Strategic Planning of an Autopoietic Information System

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Abstract. *In this paper we consider implementation possibilities of an autopoietic information system for transparent, open and public political project management through a web interface as well as for further development of Internet democracy. We have developed proper documentation for such a system using the strategic planning of information systems (SPIS) framework. We show that it is possible to use this framework in strategic planning of social information systems that can potentially have a large number of users. In the end we give guidelines for the implementation of such a system.*

Keywords. strategic planning of information systems (SPIS), autopoiesis, autopoietical information system, TOP principles, integral decision making process, balanced scorecard, documentation, WEB 2.0

1. Introduction

In this paper we want to draw attention to a project that aims on the implementation of an autopoietic information system [1] with accent on the possible use in further development of Internet democracy, political project management and it's integration into common social systems. The main idea is to use modern concepts from organization theory (the fishnet organization, virtual organization, Balanced Scorecard etc.), communicology (mind mapping, idea writing etc.), decision theory (integral decision making process, multicriteria decision making methods etc.), information and communication technology (WEB2.0, semantic web, wiki, forum, blog, Open Source etc.) and organizational chaos theory (attractors, autopoiesis, butterfly effect) to constitute a sustainable autopoietic information system which will allow political organizations, activists, parties, syndicates and other individuals to get in touch with the public and create a world wide network of political entities. This project brought together a group of enthusiasts, parties and syndicates from all over the world which resulted in a extensive documentation of an autopoietic information system as well as definitions of what an autopoietic [7] information system actually is and what are it's possible implications.

The project is based on Open Source development, or better said it's based on TOP (Transparent Open Public) principles of project management as argued further. Almost every document referenced in this paper is openstanding, which means always open for further development and discussion, as well as transparent and public to every individual or organization which might want to join the project.

A question to ask here is how to efficiently and effectively implement such a system? The main problem in answering this question is that no such system exists so far, as well as that there is no person who could know how such a system should look like. We try to answer this question by introducing Strategic planning of informations systems (SPIS) [2] as a powerful framework for information system planning and development.

Strategy is about making decisions on how to manage the overall organizational resources, whereas strategic planning is the alignment of these resources with environmental factors [3; 3]. Strategic planning consists in its essence of answering three simple questions:

1. Where we are now?
2. Where we want to be?
3. How we plan to get there?

By answering those three questions, especially the last one a strategic plan is obtained [13; 7]. SPIS represents long-term planning of useful information system and information technology effects inside the strategic development plan of the organization as a whole [2].

A distinction that has to be made here is that SPIS is a framework developed in the context of organizations e. g. it's result should be an information system which supports an organization (be it an existing one or a planned one). The autopoietic information system shall support not only a number of very different organizations, but also in a broader aspect a number of very different social systems (e. g. communities). Thus we use SPIS in this paper in a broader aspect than usual. We are trying to create a strategic plan of an information system which should support a complex (chaotic) social system, which contours are just a shadow on the edge of cyberspace. Also, not only the information system has to be modeled but also the social system it self which in the end means to "set up the stage where the drama of life will take place" (a popular phrase which is used to describe the modeling of organizational architecture)[13; 2].

2. Main Ideas

In the beginning of the project there was need to explain why there is need for strategic planning of such a system and why such a system should be modeled at all. This discussion ended up with a document which we will rephrase here in short [10].

2.1. The Importance of Modeling the Autopoietic Information System

The modeling of a new information system is an important step, if not the most important step in the development process. During this modeling a conceptual model of the system is developed that should as well as possible describe the new systems structure (elements and their relationships), functionality (purpose) and the inputs and outputs of the system.

In complex systems even small events can have huge implications, so that even little changes in starting conditions can completely change the output of the system. This sensibility to starting conditions is popularly called butterfly effect because of the interesting analogy that a butterflies wing wag in Hong Kong can be the cause of a hurricane in Florida.

The autopoietic information system shall be a platform for the constitution of a new political environment, Internet democracy. It shall be the source of public opinion, a virtual meeting place for political projects and other activities.

Attractors are dynamic tendencies of a chaotic system. So called strange attractors, which are typical for chaotic systems, describe the tendency of a system to a defined set of acceptable values, even if no value or sequence of values ever revolves.

