
VALUE DRIVEN ICT FOR THE BRIEFING PROCESS

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ABSTRACT

The way briefing is prepared in conjunction with building projects is crucial to the project's adherence to the client's intentions. It is through the brief that the values expected are documented and transferred. However, international research has for a long time pointed out the briefing stage as a constantly recurring problem area for the construction sector.

The aim of this research is to achieve a more value-driven building process by the use of ICT. The objective of this study is to improve the briefing phase using ICT.

To reach this objective the following questions will be addressed:

Q1: What values are defined in the briefing process?

Q2: What values were created by the use of ICT?

Q3: How could ICT be developed to further support a value-driven briefing process?

In order to answer the research questions one of the case studies concerning a healthcare building is presented here. The ICT tool Program of Technical Standard (PTS 2012) was used to support the briefing process in the building project studied.

The result of the studies is that using ICT to support the briefing process has many valuable advantages. The use of ICT-support in the briefing process makes the process more efficient. PTS enables capturing of requirements, facilitates information transfer and enables a united vision of the project. PTS also enables consistency of standard and enables benchmarking and exchange of knowledge by the fact that ten Real Estate organisations of County Councils in Sweden use and develop PTS in collaboration. The ICT-support could be improved by better supporting verification of requirements, prioritization of the client's requirements and discussions about alternative conceptual and possible solutions.

This research is a part of the Eracobuild project "Value Driven Procurement in Building and Real Estate" (ValPro 2012).

Keywords: Planning and implementation Processes briefing, Values, ICT support.

1. INTRODUCTION

1.1 Value driven briefing process

A building should create value for all the parties involved, both those who ordered the building, owns it and maintain it, but also those who use the building. The building sector is mainly focused on reducing the initial (investment) costs, rather than applying any comprehensive approaches for optimizing total facility life cycle values for the benefit of owners, users, the environment and the society. This is partly due to lack of models, methods and tools for total life cycle value management.

“Briefing” can be considered almost synonymous with concepts of “Architectural Programming” as used in North America (Kelly and Duerk 2002) and “Scope Management” as used in Australia (Peakman 2008). Presently, the terminology describing various types of briefing is inconsistent and different terms are used by different professions and for different project types in construction (Chung et al. 2009).

The way briefing is prepared in conjunction with facility-provision projects is crucial to the project's adherence to the client's intentions. Through the brief, the expected values are documented and transferred. However, international research and development projects have long pointed to the briefing stage as a constantly recurring problem area for the construction sector (Kelly 1992; Construction Industry Board 1997). One key problem is that the information in the briefing process is relatively unstructured and therefore hard to manage and verify. This deficiency is most obvious in the information about the business concerned and its facility needs.

In order to achieve premises the client can chose between different briefing methods when a new building are planned. Regardless of the method chosen, one success factor of a building project is the way that requirements from the client is transformed and communicated to the contractor (Ryd 2004; Pemsel et al 2010). This process can be supported by ICT tools.

1.2 ICT support used for briefing in practice

The briefing process is an iterative process in which the client's requirements and values will be absorbed into both the brief and the design phase. One success factor of a building project is the understanding of end-users needs and the communication of the clients requirements to the contractor (Kelly et al. 2005). Understanding the requirements and the ability to communicate them are a success factor for the building project and leads to more satisfied and less critical clients and end-users (Pemsel et al. 2010). There are many different methods to understand and communicate the requirements of the end-user (Malmqvist and Ryd 2006), some of which are supported by ICT. There have been some reviews of ICT applications in briefing, e.g. (Ryd 2003, Chung et al. 2009) but these reviews have been focused on research prototypes more that the softwares used in practice. There is a lack in the literature of how ICT-support is used for briefing in practice and the values coming from this use. This knowledge is vital as a foundation for further development of ICT-support for briefing. In Sweden there are two systems that are widely used in practice: dRofus (Nosyko 2012) and Program of Technical Standard (PTS 2012). PTS is used by more than half of the Real Estate organisations of County Council in Sweden in the early stages of the building process, and therefore chosen as a case study in this study.

2. AIM AND RESEARCH QUESTIONS

The **aim** of the research project, where the study presented here is a part, is to achieve a more value-driven building process by the use of ICT in the briefing process.

To fulfill this aim three main **research questions** were formulated:

Q1: How is ICT used today in a value-driven briefing process?

Q2: What values are given by using ICT-support in the briefing process?

Q3: How could ICT be developed to further support a value-driven briefing process?

In this paper question Q1 and Q2 will be in focus but answering these two questions will also bring forth some information concerning Q3.

To answer the questions above three case studies were used. Three ongoing building project were studied; two healthcare buildings and one building for culture and music. These case-studies were performed as a part of the Eracobuild project “Value Driven Procurement in Building and Real Estate” (ValPro 2012) to develop a holistic value model for the facility life cycle.

In this paper we focus on one of the case studies concerning the planning and production of a healthcare building. The ICT tool Program of Technical Standard (PTS) was used to support the briefing process in this project. The main methods for gathering data in the case studies were workshops and interviews.

3. THE CASE STUDY BUILDING 36, HÖGLAND’S HOSPITAL EKSJÖ

3.1 About the building project

To increase the quality of stroke treatment, it was necessary to bring all the resources together around a patient, for both medical and rehabilitation treatment. The result of a pre-study show that a new building was required and the decision was made to construct a new building, Building 36 in Högländs Hospital Eksjö. The old building had neither the space nor the qualities that the new treatment method requires. The new building will have a total area of 11 000 square meters. The type of contract being used is a turnkey contract with an estimated budget of 20 million Euros. The building contractor is Skanska. The procurement process started in June 2009 and the estimated time of completion is November 2012. PTS was used as an ICT tool to support the briefing process in this project.

3.2 The Case owner

The case owner and client of this case study is Landstingsfastigheter Jönköping (the Real Estate organisation of Jönköping’s County Council, called Landstingsfastigheter from now on). Landstingsfastigheter manages and develops properties for healthcare providers of the County Council. The roles and responsibilities of Landstingsfastigheter include real estate planning, new building and renovations, managing administration and maintenance of Council premises. During 2012 Landstingsfastigheter will be carrying out 185 projects with a total budget of 42 million Euros.

