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THE EIGHT FUSCHL CONVERSATION

Fuschl am See, Austria, 14-19 April, 1996

A SUMMARY REPORT

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The Fuschl Conversations are one the programs of International Federation of Systems Research (IFSR). These Conversations of the international systems research community have been held since 1982 every even year in the Hotel Seeewinkle, on the Fuschl Lake. As usual, the 1996 Conversation was held following the European Meeting on Cybernetics and Systems Research, held in Vienna. Participants represented thirteen countries. Research teams worked on three topics.

* *ENHANCING SYSTEMS DESIGN PRACTICE THROUGH CREATIVE SYNERGY.* The Research Team first considered the nature of design conversation as the method of choice of team communication. Members of the team shared examples of their own systems/design practices and considered exercises that promote such practice. They elaborated these practices in detail and found them to be powerful means of evoking creativity in systems design. (Reported by Amanda Gregory.)

* *EDUCATION AND SOCIETAL DEVELOPMENT* were continuing themes from the previous conversation. The Research Team combined the two thems and explored their synergic relationship. The team considered: (a) the role of requisite variety in education as related to societal development, (b) the role of complexity in societal/ economic development (c) the role and responsibility of each individual as social agents, (d) the resolution of the contradiction between change in complexity and qualitative change, (e) the contribution of learning to societal development as a creative, constructive and collaborative process, and (f) the design of the system that will bring to life the kind of contributions indicated in (e). (Reported by Sue McCormick.)

* *THE SYSTEMIC DESIGN OF INFORMATION SYSTEMS* was a first time theme in the stream of Fuschl Conversations. The initial focus of the research team was on information systems serving in a "decision support" role during the design inquiry of social systems. This focus became uickly "generalized" to include all functions/roles that are involved in systems design. As the work progressed, the team began to articulate specific design principles and applied those to the conversation process itself. The conversation produced a road-map like accounting of the concepts, principles, and processes encountered en-route to the findings of the team. (Reported by B. Antal Banathy.)

Appendix A presents the Cognitive Map of our Conversations and Appendix B the goals of the Conversations as defined in the course of the first (1982) program.

Bela H. Banathy
Conversation Coordinator

Febr. 1997

Enhancing Systems Design Practice Through Creative Synergy
Summary Report from the Design Group, Fuschl Conversation 1996

by
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Introduction

This report summarizes the efforts and conclusions of the Design Group at the Fuschl Conversation 1996. The week-long Fuschl Conversations were co-founded by Professor Bela Banathy and Professor Gerhard Chroust and, given financial support from the IFSR, have taken place bi-ennually since 1982. The ongoing theme of the Fuschl Conversations has been: 'How can we use the insights gained from systems science for the improvement of the human condition?'

The Fuschl Conversations serve to bring together academics and practitioners in an environment in which they can work creatively and productively on the 'big issues' facing human-kind. This paper summarises the experiences of one such group of systems thinkers.

Firstly, the paper introduces the design conversation process around which the meetings are based. Following a review of the formation of the Design Group and its efforts to find a focus for the Conversation, a summary is given of the Group members' accounts of their use in practice of systems thinking. Detailed discussion is then made of the exercises which the Group believed had the potential for further development and which might be used to promote what it means to think holistically and why it is important to do so. Finally, the paper concludes with an evaluation of whether the Group had become a 'learning community' and the Group's critical reflections on the design conversation process.

Design Conversation

The Fuschl Conversations are based upon the notion of *design conversation.* According to Banathy (1996), "Design conversation combines two modes of dialogue and thus becomes the most appropriate mode of social discourse in design inquiry." (p. 39). The

two modes of discourse encompassed by design inquiry are generative dialogue, which serves to generate shared group consciousness based upon the exploration of points of difference, and strategic dialogue, which is more task oriented. Banathy opines, "The program of the International Systems Institute demonstrates the power of conversation as a means to: (1) tap into the collective intelligence of groups, (2) create communities with shared meaning and a shared view of the world, (3) generate collective wisdom and capacity to engage in purposeful design." (p. 41). Consequently, it may be argued that the aim of the Fuschl Conversations is to create sustainable learning communities within the systems field.

Preparation for the Conversation

An essential part of the Conversations is that participants engage in a set of activities in preparation for the event. The first step is the naming of a set of themes for the event and it is expected that each group will address one theme. Following the identification of a Preparation Coordinator for each group of participants, there is a three stage preparatory process:

a) Development of individual think papers
The think paper serves to:
tell of the writer's interest and previous work on the topic
review some topic relevant knowledge sources (i.e. circulation of relevant papers on the subject)

b) Coordination
Preparation Coordinators synthesize the think papers and develop a first draft of the topic theme which are circulated to members of the group who are asked to return their comments to the Preparation Coordinator. Based on the comments, the Preparation Coordinator formulates a second draft which is sent to the group members.

c) Development of a knowledge base
Participants are required to explore topic relevant knowledge base and to bring to the conversation a rich set of ideas and a set of triggering questions that they wish to explore.

In preparation for the Fuschl 1996 Conversation five themes were set and the associated groups successfully completed the preparatory stages prior to the event. The teams were concerned with:

- Systems Design
- Systems and Design Education
- Education in the 21st Century
- Societal Evolution
- Information Systems for Design Support

The Conversation: Getting Going

The Design Group formed, at the Conversation, from the original Systems Design Group and the Systems and Design Education Group. As the members of the Group came from a rich variety of backgrounds it was realized that some time would be needed to develop common ground. It was decided that a good way to start the dialogue would be for members of the Group to share the questions that they hoped to gain answers to as a result of their participation in the Conversation. A diverse range of questions were raised ranging from 'What makes a systemic research method, systemic?' to 'How do we engender wisdom through the family in the young?'. As the questions did not provide any obvious common ground for a direct way forward, the Group decided to return to the ongoing theme of the Conversations, the improvement of the human condition, and to share visions of an Ideal Society. Members of the Group collectively generated descriptions of some elements of their Ideal Society. For example, an Ideal Society is one in which:

- emphasis is on technology which empowers and which serves humans and not vice versa
- the motivation and opportunity to learn is maximized for all based on the removal of barriers to learning and education and promotion of life long learning
- there is room for excursions of behaviour, allowing for initiative and creativity as well as providing a safety valve for deviancy.

The descriptions generated a debate which culminated in the consensus that an Ideal Society is one in which people act responsibly because they care about the consequences of their actions for others and the environment. At this stage it was recognised by the Group that the only way an Ideal Society might be achieved would be if more people were able to appreciate and employ systems thinking. Consequently, it was decided that it would be useful to for the Group members to share their experiences of the real-world applications of systems practice which had made a positive difference to the quality of life of those involved or had nurtured in others the ability to think holistically.

Sharing of Practice

Each member of the Group was invited to give a twenty minute presentation on an example of systems practice or an exercise which promotes systems practice.

Mountain Survival: Gordon Dyer described the Mountain survival exercise, a simulation game used as an ice-breaker at UK Open University systems summer schools. The aim of the exercise is to get participants to act as a human activity system and to appreciate the importance of working co-operatively.

Developing the Developers of Pre-professionals: Ken Udas introduced a case-study from the Miami University involving 'partner liaison' in which professors from the School of

Education involved with pre-professional training work within the community. The case-study was seen to be an example of authentic communication and community involvement in a multi-stakeholder system.

Becoming a Human Activity System: Arne Collen described an experiential exercise which is played by students as part of a human science research seminar. The exercise begins with each person being given a short piece of rope. The students then come together in a circle with each holding one end of the rope in their right hand. They take their free hand and grab another rope. They are told that they are now a human activity system in a 'mess' with an aim -they are to open the system so that they can form a continuous line in form of circle; they are not allowed to let go of any rope. The aim of the exercise is to get the students to recognise that their actions have implications for their colleagues.

Systems Design with Nursery Teachers: Cecilia Tagliaferri described a 6 day course which she had facilitated to enable nursery school teachers to experience being part of a human activity system. The explicit aim of the course was to activate the design ability of the group to define and achieve a shared dream (self organisation ability). The implicit aim of the course was to introduce systems thinking as an effective way to deal with human complexity.

Systems Design of a Community Centre: Amanda Gregory recounted how systems methods had been used to enable members of a residents association in association with city planners determine and prioritise the functions of a community centre. The stakeholders had used a variety of systems based methods (including, rich pictures, decision mapping, and nominal group technique) in such a way that the residents had been able to participate in the design process on an equal basis with architects and city planners.

Development of Enterprises: Donald McNeil described how he has worked with the development of new companies and their projects from initial "idea" to practical "realization". Such a process is conceived in an initiation phase and proceeds to engage stakeholders, acquire resources, recruit talented people, organize the project, etc., and ultimately unfolds through a spiral of iterated phases.

Building the Whole from a Partial Picture: Werner Vogelauer described an exercise for introducing groups to communication and information flows, which he saw as a vital feature of systems design. The exercise involves participants working in a group on the reconstruction of a photograph which has been cut into pieces.

In the light of the sharing of experiences of systems practice, the Group decided that they particularly wanted to focus on the issue of how to promote the ability to think holistically in others as it was realised that this crucially affects people's ability to act responsibly to others and to the environment. It was the general consensus in the Group that the exercise entitled 'Building the whole from a partial picture' warranted further

discussion as this had the potential for further development as evidenced by the many 'what if' questions that were posed by Group members as this exercise was being presented.

An Exercise in Systemic Thinking

The six stage exercise involves the reconstruction by a group of participants of a photographic picture:

Stage 1
A picture is cut into three pieces by the facilitator of the exercise.

Stage 2
Each of the smaller pieces of the picture are seen by two participants though neither knows who else has seen the same piece as them. The participants are allowed to look at their piece of the picture for 1 minute only and then the pieces of the picture are removed. (NB. If there are more than six people, then six are allowed to see a part of the picture and the other participants do not see any of the picture but instead have to listen to, and rely on the discussion which follows.)

Stage 3
The group is told that the aim of the exercise is for them to reconstruct the whole picture in their heads. In order to achieve this the group is instructed to discuss and exchange information for 30 minutes.

Stage 4
Each participant draws the whole picture as they perceive it from the discussion.

Stage 5
The participants reveal their drawings to their fellow group members and the facilitator reveals the picture as a whole to the group.

Stage 6
The exchange of information (Stage 3) enables participants to develop a perception of the picture is evaluated using the six dimensions of detailed, general, goal, hear, speak and summary.

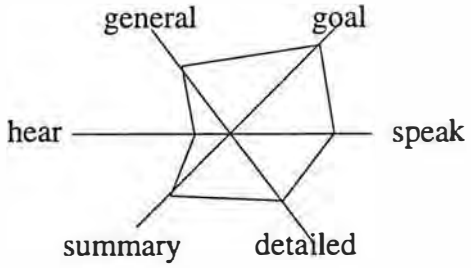


Fig. 1 The Evaluation Hexagon

Individuals do their own evaluation and produce a hexagon of the 6 points on the 6 axes (see Fig. 1) on their individual performance and the facilitator constructs a map for the group as a whole.

