The Manufacturing Mandate

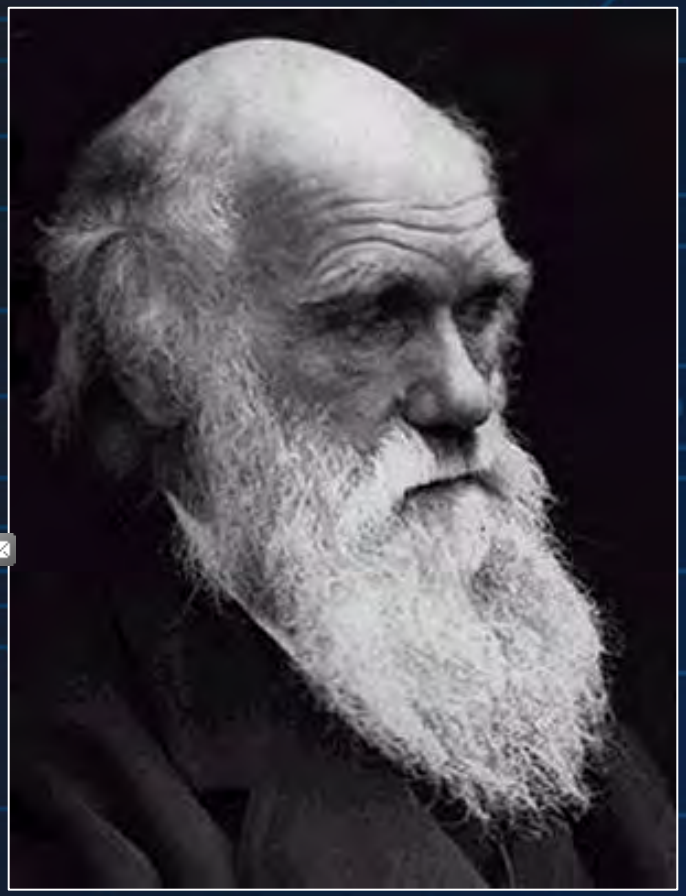
Douglas K. Woods
President


MANUFACTURING
MANDATE

National Policy

Innovation

The primary source of economic growth, competitiveness, and increases in standards of living in a globalized economy is innovation in the form of new products and services, more efficient production processes, and new business models.

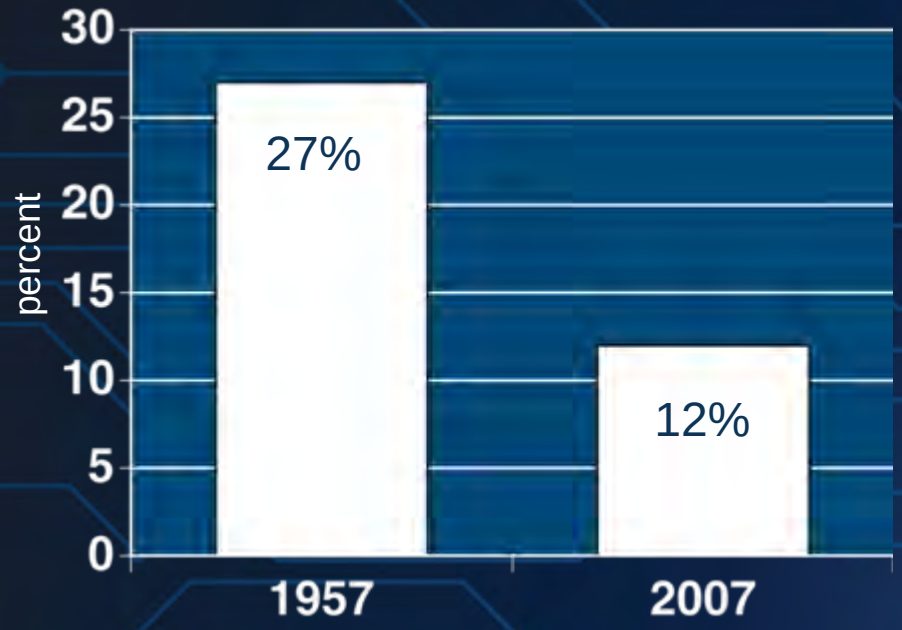


“It is not the strongest of the species that survive, nor the most intelligent, but the one most responsive to change.”

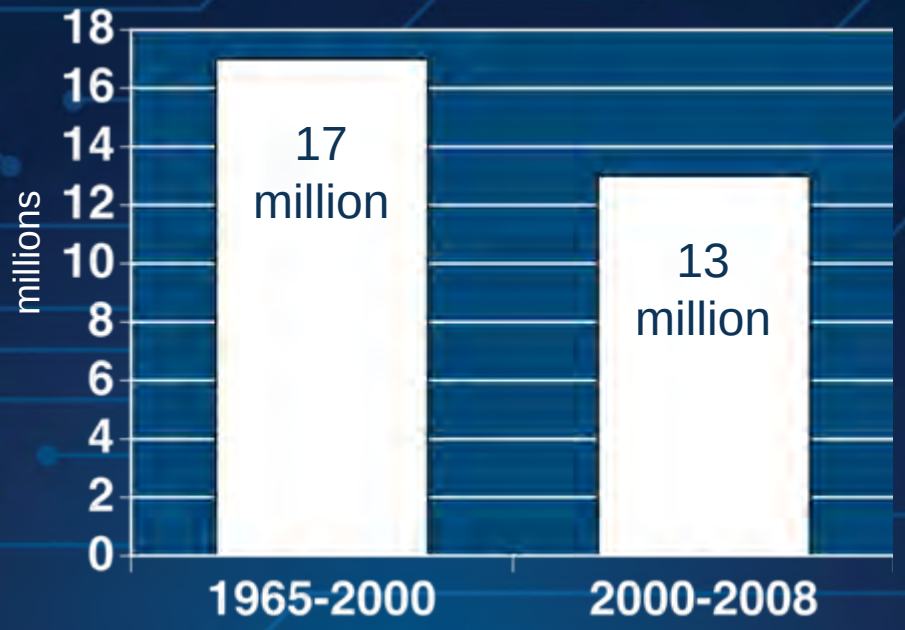
Charles Darwin *(1809-1882) English Naturalist*