3.3 Objectives and research questions

The objective of this case study was to investigate and describe the use of the ICT tool Program of Technical Standard (PTS) in the building process of a hospital building and in this way find answers to the two main research questions described above.

To reach the objective the following questions were focused in the case study:

C1Q1) What functionalities in PTS support the briefing process?

C1Q2) How did the use of PTS influence the process?

C1Q3) What values were created by the use of PTS?

The two first questions, C1Q1 and C1Q2, will mainly answer research question Q1.

The third question, C1Q3, will mainly answer research question Q2

3.4 Method and research realization

An illustrative case study, is primarily descriptive (Hyvärinen and Mäkeläinen 2010), and seemed the right choice for this case study, which seeks to identify and describe how PTS was used in the building process of a hospital building.

Three different techniques for collecting data were used in this case study:

1) Document study

2) Workshops

3) Semi-structured interviews

A summary of techniques used for collecting data and how they are related to the research questions are presented in table 1.

Table 1: Techniques used for collecting data related to the research questions.

Research question	Technique	Analyse Method
Q1 What functionalities in PTS support the briefing process?	Workshops, Document study	Descriptive
Q2. How did the use of PTS influence the process?	Workshops	Descriptive
	Semi-structured interviews	Content analysis
Q3. What values were created by the use of PTS?	Workshops	Content analysis
	Semi-structured interviews	

Document study

Written sources such as administrative documents, newspapers, websites, letters and other internal documents can be used and be relevant to a case study (Yin 2009). However, one should be aware that these types of documents and information are not always correct and they can also contain some bias, and therefore should be used with caution.

In this case study websites and internal reports were used for collecting information about ICT tools, project description etc.

Workshops

Workshop is a creative form of meeting that, if performed correctly, can bring out the participants' motivation and creativity. A well-conducted workshop has great advantages over a traditional meeting. The focus moves from the leader to the group and it becomes a more democratic process where everyone can contribute. This makes the participants more motivated and active (Eriksson 2007).

The workshops were carried out with staff from Landstingsfastigheter, acting in a double role as both client and case owner. In the group there were professionals that have a decision-making role at Landstingsfastigheter and people who use PTS on a daily basis.

Three workshop-series were carried out in this research and the aims of the workshops were to:

1. identify the briefing process and establish a description of how and when Program of Technical Standard (PTS) was used during the early stages in the building process. This should give data to answer research question C1Q1 and C1Q2.
2. establish a description on the values of using PTS. This should give data to answer research question C1Q3.

In the first workshop-series, six meetings were carried out with representatives from Landstingsfastigheter during the spring of 2011. In the second workshops-series, where three meetings were conducted, a description of the values of using PTS was produced. The last workshop-series was conducted in two meetings during spring and autumn 2011.

One facility planner, one project manager, two operation managers and one technical manager participated in workshops-series no 1. The workshops were coordinated and held by the first author of this paper. Between the workshops, a smaller group summarized and structured the outcome from the workshop. The smaller group consisted of the facility planner, project manager and the first author. The smaller group presented the outcome to the bigger group, which discussed the result, made some suggestions for change and finally at the last workshop everyone agreed on the outcome.

In workshop-series no 2, one facility planner, one project manager and the first author participated. The workshops were coordinated and held by the author.

In the last workshop series one facility planner, one project manager, two ICT developers and a user of AEC applications participated.

Interviews

Semi-structured interviews were conducted with selected respondents, to study their experiences, thoughts and expectations or perceived effects and problems associated with the use of ICT support in the process.

Semi-structured interviews are a combination of standardized interviews, which have a tighter structure, and unstructured interviews, which are more flexible (Kvale and Brinkmann 2009). The reason why semi-structured, rather than unstructured, interviews were used in this case study was because some topics were addressed to all respondents in order to be able to draw

conclusions but also to show resemblance with the results of the workshops that were conducted in this case study. Semi-structured interviews also allow the interviews to have some openness, which enables the unexpected (Kvale and Brinkmann 2009).

Responses from those who work for the client was compared with the replies from those who carry out or develop the building project. Therefore project participants from both the client and the current contractor were asked to participate in the study. To participate in the interviews only one criterion needed be fulfilled:

- the respondents must have been involved in the building project's early stages.

The project managers were given the opportunity to recommend which representatives from the tenant that could participate in the interviews because they had the knowledge about who participated in the early stages.

Seven (7) semi-structured interviews were conducted in this case study. The respondents' professions were as follows;

1. Facility planner,
2. Project manager,
3. Facility operation manager,
4. Care unit manager,
5. Architect,
6. Installation coordinator,
7. Site Manager

Interviews with facility planner, project manager, facility operation manager and care unit manager were carried out by one interviewer. The interviews with the installation coordinator and the site manager were carried out by another interviewer and a third interviewer interviewed the architect.

The interviews were recorded on tape to make it easier to analyse the data and to carry out an interpretation. Permission to record was asked for and accepted by all respondents before the interview. Most of the individual interviews were conducted in the respondent's natural work environment, to create a positive atmosphere, which made it easier for the respondent to speak freely and unbound (Kvale and Brinkmann 2009). In some cases there was no opportunity to conduct the interviews in the respondent's natural working environment, therefore, a conference room or another neutral place was used.

The interviews conducted in the case study, resembled an everyday conversation, a freer conversation with the purpose of increasing the possibility of finding the unexpected.

Many of the questions were of a retrospective nature and resulted in the fact that the respondents had to look back and try to remember how it was back then. This flashback can be seen as a risk, if the respondents have reformulated their memories so that they conform to what they believe today. This risk was taken into account when the analysis was performed, in the sense that similarities in the responses have been compiled, rather than individual statements in which there may be biases and errors.

By sending the transcriptions of the interviews via e-mail to the respondents, they have been given the opportunity to complement and clarify their interviews. Only one respondent took this opportunity.

The full transcripts are stored in a case study database.

