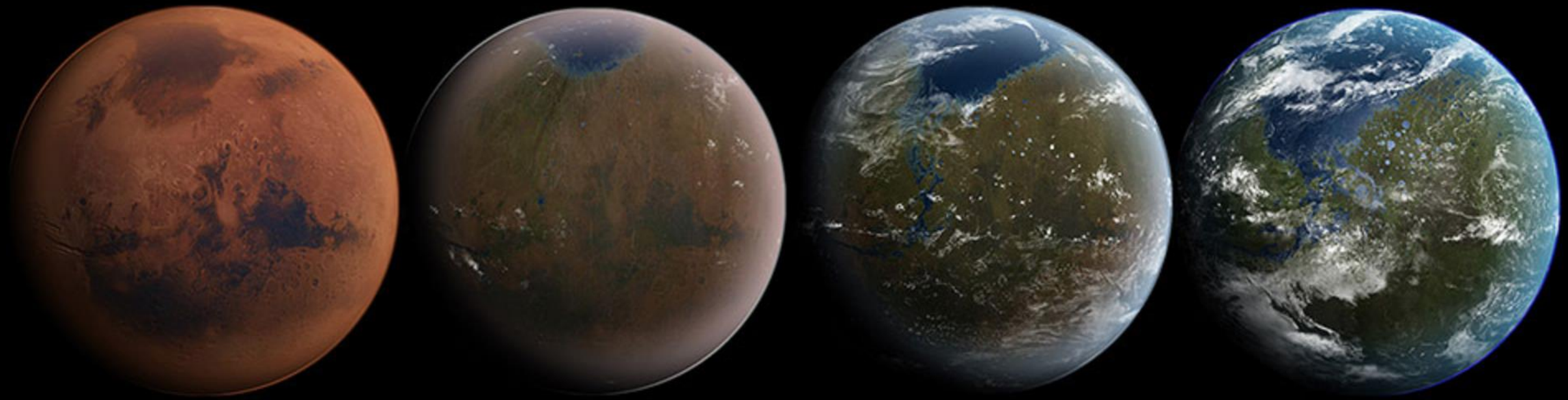
FAB: An Emergent Network for Future Workforce, Innovatio and Social Impact

Sherry Lassiter, Ed. M.
Director
The Fab Foundation
& MIT Fab Lab Program

Space X: Falcon Heavy Project

YouTube
March 10, 2018



ROAD TO THE RED PLANET

SpaceX was founded under the belief that a future where humanity is out exploring the stars is fundamentally more exciting than one where we are not. Today SpaceX is actively developing the technologies to make this possible, with the ultimate goal of **enabling human life on Mars**.

