



## I D C   A N A L Y S T   C O N N E C T I O N



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### **Using Visual Decision Making to Optimize Manufacturing Design and Development**

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*In today's environments, global manufacturers are managing a broad range of information. Data is often scattered across countless files throughout the product life cycle, generated by different applications and platforms. Organizations are struggling to utilize these multidisciplinary sources in an optimal way. Visual decision making is a strategy and technology that can address this challenge by integrating and widening access to digital information assets. Integrating with PLM and ERP tools across engineering, manufacturing, sales, and marketing, visual decision making makes digital content more accessible to employees and partners in the supply chain. The use of visual decision-making information rendered in the appropriate business context and shared across functional teams contributes to more effective product-related decision making and positively impacts business performance.*

The following questions were posed by Oracle to Joe Barkai, research vice president of IDC's Product Lifecycle Strategies research service, on behalf of Oracle's AutoVue customers.

**Q.      What is visual decision making, and how is it used in today's manufacturing environments?**

A.      Visual decision making is an approach to organize and present multidisciplinary information in a way that improves the fidelity of decision making. Visualization is a very effective way to present complex information and level the playing field for knowledge workers who come from different disciplines and who have different experience levels and skills. The global nature of product development and expanding markets involves individuals from different backgrounds and languages. Visualization helps here too.

Individuals and functional teams view data from the perspective of their disciplines and tasks at hand and as their own version of the truth. They have a different interpretation of what it means than other groups in the collaborative cycle. It's a bit like the parable of the six blind men and the elephant. Decision makers therefore do not have a complete context with which to make decisions. Their decisions may be biased, may be based on incomplete information, or may fail to recognize the impact on downstream activities. Even the best decisions may be optimized to meet the goals and constraints of one functional area but can result in an overall suboptimal design or process because they don't consider the negative impacts on the ability of downstream functions to meet their goals. Leading manufacturing companies use visual decision making to optimize product-related decisions across the entire product life cycle.

**Q.      Why is visual decision making important for discrete manufacturing companies?**

A.      In today's environment, global manufacturers must tackle complex, multidisciplinary decisions on a daily basis. Products are increasingly complex, involving many scientific and engineering disciplines. The role of software-controlled systems is growing rapidly, and these



systems can be found everywhere, from household appliances to airplanes. In addition to the increase in technological complexity, companies face unprecedented operational complexity. Companies design and manufacture products that must meet the needs of customers in many markets, resulting in elongated and fragmented supply chains. They often rely on suppliers and partners to help innovate, manufacture, and take products to market. Moreover, financial, environmental, and other compliance issues create additional burdens.

To make sound decisions, functional teams need to consider a wider range of goals in multiple disciplines simultaneously. For example, a design engineer tends to think about the design as meeting his or her own functional requirements but may not always be able to ascertain how decisions can influence or be influenced by the entire supply chain. A system could be optimally designed to meet market requirements, but the manufacturing process may not comply with emerging environmental regulations. Or a design may not consider the ability of a service technician to repair the equipment efficiently and safely. These individuals are not making poor decisions out of incompetence. They simply lack visibility and the ability to understand the impact of their decisions on other downstream and upstream activities. Visual decision making is a way to address many of these challenges in the product life cycle.

**Q. What are some of the specific benefits that visual decision making offers?**

- A. Over the decades, manufacturers have enlisted a broad portfolio of increasingly capable IT tools to support various product life-cycle activities. However, many decision support tools tend to focus on narrow task performance. The proliferation of often incompatible software and information stores drives up the volume and complexity of information, making it harder to obtain a broad multidisciplinary view. This has a major impact on the collaboration process. Visual decision making leverages these silos of digital assets, thereby optimizing the value of business data. By integrating with existing enterprise systems, it fosters a process whereby teams can better collaborate around their engineering and business documents with the goal of making sound business decisions to drive innovation and operational efficiency.

Effective collaboration for product life-cycle decisions mandates the participation and contribution of multiple communities of practice inside and outside the enterprise. However, different business drivers, narrow-focus business functions, and diversity of skills and backgrounds often hinder effective communication and collaboration. Visual information helps level the playing field, expands the decision-making population, and allows groups underrepresented in product decisions to contribute their input, suggestions, and experiences. Manufacturing and high-tech/electronics organizations can improve decision-making capacity by broadening the community of decision makers and giving decision makers better information. This serves to improve the capacity for high-fidelity interdisciplinary decisions.

**Q. Other than manufacturing, in which industries would visual decision making be most applicable?**

- A. While we tend to think of visual decision making as being particularly impactful in discrete manufacturing, the use of visual information can aid in the performance of many tasks and improve the performance of knowledge workers in other vertical industries. For example, in the oil and gas and utilities sectors, where project complexity really challenges managers and projects are always at risk of running over time and over budget, there is a clear need to optimize resources and schedules. Decision makers at any level can benefit from access to visually rich information for models, designs, and drawings.

An area that applies to a number of vertical industries is sales and aftermarket services. Here, visual decision making can be used by technicians to identify problem and solution options while planning a service activity, thereby decreasing mean time to repair. It can also give service engineers and field technicians ready access to key product information, including

diagrams, schematics, and maintenance notes in the context of specific service activities, all of which can facilitate problem diagnosis, accelerate repairs, and reduce parts ordering errors.

**Q. How can organizations capitalize on the potential of visual decision making?**

- A. To leverage the opportunity promised by visual decision making, organizations should take a structured approach to implementation. They should start by assessing their current decision-making capabilities, identifying process improvement opportunities and areas where visualization and especially visual decision making can lead to a significant improvement. In this process, organizations should use a maturity model to help them understand and define a technology implementation road map. At a very basic level, knowledge workers use multiple individual documents of different formats and structures and use different visualization solutions. At the next maturity level, organizations typically implement advanced visualization solutions that enhance the user experience and productivity. Decision makers are likely to see a significant improvement when these individual tools are connected to enterprise systems, allowing access to information gleaned and synthesized from multiple sources, including engineering, PLM, supply chain, and ERP. This allows organizations to reach higher levels of collaboration and decision optimization as users can benefit from in-context access to visual information. For instance, within a PLM system, a design engineer can access a product assembly and review digital annotations specific to the engineering change request he is reviewing rather than all historical annotations. A third stage then involves another level of integration that allows specific actions to be triggered in enterprise applications from within documents to maximize user productivity. This would allow a product manager to quickly review product enhancement requests relayed by customers in the context of a 3D model representation and trigger the creation of engineering change requests in the PLM system directly from this visual environment.

Organizations adopting visualization as a decision-making discipline are likely to see an improvement in both the agility and the fidelity of product-related decisions because they are able to consider a broad set of business and technical considerations as well as make effective use of past experience and best practices. Visual decision-making information rendered in the appropriate business context and shared across functional teams contributes to more effective product-related decision making, encourages parts reuse, and has a transformational effect on business processes.

**ABOUT THIS ANALYST**

*Joe Barkai is research vice president for IDC Manufacturing Insights' Product Lifecycle Strategies research service. In this role, he examines discrete manufacturing industries that include automotive, aerospace, industrial equipment, and other complex, mission-critical capital equipment to identify business imperatives, best practices, and emerging technologies. His research topics center on effective product life-cycle management and include innovation, design and engineering, service and warranty, and product end of life.*

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