Analysis of interviews

Silverman’s (Silverman 2000) four phases (data reduction, data image, conclusion and verification) were chosen in order to analyse the collected data from the interviews. First a *data reduction* was carried out by the three interviewers. Each of them has independently reduced the data in the interview transcriptions through interpretation of the respondent’s sentences. The interpretation was sorted into different nodes (table 2) and registered in a case study database. CAQDAS software (computer-assisted analysis of qualitative data) was used to support this process. One advantage of using CAQDAS is that it facilitates team research to develop consistent coding (Silverman 2009).

Table 2: Description of nodes (Case Study: Building 36).

Nodes used when coded the respondents answers	
1) PTS benefits	7) Process
2) PTS disadvantages	8) Value added activities
3) Development proposals	9) Visualisation
4) Performance metrics	10) BIM
5) Procurement/contracts	11) Economy
6) Competence	

After this step the interpretations were compared and discussed between the interviewers and this led to a joint interpretation (Silverman 2000). This procedure creates opportunities for the interviewers to be affected by each other’s interpretation and it allowed for a controlled and structured approach to find, if any, correspondence between them.

In the second phase, *the data generation*, the interviewers organised and coded the data in the case study database into different categories (table 3). The nodes were categorised into four groups; Use of PTS, Process, Tangible & intangible values and Development proposals. Some nodes could be found in several categories. This gave a clear and structured way to view the respondents' answers grouped and connected to the research questions.

Table 3: Description of categories and connection to research questions of the case study.

Categories used when analyzing the respondents answers
1) Use of PTS; This category contains following nodes: Economy, PTS benefits, PTS disadvantages, Process, Value added activities.
2) Process; This category contains following nodes: Procurement/contracts, Process.
3) Tangible and Intangible values; This category contains following nodes: Competence, Performance metrics, Value added activities, Process, BIM, Visualisation.
4) Improvement proposals; This category contains following nodes: Development proposals, PTS disadvantages.

To draw *conclusions* a matrix was created which enables the researchers to see the responses group wise in categories and the respondent’s professions. This procedure increased the chances to get a comprehensive picture of the results and also increase the opportunities to be

able to see patterns and different contexts (Silverman 2000). In the *verification phase* a critical approach has been used to evaluate the validity of the data collected. Were there reasons for respondents to twist the truth? How much has the impact from the interviewer affect the respondent? Have the answers been spontaneous or initiated by the interviewer?

4. RESULTS

A summary of the results from the document study, workshops-series and interviews is presented below. The result is presented divided by the research questions. The citations used from the interviews below are translated from Swedish into English by the first author.

4.1 What functionalities in PTS support the briefing process? (C1Q1)

As a result of the document study a description of the ICT support PTS was made. The use of the ICT software in the process was mapped using the results from the document study, the workshops and the interviews.

Description of Program of Technical Standard (PTS)

Landstingsfastigheter has developed PTS as an ICT-based management system for controlling and supporting its building process. PTS is a knowledge database containing best practice and specific knowledge about how the building of premises for healthcare should be carried out.

“Program of Technical Standard aims to strengthen the client’s role through active assumption of responsibility, acting correctly from the start, involving clear instructions, good solutions that can be reused and guidelines that set value related goals.” (Landstingsfastigheter i Jönköping 2010)

PTS was developed back in the early seventies when two of the County council’s hospitals were planned. Today it is a web-based software that can be used if a computer has a connection to the Internet.

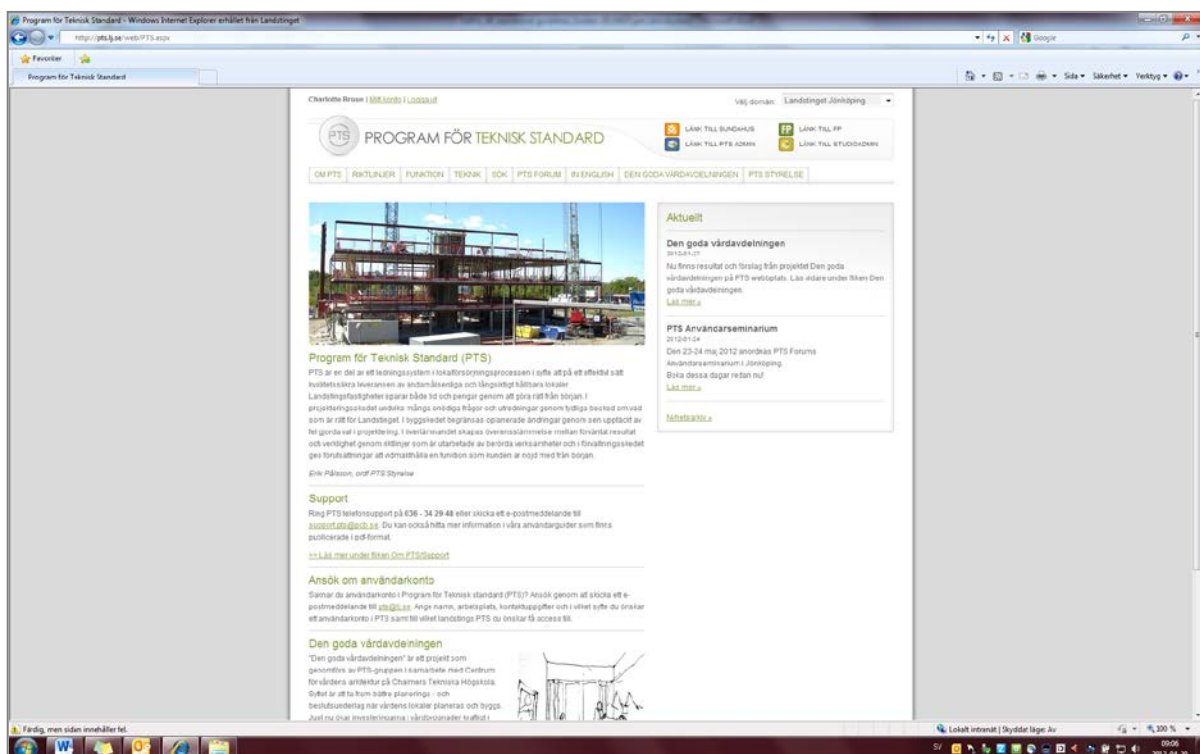


Figure 1: Program of Technical Standard is a web-based ICT solution that supports the briefing process.

