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Global Value Chains: Knowledge-based Capital and the Positioning of Countries and Industries

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Growth, Innovation and Competitiveness: Maximizing the Benefits of Knowledge-Based Capital

OECD

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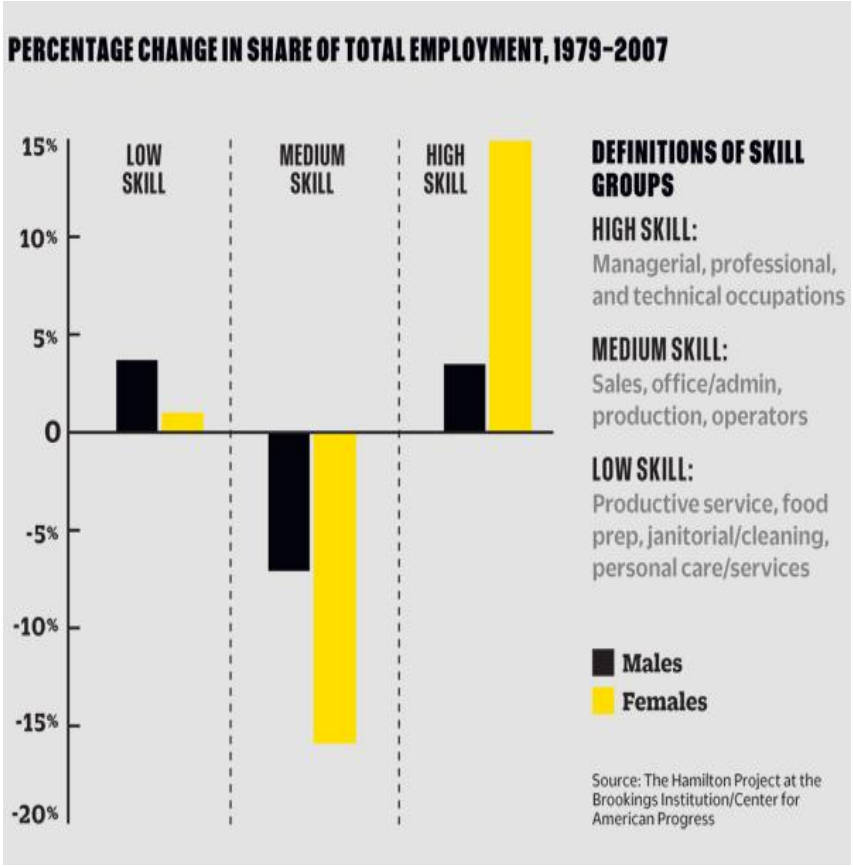
Sensing, Automation, and Data Driven Manufacturing

Factory 2.0: GE's advanced battery plant in Schenectady is a test-bed for the "industrial Internet."

Kiva Mobile-robotic Warehouse Automation System
http://www.kivasystems.com/solutions

A High Performance Workforce for the Future

- Cultural change in attitude toward manufacturing-related education
- Workers at all levels will require:
  - IT and modeling and simulation training
  - analytical and computational methods
  - use of high precision tools
  - understand outputs from large volumes of data
  - engagement in lifelong learning
- Reduce inequality (return to the Deming model)
- Invest in Community College Level Education
- Develop Partnerships to Provide Skills Certifications and Accreditation



