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"Emergence and Creativity in Organisations"

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Abstracts of Papers

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Chair: Frans M. van Eijnatten
Eindhoven University of Technology
E-mail: F.M.v.Eijnatten@tm.tue.nl

Conference Secretariat
Overmars Organisatie Adviseurs
Dorpsstraat 74
3732 HK De Bilt
Voice: +31 30 634 73 20
Fax: +31 30 634 73 22
Website: http://www.overmars.nl
E-mail: info@overmars.nl

Chaosforum.com
Website: http://www.chaosforum.com
E-mail: info@chaosforum.com

Abstracts of Papers to be presented at the Second Meeting of the European Chaos/Complexity in Organisations Network (ECCON)

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Emergence and Creativity: Creative Solutions to Govern Emergent Order in Complex Social Systems

Ton van Asseldonk, Leon Berger & Erik den Hartigh

TVA Developments BV, Veldhoven, The Netherlands, Voice: + 31 40 23 00 100; Fax: +31 40 23 00 200; E-mail: tva@tva.nl; edh@tva.nl

Abstract

Why is a roundabout more effective than a crossroad with traffic lights? The essential difference is the way we govern emergent order in complex systems. Traffic lights are an example of a highly sophisticated central management solution to a complex problem. And yet, despite all this sophistication, we find ourselves standing still before a red traffic light even when there is no other traffic on the road. Roundabouts provide a much simpler solution to the same problem: a simple repetitive rule – left-hand priority – ensures effective traffic throughput.

In this article we argue that similar issues arise in many complex social systems. How to organise the health care system? How to reduce packaging in supply chains? How to improve traffic safety? Different as they may be, these issues share a central question: "How can complex social systems be governed to show meaningful and purposeful behaviour?"

Traditionally we are inclined to solve complex problems by improving the central management and predictive power of the system. In this article, we argue that this is a dead-end road. The self-evident alternative, leaving the system to itself, is equally flawed because it will lead to chaos, and the price to pay for this chaos is socially unacceptable. And yet, roundabout example clearly shows that this kind of problem can be solved.

What are the principles of emergent order underlying these solutions? How can these principles be applied to govern complex systems? On the basis of a number of examples of complex social systems, we show in this article that creative solutions are a necessary in order to govern these systems toward meaningful and purposeful behaviour.

Self-Organisation and the Co-Worker

Tomas Bäckstrom

National Institute for Working Life, Organisational Development and Learning
SE-112 79 Stockholm, Sweden
Voice: +46 8 730 95 20; Fax: +46 8 730 19 67, E-mail: tomas.backstrom@niwl.se

Abstract

Environmental conditions for a lot of companies are volatile. Ambitious companies has to be able to initiate and control parts of the changes in the market by itself; i.e. to be a transformative organisation capable of complex behaviour. Self-organising co-workers may be one way to reach this goal. Self-organisation is a process of interaction between independent actors characterized by:

- Order for free, a natural tendency to move toward order without energy consumption,
- Continuity as well as transformation at the same time,
- The emergence of the truly unknowable.

For self-organisation to occur in human systems actors have to trust their co-actors enough to allow lose of control and to follow the emergent line of action. Such a vulnerable conduct suggests one more characteristics of self-organisation:

- Self organisation is only possible in groups where most of the members have known each other for a while, and have confidence-inspiring experiences.

Joining a process of self-organisation the actor may choose different strategies. One is to give up your own will and throw off the responsibility for contributing actively. Another is to try to take control; make a pre-planning and try to drive your understanding of the truth through. Both those strategies run the risk of undoing self-organisation. In the first strategy you are not really an actor, but a passive thing. And in the second you are not really a part of the group, but someone standing beside it, trying to use it. Self-organisation requires that the actors paradoxically uses both of those extreme strategies at the same time. A fifth characteristic of self-organisation in human systems is accordingly:

- Each actor give expression to his/her views and criticise other's and on the same time listen to the other actor's views and criticise his/her own.