CAREERS

UNIVERSITY

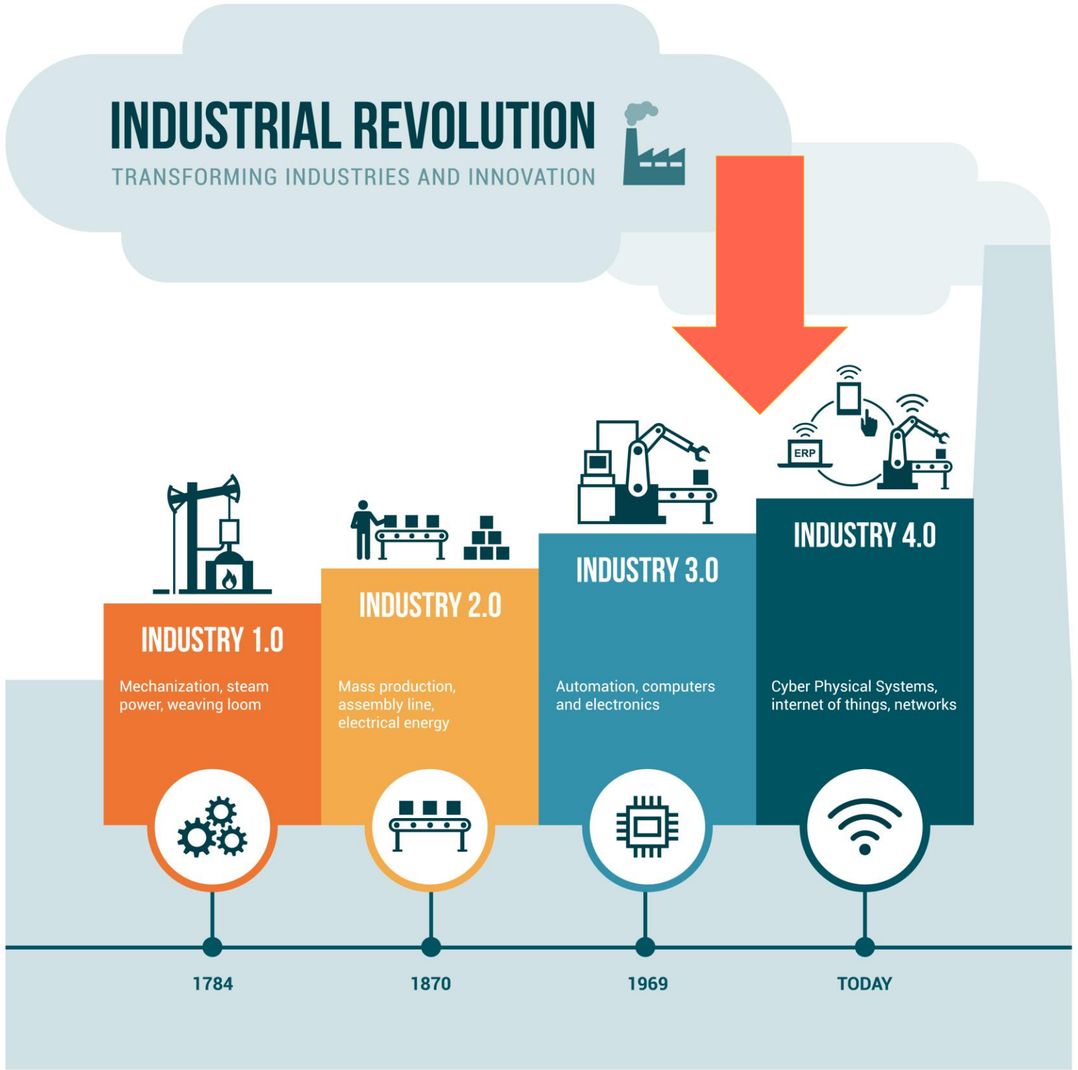
MANUFACTURING AND PRODUCTION - LEADERSHIP	
AVIONICS PRODUCTION MANAGER - ELECTRO-MECHANICAL ASSEMBLY	HAWTHORNE, CA, UNITED STATES
AVIONICS PRODUCTION SUPERVISOR (ELECTRO-MECHANICAL)	HAWTHORNE, CA, UNITED STATES
PRODUCTION MANAGER - F9 SUBASSEMBLIES	HAWTHORNE, CA, UNITED STATES
PRODUCTION MANAGER – DRAGON PROPULSION COMPONENTS	HAWTHORNE, CA, UNITED STATES
PRODUCTION MANAGER – MERLIN – PROPULSION ASSEMBLIES	HAWTHORNE, CA, UNITED STATES
PRODUCTION SCHEDULING SUPERVISOR	HAWTHORNE, CA, UNITED STATES
PRODUCTION SUPERVISOR - DRAGON INTEGRATION	HAWTHORNE, CA, UNITED STATES
PRODUCTION SUPERVISOR - F9 - 2ND SHIFT	HAWTHORNE, CA, UNITED STATES
PRODUCTION SUPERVISOR – SPACECRAFT FLUIDS SYSTEM	
PRODUCTION SUPERVISOR – SPACECRAFT STRUCTURAL ASSEMBLY	
QUALITY ASSURANCE SUPERVISOR - LAUNCH VEHICLE SUBASSEMBLIES - 2ND SHIFT	
SENIOR MANAGER, AVIONICS ELECTROMECHANICAL PRODUCTION	
SUPERVISOR, PRODUCTION (FALCON 9 SUBASSEMBLIES) 2ND SHIFT	
SUPERVISOR, PRODUCTION (ORBITAL TUBE WELDING) 2ND SHIFT	

MANUFACTURING AND PRODUCTION - OPERATIONS	
BUILD RELIABILITY ANALYST	HAWTHORNE, CA, UNITED STATES
CNC MACHINIST	HAWTHORNE, CA, UNITED STATES
CNC MACHINIST (2ND SHIFT)	HAWTHORNE, CA, UNITED STATES
MANUFACTURING SPECIALIST	HAWTHORNE, CA, UNITED STATES
PRODUCTION CONTROL COORDINATOR	HAWTHORNE, CA, UNITED STATES
PRODUCTION COORDINATOR - TEMPORARY	HAWTHORNE, CA, UNITED STATES
PRODUCTION SCHEDULER - TEMPORARY	HAWTHORNE, CA, UNITED STATES
TECHNICAL TRAINER (STRUCTURES)	HAWTHORNE, CA, UNITED STATES
TEST LAB ANALYST (PRODUCTION)	HAWTHORNE, CA, UNITED STATES

MANUFACTURING AND PRODUCTION - TECHNICIANS AND TRADE SKILLS	
APPRENTICE COMPOSITES TECHNICIAN - TEMPORARY	HAWTHORNE, CA, UNITED STATES
AVIONICS ELECTRO-MECHANICAL TECHNICIAN	HAWTHORNE, CA, UNITED STATES
AVIONICS ELECTRO-MECHANICAL TEST TECHNICIAN – TEMPORARY	HAWTHORNE, CA, UNITED STATES
AVIONICS INTEGRATION TECHNICIAN (FALCON 9 ROCKET)	HAWTHORNE, CA, UNITED STATES
AVIONICS R&D TECHNICIAN, TEMPORARY	HAWTHORNE, CA, UNITED STATES
AVIONICS TEST TECHNICIAN (HARDWARE) - 2ND SHIFT	HAWTHORNE, CA, UNITED STATES
CMM INSPECTOR	HAWTHORNE, CA, UNITED STATES
CNC MACHINIST	HAWTHORNE, CA, UNITED STATES
CNC MACHINIST	HAWTHORNE, CA, UNITED STATES
CNC MACHINIST	HAWTHORNE, CA, UNITED STATES
CNC PROGRAMMER	HAWTHORNE, CA, UNITED STATES
CNC PROGRAMMER	HAWTHORNE, CA, UNITED STATES
CNC ROUTER SHOP SUPERVISOR	HAWTHORNE, CA, UNITED STATES
CNC VERTICAL MILL MACHINIST	HAWTHORNE, CA, UNITED STATES
CNC VERTICAL MILL MACHINIST - 2ND SHIFT	HAWTHORNE, CA, UNITED STATES
CNC VTL MACHINIST	HAWTHORNE, CA, UNITED STATES

