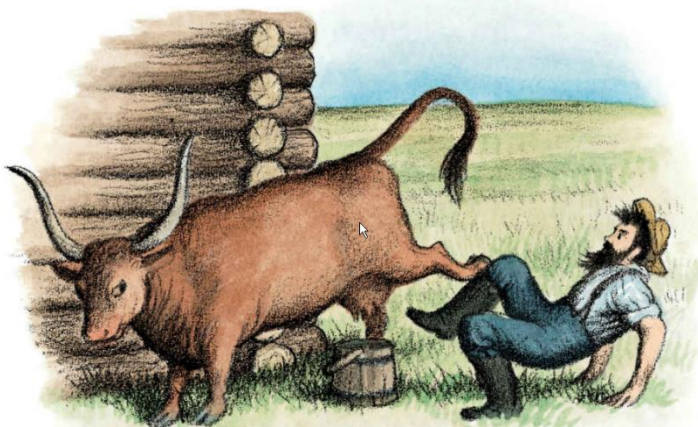
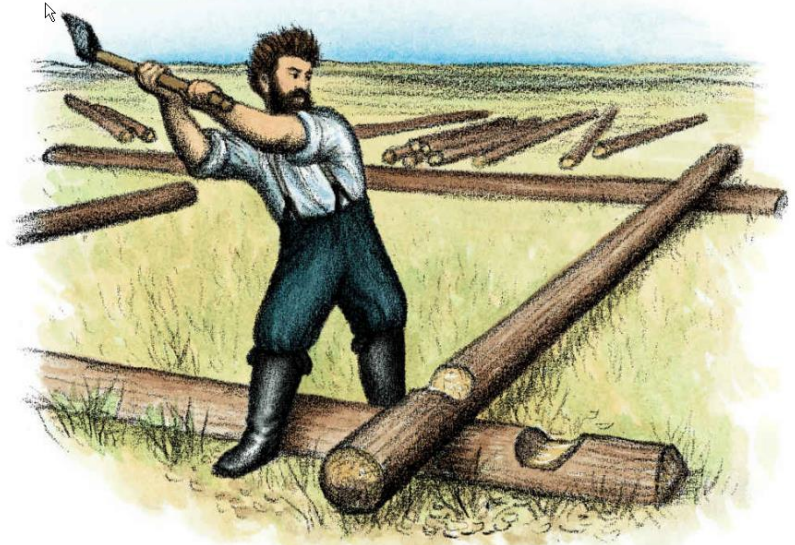
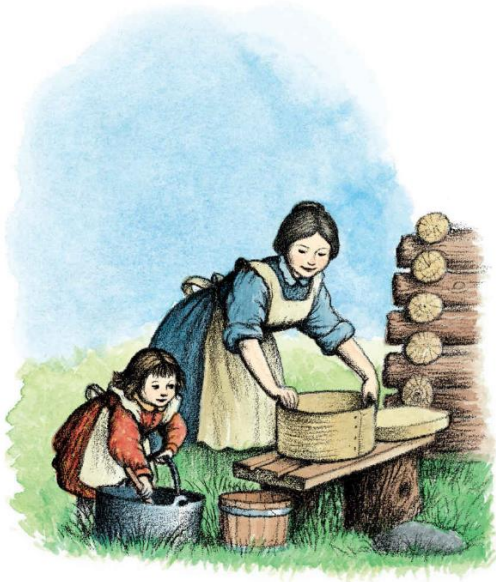