Gaming Approach Route 26: A Combination of Computer Simulation, Design Tools and Social Interaction

Mike Duijn & Ben Immers

TNO Inro, Delft, The Netherlands, Voice: +31 20 692 6811/6848;
Fax: +31 15 269 60 50, E-mail: bim@inro.tno.nl; mdu@inro.tno.nl

Abstract

Many policy problems in the field of urban planning and traffic management can be characterized as 'ill structured problems', i.e. there is little consensus about 'goals and facts'. The policy making process for such problems is a learning process, a continuous search for acceptable goals and relevant knowledge. TNO Inro was asked to facilitate a policy making process, aimed at solving such an 'ill structured problem': the congestion problems in and around medium scale cities, taking into account that these cities are also facing substantial challenges in the field of spatial planning.
In our workshop design we used gaming techniques combined with a traffic simulation model (Paramics) and a spatial design tool (Smartmap), that is supported by an interactive white board (Smartboard). The simulation workshop was successfully tested on a group of experts who are usually involved in regional traffic and planning problems, i.e. representatives of the national government as well as chamber of commerce, environmental groups, local governments, transportation enterprises, employers and consumer organizations, each playing their respective role. Although a fictional, not existing region (Maasmere) was used, the simulated problems in the region and the roles in the game were derived from real life situations and thus recognizable for the participants.
To put it briefly, Spelaanpak Route 26 (in English: Gaming approach Route 26) uses computer simulation and design tools for which input is generated by the social interaction between group members. The participants have to negotiate what will be the input for the simulation runs as well as the spatial designs.
The experiences from the test run were used to improve the design of the workshop. We learned e.g. that the planning focus (short term vs. long term) plays a crucial role in solving the problems encountered. Therefore, in the improved version of the simulation workshop, the short term and long term planning assignments are further elaborated and represented in a more prominent way.
It is our aim to apply this simulation workshop to a real situation: a region facing congestion as well as planning problems, whereby the solution requires a multi-

coloured participation from the policy network. We are convinced that the simulation workshop can play an important role in the policy process phase of problem structuring. The simulation approach will help to identify the main policy issues, i.e. what are the perceived problems, can we reach an agreement on what our problems are, what are possible and acceptable policy options, and so on.

Navigating and Path Finding by Using Dialogue
The Evolution of Dolphin Behaviour in a Dutch Manufacturing Firm.

Frans M. van Eijnatten & Maarten C. van Galen

Institute for Business Engineering and Technology Application, Eindhoven University of Technology, Faculty of Technology Management, The Netherlands, Voice: +31 40 247 24 69, Fax: +31 40 243 71 61; E-mail: F.M.v.Eijnatten@tm.tue.nl

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Stork PMT, Boxmeer, The Netherlands, Voice: +31 485 586 311; Fax: +31 485 586 484; E-mail: maarten.vangalen@stork.com

Abstract

This paper documents a series of interventions in a Dutch capital-equipment manufacturing firm, which are focused on the development of the organisational mind, seen through the Chaos lens. The organisational goal is to facilitate self-organisation.
The project was executed in a capital-equipment manufacturing firm in the South of The Netherlands, which is specialised in developing and producing tailor-made, complex processing systems for the food industry. Its rich history of organisational development dates back to 1988. Up until 1999 the company evolved into a fully team-based organisation, using Socio-Technical Systems Design as the main re-design approach. However, an evaluation study carried out in 1999 revealed, that – although numerous projects have been successful both in implementing new team structures in production, sales, R&D, and service, and in increasing productivity – individual performance did not show much development. Management complains that the taking of initiatives by employees still is below expectation. Therefore, medio 1999 management, researchers and consultants worked together to explore some possibilities how to furnish the renewal process with new impulses.

The diagnosis that came out of that process showed that the interior aspects – the actual thinking of individuals and groups - were less well developed than the exterior aspects –tasks, structures, processes, and systems. In terms of Wilber's (1996) four quadrants, this means that the holons were functioning in an unbalanced way, producing constrained possibilities for self-organisation. A remedy to repair this incompleteness constitutes of introducing dialogue as the main mode of

communication in the manufacturing firm, in order to develop the thinking process (intentional and cultural aspects) to the same degree as the tasks, structures, processes, and systems did (behavioural and social aspects) in the past ten years. The goal of practicing dialogue is to boost the holonic potential of the organisation in order to enable it to re-design and transform itself from within, and to jump to a next level of complexity and coherence, while making use of emergent processes of self-organisation and self-reference to their full extend.
The introduction of the new concepts, and the consecutive change trajectory was 'planned' and executed by a team of managers, researchers and an external consultant. Over a period of three years a great number of sessions were held: Introductions into Chaos, and consecutive workshops in small groups were held to let management actually experience dialogue and emergent leadership, and develop the basic competences in using it. The leadership sessions became known as "Dolphin training".
In this paper we will go into detail about the way a chaordic project is 'planned' and executed as a 'navigating' and 'pathfinding' exercise instead of a planned change effort. Also, some methodological aspects of doing 'chaordic action research' will be presented.

