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Topic (ii): Development strategies for statistical information systems

**BETTER SYSTEMS? THAT MEANS IMPROVEMENT OF THE DEVELOPMENT PROCESS!**

### **Invited Paper**

Submitted by Statistics Netherlands<sup>1</sup>

## **I. INTRODUCTION**

1. In the beginning of 2000 Statistics Netherlands made the organizational change to a process-oriented organization. Although the organization underwent a profound change, it became clear that old habits are not so easily changed. Not only in the statistical profession, but also in the IT area, the stovepipe habit was hard to break. Besides that, the development methods had grown towards the development of small, dedicated systems or applications, built on desktop computers in a somewhat informal way. Keeping up with the habits of that day and age, formal development methods had been largely abandoned being judged “to heavy cannon” for this kind of applications. It also was perceived at that time, that this formal process with its specifications and numerous document versions was very time-consuming and contributing to a considerable overhead. Rapid Application Development was the going paradigm.
2. As the organization slowly settled into process orientation and started to group processes together into bigger single ones, the applications needed grew bigger and much more complex.
3. With the informal way of application building there really was no answer to the need of the customer for big complex applications with a fair quality.
4. Several problem areas were identified. First it was found, that the development process was much too informal for the level of complexity in the applications produced. Second, for the level of quality desired, rigorous and methodical testing would be needed with a formal documentation process. Third, with development on this scale, the project management process left much to be desired. Although all personnel in projects were educated in this area, a coherent approach was missing and so were standards.

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5. At the beginning of 2003 it was then decided by the manager responsible for IT implementation that an improvement program was to be started. The scope of the program was limited to the implementation department of the IT division.

## **II. Methods and strategy**

6. In a short selection process, a choice was made for the following methods:
- For application development, RUP (Rational Unified Process) was chosen as the most suitable method;
  - For testing TMAP/ISEB was selected;
  - For project management a weakened form of Prince2 was selected.

### **The RUP method**

7. The RUP method comes as a complete package including software, manuals, and a shrink-wrapped website with the complete process and descriptions in interactive format. The method itself has the following characteristics:

- Based on the UML modelling language;
- User interface behaviour is specified in terms of so called use-cases in which, on a logical level, the functional behaviour is specified;
- Every activity in the application building process is assigned to specific role playing individuals (e.g. architect, specifier, tester, etc.). There are many roles;
- Every activity is to produce one or more so called artefacts. Artefacts are documents, source code modules etc.;
- For ongoing projects a so-called process engineer is available to oversee the correct use of the method and to help and facilitate individuals;
- Development is done by going through the standard phases of Inception, Elaboration, Construction and Transition and in opposite to the waterfall method does the development in iterations in which the specifications are adjusted.

8. The method is purely for application building and has the advantage that much attention is paid to the correctness of the application with respect to understanding user requirements.

9. Implementation strategy with the acquisition of software and courses was straightforward. In the RUP method there is already a provision for local support in the form of a process engineer. The process engineer is a person that supports and helps project teams with the correct use of the method.

### **The ISEB/TMAP testmethod**

10. The method was conceived by the Information Systems Examination Board and based upon the Foundation Syllabus in Software Testing. Nowadays there is an extensive body of knowledge and a certification system.

11. The method can be characterized as a structured approach to the problem of testing. All activities are methodically described and put together in a framework. Although seemingly trivial at first, the strength of the method lies in the fact that it introduces a strict formality in all levels of the testing process.

12. The implementation is done through education and certification. In the IT division the function of test manager was created as a specialization of project manager. External coaches were hired to help the test managers fulfil their role.

### **The Prince2 project management method**

13. The method stems from the UK Government and is basically a collection of best practices, much like other methods in this field. PRINCE stands for Projects IN Controlled Environment. The main characteristics of the method are:

- Project management is seen as a management exercise not related to specific specialist areas. The management principle is management by exception;
- Very much attention is paid to the environment of the project, like the composition and mandate of the project board;
- The business case is central to the project;
- Risk containment and processing of issues is very important;
- A project is divided into 8 separate management processes;
- Although scalable, the method requires a fair amount of stationery.

14. Knowing that there was considerable opposition to what was considered by some as useless overhead, the method was weakened or adapted to the local needs. This meant that the number of different forms was reduced and that a simple form of the “matrix of formality” as used by the U.S. Census Bureau was introduced to keep the paperwork down to an acceptable level.

15. A handbook was produced as well as a set of MS Word templates. For the project managers there was additional training provided of the “soft side”, being things like negotiating skills, meeting techniques, stakeholder management etc.

16. A so-called “Flying Squad” was formed to help project managers and executives with the correct application of the method. A committee or working group was formed with representatives from all major parts of the organization to give guidance and to create support for the project.

### **III. IMPLEMENTING IMPROVEMENT**

17. In the first year much training was given to the users of RUP and with the project managers an extensive improvement program was implemented in which the “soft” personal skills were developed and basic training in the principles of project management was given.

18. Although this approach seemed all right with RUP and Testing, it became clear in the first year, that the project managers benefited less than was expected. The initial diagnosis, that the problems could be overcome by education and training of the project managers, was proven to be inaccurate.

19. Investigation led to the conclusion that the way the organization was doing business with the IT division was in effect that they were using it as a staffing bureau. In such an environment, project management is only partially successful. Another problem was that quite a few project managers met with resistance from the rest of the organization. This was caused partly because of unfamiliarity with the Prince2 method and partly because of other reasons.