Based on the above description of the exercise, the Group reflected on the systems principles that were intrinsic to the exercise and the lessons that might be learnt from it. Firstly, it was recognised that the exercise serves to illustrate the dangers of extrapolation from a partial knowledge base and failure to make assumptions explicit. Secondly, the exercise serves to illustrate the need for communication and co-operation between system participants when engaging in problem-solving. Recognition of this should serve to nurture in participants an awareness of the need to respect the contribution that all participants can make. Indeed, allowing only some of the participants to see parts of the picture was perceived to reflect many real situations where so-called experts are allowed to see confidential research reports but those involved in the actual situation are denied access to the information.

Based on the elicitation of the lessons to be learnt from the exercise it was recognised that it might have many possible variants each demonstrating an aspect of systems thinking. The team went on to consider eight variations of the exercise and the lesson(s) that they embody.

Exploring Partialities

Variant 1
A whole picture might be partitioned thematically, i.e., as if it were a composite of overlaid partial pictures. An example of this would be to supply one overlay which showed only the people in a room, another which showed only the furniture in the room, a third which showed only the pictures on the walls of the room, etc.

Variant 1 reflects what happens when a multi-disciplinary team comes together to work on a problem of common concern. The thematic partitioning would represent the different interests according to their professional training of the problem-solvers.

Variant 2
A whole picture might be partitioned so that its reconstruction included not only pieces cut apart and distinct overlays but also overlapping pictures which included bits of collateral or contingent images.

Variant 2 would serve to represent the fact that problem solvers very often have areas of common concern/interest and that in practice problem solvers have to engage in a process of negotiation and investigation to reveal these common areas.

Variant 3
A single three dimensional scene could be represented from different perspectives including external views from various sides, from below, from above, and from inside. The differences in perspective would potentially be as different as the view we would have of a hurricane from within its gale, from within its eye, and as a whole from the vantage point of a satellite in orbit.

Variant 3 addresses the notion that the way in which we see a situation depends upon where we are located with regard to it and what our interests and priorities are. For example while, from a distance, I would be concerned about an earthquake in Japan I would not be as concerned or as affected as if I were actually living in Japan at that time.

Variant 4
One whole picture could be shown to each of several participants and they could try to reconstruct it from memory. This would lead to a greater appreciation of individual differences in perceptions of same picture and attention to various different features.

Variant 4 serves to illustrate how, whilst we may share common experiences with others, our experiences are quite unique. Consequently, it is only through discussing our experiences with others that we start to appreciate others' priorities, values, etc.

Variant 5
A two dimensional cross-section of a familiar three dimensional scene or object can be produced so as to appear very strange and ambiguous. This draws attention to how we are misled by under-dimensioned or highly abstracted representations.

Variant 5 shows how something very simple and familiar can be made complex and in such cases how we need to search our memories for familiar aspects of the scene that we can seek to understand.

Variant 6
The importance of timing, phase, rhythm, and harmony in forming complete pictures of dynamic perceptions can be examined, perhaps using artificially separated parts of a musical composition.

Variant 6 represents an illustration that is non-visual and has a temporal element in it (rhythm, etc.).

Variant 7
The effects of contexts and croppings can be explored by offering a picture for interpretation, then showing how interpretations change when it is shown together with its immediate context, then showing it and its immediate context in a larger context, etc.

Variant 7 demonstrates how we can make certain assumptions about the way things are that may turn out to be incorrect when the scene is placed in its wider context.

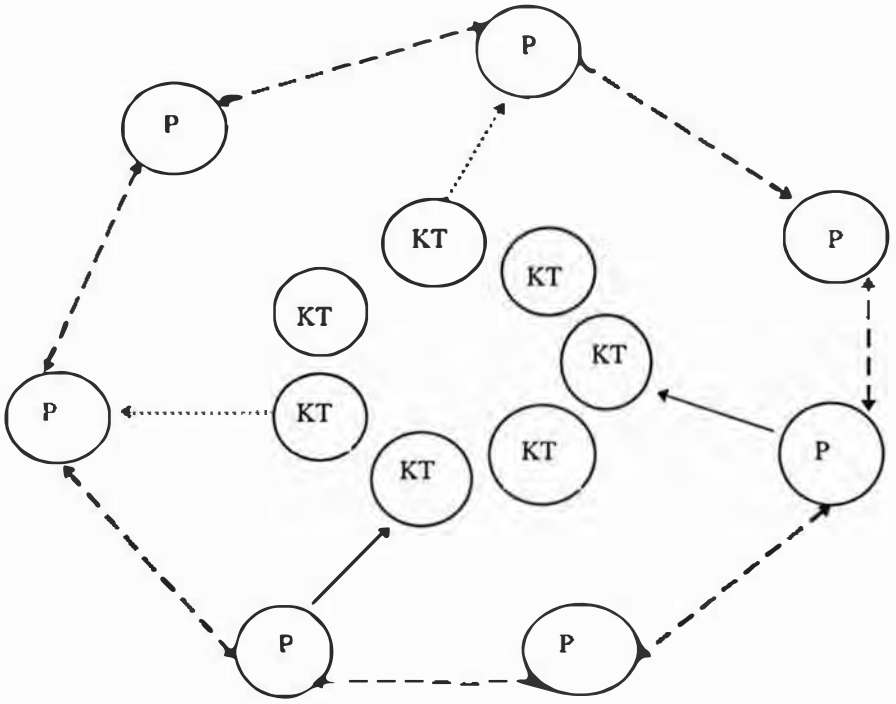
Variant 8
By using differentially magnified views of the same picture, we can see the effects of differences in resolution, focus, and aspect.

Variant 8 illustrates the need to look at things from a variety of angles and perspectives because things can look very different according to where you are positioned. Furthermore, it promotes the idea that one should try putting oneself in 'others shoes' before stating how things are.

Enhancement of Practice Through Conversation Synergy

By way of conclusion, the team identified three key areas that emerged from the discussion around the sharing of personal experiences of practice:

- participants were each able to identify aspects in each others' activities which they might employ in their own and, to that extent, the team became a learning community. The process that occurred can be illustrated by the figure below:



Represents practice influencing practice

Represents key themes influencing practice

Represents practice generating new key themes

P represents practice

KT represents key theme

Fig. 2 The Interdependence of Key Themes and Practice

The inner core of circles represents the points that we initially identified as key to our vision of an ideal society, the outer ring shows the individual choices of practice to describe. The arrows depict examples of how ideas derive from one practice were seen to be transferable to others´ activities

- The relating of the 'Building the whole from a partial picture' exercise produced a creative synergistic response within the group. The family of alternatives which emerged from discussion of this example was recognised by the group to have potential application in numerous areas of practice.
- Finally, it was noted that the discussion of systems practice revealed other features that were important to team members in our Ideal World. These were, for example, security, context, empathy. This made us feel that we had completed the first circle of

an iterative loop, we had set out on the first stage of the systems design methodology[1] by envisioning an ideal society but we had returned to refine that vision as we developed our models of education and practice. It was recognised by the group that this was an exercise in critical reflection and how it might result in improved future practice.

Critical Reflections on the Conversation Process

As the Conversation drew to a close, the Group started to reflect on the process in which they had engaged and to evaluate the process and progress that they had made. Indeed, if the conversation had led to an holistic process then an appropriate evaluation might involve the identification of salient points between the conversation and the exercise developed by the Group. We each came to the Conversation with our own pieces of the picture (our particular areas of expertise) it took us two days before we were able to identify an area of common concern (how to engender in others the ability to appreciate what it is to adopt an holistic approach and why it is important to do so) akin to the overlapping of the segments of the photograph (variant 3 of the exercise).

Further, it was believed that by accident rather than design the Group had also put into practice a key systems principle - the importance of points of leverage in a system. The simple relating of one member's experience of using a quick exercise with his students provided a focus for the group and resulted in the creation of an exercise with many variations to which the whole group had contributed. Further, each member of the Group was committed to using the exercise with their students and, given the diverse locations in which the Group members taught and practiced systems thinking, the knock-on effects are potentially quite considerable. Indeed, it might be said that the identification of a focus for the Group led them to become a learning community. But might such learning have taken place without the Conversation? In order to evaluate the Conversation it is first necessary to examine critically the notion of learning.

Van der Knaap (1995) defines three categories of learning:

System	-	corrective system learning on the basis of feedback
Cognitive	-	development of a capacity for problem-solving based on knowing and understanding
Social	-	learning by means of dialogue and argumentation

The Fuschl Conversations are fundamentally based on learning from the third perspective, social learning. Van der Knaap states well the importance that is accredited to social learning:

"In a dialectic connection, mutual convictions and opinion are continuously tested and verified. Some argue that truly innovative learning is only possible in processes of collective argumentation: the individual can only learn something fundamentally new when her or his learning process involves the assimilation of or accommodation to the

dynamics of social interaction (Bandura, 1977; Miller, 1986). Challenging by nature, taking part in discussion will in many instances increase the need for reflection, the prospect of cognitive change and development and, hence, learning (Van der Knaap, 1994)" (1995, p. 197).

If we are to evaluate whether the dialogue process is necessary for satisfactory learning to take place, it is necessary to consider the problems that may occur with the system and cognitive forms of learning. In relation to systems learning which, as has been stated, is based on feedback, it is argued that the feedback information may simply be ignored or may result in 'tunnel vision'. Secondly, it is stated that many of the problems related to the second form of learning are based on 'cognitive blindness' as "...we cannot observe or experience what we cannot recognize. In addition, since our powers of perception are limited, many things go by unnoticed. Most of our interpretation is biased: the perceived stimuli are made sense of in such a way that they correspond with accepted worldviews." (pp. 198-199). Many of the problems that are associated with system and cognitive learning are overcome with social learning. 'Tunnel vision' is less common in group situations where there is usually comprehensive evaluation of the arguments put forth by group members. Also, 'cognitive blindness' is not usually associated with group learning as the resources available, especially 'brainpower', is far greater. Whilst, in the light of the criticisms which have been leveled at systems and cognitive learning. the argument for social learning may be advanced, it is not without its critics.

According to Van der Knaap social learning may be blighted by a particular set of communication related problems: "social learning...may get distorted by deficient or incomplete comprehension between participants. In addition, when communication consists of merely the disconnected exchange of convictions and ideas, there can be no such thing as the construction of a shared or social reality. When strategic considerations prevails, participants often develop defensive routines: concealing practices to obstruct the confrontation of viewpoints (Argyris, 1991)" (p. 199). In the case of the Fuschl Conversations, engagement in defensive routines is overcome by the inculcation of a set of norms and values which are passed on from one Conversation to another: everyone has a contribution to make and everyone will be respected for that contribution. Even the contribution of the cynics in the group is respected as this prevents 'tunnel vision' and 'groupthink'. These strong values are established from day one and serve to overcome many of the problems Van der Knaap associates with social learning. Given the strong culture that has grown up as a result of participants of the Fuschl Conversations participating time again, there is a healthy sceptiscm that ensures that the meetings do not just become a talking shop. Indeed, it was this sceptism that led the Design Group to critically reflect upon the Conversation and to engage in 'double loop learning' (Argyris and Schon, 1978), that is 'the modification of underlying norms, policies and objectives'. Indeed, it was this form of double-loop learning that led to the questioning of the value of conferences in 1982 by the founders of the Fuschl Conversations and it is this ongoing questioning by the academics and practitioners involved that ensures the Conversations are relevant and have worth beyond the event.