Another fact to point out here is that by modeling the information system strange attractors for the future social system are intentionally set up. There is probably no method to predict the future development of the system, but by setting up an initial model certain guidelines to this development are constituted.

Autopoietic development according to the principles of the Open Source paradigm, under certain conditions, guarantees the system's self optimization. Namely, these conditions include a large enough user base, and an initial system that than be continuously tested and optimized. But these conditions are not satisfied at this very moment, so a natural question is how to test a non existing system without any users? One possible solution to this problem is the simulation of the system. Simulation can, to a certain degree of probability, answer plenty questions like:

- How will the system function when 100 000 users are using it?
- How will political project evolve?
- How will a distributed system work with 30 servers?

These and similar questions cannot be answered at this very moment.

The autopoietic information system is complex and enters a broad spectrum of different systems of men kind. This is why the system should be modeled using a scientific approach, which is why we decided to use an adapted SPIS framework.

2.2. The Distributed Central Information System [10]

The creation and development of alternative projects or even the takeover and forking of projects in the Open Source domain is rather the rule than the exception. Nowadays, maybe the best known Open Source project, Linux, has many different distributions, which are similar but often even incompatible to each other. Since the autopoietic information system is developed in an Open Source manner, such situations should be taken into consideration.

One of the ideas of the project, is to legitimate one central (official) system to be the relevant source of public opinion. If multiple systems were developed, how should this legitimation be achieved? Legitimacy is an important factor in political project management and especially political decision making.

If we take the possibility of development of alternative and forked systems as well as possible add-ons and upgrades as a fact, than this fact can be embedded into the information systems model. With such an approach legitimacy is possible even if a potentially large number of systems exists, as elaborated further.

The main issue to consider here is to achieve compatibility and interoperability of such systems. If a possibility of interconnecting such systems is build into every one of them, and this possibility is provided as a requirement for starting a new system, every new system will automatically be connected to all others already existing. In this way a legitimate network of distributed systems is constituted which are interconnected through a common protocol of interoperability.

P2P (Peer to peer) network seem to be a natural choice for such a protocol. By implementing an interoperability module to the system (under the presumption that most of the started systems are willing to participate in the network) logically there exists only one entity – the autopoietic network – even if physically there are potentially a lot of different systems connected. Since all information is available from any of the systems, the network can be transparent to the users, which anticipate only one entity.

In this way a distributed information system can be constituted which still appears logically central, a unique entity, and thus legitimacy can be achieved.

2.3. TOP Principles [11]

TOP which is an acronym for transparent, open and public is the attempt to bring Open Source principles into a political and broader into a social context. TOP principles try to answer the question how should projects, that are not necessarily information technology based, be managed in order to preserve all the benefits found in Open Source projects.

While in Open Source projects the outcome is in most cases information (in a very broad sense), the outcome of political, social and thus organizational projects does not have to be alike. Thus, the question is how to raise Open Source principles to a higher, more general level? How to retain the benefits of Open Source in a new context by not infringing it's main principles at the same time?

- TOP principles try to answer those questions through a set of rules and procedures. It can be stated that TOP principles consist of:
- TOP infrastructure (a standard which in turn pulls a certificate and institutions which provide certificates and licenses),
- an integral decision making process and
- an autopoietic information system which supports the above mentioned.

The standard defines the fundamental principles that must be adhered by any individual, organization or community in order to get a certificate. These principles, among others, include the principle of transparency (all processes, especially decision making processes should be transparent and well documented for the public), the principle of openness (all information is openstanding and the public has influence on it's content) and the principle of publicity (all information is public and must be published on an autopoietic information system in order to gain value). The standard also defines the necessity of making decisions through an integral decision making process which is completely defined, and the need for an adequate autopoietic information system (without any intention to define which system this has to be, i. e. this could be any system that follows the defined principles).

Projects managed through the autopoietic information system, are protected through a license. This license defines that any projects documentation is transparent, openstanding and public but with a constraint of usage. The project documentation can be used only by individuals, organizations and communities that posses the adequate certificate. In this way we are trying to achieve a “closing inside openness” (similar to Open Source).