The ICT support PTS is owned by the users and members are mainly from the County Councils in Sweden. The software is used by the client, facility planners, the contractor, architects and other consultants participating in building projects.

Organization and part-owners of PTS

Ten of the twenty Real Estate organisations of County Councils in Sweden use and are part-owners of PTS. Each part-owner has one representative person on the PTS board (Landstingsfastigheter i Jönköping 2011). The PTS board makes the overall strategic decisions about the ICT software e.g. how and when the IT-system should be developed. Program of Technical Standard is regularly updated e.g. after collecting experience from the client, contractor and tenants when a construction projects has ended (Landstingsfastigheter i Jönköping 2010). The requirements and information in PTS are also updated if the healthcare providers (the tenants) change their workflows or introduce a new treatment method that affects the requirements of the premises.

A social network, PTS Forum, is established round the ICT tool. Representatives from the ten Real Estate Organisations of County Councils get together in specialist groups e.g. HVAC, power engineering and security & safety, several times a year to share good experiences and search for and discuss new laws, rules and new innovative solutions and developments (Landstingsfastigheter i Jönköping 2011). The County Councils possessing different core competencies and can in such way share and learn from each other. PTS Forum also provides opportunity to appoint internal teams within the PTS members to investigate a specific question or to commission research studies such as the project “The good ward” (Fröst and Ulrich 2011).

Use of Guidelines, Technical Program and Standard rooms

PTS contains guidelines which set the overall values and requirements for standards in premises for healthcare. Guidelines such as acoustics, fire prevention, environmental requirements, hygiene and accessibility (disability) are specified in PTS (Landstingsfastigheter i Jönköping 2010).



Figure 2. Snapshot of guidelines in PTS.

In PTS there is a module called, Tekniska Programmet (TP) where clarifying and more specified requirements for building regulations and legislation and Sweden's law for health- and medical care are stated (Landstingsfastigheter i Jönköping 2010).

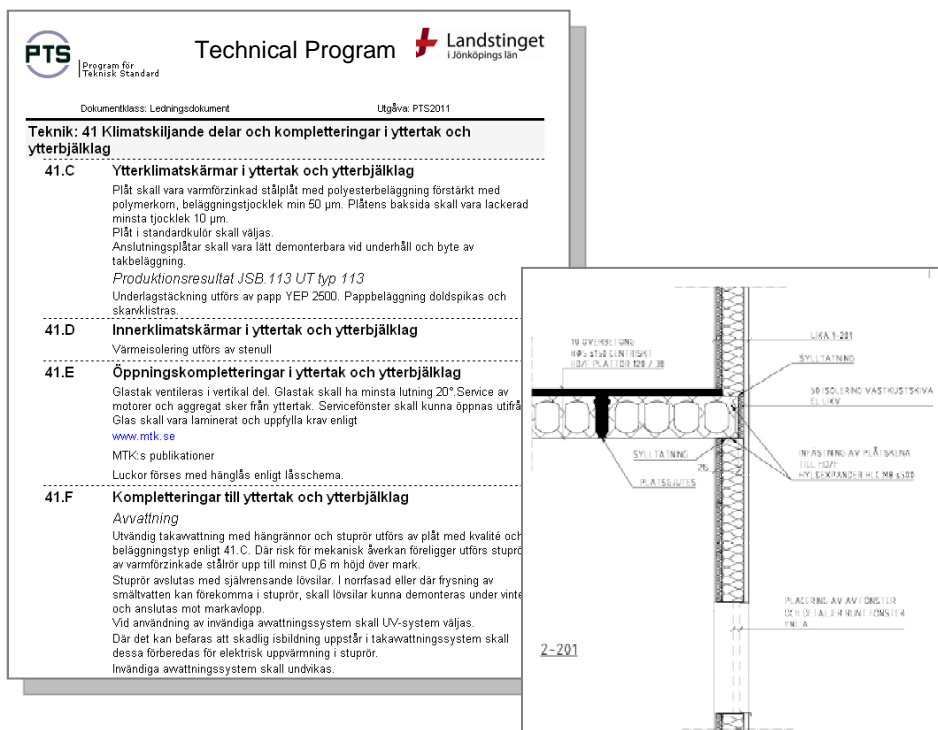



Figure 3. Snapshot of a report from the Technical Program in PTS.

In the TP module, technical requirements for the building construction and the technical system are described e.g. building frame, heating and electrical power. The information is


structured using BSAB 96 , the Swedish construction industry classification system (Svensk Byggtjänst 1999), which enables cooperation with other ICT-systems. The BSAB structure is used when integrating the TP module in PTS and the external system called Sunda Hus Miljödata. Sunda Hus Miljödata is a system for assessing the health and safety and environmental suitability of products used in the building and property areas (Sunda Hus i Linköping 2012).

PTS also contains standard rooms that are good examples of solutions for premises for the County Council. The standard rooms contain requirements for a room such as interior equipment and functional-requirements. The standard rooms are also visualised, as 3D-images, which are used in discussions about solutions with the tenants. It is valuable for the County Council that premises are general and flexible so they can be used for different purposes. Therefore the standard rooms in PTS are used as a base when building project in the county are planned (Landstingsfastigheter i Jönköping 2010).



Program för
Teknisk Standard

Standard room



Landstinget
i Jönköpings län


Dokumentklass: Ledningsdokument Utgåva: PTS2011


Rum: Behandlingsrum	Rumsid: 46	Område: tandvård	Kategori:
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Beskrivning: behandlingsrum som är inrättat för undersökning och behandling av tänder

FUNKTIONSKRAV

D61 Dörrbredder			
Dörrar	D614	fri passage 900 mm	
F11 Komfortklass			
Komfortklass	F113	Individuellt reglerad kyla / alternativt zonindelad kyla	
F31 Min temperaturkrav			
Min temperaturkrav	F315	21 °C	
G11 Min filtreringsgrad			
Min filtreringsgrad	G113	EU7	
G33 Min luftflöden l/s m2			
Min luftflöden	G333	3 1/2 m ²	
H12 Synkrav			
Synkrav	H120	Normala synkrav enligt branschrekommendationer för denna typ av rum	
H16 Belysningsstyrka			
Belysningsstyrka	H160	Normal belysningsstyrka enligt branschrekommendation för denna typ av rum	
H31 Färgåtergivning			





PLANVY, VÅDRUM PERS.

