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DESIGNING AN INTEGRATED PROJECT, PROGRAM AND PORTFOLIO SYSTEM - A CASE STUDY OF HEALTHCARE

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Abstract: Healthcare organizations are subject to an increasing complexity in the management of patient information. The modern healthcare system is developed through projects in large scale. The complexity is rapidly increasing and lack of coordination between projects is crucial in relation to performance. The contemporary approach following the traditional project related approach is insufficient and obsolete and the underlying interconnectivity between elements in a multi-project environment can be used to explore new compositions of projects, programs and portfolios. By a systematic approach in managing interdependencies based on exploring the flow of information between projects on three different levels two major outcomes can be concluded. In our systematic DSM/DMM approach we explore how projects can be organized in programs and in portfolios.

Keywords: Project management, Program management, Portfolio management, Complexity, Multi-project management, Healthcare Information management, PPM, DSM, DMM

1 Introduction

The contemporary product development and operations management are conducted in a very complex context. Projects are becoming the standard way of organizing the work of people. Complexity in organizations increases when many different projects are run simultaneously. Sometimes hundreds of projects have to be handled in a more or less coordinated way.

In order to manage a large number of projects in complex organizations new approaches are being developed in which projects are seen as components of different programs and these in turn are part of one or several portfolios of programs and projects. This is a structured approach to handle two critical aspects of organizing complex systems; decompositions and integration of systems. The decomposition is usually done in functional projects. The challenge is to find logic in the integration in which projects are clustered in programs and then into portfolios.

This research provides an overview of the Swedish healthcare system and the development of the documentation of healthcare information and IT projects within healthcare. The case illustrates a very complex system consisting of a large number of projects without a systematic approach in handling a project-program-portfolio system.

2 The contemporary approach to program and portfolio management

Program management forms the framework for grouping existing projects and has a historically loose definition in what separates the management of a project with many subprojects from the management of a program. As project management has its heritage from product development theory, program management is theoretically developed from organizational theory with lack of industry specific views on its application and context (Artto et al., 2009).

The history of Project Portfolio Management (PPM) begins with The Modern Portfolio Theory (MPT) by Harry Markowitz in 1952, presented in a seminal paper titled Portfolio Selection that led to what has become the dominant approach to manage risk and return in financial markets.

From mid-90s and on a new area of interest for PPM developed, the one of New Product Portfolio Management (Roussel, 1991). When portfolio management enters the field of product development, it also adapts the same process of execution, a serial process with defined stages each connected with a decision gate. It also addresses the interdependencies in terms of the "right mix" of projects, basically out of managing a combination of strategic goals and resources but leaves the management of interdependencies between projects at hand. The contemporary approach to PPM is therefore not without criticism (Artto et al., 2009; Engwall, 2003; Martinsuo, 2012).

The combination of 1) a missing contextual and industry perspective in the theory of program management and 2) the adoption of a product development process as model for portfolio management of projects has led to poor performance and an underdeveloped area of management of projects on a strategic level (Meskendahl, 2010).

3 Public healthcare in Sweden

Swedish healthcare is run as a political, tax financed system. 44 000 politicians on different levels are enrolled in healthcare governing and 97 % of them are working with it on their spare time. The responsibility of Swedish healthcare is divided between the state, the counties and the municipalities. The governing of healthcare is regulated by national law, special legislations and by more specific regulations made by the National Social Board. The state has an overall responsibility for the healthcare and, through the National Social board, the supervision and quality control of it.

The political mid-level is either formed by a county or as a region. There are 20 healthcare organizations at this level in Sweden. When county councils are classified as regions they take on an extended responsibility including more than healthcare, such as regional development in terms of culture, public education, communications and infrastructure. Their overall purpose and responsibility is however to provide its citizens a sufficient healthcare.

3.1 The clinical organization of healthcare

The organization of healthcare within regions and counties is divided into three levels of specialization; primary care, county healthcare and regional healthcare. The primary care is performed by approximately 1 300 medical centers, the county healthcare by 70 county hospitals and the most specialized healthcare is performed by nine regional

hospitals where also the majority of the medical research is performed. The citizen has free access to a medical center and, if in need, of more specialized care remitted to a hospital, normally a specific clinic based on a diagnosis.

