A Systemic Evaluation of Obstacles Preventing the Wider Public Benefiting from and Participating in the Broadband Society

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Abstract

In the context of a regular COST 298 management meeting, the authors have organized a structured democratic dialogue co-laboratory to study the obstacles, which the Cost298 community faces in their effort to engage the wider public in the wideband society. Through a process known as Structured Design Process (SDP), the experts of the COST 298 network collected and structured all their ideas concerning obstacles to achieving this goal. The process was initiated asynchronously before the co-laboratory by sending to all participants the following triggering question by email: "What are the obstacles to the wider public benefiting from and participating in the broadband society?" They were requested to contribute one or more ideas expressed as single sentences, but with the option of providing separate clarifications. During the co-laboratory all ideas were presented again and participants were guided through a structured process to cluster and prioritize their ideas. Subsequently, with the help of special software (Cogniscope™), the relative influence of one idea on another was systematically studied. This process resulted in a root cause influence map, which provides a clear picture of which obstacles need to be tackled first. Two ideas emerged as root causes: the inadequate public promotion of its importance and the lack of user friendliness.

Introduction

According to the Memorandum of Understanding, the objectives of the Cost298 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 Cost298 community must ensure that the public at large uses broadband technologies widely and effectively. To achieve that goal, a co-laboratory has been organized 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 & 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 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 organizational and social change (Hays and Michaelides, 2004, Laouris, 2004, Laouris & Christakis, 2007, Laouris and Michaelides, 2007, Laouris et al. 2007).

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

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

To build commitment within the COST 298 community to an action agenda for collaboratively addressing the 'system of obstacles, and

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 Cost298 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 organization 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 1 lists all factors perceived by the Cost298 experts as the most important obstacles, which prevent the wider public benefiting from and participating in the broadband society.

Table 1. List of all "obstacles" generated by the participants of the Cyprus (Larnaca, 29-30 September 2006) co-laboratory in response to the triggering question: "What are the obstacles to the wider public benefiting from and participating in the broadband society?" Participants have generated a total of 82 factors.

#	Factor
1	INADEQUATE DEFINITION OF UNIVERSAL SERVICE
2	LACK OF INFRASTRUCTURE
3	LACK OF CONSISTENT BROAD BAND KNOWLEDGE
4	LOW LEVEL OF DIGITAL LITERACY
5	NO ATTENTION ON MICROBARRIERS
6	LACK OF EASE TO USE
7	ABSENCE OF SPECIFIC SERVICES ORIENTED TO USER NEEDS
8	LACK OF TIME TO ADOPT NEW TECHNOLOGIES
9	EXISTENCE OF SOCIAL INEQUALITIES
10	LOW EDUCATIONAL LEVEL
11	HIGH COST OF SERVICE
12	LACK OF DIGITAL CONTENT IN THE MOTHER LANGUAGE
13	GENERAL NEGATIVE ATTITUTE AGAINST COMPUTERS
14	LACK OF ACCESS IN THE PERSONAL FORMATION PROCESS
15	LACK OF COMPETENCE TOWARDS ICT
16	SOCIAL RESISTANCE TO PAY THE COSTS OF BROADBAND TECHNOLOGY
17	THE OBSTACLES FOR THE NEW EASTERN AND CENTRAL EU MEMBERS ARE DIFFERENT FROM THOSE OF THE OLD MEMBERS
18	LACK OF INTEREST
19	FEAR OF INTRUSION AND RISK OF FALSIFICATION OF PERSONAL DATA
20	LACK OF AWARENESS AMONG POLITICIANS
21	SLOW UBIQUITOUS ADOPTION ON MOBILE PHONES
22	UNDERDEVOLPMENT OF THE ISP MARKET IN EASTERN AND CENTRAL EUROPEAN COUNTRIES
23	FLAWS OF TECHNOLOGY IN TERMS OF HARDWARE, SOFTWARE AND CONTENT
24	LACK OF USER PARTICIPATION IN ICT DESIGN
25	LACK OF CONFIDENCE IN DATA SECURITY