Figure 4. Examples of use of Standard rooms in PTS.

Use of PTS and building process

During two workshops-series the early stages in the process was identified and a description was conducted on how the software PTS was used in these steps.

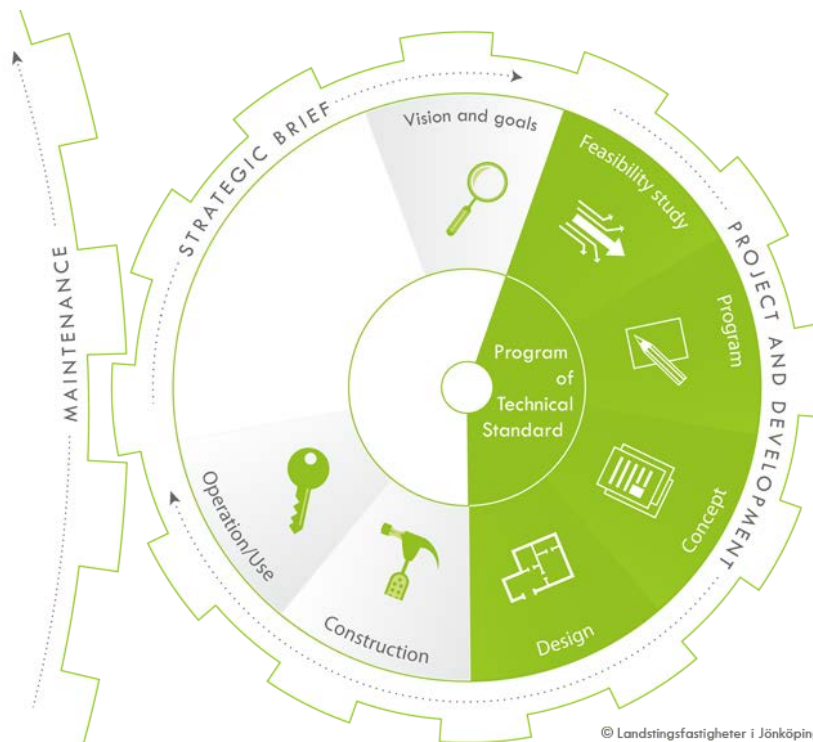


Figure 5. The building process and the use of Program of Technical Standard.

PTS is used during the feasibility study, the program, the concept and the design phase in the building process (figure 5). The use of the software in the different stages is presented below. The first phase when PTS is used, is in the **feasibility study**. The standard rooms in PTS are studied and discussed during workshops with the tenants, e.g. when discussing the tenants processes and workflows, function and size of the room etc. PTS also supports an early calculation of area, costs and the establishing of the technical brief. In this phase PTS is used by the client (facility planner, project manager) and by the architect/developer.

In the **program** phase, PTS supports a careful planning of the new premises. The FP module (FunktionsProgrammet) in PTS is being used to develop the functional brief of the premises. The brief contains a list of all needed rooms and the requirements for each room. This information is documented in room data sheets (East and Nisbet 2011), in Swedish called RumsFunktionsProgram, RFP. The RFP contains detailed information on interior requirements such as equipment and what functions the rooms should possess. To establish the RFP the standard rooms in PTS are being used and discussions are held in workshops with the tenants. The results from the earlier phase (feasibility study) support this phase and PTS is used by the client (facility planner, project manager) and by the architect in this phase.

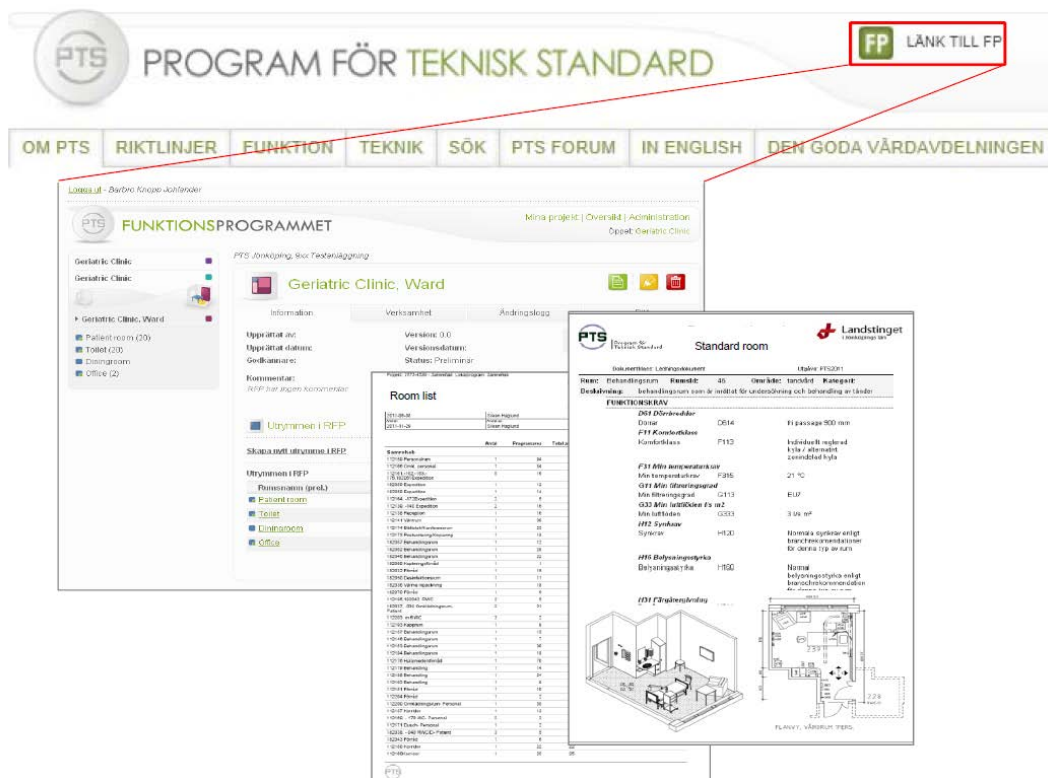


Figure 6. The use of PTS in the program phase developing Room list with connection to the standard rooms.

