The Maker Movement - Makerspaces and FabLabs

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Introduction to Digital Media 2017
The DIY/Make Culture

- The Homebrew Computer Club – 1975
- The Whole Earth Catalog – 1968-1972
- MAKE Magazine – 2005
- Maker Faire- “the Greatest Show (and Tell) on Earth—a family-friendly festival of invention, creativity and resourcefulness, and a celebration of the Maker movement.”
- The 1st Maker Faire- 2006- San Francisco Bay Area
“all of us are makers”

TED@MotorCity, Jan 2011- https://www.ted.com/talks/dale_dougherty_we_are_makers
Hackerspaces are community-operated physical places, where people share their interest in tinkering with technology, meet and work on their projects, and learn from each other.

hackerspaces.org is an informal volunteer network of such spaces, maintaining community services – including a wiki for everyone who wants to share their hackerspace stories and questions, mailing lists, XMPP services, a blog and a feed aggregator, and many others. From around the world, hackers meet on the Freenode IRC channel #hackerspaces.
Hackerspaces around the world (2015)
Hackerspaces around the world (2017)

Source: Http://hackerspaces.org
Makerspaces / Hackerspaces

- **TOG.ie** – Dublin
- **091labs** - Galway
- **miLKlabs**– Limerick
- **Nexus**- Cork
- **FORMA-Labs-** Cork
- (Lightbox- Drogheda)
- **South East Maker Space-** Waterford
- **NUIM Makers Club** - Maynooth
- **Farset Labs –** Belfast

Source: [http://hackerspaces.ie/](http://hackerspaces.ie/)
miLKLabs - project ideas 2011:

- Luppp
- Ogham Cutting Robot
- Telepresence Robot
- Kinect - Natural User Interfaces
- High Vis Jacket with Indicators
- Physical Data Artefacts
- Intelligent Sensing Clothes
- Personal Library with ISBN Scanner
- High-Speed Photo Taker
- Surface Touch Table
- Open Data Visualisations for Limerick
- Augmented Reality Layers for Limerick
- All-Terrain Long Distance Robot (Farmboz)- see https://youtu.be/cF8_JfuRBMM
miLKlabs (2010-2013)
Dublin Mini Maker Faire - 2012 on
Are you a maker?

- 3 min
- Form pairs
- After 1 min, change roles. Repeat.
- Report back to the class.

- Did any of your making preferences involve computers? Digital Media? Smartphones?
Fabrication Labs (FabLabs)

- Fabrication Laboratories - personal fabrication - aka small-scale manufacturing enabled by digital technologies
- Not mass production
- Potential to empower individuals to create smart devices for themselves.
- These devices can be tailored to local or personal needs in ways that are not practical or economical using mass production.
How did it all start?

- The program was started in the Media Lab at MIT, a collaboration between the Grassroots Invention Group and the Center for Bits and Atoms (CBA) at the Massachusetts Institute of Technology.

- Exploring:
  - how the content of information relates to its physical representation, and
  - how a community can be powered by technology at the grassroots level.

- Neil Gershenfeld, the director of MIT's Center for Bits and Atoms (CBA began this as an outreach project of this center)

- The fab lab concept also grew out of a popular class at MIT (MAS.863) named "How To Make (Almost) Anything". The class is still offered in the fall semesters.
Fabrication Tools

- Laser cutter
- Sign cutter
- Milling machine
- Electronics assembly
- Microcontroller programming
The tools

- A computer-controlled laser cutter, for press-fit assembly of 3D structures from 2D parts;
- A sign cutter, to produce printing masks, flexible circuits, and antennas;
- A precision (micron resolution) milling machine to make three-dimensional molds and surface-mount circuit boards;
- Programming tools for low-cost high-speed embedded processors;
- A larger (4'x8') numerically-controlled milling machine (CNC router), for making furniture- (and house-) sized parts. (not all the labs own this large machine)
Fabrication Supplies

- components for building devices and circuits
- vinyl film,
- machineable PCB stock,
- molding, casting and composites materials, resistors, capacitors, chokes, diodes, transistors, regulators, LEDs, photo detectors, thermistors, microcontrollers, resonators, buttons and switches,
- magnets, headers, jacks and plugs, ribbon cable and connectors, heat shrink tubing,
- soldering supplies,
- transducers and stepper motors,
- carbide cutters
- end mills.
All software that is used in the Fab Lab is either open source or included with the equipment purchased and available free of charge to students. A partial list of the types of software used and particular examples:

- CAD/CAM (ex: alien.cad, mold.cad)
- 2D vector (ex: inkscape)
- 2D raster (ex: GIMP)
- 3D (ex: SketchUp)
- Programming (ex: Python, Numpy)
- Schematic, PCBdesign (ex: Eagle)
- Circuit modeling (ex: Ngspice)
- Microcontrollers (ex: Atmel AVR)
- Milling controller (ex: Modela)
- Vinyl cutter (ex: CAMM-1)
- Lasercutter (ex: Epilog)
Other resources

Staffing

- The key to a successful Fab Lab is the hours of availability and a good facilitator. It needs to be staffed by a technician familiar with the tools and equipment present. The idea is not for the staff to run operations but to maintain the safety of the lab, although some facilitation is usually necessary. The centers are sometimes attached to a technology incubator or used at an outreach in a community location. The bottom line is that it has to be easy and painless to get to and to use.