Conclusion

This paper summarises the experiences of the Design Group at the Fuschl Conversation 1996. By way of introduction, an overview was given of the generative dialogue process and the preparatory activities it implies was given. Discussion was then made of the process by which the Design Group found a focus for its efforts based on members providing accounts of systems practice. Consequently, the exercise 'Building the whole from the parts' was explained and the variations developed by the Group summarised. The paper concluded with a critical look at the conversation process and a discussion of whether the Group could be said to have become a 'learning community'. In the light of the critical reflection process it was argued that the Group had engaged in 'double-loop' learning as it had not only further developed an exercise to engender in students the wisdom that is systems thinking but, also, the Group had reflected upon the norms and values that led to the meeting and the Group members had discovered for themselves the worth of the Conversation.

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Group Summary Report
for
The 1996 Fuschl "Core" Conversation

Fuschl, Austria
April 14 - 19, 1996

Education and Societal Development

"Do not confine your children
to your own learning...
for they were born in another time."

Hebrew Proverb

I. Introduction

This paper summarizes the work of the Education and Societal Development group that met and worked during the Fuschl "Core" Conversation in April, 1996. The group consisted of people who had prepared for a conversation on either Designing Systems for Learning and Human Development for the 21st Century, or Societal and Conscious Evolution. Since neither of the original groups could convene a large enough membership to engage in productive dialogue, the new group was formed. These people made up the new team:

Tamas David	Hungary
Charles Francois	Argentina
Sue McCormick	United States
Alexander Repeko	Belarus
Robert Vallee	France

As the reader moves through this group summary report, it is hoped s/he will get a sense not only of the content of the individual and collective ideas as they developed, but also a sense of the learning process we experienced. Like the conversation itself, the paper is a collaborative effort. Each of the five team members contributed energy and ideas to the process and the results. The ideas expressed reflect a synthesis of collective thinking made possible only through the synergy of dialogue and design conversation. We would like at this point, therefore, to express our sincere gratitude to the Austrian Ministry of Science, to the International Federation of Systems Research and to the International Systems Institute for the resource support given to make the Fuschl Conversations possible. Thank you.

The paper contains the following:

- an overview consisting of relevant information about our aspirations and expectations, a set of ground rules for guiding our interactions, the new topic, "Education and Societal Development," and the triggering questions;
- examples of individual reflections on one of the core concepts made throughout the week, a learning process which helped us clarify and make visible our frames of reference for the core concepts;
- a discussion of the original prototype for a co-evolutive model of education and societal development and its first iteration which accommodates the need for idealized systems design;
- elaborations of the prototype and first iteration, expressing through models and text
  (a) the structures and dynamics of an evolutionary education system;
  (b) a mathematical model depicting the impact of resource constraints on the relationship between education and society as well as the evolution and co-evolution of the two systems;

(c) the construction of individual and consensual reference frames, the way the unexpected breaks reference frames, and tools for (re)constructing frames; and
- concluding comments.

II. Overview
A. Aspirations and Ground rules

We started our group work by sharing information about our background, our interests and experience with the topic(s). We then began to address our learning aspirations and expectations or goals for the week-long dialogue and design conversation. After considerable dialogue and some reflections, we individually generated the following list of aspirations:

- To understand the role of requisite variety in education and societal development or evolution (Robert).
- To understand the role of communication with feedback in education and societal development (Robert).
- To understand the role of complexity in economic growth (Tamas).
- How to empower everyone to act sensibly and efficiently as social agents (Charles).
- Discover or develop some guidelines to ease the contradiction between complexity change and qualitative change (Alexander).
- To explore the nature and process of learning as a creative, constructive collaborative process at the level of individuals, small groups (working as a team we could be our own "laboratory"), organizations and communities (Sue).
- To explore the nature (function and structure) of peer systems (social, political economic) within a larger systems environment (community or society) if their purpose were to ensure a healthy, productive, sustainable future for all citizens (Sue).
- To think about what kind of education or learning system could be designed to create peer systems in a community or society that could in fact ensure the above (Sue).

Our aspirations were somewhat different and we weren't surprised. After all, we had come expecting to pursue a somewhat different conversation topic. We also knew we had enough common ground to work with energy and focus as a team. Before embarking on a brainstorming session to generate possible topics, and having already experienced some non-productive tension in our interactions resulting from a lack of guiding principles, we decided to invest the time in identifying some ground rules for guiding our interactions. Here are the principles we agreed upon:

• Listen with respect and openness. All ideas are valid.
• Seek first to understand.
• Value our diversity.
• Trust tension and conflict. These are critical, constructive phases of productive dialogue and learning.

B. The New Topic

After a brief reflection time we brainstormed the following list as possibilities for our new topic:
• Societal Evolution through Education
• Societal Evolution through Design
• Education and Societal Development
• Increasing the Humanity of Humanity through Education
• Co-Evolution of Education and Society
• Education-Generated Societal Development Through Requisite Variety

Mindful of our guiding principles, we questioned and probed one another's ideas to better understand the thinking and feeling behind these suggested topics. We engaged in a lot of "What then?" dialogue. For example, we posed to ourselves questions like these: "If we chose Societal Evolution through Education, what then? What might some of our triggering questions be? Where would the questions take us? Is that the direction we want to go, given our aspirations, interests, expectations, preparation?" We eventually reached consensus on "Education and Societal Development" as our topic.

We were tired, but felt good about the outcome and the process we had used to get there. Our next challenge was to generate triggering questions to propel our conversation.

C. The Triggering Questions

We launched this phase of the dialogue by sharing general ideas about the relationship between education and societies. We shared from the perspectives of five different cultures and three generations. The session was lively and informative.

We agreed that in contradistinction with what has been the rule in the past in stable societies and their education systems, we would have to address the fact that the world we now live in is changing and evolving rapidly. In order to avoid ongoing or recurring obsolescence of potential models, we must therefore grapple and contend with the following triggering questions:
• What is the role of education and authentic learning in a rapidly changing world?

• Could we design a model that would depict the relationship between education and societal development?
• To adapt oneself to new conditions is often considered wise, but do we teach people to adapt to anything and everything? (What about adapting to a polluted natural environment? What about adapting to a society governed by ineffective or corrupt political systems?) Is adaptation the only purpose of education?
• Is there a level of adaptation that transcends what we generally think of as adaptive, a state perhaps better described as adaptedness?
• If we see a desirable path of evolution for a society, can we ensure that education will enable people to pursue this path? Or will there be constraints within the society and/or within the education system that inhibit a fully functioning, co-evolutionary relationship?
• How can an education system guide or influence societal evolution?
• Could we design a model or a set of models that would depict an education system with the capacity to guide and inform sustainable societal development? In other words, a model of a purpose-seeking education system embedded in a purpose-seeking society?

The idea of designing a model or a set of models that would depict an education system with the capacity to guide and inform sustainable societal development was a compelling one. Some of us wanted to leap right into designing models. Some of us, however, thought that in order to effectively work with these questions, including the last one which was generating a lot of energy, we should invest some time in reaching a deeper, fuller understanding of what was meant by education, learning, society, design, adaptation, adaptedness, evolution and co-evolution. We would need to clarify for ourselves and for one another our own frames of reference for each of these abstract, core concepts. The next section of the paper, therefore, is an expression of one of the formal written reflections we used as a scaffold to prepare for the ensuing dialogue.

III. Reflections on Education: What Is It? What Is Its Purpose?

We did not spend as much time with some concepts as we did with others. Education was a cornerstone in the model we were developing, therefore we devoted a significant amount of time to expanding and deepening our understanding of this concept. We think what we generated is worth sharing.

• "Education is teaching flexible patterns of behavior based on the respect of others and the use of intelligence and knowledge. The kind of knowledge that is necessary in today's changing world is knowledge that makes behavior efficient but also opens the mind in order to be able to cope with unexpected circumstances. This implies a 'requisite variety' of knowledge.

"The purpose of education is to enable people to live a life which is worth living from the human point of view, to make humanity more human, through the teaching of patterns of behavior based upon the respect of others. They must

be inventive, flexible enough to make the respect of others realizable in all sorts of unforeseen circumstances so frequent in a changing world. In other words they must have the "requisite variety" of potential applications. These problems of behavior have to use knowledge enlightened by intelligence or even wisdom as pointed out by Charles François. Without it, good will and the best intentions may generate new situations which are worse than the old ones. Often this happens by focusing on certain aspects and forgetting side effects or by underestimating the balance between local and global issues. So education must be realistic. For example basic compulsions have not be eliminated, they have to be channeled to human values through a "good use" of them. Of course adaptation at any cost, which is a kind of submission to fate, is not the solution ; unbearable situations exist. Another important thing is that education is not to be concentrated on one part of life only, it starts at birth and must never stop."

- "It is necessary to distinguish the process of education and educational systems. The education system is a part of the human society. Notwithstanding the fact that education has a very close relationship with other aspects and components of the human society, it [education] is aimed at accomplishing a particular set of goals within the society. As a system, education has its own structure (hierarchical, organizational, etc.) and is distributed within society.

  "Education as a process is a kind of societal movement (forgive me for such a term). Hereunder the term 'movement' I understand as a philosophical term that means any changing (qualitative, quantitative, in time and/or in space). The movement (educational process) forms a structure of the educational system and at the same time is guided by it.

  "So education can be understood as a sub-system within a societal system describing the specific kind of social movement, having its own structure and performing specific tasks."

- "For me education is about creating new individuals who are well integrated within themselves: biologically, psychologically, mentally, socially. In this way, education can shape societies that are well integrated, where individuals cooperate harmoniously in every social endeavor.

  "In a stable world (as was generally true in the past), the role of education was to reproduce society as it was. In a changing world, the role of education is to enable people to acquire adaptedness, i.e. the capacity to re-adapt as many times as needed to as many situations as can arise."

- "Education is the process of making the next generation of the population have 'adaptive' behavior, and education is always subject to resource constraints. What is 'adaptive' depends on the features/characteristics of the environment. For example, if the environment is stable, then education passes on behavioral rules that maintain the current stability. If the environment is stationary, then education passes on models and norms for behavior. If the environment is instationery, then education must develop the ability in people to obtain or construct models and create new norms."

• "I am swinging back and forth between on the one hand, what I think and feel education is, on the other, what it should be. I will try to clarify both, beginning with what it is right now followed by what I think it should be.

