Common Myths about Operator Training Simulators

1. One model will do everything. It's possible to build so much detail and functionality into one model that it can be used for engineering studies, OTS and other purposes, but in general a model should be built with its end use in mind. A study model needs to be highly detailed and accurate, but should be small and agile enough to allow easy changes, multiple runs and fast execution but does not need to be integrated with an accurate DCS emulation nor does it a user environment to support training. Both systems can have common components but they both need to be customised to their separate user requirements.
2. The model must be built in a friendly GUI environment to enable users to update it easily. Updating a complex process model needs a detailed understanding of both the process and the simulation technology. Those that are likely to have this are also likely to be able to work in a non-GUI environment. A GUI makes the model more accessible but only to those that are unlikely to be able to effectively contribute to a complex model.
3. The model must be able to run at 10 x real time. Better to use snapshots to move quickly between conditions that are a long way apart in time. Vast majority of training is done at real time.
4. Start-up training must start from a completely cold and empty condition. From cold and empty to warm and inventoried is mostly done by outside operators. Training simulators are design to train panel operators. During pre-startup (warm-up etc), the most likely cause of problems is mechanical failure or incorrect alignment of valves, equipment or electrics. There is little that the panel operator can contribute during this phase, other than overseeing operations and checking status before starting unit operations.
5. A link to the plant data collection system will enable the model to be kept aligned with the process at all times. The plant data collection system, regardless of how detailed it might be, only provides a subset of the data needed to provide a complete model, and this data includes errors and unreconciled values. For example, the plant data system cannot advise on compositions at all points that are relevant, or catalyst activity or exchanger fouling, or filter pressure drops, etc. The only way that plant data can be used to initialise a simulation is to have the simulation based completely and entirely on the plant data, with no other sources of input. Fr example, a neural net model might work, but that will be no value for training away from the normal operating point.
6. Instructor graphics should look and feel like the DCS. They have different purposes and different requirements. Furthermore, there are real advantages to an instant recognition of which system an instructor or operator is sitting in front of. DCS graphics with instructor features will become overly crowded and contain information that is not relevant for the instructor.
7. Replay functionality is both important and achievable across integrated systems. A high fidelity OTS will integrate several systems together – the process model, the DCS (probably stimulated), ESD (probably emulated) and maybe some PLCs (either stimulated or emulated). While the OTS executive will have access to all data stored wth the OTS, it will not be able to "see inside" the DCS database or other linked systems. Thus, it will nt be able to record operator actions
8. Simulators can be made faster by simply using more CPUs. Up to a point this is true, but in order to utilise more CPUs, the simulator model needs to be divided into more and more pieces. Every time there is a division, there is ad addition to the comms load and a possible reduction in stability. Beyond 8-10 CPUs, the model should probably not be sub-divided any further. This limit is also a

function of the size of s ingle unit that can be satisfactorily run on a single CPU, and this varies between manufacturers.

9. An integrated environment for model building and instructor graphics construction saves time. It may save time during model maintenance and upgrading but it's a bottleneck on a big project. Separate build environments for graphics, modelling and linking enable multiple engineers to work in parallel to reduce the overall delivery time.

10. Model building is easy and can be readily farmed out to low cost, inexperienced resources. There is a degree of repetition in building a model as the same model fragments are used again and again. However, the dynamic simulation word has still not attained the ultimate goal of a one-to-one correspondence between every item on a P&ID and every block in the model library. Until that day, the modelling engineer must be able to recognise and appreciate the limitations of his or her software and tailor solutions to fit the client requirements.