

The Concerns of Prototypers and Their Mitigating Practices: An Industrial Case-Study

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Abstract. The use of formal models such as Role Activity Diagrams (RADs) for analysing a process often hide what really happens during that process. In this paper, we build on previous research on informal aspects of the prototyping process and look at the key concerns that prototypers had during the prototyping process. We contrasted those concerns with an analysis of whether documented practice during prototyping was likely to exacerbate or lessen those concerns. The basis of our analysis was a set of interviews with prototypers all of whom were part of a team actively producing evolvable prototypes in an industrial setting. Grounded Theory was used to extract the relevant data (concerns and mitigating practice) from the interview text. Interestingly, only a small number of the concerns of prototypers seemed to be supported by any supportive action, suggesting that there are factors that contribute to project success or failure beyond the control of the prototyping team. However, time and cost pressure seemed to figure largest in our analysis of prototyper concerns. The research highlights the problems that prototypers face and the benefits that an informal analysis can have on our understanding of the process. It also complements our understanding of the formal analysis of process using techniques such as RADs and the human factors therein.

1 Introduction

A commonly cited reason for systems being delivered late and over budget is inadequate requirements elicitation due to poor communication between developers and users. Prototyping, as an information systems discipline, provides an opportunity for free and unhindered interaction between developers and users in an attempt to overcome this problem [1, 2, 3, 5, 7, 20]. In theory, prototyping also offers the potential for requirements to be elicited more clearly through constant interaction with, and feedback from, the user. The prototyping process itself can be modelled formally using a technique such as Role Activity Diagrams (RADs) [13, 17] where actions and interactions between the different prototyping staff in the form of roles can be illustrated by lines joining, and internal to, the set of roles. What techniques such as RADs

cannot show however, are the different concerns encountered during the process by the prototypers themselves and the supportive action that is taken to alleviate those concerns. Some of these concerns may be beyond the influence of the prototyper and hence detract severely from the effectiveness of that process.

In this paper, we focus on those concerns experienced by prototypers in the processes of five organisations, all of which used prototyping as part of their IS development strategy. Interview text with twenty different members (in ten interviews) of the prototyping team across the five organisations was analysed using principles of grounded theory [10] and their key concerns extracted. A number of centrally recurring concerns emerged from our analysis, in particular those related to restrictions of time and cost, the importance of experience and the effect of an overly bureaucratic environment in which prototyping took place.

We then carried out a further analysis to determine what actions perceived by the prototyper could *lessen* the threat that these factors posed in the prototyping process. Our analysis thus provides an insight into the tangible reasons why prototyping may not deliver the benefits it promises. It may also inform the manner in which future prototyping projects can be viewed and finally, highlights the importance of carrying out qualitative analysis as well as quantitative analysis of textual documents using theoretical techniques such as grounded theory.

The paper is arranged as follows. In Section 2, we describe the motivation for the research and related work. In Section 3 we describe the format of the interview text, the organisations studied and the grounded theory approach adopted for text analysis. In Section 4 we look at the extracted information and comment on the themes (i.e., concerns of the prototypers) and in Section 5 explore mitigating actions that prototypers perceived supported their practice. We then discuss some of the issues that arise as a result of our analysis (Section 6) and finally draw some conclusions and point to future work (Section 7).

2 Motivation and Related Work

The motivation for the work described in this study stems from a number of sources. Firstly, the prototyping process is widely promoted for the benefits it may provide; capturing user requirements accurately and pro-actively involving the user is bound to provide advantages, in theory at least. Yet very little literature has been published on some of the key human issues (i.e., qualitative issues) that may arise during this process [4]. Such issues could have a profound effect on how prototyping is perceived and carried out. In particular, our analysis highlights the dangers associated with any development, and in particular through that of the prototyping process.

Secondly, it is our belief that the majority of problems in the IS world stem from the *process* of IS development (we view the end product as only a function of that process). Getting the process right must be a priority for development staff, as well as addressing those problems related to the subtle influences during development. We also believe that whatever the type of information system, whether web-based or more traditional in nature, problems of an informal nature will always occur and therefore need to be documented.