The TP module in PTS is used in the **concept phase**. TP is used for developing specifications for the technical brief, such as the frame system, materials, building systems etc. Users of this module are staff from the client when they are conducting tendering. But the contractor and entrepreneurs also use this module when procuring materials for the building project.

During the **design** phase, PTS is used to support the design documents. The TP module contains detailed specifications of technical requirements and the entrepreneurs and consultants are using it to validate their planned solutions.

4.2 How did the use of PTS influence the process? (C1Q2)

The project of building 36 is a hospital building and an ordinary building project for this client. The result from the case study shows that PTS has been used according to recommended use (figure 7). The client used the FP module (FunktionsProgrammet) to capture and manage the end-users needs, and the TP module (TekniskaProgrammet) was used by the developer to capture the client's technical requirements. The figure 7 shows a time-line of the project and where PTS has been used.

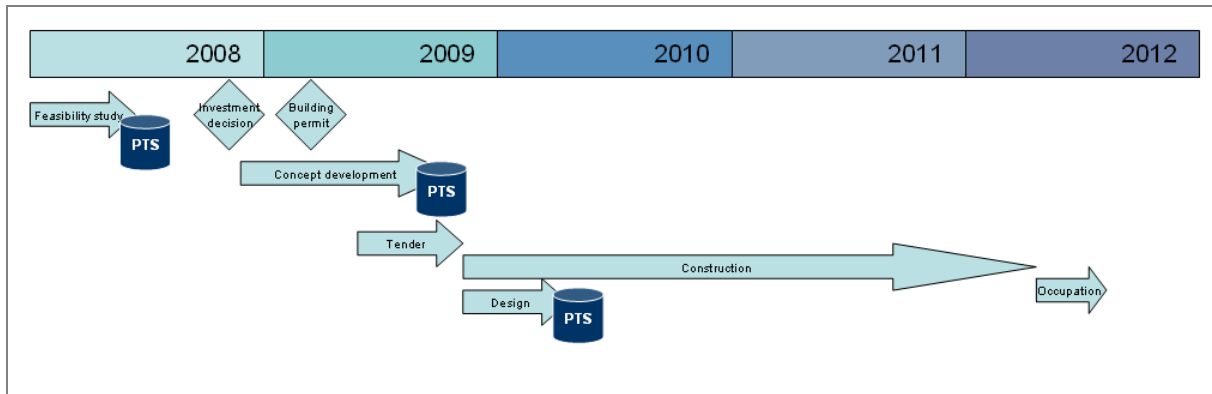


Figure 7. Timeline for the building project Building 36.

4.3 What values were created by the use of PTS? (C1Q3)

During the workshops held with the client organization Landstingsfastigheter, discussions were held on what values the use of PTS gives. Thirteen (13) values were identified and these are presented in table 4.

Table 4: Summary of values identified during the workshops.

Values using Program of Technical Standard	
Value 1	Using PTS enables capturing of requirements and reuse of good solutions since PTS contains defined requirements, specific knowledge, best practise and scientific knowledge
Value 2	Using PTS enables validation and verification of requirements which in turns reduce errors and provides a quality check
Value 3	Using PTS enables a structural approach when capture, manage and document requirements which enables a professional performance and reliability
Value 4	Using PTS facilitates communication and information transfer between clients, tenants and developers
Value 5	Using PTS enables to have different suppliers in the project
Value 6	Using PTS enables getting a united vision for those who participate in the project
Value 7	Using PTS enables to save time in the building process and make the process efficient
Value 8	Using PTS enables getting consistency of standard in the whole County council building-stock
Value 9	Using PTS provides a building-stock of the correct quality which enables the possibility of meeting the tenants' future needs
Value 10	Using PTS facilitates information transfer which enables new participants in the project to learn and understand the requirements and the goal that will be fulfilled
Value 11	Using PTS enables benchmarking and exchange of knowledge between clients of the County Councils that use the ICT tool
Value 12	Using PTS enables for the tenants to already in the early stage know the cost of "their" part of the project
Value 13	PTS enables a cost-effective ICT solution as it is used and owned by ten of the twenty Real Estate Organisations in Sweden

When comparing these thirteen (13) values of using PTS, with the result from the interviews, the results showed similarities. Six expected values could be connected to answers from respondents from the interviews;

- Number 1. Using PTS enables capturing of requirements
- Number 4. Using PTS facilitates communication and information transfer
- Number 6. Using PTS enables getting a united vision for those who participate in the project
- Number 7. Using PTS enables an efficient process
- Number 8. Using PTS enables consistency of standard

- Number 11. Using PTS enables benchmarking and exchange of knowledge

Those combined values of using PTS are described below:

Number 1. Using PTS enables capturing of requirements

“Working with standard rooms means... we don’t need to reinvent the wheel for every project we do. So, these experiences we gathered, they are here in PTS and then we can put it to use in the next project, without having invent it again.

(Facility Planner, 2011-08-18)

“...if you follow PTS, even in the RFP, then it’s clear as a bell! [...] I like it, it’s gigantic and well thought out and it would be sad to let it die, because you’ve got such a great base to start from.”

(Site Manager, 2011-09-01)

These statements indicate that the standard rooms facilitate capturing requirements since good solutions can be used over and over again, from project to project. They can be used directly or as a start for a discussion, e.g. with the tenant. The standard rooms are also being used for continuous improvement. This has made the requirements in PTS well thought out and questioned as indicated by the statement below.

“PTS is well thought out. If anyone had ... legionnaires’ disease or anything else, Landstingsfastigheter has an answer; “We have done this. We have protected ourselves in this way against legionnaires’ disease”. It can go badly anyway, but at least you have a plan. [...] I think it’s a quality assurance to have PTS.”