Trends in U.S. Manufacturing

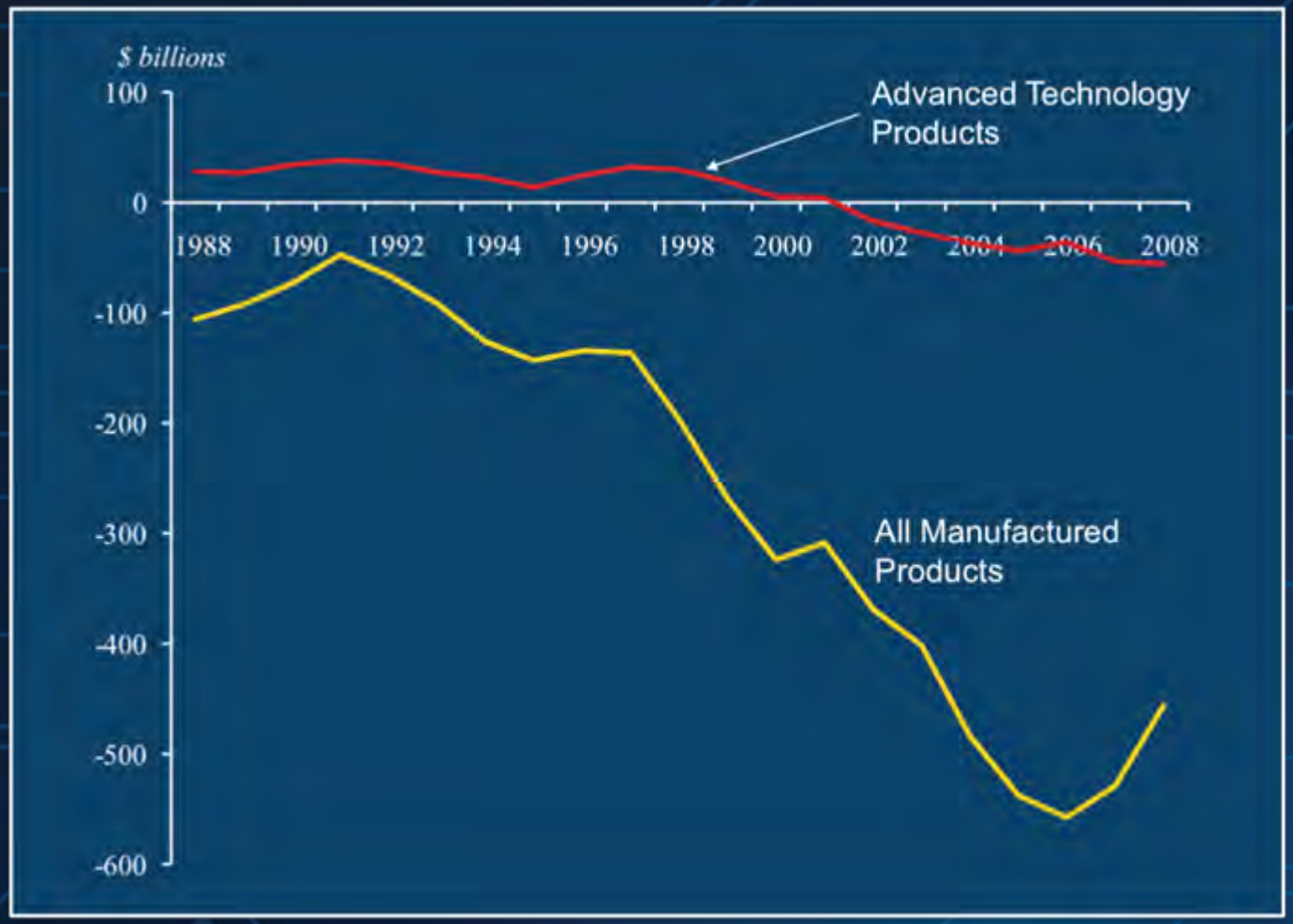
Manufacturing Percent of GDP



Manufacturing Employment



U.S. Trade Balances for High-Tech and all Manufactured Products



Source: Census Bureau, Foreign Trade Division

Importance of R&D Investment

Trends in Value Added by Major Industry Group

Industry (NAICS Code)	% Change in Value Added 1985–2000	% Change in Value Added 2000–2007	R&D Intensity 2003
GDP	132.6	40.6	2.6
Manufacturing (31-33)	(92.7)	(13.4)	3.6
Motor Vehicles and Parts (3361-63)	(84.0)	(-16.6)	(2.5)
Textiles, Apparel and Leather (313-16)	(8.2)	(-30.4)	(1.6)
Computer & Electronic Products (334)	144.5	(-21.2)	9.0
Publishing, including Software (511)	225.1	(18.9)	17.1
Information & Data Processing (518)	305.4	63.7	8.7
Professional, Scientific & Tech. Services (54)	249.6	49.3	10.0
Health Care (621-23)	194.6	60.4	3.9