"Education is the passing on to young people of what has been determined by our society and community as significant information/ knowledge/ skills/ even attitudes and to some extent values (emphasis on 'passing on...which I consider a passive process). The information/ knowledge/ skills, etc. are in three aspects of life: intellectual, social and physical. Education, as it is today, is intended to also be a caretaking institution, a place where young people (age, approximately four to nineteen) need to spend their time (roughly nine months of the calendar year, five days a week, from six to eight hours a day) so that their parents or other caregivers can go to work or engage in other activities. Education as it is now (in the US), is not intended to address young peoples' spiritual needs.

" Education as it exists today (with rare exception) is a mixture of old 'schooling' practices and vain attempts to improve and stay current with a changing society. It produces people for the most part who have learned basic functions (reading, writing, calculating), skills that can be measured by tests. It also produces people who are disconnected from one another and from the learning process itself, people who are under-prepared to integrate and apply what they've passively 'learned' in school to what is actively happening in their lives.

"What should education be? Fundamentally different than what it is today, that's for sure! The big aims of education should be to first of all help heal the social and political fragmentation and disenfranchisement it has contributed to for the past half century. It should (re)connect people, and (re)awaken a sense of belonging, dignity and worth. It should energize, inspire and empower us to participate fully in our families, neighborhoods, communities and society. It should free our minds and lift our hearts and spirits so that we as a society can once again create, imagine, and dream. It should instill a sense of 'knowing what to do when we don't know what to do.' It should be integrated with all other human development systems (social, environmental, spiritual, political, economic). It should be more organic (humanistic) and less mechanistic (militaristic and regimented). It should be actively experienced rather than passively received or tolerated. It should intimately embed itself in life.

"Clearly, a new design is needed. We must "leap out" of our current notions of schools, and create new, integrated, life-centered models, even if it means leaving forever our current structures and functions of schools as we know them. Some of the core questions that must be addressed in the design inquiry are these: What do people need to know and be able to do to live happy, healthy, productive lives in a highly technological, diverse, complex, interconnected, rapidly changing world? What are the values, skills, character traits that are needed to participate meaningfully in our social, political and economic systems, and to interact responsibly with our natural environment? How do we balance our needs for belonging, community, dignity and worth with cultural pressures to compete and advance toward higher and higher levels

of performance and excellence? How do we justify the current escalating level of consumption in light of a growing awareness not only of the limits of natural resources on our planet but also the mass destruction and havoc our high tech, consumptive lifestyles have already wreaked?

"When I free myself to imagine what should be and what could be I see schools as we know them no longer exist. Instead there are learning fields which emerge and self-organize according to sometimes intentional, sometimes spontaneous needs and desires to learn. These "fields" of learning are an integral aspect of all systems (individuals, families, neighborhoods, communities, organizations, institutions. Just as our bodies and brains, the trees, flowers, grasses, all living things in the natural world, have a propensity and capacity for integrated, ongoing learning and the development of 'intelligence,' so too should our human systems be designed with a propensity and capacity for integrated, continuous learning and the development of organizational or systemic 'intelligence.'

"Of course, such organizations and systems present a huge design challenge, one we haven't been ready for until now. Many of us may not even feel ready now. It will probably mean letting go of some deeply held beliefs and values. Once having freed myself, however, to imagine communities and a society where learning is truly life-centered and fully integrated, for me, there is no turning back."

Following the reflection, writing, sharing and ensuing dialogue, we were once again tired yet energized. We were engaging in generative dialogue in the design conversation process, and we were experiencing a vast array of group dynamics. We were especially aware of: 1) the frustrating pull, push and occasional collisions caused by our own polarities; and, 2) a resulting tendency toward individualization, literalness and rigidity, which, according to Isaacs (1994), are common experiences in the initial phases of dialogue where "fragmentation of tacit thought" can occur. Mindful of these dynamics, we challenged ourselves as a group to "suspend assumptions," and process what was happening, including our tendency toward polarization and fragmentation. In this way we were able to create a safe "container" for conversation (ibid.).

We were beginning to get a sense of where and how the generative dialogue would bridge to strategic dialogue. We were also experiencing sessions where we engaged in both generative and strategic dialogue. It took a lot of time to process each "chunk" of information and the ideas that were emerging, but we realized that because we were processing the process, we were in fact making progress, progress that may not have been possible had we not invested the time. We proceeded with the intention of producing our first iteration of a model of an education system with the capacity to guide and inform sustainable societal development.

IV. Education and Societal Development

Giving to the concept of education a very broad meaning, possibly far from its conventional one, we began to work on a model of a dynamical process of education for societal development. The first attempt was conceived and contributed by Robert Vallee. It was our prototype and a scaffold for all that followed. It was a co-evolutive model involving a closed loop with three main elements, society, knowledge and school, considered in a generalized sense. It was intended to show 1) how society with its complex, dynamic web of culture(s) influences knowledge (sciences and humanities) by the impact of its demands, 2) how identification and construction of knowledge in the sciences and humanities guides education and schooling by its proposed methods, and 3) how education modifies society by the effects of its teaching and learning. Each of these elements influences, in the given order, the next element of the loop. The prototype (Figure 1) incorporated a closed loop, which fed back its own products into itself.

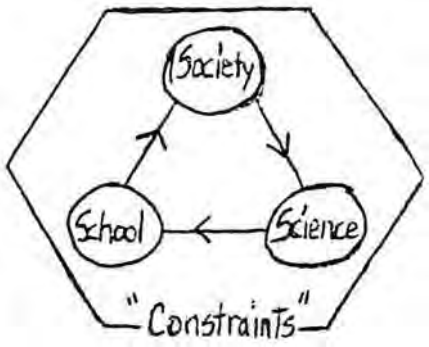


Figure 1. Prototype: closed loop, evolutive model of education and societal development

We then explored the notion that even in a society endowed with great capacities of anticipation and productivity, the impact of the radically unexpected in a turbulent and rapidly changing environment cannot be underestimated or disregarded. People must be mentally prepared for such possibilities. What is more, if a society is going to be capable of purpose-seeking behavior, even from a purely descriptive point of view, our model must have yet another aspect. Imaging, imagining, visioning, creating and inventing must also play a fundamental part in societal evolution, for these are in fact essential human abilities that go beyond mere perception and beyond knowledge that is generated in the realms of science and humanities (Banathy, 1991 and 1996). These capacities result in authentic purpose-seeking systems as opposed to rigidly controlled, deterministic, purposive or heuristic systems. The next iteration of the model (Figure 2), therefore, needed to accommodate the function of design, incorporating an open loop and creating the opportunity for the

society to feed forward its visions, images and actions toward realizing its highest hopes for a preferred future state.

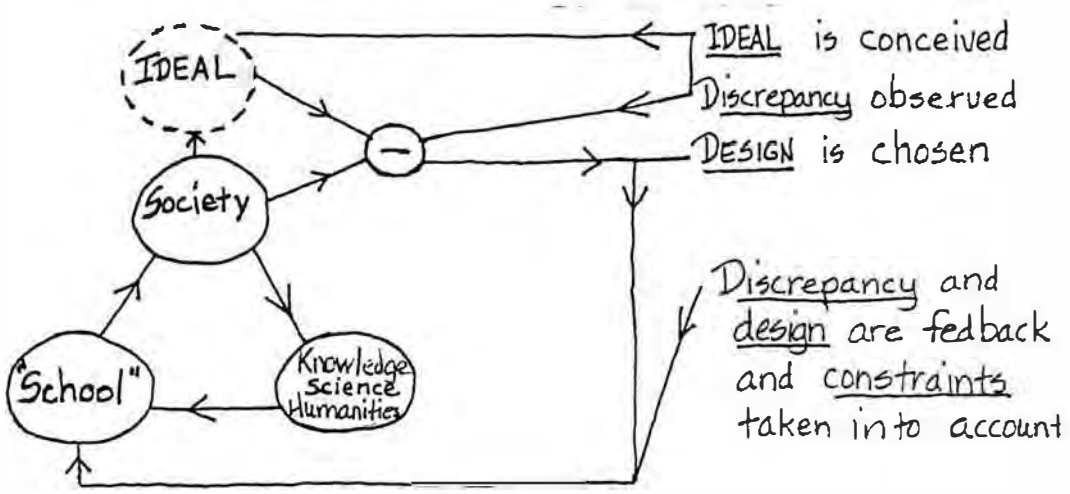


Figure 2. Open loop, co-evolutive model of education and societal development

Having established as essential in a purpose seeking society the need for design knowledge and the capacity for idealized systems design, we determined that there are several "critical requisites" for systems design, which are 1) involve all stakeholders of the system in the design process; 2) develop the capacity to achieve a deep understanding of current societal conditions, understanding that goes beyond acquisition of rote information and data, beyond acquisition of knowledge, to a state of consciousness enlightened by wisdom (described in a later elaboration by Charles Francois); and 3) the capacity to transcend the current conditions of the system, or as Banathy says, "leap out," and envision a desired future state. These capacities, we determined, would significantly increase the likelihood that a society could influence its own evolutionary path. At this point, a fundamental question crystallized and loomed largely: What kind of an education system could develop these capacities in a society?

We spent considerable time and energy exploring individual and collective ideas and beliefs about dealing effectively with the unpredictable, about idealized systems design, turning over and over our different notions of adaptation, adaptedness, inventiveness, and transcendence. We agreed that it is not enough to be mentally prepared for the unexpected by developing the ability to adapt and/or be flexible and/or be tolerant. We agreed that at least one answer to the "challenge of the unpredictable" is that a society must be able to generate a variety of potential responses and/or reactions to whatever is seen as unpredictable, uncertain, fuzzy or ambiguous. Variety within a society must be neither too large nor too small. Too much variety is too costly to the society in terms of resources; too little variety produces an insufficient number of possible responses. Instead, it must be just the necessary and sufficient amount, or, in the words of Ross Ashby, the "requisite variety."

The exploration of requisite variety resulted in still another layer of questioning and dialogue. The three questions at this level were 1) What is the relationship between requisite variety and a society's capacity to develop adaptedness or inventiveness (as opposed to adaptation, which we could clearly see)? 2) Is there a relationship between requisite variety and a society's capacity to transcend? and 3) What are the implications of the answers to these questions for designing education?

The dialogue sessions in which we grappled and contended with these three questions were the most challenging and productive of all. There were times, as a team, we verged on collapse; and there were times we nearly split apart. Yet out of these sessions came much deeper understandings of the learning process, of what might be involved in transcending, and in the end, of the relationship between an education system and its society. These deeper understandings fertilized the soil and the seeds which eventually "grew" the elaborations described in the remaining sections of this summary, as well as the ideas that are expressed in each member's individual paper.

