

# Model-based systems engineering

Adapting model-based systems engineering with a viable framework



Whether you are turning to model-based systems engineering (MBSE) to give you a collaborative engineering environment, greater requirements fidelity or to improve process integration, Perspecta can provide the knowledge and experience to transition your organization's people and processes from a document-centric and stove piped environment to a more cohesive, collaborative and integrated environment. We work with customers to establish a framework for implementing a MBSE paradigm. This framework enables users to transition from a document-driven decision methodology to a more data-centric capability, driving a more cohesive and collaborative methodology. This method will leverage systems engineering principles, processes and the tools that will enable the realization of this framework.

Building such a framework does not happen overnight, nor does it get instantiated with the installation of a commercial off-the-shelf (COTS) software tool set. Certainly providing some of the basic tools can be done rather quickly, but expanding upon them to enable greater capability of MBSE evolves over time.

## Why Perspecta?

Perspecta has the team, tool set and proven successes to get the job done. Past experiences range from modeling the anticipated performance of components, systems and threads through an evolving enterprise architecture to integrating data and architectures from disparate sources to a centralized repository under configuration management control. We have built actual environments where different tools can be evaluated for their ability to satisfy MBSE objectives, business analytics and modeling of our internal processes.

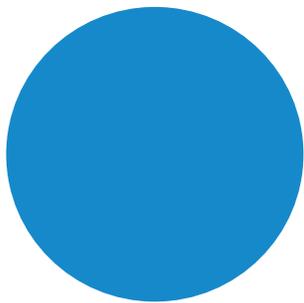
## Benefits of MBSE

- Ensure that functional requirements will meet all mission threads, operational or functional use case(s) and scenario needs
- Ensure that architectural designs will meet cost, schedule and technical performance requirements or understand what it will take to satisfy those requirements
- Ensure subsystem designs dovetail into the customer's desired to-be operational processes
- Decrease the overhead associated with physical documentation generation and maintenance
- Visualize effects of testing, budget drills and schedule changes and their effects on the ability to meet the overall desired capabilities

## Detect issues early to reduce risk

Executable models are imperative in detection of issues at any stage in a life cycle, acting as a digital twin of the physical system(s) that already exists or are intended. Our approach is to provide a well-built and executable framework which aides in indicating potential gaps or faults at the earliest life cycle stages rather than later, in an acquisition life cycle, where the cost of re-engineering and the impact to your organization's capabilities could grow significantly. Additionally, "what if" analysis and excursions can be done without the overhead of recreating system engineering artifacts or time consuming studies, allowing you to see the true impact of change in a more efficient manner.

The enhanced ability to analyze change/risks and conduct "what if" excursions to optimize acquisition road map and early verification of engineering data, allows for optimized schedules, resources and costs.



### **Consistent, accurate and reusable data**

Having access to the proper data to make informed analysis and decisions is one of the main objectives for implementing a MBSE framework. However, there are a number of relationships that need to be maintained in order to make the data work for you and not against you. Certainly the ability to relate data as it traces from capabilities to functions to products and services is imperative. But so too is the ability, to trace a single requirement to multiple systems/organizations, so that managing the dependencies defines the impact of change. Maintaining all this data with a configuration-managed, change control process, so that all stakeholders are cognizant of and can buy-off on any proposed changes, significantly reduces configuration-management overhead with the use of a single, authoritative repository for artifacts. Through Perspecta's experience, we have utilized a variety of modeling standards—UML, SysML, UPDM and UAF—which offer flexibility to work with our customers' current culture and inherent capabilities of models and tools.

### **Accelerate development schedules**

All this is done to provide a single system of record (SOR) and an integrated, configuration-managed product—concurrently and in context. A complete picture of testing progress linked to requirements can be generated to aid in tracking. Linked artifacts are used to inform processes of change across the life cycle to ensure related data can be updated in

a timely manner. Our solution provides a library of artifacts that can be reused, either in whole or in part, to accelerate the planning and design of a new capability or an understanding of what is required to satisfy that new capability.

### **Opportunities for cost reduction and avoidance**

As mentioned above, a properly structured MBSE framework within a cohesive, collaborative environment allows for early validation of capabilities and architecture(s), verification of engineering data, as well as an ability to identify changes earlier and more efficiently during the system engineering life cycle. This can reduce costly barriers and accelerate innovation. By minimizing complexities and risk, organizations have the opportunity to avoid unnecessary overhead, saving time and money. Additionally, the ability to adapt a common modeling language drives integration and interoperability through enhanced understanding and awareness.

### **Improved collaboration and oversight**

With all data being stored centrally, we can provide real-time enterprise operational status within common dashboards, giving leadership and stakeholders insight into the health and status of the organization. They can then drill down into each project or process to realize the impact of their decisions and gain the big picture of how enterprise architecture and MBSE can finally answer the questions of “how is my operation functioning today?” and “where can I improve?”