The Power of an Enterprise Configurator

by Institute for Process Excellence (IpX)
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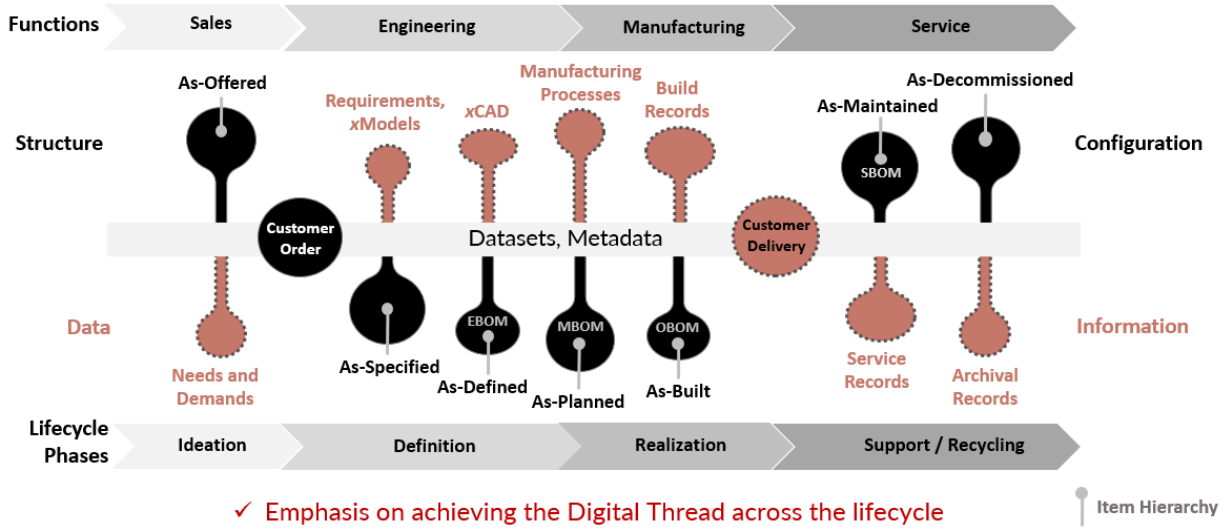
End-to-End Configuration Control of Your Product

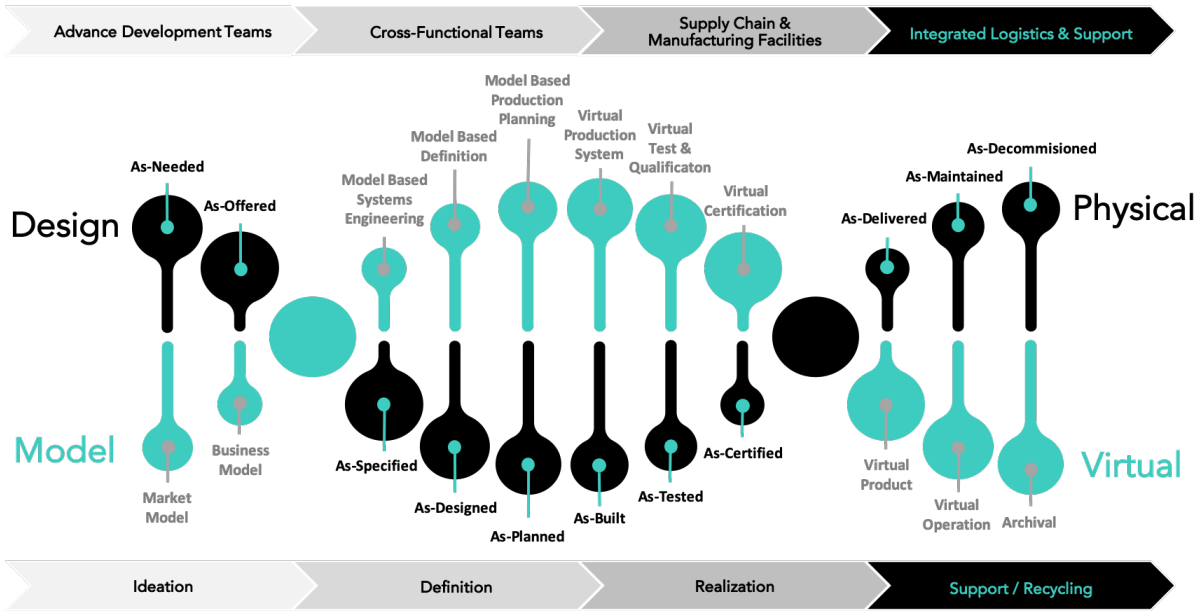
Most organizations utilize a product configurator solution at various levels of maturity to manage configuration of products and/or services. Configit, a leading enterprise configurator platform provider, states that their customers are able to reduce the overall time of the product lifecycle by 92%. To achieve this order of magnitude improvement requires an investment by an organization at multiple levels. To ensure continued success, an enterprise must focus on improving its products and/or services as well as modernizing its configuration delivery system throughout the ecosystem. A world-class enterprise not only defines and documents its products and/or services, but its configuration delivery system as well.