SpaceX was founded u… than one where we are… goal of **enabling human life on Mars.**

CAREERS UNIVERSITY



©elenabsl, 123rf.com, October 9, 2018

Oxford Martin, Citi, World Bank:

- AI is accelerating, doubling every year
- Computing power accelerating, doubling every year
- Internet connectivity: 2013 13 bn, 2030 500bn
- Developing countries at risk
  - increasing divergence of incomes
  - loss of traditional path to development

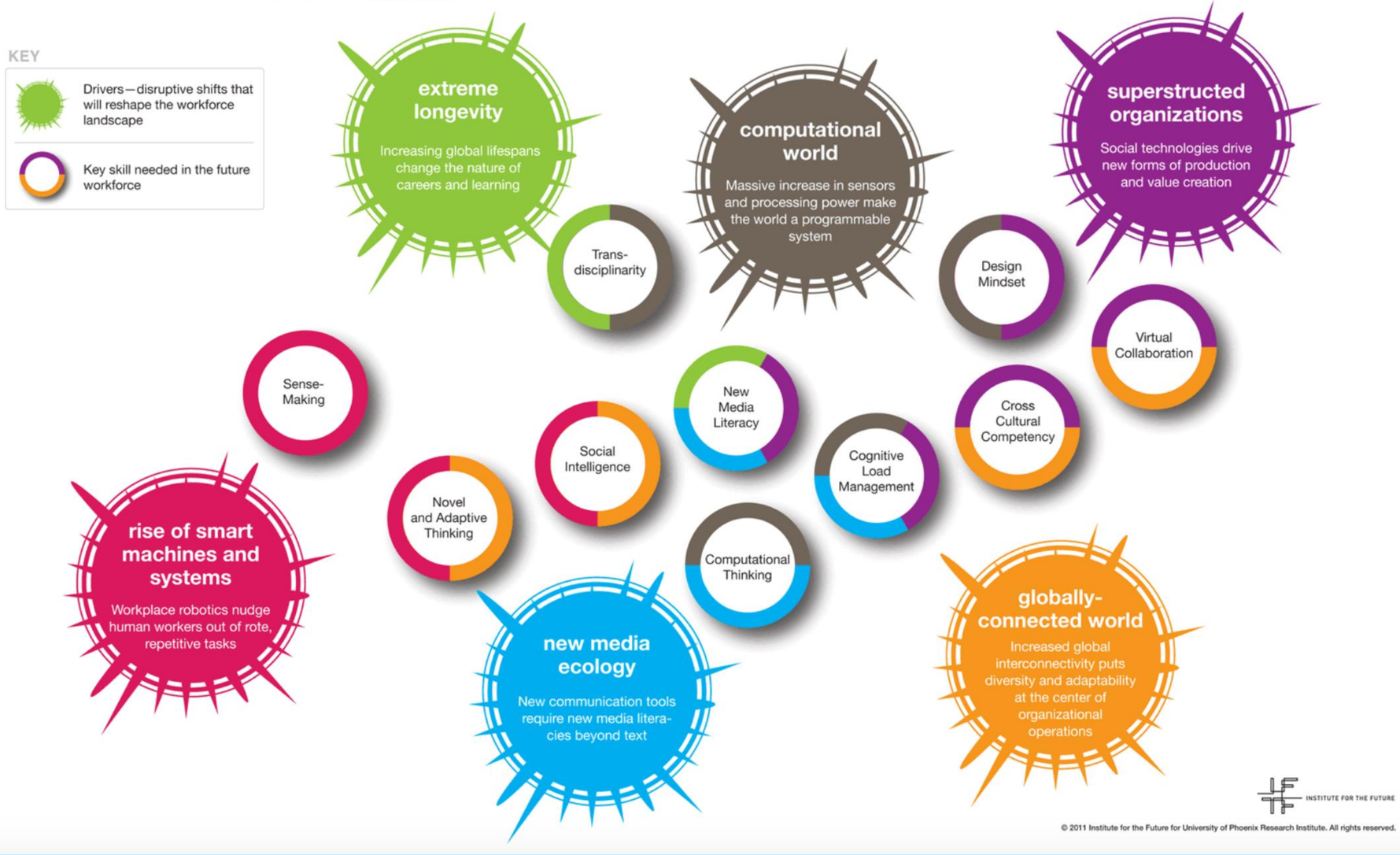
World Economic Forum, Klaus Schwab

- The Fourth Industrial Revolution is more significant and profound than any other period of human history

Brynjolfsson and McAffee (MIT) 2nd Machine Age will lead to:
Greater Divergence of income and opportunity?

Future Work Skills 2020

While all six drivers are important in shaping the landscape in which each skill emerges, the color-coding and placement here indicate which drivers have particular relevance to the development of each of the skills.



