

# Feature-based Product Line Engineering: Solution Overview

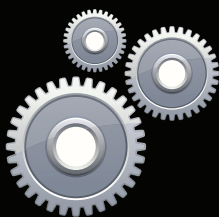


Engineer your competitive advantage.

What if the innovation, economy of scale, competitive advantage, and profitability of your product line were limited only by your imagination — instead of your engineering capacity?

Organizations are being pushed to the edge of their capability by the exponentially growing diversity and complexity of today's product lines — how they are engineered, produced, delivered, and evolved.

These variant and complexity management challenges are so significant they can impede a company's ability to achieve strategic business objectives.



Feature-based Product Line Engineering (PLE) has emerged specifically to address this problem.

Feature-based PLE is a breakthrough practice and proven approach that enables organizations to develop, deliver, and evolve an entire product line portfolio through each stage of the product lifecycle — and across the enterprise — with far more efficiency than has been possible before.



BigLever's **onePLE** is a holistic solution that removes the barriers to rapid PLE adoption, and enables companies to realize the extraordinary benefits of Feature-based PLE.



#### **Time to market.**

Leverage major engineering improvements to speed time to market. Target and hit new market windows more efficiently, effectively, and profitably than your competitors.



#### **Product line scalability.**

Use feature-based asset sharing and automated production to create new products and product features, and grow your product line — with the push of a button.



#### **Efficiency and productivity.**

Eliminate redundant, repetitive tasks to allow your skilled engineering talent to focus on high value work — and bring a new level of efficiency to your organization.



#### **Product quality.**

Remove human error, simplify and streamline testing and QA, and decrease overall defect density to make major improvements in the quality of your product line offering.

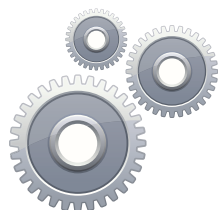
**onePLE**





# The PLE Competitive Imperative

As organizations are increasingly consumed by the mundane tasks of managing the diversity and exponential complexity of today's product lines, the opportunity for new product innovations is often lost. Meanwhile, production challenges and costs continue to escalate.



A growing number of forward-thinking programs, business divisions, and entire enterprises are adopting Feature-based PLE as a key strategy for taming complexity and gaining competitive advantage.

Feature-based PLE is injecting billions of dollars in effort avoidance into complex systems engineering industries:

- A global aerospace and security firm providing the U.S. Navy with a critical strategic defense system is saving tens of millions of dollars every year, equal to the cost of their entire engineering staff.
- A leading aviation supplier is producing certification packages for their safety-critical flight products eight times faster than was previously possible.
- A major network storage company is enjoying 300% to 500% improvements in scalability, time to market, and product quality.
- A global A&D company providing live training simulation systems to the U.S. Army saved more than \$800 million over a twelve-year period, while increasing engineering productivity 280% of previous levels.

Effort avoidance comes from eliminating redundant and repetitive branching, merging, cloning, propagation, and related low value work, through consolidation, abstraction, and automation. This dramatically reduces time and effort — and frees engineering talent to focus on high value innovation.



Organizations that adopt PLE consistently garner significant competitive advantage, in the form of more wins, more innovative and higher quality systems and products, faster engineering and business velocity, and higher revenue and profits.



Organization that are not adopting PLE are becoming less competitive as skilled engineers continue to focus on low-value redundant and repetitive product-centric effort — or leave to join organizations where their skills are put to the best use every single day.

# BigLever and **onePLE**



BigLever is the long-standing leader in helping organizations across industry sectors achieve the extraordinary benefits of PLE. We pioneered Feature-based PLE, a well-formulated, repeatable, automation-based PLE approach that is revolutionizing the way organizations work by removing engineering complexity and streamlining the creation, delivery, and evolution of a product line.

BigLever's **onePLE** is the industry's only holistic, proven solution to enable rapid and effective adoption of PLE by an organization of any size.

It combines our state-of-the-art PLE technology and methods with the business strategy and organizational change needed to accelerate PLE adoption — allowing companies to use PLE to create and bring more product innovations to market faster, more efficiently, and more competitively.

