A Unified Approach to Systems and Software Requirements

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Abstract

Praxis Critical Systems Ltd carries out systems and software engineering and we develop requirements using our own method called REVEAL®. REVEAL is a general method and makes no distinction between software and any other method of implementing a system. The same principles and the same process apply to all kinds of requirements, but the particular issues, notations and tools depend on the scale and nature of the problem and to some extent on the technology of the system being developed. This commonality is important because it means we can use insights and methods from one discipline to solve problems in other disciplines. This talk will describe the principles behind REVEAL and explain how they generalise ideas from software (for example Parnas' four variable model) and from systems engineering. It will outline the REVEAL process which ensures that we understand the way that the system and its environment interact to satisfy the mission needs.

We have applied this process to projects ranging from a $1 million software development to a $10 billion railway upgrade. Clearly the nature of the environment is very different in these two extremes. In the software project the environment is a collection of other software and hardware, plus a few system users. The important concerns include software interfaces, and the system is specified using fairly traditional software notations. In the rail upgrade the environment includes the geography of the UK and the behaviour of rail passengers, train drivers and many other people and systems. Concerns include the safety and performance of the system in the face of human and natural unpredictability. The system specification uses a wide variety of notations including for example track layouts, electrification, signalling and human procedures.

In both cases, having a common method gave us important insights and ideas which we could carry over from one kind of development to the other. Our experience suggests that requirements engineering can be applied in a unified way across a wide range of projects in many disciplines.

About the Speaker

Dr. Anthony Hall *is a Principal Consultant with Praxis Critical Systems Ltd. He is a specialist in requirements and specification methods and the development of software-intensive systems. Anthony has worked for many years on the development of critical operational systems. During this time he has pioneered the application of formal methods to industrial practice. He has carried out requirements engineering for many projects in areas including aviation, railway signalling, secure systems and communications. He has also been closely involved in academic and professional developments in requirements engineering. Together with colleagues in Praxis Critical Systems he has brought together extensive practical experience and the latest research findings to develop REVEAL, a principled yet practical approach to requirements engineering. Anthony has a DPhil from Oxford and is a Chartered Engineer and a Fellow of the British Computer Society.*

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