Comments on the Modelling Challenge.

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WWW Information: The "Modelling Challenge" was issued in IOPener Vol 2, No. 4. It was motivated by the report that participants in a case study had felt that Role Activity Diagrams gave less information about the end-to-end flow of a process than IDEF0. This report was given in the author's "Comments on the use of RADs in case studies" (http://www.cs.man.ac.uk/ipg/publications.html). A complete set of responses was published in IOPener Vol. 3 No. 1.

Clarification.

First of all, I seek to provide some background on my use of Role Activity Diagrams (RADs). A number of recent collaborative projects with different companies has suggested to me that RADs are a very useful way of modelling activity. In particular, it is the modularity of RADs that seems to be important. Each role represents a module of activity with its own (internal and external) coordination characteristics and support requirements. A process can be configured through the assemblage of roles. A role may occur more than once in a process and indeed may be shared by different processes. Therefore a role, as expressed in a RAD, is a building block which we can use to understand and assemble processes. Furthermore, it seems that the best way to understand what we want of technology comes from an understanding of the activities we wish it to serve or enable. A RAD role can be described as a neat little package which represents activity and the technology required by that activity. I am hinting at the utility of RADs as reusable components in process design/redesign projects but have no cause to develop this point further at the present time.

Now, we need to be clear about the comment which has given rise to this challenge. Reporting my favourable impressions of RADs in the last IOPener I noted criticisms made of them by some participants in the collaborative projects, viz: "RADs give less information about what makes an activity happen than IDEF0, and are less well suited to expressing the overall flow and structure of an end to end process." It is the second of these points which we discuss through this modelling challenge. It arose because when wishing to consider the process as a whole (customer request through to satisfaction) the participants preferred to look at an IDEF0 representation rather than an equivalent RAD. This preference might be accounted for by many factors. Perhaps it was the nature of the process under consideration, the interpretation of the notations by the modeller, the backgrounds of the participants, or something integral to the RAD and IDEF0 notations themselves. In this challenge the issue has been simplified by concentrating only upon the last of these variables. That is, is there is something inherent in IDEF0 and RADs that makes each more suited to a different kind of modelling? It seems reasonable to suppose that this is the case. Moreover, to state my own position, I suspect that there are good reasons to use IDEF0 to model a process at a high level and to use RADs to represent the lower level activities which take place within this process. However it is difficult, and probably unnecessary, to formulate *firm* principles.

Consideration.

We should consider what we want a model for. Models of process or data are a means to an end. Presumably we create them because we wish to influence, support or in some other way develop an existing situation. Whilst we may conceive of many roles for graphical models in this, it is probably true to say that usually they are used to develop a shared understanding of a situation. It is likely then that concepts such as completeness or richness are not only in the eye of the beholder but affected by the purpose to which we put a model.

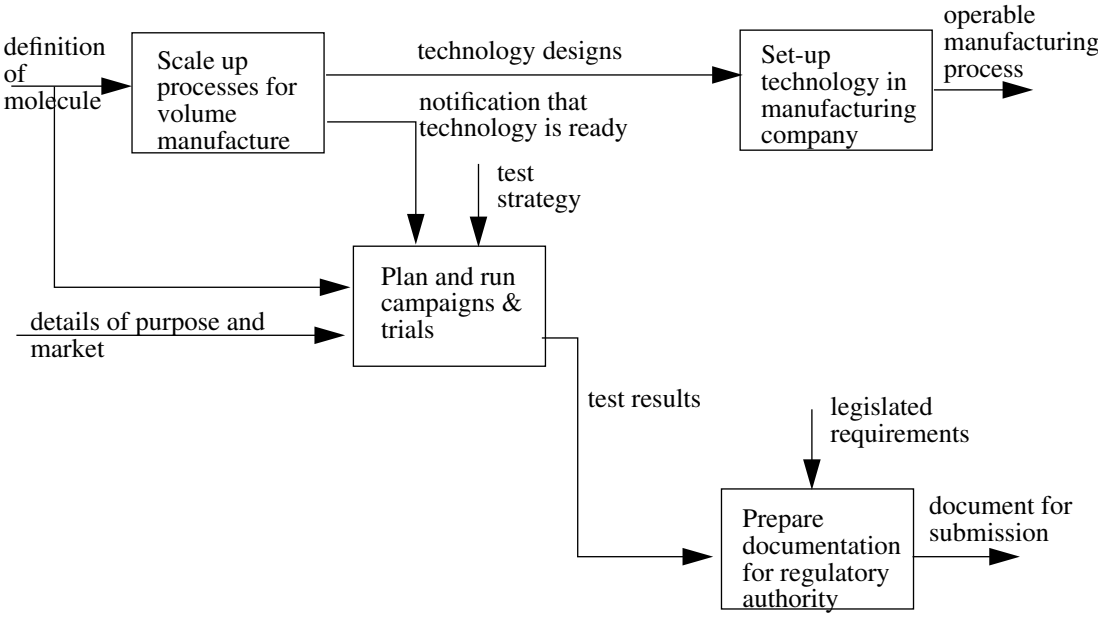
IDEF0 allows the modeller to express clearly the assemblage of factors which are required by an activity (inputs, controls, mechanisms). Therefore the ordering of activities arises as a consequence of dependency. This is good as it conveys the potential complexity of the ordering patterns. Rarely will we find simple 'B follows A and precedes C' behaviour patterns amongst high level activities. A high level IDEF0 model helps us to understand the structure of activities within a process. It is thereby a useful device for use in radical change projects where the concern is to understand a process as a whole and in particular *what* is done rather *who does what*. RADs, as I have said, seem to be best suited to expressing the modularity of work, the actions that staff undertake and the synchronisation between roles.

Challenge.

The short description of the "From Molecule to Market" process gives only a simple summary of what must in reality be a complex process. Hoping to avoid making assumptions I was initially tempted to meet the challenge by only providing unconnected activity boxes and a series of further questions.

The model that I have settled upon does make a number of assumptions. These are the ones that I am aware of:

- 'Scale up processes for volume manufacture' will require the input of a definition of the molecule which is to be created.
- The activity 'Plan and run campaigns and trials' is controlled by a notification from 'Scale up processes for volume manufacture' that the technology is available.
- The activity 'Plan and run campaigns and trials' requires the input of a definition of the molecule and a description of its expected purpose and market.
- The manufacturing part of the company receives only technology designs from the R&D department rather than physical technology itself.
- There is a significant activity required to set-up the technology in the manufacturing company.
- 'Prepare documentation for regulatory authority' requires test results from 'Plan and run campaigns and trials.'
- A company test strategy guides 'Plan and run campaigns and trials.'
- Government legislation guides 'Prepare documentation for regulatory authority.'

- I am aware that the technology used in the process could be shown through mechanisms. However, having no domain knowledge, I am not even sure of what actually constitutes technology in a process such as this. Therefore I have avoided use of the mechanism arrow at this stage.
- Note also that I have hidden some detail in the model. For example, the compound batches are not shown in the diagram. I have used a single box 'Plan and run campaigns and trials' to hide all this. Whether or not this is right at this level is of course, and as usual, debatable. However, to use IDEF0 to give a high level picture is consistent with my views expressed previously. If I were to attempt a more detailed model I might first wish to consider whether IDEF0 or RAD provides the most suitable means. I might use RADs and link them via calls from an IDEF0 model something like this one.

Thus, my IDEF0 representation of "From Molecule to Market."