**onePLE** is based on our many years of experience in helping some of the world's largest companies transition to and operate a game-changing PLE practice.

BigLever customers have received industry recognition for their innovation and breakthrough success in implementing Feature-based PLE.

Feature-based PLE is not just a technological solution.  
It becomes transformative to your business.

With **onePLE**, your company's executive leadership can define the key business drivers behind your PLE initiative, and create a well-defined PLE vision for your organization.

**onePLE** brings a fully unified approach for allowing your organization to adopt and execute on that PLE vision.

It is specifically designed to address the challenges of moving your organization to PLE practice — removing obstacles and accelerating this transition.



## The PLE Body of Knowledge

*A pillar of **onePLE** is another industry first — a comprehensive body of PLE knowledge structured and available online for use throughout your organization.*

BigLever's PLE Body of Knowledge (BoK) contains detailed process descriptions, training, and examples for every aspect of PLE, including all of the activities involved in establishing your successful Feature-based PLE practice. The PLE BoK provides specialized training courses, best practices compendia, Quick Reference Guides, slide presentations, how-to videos, white papers, and more.

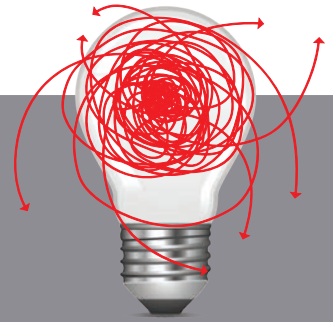
# The Quagmire of Product-Centric Thinking

The methods and tools of systems and software engineering have predominantly promoted a traditional product-centric perspective. The result is a bevy of sophisticated development tools and processes that can be effectively applied to the engineering lifecycle of an *individual product*.

In that world, a product line is nothing more than a collection of individual products. It is left as an exercise for tool users to craft the homegrown techniques for managing the variation and exploiting the commonality among these products — commonality that holds a treasure trove of cost savings and effort avoidance.

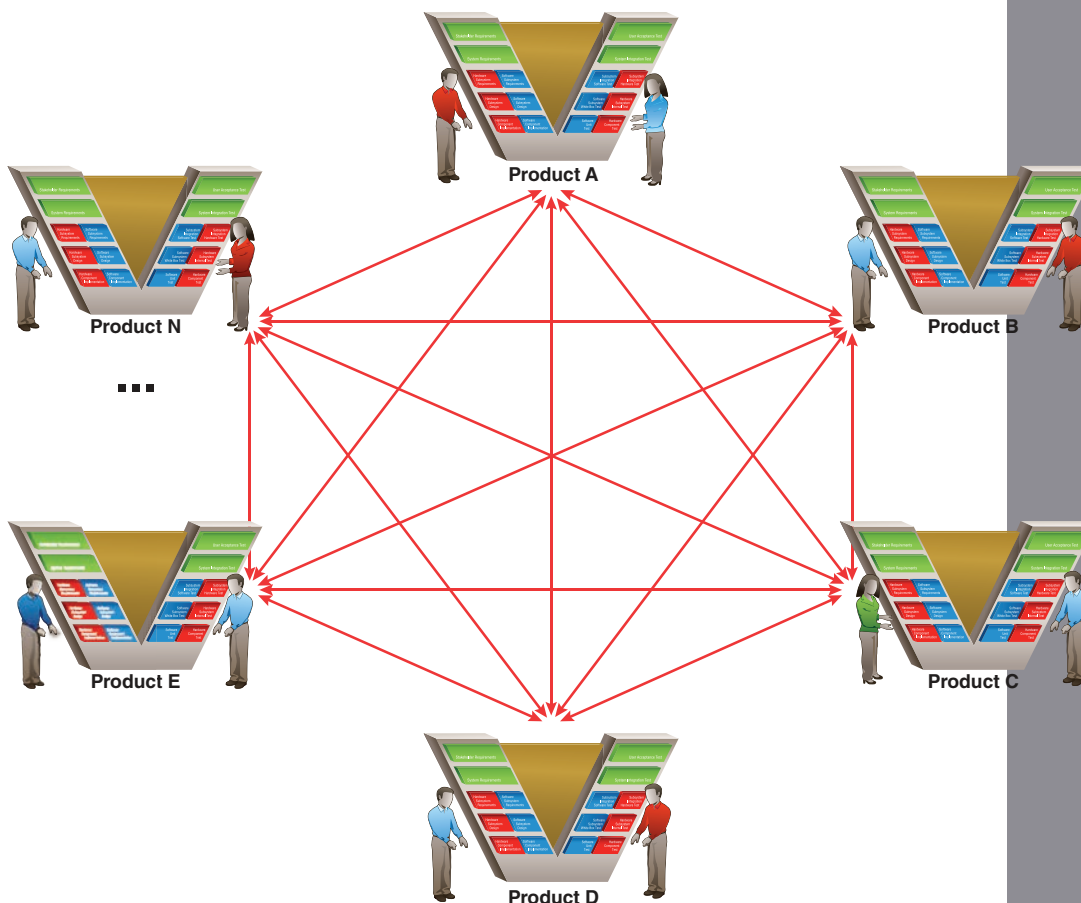
Even when a tool offers (at best) rudimentary ways to handle variation, the result is a solution that is only applicable in the context of that tool and does not address any other part of the lifecycle, or other tools across the tool ecosystem.

