

Achieving Success with NSE MBE Maturity Index



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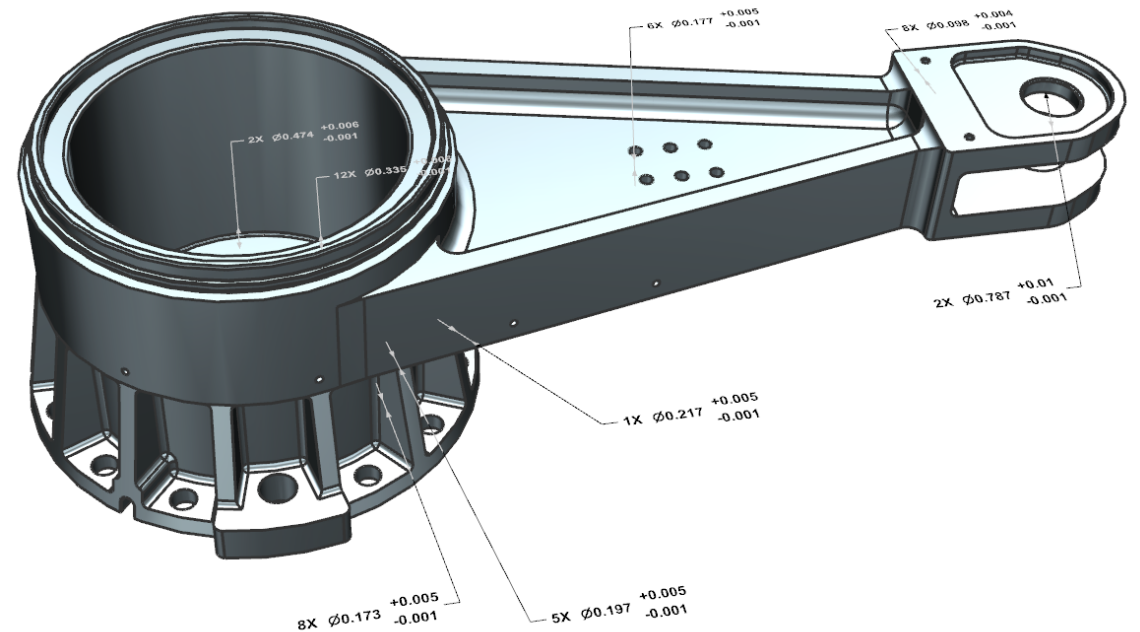
VP Cross Segment Programs & Operations

