Prioritization of Best Practices in the Implementation of Model-Based Systems Engineering

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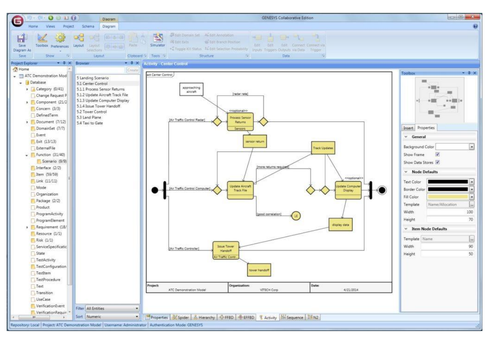
BACKGROUND

Model-Based Systems Engineering (MBSE) is the formalized application of modeling to support systems engineering activities. [1]



MBSE provides benefits such as:

- Finding inconsistencies earlier in development
- Traceability and impact analysis in changes to the design
- Improved design representation. [2]

Studies have attempted to address implementation challenges, but recommendations are inconsistent and conflicting. [2-6]

Hypothesis

Recommendations/Best Practices (BPs) for successful MBSE implementation vary on a case-by-case basis, impacted by factors such as company size, location and industry.

RESEARCH METHOD

LITERATURE REVIEW

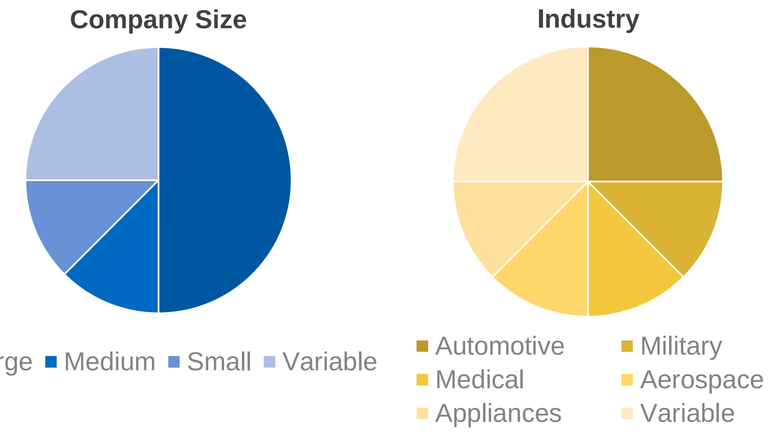
Compared existing literature and compiled a list of challenges and best practices. These findings prompted further exploration using interviews.

INTERVIEWS

Eight semi-structured interviews were conducted with engineers & consultants experienced in implementing MBSE.

Topics of interest: Company structure, current status of SE, MBSE implementation experience & MBSE obstacles and challenges

1 Female, 7 Males



LITERATURE REVIEW RESULTS

Common Challenges

Management support, understanding of value, organizational culture, lack of acceptance, low availability of skills, steep learning curve [7]

Best Practices (BPs) from Literature		References				
		Amorim et al. [3]	Chami et al. [4]	Hallqvist & Larsson [5]	Kim, Wagner & Jimenez [6]	McDermott et al. [2]
1.	Set Appropriate Pace	X		X		
2.	Include Stakeholders	X	X	X		X
3.	Train all Staff	X	X			X
4.	Have a Known End Goal		X	X		
5.	Use Documentation	X		X		
6.	Communication Plan	X	X	X		X
7.	Develop Ontologies		X		X	X
8.	Define Process to use MBSE		X		X	X
9.	Make MBSE Tool Accessible to all Engineers	X				
10.	Make Advantages of MBSE Clear	X				

Data collection method, industry, company size and company location for the data provided by these papers were analyzed against the conflicting BPs. No correlation was found.

INTERVIEW FINDINGS

Each organization faces different challenges depending on their circumstances such as:

Recurrent Biggest Challenge: Understanding of value

The list of BPs was validated and augmented following the interviews.

Validated List of BPs	
1.	Set Appropriate Pace
2.	Include Stakeholders
3.	Provide *Tiered* Staff Training
4.	Have a Known End Goal ★
5.	Use Documentation
6.	Communication Plan ★
7.	Develop Ontologies
8.	Define Process to use MBSE
9.	*Tiered* Tool Accessibility
10.	Make Advantages of MBSE Clear ★

★ Most important best practices commonly identified by interviewees

+

11.	Metrics to Track Progress
12.	Low-Risk Initial Project
13.	Delayed / Careful Tool Selection

Some BPs may be more important depending on an organization's unique challenges and circumstances, but **all best practices remain relevant** to some degree.

CONCLUSION

This work questions and examines inconsistencies in existing literature regarding MBSE implementation to provide a validated and more comprehensive set of best practices.

Recommendation

Companies should perform an internal assessment prior to implementing MBSE to **prioritize best practices** based on their unique circumstances.

The three BPs identified as most important can be used as a starting point.

CONTACTS / REFERENCES

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