This product-centric approach results in complex and labor-intensive interactions, dependencies, and coordination activities that groups must undertake to take advantage of similarity among products.



Copying and reusing engineering artifacts leads to vast amounts of duplicated material — and vast amounts of replicated work across the organization.

“Clone and own” provides 100% reuse on the day it occurs, and 0% reuse every day thereafter.





# The Power of the PLE Factory

Your Feature-based PLE Factory eliminates all of the duplication in artifacts and replication of work, resulting in the most efficient and cost effective engineering effort possible.

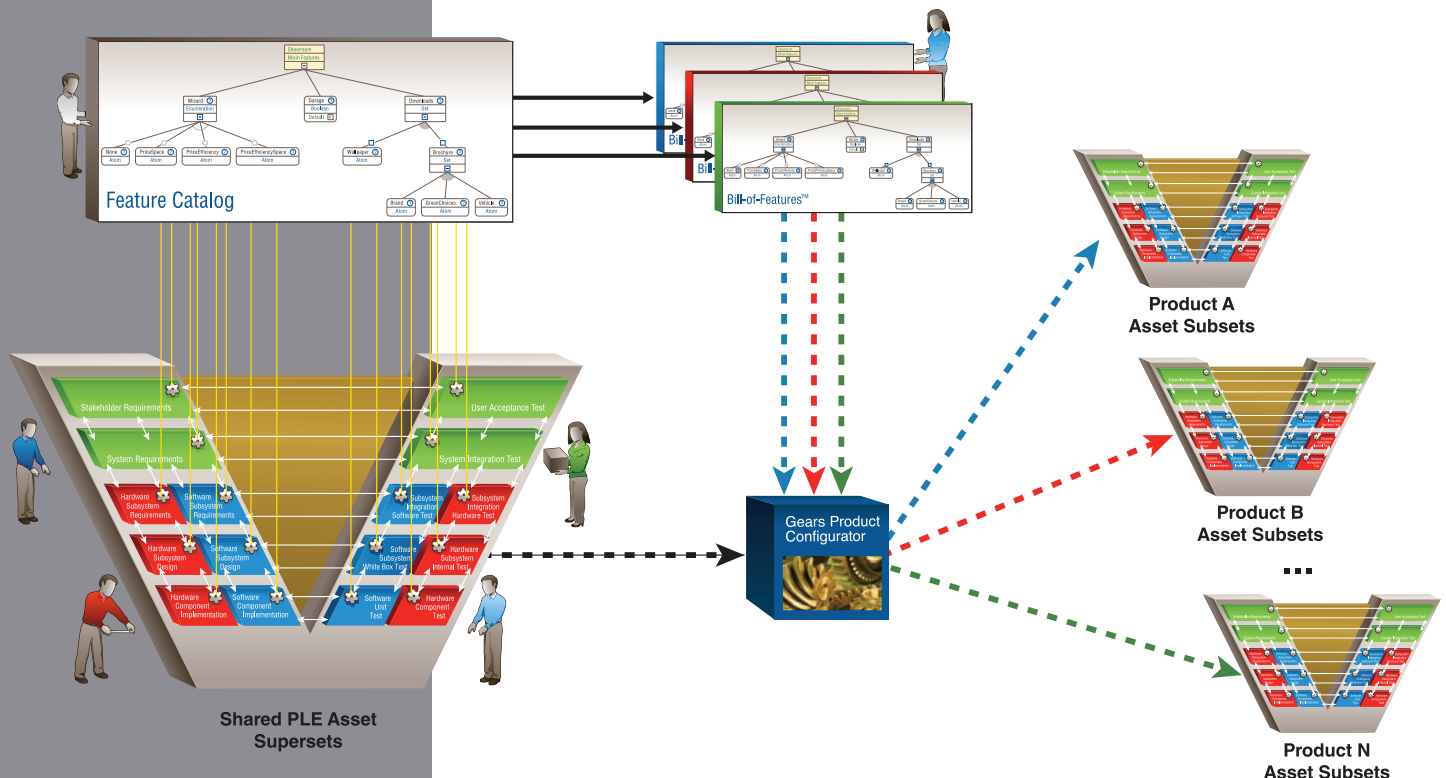
In the world of PLE, a product line is a single entity, rather than a multitude of products.

