Successful Product Line Engineering (PLE) for the Entire Product Line:
Removing Time and Cost for Systems Development

Introduction

Research from Tech-Clarity's Developing Software-Intensive Products finds that 53% of companies report significant increases to the amount of software in their products. Further 75% say that over the next 5 years, they will be adding even more software to their products. This growth makes sense as software offers lots of opportunity. However, it also introduces challenges. Ignoring these challenges will hurt company profitability, while companies who address them will be far more successful, win new customers, and beat their competition.

Understand the Opportunity

So what is driving this increase in software? Figure 1 shows the top reasons. They are looking to enable key criteria that will make their products become more competitive and meet customer needs. For many companies, it is fundamental to the business.
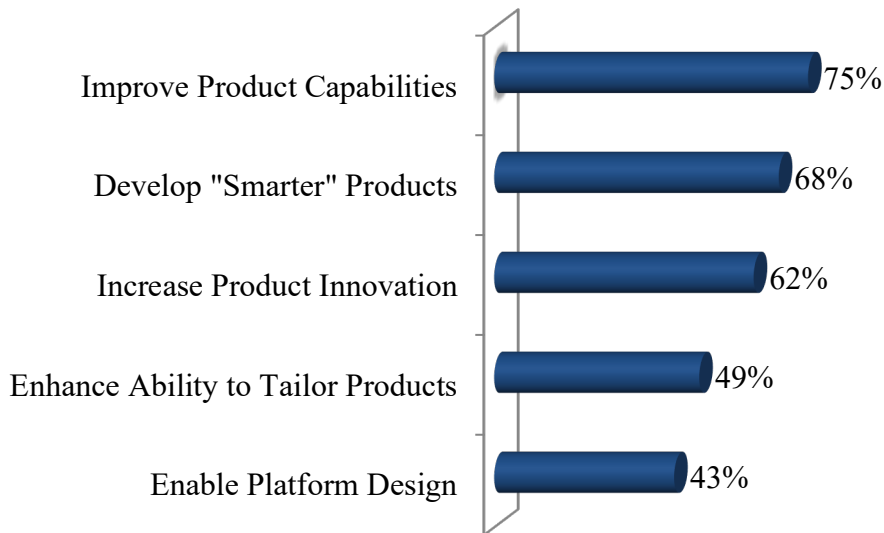

Improve Product Capabilities — 75%
Develop "Smarter" Products — 68%
Increase Product Innovation — 62%
Enhance Ability to Tailor Products — 49%
Enable Platform Design — 43%

Figure 1 – Product Strategies Driving the Use of Software in Products

Yet, to fully take advantage of these opportunities, several challenges must be addressed. (Figure 2).
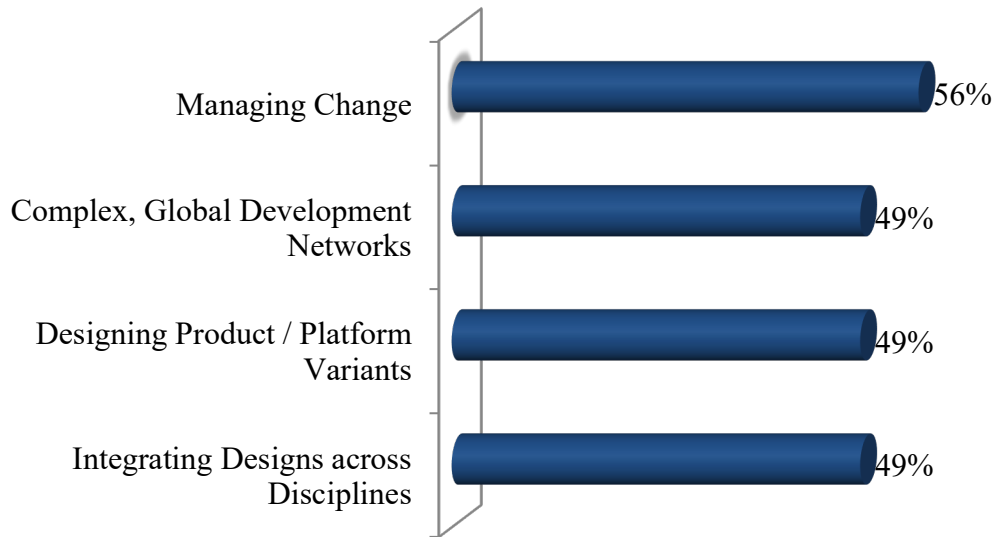
Figure 2 – Challenges of Developing Products with Embedded Software