**lux**research

# 150 years (or so) ago, everything was done by hand



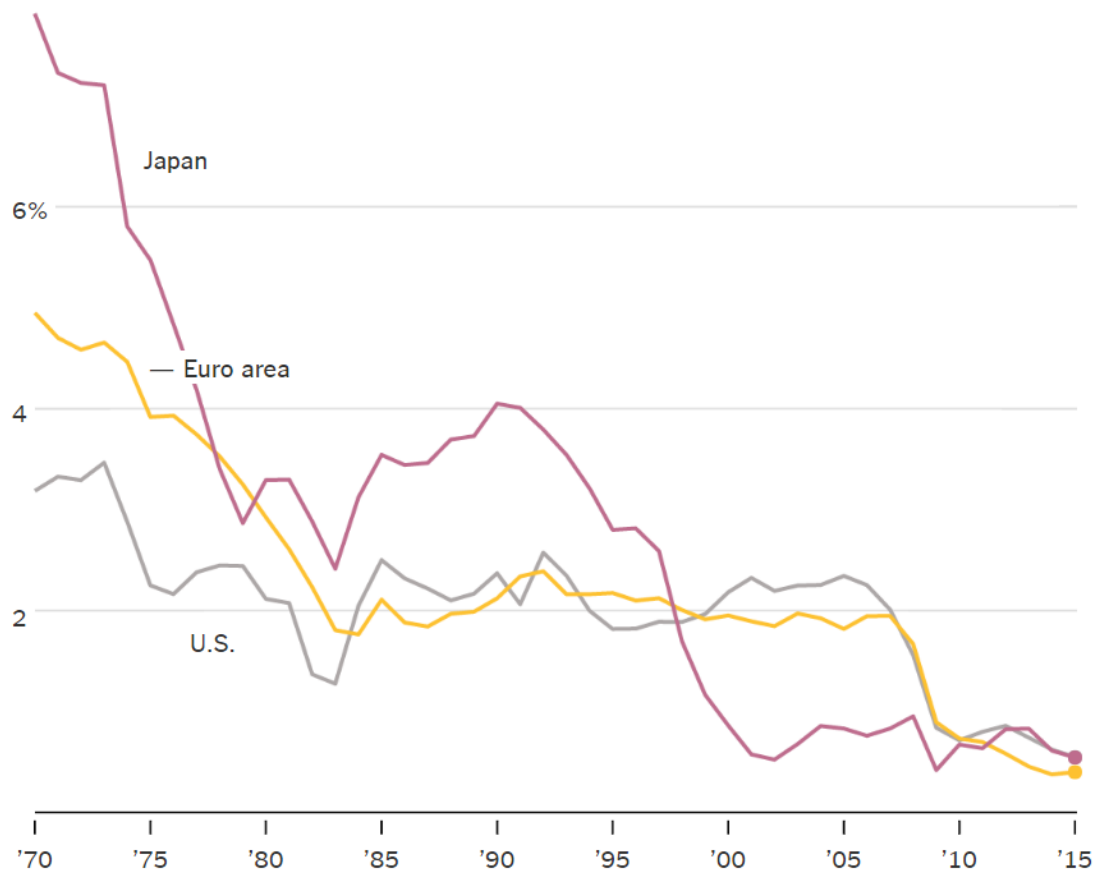
## Now it's done by finger (tap)