Organizations utilizing Feature-based PLE adopt a factory approach to building their product line. A PLE Factory is much like a typical manufacturing factory except that it operates on digital assets rather than physical parts. *BigLever's Gears PLE Lifecycle Framework provides the technology foundation for **one**PLE and your PLE Factory.*

To establish the factory, based on Gears, your organization creates a “superset” supply chain of digital assets that can be shared across the entire product line. These digital assets contain variation points (illustrated by the small gear symbols in each asset type) that are defined in terms of features in the product line's Feature Catalog. The Feature Catalog contains all the feature options available for all the products in the product line, and is used by individuals and teams across the engineering and operations lifecycle, and across organizational functions to gain shared understanding of the product line's diversity.

The features chosen for each product are specified in the Bill-of-Features for that product. The Gears product configurator creates a product instance by exercising variation points according to the features selected — with the push of a button.

Engineers now work on the shared asset supersets, the Feature Catalog, and the Bills-of-Features. All development occurs inside the PLE Factory.





# The Economics of Feature-based Product Line Engineering

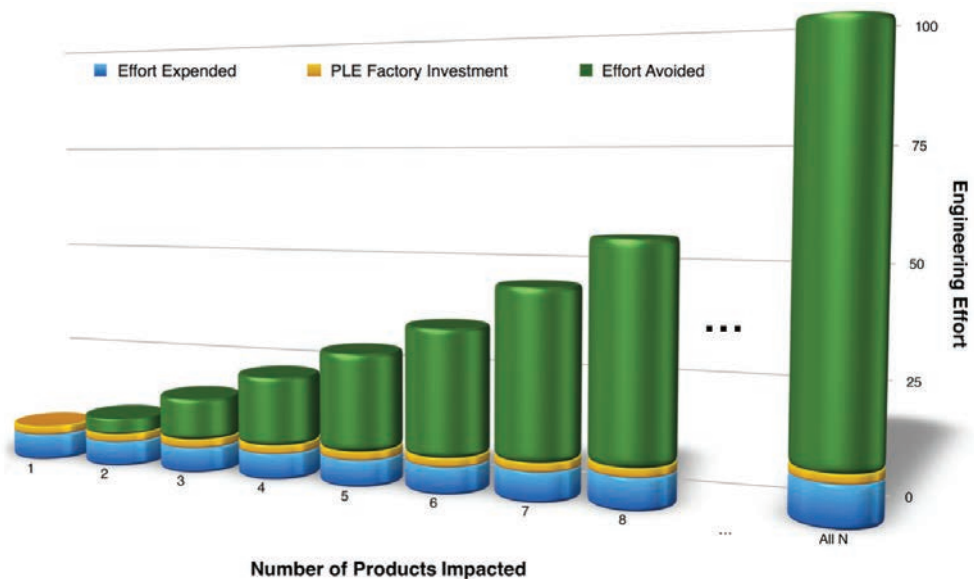
As an organization carries out its daily engineering work, that work can be characterized by how many products in the portfolio each piece of work affects. Suppose a task affects four products. In a product-centric environment, each individual product team will apply that task.

