# New manufacturing

Digitised methods of fabrication are decentralising manufacture, with implications for the materials needed and where they come from. Could this mean supply chains generate less waste, with new opportunities for local economies?

Whereas traditional manufacturing sees raw materials transported into one large, central factory where they are assembled into products, digital plans are now being sent to local manufacturing hubs for assembly in workshops or directly by the consumer. At the industrial level, distributed manufacturing is nascent but diverse in application. Early commercial adopters range from healthcare to the automotive sector, with rising interest from electronics.

A variety of techniques, including laser-cutting, computer numerical control (CNC) milling and rapid prototyping, are transforming how things are made. One of the most frequently cited is 3D printing – an additive process where products are assembled one layer at a time, under computer control. This has now been used for several years in high-value manufacturing, such as for jet engine parts.

Since 2012, improvements in the technology coupled with a significant drop in price have made new manufacturing processes widely available, with the potential to disrupt mainstream supply chains, in everything from sofas to pills. This has enabled new modes of production, outside the factory. 'Makers' can now be home-based, community-based and operating at a small yet affordable scale. Through open source designs and the communal use of 3D printers in shared spaces (such as cafes and 'fab labs'), the DIY Maker Movement has enabled groups to design and prototype their own products while building communities and engaging the public.

Companies now face the challenge of efficiently manufacturing products through collaborative networks and distributed structures, operating beyond the quality control mechanisms they have established for production at scale in state-of-the-art facilities.

Last updated: 15 September 2015

## Implications

- Digitised manufacturing methods may not replace traditional ones, but they are giving rise to new business models [1] and disrupting the economics and competitive hold of existing supply chains. In the long term, they may have a broad and transformative impact, changing global trade and retail patterns.
- While distributed manufacturing can be seen as a potential driver of consumer or local empowerment, giving people more control over the material artefacts in their lives, it is not in itself a positive development for sustainability. On one hand, making items closer to their intended retail market could reduce their environmental impact and logistics costs, and the time from production to application may also be reduced. [2] But affordable local manufacture could also simply mean more low-value, short-life and even non-recyclable items are produced, increasing pressure on resources in a similar way to 'fast food'. Challenges to overcome include sustainable feedstock for the 3D-printing process, how unwanted printed items are disposed of, and who takes responsibility if printed products fail or are unsafe.

Footnotes:

1. Cornerstone Advisers (2014)

2. Cerasis (2014, April). The Rise of Distributed Manufacturing and 7 Advantages over Traditional Manufacturing

## Current trajectory

- Harvard Business Review estimates that over 30% of the top 300 largest global brands are now using or evaluating 3D printing (often with printing technology in-house) for prototyping, innovation projects or to fabricate their products. [1]
- 3D printer prices have fallen rapidly in the last few years, with Da Vinci models now retailing for less than $300. [2] Kickstarter campaigns for 3D printers priced at $100 have also been successfully funded.
- A Michigan Technological University study estimated that by using a low-cost 3D printer such as the RepRap to produce commonly used household objects, a family could save $300 to $2000 per year. [3]
- The concept of the "Fab Lab", a digital fabrication maker space, developed in the early 2000s at the Massachusetts Institute of Technology (MIT)'s Centre for Bits and Atoms to democratise high-tech fabrication. According to fablabs.io, there are now over 560 fab labs in 78 countries around the world with the US having the most at 97. [4]
- In Spain, the city of Barcelona has launched a Fab City project that aims to restore production centres to the heart of the city. The plan is to open fab labs in every district of the city, and eventually every neighbourhood, to enable local production of almost any kind of goods, the repair and repurposing of old appliances, and the upcycling of waste. The fab labs are also planned to be community problem-solving centres that assist in local energy and food production. [5]
- Over 200 universities and colleges already offer 3D coursework in their curricula – covering aspects of not only 3D printing but also 3D scanning and design. [6]

Footnotes:

1. Harvard Business Review (2015, July). 3D Printing Is Changing the Way We Think
2. Uberigizmo (2015, Jan). da Vinci Junior Is A $299 3D Printer
3. Academia (2013). Life-Cycle Economic Analysis of Distributed Manufacturing with Open-Source 3-D Printers
4. FabLabs (2015)
5. The Futures Centre (2015, March). Barcelona plans to become a self-sufficient Fab City
6. Harvard Business Review (2015, July). 3D Printing Is Changing the Way We Think