



# Utilization of a Manufacturability Assessment Methodology and Metric: A Case Study Application

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**— MAKE —**

**Manufacturability Assessment  
Knowledge-Based Evaluation**



*Mission Context  
Resilience  
Lifecycle Cost  
Tradespace*



*Big Data  
Manufacturability  
Reliability  
Affordability*



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# Manufacturability Assessment Knowledge-Based Evaluation (MAKE)

- **Manufacturability** – ease in which a component or product can be manufactured. Components such as production cost, time to produce, production volumes, supply chain issues and product quality are typically used to determine manufacturability. While some publications define manufacturability and producibility separately, this research will assume the term manufacturability includes producibility.
- **Assessment** – detailed review of how the design impacts manufacturing.
- **Knowledge-Based** – judgment based assessment by subject matter experts (SMEs).
- **Evaluation** – identification of cost drivers and prescriptive measures to improve manufacturability.



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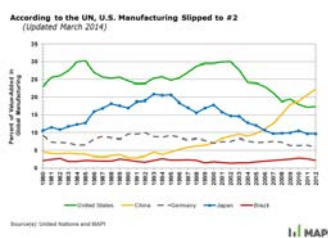
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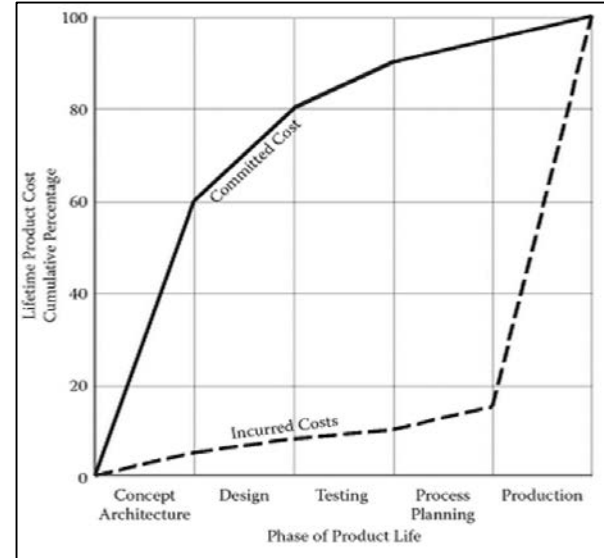
# Manufacturability (MAKE)



## Purpose

To develop a **manufacturability assessment methodology** targeted for use in assessment of system designs for the DoD lifecycle acquisition process.

Develop a **manufacturability metric** to be utilized for Tradespace analysis to improve the manufacturability of a design.



Product Cost vs. Phase of Product Life, D.M. Anderson 2014

- Improvements in cost, design, and manufacturability of the product
- Risk mitigation
- Reduction in time-to-market
- Mechanism for trade off analysis



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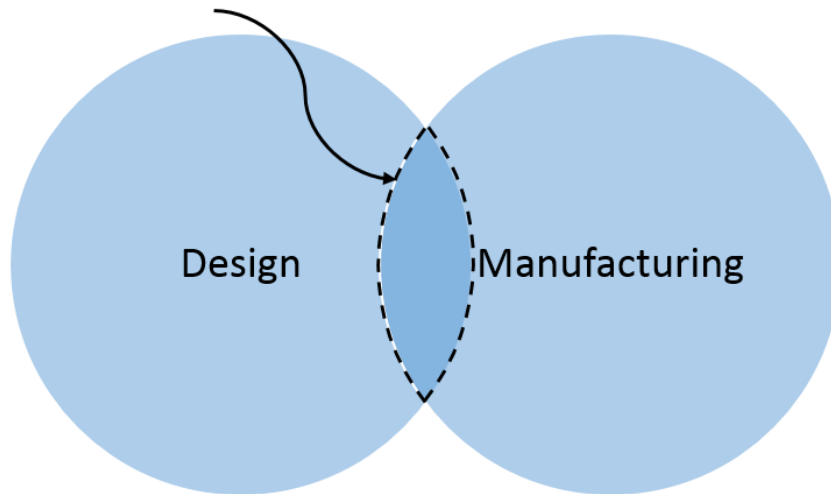
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# Development of Key Elements

- Focus on defining taxonomy based on key understanding **“what is the impact of a particular aspect of design on particular aspect of manufacturing”**

Interaction of design and manufacturing



Aspects of Design → / ↓ Aspects of Mfg	Material	Product and Manufacturing Information (PMI)	Design Geometry
Process	X	X	X
Quality	X	X	X
Supply Chain	X	X	X
Capital			
Equipment & Tooling	X	X	X
Labor	X	X	X
EHS & Ergonomics	X	X	X
Capacity and Scalability	X	X	X