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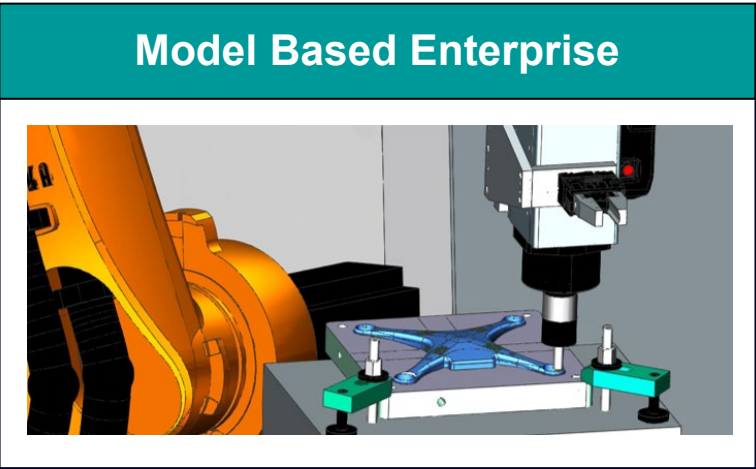
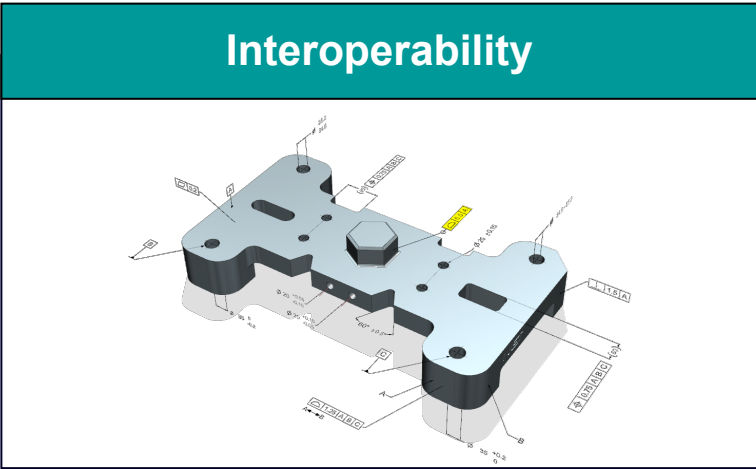
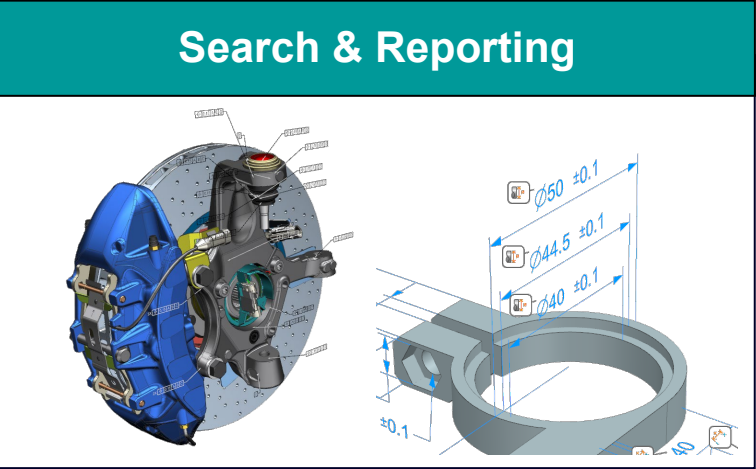
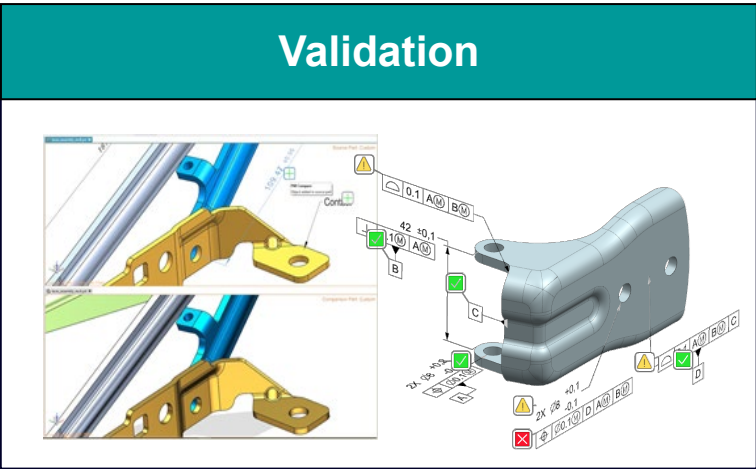
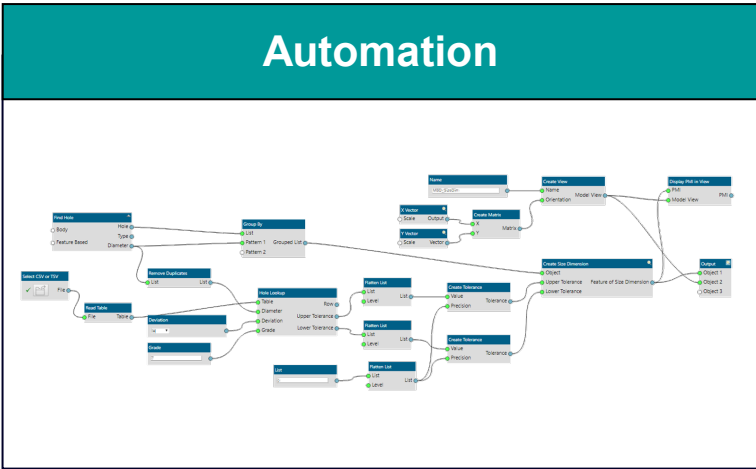
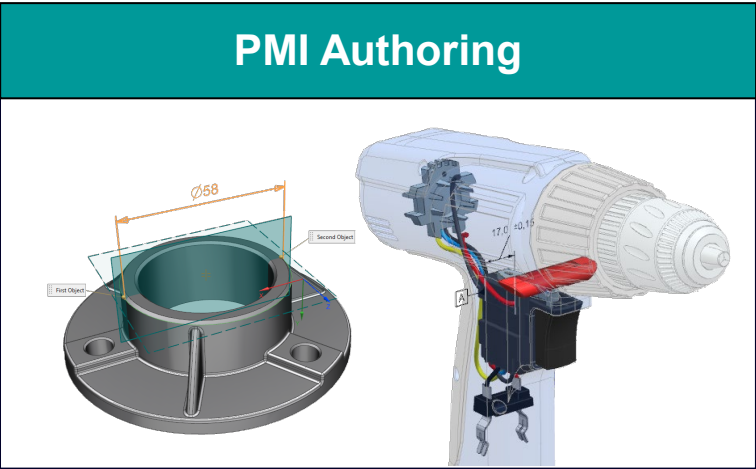
MBE Implementation SME