We Third-Milllenium Minds: Opening the Human Glass Fibres of Third-Milllenium Minds

Cees de Groot

Non Fiction Egolution Productions, The Netherlands, E-mail: cees.de.groot@dwr.nl; Welllmm@nepeta.demon.nl

Abstract

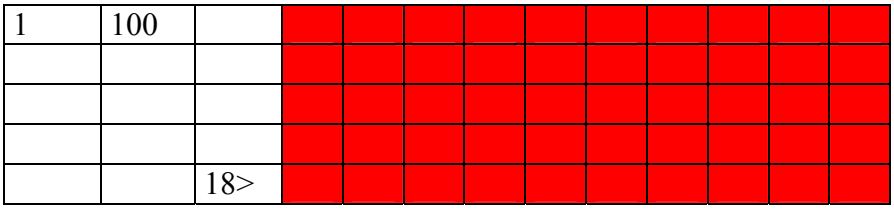
Generation Building: Third milllenium thinking will get rid of some tabus that were disturbing human bindings in previous milllenium. Well, things happen as they do so often when apparently not changable conditions are consumed as hard facts by degenerating selfs being comfortizing human : egoists!?

Tabus:

- Everyone is equal in a election system (from the age of 18),
- One has only one vote,
- One has to vote within one party,
- Ones vote, in which one puts ones belief for a coming period, is secret,
- Only on one (election)day one can deliver ones vote.

In the end there may be a world (to win) of new possibilities and perceptions for democratic societies.

Draft for a 2nd milllenium voting system



First now we replace the idea of 1 vote by 100 point … in the same draft.

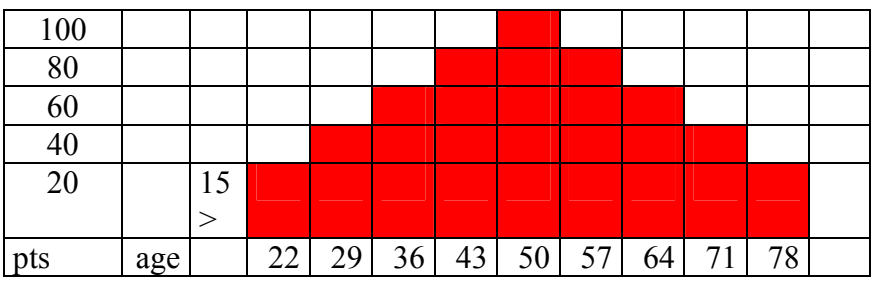
Next, we take a meditative moment … considering … :

- A mindshift reflected by the Shakespeare saying … to be or not to be … ; and also replace the verb 'be' by such as … know, learn, share.
- Once somebody (think of Steiner / Antroposophe) suggested … if only i could teach my thoughts of wisdom to 12 other persons (and those ones each to 12 other ones too) … than i can be a satisfied man.

For the design of the new votingsystem we assume the next principles as essential:

- A seven year cycle,
- A different draft for local election system which is similar to the delocal system (presented below),
- The system is self corrective taking the goals as standard objective,
- When starting to participate in the system one starts with 20% of the max. 100 points a person,
- Only 50 % of the point may be put to one candidate,
- Principle of divide: 20 pts at least 3 candidates get points; 100 … 11; (so: 40/5;60/7;80/9),
- A civilian who fully participates in society and feels a personal contribution … surely will find this responded by (the voting behaviour of) his personal neighbourhood,
- One can change one 'votingmirror' when one wants to,
- Once in 3 months inquiries to the votingbank will be free and allowed (rest closed),
- … (further research needed).

