# Investigating rationality, in concept and use, in a model for IT maintenance and governance

Jenny Lagsten and Malin Nordström


Presented at The 2nd International Workshop on IT Artefact Design & Workpractice Intervention, June 5, Tilburg, Netherlands, 2013

# INVESTIGATING RATIONALITY, IN CONCEPT AND IN USE, IN A MODEL FOR IT GOVERNANCE

Jenny Lagsten, Örebro University and Linköping University, Sweden, jenny.lagsten@oru.se

Malin Nordström, Linköping University, Sweden, malin.nordstrom@liu.se

## Abstract

*In this study we investigate the deployment of a model for IT governance named pm$^3$ in a large healthcare organisation. We are especially interested in if and how the basic goals, the inherent rationality, of the pm$^3$ model-in-concept change in translation during the model deployment process. The concept of model rationality is suggested as a beneficial approach for analysing differences between pm3-in-concept and pm$^3$-in-use. We have identified three main contributions with the suggested approach that are of benefit for both research and practice: 1) We can define and express the rationality in the pm3 model for IT and governance in a clear manner, 2) we have used the pm3 rationality as an evaluation tool that has proven to be useful in practice, and 3) we have also identified the main problems in deploying pm$^3$ in the investigated healthcare organisation.*

*Keywords: IT maintenance, IT governance, model rationality*

# 1 Introduction

The organisation of the IT department and the whole IT function of businesses and organisations has become top priority amongst IT managers and CIOs (De Haes and Van Grembergen 2009). Models and methods for maintaining and governing the installed base of IT systems in a business are important tools for making IT maintenance and governance comprehensive, efficient and appropriately aligning IT with work. Information system maintenance and governance is core business for both IT departments in larger organisations as well as for IT companies and consultants.

Information systems development (ISD) and systems development methods (SDMs) have been extensively researched in the IS research field. Most IS projects concentrate on the development of one information system and has a length of between 3 months and 2 years (Fitzgerald et al. 2002). When the system is deployed in the organisation it might be in operation for 5 to 10 years (and sometimes longer), and the system needs to interact and co-function with, maybe hundreds of, other information systems and applications during this period. Implemented systems are not final; in our changing world functional and non-functional requirements on the system continue to change when the environment put demands on systems in operation. With this in mind it is actually strange that, in our research field, ISD methods and models seem to be at centre, while models and methods for maintenance and governance has not been thoroughly researched in the same way. We believe that it is important to contribute to IS research and practice with comprehensive and well-elaborated models and methods for IS/IT maintenance and governance.

In this study we investigate the deployment of a model for IT governance named $pm^3$ in a large healthcare organisation. Over the last 15 years, $pm^3$ has grown to be the de facto standard model for IT maintenance and governance in Sweden. Our research interest is to find out how the $pm^3$ model is deployed in practice, compared to the conceptual $pm^3$ model as intended by the model developer. Differences between ISD methods-in-concept and methods-in-use are a well known phenomena in information systems research. We believe that investigating differences for IT governance models will generate useful knowledge concerning, for example, the alignment between the work practice and the IT for both practitioners and researchers in the field.

We are especially interested in if and how the basic goals, the inherent rationality, of the $pm^3$ model in concept change in translation during the model deployment process. We want to identify the differences between central goals in the conceptual model and the model in use. This in order to understand where and why other consequences then the expected occur or,why the expected benefits of the model in used do not take place. We will use the concept of model rationality as basis for the comparison because we believe that the concept of rationality will bring clarity, structure and comprehensiveness to such analysis. Hence, the purpose and research question in this paper is to investigate the benefits of using the concept of model rationality when evaluating an IT governance model.

The paper is organised as follows. In the next section we discuss and explain the concept of rationality in model-in-concept and in model-in-use. In section 3 we give a brief overview of IT governance and the $pm^3$ model. Thereafter, in section 4, we explain our practice research approach and the research methods we have used firstly for identifying and expressing the rationality in $pm^3$, and secondly for comparing this rationality with how the maintenance teams were working in practice. Section 5 contains our analysis of $pm^3$ in concept and in use based on a case in a healthcare organisation. In section 6 we describe how we think this study contribute to practice and research and the benefits of using the rationality concept. Our contributions are: 1) defined rationality in the IT governance model $pm^3$ 2) a rationality evaluation tool and 3) identified problem areas in a $pm^3$ deployment.

## 2 Rationality in model-in-concept and in model-in-use

Why methods-in-action deviate from the conceptual ideal typical method has been widely investigated in the IS research field (see e.g. Fitzgerald et al. 2002; Päivärinta et al. 2010). In some of these studies the concept of method rationality has been used for analysing goals underpinning method components and their use (see e.g. Ågerfalk and Fitzgerald 2005; Karlsson 2012). The concept of method rationality is based on the idea that method developers rationale influence on the method design and direct attention toward certain kinds of phenomena and activities (and away from others). The rationale is based on the developer's values and assumptions about the problem domain and this knowledge, implicitly or explicitly, guides the different conditions and activities prescribed by a method (Ågerfalk and Wistrand 2003). By using the concept of method rationality on the domain of models we could talk about model rationality.