Source: Bureau of Economic Analysis for value added and National Science Foundation for R&D intensity

Changing Fortunes of the Tech Sector

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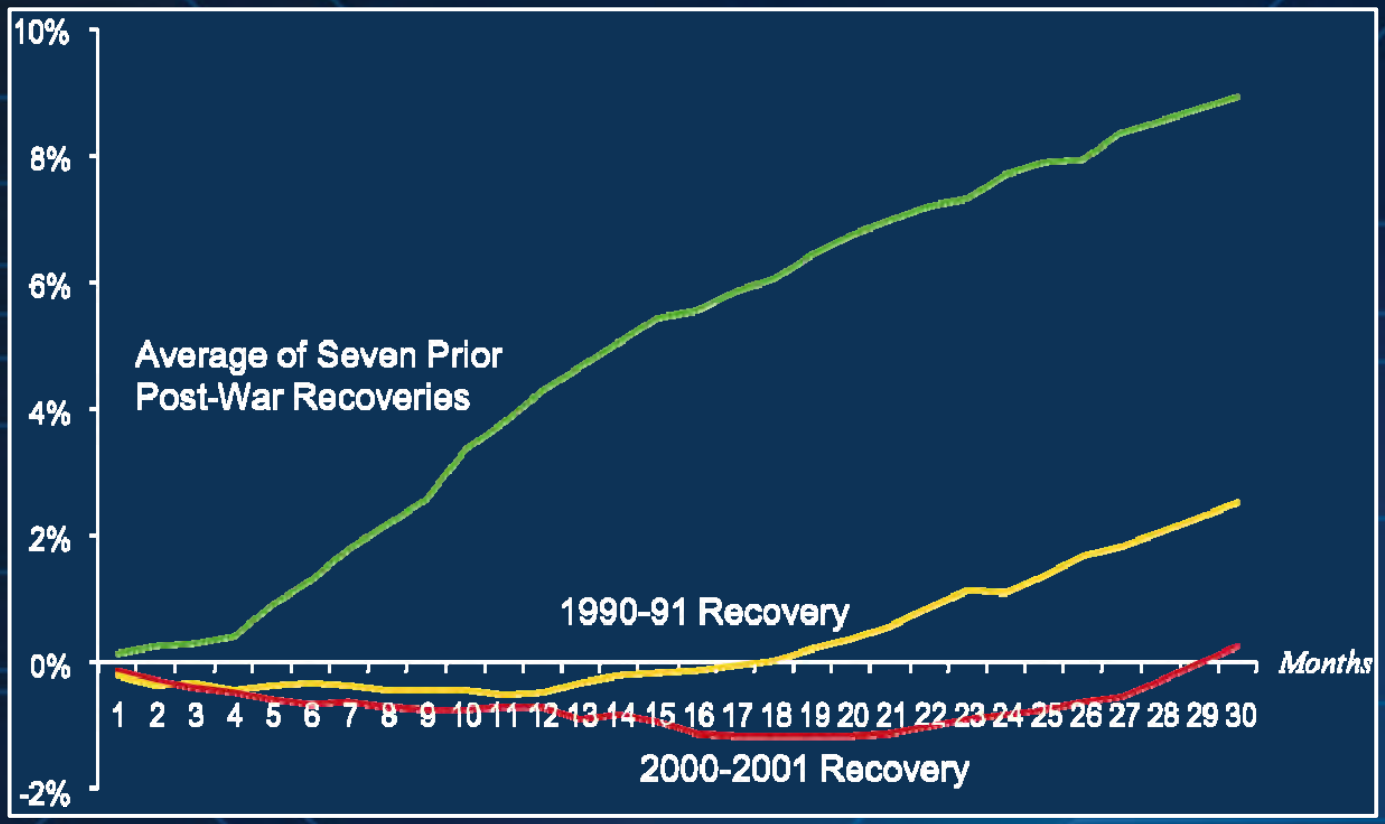
Impact on Employment Recovery

Employment Growth in Post-World War II Business Recoveries
Percent Change from Recession Trough



Source: Tassey, 2007a (BLS for employment data; NBER for recession trough dates; employment data are for non-farm, private industry)

