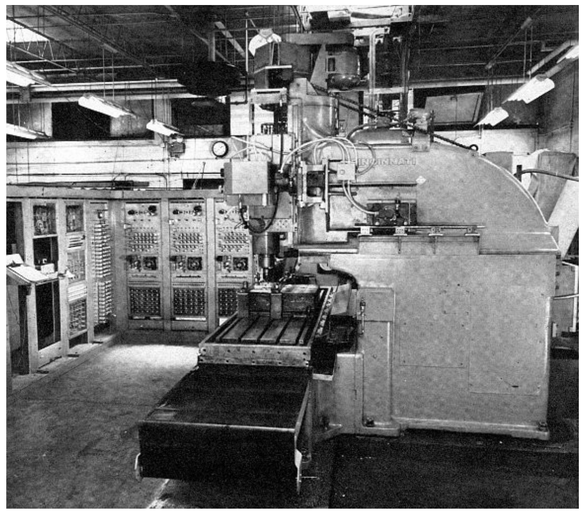
Manufacturing at MIT
2022 and Beyond

John Hart (ajhart@mit.edu) and colleagues

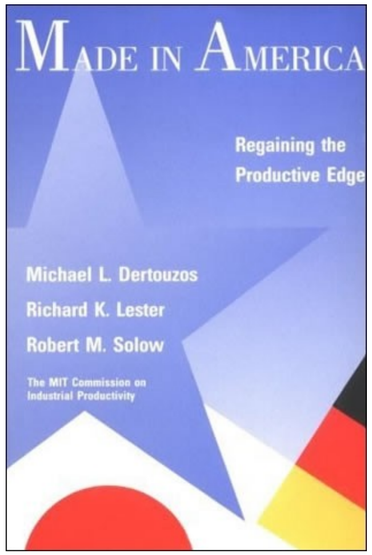
A history of manufacturing at MIT



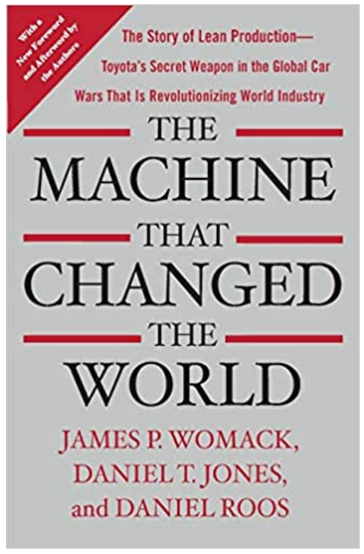
CNC machining (1955)

3D printing (~1990)