©2011 Institute for the Future
University of Phoenix Research Institute

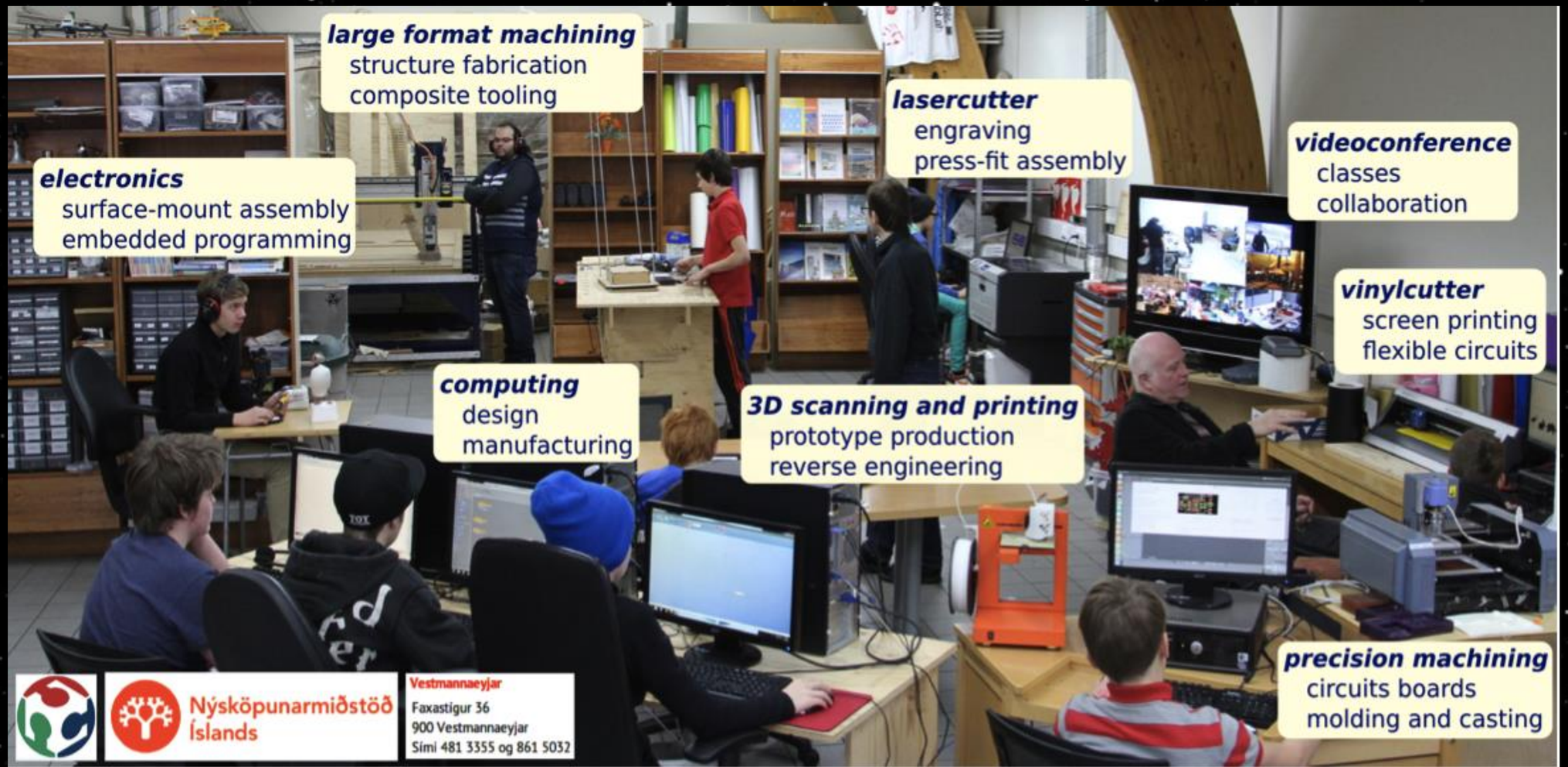
Levels of Engagement:
Emergent Learning Innovators

Emergent Networks:
Maker Movement, Fab Labs, Open Source Community, Blockchain

Fab Lab Network:
A nimble community of change agents, using digital fabrication technology as platform for innovation and change

Fab Learner:
An individual doing projects in a fab lab… a cross-disciplinary, iterative, personally engaging learning experience