3.2 Information systems

Information was originally documented in what is known as the "journal", or the patient journal, or medical records. The information was, and still is, mainly produced by physicians, nurses and medical secretaries. As the medical profession developed strongly in the 20th century, so did the need of documentation. Every medical specialty needed a documentation that could encompass their work effectively and new procedures developed by research. By the end of the century the possibility to document and share information regarding a patient other than by the paper journal occurred through the adaption of the computer.

3.3 The introduction of IT in healthcare

Every clinic and medical specialty became a business case for a supplier of software solutions in solving the problems with the paper journal. Hundreds of digital systems were adopted by different clinics within a decade, all made as an analog to digital conversion of the system with paper journals over to digital journals. Very few of these new systems could share information between them. Neither did they use a common standard for medical terms and concepts.

Problems with sharing the information were now even greater than before due to the technical limitations in sharing information; one digital system couldn't open and read files from other systems. Best case scenarios was that the patient journal from one clinic could be written on paper, sent, and correctly understood by another clinic, serving the patient and the medical staff in need of earlier documentation. This led to a new business case for software suppliers, the digitally unified ledger.

4 Methodology and data collection

In this case we applied a combination of DSM clustering (Dependency Structure Matrix) and DMM (Design Mapping Matrix) methodology into a project and its subprojects to explore the logics of the composition of the project (Danilovic and Sandkull, 2005; Eppinger et al., 1994).

Data were collected in several steps from employees at Region Halland during 2011 and from official documents concerning the project. Two domains were identified as major sources of complexity and uncertainty; the subprojects and the staff groups involved in both the development of VAS as well as medical staff groups using it.

A list of subprojects and a list of staff groups that will be affected by the outcomes of the project were developed by the project group. They checked with their staff and lists were discussed and somewhat shortened.

Other projects that this project is dependent of are not included in the analysis, though other IT projects were identified where the output must be co-aligned with the development.

4.1 Defining the project

VAS+ is a development initiative with the purpose of increased patient- and user benefits, a modern look and a future-proof technology within the present digital patient journal system. New features will be added one by one to existing system once they are developed, subsequently.

The members of the project team defined 59 subprojects as part of the project. These were integrated down to 36 subprojects. 11 other projects were identified as having strong dependencies on the future work with VAS+ and in need of coordination. The perceived complexity in terms of incalculable information was the reason for not taking this into account earlier in the project by the project team. The decision for this case is to leave this information out of the analysis but let it be done in a later stage when the internal reorganizing of VAS+ is made. It illustrates the context of the project as to that it is not the only ICT project, not even the only ongoing medical records project in the organization.

4.2 Defining stakeholders

The users and other members of the staff that were known to be involved in either the development or in the operations and support of the project were collected. Initially the list comprised 132 different healthcare units that use the medical records system and four different technical and administrative units.

A project member produced the list of the 132 units of users. The 132 units were integrated to 30 units comprising the whole amount. This reduction was made based on the assumption that several clinics have the same type of usage and it was done first by the Project manager and a second time at the workshop. It was decided that it doesn´t matter where the clinic is located, more of what type of clinic it is and what they are doing. Based on that decision a shortened list was produced. A discussion among the participants at the workshop during the first hour of the workshop led to that further reduction of units of the matrix. It was, based on the knowledge in the group, no difference between certain units and therefore no idea of repeating the answers in the matrix. The remaining 19 units or groups of units that the group decided on were used in the analysis.

4.3 Data development

The first matrix is a DMM setting with subprojects in rows, referred to as project domain and organizational units placed in columns and referred to as the organizational domain. The second matrix is a DSM setting with subprojects in both rows and columns in order to find dependencies among them. The software used is CPS, Complex Problem Solver[i]. The amount of dependency between two elements is represented through four classifications from 0 to 3 in both matrices. Number [0] indicates no interaction and is without color. Number [1] is set when information is needed either way and marked with yellow color. Number [2] indicates need of communication and is marked with pink. Number [3] defines a need of mutual development between subproject and staff group and is marked with red color. The decision for each field was made row by row, from left to right in both matrices.

5 Process of analysis

There was a choice between doing the DSM analysis first and the DMM analysis afterwards, or the opposite. The DSM analysis is used to manage complexity within the project. The DMM analysis focuses on the project in relation to another domain, in our case the organization. The choice of starting with the DMM analysis was made out of the information from project members and senior civil servants that the project wasn't perceived to be aligned with the needs from the organization.