Suppose each team accomplishes the task as efficiently as possible — and the organization's leadership is very pleased with the each team's performance.

But by shifting perspective from individual products to the product line portfolio as a whole, it becomes immediately and painfully obvious that the same work is being carried out four times.

Under the Feature-based PLE approach, when the organization undertakes a task affecting four products, the task is carried out once — inside the PLE Factory.

The task will involve changing or adding to the shared asset supersets, or the Feature Catalog, or the Bills-of-Features for the products. The PLE Factory's automated configurator is used to apply the work to each product that needs it. *No matter how many products benefit from the task, the task is only done once, consuming one "unit" of effort.*



Blue = engineering effort.

Gold = overhead of the PLE Factory approach — creating and maintaining the Feature Catalog, Bills-of-Features, and asset supersets equipped with feature-based variation points.

Green = engineering effort avoided through the PLE Factory's automation.



Engineering leadership will enjoy higher productivity, lower overhead, higher product quality, lower defect density, faster time-to-market for new features and new products, and greater scalability of the product line.



To business leadership, those advantages translate to bigger profit margins, more competitive pricing, more proposal wins and sales, beating competitors to market with new innovations, fewer recalls, and a more diverse product line to penetrate broader market opportunities.



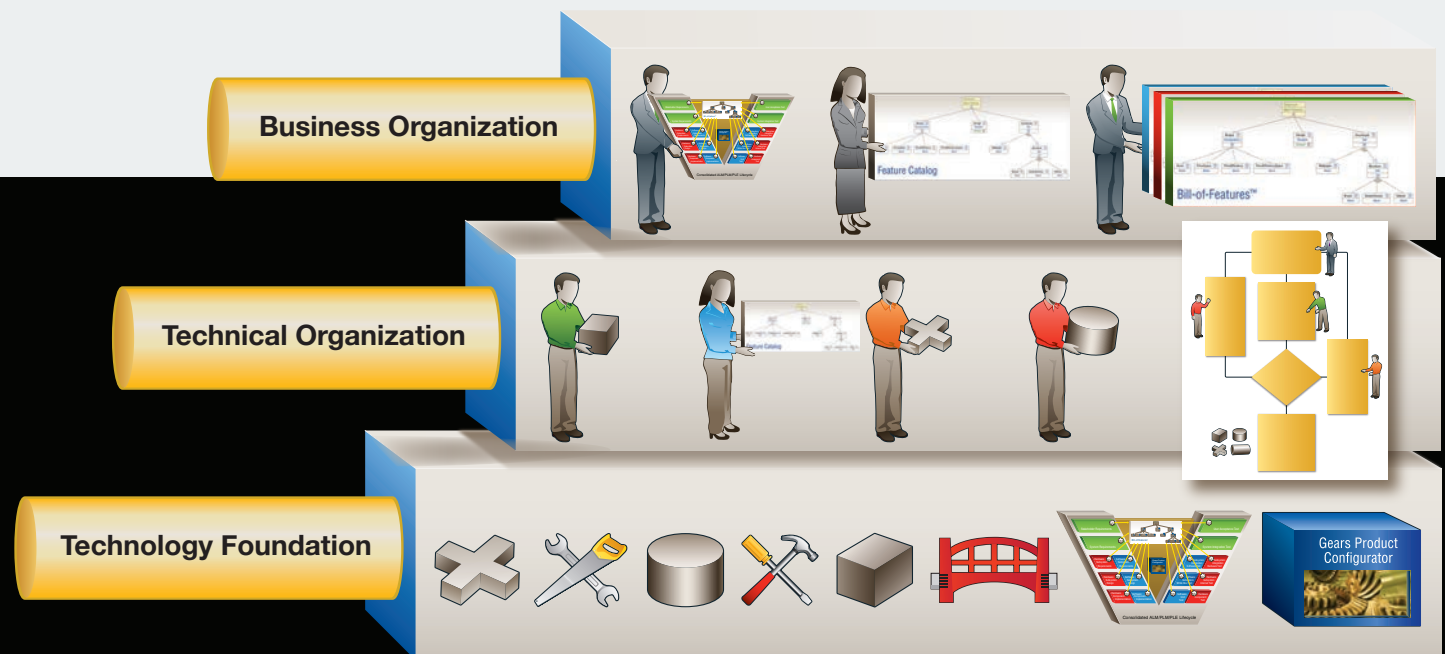
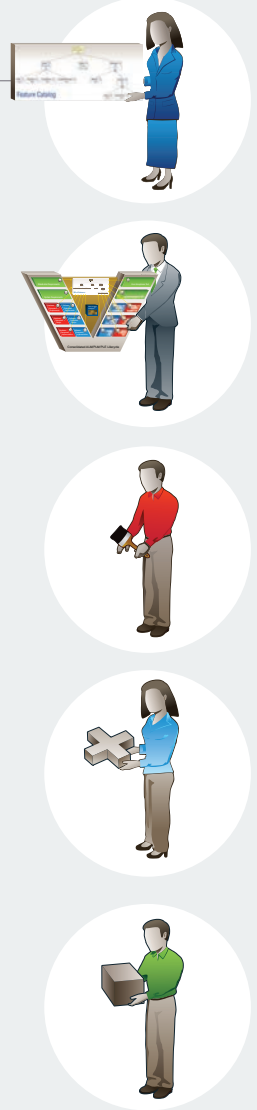
# PLE and the Organization

A core tenet of BigLever's **onePLE** is that, unlike other technical disciplines, Feature-based PLE cannot be fully adopted without executive leadership and organizational change.