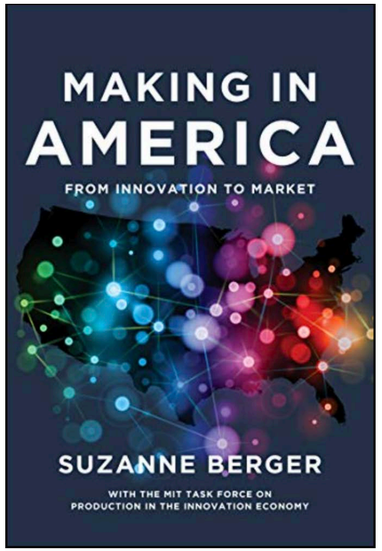
MIT startup Gingko Bioworks



1989

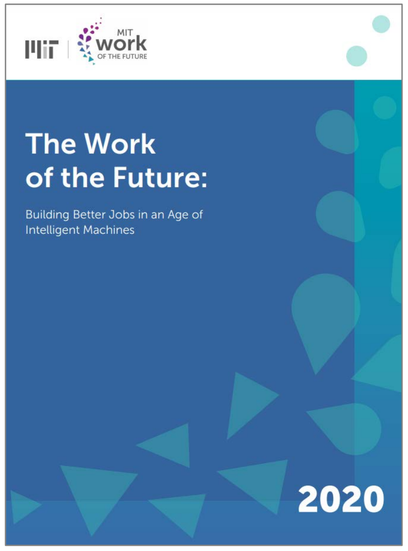


1991

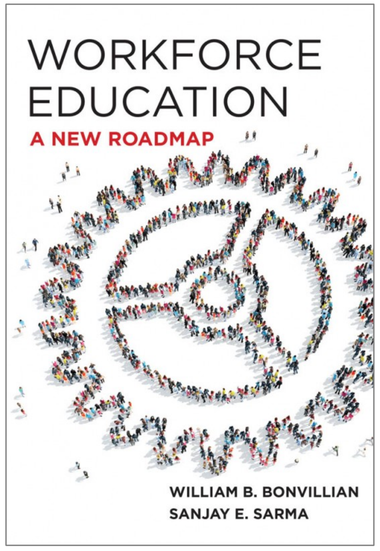


2013

2014



2020



2021

Securing Defense-Critical Supply Chains

An action plan developed in response to
President Biden's Executive Order 14017

February 2022

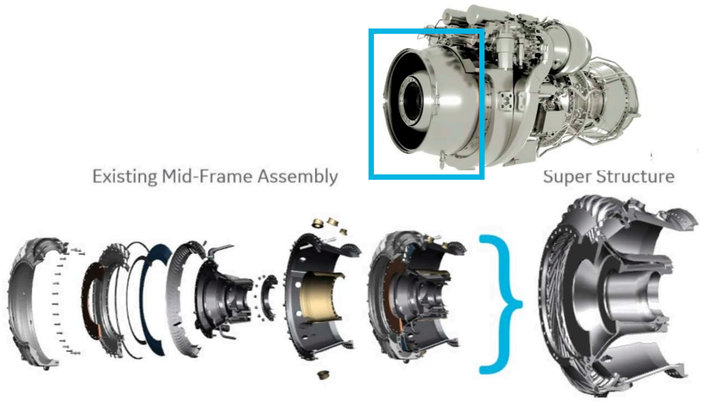
Tesla Gigafactory Texas (“largest factory building by volume”, 2022)
The factory is the product - the machine that makes the machine (Elon Musk)

has a plan.

We’ve been carbon neutral since 2020.
By 2030, all our products will be too.

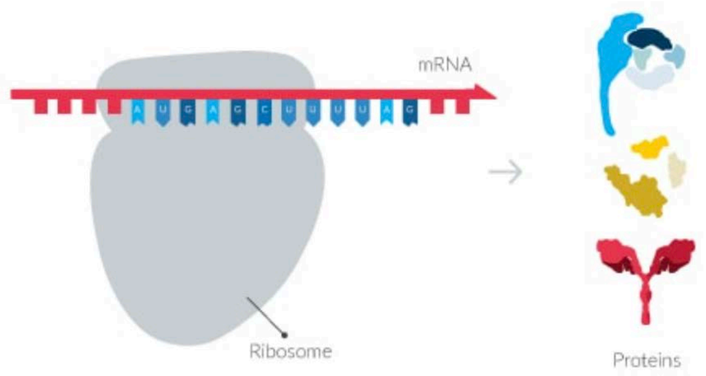
See the plan

Technology frames the frontier of manufacturing

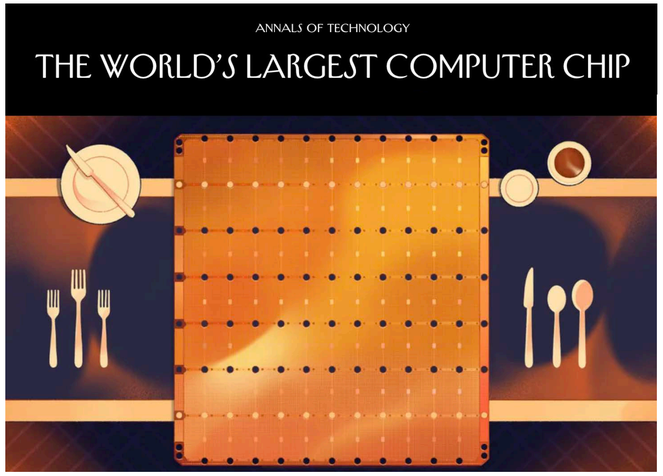


3D printing

Flexible automation



Bio and cell-based manufacturing



Electronics and photonics

Materials and recycling

Design and simulation

Sources: GE, Bright Machines, Moderna, *New Yorker* (Cerebras Systems), Redwood Materials, MIT (Faez Ahmed)

1: Charting the next generation of manufacturing

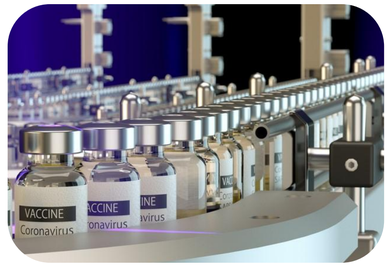
Supported by Schmidt Futures

- What are the technical and economic limits of flexible and digital manufacturing?
- Will these technologies redistribute value among firms, and enable more agile supply chains?
- What could restore high-value manufacturing in the US?

