National Innovation System and the VSM

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Abstract

1. Innovation is receiving much attention today. Two main reasons for this are current developments in ICTs and market demand for more flexible and ingenious products. The Organization for Economic Co-operation and Development (OECD) sees three issues that are high on the science and innovation policy agendas: -promotion of stronger relationships between science and innovation systems, including the changing role of intellectual property rights in stimulating knowledge creation and diffusion;

- ensuring sustained development of human resources in science and technology; -global-scale issues that call for enhanced international cooperation in science and technology. (http://www.oecd.org/document/0,2340,en_2649_34487_25998799_1_1_1_1,00.html) Along the lines of Richard Nelson's work, the OECD proposed in the 1997 the concept of a National Innovation System (NIS) (Nelson 1993- http://ideas.repec.org/e/pne56.html). It proposed the development of networks, information flows, technological change and globalization, suggesting that governments should shift their attention from addressing market failure in terms of innovation, to addressing system failure. In systemic terms Stafford Beer's VSM includes the innovation activity at the System 4 level and provides a solid foundation for the viability of business systems as well as of National Innovation System (NIS). Sean Devine from the Victoria Management School, New Zealand, has developed a proposal to discuss a NIS using the VSM (Devine 2005). This proposal focuses on how any complex adaptive system, can survive in a changing environment.

2. The MIPT is carrying out similar work in Russia. We have proposed a prototype NIS for the Moscow Region and think that the VSM is a useful model to study:

- the NIS's ability to correct its own behavior (called single loop learning);

- the variety that is required in the NIS to cope with the variety of the wider environment;

- the NIS's ability to redefine its norms, operating principles, raison d'etre-in other words its ability to be strategic.

These activities are necessary for double loop learning: i.e. for a learning which goes beyond simply responding to events, but which sets the system's future. Since our focus is the State recursive level, the NIS includes institutions such as the national science academies, R&D institutes and innovation and promotion units and its environment includes different investment units.

3. We differentiate the 'external' and the 'internal' sides of the innovation activity. The first is about using modern ICTs to coordinate the activities of many

innovation units with investors and regional government institutions. For this we are using ideas similar to those of the CyberSyn project. Initially we call this an “Innovations Barometer”. The “internal” side is much more complex. It is about creating an electronic databases to handle the content and “ontologies” of the different steps of the “Innovation lifecycle” (fundamental science, R&D, inventions, promotion). For this it is necessary a good deal of work [2] and so far it is not included in our NIS prototype.

4. The initiators of the project were members of a group interested in promoting Stafford Beer’s ideas, including from the Institute for Applied Mathematics (http://www.keldysh.ru/Eng/ipme_frame.htm) and from the Moscow Institute of Physics and Technology - http://phystech.edu) . The first step of the project was creating a conceptual and technical model of an Operations Room to monitor innovation activities in the Moscow Region. This was seen as a prototype for a future Russian NIS. In the Moscow region there is a great concentration of innovation agents (science, R&D, promotional firms, manufacturing enterprises etc). In the past few years many new institutions such as technological parks have emerged in the region. The group has succeeded in awaking the regional CEO’s interest, which has provided resources for this work.

5. Under the project the following work is in progress: -a system to gather official statistics about innovation activities in regions of Russia and beyond ; -a system to gather statistics about innovation activities in different topic in the region;-a system to filter and analyze the statistics;-the “barometer of innovations” portal for Russia ;-etc. See Appendix 1 for the details.

6. The main problem to gather “internal” information from the innovation units was to interest them to give primary information about their activities, which is less structured than that of manufacturing enterprises. Additionally, checking data credibility for innovation is more complex than for manufacturing. We expect that the VSM and our Operations Room will help to solve these problems too.

References.

1. http://www.springerlink.com/content/p3p80613xw226238/
2. http://www.ototsky.mgn.ru/it/21abreast.htm