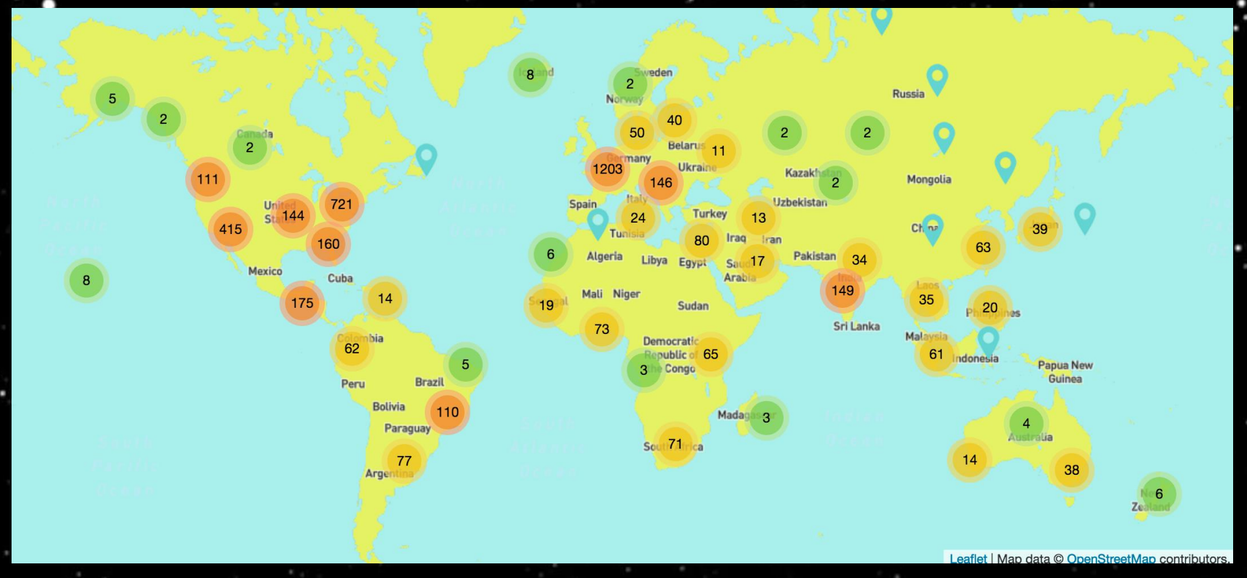
Fab Labs



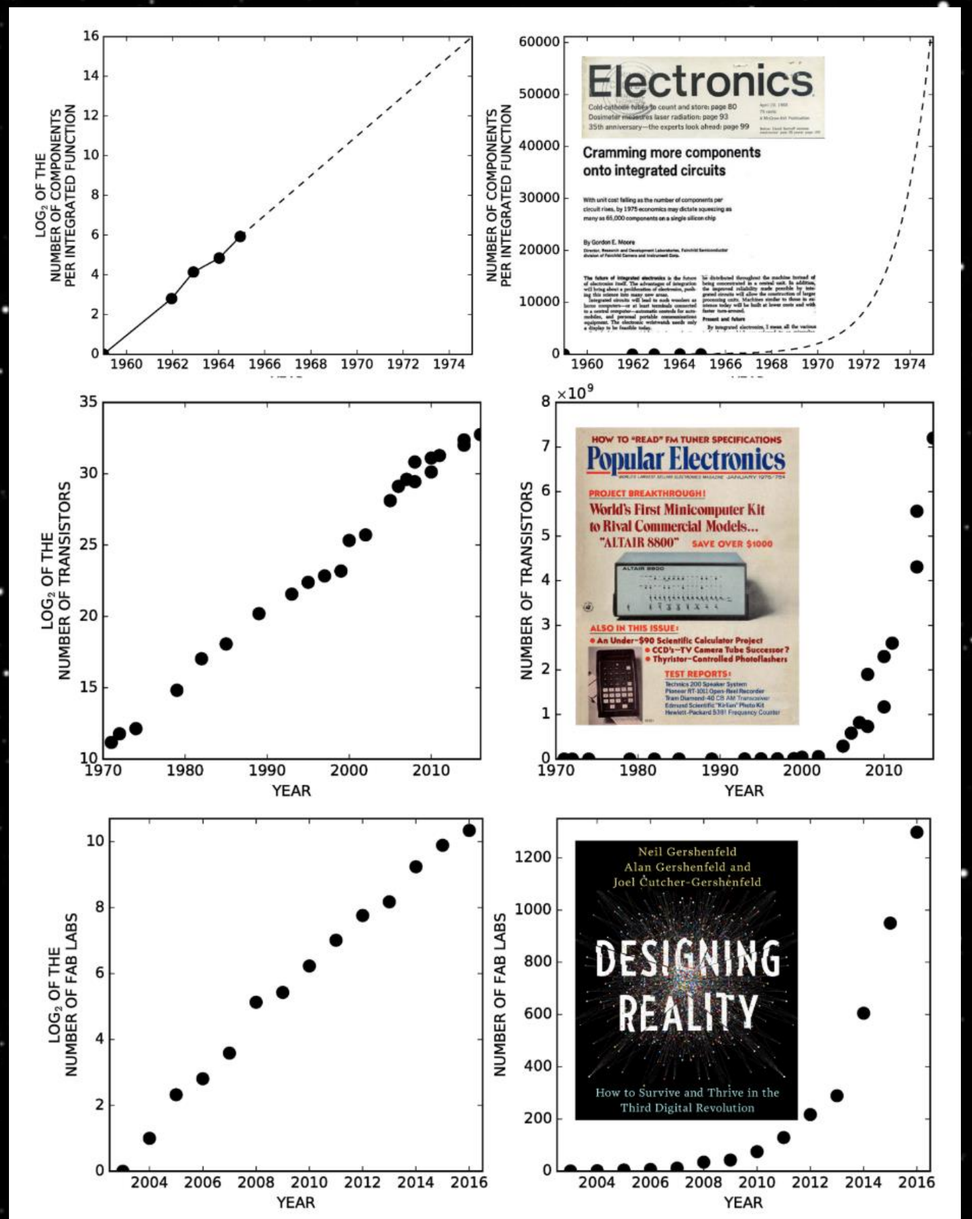
Emergent Learning

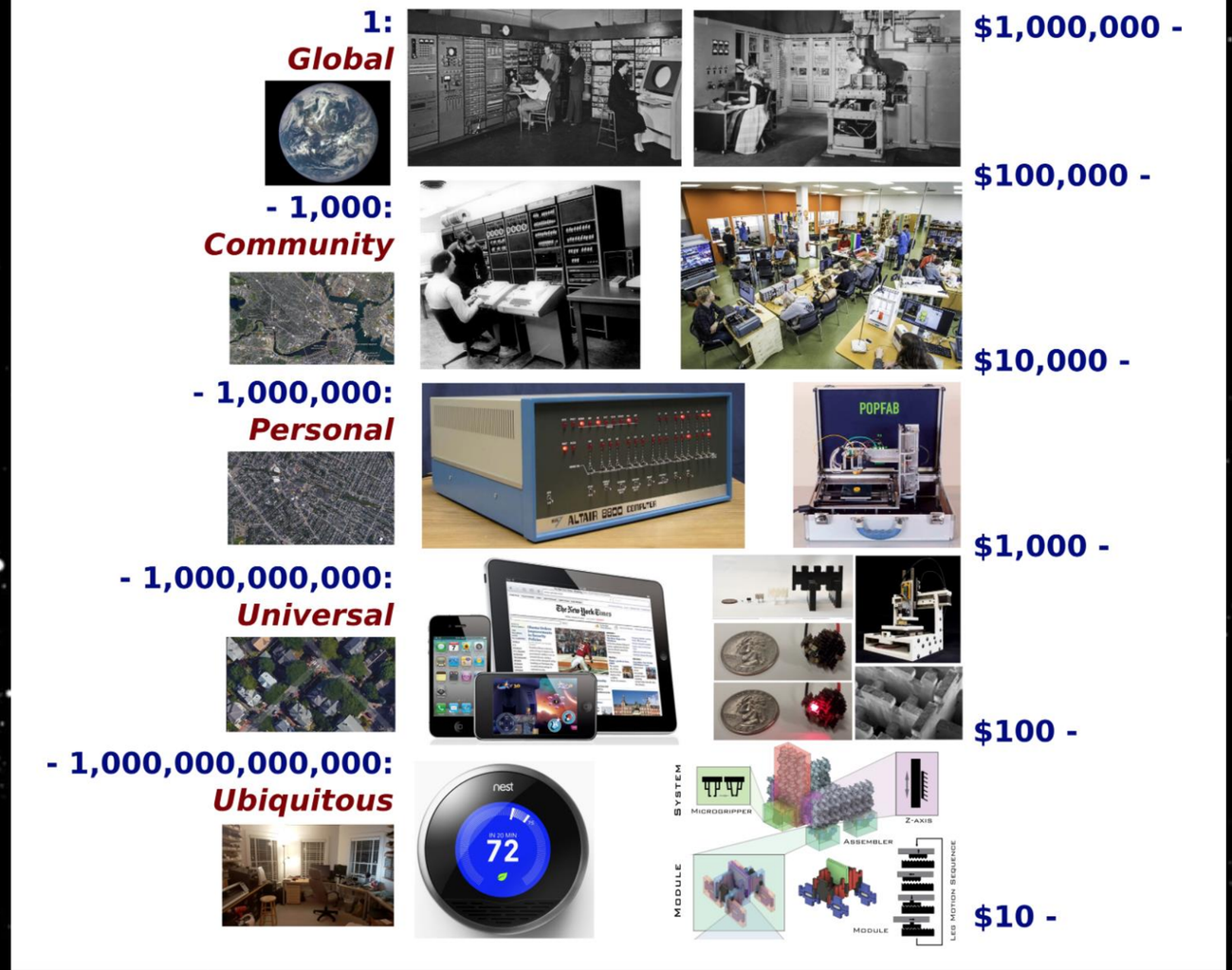
The Fab Lab Network:
~1300 Labs in 100 Countries
https://www.fablabs.io/labs/map

ANANSE Group Map
~5000 + Fab Labs, Makerspaces,
Hackerspaces & Innovation Hubs
http://52.197.65.30:5000/map



