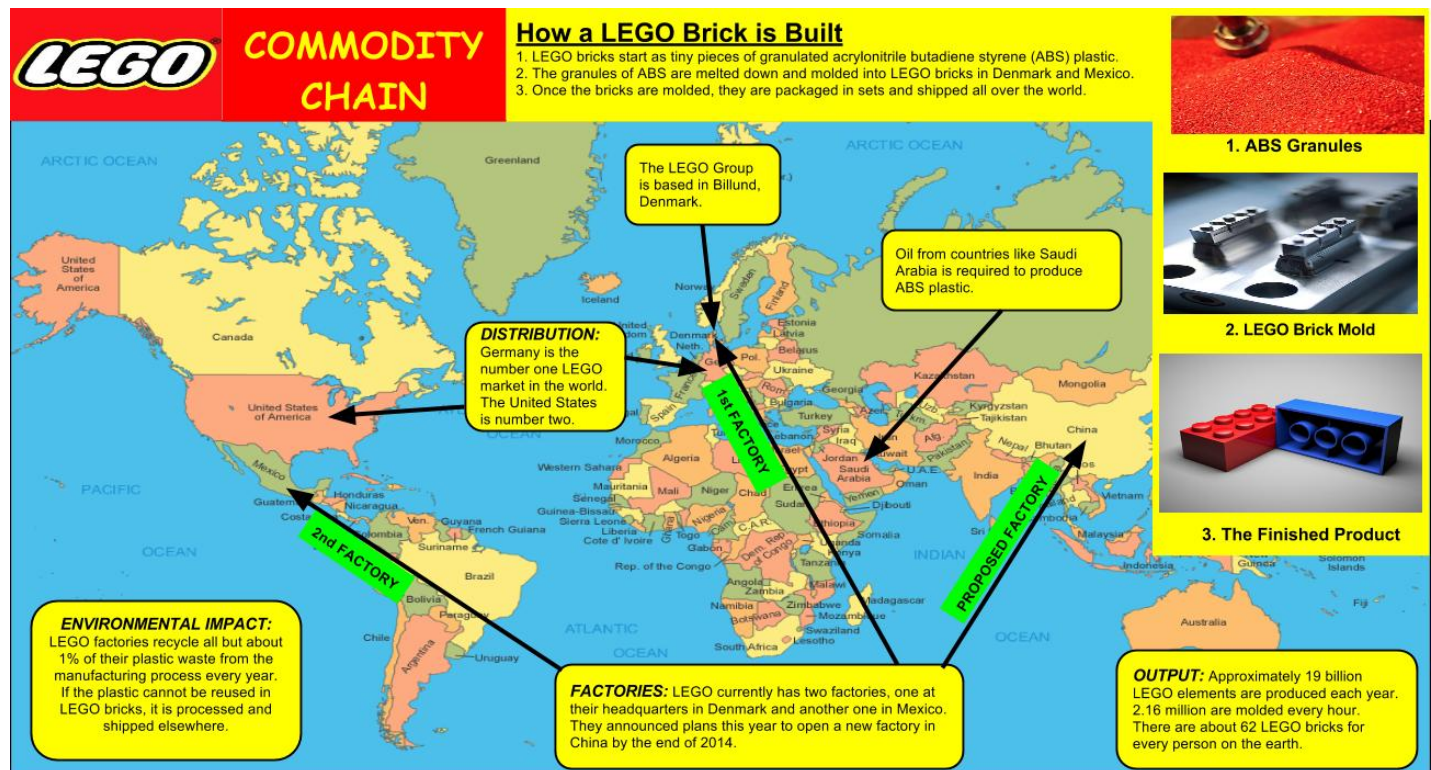# 3D PRINTING, MAKER MOVEMENT

// CLASS 20

FALL 2015 / SECTION 02 / HOLLY BUCK

DIGITIZATION OF SUPPLY CHAINS, PART ONE: ~1960 – 1980 (?)