(Installation coordinator, 2011-09-01).

Having such a system there is a danger that the system of requirements grow instead of improve.

If you should have a template, it’s amazingly easy to make a very large template, but then you must also start to remove from this template. And we don’t do that. We just add. This is the downside of PTS. But again, this is not the systems fault. It is the people who don’t have time or the will to do this.”

(Project Manager, 2011-08-11)

Number 4. Using PTS facilitates communication and information transfer

Information about the requirement is accessible through PTS and transferred from the client to the contractor or other developers involved in the project. As the developer puts it;

“It is easy to design the project when using PTS, because the requirements are defined there.”

(Installation coordinator, 2011-09-01)

The client thinks that the use of PTS helps him to transfer information about the requirements in use, not least concerning changes.

“I think it’s a great management tool. We can keep everyone informed in one place about what we want. It’s pretty incredible! And if we see that “Damn, we’ve been thinking this all wrong. We should not have these pipes made for plumbing.” or something, then we can, at only one place in PTS, change it and it has a direct impact on everybody involved. I think it’s ideal.

(Project Manager, 2011-08-11)

Value no.6. Using PTS enables getting a united vision for those who participate in the project

The result from the respondents also shows that using PTS is of importance to the process to get united vision on what to build and what requirement to demand.

“The standard rooms are reference items that you can use when you meet the tenant: “If you need a room for that kind of treatment it will look like this, and if you should have this kind of room, it may look like this.” Then if they need special functionality you can change it, but if you have the same, then this kind of room apply to you, “So PTS is more ... a way to visualize the standard room and what it can be used for.”
(Facility Planner 2011-08-18)

Furthermore the results from this case study show that PTS is a guide that helps the developer to understand what requirements the client have for the premises to be build.

“It is much easier when you know that this room has these requirements and that room over there have these requirements. If you want to make a draft of the requirements for each room, it is much easier for me to calculate and it becomes standardized. If there are three expeditions you do not have to think three times, instead it will be three similar expeditions. In this way one can avoid some errors at least.”
(Installation coordinator, 2011-09-01)

Using PTS and room function programs are great because each room contains clear requirements. You know what's expected.
(Site Manager, 2011-09-01)

This requires that everyone involved in the process are committed, not only the client, tenant and developer, but also representatives from those who will operate the new building; the facility operation. The result from this case study shows that to obtain maximum value the facility operation staff must be more involved in the development and the improvement of the ICT support and its containing requirements.

“PTS is great! If we only could get everyone to participate and to decide that this is what we want and require!”
(Facility Operation Manager, 2011-09-15)

Number 7. Using PTS enables an efficient process

The result from the interviews shows that the use of PTS facilitates the process of establishing the feasibility study and the building program.

“We were building from scratch here and we could decide “this is how we want a treatment room to look, this is our type room in PTS.” Therefore it was really easy to work with the function programme when building House 36. I thought it was great. Once we had planned a treatment room properly then all the treatment rooms were the same. I think it was very easy and efficient.”
(Facility Planner, 2011-08-18)

The contractor thinks that the use of the standard rooms in PTS is good when doing early cost-calculation of the building project:

“It is a lot easier when you know that this room has these requirements and that room over there, they have those requirements, than if the client should make a suggestion on how each room should work. [...] It is easy to calculate and it will be standardized, it is ... If there are three offices, you don't need to think three times in a row; all three offices will be the same. In this way I think the client can save some errors, if nothing else.”
(Site Manager, 2011-09-01)

But the result shows that there are different attitudes to using the standard rooms in PTS. Some respondents mean that it will e.g. hinder the architect's creativity.

"But for the architect, it can't be fun. It's like getting a bag of Lego: - These are the pieces that you must use. It may not be fun. Because architects - they want to create..."
(Project Manager, 2011-08-11)

However, when asking the architect about the standard rooms, he sees it in a different way, that the use of it gives the possibility to focus on creating values for the tenant.

"Now there is a science behind it all, which for us means that we can concentrate on the human environment, the total view. That's the most important thing! [...] PTS has been like a little bible for us."
(Architect, 2011-09-27)

Since the reusing of the standard rooms in PTS facilitate the establishing of the program, the facility planners could save time in the process. Time that could be spent on creating greater values for the tenant and end-users or time saved which makes it possible to save money in the project. It can be noted that by using PTS in the building project, the process can be more efficient. Respondents emphasize that if PTS is used, the focus can instead be concentrated on the core of the building process i.e. to create a greater value for the end-users, the tenant and its customers. That is, ensuring that the use of the premises works for the tenant, its work processes and its identified flows. As an architect puts it when talking about benefits of using PTS:

"Using PTS we can't do the things we did before, to try to sketch all of it. But now there is a science behind it all, which for us means we can concentrate on the human environment, the overall sense. That's the most important thing!"
(Architect, 2011-09-27)

Johansson et al (2009) also shows that the advantage of using ICT in the construction process can enable a focus on the worth of the building for client, owner and end-users.

Number 8. Using PTS enables consistency of standard

The respondents in this study state that PTS provides a standard for the entire building stock and some of the respondents think that achieving a standard is a good thing. E.g. consistency in standard enables generality, i.e. it is easier to change tenants in the building's premises if they are generally built. One day as a medical ward and the next day the premises are occupied by a tenant with another type of activity: the building withstands operational changes. The client points out the importance of using the requirements in PTS so that the client will have the same levels of requirements at all times, a standard in the County's premises.

"They are experts that have developed the requirement in PTS... They must definitely be more correct than if we would have done it in each project and we now know what we will get. If we had done it every time, in each project, we would have got ... an apple or a pear, that is, different things each time. And then we shouldn't know what we get."
(Project Manager, 2011-08-11)

The facility planner puts it like this:

"The standard rooms in PTS give the benefit that they are reference objects, which you can use when discussions are held in the working group with the tenant: "Are you going to have a treatment room for this and this, we have a proposal here, or here we have the PTS. If you have special activities and requirement we need to change

it, but if you have the same activity, it is this room you need." So PTS is more than a visualisation of the surface and what it can be used for. "
(Facility Planner, 2011-09-05)

The developer puts it like this:

"You have uniform requirements in your premises. There is no diversity in the type of premises you have provided for different operations in the county."
(Installation coordinator, 2011-09-02)

But the use of PTS and the control of the requirements and the solutions are in some way also seemed as a disadvantage. The use of PTS is considered contradictive to development and innovation and the client receive only what is referred to, neither more or less.