The following three “tiers” of the enterprise have to work collaboratively to develop and operate one or more PLE Factories that will be used to build, deliver, and evolve products:

- The Technology tier puts in place and maintains the tool and technology environment and ecosystem to operate the PLE Factory. Think of this as a fully functional factory awaiting the people inside to run it. The people to run the factory are brought in, carefully trained, and equipped to be highly effective at their specific roles in the middle tier.
- The Technical Organization tier focuses on the people, roles, and processes that operate the PLE Factory on a day to day basis. In this tier, PLE roles and processes are put into play, and factory governance and management are applied. In combination with the Technology tier, this tier provides a fully operational PLE Factory capable of producing all of the products in a product line portfolio.
- The Business Organization tier focuses on the people, roles, and processes that utilize the PLE Factory to achieve the business objectives of the enterprise. This tier also executes the required processes for enterprise leadership to establish a PLE Factory, and to provide the necessary support and guidance for the factory during its operation.

*BigLever's **onePLE** is a complete, holistic solution that enables these three tiers to work productively to establish and then achieve the common goal of PLE success.*



# PLE Across the Enterprise



Born of the software engineering field, Feature-based PLE was initially focused on software source code, but soon spread across the Application Lifecycle Management (ALM) realm. PLE Factories grew as shared asset supersets expanded to include requirements, design models, testing artifacts, documentation, and more. Then came the marriage between Feature-based PLE and Product Lifecycle Management (PLM) to cover the full systems engineering