Product & Manufacturing Information

- Enables the production of a digital definition of a product within a 3D model eliminating the need for traditional drawings
 - A single source of dimensional and tolerance information
 - Reduced documentation time
 - Easier to understand annotated models
 - Automation to reduce the cost of converting from a drawing-based process to using 3D models and PMI
 - Limited detail available for consumption in some downstream processes



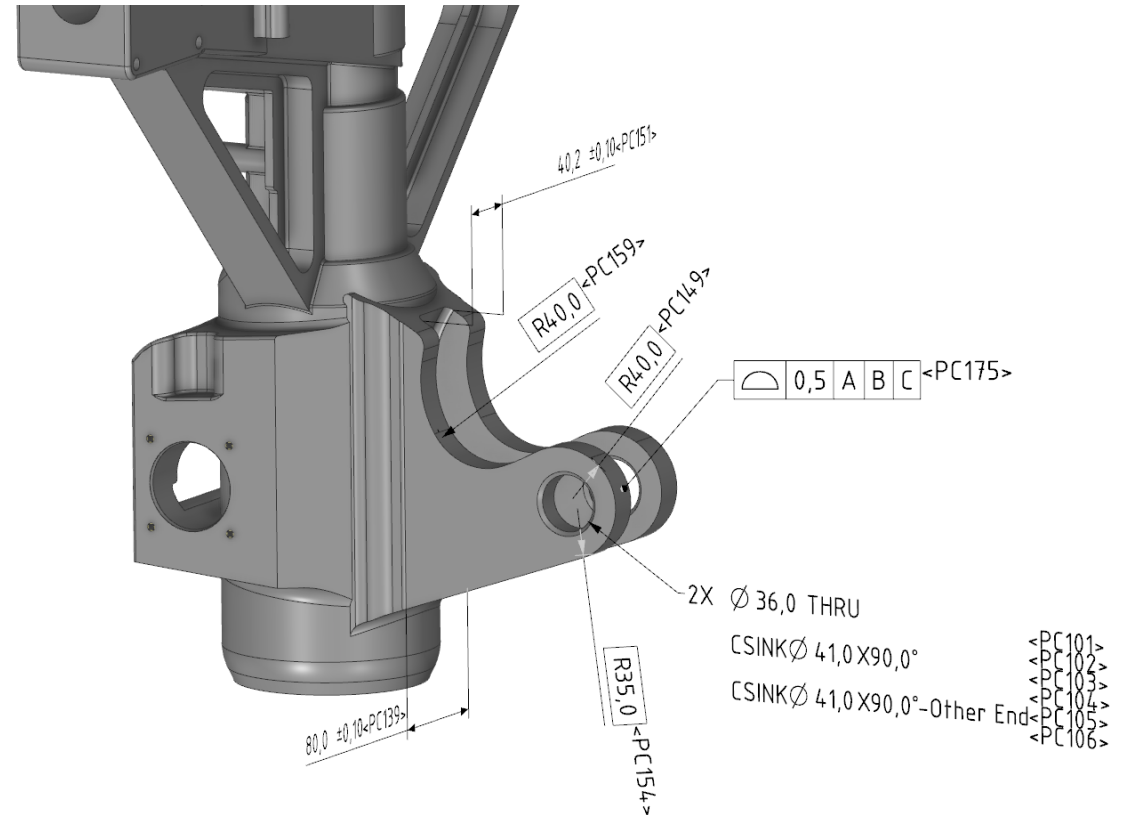
Model Based Definition solution capabilities



