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SELECTING APPROPRIATE SIMULATION USER INTERFACES

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ABSTRACT

A simulation user interface often takes a model from code to a tool organizations gain value from. This presentation focuses on why companies should invest in user interfaces for simulation models, what the different types of user interfaces are, and how an appropriate user interface option can be selected. When selecting the appropriate user interface, several dimensions should be considered, including the number of users, user sophistication, data feeds to and from other applications, the frequency of model use, and the significance of the decision being made with the simulation model. This presentation will share examples of real-world projects with a variety of user interfaces to discuss why they were selected for their particular project.

1 INTRODUCTION

At a minimum, a simulation user interface, sometimes referred to as the front end, provides the user of a simulation model with a means to change model inputs and view model outputs. Additional functionality may include scenario management or optimization to increase the usefulness of a simulation model.

While there may be several reasons to create a user interface for a model, there are 3 significant reasons justifying the time required to design a good user interface:

1. It saves time and time is money.
    a. If users can reach the same decisions faster, it allows for a lower long-term cost of ownership for using the simulation model.
2. It prevents mistakes.
    a. If users are making the wrong decisions from a simulation model, then the model has done more harm than good.
3. It increases model adoption.
    a. If a model has the power to enable profit-optimal decisions, but no one wants to use it because it is too difficult, then the model is not useful to the organization.

2 TYPES OF USER INTERFACES

There are several types of simulation user interfaces. During the WinterSim presentation, examples of user interfaces for various clients will be shared.

2.1 Development Environment User Interfaces

Many existing simulation tools include easy to use mechanisms to input data and view model output dashboards as part of the development environment. The presentation will show a recent model where Simio was used for both the development environment and the analysis environment. Items to consider when using the development environment as the analysis environment include:

1. Licensing costs and installation requirements

2. Internal reporting capabilities, especially dashboards
3. Ability to provide tool tips and context sensitive inputs
4. Ability to compare scenarios and do batch runs

2.2 Manual Input / Output Front Ends

After initial model development, the first step new simulation analysts typically take is to export model outputs to another tool for analysis. This approach can provide the user with much more flexibility in creating dashboards or more advanced statistical analysis options. For example, a tool like PowerBI may provide much more visually appealing and insightful dashboards than what is possible within the simulation development environment.

In addition to using another tool for post model-run analysis, users often create supplemental tools for input data transformation. The entire workflow may start to look like:

1. Open tool X for data transformation
2. Open the development environment to run the model
3. Open tool X for conducting analysis

While this approach can be the right decision for some projects, it does create extra layers of files that need to be manually managed by the analyst and may result in gaps in information if not managed carefully. This approach, if applied to too large of a model, may also not be appropriate for the non-developer analyst.

2.3 Desktop Front Ends

A desktop top front end can bring the input data transformation, modeling running, and output analysis into a single integrated tool. The integrated nature of the tool can overcome the challenges of manual input and output front ends. Because the model is no longer limited to the output capabilities of the developer environment, much more advanced dashboards can be developed.

A desktop front end can include very simple Excel input/outputs or custom built screens with a database back end. The amount of time spent developing the front end should be dependent on how savvy the end user will be, how often the model will be used, and how many users there are.

2.4 Cloud Based Front Ends

Like some desktop front ends, cloud based front ends often have custom built screens with a database back end. Some modeling tools, such as AnyLogic or Simio, come with configurable front ends for cloud based modeling. Sometimes the system being modeled or the user base requires a much more custom front end. In these cases, a custom web-app may be developed, with API calls to run the simulation model.

For many desktop front ends, transitioning to a cloud based front end makes sense due to traceability and model maintenance. However, there can still be a significant startup cost in infrastructure setup. For desktop models with simple Excel front ends used by engineers a few times a year, it can be difficult to justify the additional cost of web-app development, even if the models are extremely beneficial to the organization.

3 SUMMARY

The full presentation will provide more robust examples of different types of simulation user interfaces. Both cloud based and desktop based examples will be provided with discussion related to how to select the most appropriate approach.

Models that are not used or are used incorrectly are not valuable to the organization. Considering the components that facilitate the model running is critical to a successful simulation practice. Ensuring every model has an adequate front end is essential to long term modeling success.