



A Future of Product Design

Bodies of knowledge ebb and flow over time. When you step back and look at them, the maturation of a specific discipline or technology is counted in decades. Last month (*MD* Apr '19), this column codified a history of product design dating to the early 15th Century. Here is a snapshot of what is happening in the early 21st Century, and its likely effect on product design and product designers.

Several cool physical technologies are just coming of age. Their origins date to the 1980s. Rapid prototyping is becoming Additive Manufacturing and changing the factory. Composite materials and advanced polymers are increasingly replacing metal parts.

Several cool software technologies are just coming of age. 2D CAD is now quite another thing. The PTC-Ansys alliance product appears to be close to being the first real-time 3D design and analysis package. The same happened earlier with EDA design software. And the digital world now ties product creators right into the factory, which has reciprocated with advanced process design and manufacturing systems.

Product Design vs. Design Engineering: There will always be a place in each company where the integration of customer and market needs are channeled to a think tank of designers and engineers, who, in turn, conceive designs and engineer them. In the 1980s, the knowledge domains were well within the grasp of one or a few people. In a global world, with everything “downstream” increasingly automated, product design and design engineering (product and process) will become increasingly specific. A new version of cross-functional team members will emerge. Big data, analytics, and evolving AI will provide growing levels of information to all the creators. But, the big decisions will increasingly be in the minds of the creators.

Business and Economic Responsibilities: There is an old rule that has never been disproven: Those at the beginning of the process absolutely have the most impact on the ultimate cost and efficiency of the entire product development process. It is on the order of 70%. And, in a digital world, that means the impact is rising. Those at the fuzzy front end control the product's outcome during the first 20% of its development budget, and their decisions remain throughout the product's life cycle and affect all financial parameters.

3D Printing vs. Additive Manufacturing: AM is no small thing. For the last 100 years there have only been five types of manufacturing processes (*MD* Sep '15). Metal AM and

advanced materials are coming of age (*MD* Sep '18). The advent of regular everyday Additive Manufacturing into an alternative 6th manufacturing process changes decisions product designers have to make. As an experimental tool to replace clay modeling and wooden prototypes, as CAD replaced drafting boards, production process decisions were never really designers' responsibility. With AM, they are. Knowledge of unit volumes and revenue/profit outcomes for each manufacturing process alternative should guide how designers build their initial model. Weeks of time go by pursuing non-optimal production designs. This truism will remain.

Industrial vs. User Interface/Experience Design: Specialization in IE, UI, and UE/UX also date to the 1980s. Apple's release of the iPhone in 2007 sped it up about a dozen years ago. The domain knowledge is now quite great for UI and UE/UX, an expertise unto itself. And, it is increasingly making real-time adjustments based on learning from actual users, a “continuous design activity” of sorts. Industrial design gets one shot. If not, it is costly. ID must prioritize the targeted size and location of the UI, then do a great job designing everything else around the UI and/or UE/UX so as to fully accommodate all other required product features and functions. ID decisions therefore affect the product throughout its life cycle. The decisions that both ID and UI-UE/UX designers make greatly affect business results. UI/UE/UX studies show 400% revenue differences between good and poor UI/UE/UX designs for comparable products (*Forbes*). ID studies show 200% better stock prices for companies with consistently good ID (DMI).

Design for IIoT and IoT: As a growing number of products are manufactured by automation, receiving and sending sensor signals comes to the forefront (*MD* Nov '16). Design must assure the automated factory can interact with the product to remain in cross-functional harmony with production, quality, and sensor-based testing. When the product is launched and in the hands of B2B or B2C users, the sensors must let it interact with data in the cloud (*MD* Apr '17). Soon, the profit that post-launch data generates will exceed the profit from the product. Product designers are entering an exciting time for the profession. **md**

BRADFORD L. GOLDENSE is founder and president of Goldense Group Inc. (GGI; www.goldensgroupinc.com), a consulting, market research, and education firm focused on business and technology management strategies and practices for product creation, development, and commercialization.