The Future of Making Things, IoT, Forge and more

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Notes from Jim Quanci's DevDays 2015/2016 presentations, edited by Jeremy Tammik.

Jim talks about the Autodesk view of what is happening in the world around us – how design, engineering, making and operating are changing – changes that effect all of us – the tool makers.

The Future of Making Things

- Design
- Make
- Use

We've been focused on design for the last few decades with just a few of us looking at the ***Make*** side: Manufacture, Fabricate, Construct. The Cloud – making it easy to connect Design/Make/Use – changes all this. The way people work is changing. This is a huge opportunity to build a connected, productive, higher velocity process that will design, build and maintain better products and remove the barriers between these processes.

Traditional Crafting

Smithy: For hundreds of years, this is how things were made. By individuals with their tools, creating a part – a component. Do many of you feel this way when crafting code today?

Technology Powered Modern Production

Factory: This is modern production – technology powered. Driven by code. See any people?

Traditional Building

Beam house: This is the way buildings were built for hundreds and thousands of years. Lots of people. Lots of labour.

Perfect, Fast Pre-Fab – Subtractive

Prefab house: Today a few people can assemble a building in days. Anyone recall the PR around a 30-story building being built in 15 days in China last year using BIM?

Much of the building is pre-built in a factory.

Enabled by technology and code. Not possible in the old non-digital world.

Autonomous, Automated – Additive

Additive manufacturing robots: How about this manufacture of a steel bridge by robots. Additive manufacturing process. People set up and then walk away.

Digital powered. Additive manufacturing.

A Real Jet Engine Part Used Today

This is a jet engine part – printed – and used in e GE engine – that was likely in an engine of a plane some of you flew in on to this conference. Real production 3D printed part. Not just a prototype.

Accessible, Affordable, Cheap

This technology is accessible for everyone today. It's not just big companies. The biggest changes are what individuals and small companies can do. This is Jim Quanci himself using cloud powered design and simulation, and a low cost consumer 3D Printer, with a boat he designed in Fusion and printed. This is the 1 to 4 scale model. Next is full scale that he will go sailing in. And the cost? Near zero labour costs – its just material and machine time. And modifications, revisions, iterations cost near nothing – the software is pay as you go, no tooling required.

IoT, the Internet of Things

Here are a handful of small sensors – sending temperature, humidity, vibration, flow, and more. Cheap. Easy to connect to the web – whether wired or wireless. Another game changer.

Design Requires Data – Live

Here is a sensor that is "self powered". Can be wireless. No batteries required. Scavenges power from the environment – RF and temperature variation. Now we are talking cheap maintenance free wireless sensors – you can add anywhere. You and your customers should be adding these new generation sensors everywhere – gathering real time performance data. Many of you help your customers design based on theory, logic and "past" empirical data – information that was not created knowing what your customer is trying to accomplish. With all these cheap sensors, you have the opportunity to help your gathers gather and analyse real time data – data on how their products are performing right now. Data that can allow you and your customers to predict what will happen before it happens. This changes the way engineers work forever. Being able to design having access to real time data from real customer use of their products. Are you helping your customers leverage this "Big Data" – enabled by low cost sensors and the Cloud to easily gather, analyse, and deliver real time insights. This is a huge opportunity – that will become "expected" of all modern design tools in the not to distant future.

Maintenance

Think of the value of predicting when any of these machines is about to "go down"? Knowing when a bearing is going to seize before it does – and stops

production. Knowing a motor is about to burn out so you can schedule maintenance when the factory is off-line – avoiding plant disruption and lost production.

More Than Live – Prediction

Here is an example of exactly that, monitoring bearings in a machine, real time data, analytics, enabling predictive maintenance. Imagine you receive an email from your dishwasher manufacturer telling you a pump is a pump is about to die and needs replacing... just a few days before a large party at your house.

Live Concrete Monitoring for BIM

Here is data from a sensor embedded in concrete. Data that would enable more rapid construction because you can know when the pour is strong enough to support itself – so you can start removing the formwork sooner. And you can take the long-term data from the sensors and feed it back to the engineer so they can build a better more cost effective structure next time. Imagine the engineer then designing with different amounts of steel and types of concrete knowing they will get real time performance data – data that will make for more informed better designs – and data they can use to show their customers they are the best engineer in the business – helping them win new business. The Cloud, Ubiquitous Connectivity, Big Data, Cheap Sensors – all tied together by your code. Powerful. Autodesk wants to help you get there – is building a number of web services that make this vision doable by even small companies – whether a start-up or someone serving a small industry.

Think Connected

- Design
- Make
- Use

Many of you only work in the "Apps" box. Maybe you have done a mobile app. The real power is in tying the pieces together – the Cloud as your data hub. Big data, analytics, insights, delivering real time predictions. Tying this together with the design tools many of you are building today – to make for better designs based on real world real-time data.

Experience It Live Yourself

Samples:

http://the3dwebcoder.typepad.com/blog/2016/01/view-and-data-api-intro-for-bim-programming.html#3

Demos: LMV Rocks, Fluent, printed gooseneck, Pier 9, Cyrille's home IoT...