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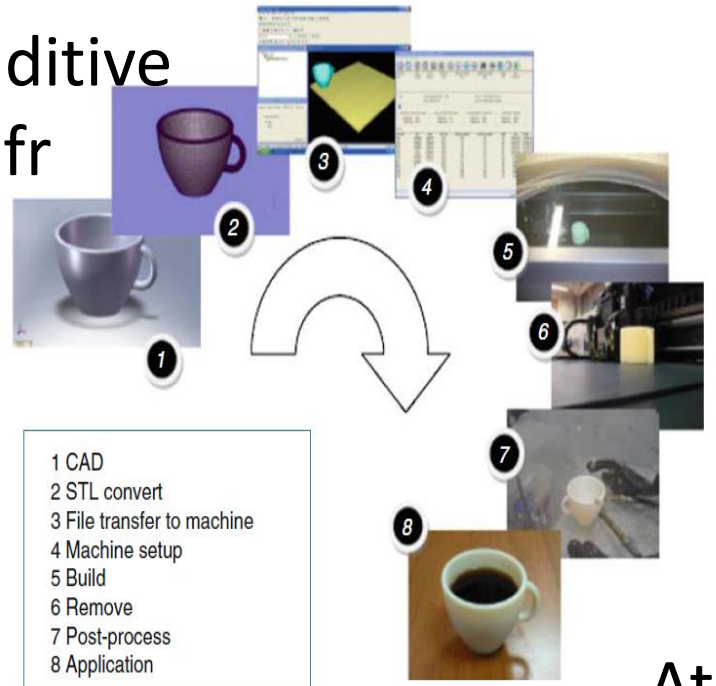
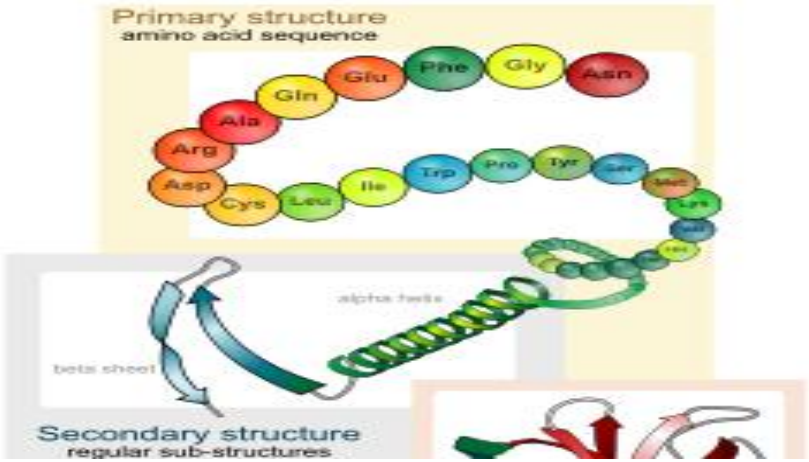
New Manufacturing Methods are the Future

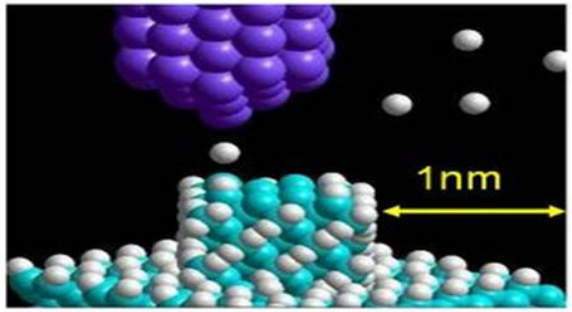
Additive Mfr



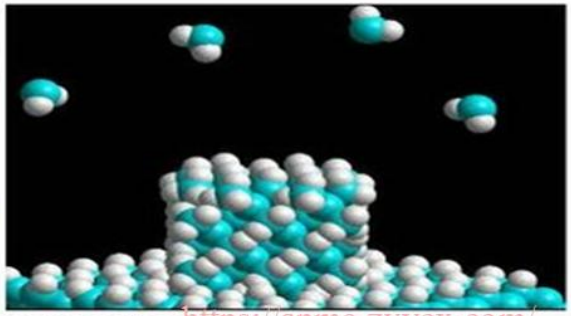
Synthetic Biology



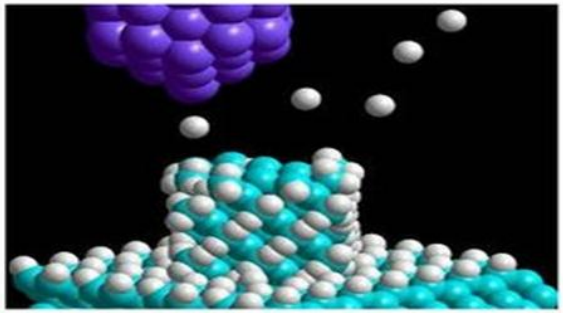
Atomically Precise Mfr



Invariant **atomically-precise STM tip**, with closed loop computer control, inside UHV system, removes H from Si surface with atomic precision



In deposition phase, gaseous SiH_2 radicals deposit one Si atom wherever H atom is removed (**patterned Atomic Layer Epitaxy**)



After each deposition cycle, SiH_2 is evacuated and patterning step is repeated to create **designed 3D structure**