This evolving schematic model, therefore, must be considered just as a general guide. It has to be made more precise by specific additions. Not forgetting its human significance we may observe that it fits well in a cybernetic and systemic framework. It involves communication theory through transmission of information and data from one element to another, and control theory through feedback of discrepancy (between the existing state of the society and its ideal state). Moreover the evolution of the state of the society may be seen as a temporary, but "fixed point" of some operation in a specific space, generated by the very nature of the loop. A society's perception and inquiry of itself, along with its resulting decision and action link the system to both epistemology and praxiology, which strongly depend on one another.

Important elaborations in the above prototype and its first iteration were explored and proposed as the design conversation continued. These elaborations comprise the next section of this summary and consist of 1) a more detailed and dynamical model of the initial prototype, contributed by Alexander Repeko; 2) a mathematical frame involving the viability of society, limited memory concerning its evolution, and discrepancy between its requisite variety and its actual complexity, contributed by Tamas David; and 3) models for the construction of reference frames, what happens when reference frames are broken by the unexpected, and some tools for this constructive process, contributed by Charles Francois. The reader should also note that these next three sections are further developed in the individual follow-up papers contributed by the above noted team members and contained in this volume of the published proceedings.

V. Elaborations

A. The Structures and Dynamics of an Evolutionary Education System

The following dynamical model (Figure 3) proposed by Alexander Repeko is more detailed than the initial one : knowledge is explored by science and methodology, school is decomposed into teacher and student. Each element influences the next, starting with science : solutions, methods, knowledge, skills, problems, all to be considered at three hierarchical levels, each having its own speed of evolution. What follows are excerpted from his individual paper, but represent the ideas generated during our group dialogue sessions at Fuschl.

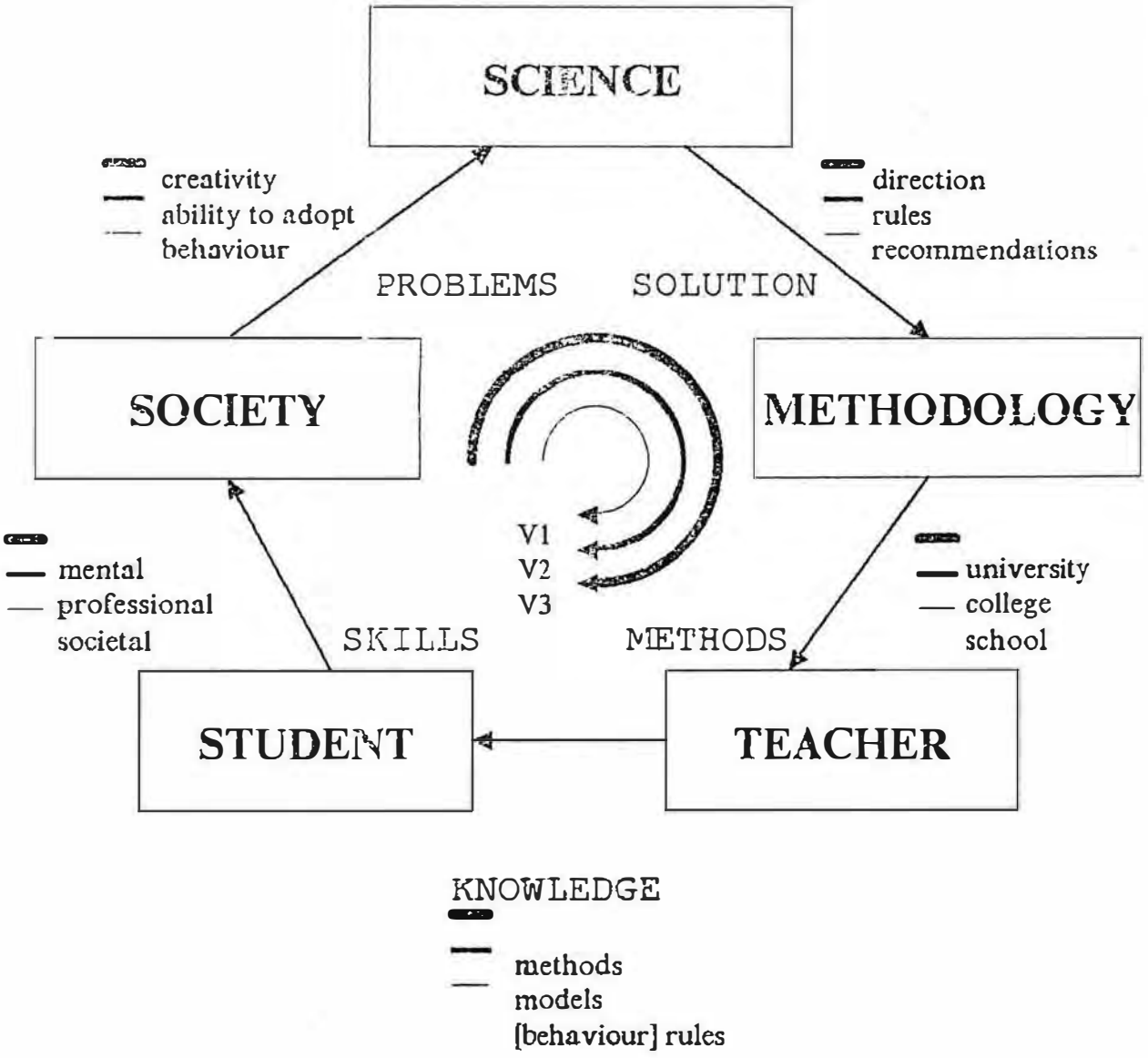
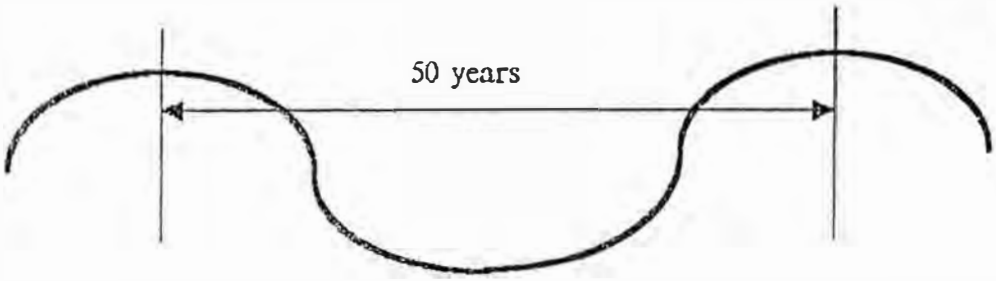


Figure 3. Evolutionary model of an education system

a) periodicity of changes on the first hierarchical level



b) periodicity of changes on the second hierarchical level

c) periodicity of changes on the third hierarchical level

c) resulting process

Figure 4. Speed of changes on different hierarchical levels within an evolutionary educational system

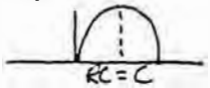
B. Mathematical Model of Resource Constraints Within the System

The following is a depiction of the initial schematic model of education for societal development presented by Tamás Dávid in a mathematical frame (Table 1) which involves the viability of society, limited memory concerning its evolution, discrepancy between its requisite and its actual complexity. The best choice of the evolution of the resources to be devoted to education is given by the minimization, under constraints, of an adequate function. The mathematical frame also addresses the relationship between education and society and the co-evolution of the two systems.

(1.) $P_s^t \mid \Omega^t = P_s^{t\Omega}$

(2.) $\Omega^t = \{\pi\}_0^t \;,\; \Omega_s^t \;, = \{\pi\}_{t-\tau}^t$

(3.) $P_s^{t\Omega} = P_s^{t\Omega}\,(\| RC^t - C^t \|)$



$P_s^{t\Omega}$ = concave function / max at $(\cdot) = 0$

(4.) $RC^t = RC(\Omega^t)$

(5.) $C^t = C(\{ED\}_0^t \;,\; \{\pi\}_0^t)$

(6.) $ED^t = ED(\hat{R}_{ED}^t \;,\; \Omega_s^t)$

$$\text{MIN.}\left[\, \| RC^t(\Omega^t) - C^t\left[\{ED(\hat{R}_{ED}, \Omega_s^t)\}_0^t \;,\; \{\pi\}_0^t\right] \| \right]$$

$$\hat{R}_{ED}^t \quad (\tau)$$

$$\text{s.t.} \quad \hat{R}_{ED} < \bar{R}_{ED}$$

$$\hat{R}_{ED} \rightarrow P_s^t$$

Table 1. Mathematical model of resource constraints within the system

C. The Construction of Individual and Consensual Reference Frames, How the Unexpected Breaks Reference Frames, and Tools for (Re)Constructing Frames

In this section, the models and drawings (Figures 5, 6, and 7) of Charles François offer a depiction of the construction of reference frames and what happens when a frame is broken by the unexpected. In these drawings one sees the difference between inventive learning (adaptedness) and adaptive learning. Authentic learning is a process of acquiring information in order to be able to create referenceframeworks, to make them significant, and become capable of modifying them when needed (to be creative or inventive). Adaptation on the other hand, is a more or less limited capacity to adapt to changes, depending on the variety of response patterns possible.