# Yet.... slow growth is painful for everyone

Average annual per-capita G.D.P. growth over the preceding 10 years

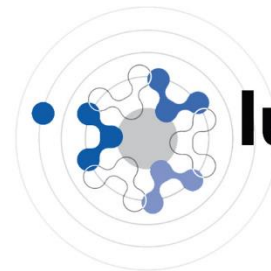


Source: World Bank,  
*New York Times*

# The Innovation Paradox

Michael Holman  
VP of Research

April 5, 2017



**lux** executive summit

Boston • April 4-6, 2017

# Agenda

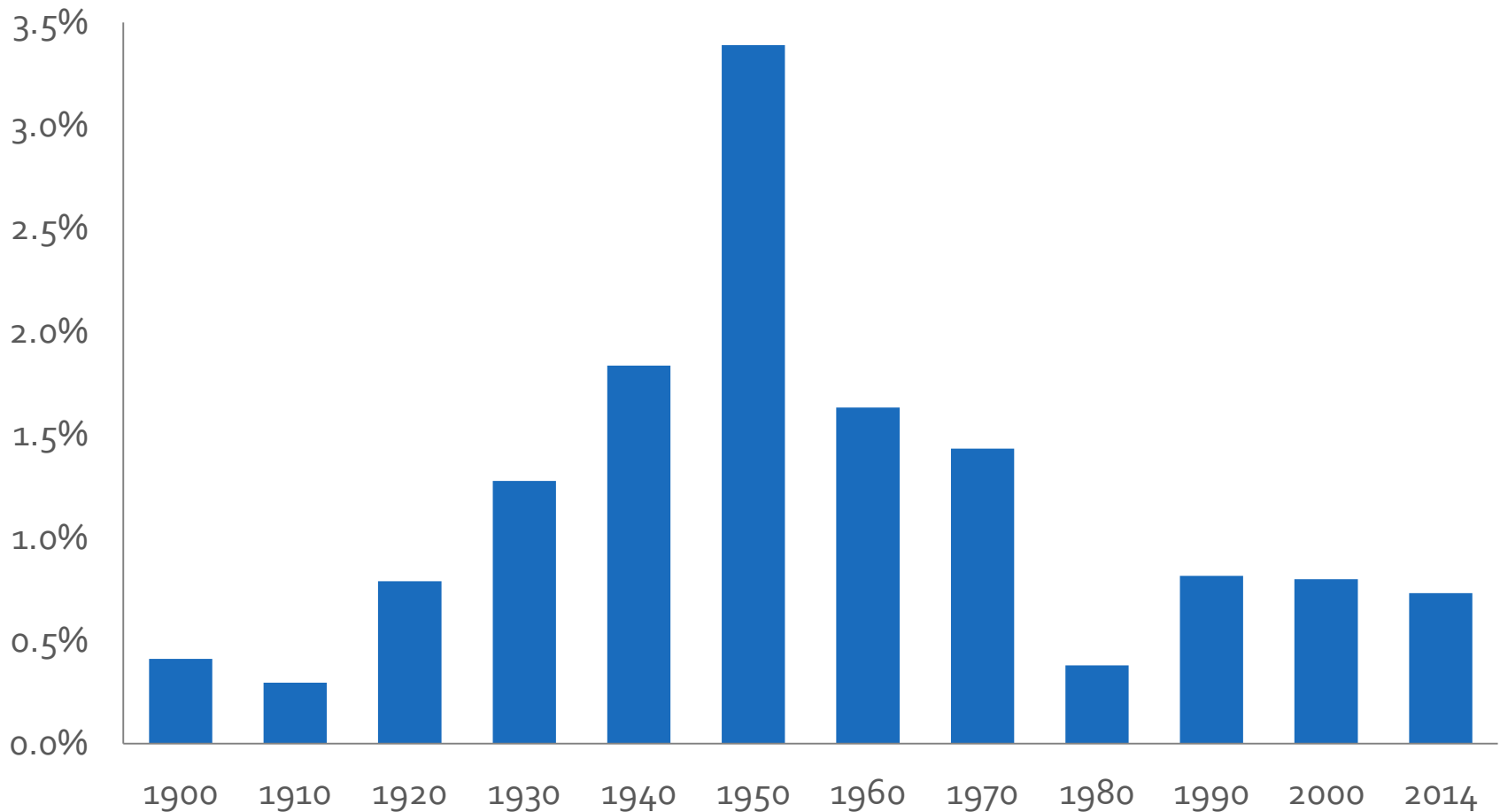
- Challenges to growth
- Innovations to fight back
- Strategies to succeed

# Agenda

- Challenges to growth
- Innovations to fight back
- Strategies to succeed

# Productivity growth has slowed

Total factor productivity growth, previous 10 years



Source: *The Rise and Fall of American Growth*, Robert Gordon



# What to make of this?



*"The economic revolution of 1870 to 1970 was unique... so many of its achievements could happen only once"*