20. More research into this area uncovered the fact that the improvement program would benefit enormously if it could be done for the organization as a whole. For RUP we would be able to educate the people that were giving the input to the specifiers that were making the use-cases. For ISEB/TMAP, we would be able to educate the testers that would be doing the acceptance tests. Finally for Prince2 we would be able to educate the management how to fulfil the various roles in the project boards. For us, the IT division, that is where the business case for this Prince2 project lies.

21. In October 2003 a KPMG audit recommended that improvement for the organization as a whole would be needed in these areas. For the improvement program that meant that the breakthrough needed was

happening. The programme was changed into an improvement programme for the whole institute with the seal of approval of the board of directors. For RUP and ISEB/TMAP this simply meant an enlargement of the scope of the ongoing education program.

22. For the Prince2 project it meant a bigger change. To improve the level of acceptance of the organization, a new education program was set up. The program was set up as a top down approach. One of the most important features was that it was a level S3 system of workshops (Hersey and Blanchard; involved learners) in which much attention was paid to high-level interactive learning with the class. In this top down approach we started giving courses to the board of directors and then slowly descended the chain of command. The underlying thought was that, together with the endorsement of the board of directors for this implementation, going down the chain of command would create a kind of pendulum effect in the organization, acquiring momentum as we descended into the organization. The courses for managers were tailored towards being good project board members and understanding the important role of a properly functioning project board. For the project managers the course was tailored towards understanding the interactions with the organization and the importance of risk containment and the issue and change process. For both groups emphasis was placed on the business case as the foundation of a project. The courses were designed to be an agent of change in the organization. Emphasis was placed on the benefits of the method and the fact that it was already decided by management that it was the method to be used in all new projects.

23. The complete set of improvement measures for Prince2 now looked like this:

- Workshops for all involved personnel, top down implemented;
- A Flying Squad to assist with the use of the Prince2 method;
- A work group or “ think tank” to give guidance and to create support;
- A website with all relevant information about the method;
- Word templates for all important document types;
- A set of presentations for all interested employees to clarify the project and its reasons and to give a global idea of the Prince2 method;
- Strict directives about progress and exception reporting to be done by the project managers on a bi weekly basis.

#### **IV. THE END OF IT AS A PROJECT**

24. At the beginning of 2005 it was decided that the projects of the improvement program were to be terminated as of April that year and that the responsibility for the further improvement of the organization should be transferred back to the line organization. For Prince2, the Flying Squad will remain as a knowledge centre in the form of a special interest group that will take care of the website and publicise new versions of the handbook. The working party that was guiding the project was invited to join the special interest group. For RUP and ISEB/TMAP special interest groups have been formed also but there remains a fair amount of coaching by external coaches.

25. The IT division has again become the focal point of all three activities. The reason for this is that this division has the biggest number of projects and has the most to gain from this programme. Still, the director of the IT division reports to the board of directors about the progress in this area.

26. To ensure that the improvement in the project management area is carried forward in the future, the Flying Squad or Special Interest Group Prince2 as it is called now, implemented measurements (first and last quarter) of this year to gauge the progress of the improvement. The measurement method used is OPM3. This is a newly developed method from PMI (Project Management Institute) that is based upon the occurrence of known best practices in a self-assessment. The OPM3 system is an automated questionnaire of 150 questions. We have set up a protocol in which two members of the organization that have good knowledge of the organization itself and a member of the special interest group answer the questions while a fourth person guards the course of the proceedings.

## V. CONCLUSIONS AND LESSONS LEARNED

27. Measuring success or failure should be done from the start, even if a practical method is hard to find. Looking back, it is hard to evaluate the amount of progress made in the project.
28. It turned out, that training professionals in the use of methods is relatively straightforward. As long as there is coaching for a longer period of time, the implementation will progress at a reasonable pace. In our case for the professionals the adoption of methods meant better systems and more control of the development process.
29. For implementation of change, the type of workshop used to bring knowledge across is of great importance. It turned out that the high-level (S3) interactive workshops had a very big influence in the organization, while previous attempts with other workshops in which simply the subject matter was thought had little or no effect.
30. However, changing an organization is by no means an easy task. Like in other government bodies, the extensive use of business cases, management by exception, and rigid portfolio management were not that common and resistance was present. The production paradox proved to be another factor; especially the fact that the learning of these new methods takes time was not generally appreciated in an environment where human capacity is scarce. In spite of these difficulties we see an overall improvement in the way IT projects are being carried out and in the results they produce.
31. The implementation of RUP had an interesting side effect. In the RUP method it is assumed that quite a number of different activities are performed by different individuals or individuals in different roles. Because of these explicit roles it became apparent that not only there is a complicating factor on the side of human resource management, but also the system of job descriptions of the different professionals had to change in the organization.
32. In the course of implementation a number of managers and some professionals came with arguments why the methods should not apply to them. The arguments ranged from:
- “ There is considerable talk that the methods are not fully accepted yet.”
  - “ A lot of people say that management hasn’t decided yet to make the method obligatory.”
  - “ It seems that the connection between RUP and Prince is not fully clarified yet.”
- This is flight behaviour and has one common mechanism: The antagonist cites an anonymous crowd and so voices doubts avoiding a direct argument because he/she is just the messenger, rightfully drawing the conclusions from the existence of such a crowd with that opinion. The best response proved to be to ask for the list of names of the anonymous crowd.
33. Did we get better systems? Yes, especially the improved specification process with use-cases proved to be very effective in ensuring that the systems built were actually what the user or customer wanted. Fewer last minute changes were needed. Also the better testing process assured a better operational quality of the systems. In the project management area the improved composition of project boards is paying off.

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