Diginova

Innovation for Digital Fabrication

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Marcel Slot, Océ-Technologies B.V.

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Biomedical Applications for Digital Fabrication

Sedgefield, UK, November 6th, 2013

Outline

- **Introduction to the Diginova project**
  - *Vision, scope, objective*
  - *Digital Fabrication definition / concept*
- **Technology & applications**
- **Biomedical / healthcare application domain**

Diginova project partners

Diginova project members

Project duration:

March 2012
March 2014

Diginova partnership

IS&T imaging.org
Society for Imaging Science and Technology

Visions and ideas that led to Diginova

Observation: The digital age advances, industries & society need to adapt

- **Digital technology has changed whole industries, consumer behaviour & supply chains**
  - *Music industry*
  - *Photography*
  - *Printing*
  - *Communication*
  - *….*
- **Impact on Manufacturing & Materials?**

Diginova

Vision

- **We have had an industrial revolution …**
- **We have had a digital revolution …**
- ***Now is the time for a digital industrial revolution***

Diginova: Innovation for Digital Fabrication

Digital Fabrication: definition

A **new industry** that uses **computer controlled** tools and **processes** to **transform digital designs** directly **into useful physical products**.

Development of well matched combinations of advanced new material deposition tools, processes and materials is emerging as a key succes factor for Digital Fabrication.

Diginova: Innovation for Digital Fabrication

Benefits / impact ?

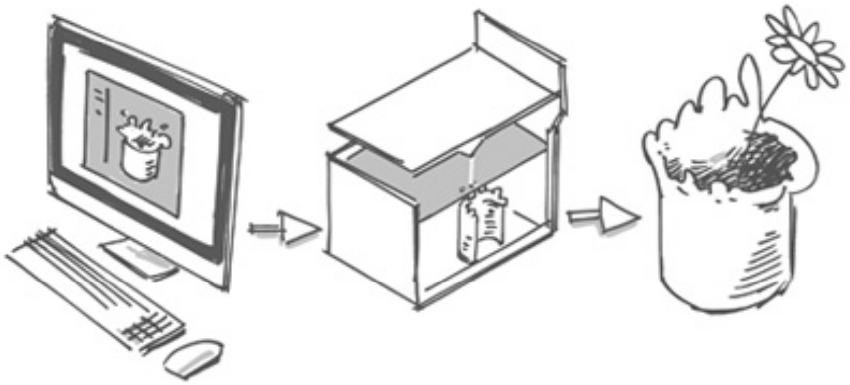
Paradigm shifts in manufacturing: design, manufacturing, materials, supply & demand, …

short runs, on-demand, customized, personalised, zero-waste, no stock, decentralized, fast turnaround, distribute & print (instead of print & distribute), clean & green, ease of use, …

Digital Fabrication: paradigm shift in manufacturing

Intermezzo

Concept of Digital Fabrication … a peek into the future



Diginova: Coordination & support action project

GOAL:

Determine current status, assess and promote the potential of Digital Fabrication

Impact on:

- *Manufacturing*
- *Materials*

Deliver a Digital Fabrication roadmap

- *clarify potential contribution to sustainable future of manufacturing in Europe*

Scope of Digital Fabrication in Diginova

- ***Matching manufacturing*** technology and ***key new materials***
- ***On-demand manufacturing*** for ***customized products*** with ***potential for short production series*** (down to 'series-of-one')
- ***Shortening change-over times*** to accommodate ***flexible production***
- Using ***additive manufacturing*** methods to enable production of products comprising of more than one material using ***minimal resources*** with ***no waste***
- Exploiting the ***inherent freedom of design*** in both geometry and material composition to produce ***products optimized for functional performance*** and not hampered by limitations imposed by manufacturing processes

Example of 'Freedom of Design'

From Design for Manufacturing

to

Manufacturing for Design

Technology in scope

Printing as a ***digital material deposition*** technology, including its use for three dimensional products

What we do

Create a Digital Fabrication roadmap

Coordinate EU programs

- Clarify economic & societal **relevance of 'Digital Fabrication'** for Europe
- Focus on both **business value and technology**
- Towards new sustainable economic **growth**

Connect

- Communities
- EU programs, research agendas, roadmaps
- Mobilize & build innovation networks and eco-systems

Will our story be heard?