As we are interested in comparing a conceptual description with the deployment of an IT governance model we find that the deployment perspective (figure 1) is useful for our purpose. Päivärinta et. al. describe the process of how SDMs first are developed (construction process) and then take on different versions as they are adapted and used in an organisational setting (deployment process). Versions could differ in, for example, activities, goals, rules, procedures and practices. It seems reasonable that models, as well as methods, undergo several modifications in the translation procedure as described in figure 1. At start there is a described model (described by a developer) that is transformed into an understood version when taken into the organisational setting and thereafter a version adapted to organisational conditions and, finally, a version of the model that actually is used in daily operations.

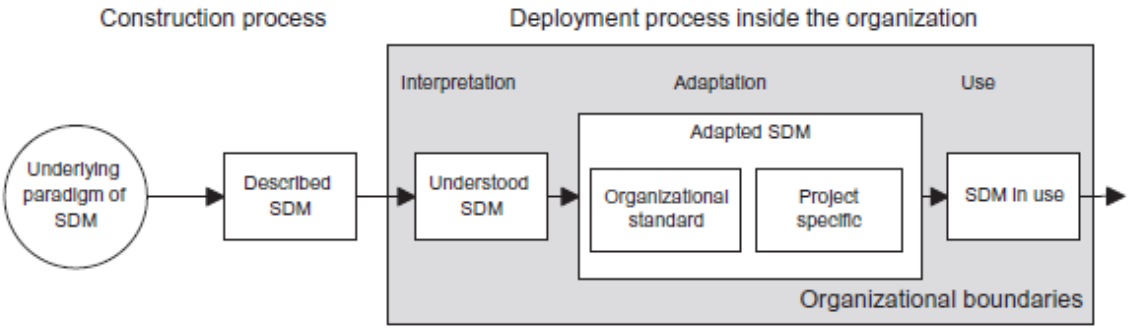


*Figure 1. Deployment perspective (Päivärinta et.al. 2010)*

In this study, our interest lies in comparing the pm$^3$ model-in-concept with the pm$^3$-model-in-use (or model-in-action) in a healthcare organisation. We will use model rationality as basis for this comparison because we think that the concept of rationality will bring clarity, structure and comprehensiveness to the analysis. Model rationality can be expressed in goal graphs by using goal modeling as method of analysis. Goal graphs show underpinning goals, their relations, and how underlying goals contribute to achieve higher level goals in goal-hierarchies; in this context this is also how we define model rationality. Here, we consider goals as desirable states that are means to achieve higher level states or conditions. The goal graphs become formal reasoning schemes that express the logic or the rationality of pm$^3$. Lamsweerde (2001) compares main approaches to goal modeling in the domain of requirements engineering and confirms that the benefit of goal modeling is to support heuristic, qualitative or formal reasoning schemes. Thus, by comparing the rationale of pm$^3$-in-concept with pm$^3$-in-use we are making a comparison between the design rationality and the use rationality of the model at the studied site.

# 3 IT governance and pm$^3$

Due to the increasing dependency on IT in most organizations, IT governance is nowadays highly ranked on executives' agendas. (De Haes and Van Grembergen, 2009). There are different definitions of IT governance but they all have the same purpose; to, in some way, activate the link between work practice units and IT units (De Haes and Van Grembergen, 2005). An IT governance framework contains structures, processes and relational mechanisms, which must be adopted to the conditions of organizations (ibid). The phenomenon to organise collaboration between work practice and IT is not new and studies can be traced back to the 1960´s (Brown and Grant, 2005). pm$^3$ is a well- used IT governance model in Sweden, used in a maintenance and further development context. pm$^3$ originates from academia and has its roots in the Scandinavian School of Information Systems (Iivari and Lyytinen, 1996). The model developers stress the need for good organising of IT maintenance and governance practice, and compare maintenance and governance practice to the significant project tradition in the IS field (Nordström and Welander 2007). The model has been theoretically grounded in action and practice theories as well as in a sociotechnical perspective (Nordström, 2005). The pm$^3$ model (På AB, 2013) has been further developed and refined through hundreds of implementations in knowledge cooperation between the pm$^3$ vendor and the organisations using pm$^3$. Basically pm$^3$ organizes IT and work practice collaboration on two levels in an organisation; a team level and on an organisational level. The model developers stress the need for good organising of IT maintenance and governance practice and compare maintenance and governance practice to the significant project tradition in the IS field (Nordström and Welander 2007).

**The team level,** central concepts, or mechanisms, on the team level are:

*Maintenance object (MO).* A maintenance object contains work practice-components (e.g. processes, templates, concept definitions) and IT-components (as IT-systems, applications) in support for a defined work practice. Maintenance objects are a way of delimiting responsibility for maintenance teams, which covers IT service management as well as work practice and technical development. *Maintenance assignment.* Maintenance plans has the functions of a project plan, governing IT service management and IT development for a maintenance object. The plan contains a time-limited assignment for the team were goals and maintenance results, of benefit for the work processes, are clearly defined. *Maintenance team.* The central mechanism of the team is to create collaboration between the units and the IT-department, the team is proportionally staffed with competencies from both work practice and IT. The team is working goal based according to a maintenance plan.

**The organisational level,** central concepts, or mechanisms, on the organisational level are:

*Maintenance Object Architecture (MOA).* The MOA is an overall description of all maintenance objects categorised and grouped into portfolios based on the type of work practice support (e.g. type of core practice, support practice, IT). *Steering committee structure.* On the organisational level there must be a structure of steering committees with explicit roles, responsibilities and relations to each other. The governing structure is for example responsible for approving yearly maintenance plans, making priorities and coordination.

The purpose of pm$^3$ is to establish governable IT through structured collaboration between work practices and IT units within and between organizations. Figure 2 show the overall rationality that pm$^3$ is based on.