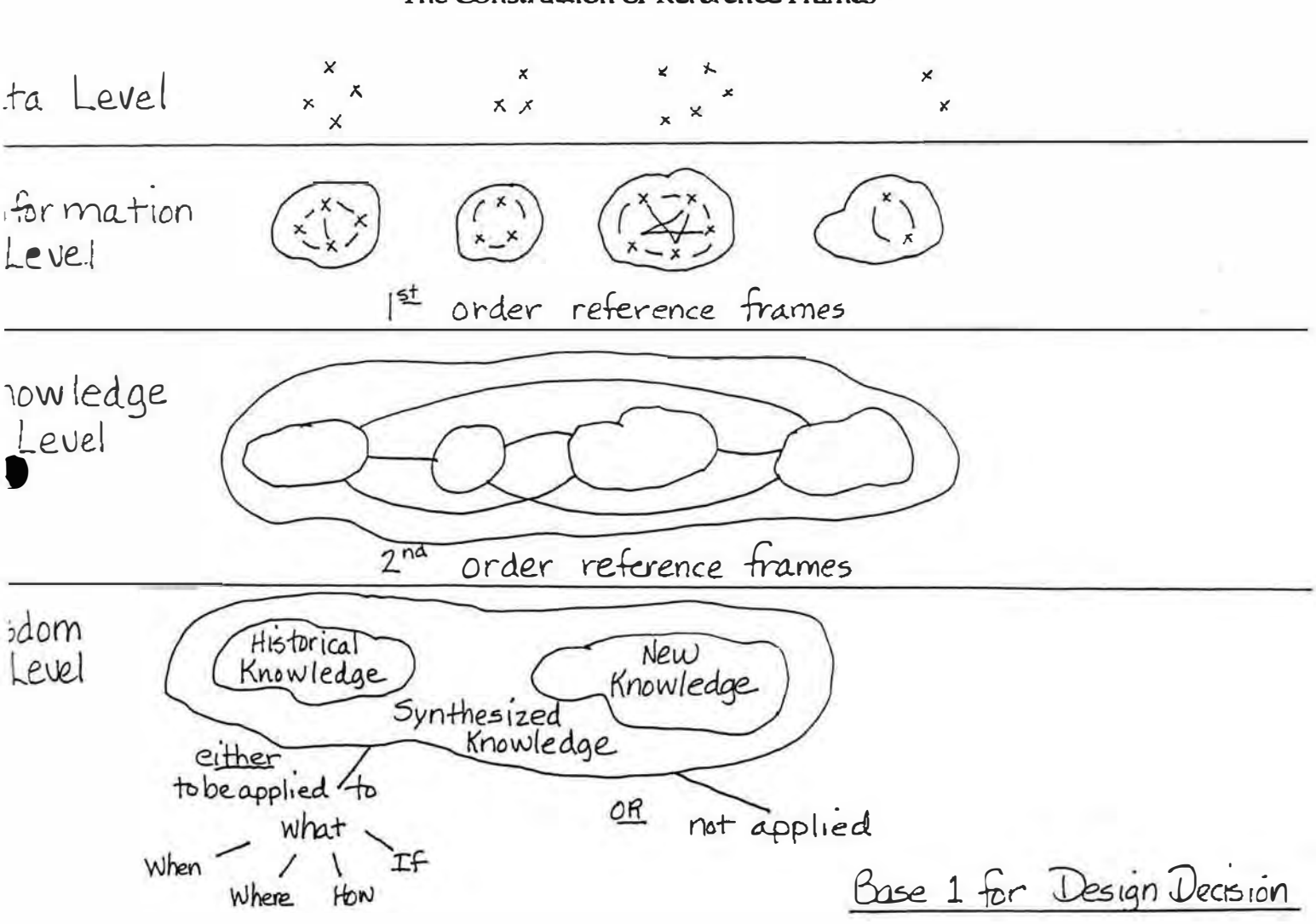


Figure 5. Construction of reference frames

The Construction of Consensual Reference Frames

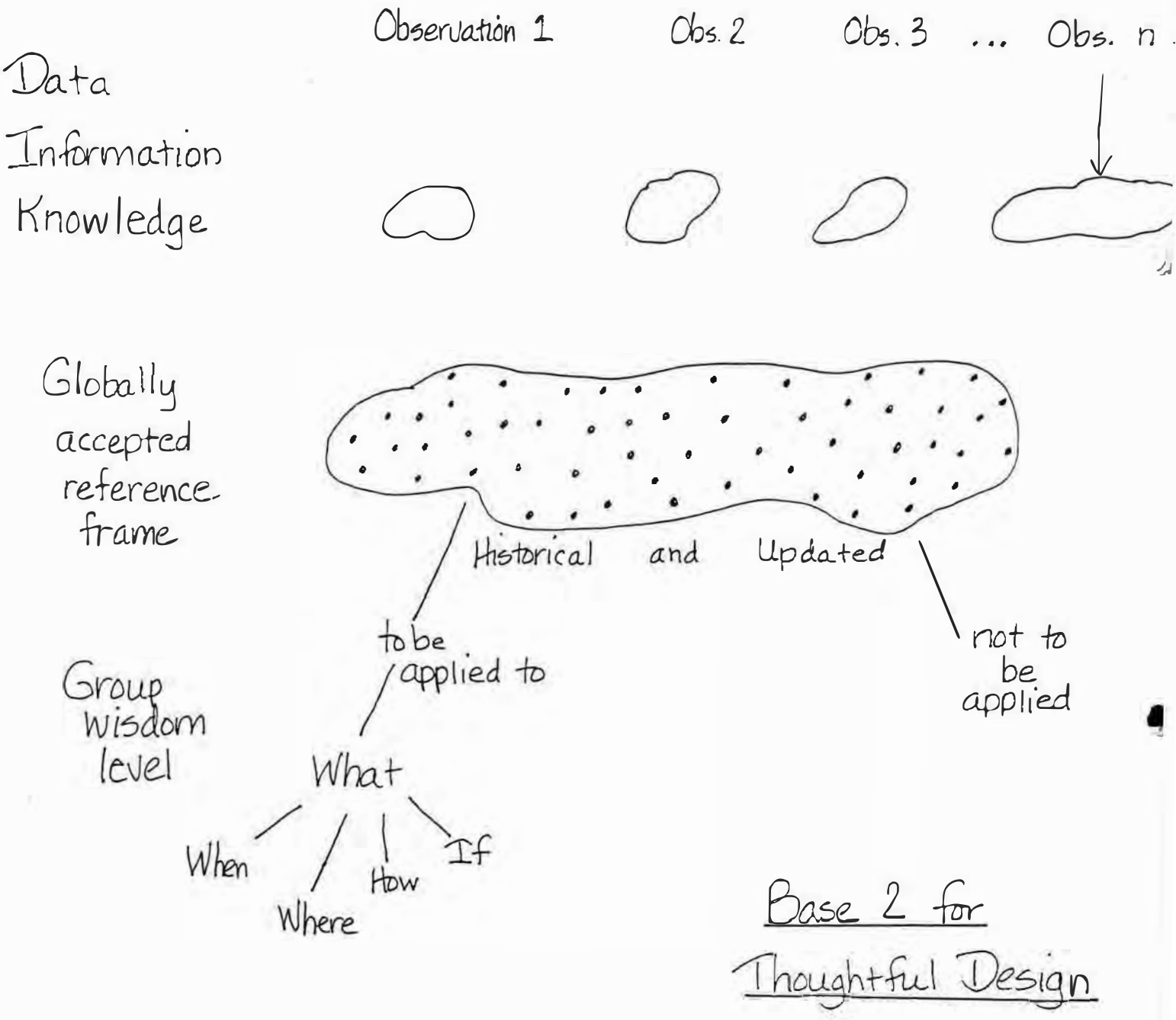


Figure 6. Construction of consensual reference frames

How the Unexpected Breaks Reference Frames

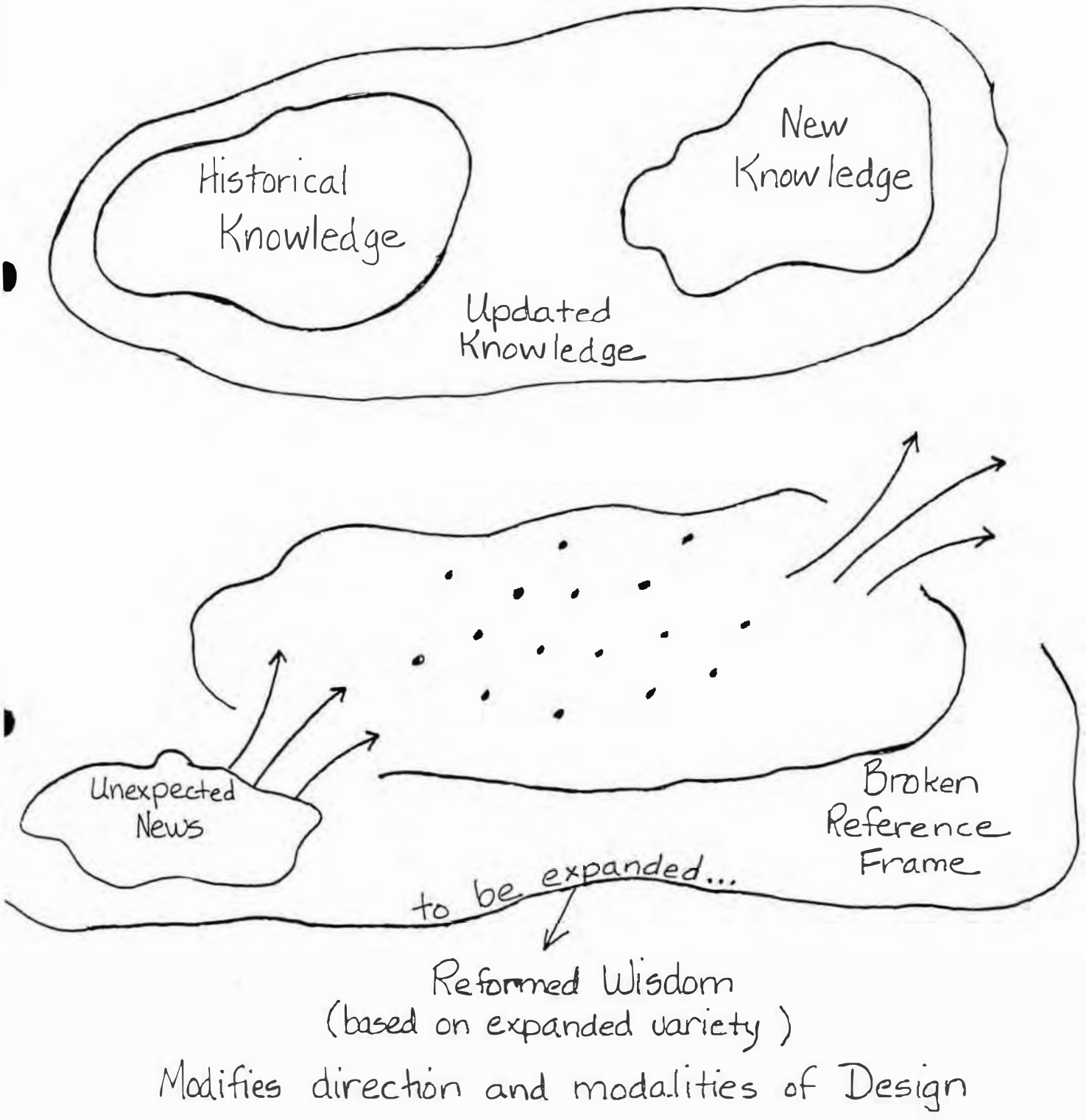


Figure 7. How the unexpected breaks reference frames

Tools

Training for the Construction of Reference Frames

- What are the data?
- Why, what for and how to select them?
- How to construct information? Knowledge?
  Types of models: systemic, cybernetic, others
- How to update information? Knowledge?
  Critique and reform of crumbling models

The power and relevance of these models and implications for education and societal development rest in the important distinction being made between learning (adaptedness or adaptation) the education system promotes and the critical role of authentic learning in the process of social systems design. Both of these issues are further addressed in his individual paper published in this volume of the proceedings.

VI. Concluding Remarks

This paper summarizes the work of the Fuschl team that through the process of design conversation explored the topic and issues of Education and Societal Development. Members of the team came together from two previously assigned conversation topics: 1) Societal and Conscious Evolution, and 2) Designing Systems for Learning and Human Development for the 21st Century. There was a rich, stimulating and challenging mix of diverse interests, experiences, cultural backgrounds, and ages: Fertile ground for productive dialogue and for ongoing systems inquiry and action.