" There are many who chide the consultant and think that he just does what is written in PTS; nothing more. But if you get a drawing to build a Mercedes, you don't dare to build a Skoda. We don't dare to do something else unless someone tells us to do it. It is... I know that the consultants may sometimes get a bad reputation, but I think if we want something other than what is written in PTS; we probably must specify it. "
(Project Manager, 2011-08-11)

The same respondent also reflects on the fact that the client may control their developers too strictly with the use of PTS.

"We might control too strictly by always using PTS as templates. If you should have a template, it's amazingly easy to make a very large template, but then you must also start to remove from this template. And we don't do that. We just add. This is the downside of PTS. But again, this is not the systems fault. It is the people who don't have time or the will to do this."
(Project Manager, 2011-08-11)

The developer agrees with the project manager that the client control the developer and consultants with the specific requirements in PTS.

"This project has been strictly controlled, unusually so. The developer has also had very definite requirements and wanted things to look a certain way.... There hasn't been any freedom to improvise really."
(Site Manager, 2011-09-01)

Number 11. Using PTS enables benchmarking and exchange of knowledge

Other values that the use of PTS gives are the benchmarking in PTS social network, the PTS Forum. Several of the respondents explain that it is of great benefit when sharing knowledge, discussing good solutions and checking for future solutions and innovations. The recommendations from international project Credit (Bertelsen et al. 2010) show that benchmarking and knowledge systems should be developed to obtain value.

"PTS Forum is great when exchanging experiences between County Councils. And it enables the real estate organisations in the county to become stronger on the market."
(Project Manager, 2011-08-11)

5. ANALYSIS AND DISCUSSION

Ryd (2003) describes a number of values that ICT-tools for briefing should support. These values are here used as a basis for an analysis. Each value is written with bold text with the analysis of PTS concerning that value following right under.

An ICT-tool for briefing should:

- **facilitate communication and shared understanding of the client's targets with regard to a facility-provision project, but also act as an engine for capturing, preparing and identifying information and requirements.**

The value no. 4, *Using PTS facilitates communication and information transfer*, indicates that PTS facilitate communication of client's targets. Information about the requirement is accessible thru PTS and transferred from the client to the contractor or other developers involved in the project. The value no.1, *Using PTS enables capturing of requirements* indicates that PTS is supporting the capturing, preparing and identifying information and requirements.

- **be user-friendly and contribute to more active participation on the part of everyone – not least the client.**

Having the information about the client's targets and requirement available is a basis for common understanding and in this way it also contribute to more active participation. Value no. 6, *Using PTS enables getting a united vision for those who participate in the project*, states that PTS enables a united vision which in turn also contribute to more active participation. The visualization of the standard rooms makes information about some requirements. The results from the case study gave that the huge amount of information contained in PTS is in some cases an obstacles to grasp the requirements and values and in turn also for active participation in discussions about these.

- **support a translation of the client's picture of requirements into measurable requirement formulations.**

Value no.1, *Using PTS enables capturing of requirements* and Value no. 11, *Using PTS enables benchmarking and exchange of knowledge* both show that this is firmly supported by PTS. The continuous development and improvement of the requirements into measurable units is one of the main functions of this support.

- **facilitate structuring and prioritization of the client's requirements.**

PTS facilitates documentation of requirements. PTS also facilitate structuring of the requirements to some degree. PTS has no support for prioritisation of requirements though.

- **include systems for regularly following up agreed brief assignments and not just final targets. This creates a better possibility of early capture and rectification of things that are unclear.**

In the time of this study PTS lacked support for this, although having clear requirements made the process of following up the agreed brief easier.

- **support discussions about alternative conceptual and possible solutions.**

As of today PTS do not have support for this. Support for verification of requirements should support evaluation of different solutions. Value models are another technique that should support this (ValPro 2012).

- **simplify verification that the brief's (detailed design brief) requirements are satisfied in the planned solutions.**

In the time of this study PTS lacked support for this all though having clear requirements made the process of follow up the agreed brief easier.

On top of the values described by Ryd (2003), the results above show that PTS supports **change management** due to the fact that PTS facilitates communication and information transfer (value no.6) which in turn makes that changes in requirements just have to be changed in one place.

Another aspect not described by Ryd (2003) is the value no.11, *Using PTS enable benchmarking and exchange of knowledge*. The support for benchmarking in PTS is the social network, the PTS Forum. Several of the respondents explain that it is of great benefit when sharing knowledge, discussing good solutions and checking for future solutions and innovations. The recommendations from the international project Credit (Bertelsen et al. 2010) show that benchmarking and knowledge systems should be developed to obtain value.

6. CONCLUSIONS

In this paper we focus on how ICT-support is used for briefing in practice. The use of the ICT tool Program of Technical Standard (PTS) has been studied. PTS is used in the early stages of the building process to support the briefing process by more than half of the Real Estate organisations of County Councils in Sweden. The findings in this paper are based on a case study concerning the planning and production of a healthcare building. The main methods for gathering data in the case study were workshops and interviews.

PTS is a knowledge database containing best practice and specific knowledge and the ICT support is valuable to use in the feasibility, concept and design process. It is valuable for all parties involved in the process. The case study gave the following values using PTS:

- Enabling the capturing of requirements.
- Facilitating communication and information transfer
- Facilitating the information transfer which in turn enables getting a united vision.
- Enabling an efficient process
- Enabling consistency of standard
- Enabling benchmarking and exchange of knowledge

Analysing the results using literature gave support for the values above but it also showed that the ICT-support could be improved by better supporting the verification of requirements, prioritization of the client's requirements and discussions about alternative conceptual and possible solutions.

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