The development of a process mapping methodology for The Process Protocol Level 2

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ABSTRACT: The Generic Design and Construction Process Protocol (GDCPP) was created by the University of Salford in 1998. It is a high-level process map that aims to provide a framework to help companies achieve an improved design and construction process. Furthermore, industry interest and acceptance of the framework provided the impetus for further funding to continue the research for an additional three years. The first project concentrated on the high level protocol, and the second aims to develop the sub processes of the original high level map. This paper describes the methodology used to develop the sub processes and explains why a bespoke modeling methodology was developed rather than using the standard process modeling techniques. The methodology enables all of the information relating to the sub processes to be represented as a series of process maps and when viewed holistically, presents an integrated generic decomposition of the processes on the high level map.

1 INTRODUCTION

The British Property Federation Survey (British Property Federation, 1997) identified that one third of major UK clients are dissatisfied with contractor and consultant performance. Similarly, The Egan Report, Rethinking Construction (Egan, 1998), stated that the industry also suffers from low and unreliable profitability, insufficient research & development, and a lack of customer focus. Moreover, these problems typically relate to the industry's adversarial nature, and a profound co-ordination and communication system between the parties is much needed.

The Generic Design and Construction Process Protocol (GDCPP) was created by the University of Salford in 1998 in an attempt to improve the prevailing situation (http://www.processprotocol.com). It is a high-level process map that aims to provide a framework to help companies achieve an improved design and construction process. The map draws from principles developed within the manufacturing industry that include stakeholder involvement, teamwork and feedback, and reconstructs the design and construction team in terms of Activity Zones rather than in disciplines to create a cross-functional team. These Activity Zones are multi-functional and may consist of a network of disciplines to enact specific task of the project, allowing the ‘product’ to drive the process rather than the function as in a sequential approach. Luck and Newcombe (1996) argue that traditional roles and responsibilities change from project to project, often resulting in ambiguity and confusion; the use of zones potentially reduces this confusion and enhances communication and coordination (Cooper et al, 1998). The zones consist of Development Management, Project Management, Resource Management, Design Management, Production Management, Facilities Management, Health and Safety, Statutory and Legal Management, and Process Management, and are located down the left-hand column of the protocol (see Figure 1). The Activity Zones contain high-level processes spanning the duration of a project from inception, through design and construction, and including operation and maintenance. The responsibility for completing the processes may lie with one Activity Zone or be shared.

Furthermore, industry interest and acceptance provided the impetus for further funding to continue the research under the moniker Process Protocol Level 2. One of the primary deliverables of the Process Protocol Level 2 is to create sub process maps of the eight Activity Zones that exist within the original Generic Design and Construction Process Protocol model (Kagioglou et al, 1998).

The maps should provide an increased level of detail and description than the existing GDCPP
Map. Moreover, it still should remain generic and adhere to the principles of the GDCPP. The extra level of detail may require the inclusion of sub deliverables as well as sub processes.

2 RESEARCH METHODOLOGY

The methodology for the Level 2 project (Figure 2.) commenced with literature searches of key authors, texts and relevant research projects. A written literature review was prepared and disseminated amongst the project participants. The literature review provided the foundation of knowledge required by the researchers to familiarise themselves with the subject matter and to interview key persons effectively.

The methodology stated that ten persons were to be interviewed for each Activity Zone. Key persons were identified and contacted to gain co-operation. The primary purpose of the interviews was to extract the working method/process of the interviewed companies. This information would then be used to identify innovative and effective practice whilst also monitoring processes and practices that were not effective.

Development of the sub processes for the activity zones was based on the GDCPP guide (Kagioglou, et al, 1998). The GDCPP map was examined horizontally across the activity zones. This was performed process by process in a horizontal fashion. At all times the context of the phase was considered. This formed a skeletal structure that helped extricate the relevant information from the research material that had been collected. Once the information had been collected, analysed, structured and presented in a logical format, the next task would be design a sub process map template that that would effectively present the information.

3 SUB PROCESS MAP DEFINITION

A key requirement of the process maps was that prior understanding of process modelling techniques should not be a pre-requisite to understanding the maps. Process modelling tools such as the IDEF family were considered but felt to be too complex for certain members of the targeted user group. The key was in the representation (Cheung, 1998) of the
process and it was felt that none of the tools available met the project’s requirements. Therefore it was necessary to develop an original process map template.

After investigation of Visio a diagramming tool it was decided to use it to design and create the sub process maps. Visio had the ability to attribute information to objects within its diagrams and store this information within its own database. This led to the possibility of exporting data to other applications thus increasing the usefulness of the maps. The number of maps in a series is dependant on the level of detail attributed to a process and the number of processes in the Activity Zone.

A map was created that represented all of the information that the project required and was formally presented to an industrial workshop and conditionally approved. Feedback about the maps format was received. Internal development workshops were held to refine the map. Issues arose from the workshop regarding the modelling of the sub process maps. There was a lack of information relating to the different levels of process modeling. For instance, what criteria is used to distinguish between a level two or three process. It was decided that the distinction is a subtle one that relies on the experience and judgement of the process modeler.