The conclusion of this group report, therefore, is more like a thin, transparent veil than a curtain closing. The ideas expressed here are truly "works in progress," many of which are expanded in the individual papers included in this volume of the proceedings. Although the face-to-face interaction and dialogue that occurs at Fuschl end after one week, the energy generated by the learning that has taken place fuels months if not years of future work and learning. In our case, we probably each left Fuschl with more questions than clear, definitive solutions.

The work we did, the ideas we developed will serve as scaffolds for projects in our systems back home as the quest continues.

VII. References

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The Systemic Design of Information Systems, a Group Report on the 1996 Fuschl Conversation

1. Introduction

This report is organized into three sections. After this brief introduction, the primary findings will be presented. The primary findings include contributions to the theoretical framework of information systems design, as well as discoveries about the nature of the conversational from of disciplined inquiry.

We believe that, while the focus of the group was on information systems design, our results are applicable to systems design tasks in general. One other introductory comment needs to be made. As the conversation progressed, and as we began to articulate specific design principles, we began to apply those principles to the conversation process itself. Of course this is to be expected. All groups go through a forming process, and as a result of discoveries about themselves, alter their operating procedures.

There was; however, something highly reflexive about our task. Since we were concerned about systems for the creation and custody of information, and we were engaged in "group" creation and custody of information (that is one workable definition of a conversation), reflexive application of our findings "immediately" changed our modes of operation. This phenomenon creates some paradoxes, and also introduces the notion of the "guarantor of quality", in conversations.

The report concludes with a roadmap-like accounting of the concepts and procedures that were encountered en-route to our findings.

1.1 Group Task

Our task changed a number of times during the year preceding the Fuschl Conversation. Our initial focus was on information systems in the sense of "decision support" during a design process. This focus became more generalized to include all aspects of information systems involved in systemic design. The input papers further broadened the territory

1.2 Group Composition

The group included Lars Albinsson, B. Antal Banathy, Mieczyslaw Bazewicz, Olov Forsgren, Paul Grunbacher, and Jaak Tepandi. What made the group rather unusual is that four of the six members have worked together on issues related to the group-task for several years. In fact, these members have met, and worked in a conversation format on many previous occasions.

It is particularly noteworthy that the two new members contributed, what turned out to be, most important dimensions to the group. Lars Albinsson brought the (critical view and) point of view and energy of a private sector CEO. Paul Grunbacher approached tasks (with the critical view and) with the discipline and formality of a recent Ph.D.

2. Summary of Findings

Our most significant contribution is a distillation of a "minimal" set of design principles for the design of information systems. We believe that the list of principles is general enough to be of, at least heuristic, value in systemic design tasks. We also believe that our experience has implications for the way in which conversation groups should be constituted and conducted.

2.1 Theoretical Results

Our theoretical conclusions fall into four areas. The first two are highly related and the last two result from the application of the concepts to the practice of information system design.

2.1.1 Definition of Systemic

Our most general theoretical contribution is a set of definitions of the term "systemic". Each of the following is a distillation of those properties or attributes that one would normally associate with the term systemic. Each item captures the essence of systemic, from some perspective. The items are intended to be meaningful individually, collectively the list represents broad territory.

* Dynamic Schemes, Multiple Schemes is an important driving force, Metabolize Schemes to produce new ones.

* Handle emergent properties that result from integration of target system.

* Analysis and Change-management of Requirements in order to fulfill combined expectations of users and clients.

* Adoption and continuous improvement of processes and methods for development. operations, and maintenance.

* Lovable Computer Servants.

* A just way to handle a community with valuable dynamic conflicting perspectives and connected action possibilities.

* All stakeholders Handle Changes as they Take into account the Environment while balancing ethical conflict.

* Enhances Evolution by permitting the invention of interactions between the parts and the whole.

* Facilitates Design Conversation.

2.1.2 Principles of Information Systems Design

This list of principles was developed specifically for guiding the design of information systems. However, we believe that the list is applicable to system design in general. We

need to note that, for us, design cannot be separated from normal (ongoing) operations of systems. While this may not be the case today, we believe that conducting design as a distinct stage, while well intentioned, cannot work in the long-run. In this light, the following is a list of principles for the operation (design) of an organization:

*** All systems have consequences**

and the ongoing conversation with the stakeholders makes the consequences explicit.

*** Create experience**

to maintain and expand the intellectual, technological, aesthetic, and ethical repertoire of the stakeholders.

*** The designer is responsible**

since the designer must be an integral part of the system, the impact, and consequently responsibility, of the designer never ends.

For us this is a **minimal** set of guiding principles. This set of three was distilled from a set of over two dozen. This minimal set covers the crucial aspects of design only if one makes certain fundamental assumptions about the nature of living (socio-technical) systems. Some of these assumptions seem to be contrary to the standard, commonly accepted set; consequently, we need to explicitly state them.

It is common practice to characterize systems in terms of the boundaries that define them. We believe that boundary setting is a useful heuristic for initially engaging a system. However, we believe that it is more fruitful to think of systems as "A domain of reality delimited by interaction" (Kampis, 1991). The salient point is that systems are involved in a multitude of interactions that are often not explicit, or not articulated. In fact, systems constantly seek-out new interactions.

Now, admittedly it is useful for us to identify boundaries for the purpose of constructing models. By definition, modeling is a boundary setting exercise. The epistemology of systems-design dictates that at any point in time we need to erect boundaries to preserve the validity of descriptions. However, the ontolgy of systems dictates that at a ny point in time the creative-dynamics of systemic-operations need to be honored if we are to realize the full potential of the system.

This is a delicate balancing act. We need to establish a balance between constraints and creative-dynamics. The constraints have to do with systemic purpose, designer responsibility, environmental constrains, etc. The creative-dynamics have to do with individual-potential, emergent aspects of the system, co-evolution with the environment.

Seen in this light, the minimal list of three design principles establishes a conceptual framework in which the designer(s) can operate.

While these results seem to be aesthetically pleasing, at least to our research group, they are highly tentative and need to be validated through application.

2.1.3 Establishment and Maintenance of a Design Community

This approach to systemic design relies heavily on the establishment and nurturing of a design community. The community is defined along at least two dimensions. First of all, it is obvious that the individuals engaged in the system's operations constitute a community. In this case the traditional heuristics for community maintenance apply. However, there is a second aspect that has to do with shared knowledge, with what is often called community knowledge.

Community knowledge is **not** merely the body of knowledge held in a common repository, accessible to all members of the community. Community knowledge is the practical "working knowledge" as it relates to the operation of the system, and as held by the appropriate members of the community. In the simplest terms we are talking about "knowing-how" as opposed to "knowing-that", a distinction formally made by Follett (1921), Ryle (1949), Kampis (1991), and others.

In terms of today's information technologies, a reasonable first step is to establish communications linkages that are bi-directional, that serve not merely to **distribute** "knowledge" but to **gather** "consequences". This is a most important point. In a community, the sharing of **consequences** of action is/becomes the systemic-glue that binds. Now, we are talking about more than simple homeostasis or feedback. We are talking about individuals and or groups being empowered to take action, to exercise their creative-dynamics as they invent ways to participate in the system, and do so without abdicating their responsibility for the good of the whole.

Given today's information technologies, one obvious step in this direction is the establishment of web-sites. The group has agreed to establish the first such web-site to serve the general information systems design community. Presumably, other web-sites will be established in association with specific design projects.

The fundamental design consideration for such web-sites is two-fold. First of all, the individual sites are intended to be highly interactive in the sense that the community of users is expected to contribute to the knowledge-base, as well as partake of the knowledge-base. The contributions are expected to be additions to the base-of-knowledge as well as information about the consequences of the application of knowledge.

The second design consideration is to provide effective means of linking the multiple web-sites together. Technically this can be rather simple; however, conceptually great care must be taken to preserve the integrity of individual design communities. A conceptual framework for accomplishing these two design requirements needs to be developed.

2.1.3.1 A proposal for the Lovable Computer Servants (LCS) site

As a concrete example of the factors to be considered in the development of such web-sites, we offer the following specifications:

* Image and target groups
  Image: LCS, their use and development
  Special target groups: Attractive for the young, useful for the elderly. Initiated and used by the others anyway.

- [Comment: first it has to be interesting and useful. If it will be used, the other goals can be achieved]

*** Background**

Systemic approach

- People self-development ["the only thing how you can help"]
- [Fuschl] conversation, IISI
- Ethical computer systems

[Comment: perhaps these are the most important goals, however they are kept on the background. The interested will have the possibility]

*** Functions**

Cases presenting and illustrating the concept

- Network of people

Contest and awards ["Do you want to meet the top brains of the world in this environment next year?"]

BI-annual meeting [in the mountains]

- Trail down to the background (the "How?" button)

*** Organisation**

Attracting the young

Part of the site

- Physical meetings giving the perspective
- Distributed development

The other groups as designers: elderly, educational, etc.

The office system for the IISI

Project management

Funding: INFOSOND, Technology Transfer, IFSR, Unusual systems (?)

Schedule:

Premises:

*** Cases**

LCS site

YAHOO etc. [What are you giving if all this exists already? But it can be improved - and can you do it?]

2.1.4 Contracting for Design

Design is NOT distinct from life. Specifically, in relation to the computing and information systems communities, the implication is that design is an integral part of on-going operations. From the perspective of a company involved in informations systems consulting, the responsibility of the company towards the client never ends. While this seems to contradict normal contract provisions, from a systemic viewpoint, the relationship between clent and consultant is an on-going one.

The relationship may lapse into inactivity. In fact, the consultant, having developed in the client the requisite competence to function autonomously, has an obligation to let the client control her/his/its own fate. However, the consultant has a perpetual responsibility as an initial guarantor of success. This responsibility cannot be avoided, as does not diminish with time.

2.2 Group Process Guidelines - Guarantor of Quality

Our experience indicates that there is a delicate balance between pre-structuring of the group process, where careful "deductive-orchestration" of interactions takes place; and dynamic evolution of group process, where the group experience is created based on "inductive-progress" (or lack of progress) toward group goals.

This inductive-progress is probably a version of transcandence, and may have to do with the expectations, held by individual members, of the "group ideal" regarding the quality of the results to be achieved. What we are referring to is in the aesthetic domain, more so than the rational-cognitive domain. The fundimental question revolves around the recognition of when "what has been achieved" is of high enough quality to warrant *closure.*

We are talking about a guarantor of quality, or perhaps guarantor of truth, or validity, or beauty, or justice. How does the group know that is all right to stop working on a task? What keeps the group going until this point is reached?

There is a wonderful paradox built into this series of questions. The condition that we are referring to is one in which one or more members are willing to risk the breakup of the group, by pushing the group beyond its normal limits, in order to achieve what she/he (they) perceive to be higher norms. The implication is that the group does not have the right to continue as a group, if it abandons the task pre-maturely. The paradox (and risk) in all of this is that significant intermediate (or final) results may be sacrificed in the quest for "higher" peaks, or that a false peak may be accepted as the ultimate goal.

2.3 Plan for Continuation of Research

The group agreed that this research effort needs to be sustained. The specific action items included:

* The preparation of individual concept papers.