Enterprise configurators allow complex product information to be broken down into multiple views throughout the lifecycle. Everything an enterprise does originates from a customer demand or a market-driven need. Each view is associated with its own set of data and hierarchical structure. Enterprises that integrate the configurator solution beyond standard CPQ capability have an advanced ability to forecast and dynamically plan the need for components that are available to add to the configuration as opposed to trying to forecast all the end versions.



Empowering Innovation and Quality

Any development effort begins with a concept. The concept typically revolves around the developer's core competency. If the potential market and cost versus benefits appear to be sufficiently positive, the developer will proceed to the next step. The next step is to define and/or validate the application requirements which, in turn, will be used to develop the design basis. Application requirements must be sifted out of the applicable laws, regulations, contractual agreements, user expectations, and so on.

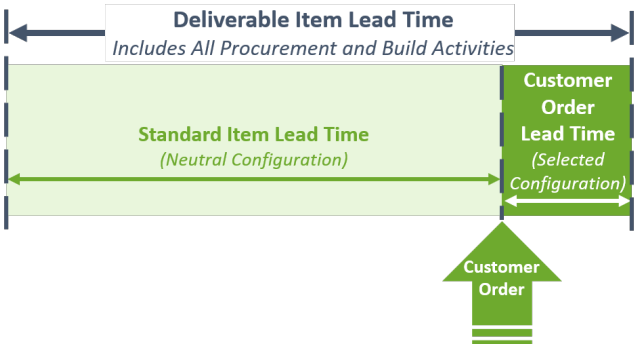


To tap the power of the Digital Thread and to facilitate a true Digital Twin, all facets of the organization and all lifecycle phases are reliant upon the ability to rapidly document, communicate, and leverage product requirements. Activities driven through the Digital Thread impact the Digital Twin with a constant barrage of changes making the ability to manage the Digital Twin that much more complex. How an organization identifies, structures and links its requirements and internal processes directly affect its ability to successfully and efficiently satisfy the customer.

Configurators let you establish options and rules for a manufactured product. Best-in-class product configuration solutions empower your development lifecycle and make it easy to configure product requests. Modern enterprise configurators that are integrated across all