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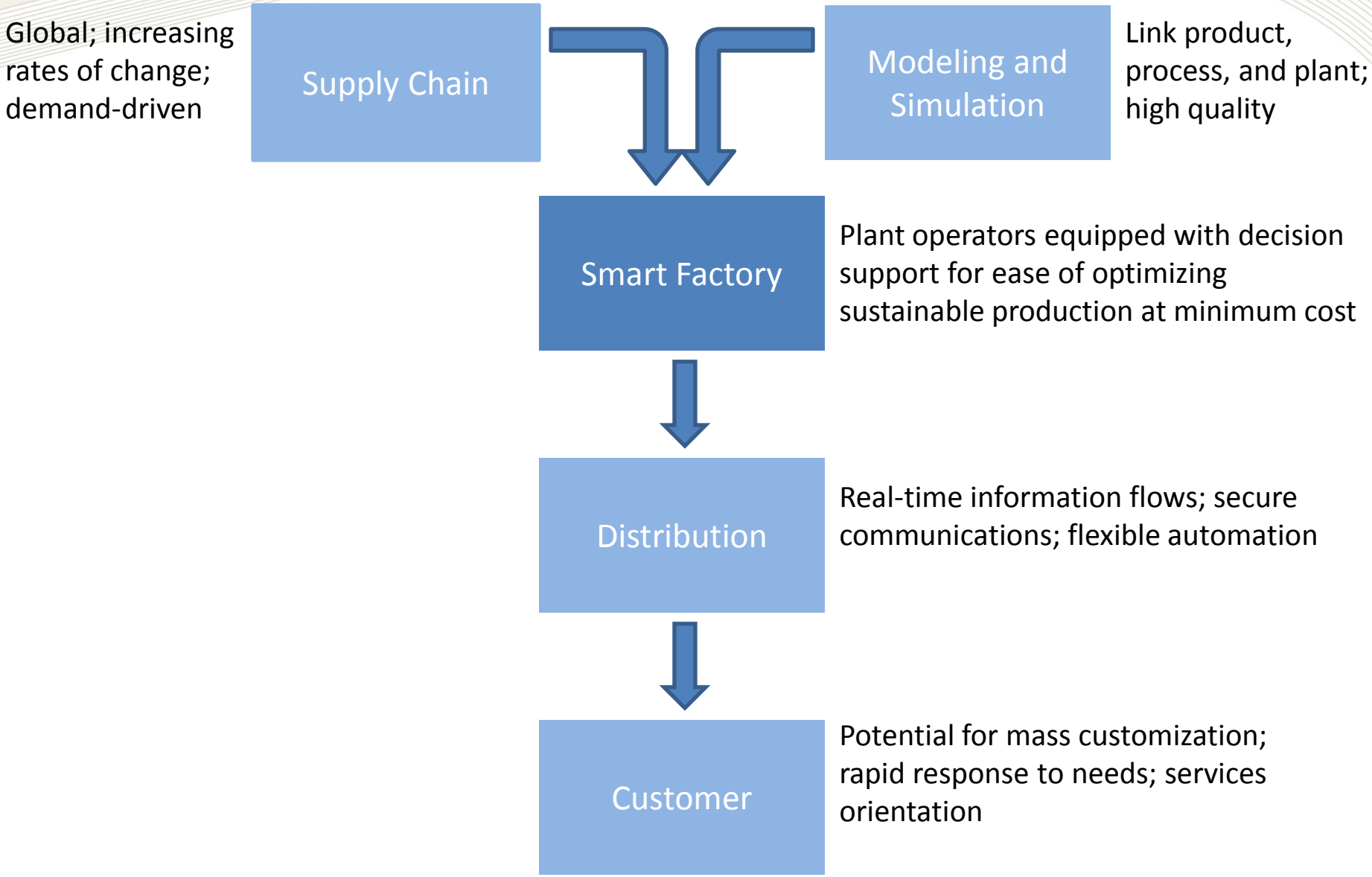
The Factory of the Future: Enterprise Innovation



Policies to Ensure Smart Future

- Address workforce and education needed for new manufacturing world
- Increase investment funding in STI
- Address regulations for new sectors - ethics, safety, and security concerns
- Increase cybersecurity infrastructure
- Intellectual Property Regimes (IPR) across countries
- Improve measurement of the manufacturing sector, including spillover effects