

The logo for Tech-Clarity, featuring the word "Tech-Clarity" in a bold, sans-serif font. "Tech" is white and "Clarity" is yellow, both set against a dark blue rounded rectangular background.

Tech-Clarity

Smart Systems Buyer's Guide for Systems Engineers and IoT Solution Architects

***The Expert Guide for
Solutions to Develop
Intelligence Systems***



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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.**

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Executive Overview

In today's world, fierce global competition is driving companies to seek new ways to competitively differentiate their products. Many companies are incorporating embedded software into their products to set their products apart from the competition. Embedded software offers opportunities to incorporate intelligence into a product as well as offer customers a more personalized experience. The Internet of Things (IoT) takes this even further by creating exciting possibilities for new and differentiated services for products with smart, connected devices.

While bringing together mechanical components, electronics, and software presents exciting opportunities for innovation, it also brings unique challenges and adds new levels of complexity to today's products and product development processes. The same is goes for connected products as you add sensors, streaming data, and an ecosystem of connected systems. Whether you are a systems engineer or IoT solutions architect, expert systems engineering practices are critical to the success of today's products. An essential part of implementing expert systems engineering practices is having the technology to support them. This buyer's guide will help manufacturers select the right software to support systems engineering.

Bringing together mechanical components, electronics, and software presents exciting opportunities for innovation, but also brings unique challenges.

This guide is composed of four major sections covering, systems engineering software tool functionality, service requirements, vendor attributes, and special company considerations (Figure 1). Each section includes a checklist of key requirements to investigate when selecting software tools to support systems engineering.

To set the foundation for expert systems engineering practices, companies should focus on the entire systems engineering process, ensuring there are solutions for all aspects of systems engineering. With expert systems engineering practices, companies will be even more competitive in ways that will lead to higher growth and greater profitability.

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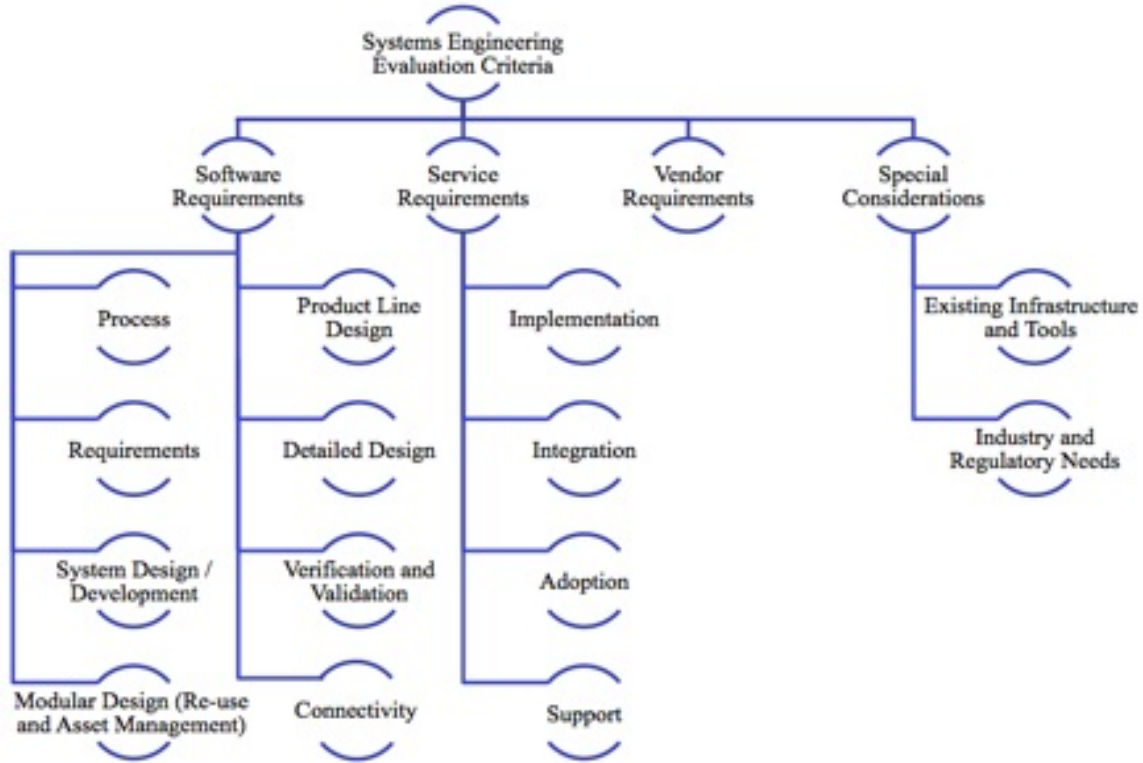