Offshoring Impact – Changing Equilibrium

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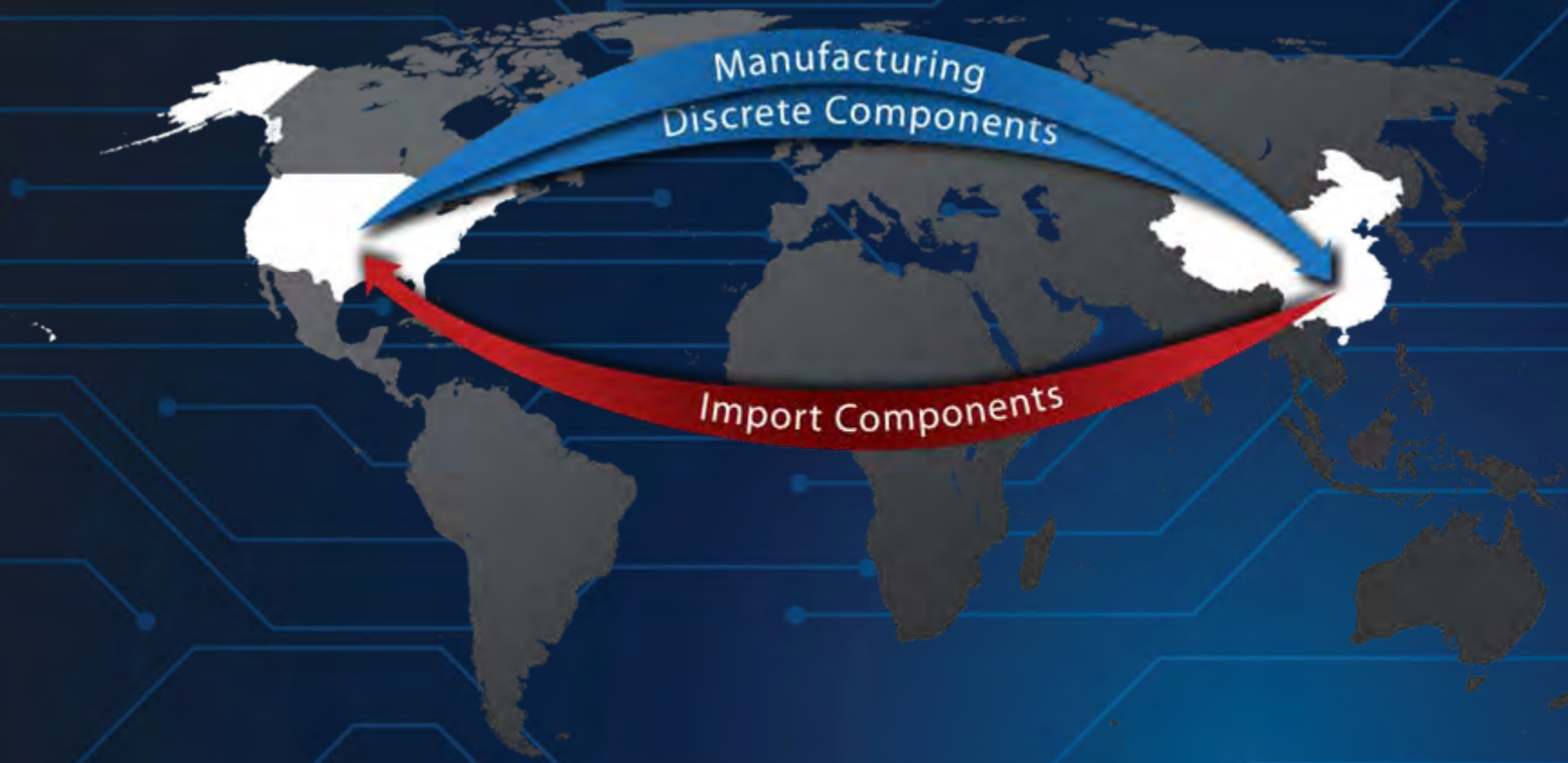

