

Tech-Clarity

making the value of technology clear

**Issue in Focus:
Systems and Software Driven
Innovation**

***Complexity and Opportunity
in the Mechatronic Era***



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***This summary is an abbreviated version of the report and does not contain the full content. A link to download the full report is available on the Tech-Clarity website, www.tech-clarity.com.**

If you have difficulty obtaining a copy of the report, please contact the author at jim.brown@tech-clarity.com.

Introducing the Issue

Modern products increasingly incorporate a combination of mechanical, electrical, and software components that allow innovative designers to take advantage of sensors and logic to solve problems and provide capabilities in new ways. This impacts the way companies innovate. As manufacturers develop their next generation of products, they are more likely to turn to electronics and software to make a “smarter” mousetrap as opposed to innovating solely in their mechanical design.

Over the last decade, there has been a steady, fundamental shift towards increased software and electronics in traditionally mechanical products.

Over the last decade, there has been a steady, fundamental shift towards increased software and electronics in traditionally mechanical products. Engineers have added more monitoring and more sophisticated controls, and have increased the amount of product functionality and value delivered through software as compared to mechanics. Examples of this shift range from automobiles, to mobile devices, to “simple” household appliances.

The shift has driven higher levels of product development and engineering complexity.

This changing paradigm requires multiple design disciplines to work together to develop a working system. Systems that rely more heavily on the combination of mechanics, electronics, and software demand more integrated engineering and validation processes. The shift has driven higher levels of product development and engineering complexity starting in the early requirements phase of a product, continuing through design, making a significant impact on product testing and validation, and continuing as a configuration management issue throughout the product lifecycle.

Conclusion

The trend towards mechatronics will continue because the benefits are simply too compelling to ignore. Software will play an increasing role in determining product behavior and the value it delivers to customers. Manufacturers across industries must find a way to manage product design and change management complexity or suffer from issues including delayed new product introduction, poor quality, and costly recalls.

Leading companies will look to take advantage of software driven innovation to improve their ability to tailor products, increase reuse, make agile updates to products in the field, reduce product cost, and lower product development cost. They will go beyond managing complexity to look for new opportunities. Software driven innovation is the new frontier of competition, helping companies drive more rapid innovation and creating opportunity due to the increased flexibility and agility of software-based products.

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Systems-level PLM solutions promise to unify the development of the disparate design disciplines in mechatronic products. Today, companies have to build this PLM layer on their own or enhance and modify a combination of PLM and ALM solutions to provide the full systems view from requirements through validation. In time, systems-level PLM solutions will undoubtedly be available from software vendors, but today the integrated solution requires work on the part of the manufacturer.

Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations:

- Manage mechatronic complexity to improve quality and reduce design cycle times
- Leverage software to more rapidly and cost-effectively innovate and add capabilities to products and product platforms, even late in the design cycle
- Take advantage of the new competitive differentiators enabled by software based innovation
- Enable designers from each discipline within the entire system to leverage the appropriate design and data management tools
- Provide a PLM layer to manage systems-level processes such as requirements, test cases, and change management in an integrated way, or integrate ALM and PLM and choose one as the systems-level PLM solution
- Over time, look for the PLM layer and integrated data management and design tools that support the new paradigm of systems and software based innovation

About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the true business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry, and research. He has worked as a manufacturing engineer as well as a software developer. His experience spans enterprise applications including PLM, PDM, ERP, quality management, service, manufacturing, and others. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology and social computing techniques.

Jim is an experienced researcher, author, and public speaker and enjoys the opportunity to speak at conferences or anywhere that he can engage with people that are passionate about improving business performance through software technology.

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