The map produced was discussed and the consensus was that it needed to be simplified. The content of the maps was becoming complex and methods to reduce this complexity were considered whilst still showing all the detail required. A decision was made to only show level 1 deliverables.

Processes that were common to all or some of the activity zones were beginning to be identified and considered as generic process components. An issue that remained unsolved at this stage was how to illustrate the interaction of these intra activity zone components. Process inputs and outputs were indicated at this stage by an arrow headed line and labeled. This was considered to be a temporary measure and would be improved.

3.1 Information structure on the maps

A further workshop was held and the debate focused on the distribution of the content of the maps with respect to the validity of the content and whether it appeared at the correct phase and in the correct sequence. The detail of the level two and three processes was considered as was the level in which the process should belong. Should the process be moved up to level two or down to level three or excluded completely. This allowed the team to familiarise themselves with the content of the maps.

This workshop saw the introduction of phase grouping. Previously it had been noted that activities were often repeated through several phases. Therefore in order to simplify the content of the maps and to avoid repetition activities were grouped together logically. Depending on whether these processes occurred at the beginning of a phase, during a phase or at the end of a phase would determine the standard group in which they would reside.

A further workshop was held which was notable for two main outcomes. The first introduced the principle of process ownership. All of the processes would have an activity zone having overall ownership of a process to ease the co-ordination of a process. The second was the introduction of a new process symbol that illustrated which activity zones were participants to the process/sub process. This solved the problem of how to show intra-activity zone processes. A single glance would now indicate the origin and ownership of a process and what activity zones participated in the process thus validating Activity Zone interfaces. It was agreed to incorporate the new symbol onto the developing process map template together with the activity groups.

An industrial workshop was held to gain industrial validation of the sub process maps. This workshop considered the modeling rules and conventions used to define and model the high level processes into sub processes. A total decomposition modeling technique was adopted to illustrate the decomposition of a process and its sub processes. Logical dependency is represented between processes when they exist.

4 Modelling Rules

The aim of the modelling work is to provide a visual representation of the sub processes of the activity zones of the Process Protocol map. This is achieved by illustrating 'what' are the sub-processes of the high level processes identified in the Process Protocol map and 'how' these sub-processes interact. As a result it will be possible to provide models for individual phases.

4.1 Modelling conventions

This section describes the main convention types used for the modelling of the sub-processes of the Process Protocol map. The main elements of the template include:

- Phase start up activities
- Map title including phase number, phase title, and Activity Zone name
- The generic top level processes, the two levels of its decomposition and their respective processes
- Ongoing activities
- End of phase activities
- Lexicon
4.2 Process representation

The processes and sub-processes are denoted by using the symbol shown in figure 3, which includes:

- Process owner(s)
- Process name (potentially including some description for clarification where required)
- An indication of likely/potential participation from other activity zones in the process

![Figure 3 Process Symbol](image)

Furthermore, inputs and outputs from a process can be shown as illustrated in figure 6.

![Figure 4 Inputs and Outputs to the Process](image)

4.2.1 Inputs

For clarity, inputs to a process are only shown where they form a logical dependency from another process at that level on the same diagram. All other inputs from different phases or Activity Zones are not shown, but are traceable through the modelling database.

4.2.2 Outputs and deliverables

All processes by definition have an output. Some of these can be called ‘deliverables’, where the information is in a form (or document) that should be named for easy reference and use in other processes. The outputs to be named as deliverables may be defined later in the Process Protocol II Project.

The maps only illustrate the level 1 deliverables for simplicity and space purposes. The outputs from all level 2 & 3 processes will be included in the modelling database, which will eventually lead in its inclusion in the process toolkit.

4.3 Process levels

The maps contain three levels that are independent, in that there are no interactions between them. These are defined as follows figure 7 for an illustration:

- Level 1 contains the high level processes and their deliverables as identified in the Process Protocol Map
- Level II contains the sub-processes of the main process at level I (i.e. what the Level I process consists of) and how those sub-processes interact with each other (i.e. how is the Level I process undertaken)
- Level III contains the sub-processes of the processes at level II (what the Level II process consists of) and how those sub-processes interact with each other (how is the Level II process undertaken)

Other attributes related to the process levels include:

- The three levels are separated by a black line
- A single line connects a process at one level with its group of sub-processes at the level below to denote decomposition as shown in figure 7.
- Processes can have a logical dependency within a level and this is shown by an arrow as illustrated in figure 8.
- The participation in a process is shown in the table at the bottom of the process symbol and where such participation does not occur the respective table cell will be knocked back i.e. faded in relation to the other cells.
5 CONCLUSION

As mentioned earlier in this paper, the development of sub process maps for the Process Protocol activity zones was a primary deliverable of the Process Protocol Level 2 project. The aim was to produce sub process maps that would convey detailed design and construction process information to all the participants in the process. Once the research had defined the content of the maps it was then necessary to develop an infrastructure to support the content. Therefore a process map template and set of modelling rules were developed to effectively support the presentation of the processes. The eight activity zones thus have an effective medium of representation either holistically or separately.

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REFERENCES