Draft for a 3rd milllenium voting system (delocal):



Creativity as a Complex Phenomenon

Saskia J.M. Harkema

University of Nyenrode –NOTION
Straatweg 25, 3621 BG Breukelen, The Netherlands
Voice: +31 346 291 225; Fax: +31 346 291 250; E-mail: S.Harkema@nyenrode.nl

Abstract

In innovation literature, knowledge creation is regarded as the phase prior to the actual innovation process. This is called the Idea phase in most innovation models, which are aimed at regulating innovation processes (Cooper 1987, Wheelwright& Clarck 1992, Utterback, 1994).
In this paper I would like to bring forward and unfold the argument that knowledge creation is actually a continuous process that lasts up until the actual development of a product or service, which I regard as embodied knowledge (Coleman, 1998). In this process knowledge originates at the individual level and is created and re-created in a learning process. This is usually done in a project team. Whereby the project team is seen as a permanent structure that is imposed on groups of people to guide and regulate their behavior. Project teams are however context- and history dependent, and as such particular and unique (see e.g. Engwall, 2002). Creativity processes in organizations are usually channeled through a project structure like for instance NPD funnels, or Product Innovation Charters (Cooper, 1987) and as such are regarded as a phase in the innovation process. I will argue that this is counterproductive to real creativity.
In this paper an alternative approach on creativity and project management will be highlighted based on complexity theory. A multi-agent simulation model was built to demonstrate what some of the effects are of this approach, which is based on knowledge sharing, learning and flexible project structures and boundaries. The simulation gives insight in the conditions under which project teams learn and share knowledge, *i.e.* create knowledge and gives some insights in how creation processes work. This will have repercussions on project management; a subject that will be dealt with at the end of this paper.

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Creativity and Software Support in Project Teams

Scott Little, Toni Wäfler & Gudela Grote

Swiss Federal Institute of Technology (ETH), Institute of Work Psychology, CH-8092 Zurich, Switzerland; E-mail: little@ifap.bepr.ethz.ch; waefler@ifap.bepr.ethz.ch

Abstract

Within the EU Project PSIM[1] the prototype of an IT tool has been developed for supporting project teams in reorganizing production units. The tool is based on the sociotechnical approach and was designed for participatory use involving employees of the production unit being reorganized. The project team is heterogeneous as employees from different levels of the hierarchy performing different tasks constitute the project team.
The context of participatory project teams involved in reorganization processes is characterized by specific features. One feature is that participatory project teams need to reflect upon their own day to day work. This has the advantage of utilizing the specific expertise of the project team, on the other hand the different members need to disengage from their personal work roles and preferences in order to develop solutions (suggestions for a new organization) that optimize the production unit as a whole. Another feature is the complexity of the task. The project team needs to consider numerous social and technical aspects and their interactions jointly (sociotechnical approach).
The IT tool offers support for dealing with the complexity by means of a simulation network that increases the transparency of the interactions of the different aspects. In addition visualizations facilitate the handling of complexity. Furthermore the tool guides the project team through the problem solving process with help of a flexible procedure.
Our interest is to study how creativity can be fostered and guided in project teams in the described context. The creativity of the project team is essential for deriving solutions that are innovative and enable a significant advantage.
A research plan for investigating creativity and team processes will be presented. Actual project teams will be studied in their working environment and in addition an experiment will be conducted in which certain aspects can be focused in more detail. Based on the results of the study requirements for IT support that foster the creativity of the project team will be derived.

[1] EU IST-IMS PSIM Project (Participative Simulation environment for Integral Manufacturing enterprise renewal (IMS 1999-00004)). The project was funded by the European Commission and the Swiss Federation. PSIM was part of HUMACS, a project within the international IMS research program.

New Product Development as a Complex System of Decisions

Ian McCarthy

University of Warwick, Warwick Manufacturing Group, Coventry, United Kingdom,
Voice: +44 247 652 4741; E-mail: i.p.mccarthy@warwick.ac.uk

Abstract

Empirical research shows that decision activities constitute a considerable percentage of the time taken to develop new products. These activities also determine the final product quality, innovation, cost and reliability. Thus, as organisations seek to reduce new product development (NPD) lead-time, they must also maximise the overall output in terms of value. This means that lean and concurrent NPD processes, should not be achieved at the expense of creativity, innovation and adaptability.
To address this problem, this paper presents a conceptual model and case study of the NPD process as a complex system of decisions. It provides a better understanding about how to effectively design and manage the NPD process as a complex system of decision activities. The model presented provides a process map and a generic categorisation of the decisions involved in the development of new products. The process map illustrates the characteristics of a complex system, *emergence*, *learning* and *self-organisation*. This provides knowledge on how system issues such as connectivity, uncertainty and feedback influence the behaviour of the NPD process. The model also demonstrates how complex systems characteristics influence NPD performance measures such as lead-time, cost, innovation, reliability and quality.
The model is built using decision analysis software and qualitative data collected from case study organisations. The data is processed and analysed to reveal the underlying mechanisms (structure, uncertainty, risk, etc.) of the decision activities. The paper also presents a case study of an engineering organisation's NPD process. This demonstrates the methodology, the model and illustrates the complex system characteristics of the NPD process. The paper concludes by discussing the implications of complex systems theories and methods in the design and management of the NPD process, and outlines future directions for this research.