"Print me a Stradivarius"

How a new manufacturing technology will change the world

Coverstory , February 2011

http://www.economist.com/node/18114327

"The printed world"

"Print me a phone"

- *New techniques to embed electronics into products*
- *Convergence of printed electronics & 3D printing*

July 28th, 2012

http://www.economist.com/node/21559593

"The third Industrial Revolution"

"The digitisation of manufacturing will transform the way goods are made—and change the politics of jobs too"

Coverstory, April 2012

http://www.economist.com/node/21553017

Digital Fabrication: raising the bar in the US

Home / Blogs / Business / The Bulletin Follow this blog:

3D printing the 'next revolution' in manufacturing: President Obama

By Joe McKendrick | February 12, 2013, 7:01 PM PST

17 Comments

In his State of the Union address Tuesday night, U.S. President Barack Obama acknowledged the revival of the long-suffering U.S. manufacturing economy, and points to 3D printing as the technology that will create even more manufacturing opportunities.

Here is an excerpt of the speech:

"Our first priority is making America a magnet for new jobs and manufacturing. After shedding jobs for more than 10 years, our manufacturers have added about 500,000 jobs over the past three. Caterpillar is bringing jobs back from Japan. Ford is bringing jobs back from Mexico. After locating plants in other countries like China, Intel is opening its most advanced plant right here at home. And this year, Apple will start making Macs in America again.

"There are things we can do, right now, to accelerate this trend. Last year, we created our first manufacturing innovation institute in Youngstown, Ohio. A once-shuttered warehouse is now a state-of-the art lab where new workers are mastering the 3D printing that has the potential to revolutionize the way we make almost everything. There's no reason this can't happen in other towns. So tonight, I'm

11

+1

Most promising applications for Digital Fabrication

1. **Digital graphical printing**

2. **Digital Textiles**
   - Textile Printing
   - Smart Textiles
   - Digitally fabricated garments

3. **Functional end-use parts & products (Additive Manufacturing)**

Most promising applications for Digital Fabrication

4. **AM objects with embedded printed intelligence**
   - Integrated Electronics
   - Sensing
   - Energy Storage
5. **OLED Lighting + smart windows**
6. **Printed Sensors**

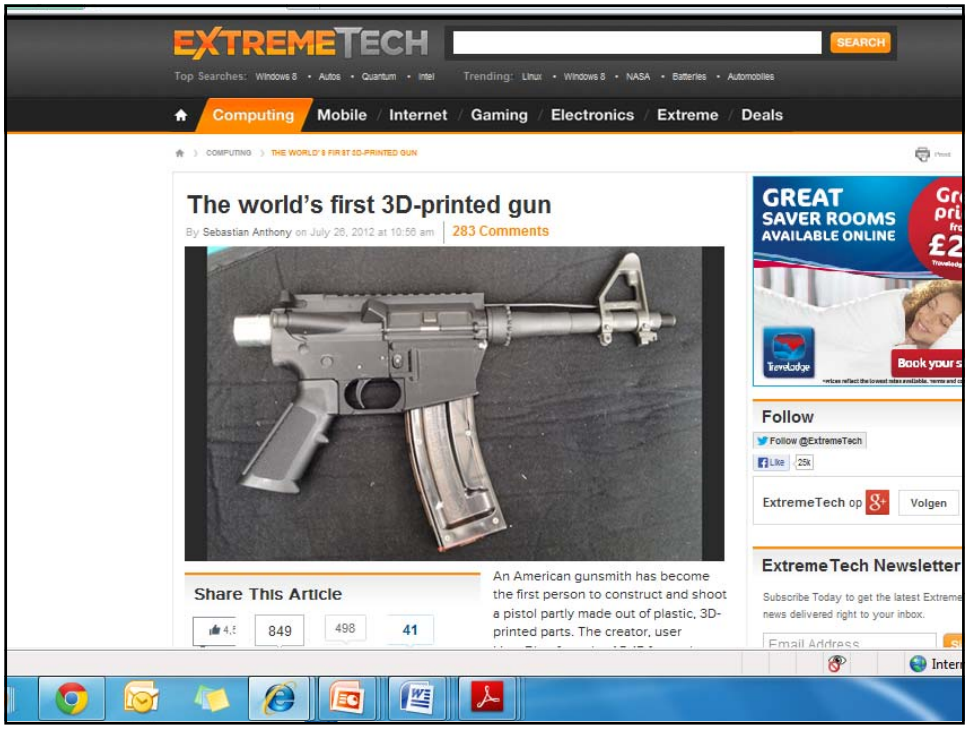
Most promising applications for Digital Fabrication

7. ***Medical Microfactories***
   - *Fabrication or repair of tissue & implants near/in patient*
   - *Tissue Engineering Scaffolds*
8. ***Personalized Diagnostics & Drug Delivery***
9. **Digital building & construction / mega-scale digital fabrication**