26	FEAR OF NEW TECHNOLOGIES
27	BADLY DESIGNED INTELLECTUAL PROPERTY SYSTEMS
28	LOW PERCEPTION OF USER RELEVANCE
29	INABILITY TO PREDICT BENEFITS FOR INDIVIDUALS
30	INADEQUATE PUBLIC PROMOTION OF ITS IMPORTANCE
31	WEAKNESS OF EUROPEAN COORDINATION
32	LACK OF LEGAL FRAMEWORK ON BROADBAND ISSUES
33	WEAKNESS OF REGULATORY IMPLEMENTATION OF THE LEGAL FRAMEWORK
34	OVERESTIMATION OF THE POTENTIAL RISKS OF THE INTERNET
35	INADEQUATE GOVERNMENT POLICIES ON SERVICES TO THE PUBLIC
36	LOW INDIVIDUAL INTEREST ABOUT THE CONTENT AVAILABLE ON BROADBAND
37	BAD PRIORITISATION: FIRST TECHNOLOGY, THEN CONTENT
38	LACK OF POLITICAL ORGANIZATION OF USERS AND NON USERS
39	RESISTANCE TO LEARN NEW PRACTICES
40	TECHNOPHOBIA, THE FEAR OF TECHNOLOGY
41	THE TOO BIG POWER OF TECHNOLOGISTS
42	POVERTY IN THE NEW CENTRAL AND EASTERN EU COUNTRIES
43	LACK OF SELF CONFIDENCE IN MASTERING THE TECHNOLOGY
44	TOO MUCH TIME CONSUMING AND RISK OF ADDICTION
45	MORAL PANIC REGARDING THE INTERNET
46	INERTIA
47	LACK OF USER FRIENDLINESS
48	POOR INTERFACE DESIGN
49	FEAR OF TECHNOMAFIA
50	LACK OF SOFTWARE DESIGN CAPACITY
51	DIFICULTIES TO CHOOSE BETWEEN SERVICE PACKAGES
52	FEAR OF BEING WATCHED BY THE BIG EYE
53	SHORTERM NATIONAL POLITICAL DECISIONS
54	FRUSTRATION BECAUSE OF THE LACK OF RELIABILITY OF THE CONTENT
55	SNOBISM
56	NOT HAVING A COMPUTER
57	TELECOM FOCUSING ON 3G, WHEREAS PEOPLE ON WIFI
58	NON USE AS A DELIBERATE LIFESTYLE
59	AGE
60	LACK OF UNDERSTANDING OF ADVANTAGES

small group clustering

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 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 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:

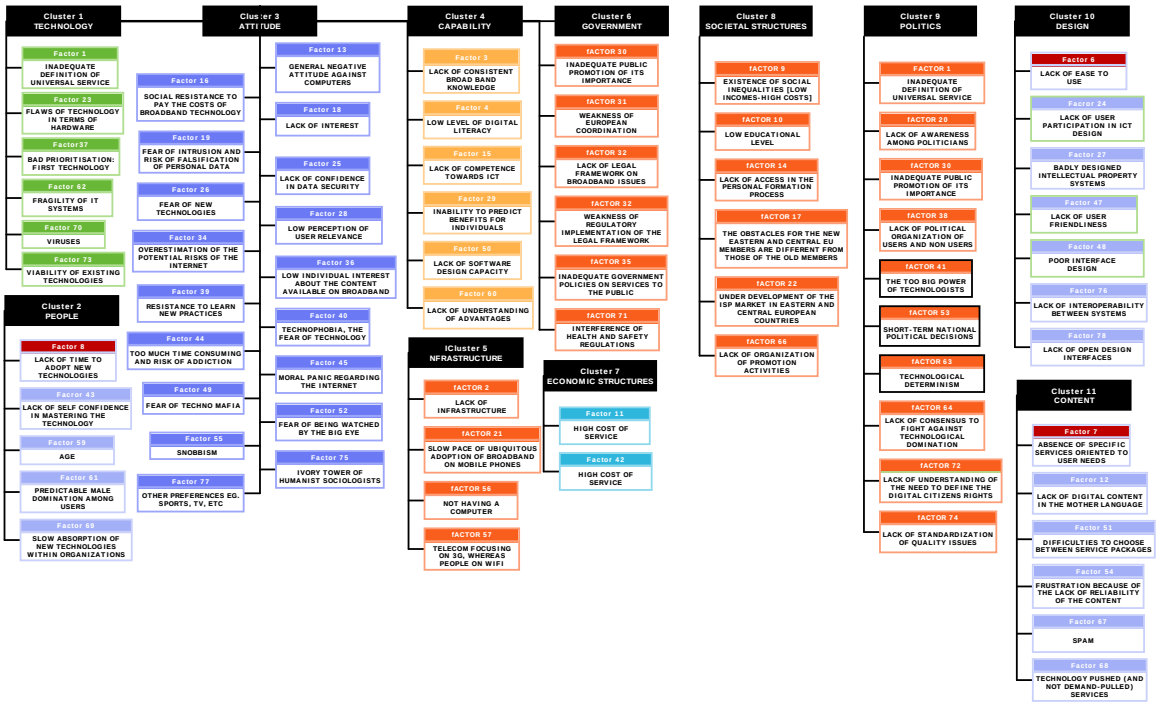
If obstacle X was successfully addressed, will that

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.

Table 2. Clustering of the 82 factors in 11 categories.



The technique uses the simple mathematical concept of 'If A>B and B>C then we can safely assume A>C,' to minimize 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.