3. Developed Documentation

Since this project was managed in an Open Source manner various methods and techniques from the SPIS framework were used which resulted in a lot of different documents and specifications (in particularly methods used were Balanced Scorecard, decomposition diagrams, work flow diagram, data flow diagram, ERA (entity, relationship, attribute) model, relational model, and use case diagram [8]). The following is a short compilation of what is achieved so far.

3.1. Balanced Scorecard [10]

To focus the strategy during the project a Balanced Scorecard [5] was developed. In order to define one or more strategies a vision and a mission statement is needed. To define a vision marked trends, expected development in technology, and users and stakeholders (which in this context become a new meaning) expectations must be considered [6].

The intention is to develop information and communication infrastructure for a political and social system based on Internet democracy in which the whole public has a right to participate, not only individuals or parties. A system that should make it possible to hear the voice of the people, not only the voice of politicians or political parties. A system in which the only competitive advantage will be ones knowledge, not manipulative capabilities. A system in which ideas of great value to the community will be accepted, not ideas of great value to specific interest groups and people. A system in which the best in specific parts of humanity will be revealed.

The Internet seems to be the technology media for making such a system true, specifically through Open Source as a philosophy of free software. The autopoietic information system which should be a virtual place for political discussions, project

management and decision making is the main tool of this order in which all stated should be made possible. This interface should be the framework of interconnecting a network of political subjects.

The vision is the main criteria to form the missions. Missions are current and future occupations the organization wants to deal with. A mission has to give the answers to the following questions:

1. What (What are the new products and/or services?),
2. How (Which processes and technologies to use?),
3. Why (What do we get with the production and selling of this products and/or services?), and
4. Who (Who are the users/consumers?)[6]

The autopoietic information system, as an open interface, is the most important product of this system. The system should be implemented in a form of an interactive Internet interface. Authentication and authorization, implementation of discussion management, decision and idea making procedures have to be considered. It should make the revealing of competent people's ideas possible. In the same way it should indulge fair discussion, idea and problem evaluation, as well as decision making.

In this way a it should be made possible that larger amount of knowledge enters the decision making process, since a greater amount of ideas and knowledge pulls greater quality of solutions, consideration of political problems from more perspectives as well as a greater probability of progress and prosperity.

The interface should provide political project management in a transparent and openstanding and public way. Every user should be able to start a political project.

The autopoietic information system is a platform which can be but does not have to be the central interface for transparent political project management, since it is possible that there are many of them. Thus it should provide means of interconnection and integration with common technologies as well as with other similar systems.

User of the autopoietic information system may become any person that feels to be competent for political discussion and/or project management. The selforganizing mechanism of the system shall reveal the most competent individuals.

Missions are converted into strategies in order to strengthen the advantages of the organization system, and eliminate his weaknesses [8g. In the beginning of this project it was easy to find two main aspects:

- Idea promotion
- System development

These two aspects represent the two main strategies of this project. The first strategy concerns the promotion of this idea through different medias and the gathering of critical mass to temporary virtual places (like forums, mailing lists, wikis, content management systems etc.). For the management of this project a core team of relevant and competent people is required, so the formation of this core team is also part of this strategy. The second strategy starts with the logical modeling and planning of the future information system. After the logical model is finished, technology and ways of implementation have to be chosen. After that it is possible to create a list of jobs which have to be done (TODO list) in form of tasks. These tasks should be contributed by people who are interested in developing the system, because it shall be Open Source.

The strategies are converted to strategic goals and put in a so called cause & effect diagram through four perspectives. These goals state what should be done in near future. The main goal in the finance perspective is financial success, in the users perspective the satisfaction of users needs, in the processes perspective their efficiency and effectiveness, and in the perspective knowledge motivated, competent and satisfied participants. For every goal there are critical success factors, which are features on which the success of a goal depends. Also there are measures which provide means of measuring the realization of a goal. In the end an action plan for every goal has to be defined. After an analysis of the strategies 27 strategic goals have been defined. A detailed overview of strategic goals is available at [10] and [12].

3.2. Decomposition Diagrams [10]

Decomposition diagrams [2] are a simple, but still powerful method for analysis of various aspects of the future information system including goals, problems, organizational units, processes etc. Figure 1. shows on of the diagrams (particularly the decomposition of goals) developed so far.