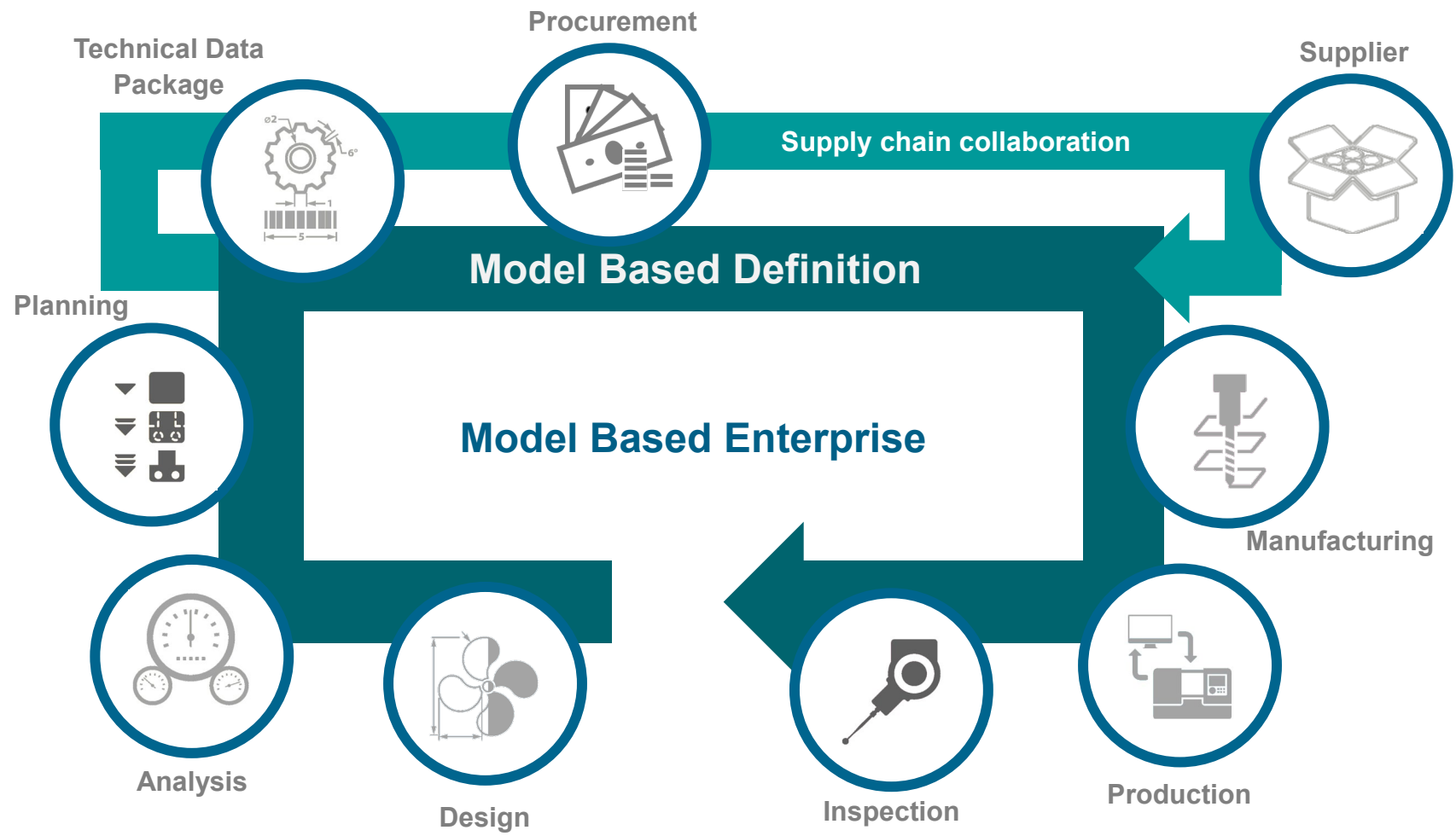
Building the richest and most comprehensive digital twin

