Voluntary Questionnaire for MBSE Benchmarking

This request is issued by a group in the Mission Operations Directorate (MOD) at the National Aeronautics & Space Administration/Johnson Space Center (NASA/JSC) involved in a Model Based Systems Engineering (MBSE) benchmarking activity. We are seeking voluntary information from industries that have applied Systems Engineering and Integration (SE&I) techniques to large complex projects, particularly MBSE. The purpose of this is for industry to share their experiences and lessons learned while addressing problems and challenges similar to the ones described below.

Problem statement:

The Flight Production Process (FPP) is the collection of work tasks (business processes) conducted by many technical disciplines that are executed for each space mission to plan, train for and execute flight operations. The FPP re-engineering project is the result of the need to transform MOD into an agile organization that will be able to quickly meet the needs and opportunities that arise in the next decade.

For future space programs, we need to

* Increase process efficiency
  + Eliminate function and activity duplication
  + Reduce manual data entry
  + Reduce or eliminate data format conversion between software tools
  + Reduce configuration management steps
* Reduce costs
* Reduce the mission preparation schedule length
* Be able to integrate the templates and systematically analyze the overall process.
* Increase process/system flexibility to serve more customers
* Based on FPP system analysis, provide requirements input to the Mission Control Center re-engineering project

What is the FPP re-engineering project?

The FPP re-engineering project is utilizing MBSE within an enterprise architecture to address the following problems:

* The current process was built a piece at a time by each of six large functional areas rather than as one integrated system
* Several areas (divisions) with different roles and responsibilities need to be integrated into one cohesive process
* Many legacy systems did not address interoperability in the initial design and had to be addressed after development
* Most information about how we conduct business is housed in different documents, spreadsheets, systems and repositories

During this FPP re-engineering project, we have encountered these challenges:

* Key stakeholders were not convinced of model-based systems engineering methodology benefits
* Limited resources and the difficulty of finding the right people to participate in the project
* Lack of a readily available software tool set that is compatible with a wide range of other software tools
* Ensuring that the modeling artifacts being developed can easily be refined and reused in other applications to support product line and evolutionary development approaches

A set of questions to aid in gathering a consistent set of information for the benchmarking activity is attached. No future procurement activities will result by providing responses to these questions. If you are interested in sharing best practices, experiences, and lessons learned in the application of MBSE or similar SE&I techniques, please supply name, company, position and contact information to:

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MBSE Benchmarking Questions

1. In what large complex projects have you utilized a model based approach? What have you learned from them?
2. What are examples of problems that you have addressed using a model based approach?
3. What was the scope of the problem you helped resolve (hardware, software, system level, enterprise, etc.)?
4. How did your approach help solve the problems?
5. Where have you found MBSE is best applied?
6. How have you used MBSE to model and refine processes (operational or production or a combination of the two)?
7. Did you consider approaches other than MBSE?
8. How do you identify which processes drive the system design and architecture?
9. What architecture framework did you use and why?
10. What software tool(s) did you choose and why?
11. What have you learned about how deeply to model the process? How do you decide the level of detail?
12. Have you tried to re-use models? What problems have you observed?
13. What was biggest obstacle in implementing an MBSE approach?
14. What have you learned about breaking down organizational resistance to using MBSE?
15. How has your approach been used to improve the efficiency of the process? How is improvement measured?
16. Have you been able to tie cost data to the models in order to assess project costs and impacts of changes?
17. What was biggest payback (money, efficiency, other)? What percentage of improvement?
18. Can you quantify the return on investment?

Please send responses along with name, company, position and contact information to:

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