Ignoring these challenges and not addressing them can be quite costly. Figure 3 shows the top negative business impacts of developing products with embedded software.
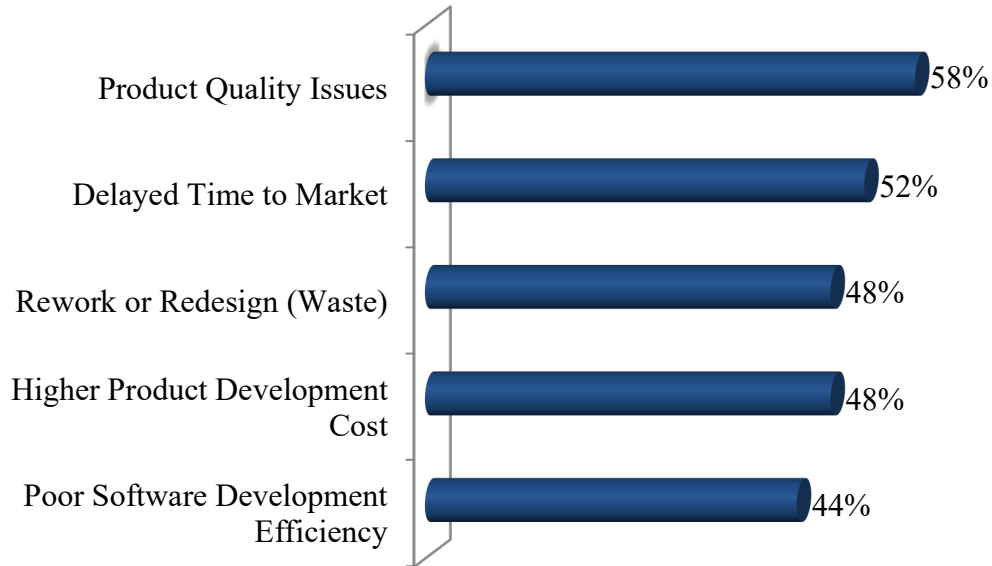

Figure 3– Negative Business Impacts Developing Products with Embedded Software

The good news is that companies also report that using the right software tools provides strategic benefits and effectively addresses the biggest negative impacts companies face. Companies report the following improvements as a result of using the right software tools:

- Better product quality (49%)
- Faster time to market (26%)
- More innovative products (22%)
- Lower product development cost (22%)

Percentages are the percent of companies reporting improvement in that area.

Consider Product Line Engineering

It has become harder to stand out from the competition. With customers demanding more and ever increasing product complexity, many companies look at platform design as a way to bring products to market more profitability. As such, enabling platform design is one of the top reasons companies turn to embedded software, yet managing product variants is a top challenge. Tools and methods supporting Product Line Engineering (PLE) can help. This has been used in software development for quite some time and many companies are finding great success by applying it to systems engineering as well. The following is a list of areas to consider when looking for a solution to support PLE:

- **Collaboration**: One of the biggest challenges for system development is collaboration. Engineers are experts in their own domains, but mechanical, electrical, software, and other engineers must work together. They must have ways to overcome those inherent silos of knowledge. Some companies find a common language helps so they define a product line based on its features rather than part numbers.
- **Manage complexity**: Tech-Clarity's <u>Reducing Non-Value Added Work in Engineering</u> finds that 32% of engineering time is spent on non-value added work. Part of this non-value added work includes searching for information, incorporating changes made by others, and recreating work you couldn't find. Tools are needed to help manage the different variants, across engineering domains, so that engineers are not wasting time hunting for information and can instead use more of their valuable time on innovation. By using software that understands the relationships between components different variants can be created more easily and changes can be implemented in less time.
- **Automation**: In the <u>Best Practices for Developing Industrial Equipment study,</u> Tech-Clarity found that Top Performing companies are 45% more likely than their less successful competitors to use configuration / design automation technology. This technology automates the process of putting together the components that will go into an individual product variant or product line. The automation can be based on things such as defined rules, intelligence, and required features.

Key Takeaways

With the increasing amount of embedded software and the need to stand out from the competition, Product Line Engineering (PLE) across systems and software can be a helpful way to enable platform design. With the right software solution, companies can avoid some of the challenges of systems engineering. Qualities to consider in a PLE solution include facilitating collaboration across engineering discipline, managing complexity, and supporting design automation.

About Tech-Clarity

Tech-Clarity is an independent research firm that specializes in analyzing the true business value of software technology and services.