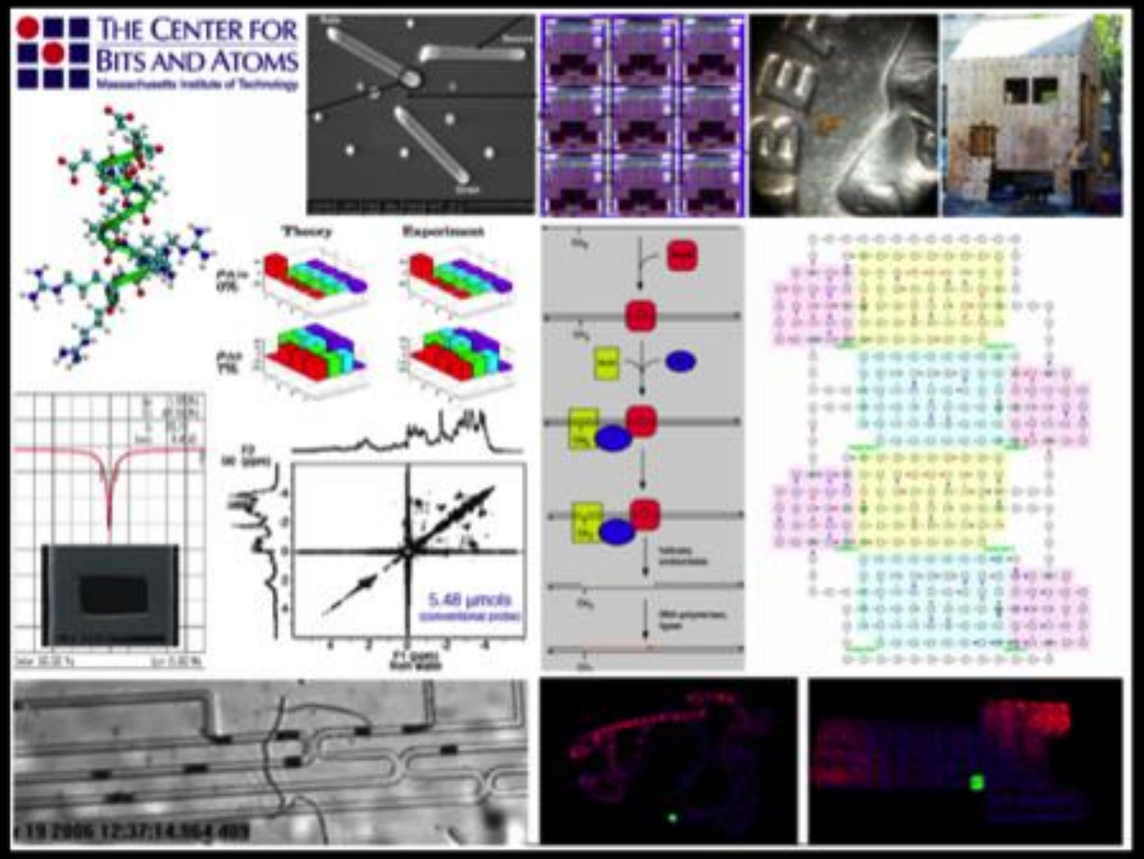
Scale and Scope of Networks





2018 Neil Gershenfeld, MIT

Center for Bits and Atoms
Physical Science + Computer Science



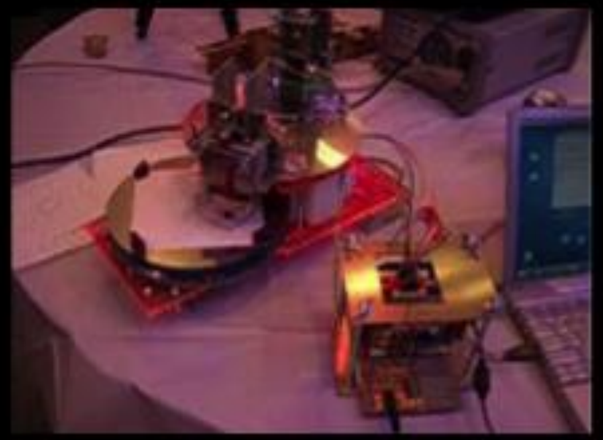
Neil Gershenfeld
Director, Center for Bits & Atoms, Massachusetts Institute of Technology

THE CENTER FOR BITS AND ATOMS
Massachusetts Institute of Technology

MIT Origins

How to Make (almost) Anything

Date	Subject
9/10	Design Tools, Input Devices
9/24	Machining
10/1	3D Printing, NC machining
10/15	Laser, Water Jet, NC Knife Cutting
10/22	Materials and Finishes
10/29	Forming and Molding
11/5	Basic Electronics
11/12	ECAD
11/19	Sensor Technology
11/26	Programmable Logic
12/3	Microcontrollers
12/10	Wired & Wireless Communications



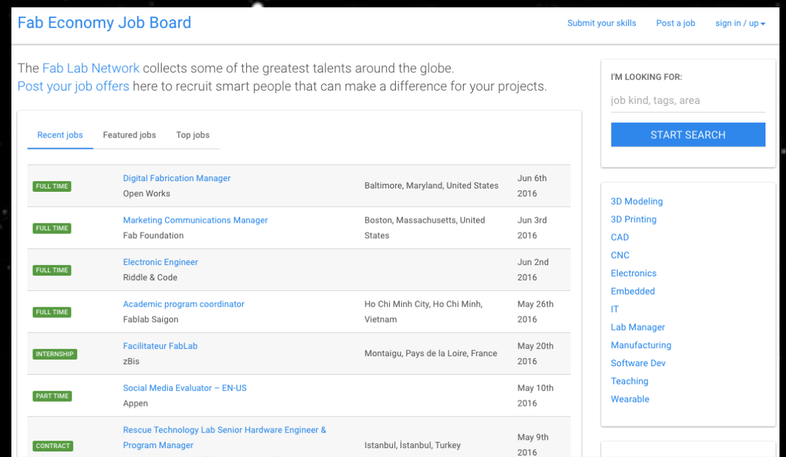
Neil Gershenfeld
Director
Center for
Bits & Atoms
MIT