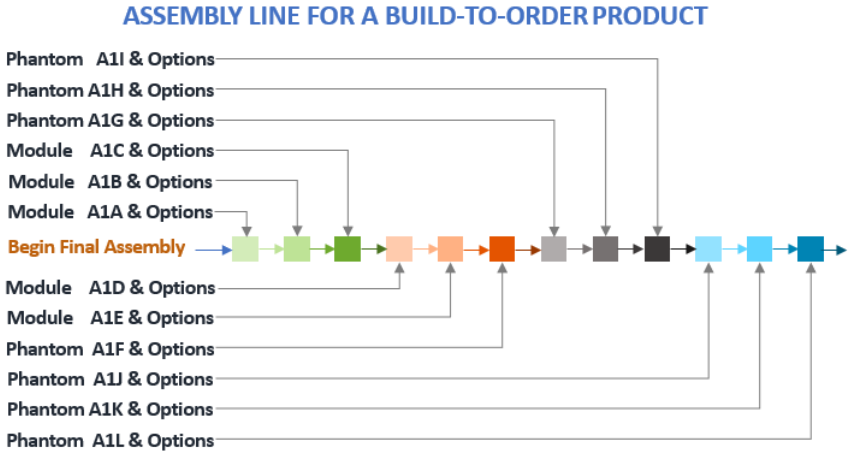
functions allow companies to design, manufacture, market and sell their products more efficiently and effectively. World-class manufacturing organizations must invest in business process refinements and digital solutions that simplify the production of engineered, ordered, and managed products that are uniquely configured.

Ensuring Customer Satisfaction



Customers have a wide spectrum of preferences. A product that is ideal for one customer may be unsatisfactory for another. One build-to-order objective is to provide each customer with a choice of options that can be included in their end-item product. Another is to minimize the lead time from receipt of a customer's order to the actual delivery of the custom-built product. A third is to build each unique end-item efficiently and with a high level of quality as if they were all identical.

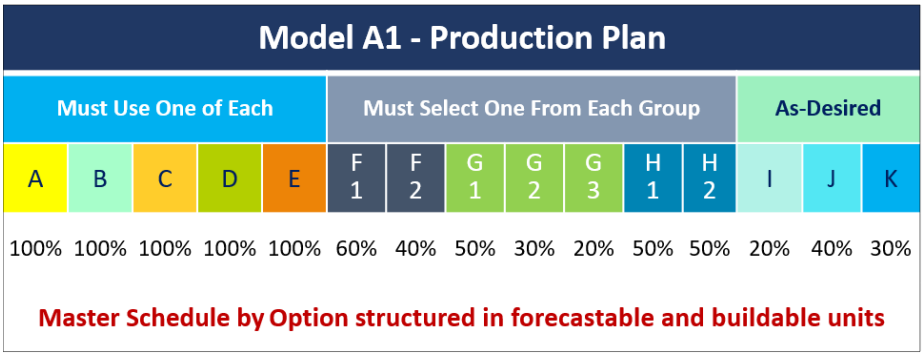
It is necessary to have the right mix of options available to support the end-item build schedule and preferably just-in-time. The supply chain is driven by a 2-level forecast. One is the end-item build rate. The other is the allotted option configurations.



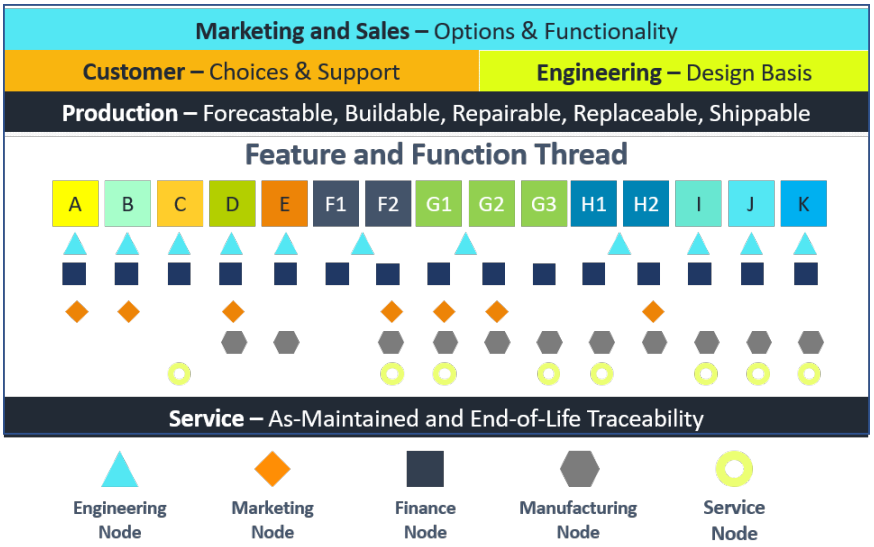
Each option selection within a specific module is incorporated at the same assembly point or workstation in the final assembly process. A final assembly plant for an automobile is a good example. There may be engine options, transmission options, wheel options, etc. All engines are incorporated at a specific station. The same is true for transmissions, wheels and any other module with options. The selected option could be a collection of items or a single item. Each option has a bill of

