

Evolution and Revolution at Autodesk University 2014

CIMdata Commentary

Key takeaways:

- *The global economy is undergoing fundamental changes in production, demand, and even the definition of what is a product, according to Autodesk, and their strategy is focused on democratizing the solutions needed in this evolving world*
- *Autodesk is in their third era of delivering product development solutions: documenting (Autodesk disrupting with AutoCAD), optimizing (with solutions from many other solution providers), and now in an era of connection, where that word is laden with social and technical meaning*
- *Autodesk recognizes they must, in part, sow the seeds of their own “destruction” to ensure long-term growth in support of their democratization mission*

The global Autodesk University (AU) series held its biggest event of the year December 2-4 at the Mandalay Bay Hotel in Las Vegas, Nevada. Over 10,000 were expected in Las Vegas, with another 12,000 attending regional AUs held at different times earlier in the year (and with still more attending online). Autodesk has been undergoing a major evolution. Other CIMdata Commentaries have reviewed their acquisitions and strong entry into product lifecycle management (PLM). The company is also changing their revenue model from generating most of their revenues from perpetual licenses to a subscription approach. In front of the trade press, Autodesk boldly announced their new Subscribe to Autodesk, “all-you-can-eat” licensing model. Mr. Carl Bass, Autodesk CEO, stated that the idea was a success for academic institutions, and they are working out the details for industrial customers. They also announced changes in their academic program, formerly a \$100 million business. Five years ago, they had 5 million students using their tools, and now there are 192 million. Mr. Bass claimed that only at Autodesk could he drive the value of their academic business to \$0, by announcing that Autodesk software would be available free globally to students, teachers, and academic institutions. Autodesk estimates that there are over 1 billion students on the planet that have access to a computer that can run their solutions, so they have many millions more to go. At AU Autodesk company executives also spent time talking about the ongoing revolution in product development and manufacturing, and spoke about how the company is responding.

Mr. Andrew Anagnost, Autodesk Senior Vice President (SVP), spoke about how the global economy is undergoing fundamental changes in production, demand, and even the definition of what constitutes a product. Historically, manufacturing companies owned at least part of their manufacturing capabilities, but no more. Global product development and manufacturing is now more like the Architecture, Engineering, and Construction part of Autodesk’s business, where specialists come together to design and construct a building or plant. New companies can cobble together specialists in value chain tasks, readily creating and sharing intellectual capital, often using cloud-based tools. Beyond just tools, the cloud provides ready access to nearly infinite computing power. Kickstarter and other similar services provide new means to find and fund ideas, without reliance on physical facilities. Production is also being disrupted by 3D printing technology. Mr. Jeff Kowalski, Autodesk CTO, spoke about how they are using that computing horsepower to support “generative design,” an emerging application that can digest mass quantities of 3D data and understand the geometry and the relationships between parts and assemblies. Then when starting a new design, the user can express the goals and constraints, and the system generates alternatives, which Mr. Kowalski claimed

mimics the way nature designs new “products.” Others are pursuing computationally intensive approaches that often yield visually striking results that cannot be made using traditional subtractive manufacturing techniques. At CIMdata’s recent PLM Market & Industry Forum, CIMdata cited an example from Airbus, where they created a replacement bracket for the Airbus A320¹ that used significantly less material, saving cost and more importantly weight. Mr. Anagnost asked the audience: what happens when you can 3D print a car chassis? As he suggested, things will indeed get interesting.

At the same time, the notion of demand is changing. CIMdata sees that customers increasingly want higher quality products that are sourced locally. Beyond just product origin though, other manufacturers are approaching the limits of mass customization, making products for markets of one. In an Innovation Forum session, Ms. Mikki Hoffman from Normal (www.nrml.com) described how her company uses pictures of your ears (yes, plural, as there can be a 20% variation between ears) and then, using 3D printing, manufactures custom, high-fidelity earphones in 48 hours from the company’s showroom/factory in Chelsea in New York City. To support this type of innovation, Autodesk recently announced their move to create and support an open ecosystem for 3D printing. Today, most initial 3D prints fail, and significant tweaking is required to get the right format to your printer, and to get the desired result. Autodesk hopes to democratize 3D printing with Spark, a free open platform for 3D printing, including the algorithms, model checking and repair tools, print preview, and the means to publish and share models, supported by well-documented APIs and a solution development kit (SDK). They have enlisted some interesting partners, including HP, and are sweetening the pot with a \$100 million Spark investment fund. Importantly, Autodesk will be working on the materials side as well, and hopes to make materials cheaper and more broadly available. This is in contrast to current industry practice, which is more like the razor-and-blades model of yesteryear. Mr. Bass was joined on the stage by Ember, an Autodesk-developed 3D printer that will provide a reference platform for materials development and experimentation. He believes that unlocking this market will entice more chemical and materials producers into the game.