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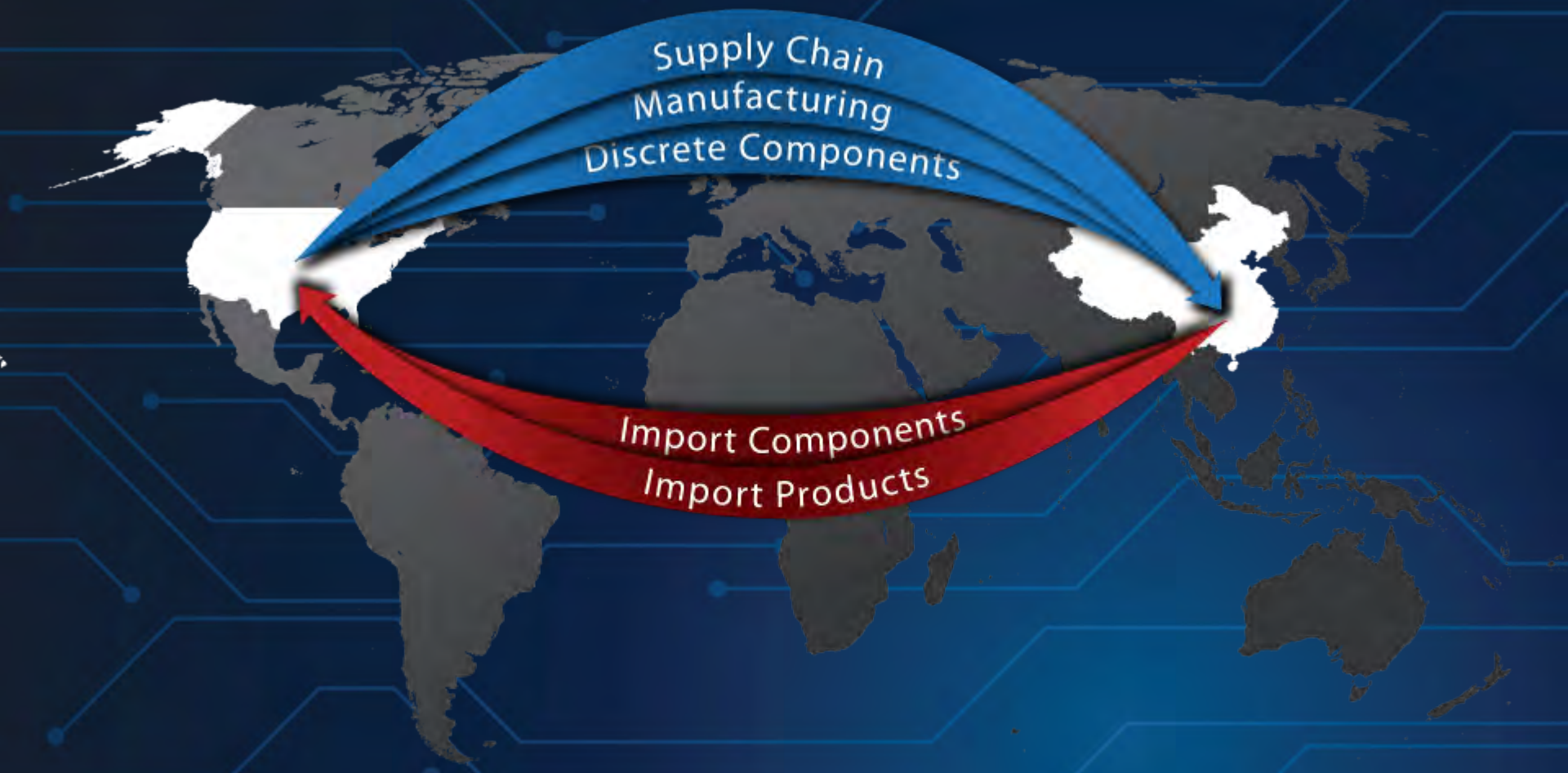
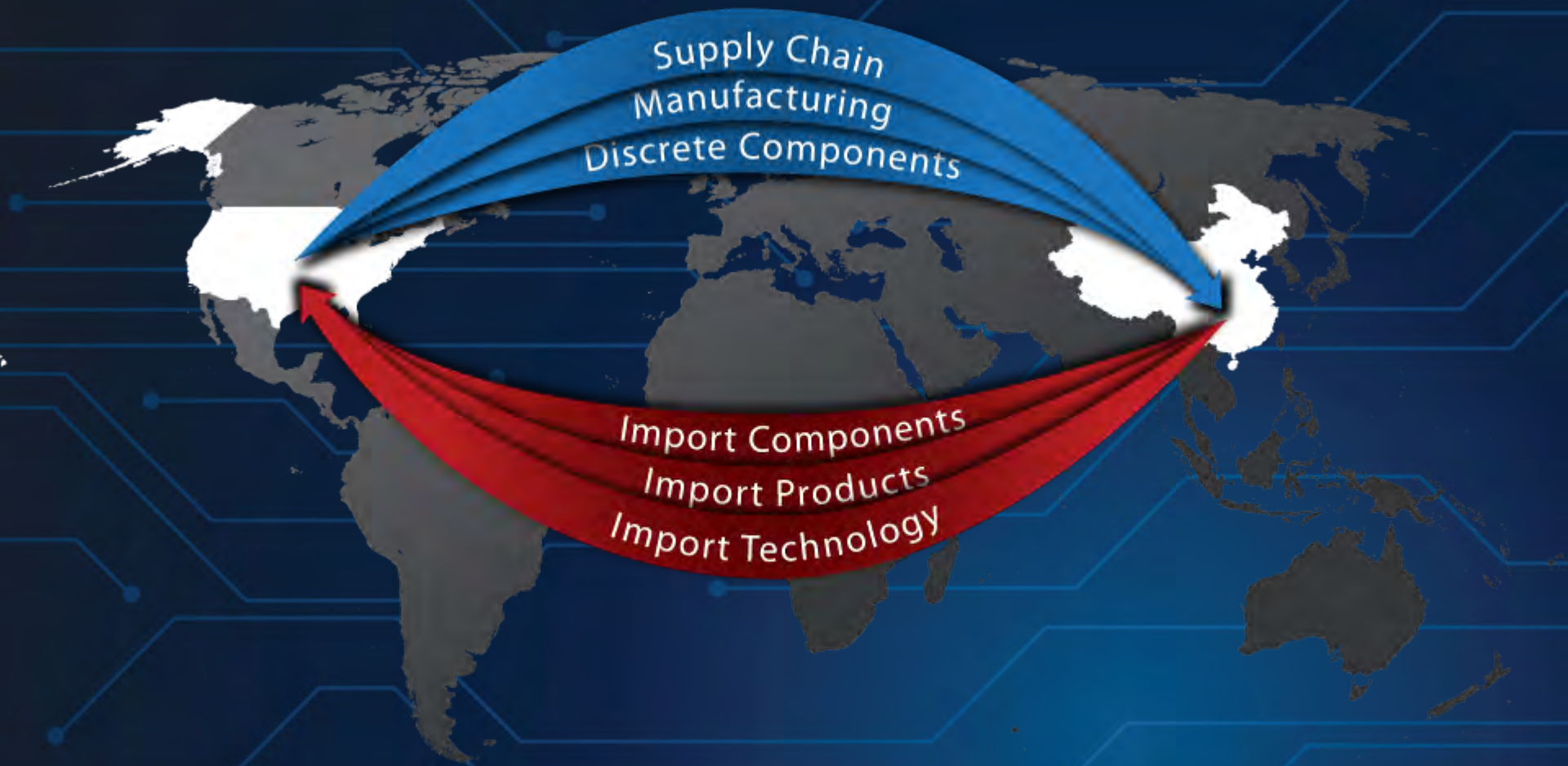
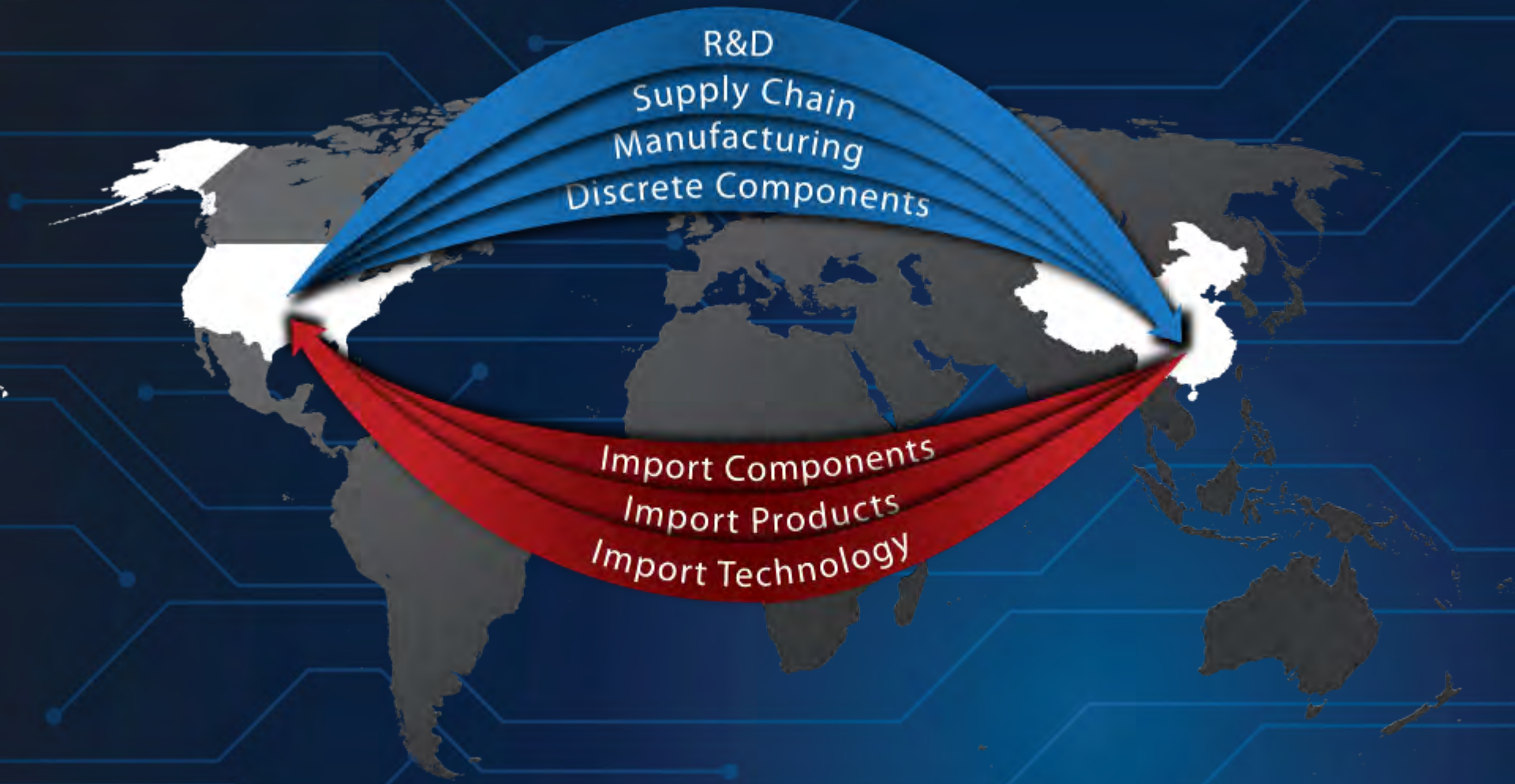