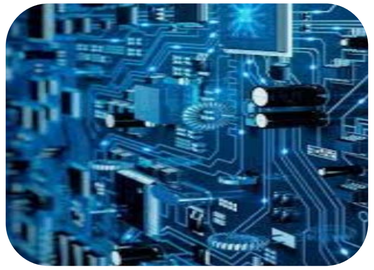
Four research thrusts

Technology scaling laws	Software infrastructure	Economic models across scales	Workforce and organization needs

Five contexts



Critical supplies



Advanced electronics

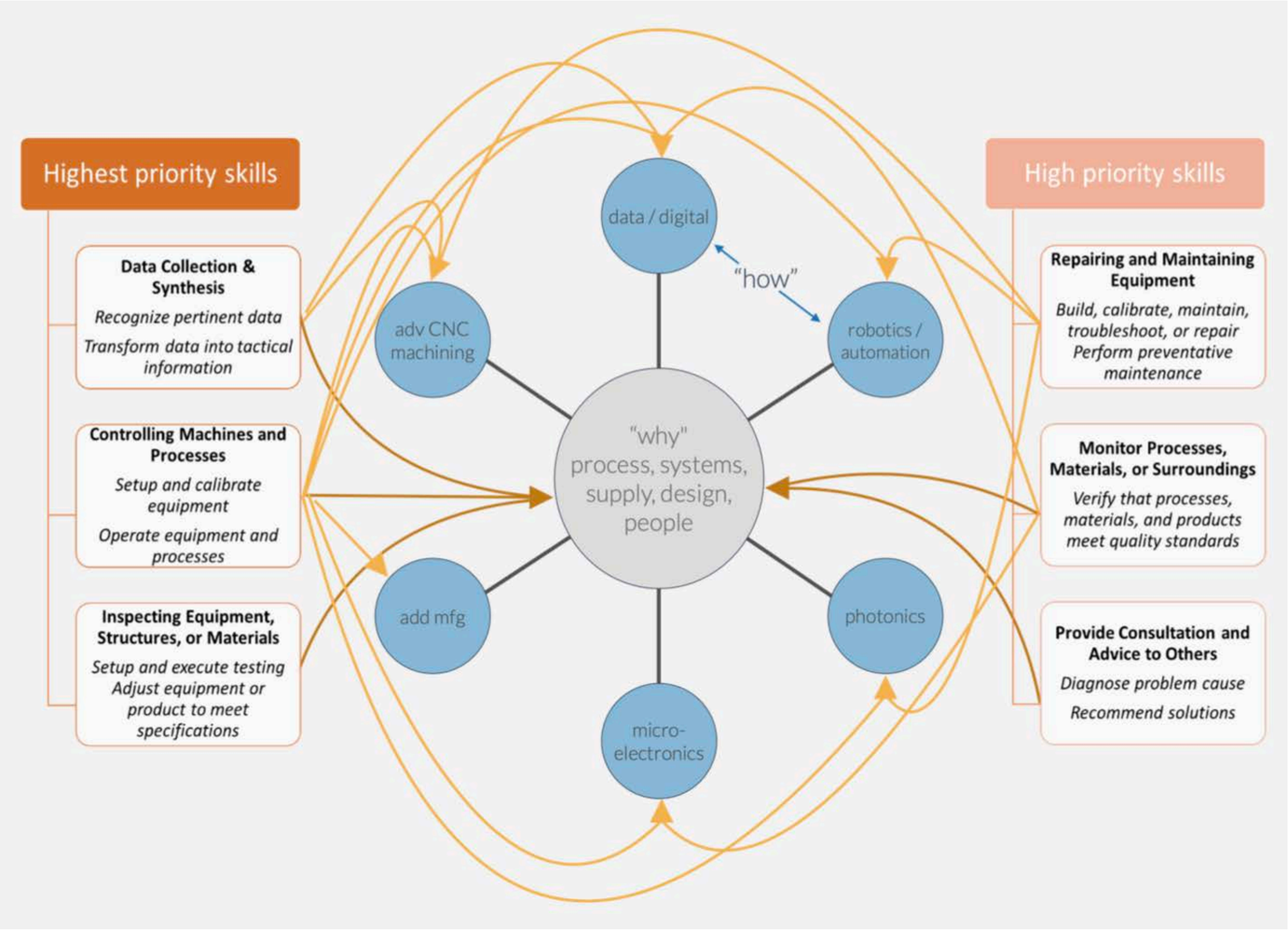
Low-volume complex systems

Batteries and electric vehicles

Mass-produced consumer goods

Hart, Armstrong, Kirchain, Liu, Berger, Lester, et al.