Simulation Study of the Effects of Time Delays in a Coupled Chain of Information-Driven Actions

Kenneth Preiss & Daniel Vekstein

Departments of Business Administration and Mechanical Engineering,
Ben-Gurion University of the Negev, Beer-Sheva, Israel
Voice: 972 8 647 7097; Fax: +972-8-64722813
E-mail: preiss@bgumail.bgu.ac.il

&

The University of Adelaide, Adelaide Graduate School of Business, Adelaide, Australia, E-mail: daniel.vekstein@adelaide.edu.au

Abstract

Computerized simulation studies were used to study the effects of time delays in information transfer in a tightly-coupled chain of information-driven processes. The paper discusses the reasons for using computerized simulation studies and the possible problems to be taken into account. Oscillation of parameters in tightly coupled dynamic processes is a well-known phenomenon. The dynamic response can be damped, or can diverge; the literature lists many factors that can lead to such diverging oscillation, which in supply chains is known as the "bullwhip effect". Results of this work showed that if the actual time delay is above a crossover value, then the system will necessarily oscillate. In other words, even if all the other factors referred to in the literature had perfect values and did not apply, oscillation will occur. Actions in the simulated system were triggered by information signals. The actions progressed serially from node to node in a simple chain (a connected graph with two nodes of degree one, and all other nodes of degree two). The information that triggers the actions need not necessarily go along the same path as the actions. If the information does go along the same path as the actions, then we have a serial system of information transfer. Another way of sending the information is to have each node collect information from a hub, for example a web site. In this case the information transfer is in parallel. For parallel topology the value of the crossover time delay is much higher than for the serial topology.
These results suggest the following. One can postulate various topologies of connection between actions and the information flows that trigger the actions. The flow of actions may be a combination of serial and parallel flows. The flow of information also can be a combination of serial and parallel flows, but may be a different topology than for the flow of actions. In this system time delays in the transfer of information that lead to action can have a great influence on the dynamic response of the system. The value of crossover time delay above which oscillation occurs, is likely to have a much higher value for parallel information topology than for serial topology.

Tactics and Strategies in Complex Problem Solving: A Systems-Dynamics View

Ole Elstrup Rasmussen **&** **Jørgen Aage Jensen**

SimCom: Simulation Studies of Competence and Qualifications

University of Copenhagen
Voice: +45 353 28 771
Fax: +45 353 27 745
E-mail: Elstrup@axp.psl.ku.dk

The Danish University of Education
Voice: +45 26 306 649
Fax: +45 39 692 415
E-mail: jaj@dpu.dk

Abstract

Two types of action, goal-oriented action and route controlling action constitute problem-solving courses in complex, dynamic problems. The former concerns establishment of what to aim for, and the latter concerns the ways and means of how to achieve the aim(s). The main intent of the paper is a discussion of our attempt at modeling handling of information during problem solving courses by a cusp-catastrophe with route controlling and goal orientation as control parameters. In the SIMCOM experiment three teams, each of two persons, are set a task that simulates a virtual international reality of global enterprises concerning the construction of plants, manufacturing, sales and the financing of products. One type of data collected is the team's verbal exchange during the handling of the task. This flow of talk appears as a text, divided into a sequence of text blocks, each of them delimited by two variables, type of activity and objective of talk. Five levels of activity are distinguished, information acquisition, -clarification, -adapting, -ordering into alternatives, and -exploitation, patterns of which determine the type of information handling. The objectives constitute the universe of subject matter that the team has dealt with, and certain features of this universe distinguish the two control parameters. The hypothesis examined is that values of control parameters and occurrences of different forms of handling information during the course of problem solving vary in accordance with a cusp-catastrophe.