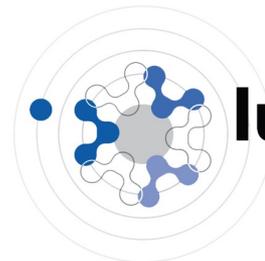


What Makes a Factory Smart? From Industry 4.0 to Makerspaces

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What does the factory of the future look like?



VW Wolfsburg
Tesla Gigafactory



TechShop
Make Media/Xerox PARC



Two communities aim to fix manufacturing's future

"New manufacturing"

"Maker manufacturing"



Two communities aim to fix manufacturing's future

"New manufacturing"

*Manufacturing is about to undergo a radical technological transformation ... combining efficient **large-scale production** with the rapid, flexible, scalable power of **communications and big data**.*

GE via

<http://www.industrialinternet.com/>

"Maker manufacturing"

*"The days of companies with names like 'General Electric' and 'General Mills' and 'General Motors' are over. The money on the table is like krill: **a billion little entrepreneurial opportunities** that can be discovered and exploited by smart, creative people." Welcome to the New Industrial Revolution.*

Cory Doctorow and Chris Anderson in [**Makers: The New Industrial Revolution**](#)

Maker Faire goes to the White House



"I am proud to host the first-ever White House Maker Faire. This event celebrates every maker — from students learning STEM skills to **entrepreneurs launching new businesses to innovators powering the renaissance in American manufacturing**. I am calling on people across the country to join us in sparking creativity and encouraging invention in their communities."

President Obama ,June 17, 2014

Discussion

Factory automation, digital design, flexible production methods (e.g. 3D printing), and frictionless logistics are all changing the scale of manufacturing and topology of supply chains. So the questions we want to discuss are:

1. Will these technologies drive centralization, scaleup, and consolidation – or fragmentation, diversity, and distribution?

2. How will this vary by industry?

Discussion structure

- **First 15 min: Prioritize the issues**
 - What are the strongest drivers reshaping factories?
 - Where is hype beyond what will ever be realistic?
- **Next 15 min: Explore new approaches and who will/might win and lose**
 - What strategies should manufacturers pursue?
 - Which developers can help?
- **Finally: Identify key open questions, and next steps/partners to answer them**
 - How can the best of both approaches be integrated?
 - What are the uncertainties, and how can they be understood quickly?

Key takeaways: Shaping the future of manufacturing

- **Changing human demographics will shape the change in manufacturing. Customer preference is clearly changing.** At the same time, competition is getting much fiercer. **Consumers do not accept standard, mass-produced products anymore.**
- **In every industry, one can decentralize to a certain extent, but where that extent lies depends per industry.** 3D printing of spare parts is easy to talk about, but it is a niche application. **Bulk chemicals, on the other hand, is a major industry and much harder to decentralize than 3D printing of spare parts.**
- **The more consumer goods are diversified, the harder it is for the material suppliers. Agility and flexibility are key terms to adapt change.**
- **For material suppliers, micro-plant concept does not apply. It is about data utilization and adding the flexibility to switch.** The one, who can use the data, may be the winner. **It is not about collecting the data, but closing the feedback loop and making best use of it.**
- **One way of adapting the change in large commodity chemicals could be using data to make sustainability and recyclability a part of business models.** Figuring out how to integrate these concepts into manufacturing offers a more meaningful upgrade to current practice than going small-scale.
- **Transparency of the value chain** is important for making the change happen. If the logistic aspects would be resolved, decentralization will become much easier.
- **While manufacturing becomes decentralized, business becomes more centralized.** Hundred companies are controlling the 90% of the global revenue generated. It heads toward a consolidated business models raising another question: **How to connect all these different units of a company together? And how to deal with resources reallocation when switching to a decentralized model?**