The purpose of the case was also decisive in the choice, a revised organization is made out of the DSM analysis that addresses the subprojects and rearranges them and therefore should be done as the last step. If the purpose would have been to source the project with personnel the order would likely be the other way around, first reorganizing the project internally and then using that information in combination with the organizational domain, the staff groups.

5.1 Process map of the case

The process map on the following page shows the different steps in the analysis. The process can be described in four steps;

> Defining elements => DMM analysis => DSM analysis => Integration of elements into clusters and chunks based on the flow of information

The process starts with the definition of domains to be analyzed and the elements of each domain. The midsection shows the analysis made in both DMM and DSM matrices and finally to the integration of elements into a new, structural composition.

5.2 The first workshop

The DMM workshop, which took approximately three hours to perform, were made by five managers from senior civil servant office and IT management, including three members of the project, together with the authors as methodology support. The matrix was printed on a large paper and fixed on the wall. Each field requires a decision according to the four possible classifications. Some decisions were very fast and easy made and others of the 684 fields needed a longer discussion.

A first recognition during the workshop was that there were few subprojects as well as few staff groups that were actively involved in the project. The pre-studies that focused on user interface and process based journal and that were conducted before the project started in full scale, showed a high degree of communication needs with most of the users of the system. Also the subproject concerning quality records had a lot of communication needs with most of the users.

Two of the staff groups showed a need of mutual development with most of the subprojects. These were Support functions and IT support together with IT applications. Senior civil servants had high involvement in a subproject in establishing supplier services but since that subproject did not have any other strong dependencies to other subprojects or user groups it could be seen as a task with minor coordination needs. Finally there were four subprojects that had a need of mutual development with people from economy that had to be taken into account.

5.3 Outcome of the first workshop

The final output from the DMM analysis shows dependencies between the healthcare organization and the project organization through its subprojects. It shows a need of mutual development between a large number of subprojects and two units of the organization. Staff from Support functions and IT support together with people from IT applications is a critical resource in almost all subprojects.

Two pre-study projects and a quality register subproject require communication with 13 different units and the majority of users. The two pre-study projects were finished before the main project started and was used as a guide to the project objectives. One very important finding during the workshop was that these subprojects did not have their tasks represented in any other subproject in the ongoing project. This leads to that the changes that are made during development stays unknown among the majority of the future users. The pre-studies were therefore decided to be activated again and link the users with the overall and ongoing development of the project.

5.4 The second workshop

The second workshop was made with the support of a DSM matrix, with the subprojects in both rows and columns in order to identify dependencies between them. This is done to identify any specific grouping of subprojects based on their need of mutual coordination. This workshop was conducted after the DMM analysis. The workshop took approximately three hours as well and was done by the Project Manager supported by the authors. Just using one person to complete a full matrix is normally not possible due to lack of sufficient knowledge; in this case the project was quite far gone into development so the Project Manager knew in detail every subproject and made a decision according to the best of his knowledge. More people at the workshop would possibly have made another set of dependencies but for the case we decided that it was sufficient.

5.5 Outcome of the second workshop

Three clusters of subprojects were identified in the analysis. 1) Process based healthcare support forms the largest group of subprojects in a group that has a clear focus on the process based healthcare when developing the new medical journal system. Ten of the subprojects are in need of mutual development with process based healthcare support; five are in need of communication. 2) Architecture comprises architecture process development and architecture support subprojects. Four other subprojects are included that have communicative dependencies with each other and that are clearly technical. The group around process based health care support works with the patients' rehabilitation; the architecture group develops the logistical network of digital information. 3) Technical platform is another technical subproject that gathers three other subprojects around the integration of information from different sources. Surgery planning, referral and answers and cash register are crucial systems and need to share information in one and the same technical platform.

