Making Requirements Elicitation Traceable

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This workshop seeks to examine how progress can be made in determining customer requirements, particularly in the development of large software-based systems, to address the problem of systems which fail to meet customer's needs on their delivery. The cause of this situation is multifaceted, and can be due to a combination of: inadequate requirements elicitation; the inability to transcribe elicited requirements in a tangible or representative form; the different interpretations given to requirements throughout their development and use; the difficulty in reconciling diverse requirements; the problems involved when integrating additional or changing requirements; and so forth.

Although improvements in requirements elicitation and requirements description can offer more assurance that customer's needs are obtained and recorded, they offer no guarantee that these needs will get met. In addition, they offer no guarantee that any subsequent changes to these needs can be handled and taken into account. Unless such improvements are coupled with techniques which enable these needs to be both considered and reconsidered, throughout the entire development process, systems will still be delivered which fail to meet them. Therefore, some form of connection needs to be established and maintained between the information elicited from customers, the requirements which have been derived from this elicited information, and the subsequent artifacts in which these requirements have been distributed. In other words, the ability to obtain and meet customer's needs depends on requirements being *traceable* from their origin and throughout their project life, so right back to and from the requirements elicitation phases.

The ability to describe and follow the life of a requirement has been referred to elsewhere as *requirements traceability* [Gotel & Finkelstein, 1994a]. In this paper, and in more depth in [Gotel & Finkelstein, 1993], we analysed the nature of requirements traceability problems that are commonly experienced in practice. This work led to the identification of two basic types of requirements traceability, revolving around a baselined requirements specification (RS), which have been referred to as: (i) *post-RS traceability*, which is concerned with requirements deployment; and (ii) *pre-RS traceability*, which is concerned with requirements production. The empirical data we gathered strongly suggested that the majority of the problems currently attributed to poor requirements traceability were in fact due to inadequate pre-RS traceability. Moreover, many of these problems were informational in character, such as the difficulty in locating the origin of dispersed needs, and the inability to reconstruct how these were integrated in the RS. An obvious first step towards addressing these problems involves obtaining and recording comprehensive details about requirements production, and further organising these details so that they are traceable in multiple ways.

However, with the present emphasis on developing formalisms in which to describe elicited requirements, there is a natural tendency to "black box" what is elicited, thereby divorcing the end product of requirements elicitation from the process which generated it. The absence of production details renders these results closed to

interrogation, so neither entertains the possibility that these may need to be questioned and re-worked, nor an exploratory approach to requirements engineering. In this workshop, not only is it important to examine how we can capture knowledge about requirements, but also how we can make this knowledge open to re-examination and hence supportive of its emergent nature. As we are primarily concerned with the issues of pre-RS traceability, we are interested in finding out about those techniques and tools which are able to couple details of the requirements elicitation process with their end products, and also in how such information can be configured to support practitioners' requirements for pre-RS traceability that we identified in [Gotel, 1992].

It is important to recognise that there are some problems encountered with the requirements elicitation process or its end results that can often only be handled in a social context. Although techniques and tools which strive to capture comprehensive project information are extremely desirable from the perspective of pre-RS traceability, they typically aim to either supplant human contact with the information they generate, else they do not functionally promote the ability to do this. A significant finding from our empirical work was the extreme importance that practitioners attached to personal contact and informal communication. This was found to be essential, not only to cope with those situations in which information is absent, but also to consolidate, supplement, or question information which is available, to carry out validation and verification of requirements with stakeholders, amongst numerous other activities. In particular, we found that the crux of the so-called "requirements traceability problem" was the inability to locate and access the (human) source(s) of requirements, requirements-related information, and requirements-related work.

To actively support this somewhat evident working practice, it is necessary to augment any information that is obtained about requirements production (and similarly about requirements development, use, and maintenance), with details of those who have contributed, i.e., with the accompanying social infrastructure. In [Gotel & Finkelstein, 1994b] we proposed a scheme for dynamically modelling and managing what we refer to as the *contribution structure* underlying the artifacts produced in requirements engineering. In the context of this workshop, we are predominantly interested in how the contributor details we refer to in this paper can be extracted and coupled to information produced both about, and as a consequence of, the requirements elicitation process. We view this as critical information to elicit, especially if we are to later deal with the inevitable problems that will arise, but information that is currently either overlooked, not maintainable, or not oriented to the purposes for which it is required.

References

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