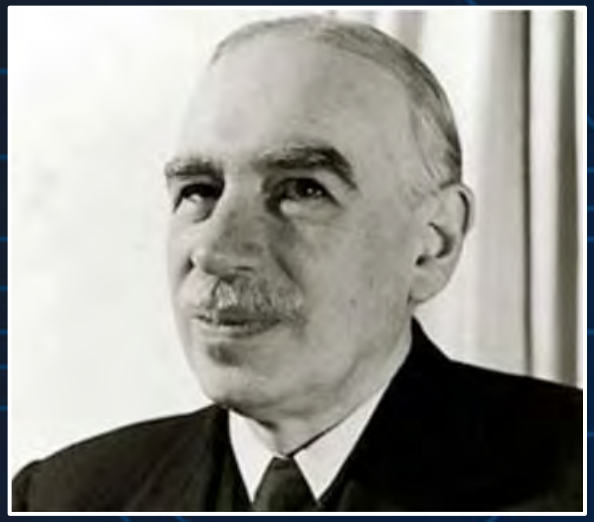
Offshoring Impact – Changing Equilibrium



Offshoring Impact – Changing Equilibrium



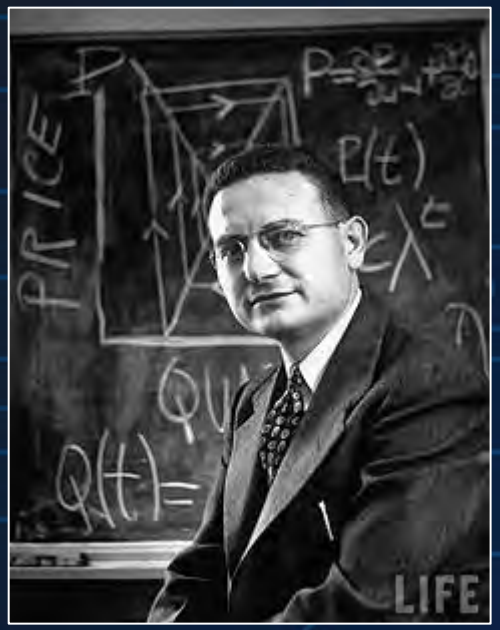
Where Do We Want to Be?



Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.

John Maynard Keynes

Comparative Advantage

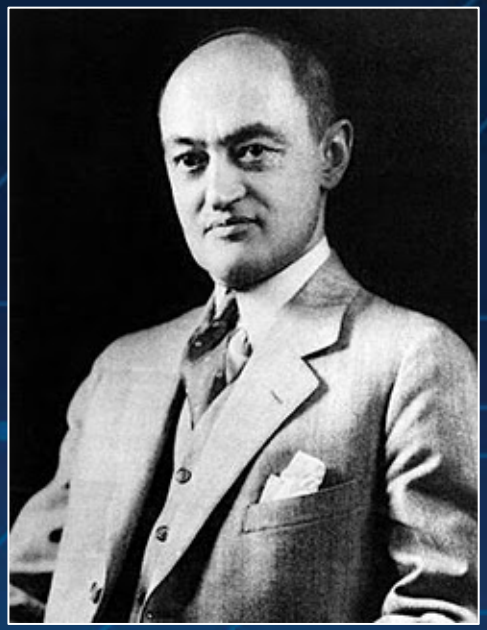


Paul Samuelson

Neoclassical Economics

vs.

Creative Destruction



Joseph Schumpeter

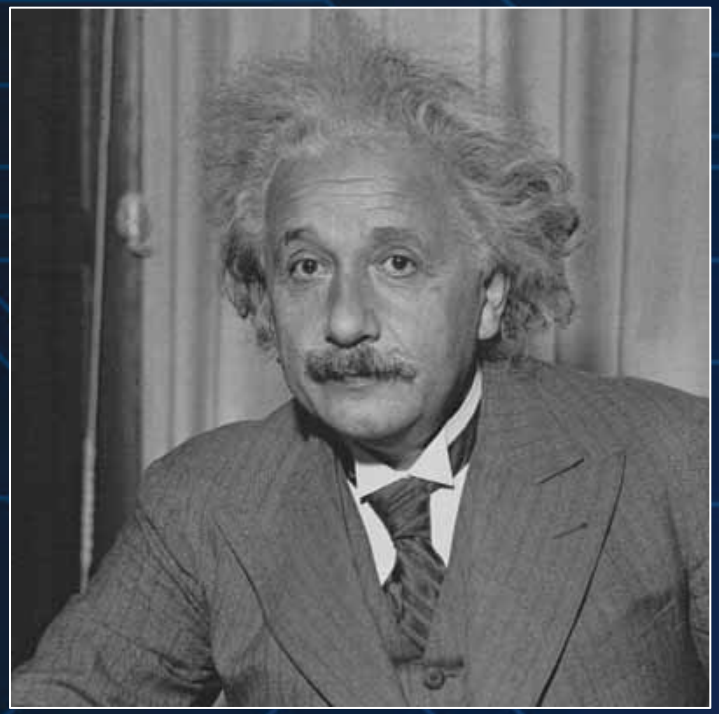
Innovation Economics

Time for a new economic model!

- **Neoclassical Economist**
- Accumulation of capital drives economic growth
- Growth is achieved by maximizing allocation efficiency
- Focus on markets and prices
- The economy tends toward equilibrium
- Individuals and firms are rational maximizers and respond to incentives

- **Innovation Economist**
- Innovation drives economic growth
- Growth driven by productive efficiency and adaptive efficiency
- Spurring evolving and learning institutions is key to growth
- The knowledge-based economy tends towards change rather than equilibrium
- Individuals and firms are not rational maximizers
- Smart public/private partnerships are the best way to implement policy.

Time for a new business model

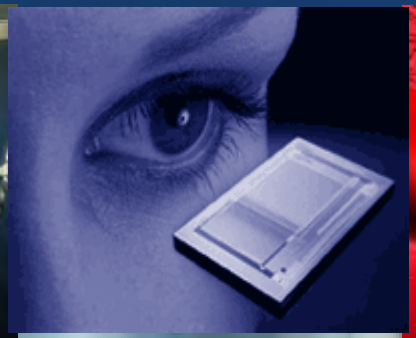
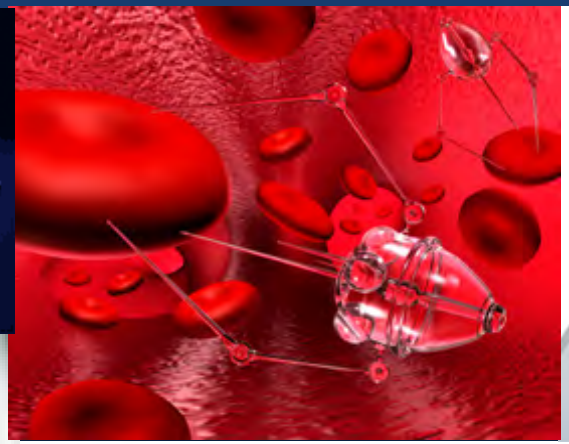


"Innovation is not the product of logical thought, although the result is tied to logical structure."