material and a process plan (or bill of operations) which identifies the incorporation point in final assembly.

The end-item build schedule is often called a Production Plan. It represents the rate at which deliverables are produced. The production plan is generally a trade-off between what Sales can sell and what the production facilities can produce. The forecast of options needed to support the Production Plan is often called a Master Schedule.

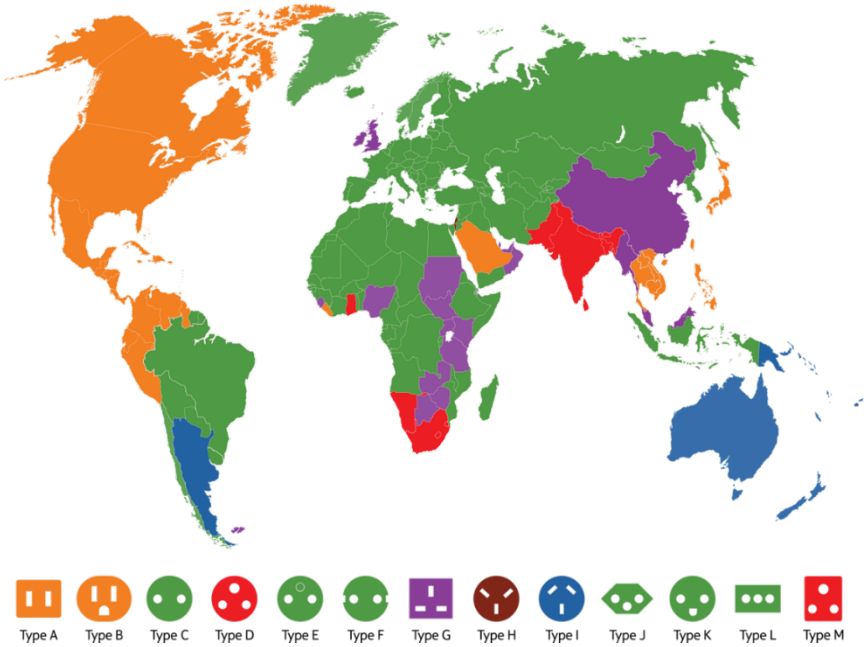


In the following image Modules A, B, C, D and E are standard and included in each deliverable. Modules F through K represent options from which a preference must be selected. The supply chain for unsold end-items is driven by planning bills which contain all available options and their forecasted usage. A two-level master production schedule is used in conjunction with planning bills in a build-to-order environment.



Build or assemble-to-order products tend to be complex when products are sold in terms of features and functions. Organizations utilizing modern enterprise configurators maximize product rationalization and empower their feature and function capability. Saleable features and functions must be translated into buildable units. Translations can be one to many, many to one or any combination. Financial accounting is similarly complex when pricing is based on features and functions and costs are based on buildable units.