Table 3: Prioritisation of Factors. The numbers in the left column correspond to the numbering performed for the coding of the proposed factors (i.e., same as in Table 1). The middle column contains the number of votes each element enjoyed. Elements that have received less than four votes have not been used in subsequent phases. 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. A total

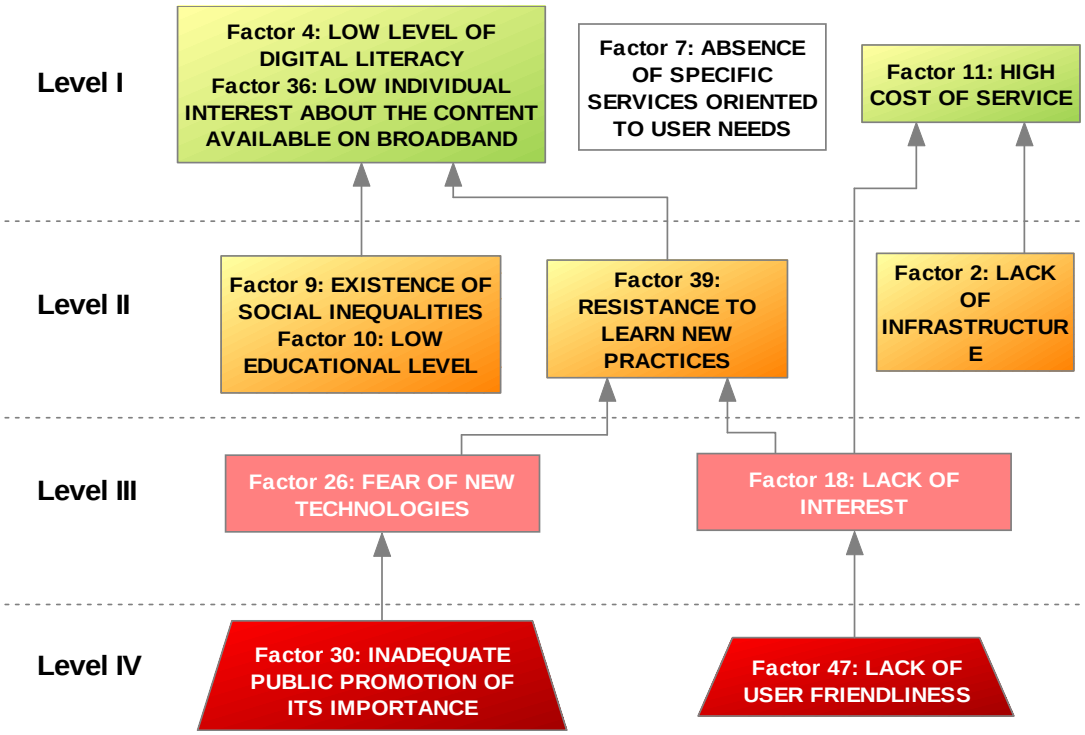
of 12 elements were used to structure the influence map shown in Fig. 1, whereas the remaining elements were not considered further.

#	Votes	Factor
4	12	LOW LEVEL OF DIGITAL LITERACY
9	9	EXISTENCE OF SOCIAL INEQUALITIES [LOW INCOMES-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 PUBLIC 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 COSTS 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 OLD 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 A DELIBERATE LIFESTYLE
68	2	TECHNOLOGY PUSHED (AND NOT DEMAND-PULLED) SERVICES
77	2	OTHER PREFERENCES EG. SPORTS, TV, ETC
1	1	INADEQUATE DEFINITION OF UNIVERSAL SERVICE
6	1	LACK OF EASE TO USE
13	1	GENERAL NEGATIVE ATTITUDE AGAINST COMPUTERS
25		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 OF 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

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 1. This particular tree has five 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. One should read the map as follows:

> *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.*

Fig. 1. Influence tree of 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 during their co-laboratory in Cyprus in September 2006.



Discussion

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 broadband are two:

Factor 30: The inadequate public promotion of its importance

Factor 47: The 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 Cost298 community perceived factors 4, 9, 8, 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 analyse 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, one is in the second layer (factor 9), one is in the third layer (factor 26), while all the rest did not even make it to the tree. This means that during the structuring phase of the SDP, the “collective wisdom” of the experts favoured other factors as having priority to be addressed first. Herein also lies 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.

Table 4. Factors that received the highest votes

Factor	Votes	
4	12	LOW LEVEL OF DIGITAL LITERACY
9	9	EXISTENCE OF SOCIAL INEQUALITIES [LOW INCOMES-HIGH COSTS]
18	9	LACK OF INTEREST
7	8	ABSENCE OF SPECIFIC SERVICES ORIENTED TO USER NEEDS
26	7	FEAR OF NEW TECHNOLOGIES

Critical assessment and limitations of the method

An SDP 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 & 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, Dr. 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 Dr. 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 SDP is scientifically grounded on six 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 SDP method is designed to fully implement these laws, but if they are compromised, the results are bound to suffer.

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

Credits

The authors would like to thank Patrick Roe and the Cost219ter community for their support and encouragement towards the implementation of the co-laboratory, Drs. Aleco Christakis and Patrick Roe for their valuable comments and contributions during the preparation of this paper and Dr. Christakis along with CWA Ltd. (www.LeadingDesign.org) for providing their proprietary software Cogniscope for use in this co-laboratory.

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