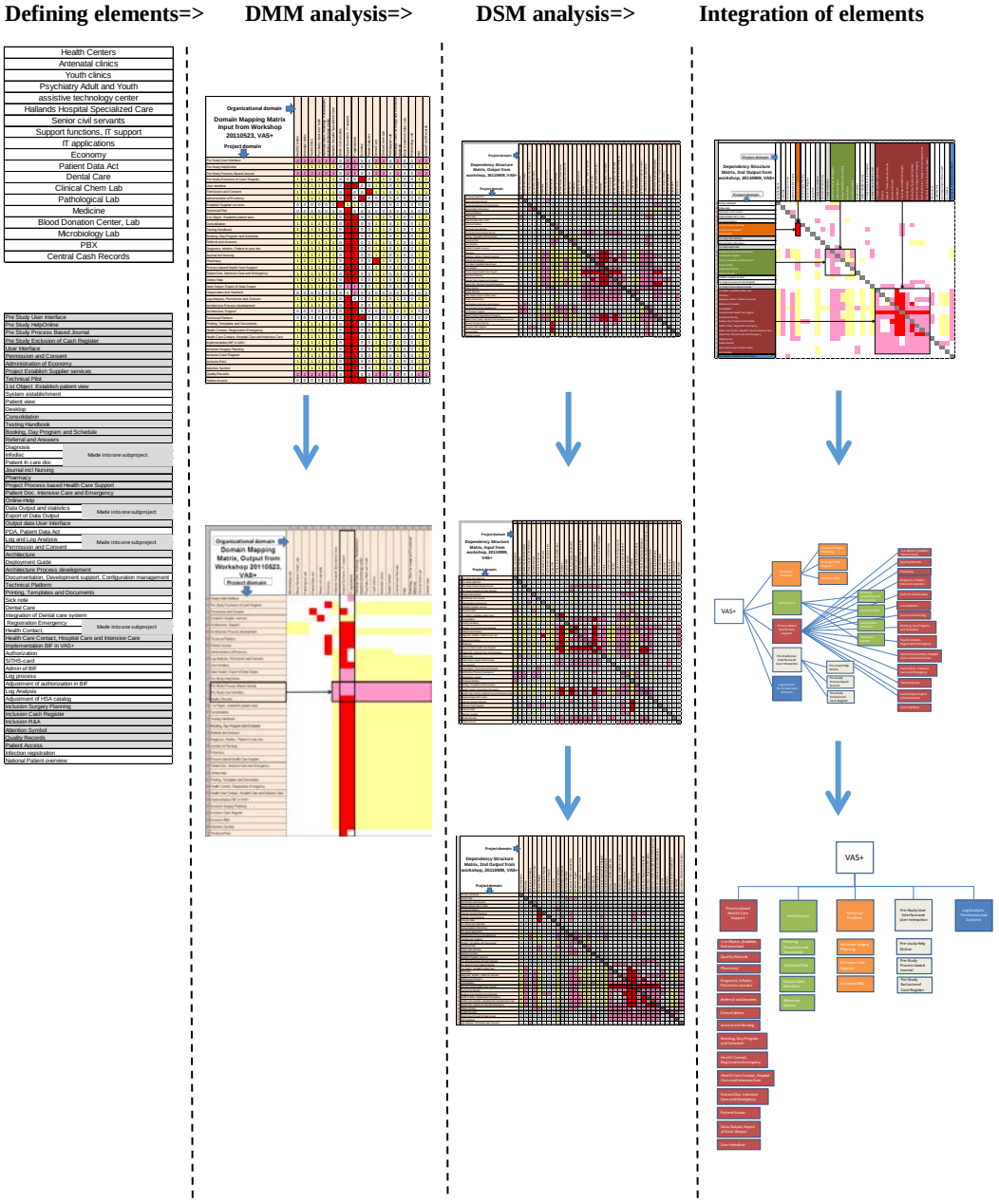

Figure 1. Process map over the analysis

6 Results from workshops

Besides the three clusters found in the analysis of the DSM analysis two important groups were identified as a result of the first workshop. The Pre-study User Interface and User Integration is in this context not a pre-study, neither are the other pre-studies in the group. They are rather an ongoing validation of what they worked with initially in the project and form the voice of the user during development.

Log Analysis and Permission and Consent are subprojects that deal with legal issues and how to secure a correct and highly ethical use of the system. They are not directly dependent of any other subprojects and thereby better suited to stand as a separate group.

6.1 VAS+ on project level

All initial subprojects are organized by their interdependencies into five groups comprising 24 different subprojects. These are defined by having clear objectives, defined resources and a temporary organization (PMI, 2013). New workloads in terms of projects or subprojects will be added and performed as part of the development.