# 4 Research approach and procedure

In this section we first describe our practice research approach and then the different analytical procedures that we have used in this study.

## 4.1 Practice research approach

The study has been conducted with a practice research approach (Goldkuhl 2012) and has a course of action similar to action research (Susman and Evered 1978). The study was carried out in a large Swedish healthcare organisation where we investigated and compared two different maintenance teams' deployments of the pm$^3$ model. The research team, as well as the practitioners at the site, expected to gain knowledge about problems and possible redesign of the conceptual pm$^3$ model as well as problems and possible redesign of the deployment process and the pm$^3$ model in use. The first maintenance team participating in the study was maintaining internal web based communication and the second was responsible for specialist medical records (e.g. pregnancy, physical therapy).

The starting point and main source of data collection was the teams' stories, or narratives, about their work. Each team selected two different cases of change management that they had performed. They were instructed to choose one case that they considered to be successful and one case that had failed. The cases were then analysed and "unwrapped" with the team in two separate workshops (one for each team), complementary interviews with team members and others that had had a role in the described case were also held. The pm$^3$ champion, responsible for the overall model implementation in the healthcare organisation, participated in the study and was interviewed during our time at the site. We also analysed an extensive amount of documents, such as protocols, plans, requests for changes, steering documents and project documentation in order to develop a detailed understanding of what had happened in the different cases and how the teams had been working and communicating.

The staffing of the research team was designed for the reason of minimising "bias". The study was planned in relation to researcher knowledge and background, one of the researchers (second author) is the pm$^3$ model developer and one researcher (first author) had no previous experiences of the model.

## 4.2 Procedures

The analysis has been performed in five steps. The first step was the analysis of the, altogether, four cases in detail by using process and activity analysis, problem analysis and goal analysis (Goldkuhl and Röstlinger 2003) in order to identify work processes, problematic areas and goals that had guided the teams' behaviour.

The second step was to analyse and define the rationality of pm$^3$-in-concept that resulted in an explication of pm$^3$ logic. Here we chose to use the concept of rationality as engine in the analysis. A two-day workshop was conducted were the pm$^3$ model developer was interviewed in depth concerning the goals underpinning the pm$^3$ model and their relations. The main question was what assumptions, of desirable and needed states and conditions (goals), that are built into the pm$^3$ model and how these relate in order to achieve the higher level goals that are assumed to be reached by using the model. During this workshop the researchers worked together with developing four goal graphs expressing the pm$^3$ rationale, figure 2 and 3 are results of this analysis.

After the construction of the graphs, the empirical material from the first step was re-analysed for the two different teams by comparing each expressed goal in the four goal graphs with the way that the team were working in daily operations in maintenance practice. This analysis is the comparison between pm$^3$-in-concept and pm$^3$-in use. The analysis is an evaluation of the teams' deployment status where the pm$^3$ rationale is the criteria for comparison. In the evaluation we used 3 markers, red (not at all), yellow (partly) and green (completely) for marking out the current status of each goal for the two teams as illustrated in figure 4 and 5. A commentary explaining the reasons for each marker was also established. In this phase, some complementing interviews and document studies were also conducted in order to collect completing data.

The goal graphs expressing pm$^3$ rationality were consequently turned into an evaluation tool for evaluating the compliance and deviation in deployment from the model-in-concept. The fourth analysis

performed is the test of the evaluation tool. The rationality evaluation tool was tested and validated in the study in three ways: 1) in the mapping of the empirical material 2) in a presentation of the tool in a yearly conference for pm$^3$ users where about 40 organisations participated 3) in two feedback workshops at the healthcare organisation where all 4 graphs where used for the two maintenance teams. In these different settings the rationality evaluation tools has proven to be useful and effective as a communication tool providing a detailed framework supporting in depth evaluation and dialog concerning complex aspects of the pm$^3$ model in concept and in use.

The last step in the analysis is to pass a judgement of the benefits of the used approach, that is the concept of rationality together with the goal graph technique, in order to evaluate an IT governance model-in-use. We do this concluding analysis by discussing our experiences in this study and what we think this approach contribute with in section 6.

# 5 pm$^3$ in concept and in use

We have used the technique of goal graphs in order to express the rationality built into pm$^3$,.. A goal graph shows how underlying goals contribute to achieving higher-level goals and becomes a formal reasoning scheme (van Lamsweerde 2001) expressing the logic or rationality in the pm$^3$ model. Here, we think of goals as desirable states that are means to achieve higher level states or conditions. We have based our analysis of pm$^3$ rationality on the three central pm$^3$ mechanisms (on the team level), which are efficient maintenance objects, explicit maintenance assignments and businesslike maintenance teams. We conclude the analysis with a graph expressing the overall logic of pm$^3$. In the graphs the goals are numbered for practical reasons of making it easier to discuss the graphs, the numbers do not consider any pm$^3$ logic. We have chosen the graph for "businesslike maintenance teams" (5.2.1) as an illustration from our case study. In figure 4 and 5 we show how we have used the graph as an evaluation tool by using coloured dots, dot analysis, which we discuss in section 5.2.2 and 5.2.3.

## 5.1 pm$^3$ in concept

We illustrate pm$^3$-in-concept by explaining the overall pm$^3$ rationality (figure 2) and the goal graph for businesslike maintenance teams (figure 3).

