Building an In-House MBSE Training and Education Program

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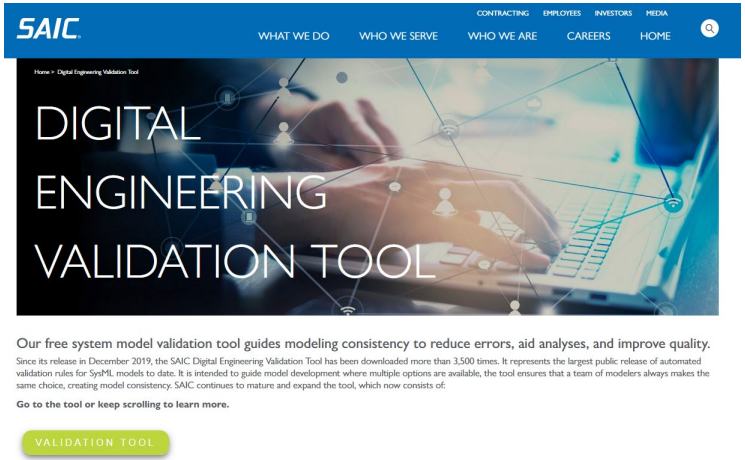
SAIC

Why did SAIC Build In-House MBSE Training?

The reason for building an in-house training and education program

There are many good model based systems engineering related training sources on the open commercial market. SAIC did not seek to "reinvent the wheel" when sufficient training was available



Areas of abundance:

- The Systems Modeling Language (SysML)
- Tool specific training
- Specific process training (OOSEM)

Areas of scarcity:

- Systems engineering fundamentals - condensened
- Practical application training, particularly how to use model validation
- Specific circumstance training (artistic choice, extensibility)
- MBSE training related to the system domains SAIC typically deals with (defense, space, intel, etc)

What was the Approach for Developing the Training Program?

How to determine what training is needed

- **Step 1**: Determine what skills were needed to execute MBSE
  - Define what it is that ***systems engineers are responsible for*** contributing to the project
  - Understand ***what skills are required*** for a systems engineer to contribute to the overall system development (what's the purpose?)
  - ***Systems Engineering fundamentals*** is the foundational bedrock that every systems engineer needs!
- **Step 2**: Search the open market for courses that could provide the necessary skills
  - ***Don't reinvent the wheel*** if there are sufficient resources available
  - ***Cost is a consideration too***. If the commercial training is expensive per participant creating an in-house version may allow for wider access if it is a critical skill

How to design the necessary training

- **Step 3:** Align the training to the system lifecycle
  - Systems and other ***engineers play various roles*** depending on the stage in the system's lifecycle
  - ***Specialized skills*** for each specialized engineering discipline are necessary for success at each stage in the lifecycle
  - There is an ***immense and diverse set of engineering knowledge*** required for system success that continuously grows over time
- **Step 4**: Focus on building the right skills at the right time
  - Knowledge decays, especially if it is not being used regularly
  - Should the entire team be involved in training sessions, or should your organization try to stage it for only the folks who need it now?

How to apply the training and make it stick

- **Step 5:** Provide ongoing support, motivation and incentives for your team to succeed

  - ***People must be supported.*** If your organization will not provide the inputs that your team depends on, don't expect success
  - ***Different people*** are motivated by different things. Find out what that is and align it as a motivator towards system success
  - ***Incentives should be aligned with motivation.*** This isn't strictly financial. Make sure people are properly recognized. Proper incentives build strong cultures

- **Step 6**: Continuously re-visit, re-evaluate, and update the training

  - Needs change, resources change
  - Make sure that you are not just sticking with an approach to problem solving because "that's how we've always done it around here" or "that's what we know" or "look how successful we've been in the past"

An example of in-house development at SAIC

SAIC released the SAIC Digital Engineering Validation Tool to the public. Internally we found that some programs that were transitioning to MBSE were still not using the tool, or were not using it to its full potential. We had to evaluate what was causing program teams not to make the most of the Validation Tool

- Did the team need additional skills or support?
  - Sometimes, however there were ample resources available to learn the foundational basics such as systems engineering fundamentals (INCOSE resources) and SysML (Delligatti associates, textbook access via Percipio)
  - Tool vendors typically offer training to learn how to use and "drive" the tools

- What was missing from the available offerings in the open market?
  - Guidance on how to apply the validation tool and use it in conjunction with a MBSE development process
  - Comfort with validation and understanding the implications of errors (how to use the style guide)
  - Domain/complexity translation (building a system descriptive model of a gas pump or ATM isn't the same as a satellite or plane)

What are the next steps for improving upon the training and education program?

Where do we go next?

SAIC's Engineering Innovation Factory team is continuously working with our internal SAIC teams and external customer teams to fully understand their toughest challenges

- We bring our "purpose first" mindset to developing creative approaches to solving those problems effectively
- There are several high potential areas for developing in-house training that aligns with our customers pain points that cant be satisfied by what is available on the open market

- UAF Enterprise model to SysML system model linkage and traceability
- System model federation
- Model consumption for non technical stakeholders
- Integrated verification & validation
- Developing and designing a trade study from the DE/MBSE Hands on Lab system of interest
- Behavioral modeling deep dive extension to DE/MBSE Hands on Lab system of interest

Questions?