Model-Based Characteristics

- CAD-native characteristics authoring support for multiple PMI types including feature control frames, dimensions, and notes
- Connected workflows with first-class representation in PLM and consumption in quality and manufacturing
- Complete traceability across product lifecycle
- Direct associativity to CAD PMI objects allow for real time update of characteristics as changes occur
- DMSC MBC standard support for characteristic semantics and display
- Support for CAD neutral formats including PLMXML and QIF



Reuse in both downstream and parallel product development processes



Create characteristics and flow data downstream to save time, reduce errors, increase first pass quality

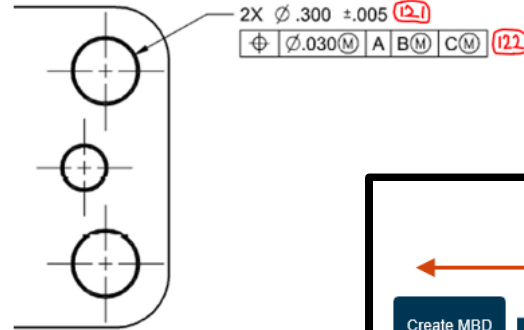
Characteristics as Backbone of Digital Thread

Drawing-Based Characterization



Gaps to a Digital Thread

- **Single Source of Truth:** Characterization unique to each supplier
- **Speed:** Time consuming with little automation
- **Quality:** Manual data transcription is error prone
- **Traceability:** Manual effort to align inspection results and req's
- **Interoperability:** Does not support machine workflows
- **Consistency:** Characterization is not done to any industry stds



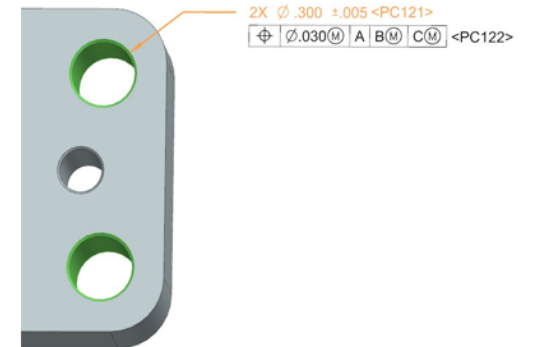
- Product Engineering is undergoing a pivotal transformation with Model-Based Definition
- Transformation is fueled by increasing maturity of technologies/methodologies and customer contractual pressures for higher levels of MBE maturity