* The preparation of (this) summary report.

* The establishment of the LCS web-site.

* The establishment of a non-profit institute, or research center, dedicated to the continuation of this work.

* The validation of our findings through application of the design principles in private-sector "real-world" environments.

The group concluded that the last action item, validation in "real-settings", is the most systemic way to further this line of inquiry.

3. Conversation Details

We began our task by generating a considerable number of trigger questions:

What is in an IS for cooperative design support?
What are the guiding principles for systemic use of computer applications?

What would a computer system that supported us look like?
Is there any independencies between socio-political and methodological issues?
What are the differences between computer supported design and human mind design?
What commonly held ideas has to change for human and technological evolution to become systemic?
How can we model cooperative design processes?
Are there design methodologies for wide-scale office systems?
What are the differencies between systemic design and human organizational ordering and technological arrangement?
How do you know if the system you are working with is systemic?
When is the design support enviroment a dictator?
How would we design a support system for a mecanistic research community?
What are principles, criteria and methods for IS design-audit and quality?
Can we compare and evaluate the changes in the personality of designers in designed IS?
How do you guarantee that the system remains systemic in your absence?
Can we find an example of a good mechanistic system and a good systemic system?
How do we estimate the size and cost of IS design?
How would a system that you design for your family be different from one you design for somebody else?
What would a first draft of proposal look-like?

Our synthesis of these questions yielded: What are the guiding principles for systemic use of computer applications?

3.1 Conceptual Aspects

Our conceptual work during the remainder of the meeting ventered on the synthesized trigger question.

What are the guiding principles for systemic use of computer applications?

To answer this question, we should know what "systemic" means. Some choices: healthy, quality, successful. A special definition (from the systems education group, could be also inserted into the guiding principles list): acting responsively, empowerment, (self)respect, appreciation, (dynamic) behavior, interdependence/dependence, life-long learning.

The guiding principles proposed by the group participants (numbered for ease of consideration):
(Healthy)ness, quality of the process
1. Are activity systems: have a consequence
2. Communication (continuos) with all stakeholders
3. Proper balance of client/developer interaction
4. Interactive & associative processing in heterogeneous environments
5. Design and use are synonymous
6. Quality determined by customer/client satisfaction (expectations satisfied)
7. Computer activity systems should not be addictive
8. Consequences for the stakeholders should be made explicit
9. Someone should make the tough decisions (and be identified)
10. Do what was intended and safeguarded against misuse
11. Flexible and secure communication interfaces (for access to user), help functions
12. Leaves decision in human hands - not WYSIWIG but SIWWIS
13. Integrated into target environment

14.Principles for systemic computer applications should be communicable to everybody
15.Transparent - rationale explained
16.Most principles are context sensitive
17.Adaptable for evolution of the environment and for predicted changes in it
18.Honors history, builds an information set
19.Transparent for maintenance and preserve design rationale
    Functional, reliable, usable, efficient, maintainable, portable (+24 sub-characteristics + 100+ metrics + 1K+ papers)
    Provide service at all levels
20.Guiding principles should be challenged and re-designed
21.Debate on "quality"
22.Maximum effect for least effort (80/20 rule)
23.Expand authorship of this list
24.Adequate education, technology, organisation, environment of the developer
25.Be able to create [with] technology
26.Develop an adequate authority and legal structure within the system
27.User is responsible for actions of his/her servants
28.Establish/destroy borders
29.Invent and promote new ways of communication
30.Try to achieve consensus on the three ethical levels

3.2 Group Process Aspects

The issue regarding the guarantor of quality surfaced on a number of occasions. In general, as the group appeared to make significant progress, even reach closure on some issue, some members seemed not to acknowledge progress, seemed not to be infected by the jubilation of the other members. At these times, the individual(s) in question would seem genuinely distressed.

In one instance a person stood up and proceeded to pace around in a circle, in obvious distress. At other times, individual(s) would appear to withdraw from the group, or exhibit passive-agressive behavior. In the extreme cases, the viability of the group, as a group, was put on the line.

Now, these behaviours are not a-typical, are probably routine consequence of group-work. What marked these episodes as significant, for us, was that the group (in response to the distress of the members-not-yet-on-board) persisted on task beyond normal limits, and often made breakthroughs by continuing.

As we mentioned earlier, most memebrs of the group had worked together many times in the past. For this reason, we could dispense with "normal" group-forming ceremonies. Furthemore, each of the new members added new depth to the group composition. It is probably the case that guarantor of quality, as a function, may arise in more mature groups. However, it seems reasonable to formally acknowledge this role in all groups.

We should note that quality in this case involves more than the "AHA!" experience. What we are talking about are instances where most of the group perceived an "AHA!", that was either not acknowledge by some, or not taken as "significant enough" by some. This is essentially a **spiraling of expectations**.

We should note that the guarantoor of quality was not always the same person. Furthermore, there is probably no agreement on precisely when these episodes took place, beyond vague agreement that something like this seemed to be at work.

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APPENDIX A

A COGNITIVE MAP OF OUR CONVERSATIONS

A COGNITIVE MAP OF OUR CONVERSATIONS

Cognitive maps are created, reflected upon, and recreated. They are living. They represent the world-view of our experiences

OUR CONVERSATION

is a collective cognitive process, a knowledge and experience based disciplined inquiry that explores the diversity of our ideas, beliefs, and propositions

in order to

CONSTRUCT shared meaning of the issue addressed and gain new insight and understanding — and — **DEVELOP COMPETENCE** in conducting systems and design inquiry

needed to build

our families, the systems in which we live, work and serve, and our communities

into

LEARNING and DESIGNING COMMUNITIES

that have the

CAPACITY (organizational and resource) — and — **COMMITMENT** compassion, flexibility, creativity, curiosity, patience, and trust in self and others

needed to

CREATE

design cultures that enable us to design

authentic, sustainable, intelligent, ideal and purpose-seeing, liberating, learning families, systems, communities, and societies — THAT — serve their own purposes, the purposes of their members, coevolve with their environment, advance human betterment and--above all--serve future generations

APPENDIX B

THE PREFACE OF THE SUMMARY REPORT

OF THE FIRST FUSCHL CONVERSATION, APRIL, 1982

VIEWING THE GLOBAL PREDICAMENT

As we approach the end of the 20th century, social changes caused by unrestrained growth or technological advance are no longer viewed as the route to a better future for humanity. These changes have occurred much faster than the corresponding rate of adaptive social behavior and our ability to guide them. They put man on a collision course with his own creations. We can now look back to two decades of research and analysis of this predicament.

For twenty years, scientific inquiry has addressed practical world problems -- involving environment, population, agriculture, pollution, and health care, and issues related to transportation, management, economics, and the human habitat in general. However, each of these problems and issues have been analyzed alone, as if it would be and could be isolated from each other.

Systems science and systems inquiry present a new scientific paradigm: a science of organized complexity which, through its integrative and transdisciplinary orientation, allows for the comprehension of connectedness and the management of complex systems or problems.

Pioneering work in systems science has provided us with a new understanding of our world, much of which is based on the ever expanding knowledge about global systems. This understanding can provide the ground rules for implementing changes without being entrapped by attempts at social engineering or utopianism. It defines present conditions and alternatives in the following manner:

- Man and his global environment constitute an extremely complex systems, which is more than and different from the aggregate of interactive components. All human activities express themselves through these dynamically connected components which mutually influence each other. Problems affecting mankind's future can only be studied and resolved in the context of the entire planetary system.
- Accelerated and uncontrolled change for which little or no societal adaptation exists can lead to breakdowns which multiply their effects throughout the entire world.
- Mankind needs to manage the global community system with as much or more care and planning as has been observable within national boundaries.
- We must be guided by the broadest possible world view that enhances a deep understanding of the complexities, the perils, and the potentials of our collective action.

A. *Preamble*

The agenda below addresses the task of education for global awareness and fostering a systemic approach to the solution of global problems, whereby:

- individuals and institutions are encouraged to recognize their inescapable involvements in, and responsibilities for global concerns;
- world problems and their histories are mapped and their effects reviewed;
- systemic views of global issues are created; and
- flexible and self-regulating strategies for improving conditions are developed and implemented.

B. *Agenda for Research, Development and Interaction*

- AWARENESS. To encourage individuals to deepen their understanding of global problems and their potential contributions to their solutions.
- RESPONSIBILITY. To make clear the ethical responsibilities and professional obligations of systems scientists to promote awareness of and search for solutions to global problems.
- COOPERATION. To develop a climate of cooperation in which links can grow between individuals, professional societies, institutions, cultures and nations for the dissemination of information on global problem situations and options for addressing those situations.
- CREATIVE LEARNING. To examine the role of formal and non-formal educational systems in building new arrangements for systems thinking based global learning.
- FRAMES OF REASONING. To further develop systems perspectives, frames of reasoning and improved methods for the characterization of the dynamics of global problems.
- CONSTRAINED SOLUTIONS. To identify specific strategies that widen perspectives, generate shared understanding, and promote feasible solutions to global problems which respect cultural differences, human potential and freedom, man's symbiosis with nature and enhance the quality of life for all.
- DECISION-MAKING. To encourage decision-makers to recognize the complexity and self-regulating properties of real-world systems so that solutions to global problems can be implemented at a local level without inducing uncontrolled instabilities and side effects.
- SOCIAL-ACTION. To encourage informed and enlightened social-action in addressing global problems at all levels.

C. Implementation

We intend to implement the purpose and the agenda described above as follows:

- *to focus our own work* – be it research, development, teaching or technical assistance – on addressing global concerns and commit ourselves toward the improvement of the human condition everywhere and the enrichment of quality of life for all;
- *to influence and encourage* our colleagues in the systems science community, particularly those we share work assignments with, to be guided by the same commitment;
- *to promote in the systems science societies*, institutions, and groups:* the consideration and adoption of the agenda described above and the development of programs of reserach and agendas for conferences that address global issues as a system of interdependent issues.
- *to assist and advise in the development and implementation of systems thinking based education* at all levels of education as an essential part of education in global awareness.
- *to encourage transnational cooperation and coordination among systems science societies* that address global issues and concepts by bringing into their deliberations a systemic orientation and the organizing perspectives and the paradigms of systems philosophy, theory, and methodology.

A CLOSING THOUGHT

You may ask – as we have asked ourselves – what can a small group like ours do? We do not have – and never will have – the illusion of "grandeur." We know very well that our voice is a small voice but it will be persistent and spoken in many languages as the years go by. We are *guided by an evolutionary vision of the global unity of mankind and the full development of human potential everywhere* and we dedicate ourselves to work on the agenda we developed in the course of our meeting. We are inspired by a shared dream for a better world for all.

When our children and grandchildren ask us – as they do –, "What kind of a world shall we inherit from you?", at least we can tell them that we will do everything within our power to leave them a more livable and peaceful world with more humanness and love in it, and more opportunities for the realization of their potential and for the enrichment of their inner quality of life.