DEVELOPMENTS IN MODELLING CAPABILITY

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Rapporteur: J Reed

Abstract

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Developments in tools and techniques for computer systems modelling will be assessed with regard to their effect on present and future practice. Aspects considered will include graphical workstations, support environments, alternative modelling paradigms and solution methods. The thesis will be that developments in support environments and graphical techniques have radically simplified problems of model construction and look set to do the same thing for experimentation. This will move the focus of modelling to its proper place, that is, on model and experiment formulation and analysis.

DISCUSSION

Rapporteur : John Reed

In his lecture Dr. Hughes identified four stages of the modelling process; Definition, Construction, Testing, and Application. To this Professor Lehman commented that there should be a fifth stage which is arguably the most important. This stage, which should take focus after the others have been completed, is an evaluation of what was learned about the system being modelled.

It was a general comment that too much time is spent on the first two stages, i.e. the definition and construction of the model, and so when testing and validation of the model comes about it is usually the case that either time, resources, or energy are fully spent. Subsequently the other phases of the modelling process suffer. Professor Lehman added that although the testing phase can be reduced the validation is important since it ensures the model is accurate enough to what you are trying to model. Dr. Hughes agreed and although he did not emphasize this in his talk, he indicated that validation, which builds confidence in the model, is an area which will become more defined and more in focus in the future.

On the subject of the definition and construction time of the modelling process, Professor Whitfield stressed the need for more critical path analysis and the use of rapid resource tools so as to prevent an exhausted state being reached. Professor Randell felt it critical that the design and modelling of a system should be tied together so as to form a strong bond with common ground so that a modelling team can produce results in step with the current design. Dr. Hughes added that this was especially true in artificial intelligence applications where the development of a system is almost purely functional.

Dr. Hughes went on to say that what was needed in the modelling schema was the addition of integrated modelling support environments to simplify and speed up the designing and building of the model. This started a discussion on how in the past the model to product development was a process of successive refinement, a technique which was commented on as being "dead but not buried". This was then corrected to, "buried but not dead"!

It was suggested by Professor Randell that a devious way of obtaining a level of integration with system modellers is to provide them with all the input parameters to a given system, tell them what is likely to occur, but withhold the results of the expected output. The concept is to get the modellers to think more about the model they are trying to implement. However in practice, the modellers produce a much simplified model, which is usually to their advantage. He went on to say that the problem with most modelling applications is the strain on formalism. Too much detail is usually incorporated in the model design, and that there is a need for new methods to be introduced.

Dr. Sorensen expressed caution about the excessive use of automation in the design process with emphasis on the validation process. He remarked that as more is automated, more has to be taken for granted. During the development process, knowledge and insight are obtained from the mistakes made. If things become too easy then it is possible that the

model will be considered less. In response, Dr Hughes added that there are compensations to be found, that by requiring less intellectual effort in some areas, allows the effort to be channelled more efficiently into others.

Professor Henderson expressed that Dmos, a higher level abstraction of Simula providing synchronization mechanisms, within a development environment is of the correct concept and abstraction. He added that if the design process is made easier, then the validation of the model becomes easier.

Mr. Walker explained that perhaps people tend to do that which they can do! People can build tools, so tools are built. However, when it comes to validation people are not so sure. To this Dr. Hughes stressed that although logical validation is always going to be incomplete it will raise confidence in the model. He finished by saying that a model can not be guaranteed until fully implemented. Tools generate correct code which removes mistakes, and with use should build confidence themselves.