### 5.1.1 Overall pm$^3$ rationality

The goal graph in figure 2 expresses that the three central mechanisms in pm$^3$ build on each other; efficient maintenance objects (1) are at the base and a means for explicit maintenance assignments (2) and businesslike maintenance teams (3).

Implementation and deployment of pm$^3$ is expected to lead to good organisation (control) of all maintenance and development activities (4). This in turn will bring a situation where the maintenance organisation is separated from the line organisation (6), in the same way that project organisations are autonomous units with clearly defined goals and assignments. This in turn will lead to a situation of governable IT (7), and the overall goal that maintenance results are beneficial for work practice over time (8). An important result of implementing and using a model shared by all in the maintenance organisation is that the model brings a mutual language (5) which makes it possible to meet in knowledge development (9) and to conduct an ongoing dialog concerning improvement of the maintenance practice and organisation.

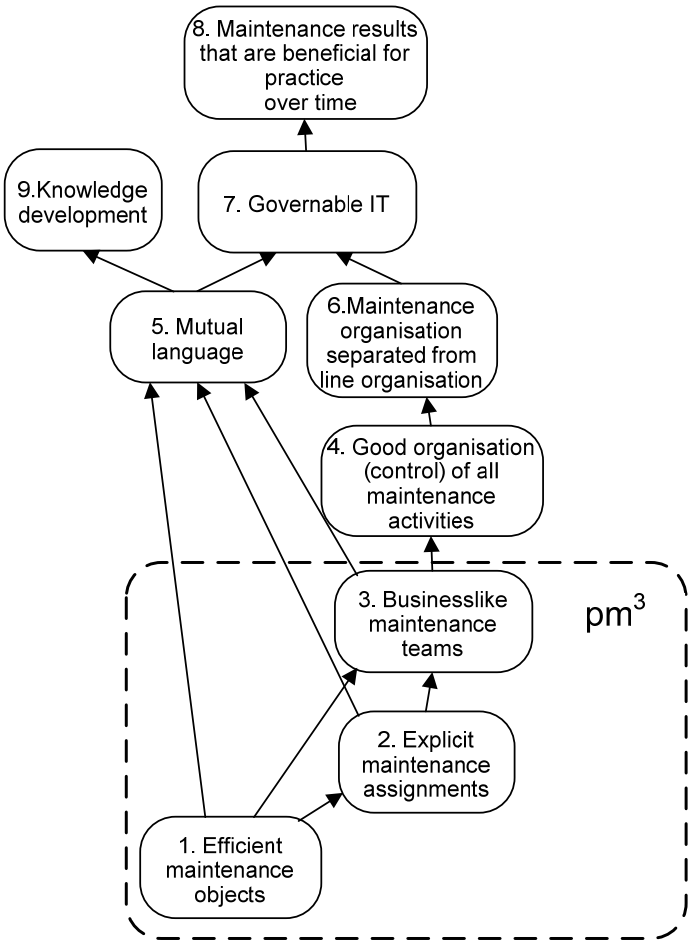


*Figure 2. Overall pm3 rationality.*

### 5.1.2 Rationality for the mechanism businesslike maintenance teams

The goal graph for businesslike maintenance teams in figure 3 (below) shows, in detail, the rationality of the goal number 3 in figure 2 (above). The central mechanism of the maintenance team is to make up collaboration between work practice units and IT units. The team should be proportionally staffed with competencies from both work practice and from IT. Efficient maintenance objects (5) are a pre-condition for clarified stakeholders (6), which is a precondition for clarified roles of responsibility (7) of the maintenance team. The other precondition is that there is a role structure for the whole maintenance organisation clarifying and coordinating organisational related maintenance (emphasis on practice competence) and IT related maintenance (emphasis on IT competence) (9). A central idea with the team is that the members of the team have shared responsibilities for different parts of the work (3). In order to accomplish that, general and shared work procedures (12) are necessary, as well as the explicit maintenance assignment (1), which in turn is a precondition in order to tailor the staff for the assignment (2). A buyer-vendor relationship (8) is also a goal, and, in order to accomplish this balanced situation, it is necessary that members in the team keep a professional attitude and behaviour (10) that, for example, includes acting according to the professional role and responsibilities that are expressed. Finally, a mandate and level based decision-making structure (4) is a prerequisite for establishing businesslike maintenance teams.