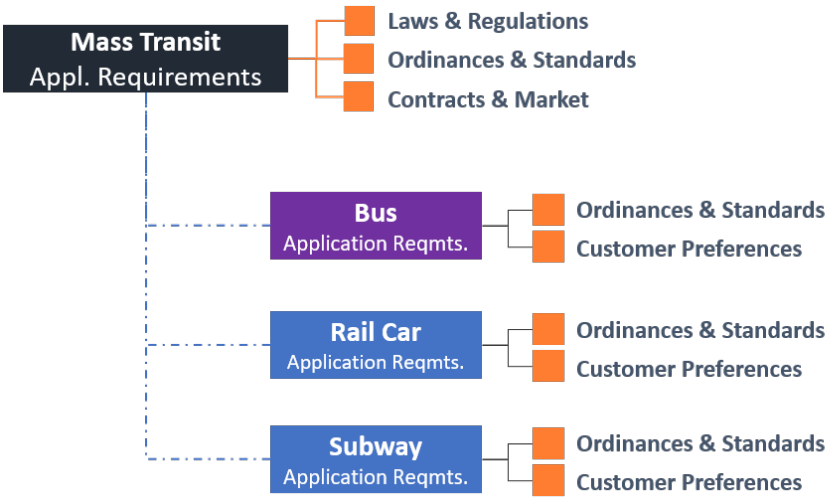
International voltage and adapter differences are examples of how industry standards differ from country to country. Producers and exporters must know the difference. Most countries outside the U.S. use the metric system for measurements. The English system is commonly used for measurements in the U.S. North America generally uses 110-127 volt, 60 Hertz electricity. Most countries outside North America use 230-240 volt, 50 Hertz electricity. It is imperative to understand the applicable local regulatory requirements and potential market impact.



Trade-offs should be addressed and resolved while creating the design basis views to achieve the application requirements. The goal is to provide those developing the design basis with visibility to any incompatible standards and the areas impacted.

A Real-World Scenario

A mass transit system is a good example to illustrate the differences between application requirements and the configurable design basis.



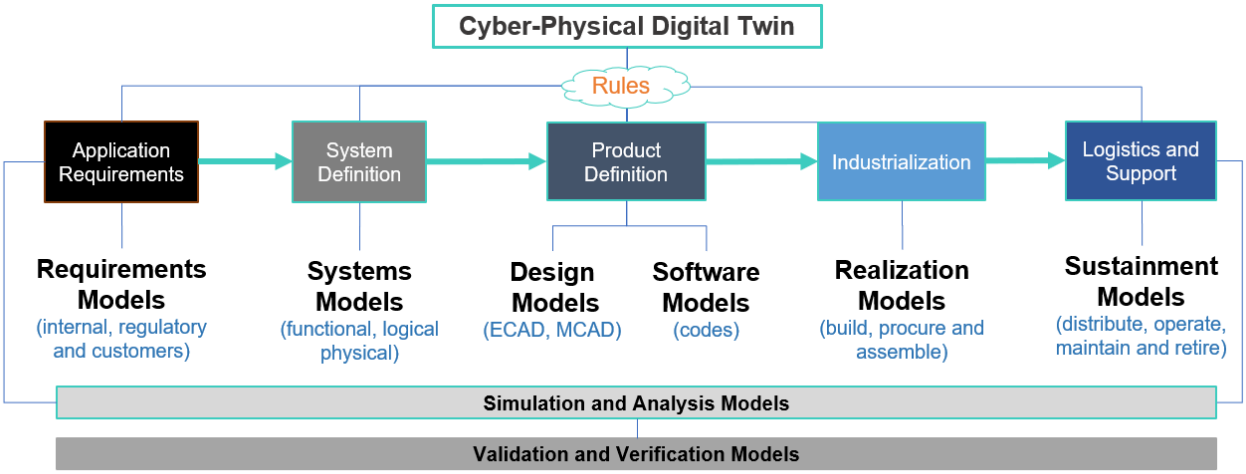
If there are multiple variation options for the Bus, then the selected

item configuration has application requirements that are specific to that variation and must be linked.

With a configurator solution, options will be available to allow for various manufacturing variants as desired by the customer without engineering assistance while creating a rapid and proper price estimate. Without a configurator, it is difficult to manage an impossibly large database to cover all the potential combinations of options offered. Automation allows the organizations cross functional team to focus on the customers and produce what they want instead of what they can get based on availability.