*- Robert Gordon,  
Northwestern*

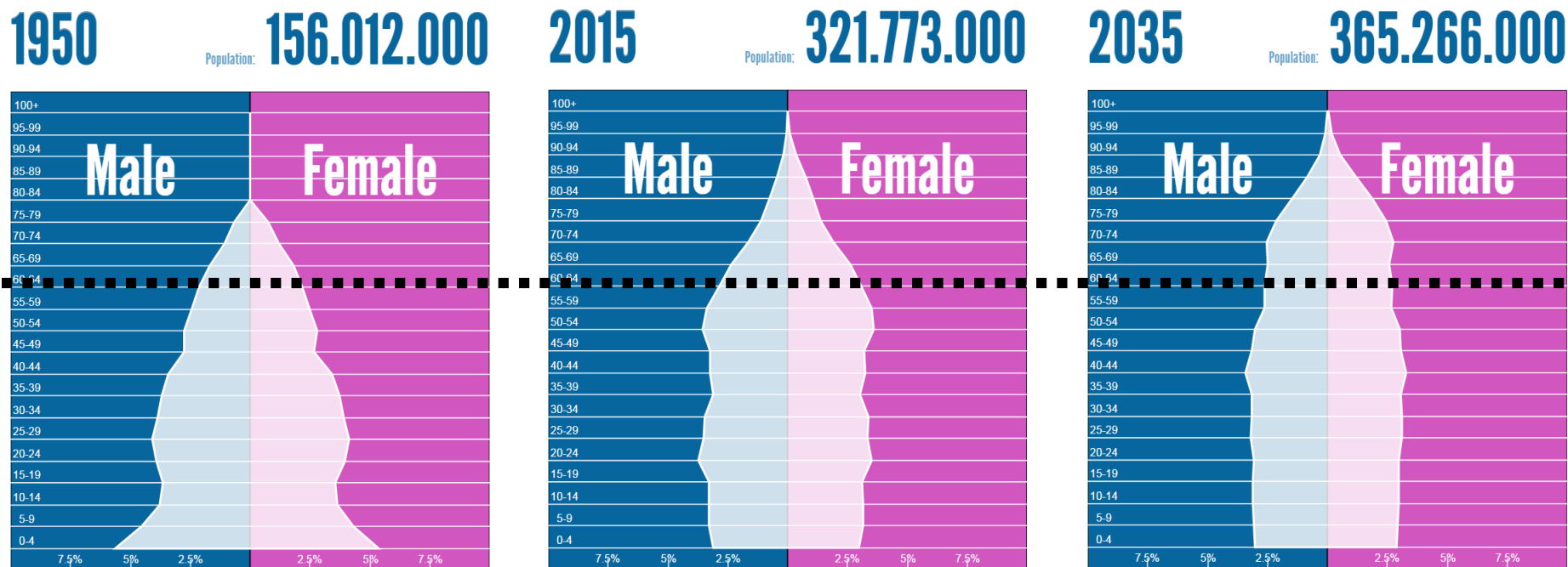


*"There has been a burst of innovations recently... that we will see come to fruition in the next five to 15 years..."*