Albert Einstein

What do we mean by Innovation?

Innovation: *The way of transforming the resources of an enterprise through the creativity of people into new resources and wealth.*









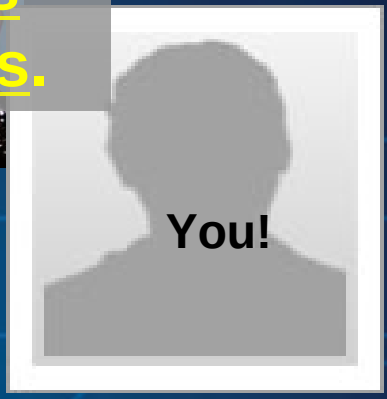


You don't need to be the creator to be the Innovator!

The Innovation Zone (*T. Kouropoulos*):

Innovation is not about creating something new.

It's about taking something that exists and aligning it with the market's needs.



Innovation is changing…

1. Occurring more rapidly and barriers of geography and access have come down.
2. Requires wider collaboration across disciplines and specialties.
3. The concept of IP is being re-thought in light of these collaborative demands.

Characteristics of Innovative Companies

- All innovative companies have a "real" strategy and well-defined processes
- R&D developments are customer-focused innovations
- Invest more than 5% of revenue in new R&D
- Invest more than 5% of revenue in new equipment annually on a three year average
- Provide more than 20 hours of formal training annually per employee
- **Innovative companies are led by innovative leaders… it's that simple!**

Source: "Next Generation Manufacturing Study"– American Small Mfrs Coalition

Technologies that will shape our future…

NBIC: Nanotechnology, Biotechnology, Information Technology and Cognitive Science

- **Artificial Intelligence**
- **Bio Technology**
- **Chemistry**
- **Computers**
- **Electronics**
- **Energy**
- **Imaging**
- **Information**
- **Medical**
- **Nanotechnology**
- **Physics**
- **Robotics**

Radical Change to regain position…

- **Reconfigurable and agile manufacturing systems** that can respond to ever shorter innovation cycles and rapidly adapt to customer demands for new products and new product features
- **Multidiscipline-based manufacturing** that combines physics, materials, engineering, and information technology to achieve state-of-the-art manufacturing precision, process optimization, and product functionality
- **Advanced sensors, control systems, and wireless communications** that provide immediate monitoring and reaction inside manufacturing systems to improve quality, decrease production cycle times, and eliminate waste
- **Advanced non-traditional manufacturing techniques**, including solid freeform fabrication (additive manufacturing) and laser processing, to make innovative complex, custom products and replacement parts
- **Smart assembly systems** that pair skilled workers with helpful automation and robotics to reinvent how manufacturers put together products quickly and safely

Supporting Infratechnologies required…

- **Automated data synthesis and decision tools** that process the high volume of product and process data from next-generation measurement systems for intelligent decision-making and manufacturing system optimization
- **Modeling and simulation tools, interface standards, and reference data** that can dramatically reduce trial-and-error, forecast costs and consequences of design and production decisions, and speed innovations to market (**KBM**)

Source: "Rationales & Mechanisms for Revitalizing U.S. Manufacturing R&D Strategies"– Greg Tassey, NIST

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Need for a Coherent National Policy

"If one does not know to which port one is sailing, no wind is favorable."

Seneca, Roman Philosopher

National Manufacturing Policy

The U.S. government, recognizing the national importance of our manufacturing sector to a vital, sustainable economy and a strong defense industrial base, will provide policies to:

- Incentivize Innovation and R&D in new products and manufacturing technologies
- Assure availability of capital
- Increase global competitiveness and promote exports
- Minimize structural cost burdens
- Enhance collaboration between government, academia and industry
- Build a better educated and trained workforce

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- Incentivize Innovation and R&D in new products and manufacturing technologies
  - Double the R&D Tax Credit and make it permanent
  - Fund targeted sustaining economic growth technologies
  - Implement a STID policy and infrastructure (incl. MEPs)

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- Assure availability of capital
  - Ease lending requirements to manufacturers for capital investments
  - Provide incentives to banks making and maintaining capital loans to qualified manufacturers
  - Create a “domestic” EXIM bank

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- Increase global competitiveness and promote exports
  - Revise and modernize Export Control Policy
  - IP Protection – simplify filing & 5x USTR resources
  - Streamline business visa process with major trading partners

National Manufacturing Policy

The U.S. government, recognizing the national importance of our manufacturing sector to a vital, sustainable economy and a strong defense industrial base, will provide policies to:

- Minimize structural cost burdens
  - Lower corporate taxes and avoid any new legislation that adds costs to U.S. manufacturers
  - Minimize or remove unilateral regulations
  - Address tort liability reform

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- Enhance collaboration between government, academia and industry
  - Implement a STID policy and infrastructure (incl. MEPs)
  - Create a cabinet level manufacturing position
  - Support and sponsor targeted technology challenges

National Manufacturing Policy

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- Build a better educated and trained workforce
  - National manufacturing skills certification
  - Grants, scholarships or incentives for engineering, sciences and technology degrees
  - Utilize MEPs as centers of manufacturing excellence to train and support local manufacturers

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