- Containerization, just-in-time shipping allowed outsourcing; economic activity moved to places with inexpensive labor & resources

DIGITIZATION OF SUPPLY CHAINS, PART TWO?

- Michael Spence: disintermediation already underway in service sectors – think of ATMs, online banking, enterprise resource planning, customer relationship management…
- "This revolution is spreading to the production of goods, where robots and 3D printing are displacing labor."
- Majority of the cost comes at the start, in design of hardware (e.g. sensors) and software creation — "Once this is achieved, the marginal cost of the hardware is relatively low (and declines as scale rises), and the marginal cost of replicating the software is essentially zero".
- "In other words, unlike the preceding wave of digital technology, which motivated firms to gain access to and deploy underutilized pools of valuable labor around the world, the driving force in this round is cost reduction via the replacement of labor."

DISINTERMEDIATION

"As the costs of this technology decline, it is easy to imagine that production will become extremely local and customized. Moreover, production may occur in response to actual demand, not anticipated or forecast demand. In some sense, this represents the ultimate compression of supply chains, as firms produce to final demand with minimal delay.

"**The world we are entering is one in which the most powerful global flows will be ideas and digital capital, not goods, services, and traditional capital.** Adapting to this will require shifts in mindsets, policies, investments (especially in human capital), and quite possibly models of employment and distribution." (Michael Spence)

NEW INDUSTRIAL AGE?

- Makers as next industrial revolution?
- Owning the means of production?

Elements:

- "products becoming little more than intellectual property wrapped in commodity materials, whether it's the code that drives the off-the-shelf chips in gadgets or the 3-D design files that drive manufacturing"
- availability of common platforms & easy-to-use tools
- Web-based collaboration
- Internet distribution

"We've seen this picture before: It's what happens just before monolithic industries fragment in the face of countless small entrants, from the music industry to newspapers. Lower the barriers to entry and the crowd pours in." — Chris Anderson

FROM COMPANY TO COMMUNITY – A NEW INDUSTRIAL ORGANIZATION?

Ronald Coase, 1930s: Companies exist to minimize "transaction costs"

"When people share a purpose and have established roles, responsibilities, and modes of communication, it's easy to make things happen. You simply turn to the person in the next cubicle and ask them to do their job."

"Now, working within a company often imposes higher transaction costs than running a project online. Why turn to the person who happens to be in the next cubicle when it's just as easy to turn to an online community member from a global marketplace of talent? Companies are full of bureaucracy, procedures, and approval processes, a structure designed to defend the integrity of the organization. Communities form around shared interests and needs and have no more process than they require …

Thus the new industrial organizational model." (Chris Anderson)

MAKER MOVEMENT

Maker movement: "an umbrella term for independent inventors, designers and tinkerers … A convergence of computer hackers and traditional artisans … Makers tap into an American admiration for self-reliance and combine that with open-source learning, contemporary design and powerful personal technology like 3-D printers."

- What is attractive about it?
- What is it in response to?
- Are you a maker? If so, what do you make, & why?
- What would you like to make?

— Joan Voight, *Adweek* http://www.adweek.com/news/advertising-branding/which-big-brands-are-courting-maker-movement-and-why-156315

3D PRINTING

Intro:
https://www.youtube.com/watch?v=G0EJmBoLq-g

Ethical filament:
https://www.youtube.com/watch?v=FDiWBoEAHdk
https://www.youtube.com/watch?v=zYp0_omc57g

Bill: "Generally speaking, ethics cannot be applied to tools."

Ethics do not inhere in technologies – ethics come in when you get down to how technologies are used; what the social organization around the technologies is.

- Do you agree?

- Exceptions to this? Guns? Chemical weapons?

3D PRINTING ISSUES

- Weapons and other restricted items
- Getting things to remote areas
- Jobs
- Liability / responsibility issues
- Creativity
- Intellectual property
- Distribution / access to technology
- Replacement organs / bioprinting
- Relocalization
- Environmental impacts
    - Chemicals
    - Energy / carbon
    - ?