*- Erik Brynjolfsson,  
MIT Sloan*

# Demographics are poised to make things worse...

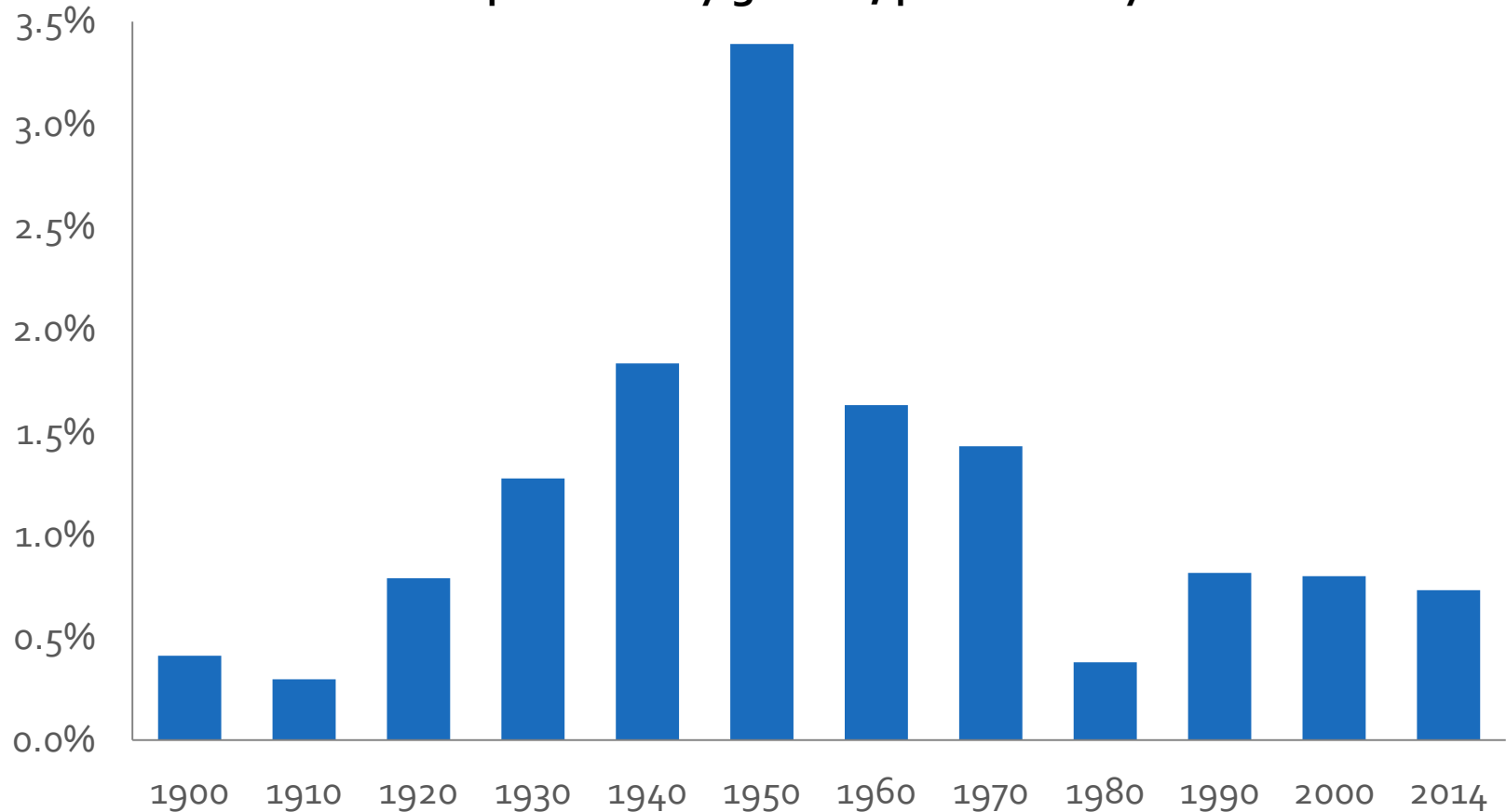
## United States



Source: <http://www.populationpyramid.net>, UN Population Division

# This is a megatrend... companies that can address it will be poised for growth

Total factor productivity growth, previous 10 years



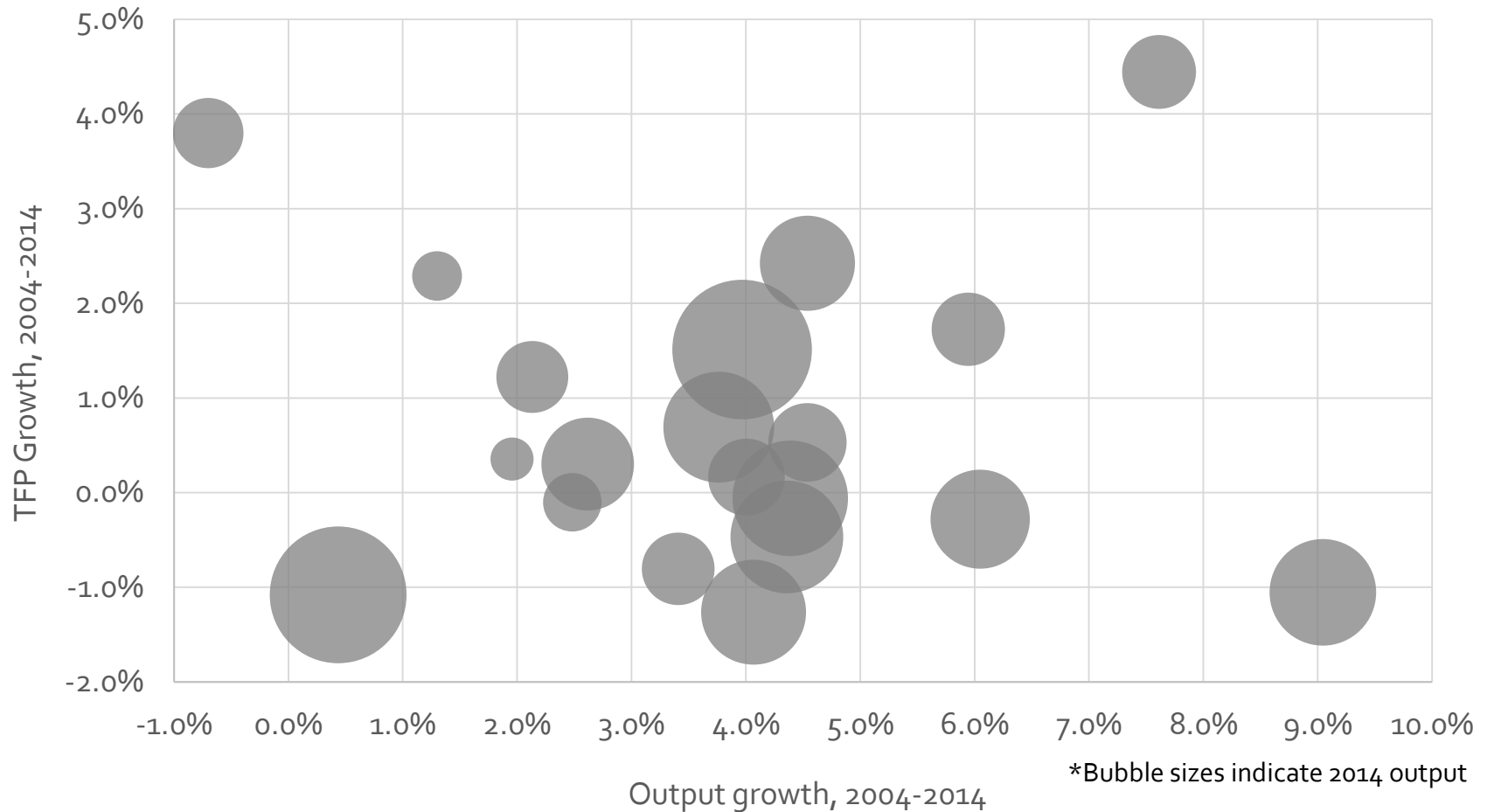
Source: *The Rise and Fall of American Growth*, Robert Gordon