Now… consider…

Meaningfull

innovation




Baby's life saved with groundbreaking 3-D printed device that restored his breathing - Windows Internet Explorer
http://www.sciencedaily.com/releases/2013/05/130522180102.htm
ScienceDaily
Your source for the latest research news
Norton delivers 5 patented layers of powerful protection.
Introducing the all new Norton lineup. Built to keep you safe, no matter what you do online.
FIND the RIGHT PROTECTION
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Matter & Energy
Science News
... from universities, journals, and other research organizations
Baby's Life Saved With Groundbreaking 3-D Printed Device That Restored His Breathing
May 22, 2013 — Every day, their baby stopped breathing, his collapsed bronchus blocking the crucial flow of air to his lungs. April and Bryan Gionfriddo watched helplessly, just praying that somehow the dire predictions weren't true.
"Quite a few doctors said he had a good chance of not leaving the hospital alive," says April Gionfriddo, about her now 20-month-old son, Kaiba. "At that point, we were desperate. Anything that would work, we would take it and run with it."
They found hope at the University of Michigan, where a new, bioresorbable device that could help Kaiba was under development. Kaiba's doctors contacted Glenn Green, M.D., associate professor
enlarge
A baby's life was saved with this groundbreaking 3-D printed device that restored his breathing. (Credit: Image courtesy of University of Michigan Health System)
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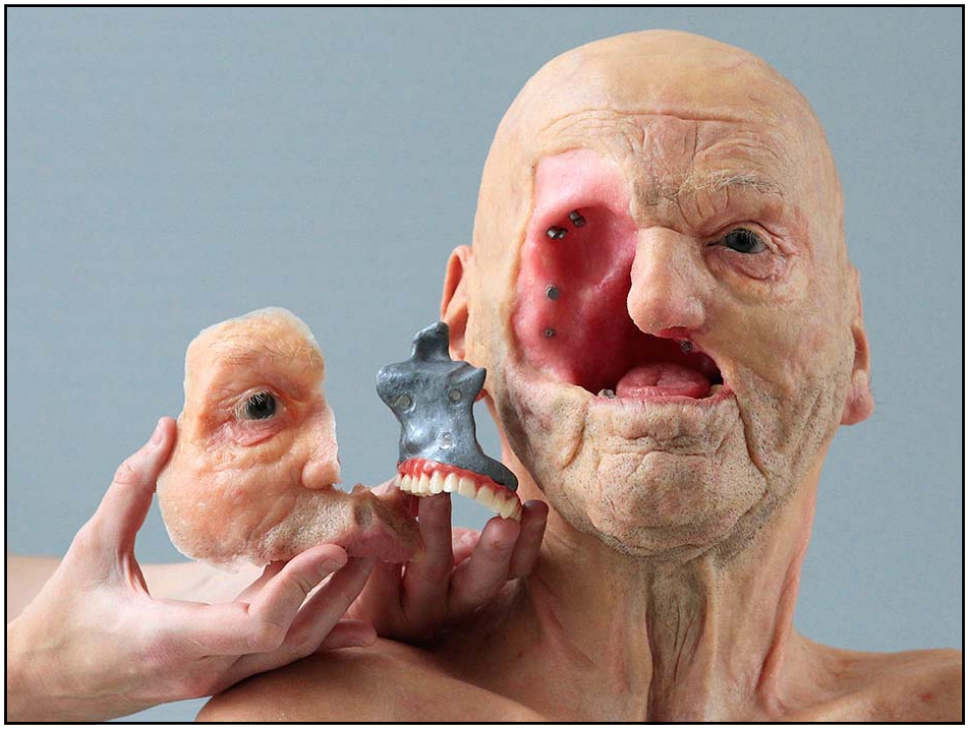
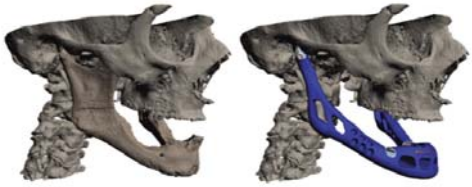
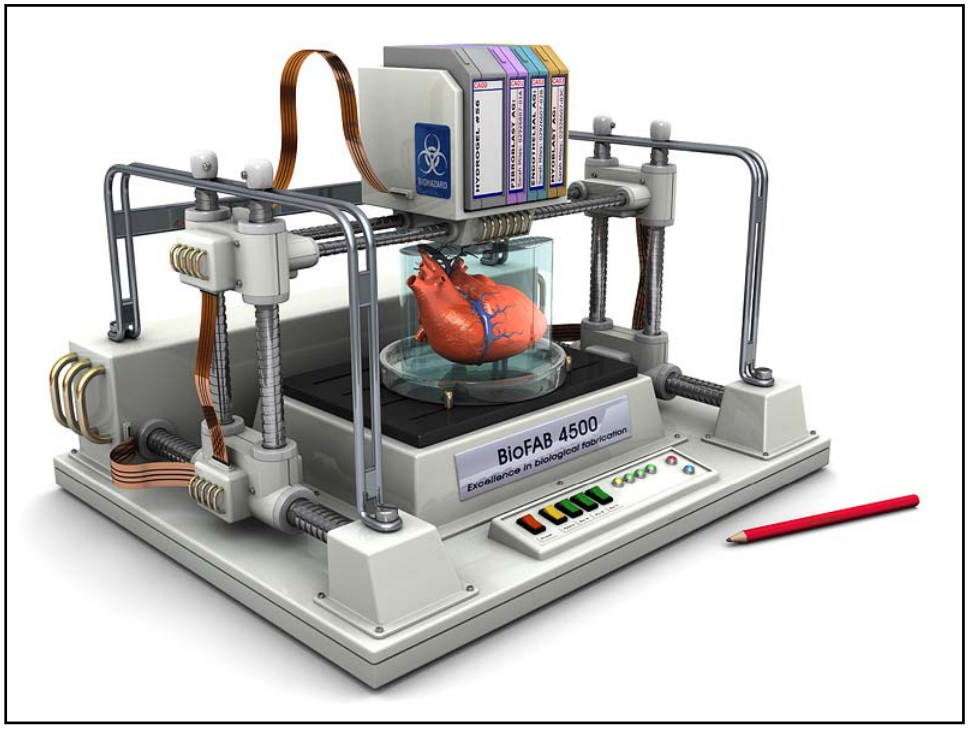


