THE SCIENCE OF IMPROVING INNOVATION

7 + 1 LPD PRINCIPLES

March 2023

LEAN PRODUCT DEVELOPMENT

Some of Our Improvement Results

Oil & Gas Supplier

40% Reduction in Project Duration

66% Increase in Projects Delivered

65% Improvement in Predictability of Project Delivery

Motorcycle Manufacturer

15% Compound Annual Profit Growth

98% Repurchase Intent

50% Reduction in Time to Market

5X Increase in Product Development Throughput

CPG Industry

35% Increase in R&D Efficiency

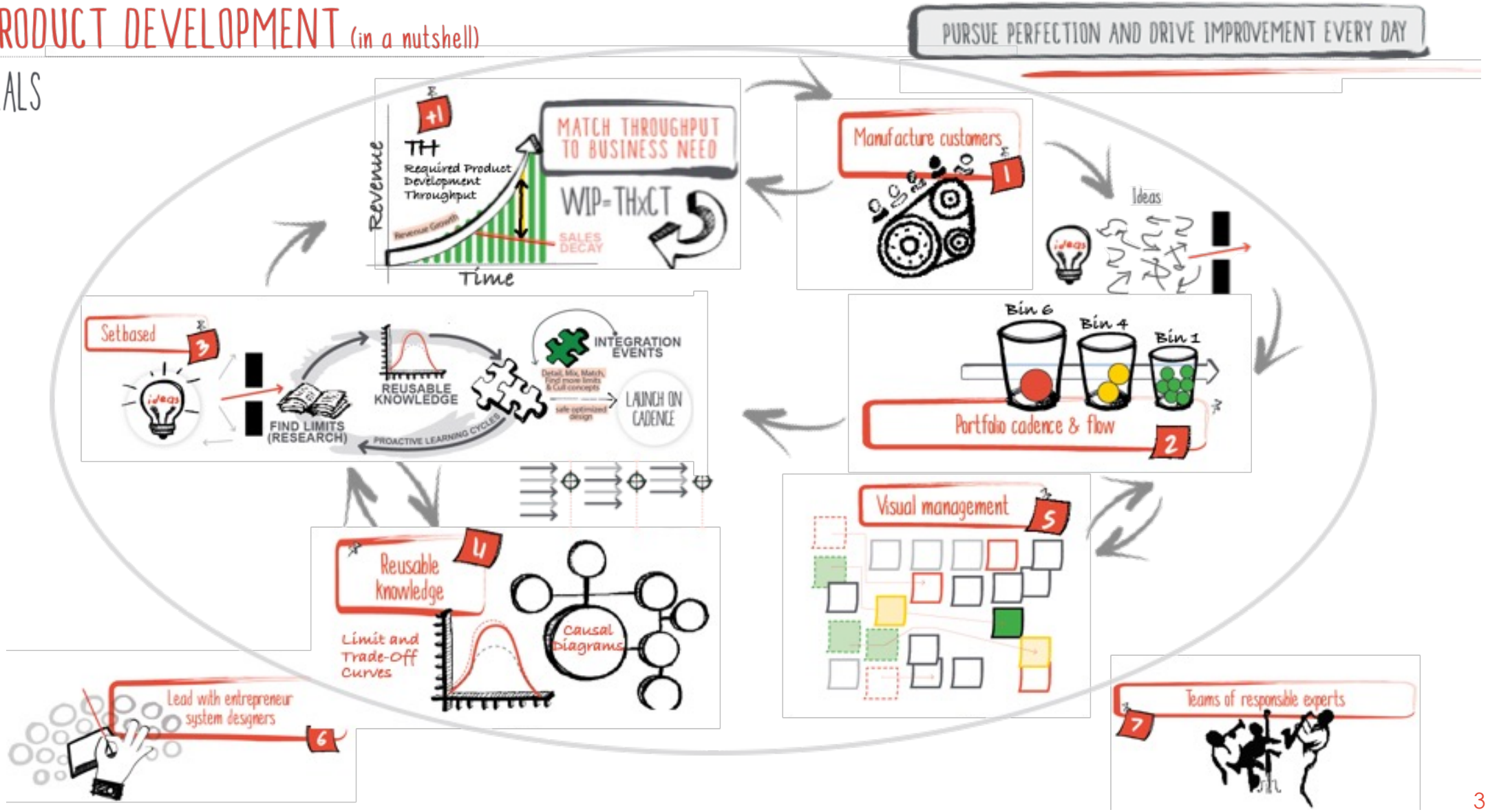
30% Acceleration in Time to Market

4X Increase in Revenue from New Products

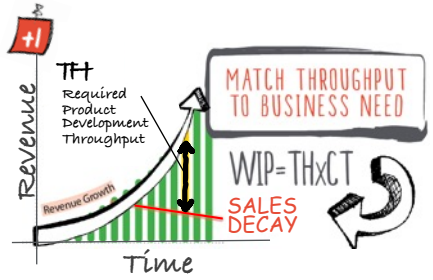
LEAN PRODUCT DEVELOPMENT

LEAN PRODUCT DEVELOPMENT (in a nutshell)