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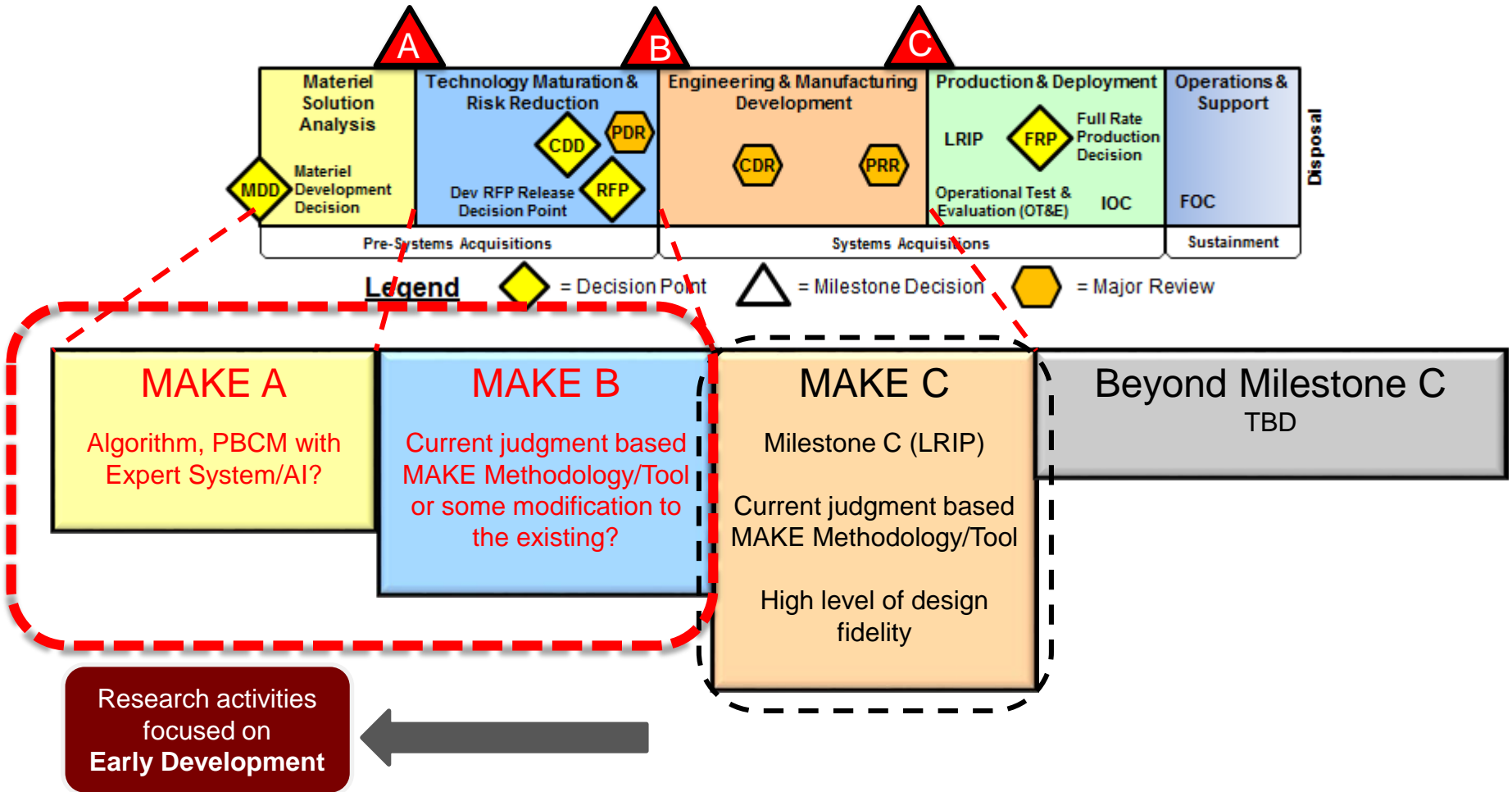
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# What is next for MAKE?





# Manufacturability Research Timeline

- Multiple cases studies have been completed as part of proving the MAKE methodology
  - ▶ 1<sup>st</sup> two case studies were products at or beyond Milestone C decision point
  - ▶ Most recent case study was a prototype product closer to Milestone B
- Methodology has been continuously modified and improved based on lessons learned from these case studies
- Improvements have been used to guide the development of a software tool to aid in performing manufacturability assessments.



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# DEMONSTRATION OF MAKE SOFTWARE TOOL



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