Videoconference

- A videoconference solution can be useful for collaborating with other centers around the world and for getting help and advice.
The worldwide FabLab network

Source: http://fablabs.io
FabLab network in Ireland

- Source: http://fablabs.io
Ireland makers

Source: http://irelandmakers.com
The principles behind FabLabs

3 important principles for operating a Fab Lab:

- a Fab Lab has to be open to the public, and offer facilitation and guidance;
- all the designs are uploaded in a library shared with all the other labs worldwide;
- it has to adhere to the Fab Lab charter (http://fab.cba.mit.edu/about/charter/).
FabLabs and Hackerspaces

- FabLabs – run by an organisation of some sorts (university, research centre, innovation centre)
- Hackerspace – community –led
- Adhering or not to the FabLab chart?
FabLabs at work
Concrete Lace
Fashion
Fab lab Limerick (2013-)
Parklet – McSwiggan’s Galway
The future…

- **ING- 3D printing- a danger for global trade**

- **What do you think?**
Exploratory study for FabLab Con 2013 (Gabriela Avram & Alan Ryan)

- interest in the social aspects of digital fabrication, and especially in its potential to change our lifestyle;
- We launched an email survey targeting Irish hackerspaces, organisations and groups with an involvement in digital fabrication;
- The survey focused on 3 aspects: the existing situation, future plans and vision for the next 5 years.
- Our presentation: https://youtu.be/Ps3c1ljl3ew
Hackerspaces

- Machines: mainly 3D printers, most assembled from kits;
- Emphasis on learning - even if this involves melting printing heads!
- Open to the public;
- Open to experiments.
Irish FabLabs

- WeCreate – Cloughjordan eco-village
- Fab Lab Limerick
- Fablab Manor Hamilton, Leitrim
- NerveCentre – Derry
- Fablab Belfast

- Public access;
- Training;
- Facilitation.
Other (semi)professional entities (according to the 2013 survey)

- 3Dprinting - Dublin
- **Inspire 3D** - Ashford
- Layerlabz - Dublin
- 3D Dave - Dublin
- Creodrone - Galway
- The Civic Works - Dublin
- **Love and Robots** (was Fab All Things) - Dublin

- Providing services for money;
- No public access;
- Protecting their own designs;
- For up-to-date list, see [http://finditmakeit.ie](http://finditmakeit.ie)
What did the survey participants say:

- “The common perception in hackerspaces is that Fablabs are just like hackerspaces without the community. People go there and make things and leave. We get that too in hackerspaces but we also get more people who come and make something and stay around because the community is great.”

- “Where I think the really interesting impact is, is less in the tangible *things* we have about and more in our relationships with these objects. How will our perceptions of consumer goods shift when we can easily produce our own high-quality products?”
“Digital fabrication has been slow to come to Ireland. At the moment there are only a handful or places to get things made and access these technologies.”

“Ultimately, 3d printing and digital fabrication lower the barrier of entry for individual designers and makers to bring new products to market and invent new things. This, we hope, will bring more choices to the consumer and will help in re-distributing wealth from the few to the many.”
Fablab Limerick

- MidWest Makers group- meeting every Thursday from 19:30 to 21:30
- https://www.facebook.com/groups/MidWestMakers/
- http://fablab.saul.ie
ATTIRE – part of 2015-Year of Irish Design

- Self-selected group of makers came together for 6 months
- Meetings documented on video at [http://attire.ie](http://attire.ie)
Fabricademy- started with a bootcamp

https://vimeo.com/216487092
One year course - part of Fab Academy

- [http://textile-academy.org/program/](http://textile-academy.org/program/)
Future Textiles Lab

- a collaboratory between LSAD and UL active in education, research and innovation in the domain of smart textiles
- https://www.facebook.com/FutureTextilesLab/
Conclusions

- The Fablab network appears to be growing year on year; their role- providers of training and access to machinery
- Makerspaces provide a space for work on joint projects
- Trend: the activity is expanding from coding and digital fabrication toward bio-hacking and textiles.