3D-Print your future: just think and produce

Germán ESTEBAN MUÑIZ
Key Enabling Technologies
DG Research and Innovation
European Commission

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CREATE
"Only he who attempts the absurd is capable of achieving the impossible."

*Miguel de Unamuno*
Additive Manufacturing / 3D Printing... evolution, revolution or illusion?

- **2009**
  - Additive Manufacturing / 3D Printing was not even there

- **2010**
  - Additive Manufacturing / 3D Printing appears.
  - Expectations: 5-10 years before maturity

- **2011**
  - Additive Manufacturing / 3D Printing entering the peak of inflated expectations.
  - Still 5-10 years before maturity
Additive Manufacturing / 3D Printing at top peak of inflated expectations

Still 5-10 years before maturity

Additive Manufacturing / 3D Printing suddenly on the «slope of enlightenment» and renamed «Enterprise 3D printing»

Appearance of «Consumer 3D printing» and «3D scanners»

[Source: Gartner]
3D-Printing? or Additive Manufacturing?

- Additive Manufacturing (AM) refers to a group of technologies that build physical objects directly from 3D Computer-Aided Design (CAD) data.

- ISO/ASTM has defined "Additive Manufacturing" as:
  
  "process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies, such as traditional machining."

- Today, both terms are used interchangeably, but Industry still prefers to use the "Additive Manufacturing" term, while Home Appliances and Consumer Goods widely use "3D-Printing".

Different terms used since AM started:
- E-Manufacturing
- Freeform Fabrication
- Generative Manufacturing
- Additive Layer Manufacturing
- Additive Manufacturing
- 3D Printing
- Rapid Manufacturing
- Constructive Manufacturing
- Direct Digital Manufacture
- Additive Fabrication

Different technologies, different materials:
- SLA / SLS / 3D-Printers / FDM / DLP / DMLS / EBM / LMD / LC / …

Polymers – Metals – Ceramics - ?

Courtesy of AM Platform
Additive Manufacturing in the EC:

- European Commission (EC) was a pioneer: Additive Manufacturing funded since the First Framework Programme (FP1, 1984-1987).
- The following Framework Programmes (1988-2013) ensured continuous support from different EC services and different funding programmes.
- Only in FP7 (2007-2013), more than 60 successful projects based on AM technologies were funded with a total amount over €160 million in EC funding and a total budget of around €225 million.
- EC explicitly mentioned 3D-Printing in the Industrial Policy Communication in 2012 as a key part for the new Industrial Revolution.
- The EC “Industrial Landscape Vision 2025”, in 2013, showed AM as a case study on how Standards will facilitate new production systems, enhancing EU innovation and competitiveness.
AM
1988-2013

RAPROMO MAID DERP VITAMIN PRIME PHIDIAS RAMATI PRINCIPLE NAIMO FLEXRAP
CUSTOM-FIT RAMA3DP METAL-PRINT FLEXFORM FANTASIA RC2 NOVELSCAFF CUSTOM-IMD
M&M ’S SHAPEFORGE M&M ’S+ IMPALA OPEN GARMENTS MULTILAYER COMPOLIGHT
MICROFLUID STEPUP DIRECTSPARE INLADE LIGHT-ROLLS A-FOOTPRINT DIGHIRO PHOCAM
CORENET KARMA IC2 MERLIN PRINTCAR INTRAPID ADM-ERA HIRESBM ARTIVASC 3D
FASTEBM NANOMASTER DIGINOVA AEROSIM EUROFIT SASAM IMPLANT DIRECT SMARTLAM
HI-MICRO 3D-HIPMAS AEROBEAM PERFORMANCE HIPR AMCOR VINDOBONA AMAZE
IDAMME2 OXIGEN BIO-SCAFFOLDS MALT RAPIDOS SASAM IMPLANT DIRECT SMARTLAM HI-
MICRO 3D-HIPMAS AEROBEAM PERFORMANCE HIPR AMCOR VINDOBONA AMAZE IDAMME2
OXIGEN BIO-SCAFFOLDS MALT RAPIDOS MANSYS SIMCHAIN CASSAMOBILE ADDFACTOR
FLOWMAT NEXTFACTORY FABIMED OPTICIAN2020 INTERAQCT RRD4E2 PILOTMANU D-
HYDROZONES FOOTPRINT PLASMAS IRRESISTIBLE REP-AIR
Additive Manufacturing Projects in European Commission

No of Funded Projects


3  12  3  12  60  ?

3D-Printing in H2020 and RIS3:

- Horizon 2020, has identified Additive Manufacturing (AM), including 3D-Printing, as part of one of the Key Enabling Technologies (KETs) and as an Advanced Manufacturing Technology.
- Up to date, more than 125 European Regions from 28 Member States have joined Regional Smart Specialization. More than 2/3 of these Regions have identified KETs as a priority for RIS3.
- AM responds to the Industrial Leadership, to several Societal Challenges, and requires a high degree of Innovation.
- AM gives the designers the ability to innovate, to quickly turn concepts into 3D models or 3D prototypes, opening up shapes that were impossible to produce before, allowing to make a mass customisation, a real shift from today´s mass production, and a relocalisation of manufacturing in Europe.
Additive Manufacturing in the Industrial Leadership

Courtesy of Sirris, UAS, GE
Combining AM with several KETs for advanced products
Combining AM with several KETs for advanced products

- CUSTOMIZATION FOR REAL END USER NEEDS
- NEW FUNCTIONAL DESIGNS FOR NEW VEHICLE CONCEPTS
- REDUCING COSTS INCREASING PERFORMANCE
- FAST RESPONSE TO HIGH DEMANDING SECTOR
- NEW TOOLS FOR NEW MINDED PROFESSIONALS
- NEW CONCEPT OPTIMISED INTRICATED STRUCTURES TO FIT FUTURE USABLE SHAPES
- MANUFACTURING ON DEMAND
µ3D-Printing Cultural Heritage:

Courtesy of PHOCAM FP7 project
3D-Printing Cultural Heritage:

Courtesy of PRODINTEC
3D-Printing Food:

Courtesy of PERFORMANCE FP7 project
"Imagination is everything. It is the preview of life's coming attractions."

Albert Einstein

Thanks for your attention!

Germán ESTEBAN MUÑIZ
german.esteban-muniz@ec.europa.eu
tel: +32-2-29 91568