A Defining Moment:
The Future of Manufacturing in the US

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CEO, Novartis

MIT Leaders Global Operations Conference, May 9, 2012
What business leaders say

“What would it take to make iPhones in the United States?... Why can’t that work come home?”
– President Barack Obama

“Those [manufacturing] jobs aren’t coming back.”
– Steve Jobs
What many Americans think

9% of all US jobs are in manufacturing, down 25% from 50 years ago

55% of Americans see manufacturing weakening

Only 17% of US school systems encourage students to pursue manufacturing
What are the job trends in American manufacturing

Manufacturing job loss (% of total job loss)

- Great Depression (1929-1933): 31%
- Last Decade (2000-2010): 33%

Percentage of cost savings (2010 versus the US)

- Mexico: 25%
- Vietnam: 20%
- India: 20%
- Russia: 20%
- Romania: 18%
- China: 15%

Reducing US manufacturing jobs, moving to low-cost countries
What’s so special about manufacturing things?

- Manufacturing drives innovation
- Manufacturing stimulates the economy
- Eroding cost savings overseas
- Higher productivity in the US
- Hidden costs in emerging markets
Manufacturing is moving back to the US

Manufacturing Job Creation
(by thousands in October 2011-March 2012)

- Associated Press
  Caterpillar Plans to Expand Texas Plant, Add Jobs

- FT
  Michelin unveils US expansion

- Forbes
  Ford To Shift Factory Jobs To U.S. From Mexico, Asia
The US must seize the opportunity

1. Incentivize and encourage business

2. Expand training for high-skilled workers

3. Lead in manufacturing innovation
1. Incentivize and encourage business
Novartis Holly Springs: First cell-culture vaccines manufacturing facility in the US
Clusters: Boston is a biotech hub
Prioritize and expand training for high-skilled workers

- **600,000**
  - Unfilled manufacturing jobs in the US

- **83%**
  - Of US companies report a serious shortage of skilled workers

- **69%**
  - Of US companies expect growing skills gap to expand

- **18%**
  - Drop in federal funding of job training programs
Novartis training programs
3 Lead in manufacturing innovation

Source: The Economist, April 2012
Novartis-MIT collaboration: Transforming pharmaceutical manufacturing

→ the ultra LEAN Manufacturing

Raw material

Final product
How pharmaceutical manufacturing works today

**Cycle #1**
1. Raw material
2. Processing
3. Bulk material

**Cycle #2 – #n**
1. Storage
2. Logistics
3. Processing

**Final product**
Several improvements with new process

**Example Diovan production**

Dimensions of Pharmaceutical manufacturing

<table>
<thead>
<tr>
<th></th>
<th>Traditional process</th>
<th>New continuous process</th>
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<tbody>
<tr>
<td><strong>Time</strong></td>
<td>13 distinct steps, One year</td>
<td>1 step, Six hours</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>Multiple disruptions</td>
<td>Continuous flow</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Large equipment, Multiple sites</td>
<td>Small equipment, One location</td>
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</tbody>
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Made in America?
Q & A