"Printing a 3D jaw and successfully implanting it, is like putting the first man on the moon.."



De Telegraaf


BIOHAZARD
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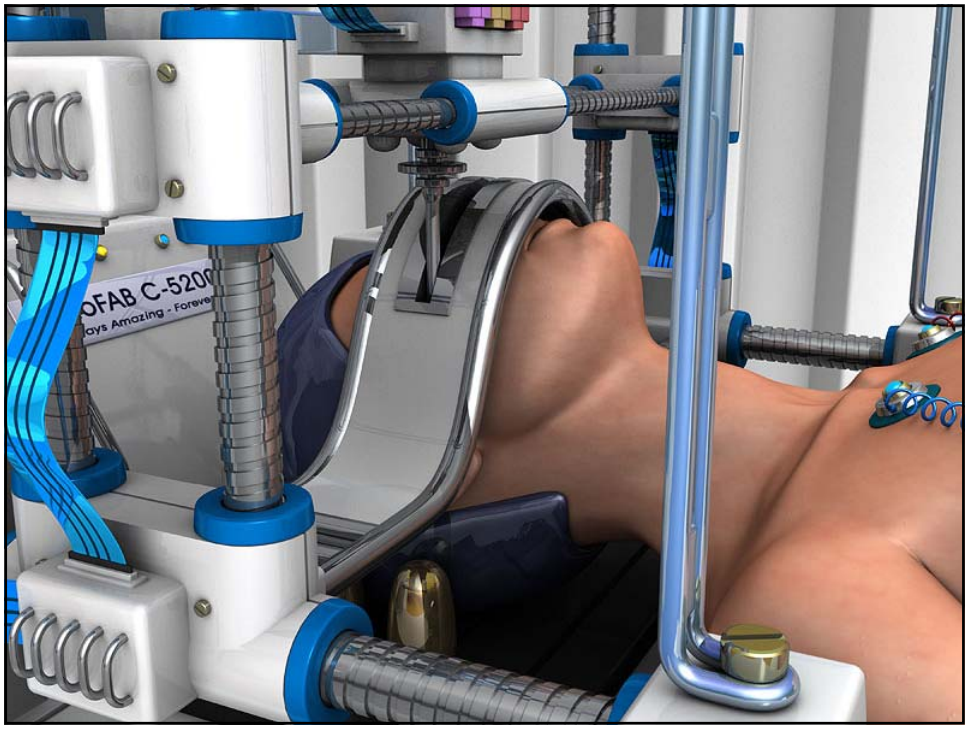
Excellence in biological fabrication



We cannot predict the future .. but we can invent it