DEPARTMENT OF DEFENSE
DIGITAL ENGINEERING WORKING GROUP

Systems Engineering Digital Engineering Fundamentals
(Including Models and Simulations)

1. The program should use a digital model to develop depictions of the system to support all program uses, including requirements analysis, architecture, design and cost trades; design evaluations; optimizations; system, subsystem, component, and subcomponent definition and integration; cost estimations; training aids and devices development; developmental and operational tests; sustainment and disposal. In addition, models and simulations should be used, to the greatest extent feasible, in systems engineering and program/project risk management; cost and schedule planning; and providing critical capabilities to effectively address issues in areas including but not limited to interoperability, joint operations, and systems of systems across the entire acquisition life cycle.

2. The responsibility for planning and coordinating programs' use of models, simulations, tools, data, data rights, and the engineering environment belongs to the program manager; the performance of the actual tasks may be delegated to the program systems engineer and other program staff as appropriate.

3. Programs should identify and maintain model-centric technology, methodology/approach and usage preferably in a digital format (e.g., a digital system model(s)), that integrates the authoritative technical data and associated artifacts generated by all stakeholders throughout the system life cycle. Unless impractical, the program should develop the digital system model(s) using standard model representations, methods, and underlying data structures.

4. The digital system model(s) is a collaborative product of systems engineering and design engineering efforts. The program should construct the digital system model(s) by integrating data consumed and produced by the activities across and related to the program. The digital system model(s) should include, but should not be limited to, the technical baseline, parametric descriptions, behavior definitions, internal and external interfaces, form, structure, and cost. This data should be traced at a minimum from operational capabilities through requirements, design constructs, test, training, and sustainment. The program should validate the digital system model(s) baseline at appropriate technical milestones.

5. Systems engineers should use models to define, understand, evaluate, communicate, and indicate the project scope, and to maintain an "authoritative source" about the system. When captured digitally, the system model may be used to produce technical documentation and other artifacts to support program decisions. It is expected that a properly managed, digitally based system model will be more accurate, consistent, and sharable.

6. Models, simulations, tools, methodology, and data employed in acquisition activities should have an established level of trust, and the program should use the activities with an acknowledged level of risk appropriate to the application. The development of models, construction of simulations, and/or use of these assets to perform program definition and development activities (including pre-Materiel Development Decision and pre-Milestone A) requires collaboration among all project stakeholders and is led by the systems engineer.

7. The program office should ensure sufficient training in the appropriate use of models, simulations, tools, data, and the engineering environment. The program should identify metrics that show the link between training and the appropriate use of activities that result in benefits to the program, especially in the areas of early identification of defects, cost avoidance, and risk reduction.

8. The program should update the digital system model(s) throughout the program life cycle and maintain configuration management (i.e., version controls). These updates will provide continuity among all program stakeholders, including the program model developers, simulation uses, and other engineering and program management activities.