Model-Based Characterization



Enabling a Digital Thread

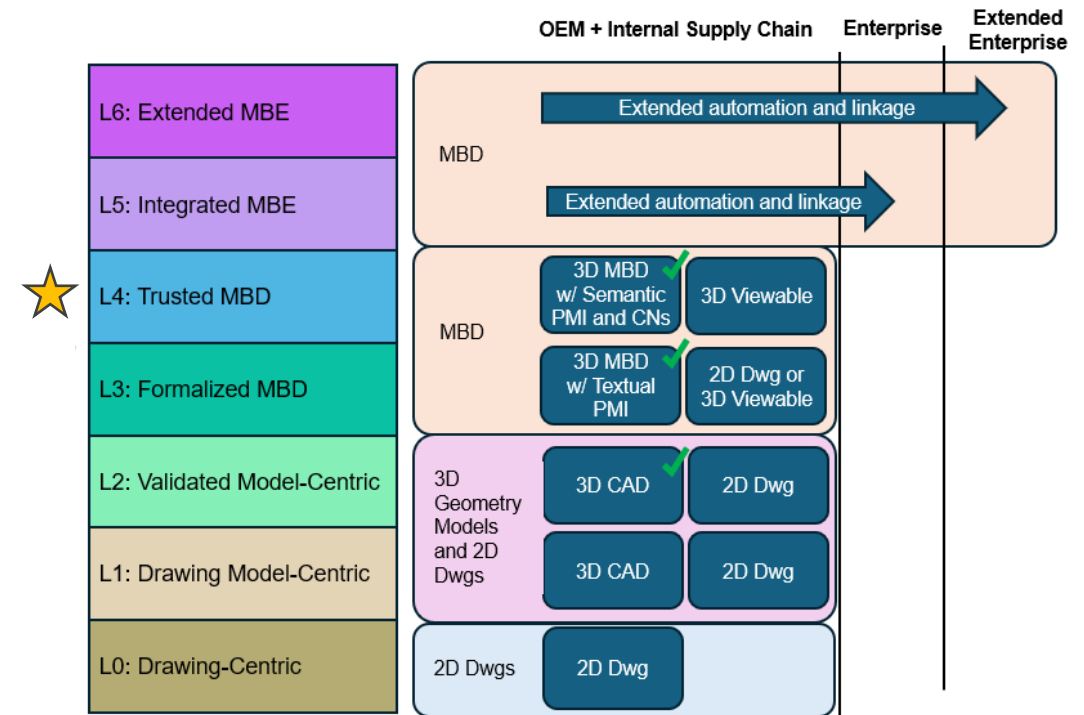
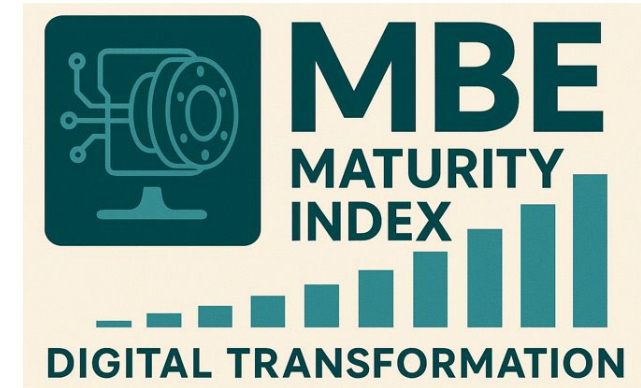
- **Single Source of Truth:** Characterization is authored once
- **Speed:** Automation enabled by machine readable formats
- **Quality:** Software integration replaces manual transcription
- **Traceability:** Unique characteristic IDs persist in digital thread
- **Interoperability:** Characteristics are embedded in interop file format
- **Consistency:** Characteristic authored to industry std format



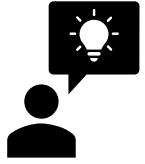
Characterization is a critical enabler for cohesive use of MBD; when embedded in CAD, the characteristics become the backbone of digital thread.

Adoption Challenges and a Common Measuring Stick

- MBE Maturity Index has emerged as a recognized framework for benchmarking digital maturity
- L4 is an increasingly common contractual requirement
- Many companies remain plateaued at L3 due to:
 - Legacy tools and processes
 - Company-developed software implementations
 - Patchwork of industry standards
 - Limited understanding of total product lifecycle ROI
- Effort to progress through the MBE Index is non-linear
 - L3 → L4+ often requires major investments in software, processes, and organizational change
- Assessing your software's capability to support L4+ is critical



Belcan Assessment of Siemens Software – Purpose and Scope



Siemens engaged Belcan to objectively assess DISW suite using MBE Index with a focus on definition, management, and usage of product characteristic data.