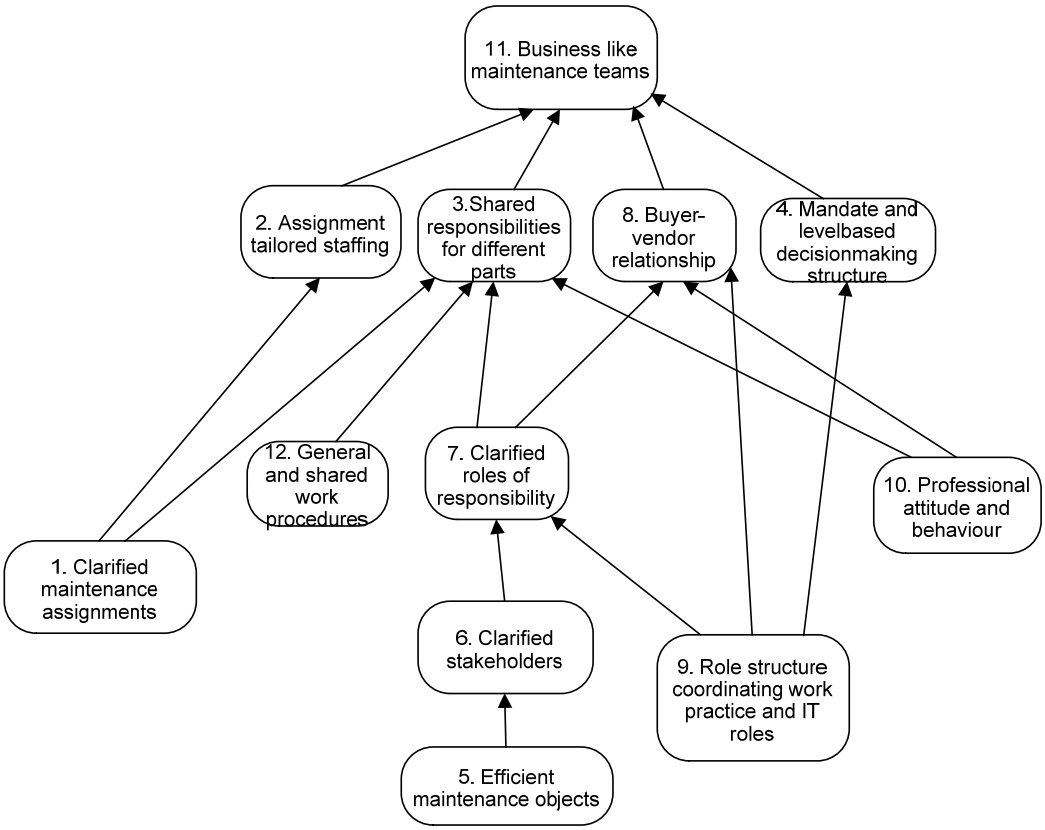


*Figure 3. The rationality of Businesslike maintenance teams in pm3.*

## 5.2 pm$^3$ in use

By comparing the logic and rationality, expressed in goal graphs, of the pm$^3$ model with how the teams were working in daily operations in maintenance practice, we made findings concerning the deployment of pm$^3$. We introduce our evaluation of the deployment by describing the pm$^3$ deployment process in the health organisation.

### 5.2.1 The deployment of pm$^3$ in the healthcare organisation

The implementation begun in late 2010. Establishing the model in the organisation included: education, analysis and definitions of roles, redefinition of all the IT-systems and applications into 19 maintenance objects in an overall maintenance object architecture, as well as recruitment and staffing of 19 maintenance teams (one team for each object). Each team had set up separate maintenance plans with yearly assignments for its maintenance object. At the time of our arrival at the site, the teams were setting up steering committees responsible for the overall level priorities and coordination. One could say that the implementation had been performed bottom-up starting with getting day-to-day maintenance operations into action, all personnel that we collaborated with were skilled in the pm$^3$ language and mechanisms, and necessary documentations and plans were in place. The teams were confident with the model and convinced of pm$^3$s abilities to bring the awaited order. Interestingly, we could see that the implementation was guided by different values. For the top management of the organisation, the pm$^3$ implementation was in line with the establishment of a strong and overall governance model, providing better control and efficiency, where the pm$^3$ implementation was one part. Parallel with the pm$^3$ implementation there had been several restructuring projects concerning outsourcing, reorganisation of IT-departments and

centralisation (regionalisation) of IT-systems and services. The IT managers on the other hand, welcomed the pm$^3$ model as a tool for bringing order and structure into daily operations of maintaining, sustaining and developing IT-systems towards business benefits balancing the needs in the care practices with the right kind of IT-support. Occasionally we got the impression that pm$^3$ was perceived as a cure against ad hoc, cumbersome and top-down management. We actually found that there was a widespread worry amongst IT managers that the top management would abandon the pm$^3$ model prematurely if they could not account for fast results. When we looked into the tensions between different management levels we also found that the model champion had had a responsibility for the implementation of pm$^3$ that widely exceeded her mandate. pm$^3$ was not well-known outside the IT management layer, which, from time to time, short-circuited operations when line managers bypassed pm$^3$ processes and IT governance structures in order to give priority to isolated needs and activities.

### 5.2.2 Dot analysis for business like maintenance teams – internal communication

Through the maintenance teams' narratives of successful and failed cases and studies of documentation (e.g. maintenance plans, project plans and request for changes) we compared the pm$^3$ design rationality with the use rationality in an evaluation that we call dot analysis. Figure 4 illustrates the result of the dot analysis for the maintenance team for internal communication and figure 5 illustrates the equivalent for the specialist medical record maintenance team.