# Agenda

- Challenges to growth
- **Innovations to fight back**
- Strategies to succeed

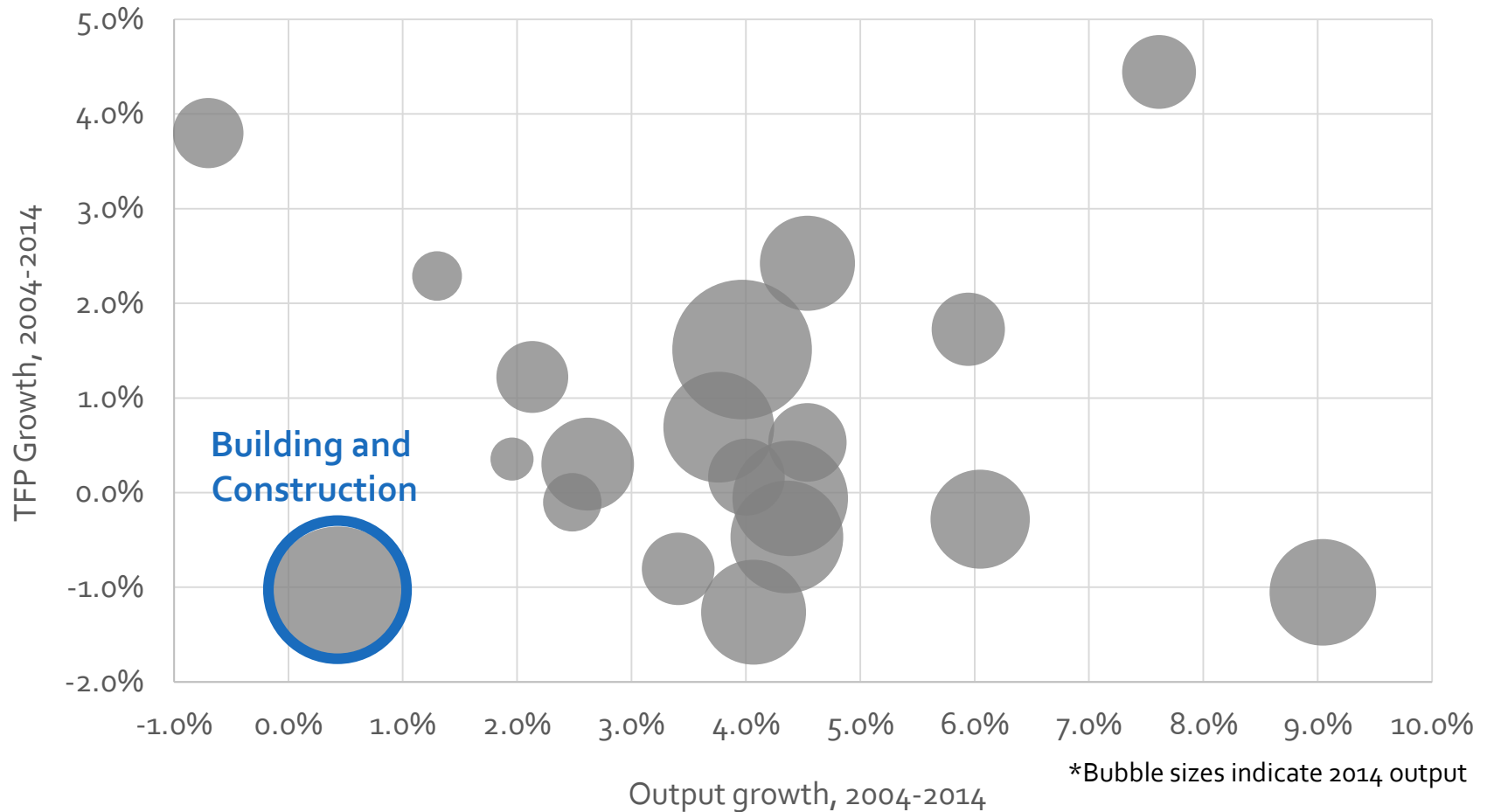
# Where to focus for opportunities ?