6.2 VAS+ on program level

Program management is not a scaled up version of project management as often presented and therefore loses its structural purpose (Lycett et al., 2004). Program management deals with the coordination of projects, with interdependencies and is often arranged around a common purpose or output (Artto et al., 2009; Turner, 1999). Consequently this applies to program level management of VAS+ and the identified five groups of interdependent subprojects.

6.3 VAS + on portfolio level

Based on the applied logic of the composition of the project it's now possible to manage VAS+ on a portfolio level and thereby relate it to other, planned and ongoing projects as part of a portfolio level management. The 11 planned or ongoing IT projects that were identified in this case can now be related to VAS+ and bring the project closer to the business and in line with strategies, resources and other change initiatives (Levine, 2005).

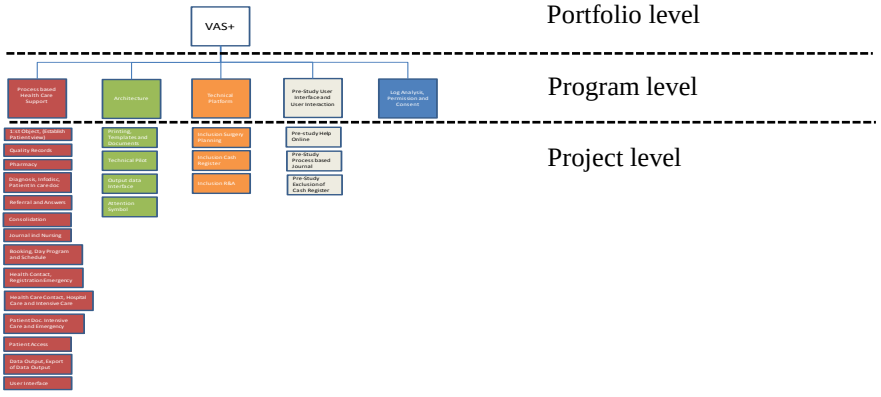

Figure 2. Three levels of coordination.

7 Conclusion

The chosen approach, focusing on high level of participation of involved people and high level of interaction with these people, led to two major outcomes. First, both involved people and their managers came to a joint understanding that the contemporary approach following the traditional project related approach was insufficient and obsolete. During this interaction they came to an understanding that the complexity obviously was high and that they needed a new approach to manage this kind of complex situations such as the development of a digital patient journal system.

A senior staff member and a resource manager at IT operations made the following conclusions based on the presentation of the suggested project organization and an overall analysis of the project;

"- We have suffered from lack of direction and lack of coordination of the many subprojects that started all at the same time but without a strict plan of execution and resource management. The VAS+ project will not end as long as we use the present medical records system and as a consequence we must organize it differently to better ensure that the deliverables over time aligns with the needs from the users. The new project organization the matrix analysis gave us will work as a program structure over time for us."

Second, the systematically performed analysis explored the underlying logics between superficially independent projects. The interconnectiveness becomes obvious and the density of interdependencies was exposed to open discussion. This interactive approach shows how a systematic approach using DSM and DMM analysis can support analyzing and understanding of how the three levels of projects, program and portfolio can be managed.

At the end we have created a new system for managing the organizing of large scale projects such as development of this digital patient journal that provides an alternative approach to the strategic management of projects compared to the contemporary models of program and portfolio management.

What shall be noted is that the empirical evidence supports that this approach is possible to perform and explores how it can be done, the political processes inside the healthcare organizations shows that they still are not ready to utilize this new approach on a broader scale.

8 Implications for managers

In order to change the practice and routines in organizing this kind of large scale projects require that managers in organizations are aware of the underlying principles they use today and realize that the consequences are severe in terms of lead-time, continuous delays in the schedule of projects and that the quality of work is limited by the amount of rework due to lack of information and lack of appropriate coordination between projects in the system.

To initially take control over an increasing complexity caused by too many ongoing anemic projects, the amount of projects must decrease and the resource allocations to the remaining few increase and thereby reduce risk, lead-time and failure of reaching project objectives.

To change the contemporary approach requires that the procedures are changed and that involved people get the appropriate competence in using software solutions enabling them to perform as simple as possible DSM and DMM analysis. People involved as well as managers also have to be trained in the applied methodology and in tools for DSM and DMM analysis. Finally, they have to have access to suitable software solutions.

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