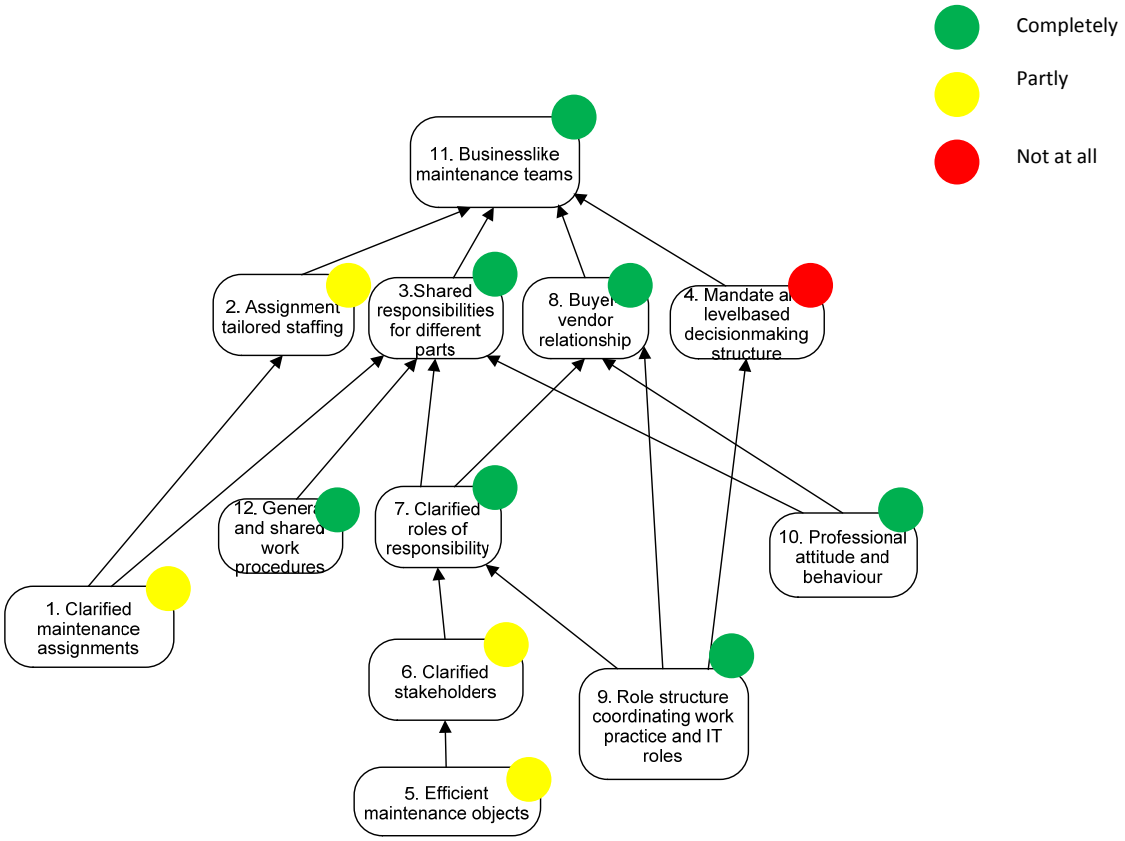


*Figure 4. Dot analysis for business like maintenance teams - internal communication.*

The dots for clarified maintenance assignments (1) and efficient maintenance objects (5) are inherited from separate analysis based on goal graphs for these areas in pm$^3$. The analysis of the maintenance assignment showed that parts of the maintenance assignment were missing in the maintenance plan and that it therefore was impossible to staff the entire maintenance assignment (2). Similarily, the analysis of the efficient maintenance object (5) showed that the work practice parts of the maintenance object were

missing. Due to this, all stakeholders were not identified (6). However, the parts that the existing maintenance team covered fulfilled the intention in pm$^3$. The roles of responsibility were clarified (7), and the role structure coordinating work practice and IT roles was defined (9). The team shared responsibility for different parts (3) and the maintenance team had general and shared work procedures. The collaboration was characterized by a buyer-vendor relationship (8) and the holders of the roles acted with a high degree of professional attitude and behaviour (10). The only red marked goal for this maintenance team was due to the fact that the level of responsibility exceeded the maintenance team's mandate (4), which made it hard for them to decide on central questions. This could be explained by an organisational decision in the deployment process of pm$^3$. Our conclusion from this analysis is that the role structure was clarified, the work procedures were described and working, and that the holders of the roles had a high degree of professionalism.