Enterprise Configurators and the Model Based Ecosystem (MBE)

Model Based Definition (MBD) uses Model-Centric processes to define the product across all Lifecycle phases. MBD relies heavily on 3D CAD as authoritative source; the goal of MBD is to achieve the Digital twin. The Digital Twin can only be realized with robust configuration control of the different models used throughout the lifecycle.



✓ The Digital Twin goes beyond 3D MBD (shape)

Potential Challenges for MBE that a Dynamic Configurator could Solve

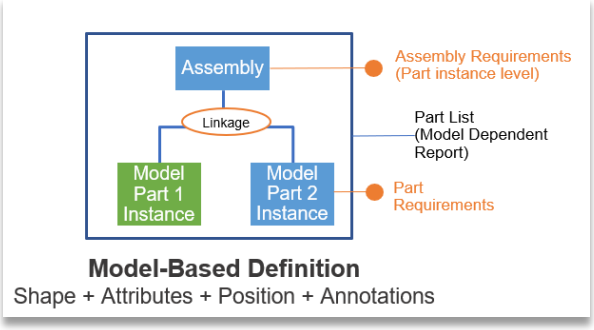
- **Model Size and Complexity -** Trying to put too much information on the model may slow down release process and create confusion for consumer of data.
- **Data Interoperability -** Difficulty to transfer data across different systems without compromising integrity especially when the models are authored in different tools / format (Ex. SysML Model vs CAD model).
- **Data Longevity -** Requirements for data longevity must be taken into consideration to ensure the data can be retrieved in its archival format for the required period. This requirement may be difficult to fulfill for 2D Model Based Design where the data cannot be presented on a 2D paper medium.
- **Collaboration -** Means must be in place to ensure that Model can be distributed to external users for viewing and or authoring without compromising security.
- **Change Management -** Ensuring that all the impacts of a Change are clearly identified across all models. This becomes more difficult as Models and Documents are authored in different systems and archived in different Repository (Paper Vs Digital Vault).

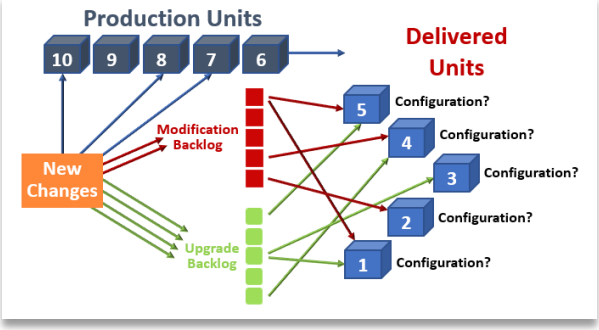
- **Configuration Management -** To ensure all users are using the proper revision of the data for a given application. The released date may not match the effective date (effectivity) of the datasets.

Enterprise Configurators and 3D Model Based Definition (3D-MBD)

Model Based Definition is a transition from File-Based to Feature-Based definition. The exposed features can be configured like product variants. 3D Model Based Definition features enable "Part instance" level rules (based on BOM path and position). For 3D MBD, the Model includes the following information:

- Manufacturing and process requirements - previously defined on the face of the drawing
- Part List - previously defined by the Bill of Material (BOM)





The Value of an Enterprise Configurator

An organization's digital capability expands with the use of a PLM system that offers a configurator engine to manage complex digital datasets. The quality of this increased capability is highly dependent upon the ability of an organization to ensure that the datasets are clear, concise and valid.

The configurator delivery system for an enterprise must be properly defined by, and conform to, product configuration requirements. This ensures that the products and services conform and satisfies the customer or market needs. Enterprise configurators save the organization from corrective action and unneeded resource intervention by avoiding model-based configuration errors. Having accurate manufacturing and parts requirements readily available within an enterprise configurator increases your competitive advantage.