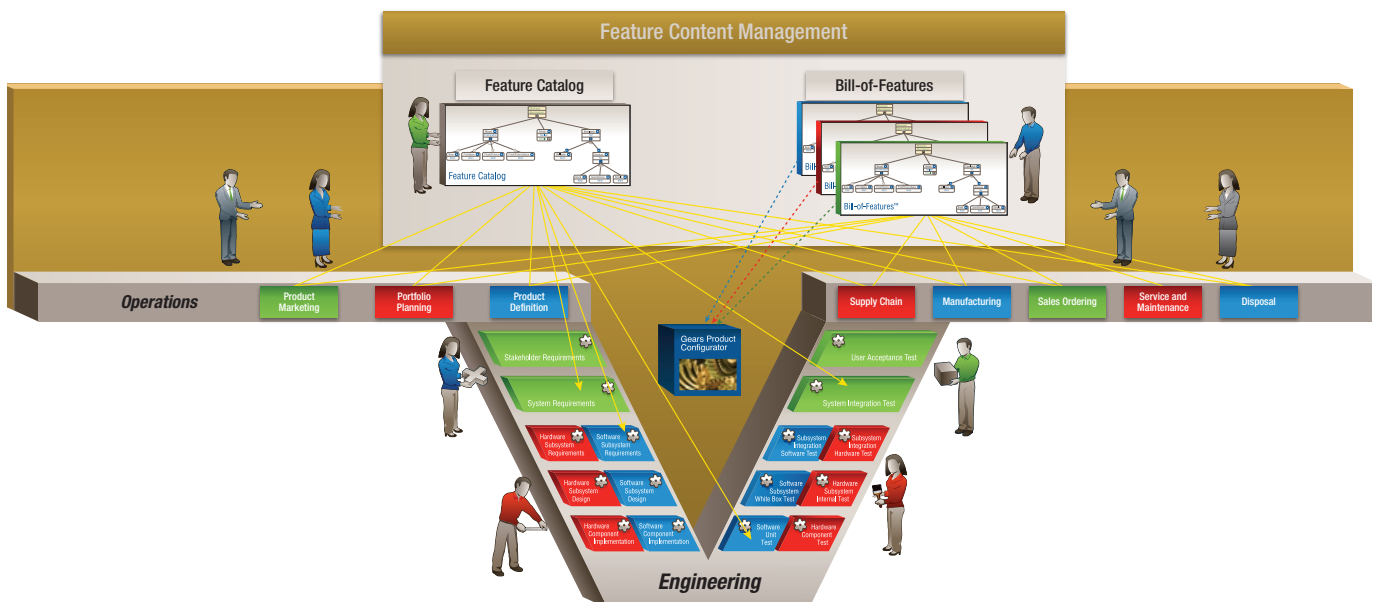
Now portfolio management, product planning, sales and marketing, manufacturing, supply chain management, and more are all within PLE's ever-growing scope.

lifecycle, bringing shared assets such as bills-of-materials and mechanical drawings into the PLE Factories.

Feature-based PLE now extends into the realm of Enterprise Operations, encompassing the “wings” of the engineering V — both upstream and downstream of conventional engineering.

Leading each stage of this evolution, BigLever consistently pushed the edge of the PLE envelope with pioneering innovation, bringing insight and proven expertise to our customers and to the industry. We constantly collaborate with customers to understand their evolving needs and work diligently with leading tool providers to extend the Gears PLE Framework with tool integrations across the full engineering and operations lifecycle.

Gears delivers a complete Feature Content Management (FCM) system that provides the “single source of feature truth” for the entire enterprise, as well as APIs that enable integration with enterprise systems and assets.



# The PLE Epiphany



Organizations mired in the pain of product-centric engineering approaches experience a “PLE epiphany” when a shift in perspective reveals a better solution to the problem: A much more efficient means of production — a single system capable of automatically producing all of the products in a product line, rather than a multitude of interrelated products.