### 5.2.3 Dot analysis for business like maintenance teams – specialist medical records

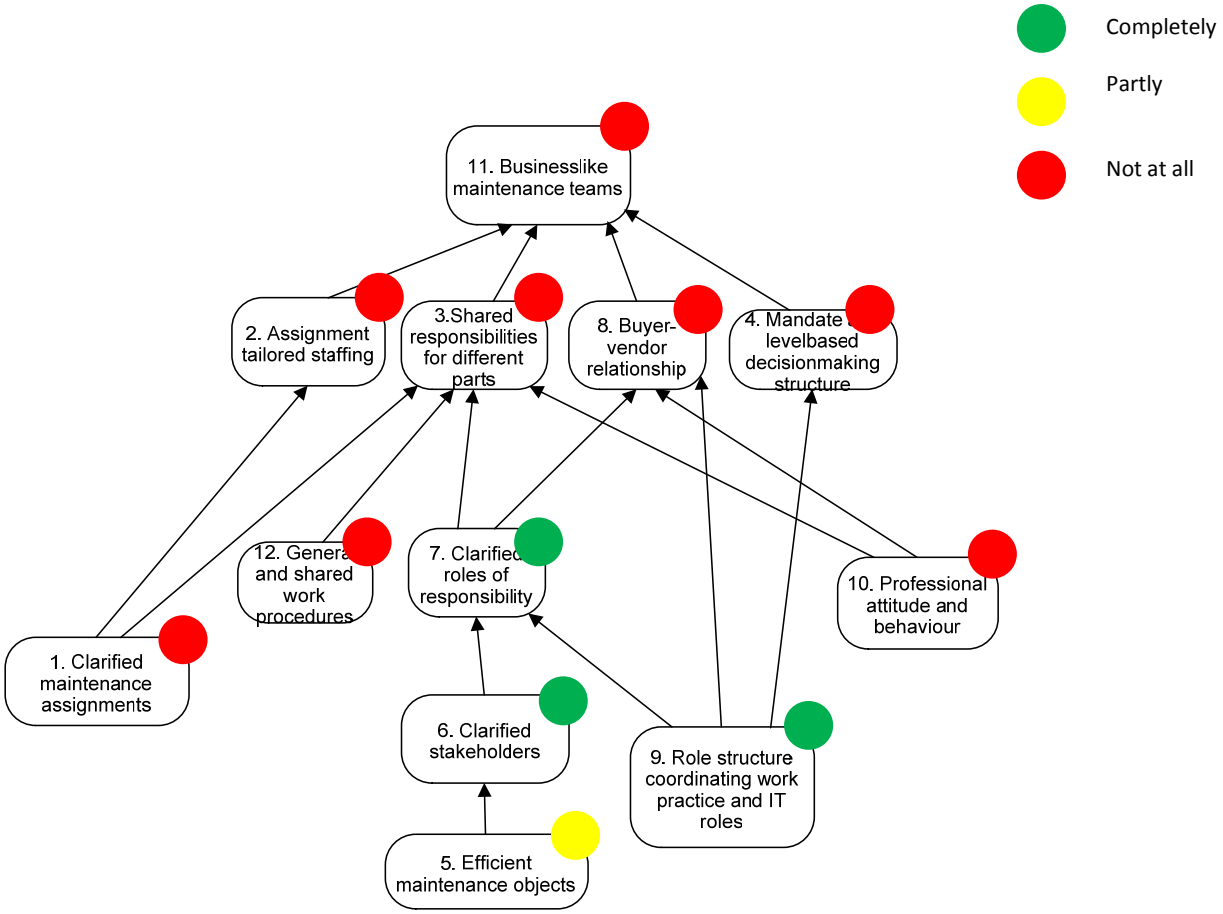


*Figure 5. Dot analysis for business like maintenance teams - specialist medical records*

The dots for clarified maintenance assignments (1) and efficient maintenance objects (5) are inherited from separate analysis based on goal graphs for these areas. The definition and management of objectives did not work in this team, and it was therefore difficult to reach a staffing in line with the maintenance assignment (2). In the maintenance plan we found clarified stakeholders (6), clarified roles of responsibility (7), and a role structure that coordinated work practice roles with IT roles (9). But the narratives told us about a maintenance team that did not share responsibilities (3) and that also lacked general and shared work procedures (12). We partly traced this back to the role holders' lack of

professional attitude and behaviour, which lead to a non-working buyer-vendor relationship. We also identified a problem with the mandate for the maintenance team (4), similar to the one for the internal communication team. Our conclusion from this analysis is that the structure of the roles was clarified but the team lacked general and shared work procedures and a professional attitude to become workable.

# 6 Contribution

In this section we discuss the main contributions and benefits of using the concept of model rationality when evaluating an IT governance model. We have identified three main contributions with the suggested approach. 1) We can define and express the rationality in the pm$^3$ model for IT and governance in a clear manner. Expressing this rationality gives guidance on how it is intended to achieve a governable IT function in an organisation by the using the model. In section 6.1 we discuss the benefits of explicating this rationality. 2) We have used the pm$^3$ rationality as an evaluation tool that has proven to be useful in practice, and 3) we have identified the main problems in the deployment of pm$^3$ in the investigated healthcare organisation.

## 6.1 Rationality in the IT governance model pm$^3$

The rationality of pm$^3$ expressed in goal graphs (two of the altogether four graphs are shown in figure 2 and 3) explains how central concepts and desired states are related in pm$^3$. The rationale expresses how goals intend to lead to higher level goals in formal reasoning schemes. Expressing the rationale serves as a grounding process for the pm$^3$ model which ensures that there is congruence between different parts of the model and that the model is consistent. This contributes to the possibilities of evaluating and further developing the pm$^3$ model. This work has already had an impact on the latest version of pm$^3$ where clarifications concerning the importance of professional attitude and behaviour have been added.

The expressed rationality should also be helpful when comparing pm$^3$ with other models for IT maintenance and governance as for example ITIL.

In addition, the expressed rationality should be especially useful when working with establishing the model in an organization as part of the education. Expressing rationality makes a more detailed discussion and dialogue possible, and could assist in creating realistic expectations, identifying colliding mind sets or developing conscious adaptions of the model on an organisational level.

## 6.2 Rationality evaluation tool

Using the rationality graphs for evaluating the maintenance teams' deployment worked well in several ways. In our analysis we used the graphs for analysing the different teams' activities and states by considering one goal at a time, determining whether the team completely, partly or not at all fulfilled the intended goal. For this purpose, we marked out green, yellow and red dots in the graphs, as illustrated in figure 4 and 5, and summarised the arguments for the assessment in a separate document. This way, the rationality graphs worked as an evaluation tool providing support for diagnosing the deployment in detail at the team level where we identified which goals had been achieved and which goals had problems. The dot analysis proved to be a strong pedagogical tool when providing feedback of our diagnose to the different teams in the concluding workshops. Presenting evaluation results through the dotted graphs established a very fruitful and detailed dialogue with the team members where actions and measures were identified and analysed, both as separate parts and as a whole. We especially noticed that the dot graphs were helpful in presenting critique and "misuse" of pm$^3$ because we could specify the critique in the larger context, which provided a constructive perspective. The main advantage of using the graphs is that they give support for zooming in on one part or goal as well as zooming out on the whole context, which we perceived productive both in our analysis and in our dialogue together with the members of the teams in the practice.