Yes – the Future of Making Things – but its happening now. There is no time to waste. We've talked about the Cloud the last 3 years. Autodesk has been investing heavily – building the tools and a platform you can leverage. If you aren't using the cloud to build your customers an easily accessible "anywhere any device" experience now – you are behind and need to get moving. Now. We are here to help you. You can delighting and surprise your customers with the insights you can deliver them using the data from these connected experiences to deliver incredibly valuable PREDICTIONs to them and their customers. If you don't, some start-up – maybe sitting down the row from you – soon will.

Some Supporting Data

Declining PC sales, in spite of predictions.

Time spent on the web today: more mobile than PC, and only mobile is growing.

- Mobile: 51% of Total
- PC: 42% of Total
- Other: 7% 0f Total

The Future of Making Code

- Visual Studio for desktop apps.
- A more flexible stack for the web.
- Open source, libraries.
- Everything has been done already.
- Hatch an idea and connect the dots.

The Future of making code is reality today.

Contrast traditional development cycles versus agile:

The old waterfall process with big specs, big teams and software taking a year or two to be complete enough to have a customer try it... This is the way development was done for most of the last 20 years – a programmer with in most part a single tool – writing much of the code. An engineering team taking several months to build a prototype and a year or two to get an app in a customers hands – where only then do they really know if the app may be successful.

Today's agile process with 2-week scrums and significant new capability releases every 2-3 months – getting customers new capabilities quickly – and using their feedback to steer development taking place in the next few months. Quick to build. Quick to identify opportunities and problems... This is development for the Cloud today. It's about many different tools, assembling pieces, open sources, and much less coding. It's a much faster development environment that takes days to develop a working prototype and weeks to get an experience in a customer's hands for evaluation and fine-tuning. So faster a environment that it becomes easier to build and test – rather then research, test and then build.

In the old days it was about securing your IP. Dongles, software locks and more.

Now it's about securing the customers data – as your IP is on a server – or its running in a browser. Very different focus. Do you have a software security expert? Are they expert in securing your IP or the customers data?

The Future of the Business

- Subscription is big already and growing fast
- 40% New Customers

Forge

What is Forge?

Autodesk Cloud Services

For the last 2 years we've been talking about Autodesk Cloud Services... what is the "Platform". We are now taking it to a new level... not just a Platform, but also a Program and a $100m Fund.

Forge is for engineering and design apps – what AWS is for numerous companies building Cloud apps – a Platform that is a growing suite of web services proving developers components they and you can leverage to create the next generation connected experience. Taking what too often are disconnected processes – Design, Make and Use – enabling creation of a connected process based on shared data on the Cloud that everyone involved can access. Eliminate the barriers that cause slow, disconnected, mistake-prone processes.

You can take a look at Forge right now:

http://forge.autodesk.com

- Design
- Make
- Use
- Visualize
- Collaborate

Horizontal:

- View and Data
- App Store
- Deep Search
- Files/Data/Translation
- DWG Automation (AutoCAD I/O)

Where is Forge is headed... including new web services with APIs that we are working on... rendering, comments, deep search (across files and projects), and more. There are plenty of web services you can leverage now, and many more coming. It's time to get started.

Spark

Just over a year ago Autodesk announced Spark – an open source platform for 3D printing. Spark is a disruptive technology that to a large extent frees up design from the limitations of subtractive manufacturing. If you are in the 3D Print business, you are likely well aware of Spark already.

Spark is an open platform for connecting the additive manufacturing ecosystem.

It serves as a common framework for 3D printing software, hardware, and materials.

It breaks down barriers to entry and opens new possibilities for innovation.

Note "design" is not in this diagram – as Autodesk is attacking the need to "design differently" within or various design tools – Fusion, Inventor, AutoCAD, Revit... with technologies like Dynamo – with more to come.

Part of the answer to these problems is a platform that delivers the basic capabilities for all the players "out of the box". Dramatically lowering the barrier to entry – and enabling one to focus on what one is good at – knowing the rest of the platform will deliver in the other areas.

Spark unifies and rationalizes the entire 3D printing workflow, connecting it end to end, so you can go smoothly and reliably from design to fabrication.

- Autodesk apps
- Partner apps
- Partner contributions

A key part of the system is a software stack explicitly created for additive manufacturing...

This stack is the foundation for applications to guarantee a "one-click and it prints" level of reliability.

We currently have 17 companies already committed to adopting the Spark platform – across the 3D printing ecosystem, from hardware manufacturers, software developers and product designers, across all industries, ranging from consumer to industrial applications.

On the hardware front we have:

- Dremel – consumer desktop printer
- Ultimaker – open FDM 3D printer very popular with makers in Europe
- MatterFab – manufacturers a metal SLS printer for industrial use
- Local Motors – large scale industrial FDM
- HP – multi jet fusion tech for industrial use

On the software front:

- Authentise – develops secure streaming software solutions and services
- 3D Industries

Service Providers:

- 3D Hubs – provides access to a network of 3D print fulfilment
- ExOne – industrial 3D printing service

Product designers:

- Nervous Systems – a generative design studio that works at the intersection of science, art, and technology
- Emerging Objects – AEC focused design firm

Mark Your Calendars... Forge DevCon

June 15-16 at Ft. Mason in San Francisco

- Pre DevCon – June 13-14
- DevCon June – June 15-16
- Post DevCon – June 17-19

The Future of Design and Engineering Software

The Forge DevCon will unite:

- 1100+ Developers
- 50+ Classes
- 40+ Exhibitors