7 ESSENTIALS

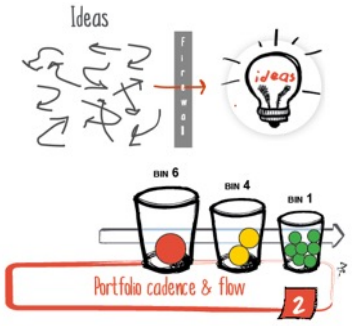


LEAN PRODUCT DEVELOPMENT

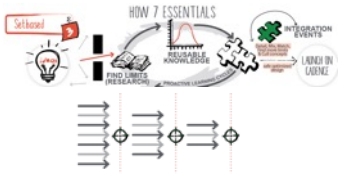


Successful Lean product development efforts are connected to business results. Just as in manufacturing, the development throughput must match the business need: The lift (the business impact in terms of revenue and profit) by type of project must be understood. With an understanding of project lift, the delivery rate in terms of the number and type of projects can be aligned with what the business requires and connected to the business strategy, objectives, and plans. This must be identified in quantifiable terms, measured, and managed. Objectives, goals, actions, progress to the business plan, and the improvement effort must be tracked.

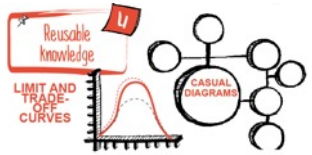
1. Manufacture customers: An intimate understanding of customers' needs, desires, and preferences is necessary to guide product development plans and the introduction of new products, solutions and components that create demand. Companies must build a deep intimate, hands-on, active understanding of real customers and the installed base, not simply rely on indirect market studies.



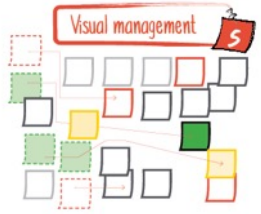
2. Bins, cadence, pull, and flow: Ideas "swirl" in front of a firewall that paces and only allows the best ideas to become development projects. Upon passing through the firewall, those projects are structured into categories called "bins," which standardize similar types of projects in terms of resources, scope, and schedule. This concept is the foundation of a repeatable innovation process that leads to the consistent and continual release of new products at a rate and by type necessary to support the business and drive profitable sales growth.



3. Set-based concurrent development: Contrary to linear, point-based phase and gate development processes, a set-based approach establishes multiple design parameters and explores many attributes simultaneously, focusing on closing knowledge gaps more effectively in the development process. Rhythmic "integration events" are the decision-making mechanisms that aligns and drives the development portfolio.



4. Reusable/visible knowledge: Compiling information into reusable/visible knowledge (e.g., limit curves, trade-off curves, casual diagrams) allows organizations to see their knowledge gaps and proactively address them. They create an effective means for teams to repeatedly leverage existing knowledge, more efficiently explore design limits, and more rapidly create the best solutions for a specific design space.



5. Visual management: Product development is fraught with hidden work and unknown issues. Visual management provides the mechanism to see the work and see the issues, leveraging predefined help chains to ensure effective progress.

6. Entrepreneurial system designer (ESD or Chief Engineer): A single entity (not necessarily a single person) — the Chief Engineer — is responsible for the success of a product, from making the business case through design and to production. While wielding little to no authority over any business function with which he or she interacts, the ESD, nonetheless, unites the organization around creating value for the customer. The ESD embodies a passion to develop products through intimate knowledge of customer needs, deep technical capabilities, and a drive to deliver business results.

7. Teams of responsible experts: Individuals with personal mastery in their area of expertise collaborate on a shared vision with defined objectives, creating and sharing knowledge. The team's cross-functional dialogue results in a level of collective thinking not attainable by individuals alone. Team members embrace "dynamic subordination" as their form of leadership. Dynamic subordination allows for fluid leadership that is determined by current conditions and needs rather than titles or positions.

WHAT WE'VE LEARNED FROM THE ROAD

Senior leaders often do not recognize the connection of product development to the success of their business

Connect lead product development to the business

It's complicated

It's a transformation

It's a system

Development is much more global, leveraging widely diverse and dispersed teams

Visual management uncovers problems and empowers collaboration and learning

Proactive learning cycles are fundamental for effective development

Agile development has evolved from lean product development for a special case