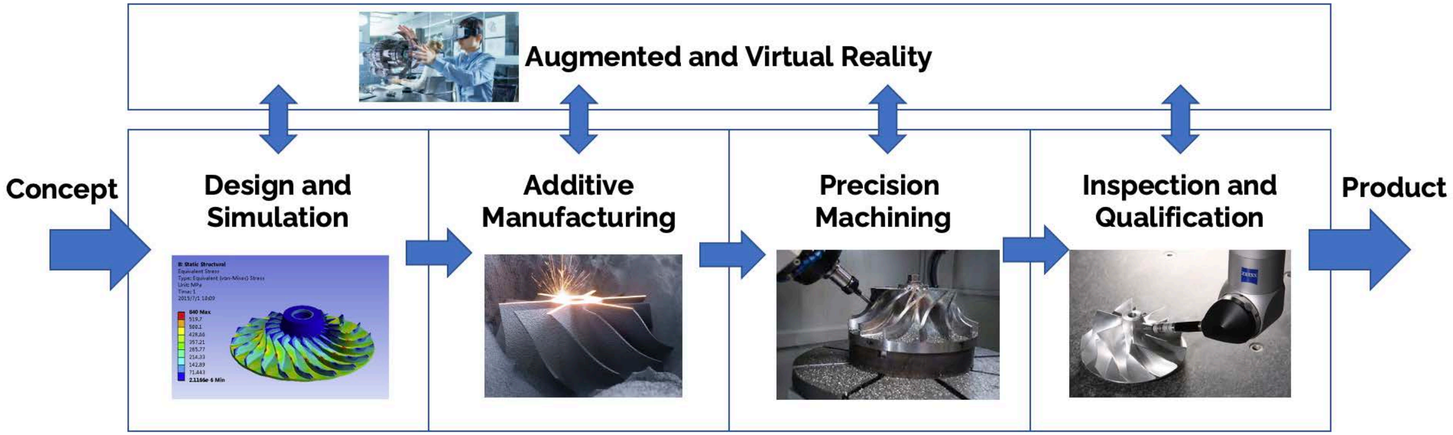
2: Advanced manufacturing technician training

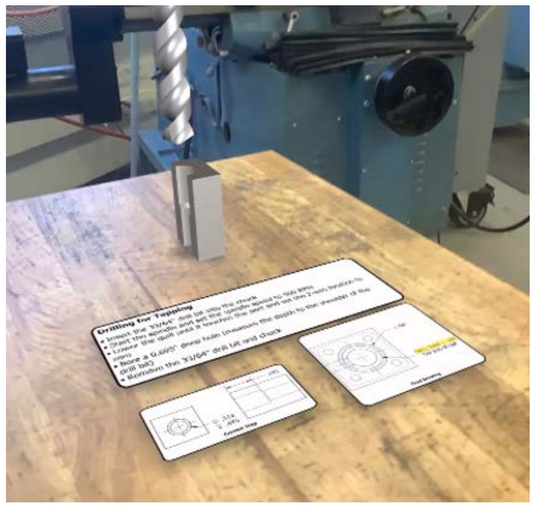


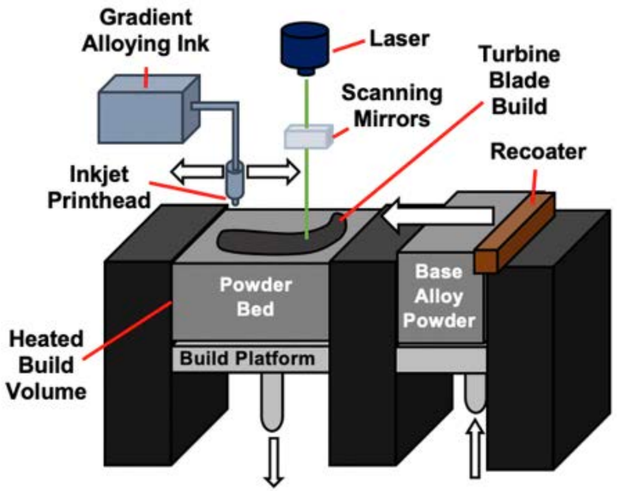
- "Technologist" = technician-engineer hybrid
- 9-month training program
- Over 190 company commitments to internships and work-learn opportunities
- Plan to place 500+ technologists in New England Region