Productivity and output growth of select U.S. industries



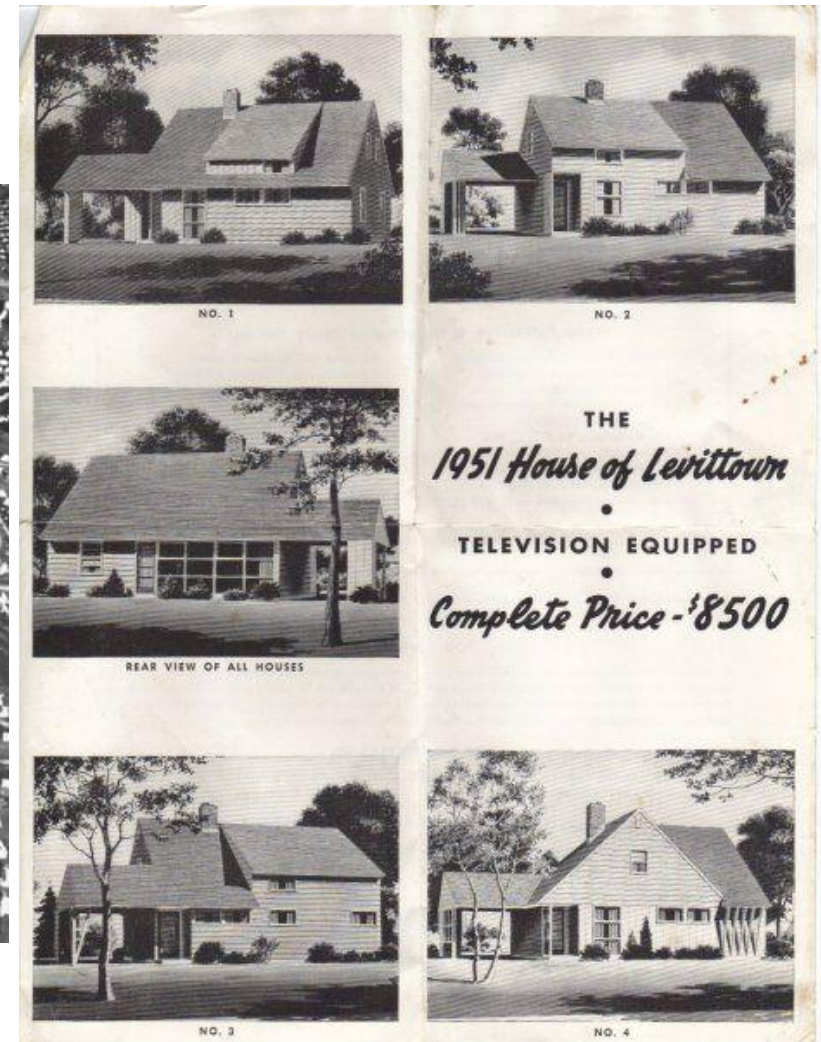
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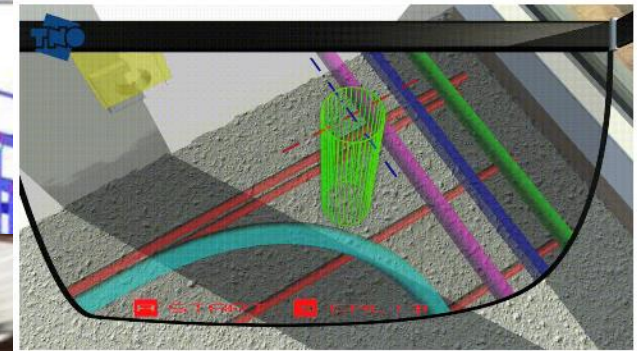
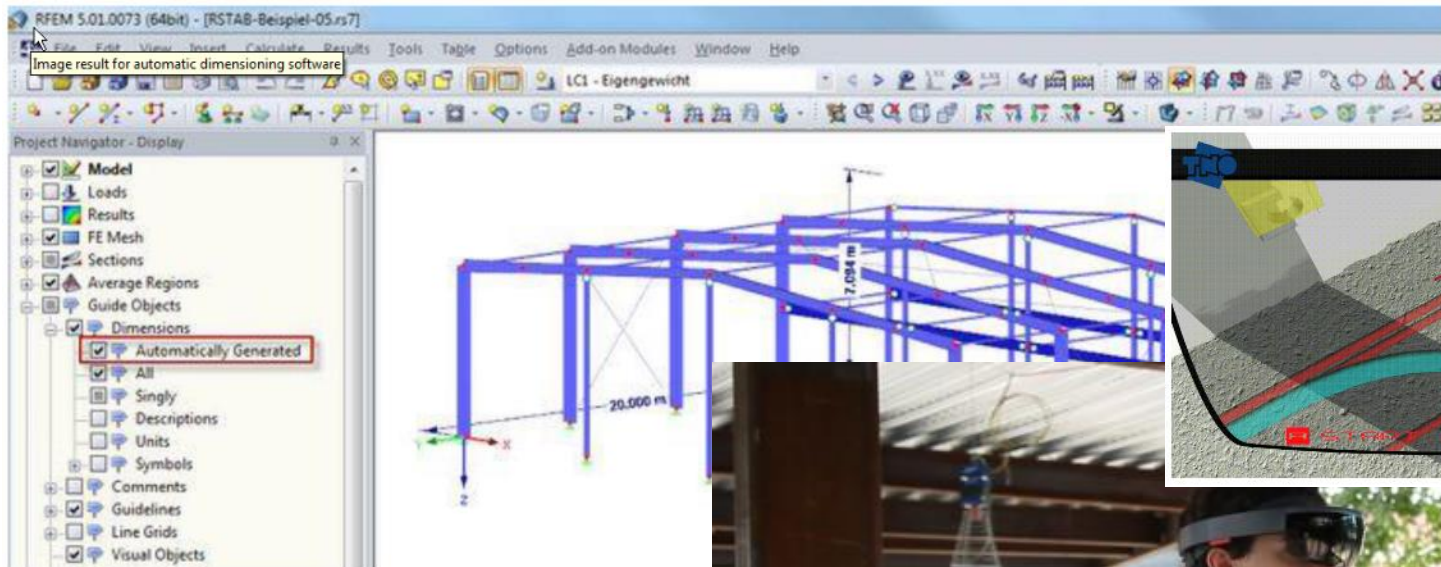