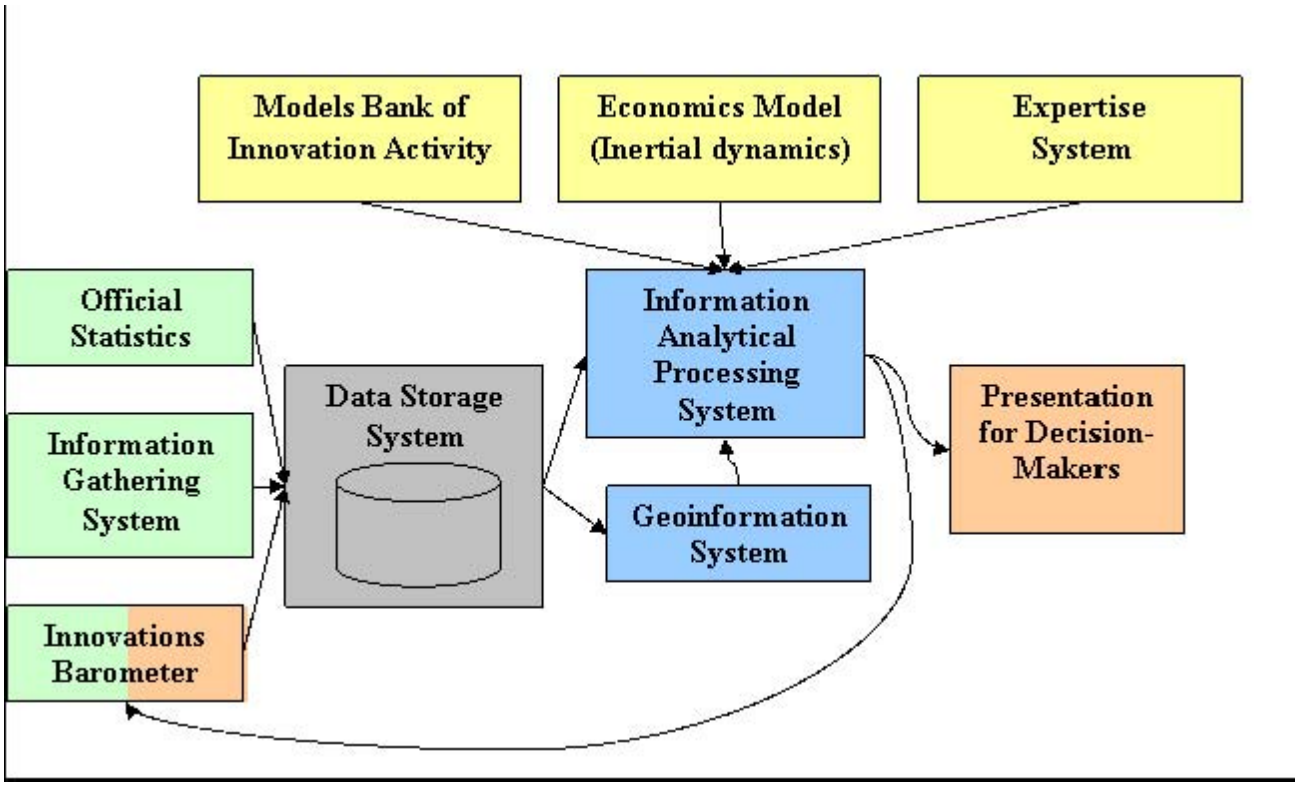
Appendix 1

The conceptual and technical model of an Operations Center for monitoring the innovation activities in the Moscow Region

The designed Operations Center in terms of Viable System Model is the instrument of System 4. It supports decision makers responsible for the regional development and for the innovation programs. The Center allows to reveal the possible trajectories of the evolution of the system and to measure the results of

the innovative programs. We tried to implement the real-time information gathering system as it was realized in the CyberSyn. To gather the initial information from the organizations turned out the main problem. The private organizations should be interested in sharing the information and there should be a way to control the accuracy of the data. The other big problem was the interaction with the decision makers. They wanted to see not only the analytical information in the final reports but the specific answers, programs and plans. So to create this Center we should understand also the existing government system.

The scheme of the Center is presented in the picture 1.



Pic. 1. The Scheme of the Operations Center for monitoring the innovation activities.

The Operations Center for Monitoring Innovations (The Center) may be functionally divided into 5 blocks:

- Information gathering block (green);
- Information storage block (gray);
- Modelling block (yellow);
- Information analysis block (blue);
- Presentation block (red).

Information gathering block:

- Official statistics – The official statistics was used as a guide line. It's not full and correct enough (especially at the regional level) but it is one view of the situation we can use.

- Information gathering system – We developed our own survey to get information about local innovation oriented companies. It is based on standard European surveys of innovations but simpler and web-oriented.
- Innovations Barometer – is a web-portal. It is used for two different functions. On the one hand it's the part of the information gathering system, and on the other hand the Barometer is the place of public presentations of the innovation activities in the region. The problem is that we should interest the private companies in shearing their information. We use the Barometer as an advertising space to publish their achievements in exchange for some information. Furthermore the Barometer has an internet searching machine for press data mining. It makes news digest and reveal public tendencies.

Data Storage System:

Data storage system is the simple database oriented for work with weak formalized information. So we used mostly meta-entities in database model and the evolutionary developing database structure.

Modelling Block:

- Models Bank of Innovation Activities – is the collection of mathematical models of innovation activities in different levels and fields integrated in one system based on Mathlab to make forecast. We came across that there is no unified field – innovations science. All existed models and approaches are very different to use them right now.
- Economics Model – we cooperated with the Institute of Control Sciences (http://www.ipu.ru) and developed the model of economics of the Moscow region. The model forecasts the inertial dynamics of the economics of the region as if there were no system changes. But we have found that there is no uniform approaches for modelling and forecasting the results of innovation activity. It's a task for our future developments.
- Expertise system – the instrument for a forecasting. It divides the problem in several sub problems, sends them to the experts, gathers responses and combines them into one forecast.

Information analysis block:

- Information analytical processing system – is based on OLAP-system used to analyze the information from the Data Storage System. It has the functional input of the modeling and expertise results.
- Geoinformation system – is used to solve spatial tasks such as revealing innovative clusters, etc.

Presentation for Decision-Makers:

The main purpose of the Information analysis block and the whole Center is to display the decision makers the main trajectories of the system evolution, the bifurcation points and the abilities and the ways to reach the required situation.