Finally, even the notion of products is changing. Some talk of servitization, which is where products are delivered as a service. You don’t buy a jet engine, you buy “power by the hour,” a concept that GE first introduced in 1961. The larger trend is toward smart, connected products, one doggedly pursued by Google, IBM, and PTC, among many others. This is one place where both sides of Autodesk’s business can connect, so to speak. People are building products and infrastructure with the expectation that the products that use that infrastructure are accessible to them.

What does this mean for Autodesk and their products? Mr. Anagnost (and other speakers) used a conceptual framework to describe this evolution. Early Autodesk products were about documenting, with AutoCAD facilitating industrial 2D drawing practices with tools to create the necessary drawings. According to Autodesk, the optimization era followed, where 3D design and analysis tools evolved to support coming up with the best alternatives that humans could conceive. Autodesk readily admitted they were not the disruptor there. Now Autodesk claims they are moving into an era of connection, where people, processes, tools, and products all have myriad connections that must be supported and enriched to come up with the best solutions. Of course, Autodesk is connecting many applications to provide simpler workflows to design and build products. They are also connecting people to means of production and consumption. A recent CIMdata commentary highlighted their recent work with partner

¹ <http://www.bbc.com/news/science-environment-24528306>

NetSuite in this area. In this era, Mr. Anagnost stated that most of Autodesk's current solutions are wrong, which is why Autodesk is sowing the seeds to destroy the current paradigm and to evolve to the new one. From a practical standpoint, this means Autodesk is often competing with themselves. For example, Product Design Suite customers get the regular Fusion 360 in Premium, and Ultimate Fusion 360 in Ultimate Product Design Suite.

In this new world Autodesk believes that tools have to be simple, invisible, and integrated. At his session on PLM 360, Mr. Brian Roepke talked about exciting enhancements under the covers to their two cloud-based collaboration platforms supporting PLM use cases, Autodesk 360 (A360) and PLM 360. The roots of A360 came from the Qontext acquisition, and PLM 360 from acquiring Datastay. Over the last two years, they have been deconstructing these offerings into services, and moving toward an Infrastructure-as-a-Service (IaaS) approach where the lines are blurred or nonexistent. In their re-conception, they will have the applications from both platforms (and eventually other products) running off the same Autodesk IaaS. Their goal is to offer more and more of their applications on one platform, integrated into the overall user experience. For example, this approach is behind the former Skyscraper project in Autodesk Labs, which became publically available as Autodesk 360 Collaboration for Revit on December 7, 2014.

Another key image used by Autodesk is that innovation will be most needed at the intersection of hardware, software, and materials. Autodesk is taking steps to support mechatronics and systems engineering, and CIMdata looks forward to learning more post-event. We were also impressed with Autodesk's work with leading materials scientists at national laboratories such as Lawrence Livermore and Oak Ridge. Generative design and 3D printing alone will result in new designs that cannot be otherwise fabricated. New materials will require new design and analysis techniques that will continue to revolutionize product development, manufacturing, and use. A session entitled "The Future of Making Things: Next-Shoring," hosted by Mr. Jordan Brandt, an Autodesk Futurist, gave a striking example: if modeled at the micron level, your phone would take about 5 petabytes (PBs) of data (that is one million GBs) to produce. It will require new geometry, and new simulation and analysis techniques, to assess material interactions at the molecular level.

This commentary only describes a small part of this sprawling event. But from the sessions attended, and the time spent with Autodesk's leadership, it is clear they are laser focused on a future where they will continue to democratize the tools and means of production for the benefit of their customers, and the broader society, through their investments in start-ups and global education. Autodesk recognizes they must, in part, sow the seeds of their own "destruction" to ensure long-term growth in support of their democratization mission. Their investments are showing initial promise, but the journey is long and just beginning. CIMdata is glad to be along for the ride with Autodesk and the rest of the PLM Economy.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata's services, visit our website at <http://www.CIMdata.com> or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI

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