C1: Product Design Activities:

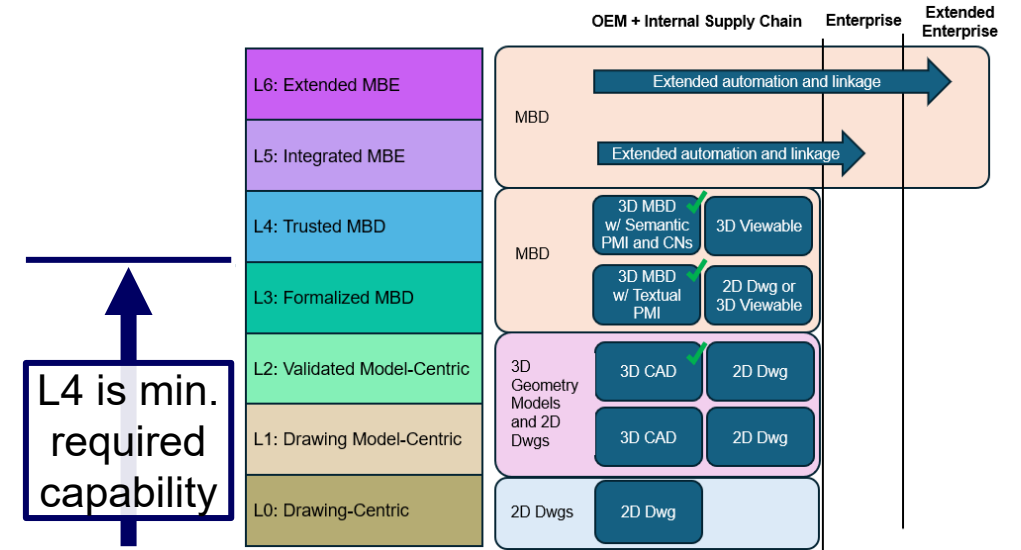
Included except tolerancing practices, ECAD activities, and design analysis data/storage.

C2: Product Data and Lifecycle Management Activities: **All included!**

C3: Product Manufacturing Activities:
All Excluded. Pivotal characteristic requirements here are redundant to C4

C4: Product Quality Activities: **All included!**

C5: Enterprise Enabling Activities:
All excluded. Out of scope.



Evaluated Minimum of L4:
Requirements at L0-L3 not evaluated.

- Generic Use Case which excludes:**
- User experience, User knowledge, training, or know-how
 - Industry-, company-, or commodity-specific requirements
 - Data translations, file interoperability, or usage outside of the DISW suite of tools

Belcan Assessment of Siemens Software - Approach

Example Decomposition (C4T2F1)

The assessment approach was structured around four key phases with responsibility for tasks shared:

1. MBE Index Requirement Decomposition:

Belcan decomposed each applicable MBE Index Facet into discrete “Verifiable Requirements.”

Belcan Decomposition			
Facet ID	Context	Level	Verifiable Requirement
C4T2F1	Scope is product quality activities involving the application of product characteristics and the generation of a BoC. L4 capability builds on L3, but shifts the acceptance from 3DIV and certified support derivative models to trusted MBD models and support 3DIV. Product characteristics must be able to be applied on demand and the BoC must be part of the product definition dataset. As maturity progresses, characteristics can be augmented with additional information and the BoC is exportable into a digital standard format, such as QIF.	4	Toolset must be capable of tagging product characteristics on-demand and adding criticality classifications in the native MBD model.
C4T2F1		4	Toolset must be capable of publishing a BoC as part of the product definition dataset.
C4T2F1		5	Toolset must be capable of augmenting product characteristics with criticality classification, verification methods and/or product requirement associations.
C4T2F1		6	Toolset must be capable of exporting the BoC as a digital standard format, such as QIF.