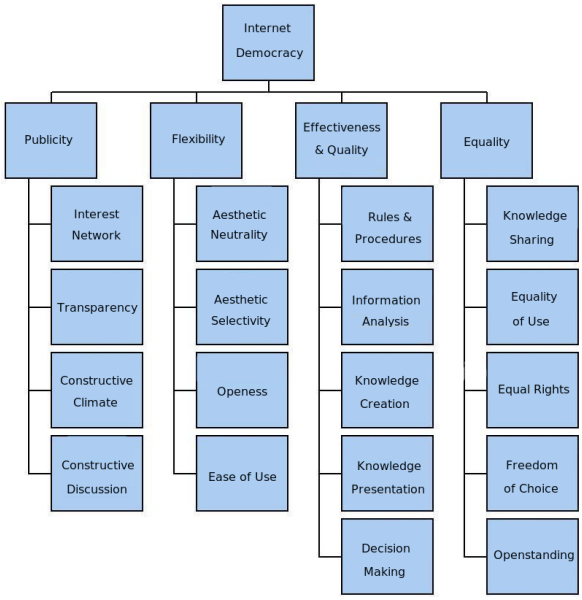

Figure 1. Goals Decomposition Diagram

Using these diagrams the main goals, problems, organizational units and processes of the future system were identified. Figure 1. shows an the goals decomposition diagram.

3.3. Work Flow Diagram [10]

The work flow diagram the previously identified processes are grouped together according to the organizational units in which they take place. The processes are then interconnected and inputs/outputs are defined which can be informational or material in nature.

In our case the following processes take place in the matching organizational units:

- System administration unit
  - System administration
  - Users briefing
  - New user registration
  - User authentication
- Interface adjustment unit
  - Interface adjustment
- Moderation unit
  - Selection and filtration of information
- Communication unit
  - Discussion
  - Solution evaluation
- Decision making unit
  - Decision making
- Project management unit
  - Project management
- Knowledge base unit
  - Storing of data, information and knowledge
  - Information retrieval
  - Interconnection to other systems
- Presentation unit
  - Presentation of information and data
- User interface
  - Interface between user and system

Since every process has to have at least one input and one output flow additional (environmental) processes and units had to be added which are under responsibility of the users (using the system) and other system (interconnection to other system). Full discussion about the developed work flow diagram is available at [10].

3.4. ERA Data Model [10]

The entity, relationship, attribute (ERA) model is used to describe the entities of an information system, as well as the relationships between those entities and the attributes which describe them. In our case 11 strong and 6 weak entities were identified. Strong entities are entities which have an own primary key attribute, while weak entities use strong entity's key attributes for their primary key. The whole ERA model is available at [10] and was used to generate the relational model of the systems database.

4. Implementation Guidelines

Using the developed documentation the system should be implemented in a web and network enabled environment. Technologies like Java, Zope, PHP, Ruby on Rails and similar seem to be a good platform for such an implementation task.

Modern WEB2.0 technologies (like forums, wikis, blogs, Open Source project management systems, bug tracking systems) and semantic web technologies (especially the concept of a semantic wiki) as well as P2P technologies can/should be used to implement the system.

There are some attempts in developing such a system like [9] and [4], but still not all requirements were met.

5. Conclusion and Future Research

In this paper we tried to, even for a short moment of time, draw attention to an interesting project of developing an autopoietic information system to support Internet democracy. We showed that parts of the SPIS framework for strategic planning of information systems are very useful for the creation of conceptual and consensual (since all documents are

openstanding and under constant discussion) documentation, even if these methods weren't originally developed for usage in such a context, e. g. the strategic planning of information systems to support large and complex social systems like Internet democracy.

The experiment of using this framework is still not finished so a final judgment cannot be given here. The system has to be implemented first and tested in a real world environment. We hope that we will be soon able to fulfill this task.

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IMPORTANT NOTICE:

An important part of the cited documentation as well as described concepts is the result of intensive discussion through several Internet enabled discussion systems, especially the TiAktiv (list and forum), TOP-Politics (list and wiki), LeParlament (forum, IRC channel) and other systems available on the Internet.