THE CENTER FOR BITS AND ATOMS
Massachusetts Institute of Technology

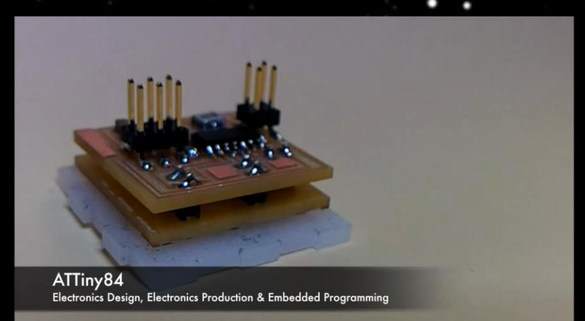
MIT Origins

Learning in a Fab Lab:
Fab Academy's Global Campus

FABECONOMY



SPORE



Emergent Learning

Fab Lab Learning: Guillaume Teyssie

Emergent Learning

Fab Lab Learning: Pedagogy of Digital Fabrication

Individual:

Imagine, Create, Fail, Iterate, Innovate

(Project-based, personal, applied science, physical embodiment of abstract concepts, just in time learning- pull for knowledge as needed, apply it right away.)

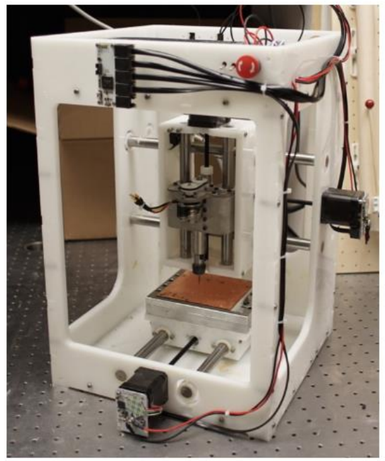
SCOPES-DF:

Teacher Community of Practice in STEM and DF for formal classrooms, K-12

Machines that Make

The Machine that Make project at the MIT Center for Bits and Atoms is developing rapid-prototyping of rapid-prototyping machines, that can be used in fab labs.

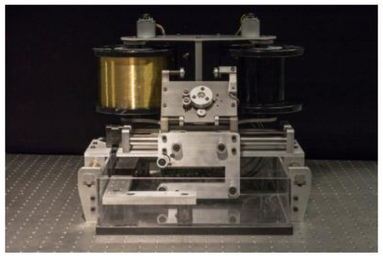
MTM class



Modular Machines and Mods

Modular Machines controlled with Modular Software

Desktop Wire-EDM



A Wire-EDM that fits on your desktop

Modular Robot

Reconfigurable modular robot with interchangeable end-effectors

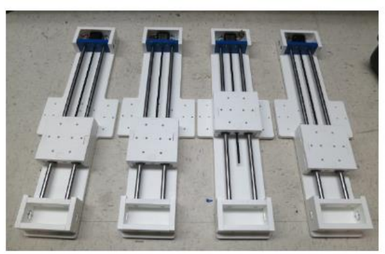
Tube carver

Milling machine for round stock

[m]MTM: modular machines that make

More modular machines out of prototyping materials for prototyping

Reconfigurable Stages



Reconfigurable one-axis stages for multi-purpose motion

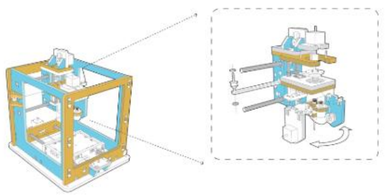
foldafab

A deployable medium-format CNC router

DIY EDM

An entry level EDM machine for making carbide/HSS tooling and/or lead screws

5 Axis Timing Belt MTM



Low cost 5 axis machining

ABOUT ROAD MAP NEWS GET INVOLVED CONTACT FAQ

FAB CITY

LOCALLY PRODUCTIVE GLOBALLY CONNECTED CITIES

36 028 00 28 39

YEARS DAYS HOURS MINUTES SECONDS

until cities produce

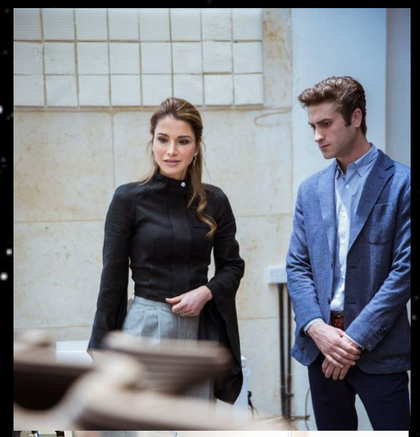
START

MEMBER CITIES

BARCELONA
BOSTON
SOMERVILLE
CAMBRIDGE
EKURHULENI
KERALA
GEORGIA
SHENZHEN
AMSTERDAM
TOULOUSE
OCCITANIE REGION
PARIS
BHUTAN
SACRAMENTO
SANTIAGO DE CHILE
DETROIT
BREST
CURITIBA

Fab.city

Fab Lab Irbid, Jordan



Fab Lab Terre des Hommes Ioannina, Greece

Making for Others

FabLAT

Addressing UN Sustainability Goals

Open-Source, Open Resources

Sherry Lassiter, Director
The Fab Foundation
http://fabfoundation.org
info@fabfoundation.org