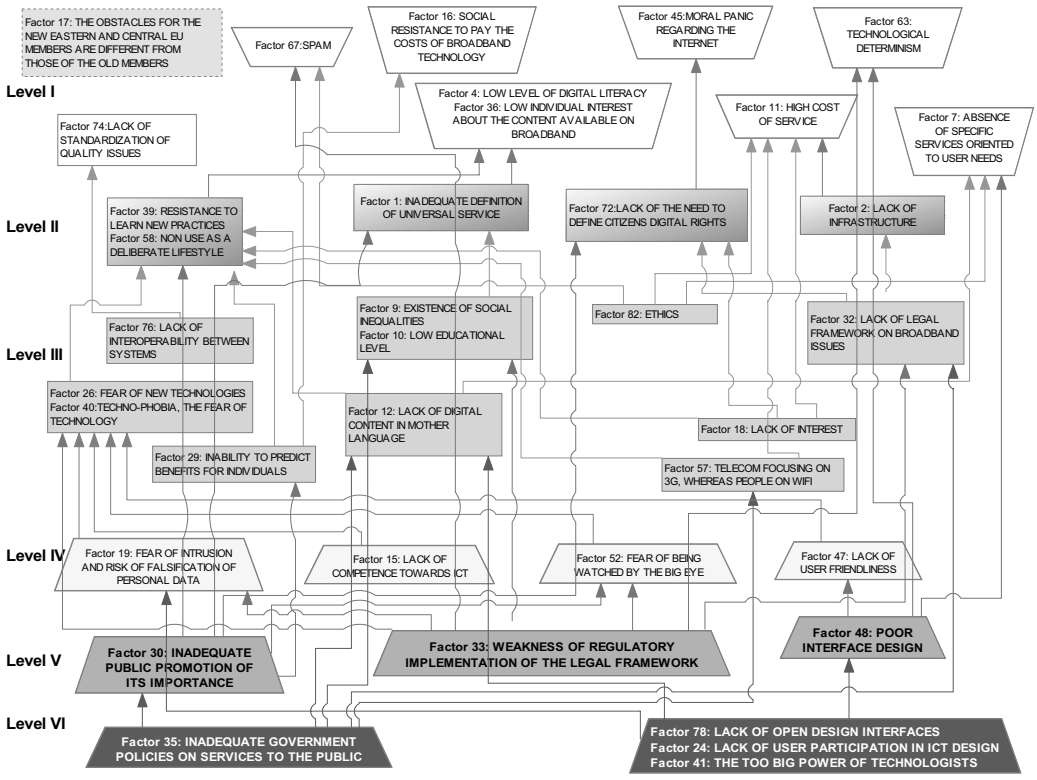

Figure 14.1: Influence tree of obstacles

Critical assessment and limitations of the method

A SDDP co-laboratory is specifically designed to assist a group of stakeholders to deal with a complex problem in a reasonably limited amount of time (Banathy, 1996; Warfield and Cardenas, 1994). It uses structured democratic dialogue to enable the integration of contributions from individuals with diverse views, backgrounds and perspectives. The process is inclusive and collaborative (for a complete review see Christakis and Bausch, 2006). It has been applied to over 600 complex problems around the globe. According to one of its founders, Aleco Christakis, the level of success in these co-laboratories was over 90%, therefore securing a very high confidence level. The methodology is, however, bound to fail if either one of its six laws is violated, or if the stakeholders are not truly engaged. Indeed, the first author, working with Christakis, has recently proposed a new constrain (i.e., the 'Law of Requisite Action'), according to which 'the capacity of a community of stakeholders to implement a plan of action effectively depends strongly on the true engagement of the stakeholders in designing it.' In other words, disregarding the stakeholders is not only unethical, but moreover it guarantees that the plans are bound to fail.

The SDDP is scientifically grounded on seven laws of cybernetics recognized by the names of their originators. If any of these laws is violated in the process, the

results will deteriorate. Ashby's Law of Requisite Variety (Ashby, 1958) calls for appreciation of the diversity of observers (i.e., invite 'observers' with diverse views). Miller's Law of Requisite Parsimony (Miller, 1956; Warfield, 1988) emphasizes the fact that humans have cognitive limitations, which need to be considered when dealing with complex multi-dimensional problems. This is secured by the fact that participants are asked to focus on one single idea or one single comparison at a time. Boulding's Law of Requisite Saliency (Boulding, 1966) calls for comparisons of the relative importance across ideas proposed by different people. This is secured through the voting process. Peirce's Law of Requisite Meaning (Turrisi, 1997) says that meaning and wisdom can only be achieved when the participants search for relationships of similarity, priority, influence etc. within the set of ideas. Tsivacou's Law of Requisite Autonomy in Decision (Tsivacou, 1997) guarantees that during the dialogue, the autonomy and authenticity of each person contributing ideas is protected and distinctions between different ideas are drawn as a method of deepening our understanding of each idea. Finally, Dye's Law of the Requisite Evolution of Observations (Dye et al., 1999) tells us that actual learning occurs during the dialogue as the participants search for influence relationships.

The SDDP method is designed to fully implement the first six laws, but if they are compromised, the results are bound to suffer. The recently discovered seventh Law of Requisite Action (Christakis and Laouris, 2007) asserts that the capacity of a community of stakeholders to implement a plan of action effectively depends strongly on the true engagement of the stakeholders in designing it. The accompanying Engagement Axiom (Özbekhan, 1969, 1970) states that designing action plans for complex social systems requires the engagement of the community of stakeholders in dialogue. Disregarding the participation of the stakeholders is unethical and the plans are bound to fail. In accordance with the Tree of Action the first six Laws are necessary, sufficient and ethical requirements for satisfying the Law of Requisite Action (Laouris et al, 2008).

In sum, a SDDP co-laboratory provides an excellent opportunity for experts, to not only expand their shared understanding of the current *problématique*, but moreover to develop a roadmap for their future work and achieve a consensus as to how to move forward.

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