### 6.3 Problem areas in the pm$^3$ deployment

From our analysis of the rationality of the all three pm$^3$ mechanisms we could see that the studied healthcare organisation seemed to have problems at the "heart" of IT maintenance and governance - the work practice/IT alignment. Maintenance objects and teams focused on IT components, separated from their work practice context, this, we believe, is a consequence of an IT biased implementation. Our conclusion is that it is impossible to reach work practice/IT alignment when only scooping IT and engaging IT people. Implementing IT maintenance and governance in large healthcare organisations is a complex undertaking. IT maintenance and governance models are compound and operates cross organisational borders involving all management layers. In order to gain the benefits from implementing an IT maintenance and governance model there has to be a broad understanding of the models mechanisms that demands education of managers, which could be difficult both to identify and to prioritise in daily practice. Another finding we did was that a less structured maintenance practice can perform successfully (internal communication) through a high degree of professionalism by the role holders.. And, correspondingly, well-described maintenance plans and role structures (specialist medical record) are not enough; the role holders must take on professional attitudes and behaviours in order to put plans and structures into a successful work performance.

## 7 Further research

From doing this research we have identified some important lines of further research. Firstly, there is a need for a thorough literature review of the field of IT maintenance and governance. In our paper we have treated maintenance and governance as one coherent concept and phenomena due to the fact that the pm$^3$ model was developed as a maintenance model and method from the beginning. pm$^3$ has developed over time and included support for governance procedures as a response to the needs of organisations where the model has been implemented. When briefing the research literature on IT or IS maintenance and IT governance these areas seem to be more divided, and different perspectives, research traditions and theories are guiding the research. Therefore it is important to make a systematic review of the literature in order to identify the different research streams in the area and the underpinning theories in order to move further theoretically.

The other line of research that we believe is important is continuing investigating deployments of pm$^3$ in different organisations. The possibilities and access to pm$^3$ user organisations for comparing pm$^3$ deployments are very good concerning our cooperation with the pm$^3$ user network and the vendor. We think that such systematic investigations will generate knowledge on crucial mechanisms for better alignment of work practices and IT of interest for both practice and research. In this paper we have identified some problems and obstacles that we intend to investigate further in order to understand the efforts and complexities involved in efficiently aligning practices with IT. One issue that we especially are interested in is how practice managers on different levels understand their role and responsibilities concerning the IT supporting the practice that they are responsible for. We could identify a possible risk that if IT maintenance and governance are developed by IT people, from an IT perspective then such approach might continue to block the alignment between work practices and IT.

# 8 References


Brown, E. and Grant, G. (2005). Framing the Frameworks: A review of IT Governance Research. Communications of the Association for Information Systems, Vol. 15, Article 38, pp 696-712.

De Haes, S. and Van Grembergen, W. (2005). IT Governance Structures, Processes and Relational Mechanisms: Achieving IT/Business Alignment in a Major Belgian Financial Group. In Proceedings of the 38th Hawaii Conference on System Sciences, pp. 1-10.

De Haes, S. and W. Van Grembergen (2009). "An Exploratory Study into IT Governance Implementations and its Impact on Business/IT Alignment." Information Systems Management **26**(2): 123-137.

Fitzgerald, B., N. Russo, et al. (2002). Information Systems Development: Methods in Action. Berkshire, McGraw-Hill.

Goldkuhl, G. (2012). "From Action Research to Practice Research." Australasian Journal of Information Systems **17** (2): 57-78.

Goldkuhl, G. and A. Röstlinger (2003). The significance of workpractice diagnosis: Socio-pragmatic ontology and epistemology of change analysis. ALOIS (Action in Language, Organisations and Information Systems) 2003, Linköping, Sverige, Linköpings universitet.

Iivari, J. and K. Lyytinen (1996). " Research on information systems development in Scandinavia - unity in plurality." *Scandivian Journal of Information Systems* **10** (1&2): 135-186.

Karlsson, F. (2012). "Longitudinal use of method rationale in method configuration: an exploratory study." European Journal of Information Systems: 1-21.

Nordström, M. (2005). *Styrbar Systemförvaltning - att organisera förvaltningsverksamhet med hjälp av effektiva förvaltningsobjekt*. Institutionen för Datavetenskap, Linköpings Universitet.

Nordström, M. and T. Welander (2007). *More Business Like Maintenance Management*, Studentlitteratur, Lund.

På AB (2013). $pm^3$ model description. På AB, Danderyd.

Päivärinta, T., M. K. Sein, et al. (2010). "From ideals towards practice: paradigmatic mismatches and drifts in method deployment." Information Systems Journal **20**: 481-516.

Susman, G. and R. Evered (1978). "An assessment of the Scientific Merits of Action Research." Administrative Science Quarterly **23**(4): 582-603.

van Lamsweerde, A. (2001). Goal-Oriented Requirements Engineering: A Guided Tour. Proceedings of the 5th IEEE International Symposium on Requirements Engineering.

Ågerfalk, P. and B. Fitzgerald (2005). Methods as Action Knowledge: Exploring the concept of Method Rationale in Method Construction, Tailoring and Use. EMMSAD 2005, Exploring Modeling Methods for Systems Analysis and Design Porto, Portugal.

Ågerfalk, P. J. and K. Wistrand (2003). Systems Development Method Rationale - A Conceptual Framework for Analysis. In: Proc. 5th International Conference on Enterprise Information Systems