Figure 1: Systems Engineering Evaluation Framework

This framework will be useful to a variety of roles, not just systems engineers. As companies develop IoT enabled smart connected devices and products, they will struggle with many of the same challenges that expert systems engineering practices solve. Many of these IoT related roles are newer, but involve end-to-end responsibility for designing and architecting the overall system as well as mapping business needs to the system and technical requirements. Functions also include developing the technical specifications for the connected system. These roles include, but are not limited to titles such as:

- IoT Solutions Architect
- DevOps IoT
- Internet of Things Solutions Engineer
- M2M and IoT Product Management and Engineering
- Technology Manager, Software Engineering (IoT)
- Solutions Engineer (IoT)
- Principal Technical Architect (IoT)
- Innovation Manager for Industry 4.0
- Product Manager



This guide is not an all-encompassing requirements list. It provides a high-level overview of systems engineering needs. In addition to the systems engineering capabilities discussed in this buyer's guide, companies should also consider needs for the tools of individual engineers for each engineering discipline.

Conclusion

Expert systems engineering practices are key to taking advantage of innovation available through embedded software and the Internet of Things. The opportunities to create smart, connected devices can help companies set their products apart from the competition, helping them win new customers and increase revenues. However, bringing together systems of mechanical, electrical, and software components is complex. That complexity grows exponentially as companies try to meet the various needs of customers with different configurations. Connected systems add even further complexity as you add sensors, streaming data, and connected ecosystems. Complexity means there is risk things will go wrong. The impact of these problems can have a significant business impact and hurt the profitability of the product. Implementing expert systems engineering practices, with the right software tools to support them, can manage this complexity, making it easier to bring profitable products to market successfully. Even if today's smart, connected devices are relatively simple, as they evolve and offer critical services such as those that impact safety, they will increase in complexity and need the same level of expert systems engineering practices. These practices and the supporting solution are not just limited to systems engineers either. There are a variety of IoT related roles involved with planning, designing, and architecting connected systems, such as IoT solution architects who will struggle with the exact same challenges as systems engineers. Companies planning for growth should consider both current and future needs.

Expert systems engineering practices are key to taking advantage of innovation available through embedded software and the Internet of Things.

However, there are so many aspects of systems engineering; determining the right solution for your company can be very difficult. Using a high-level list of tool and process evaluation criteria such as the ones in this guide can help narrow down potential solutions by providing a quick "litmus test" to determine if a solution and partner are a good fit before conducting detailed functional or technical reviews. In the end, it is important to ensure that functionality, service, vendor, and special requirements are all considered when selecting a solution.

Recommendations

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

- Identify and weigh systems engineering requirements based on company needs, existing applications, industry, and unique product and process requirements
- Use high-level requirements such as the ones in this guide to evaluate solutions based on business fit before engaging in detailed evaluations
- Consider long-term business and process growth needs and the potential to scale across product lines, departments, and engineering silos
- Consider all stages of systems engineering from process, requirements, design, and validation when investing in systems engineering solutions
- Think about all roles that can benefit from systems engineering best practices such as IoT solution architects
- Select a vendor who will be a trusted partner

About the Author

Michelle Boucher is the Vice President of Research for Engineering Software for research firm Tech-Clarity. Michelle has spent over 20 years in various roles in engineering, marketing, management, and as an analyst. She has broad experience with topics such as product design, simulation, systems engineering, mechatronics, embedded systems, PCB design, improving product performance, process improvement, and mass customization. She graduated magna cum laude with an MBA from Babson College and earned a BS in Mechanical Engineering, with distinction, from Worcester Polytechnic Institute.

Michelle began her career holding various roles as a mechanical engineer at Pratt & Whitney and KONA (now Synventive Molding Solutions). She then spent over ten years at PTC, a leading MCAD and PLM solution provider. While at PTC, she developed a deep understanding of end-user needs through roles in technical support, management, and product marketing. She worked in technical marketing at Moldflow Corporation (acquired by Autodesk), the market leader in injection molding simulation. Here she was instrumental in developing product positioning and go-to-market messages. Michelle then joined Aberdeen Group and covered product innovation, product development, and engineering processes, eventually running the Product Innovation and Engineering practice.

Michelle is an experienced researcher and author. She has benchmarked over 7000 product development professionals and published over 90 reports on product development best practices. She focuses on helping companies manage the complexity of today's products, markets, design environments, and value chains to achieve higher profitability.