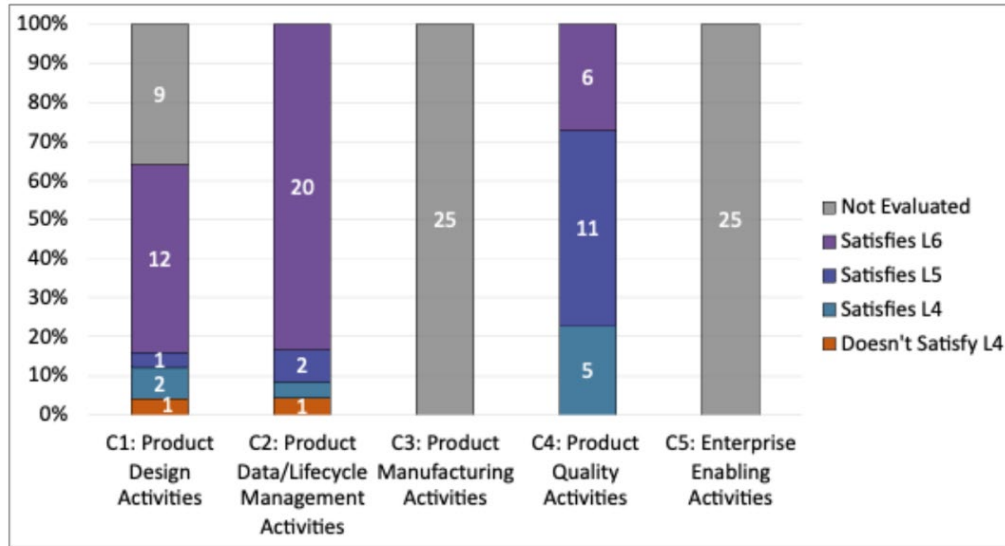
Requirement Decomposition Totals

52 Facets

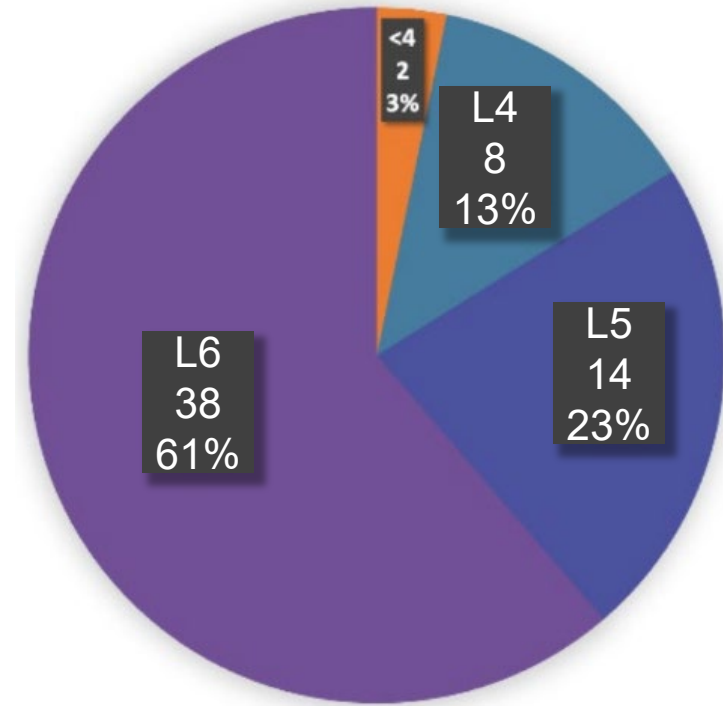
216 Verifiable Requirements

Belcan Assessment of Siemens Software - Results

All Facet MBE Maturity Levels



In-Scope Facet MBE Maturity Levels



Facets not meeting L4 capability:

- C1T2F2 (Product Requirement Associativity) - manual (vs. direct digital) linkage between product requirements and product characteristics within the 3D model
- C1T5F3 (Validation of Derivative Models) - high-fidelity validation is primarily delegated to industry partners

Toolset Capability Level	5.5
C1: Product Design Activities	5.6
C2: Product Data/Lifecycle Management Activities	5.8
C3: Product Manufacturing Activities	N/A
C4: Product Quality Activities	5.1
C5: Enterprise Enabling Activities	N/A

- The MBE Maturity Index helps avoid the common pitfall of addressing each challenge in isolation and developing disconnected point solutions.
- Organizations achieving Level 4 maturity and beyond are adopting modern, characterization-centric ecosystems.
- Software is only one piece of the solution. Modernized processes, reimagined governance, and an empowered workforce are equally essential.

Link to the
Complete
Report:



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