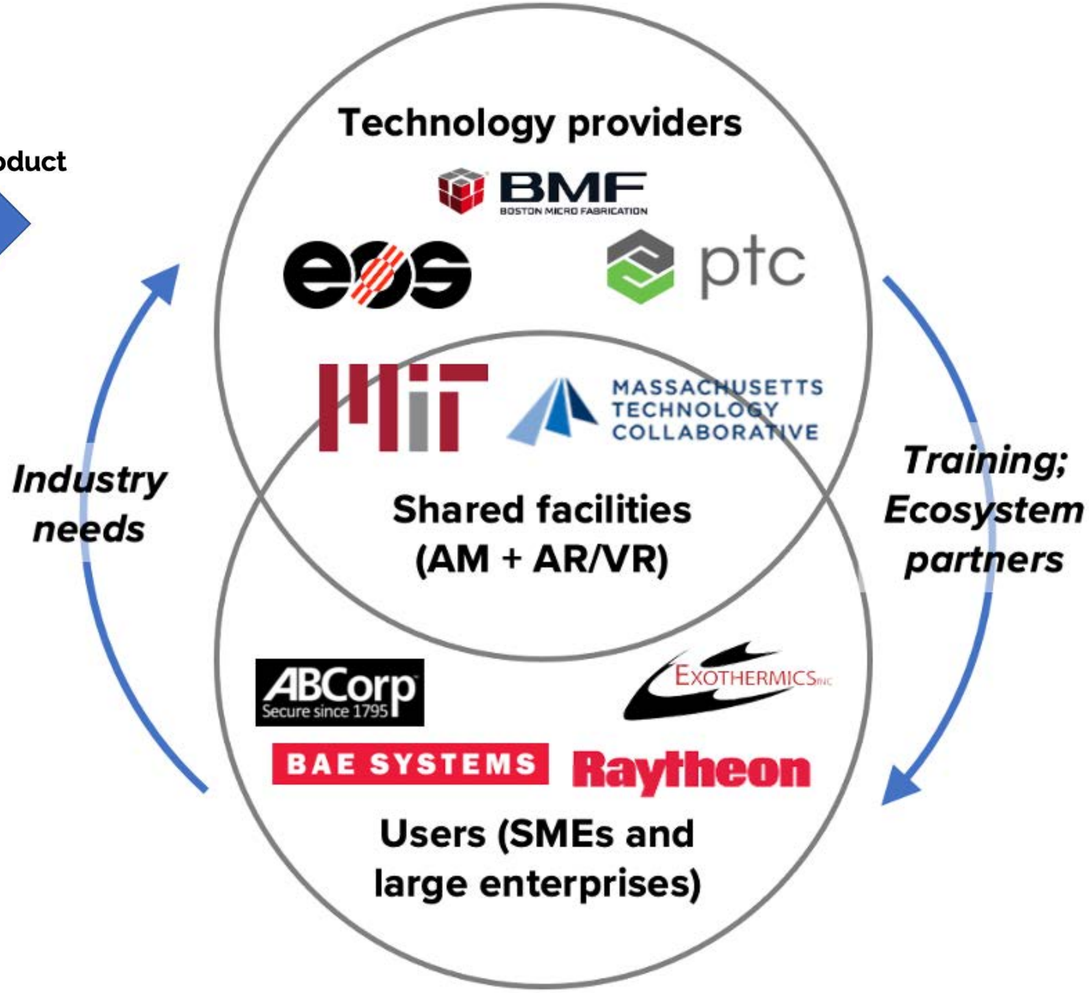
Led by Dr. John Liu

3: Integrated digital manufacturing facilities for research, prototyping, and education



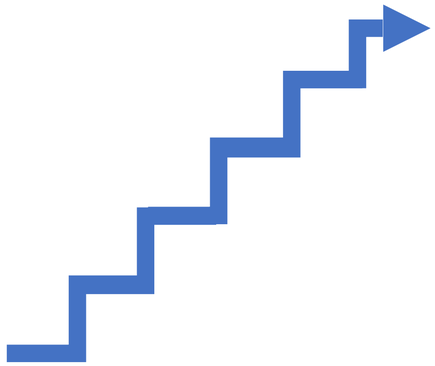






Manufacturing *for* a better world

Technology



Equity — Growth — Sustainability

Thank you

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