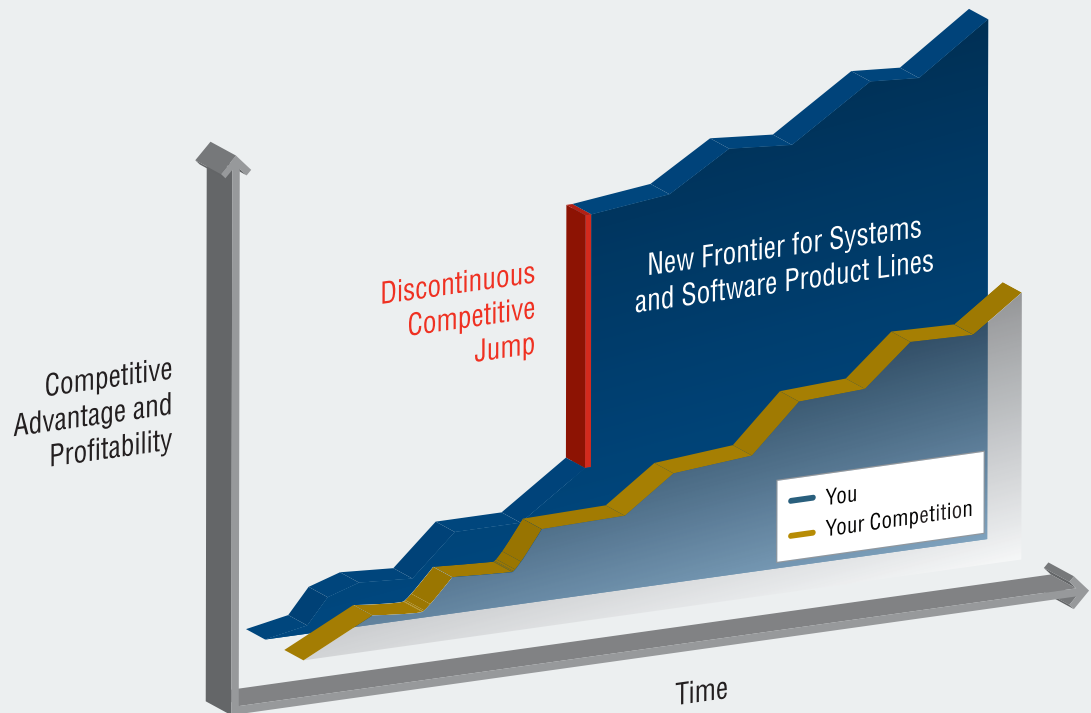
The PLE Factory is that single system.

With the PLE Factory approach, product line features become the common language for your entire organization, dramatically improving communication, cohesion, and alignment among your stakeholders.

Adding new products to the portfolio can now be a simple matter of creating a new Bill-of-Features to drive the automated production of products in the PLE Factory.

Updating or extending your portfolio with a new feature, or a new product, is now a simple matter of delta engineering — extending the PLE Factory to support the new feature or product.

*With the extraordinary cost savings and effort avoidance enabled by Feature-based PLE, your organization can eliminate low-value, repetitive product-centric work so that your time, energy, and expertise are focused on creating strategic value and innovation.*



With the PLE Factory approach, the scale of your product line — and the scope of diversity within your product line — can be based on business opportunities and profitability rather than the complexity limitations imposed by product-centric approaches.



The overall result is a game-changing discontinuous jump in competitiveness — your competitive advantage.

Give me a lever big enough  
and I will move the world.

— Archimedes



For more information:

[info@biglever.com](mailto:info@biglever.com)

[www.biglever.com](http://www.biglever.com)

+1-512-777-9552

Copyright © 2019 BigLever Software, Inc.  
All rights reserved. BigLever Software,  
Gears, **onePLE** and their respective logos  
are trademarks of BigLever Software, Inc. in  
the United States and other jurisdictions. All  
other company or product names mentioned  
are used only for identification purposes and  
may be trademarks or registered trademarks  
of their respective companies.

BigLever Software Gears is protected by  
U.S. Patent Nos. 7,543,269; 8,156,470;  
8,918,754; 9,213,527; 9,286,033 and  
9,442,699.

BigLever Software, Inc.  
10500 Laurel Hill Cove  
Austin, TX 78730 U.S.A.