# Building and construction: From mass production...



# ... to building information modeling and advanced construction technologies...



SMART REALITY

MARTIN BROS.

DAQRI

AR-media  
AUGMENTED REALITY MEDIA

Trimble

acute3D  
a Bentley Systems Company

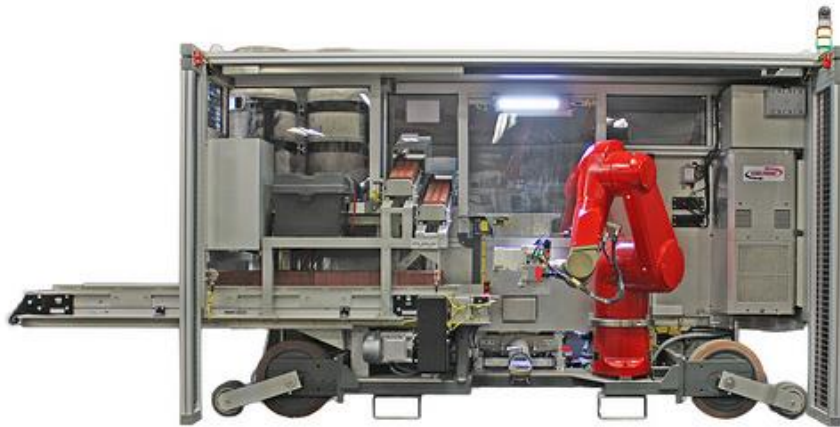
luxexecutivesummit



Source: Lux Research, "[The Industrial and Digital Revolution in Building and Construction](#)"



... to robots and, believe it or not, 3D printing



**Construction Robotics**  
"Advancing Construction"



**apis cor** | we print buildings

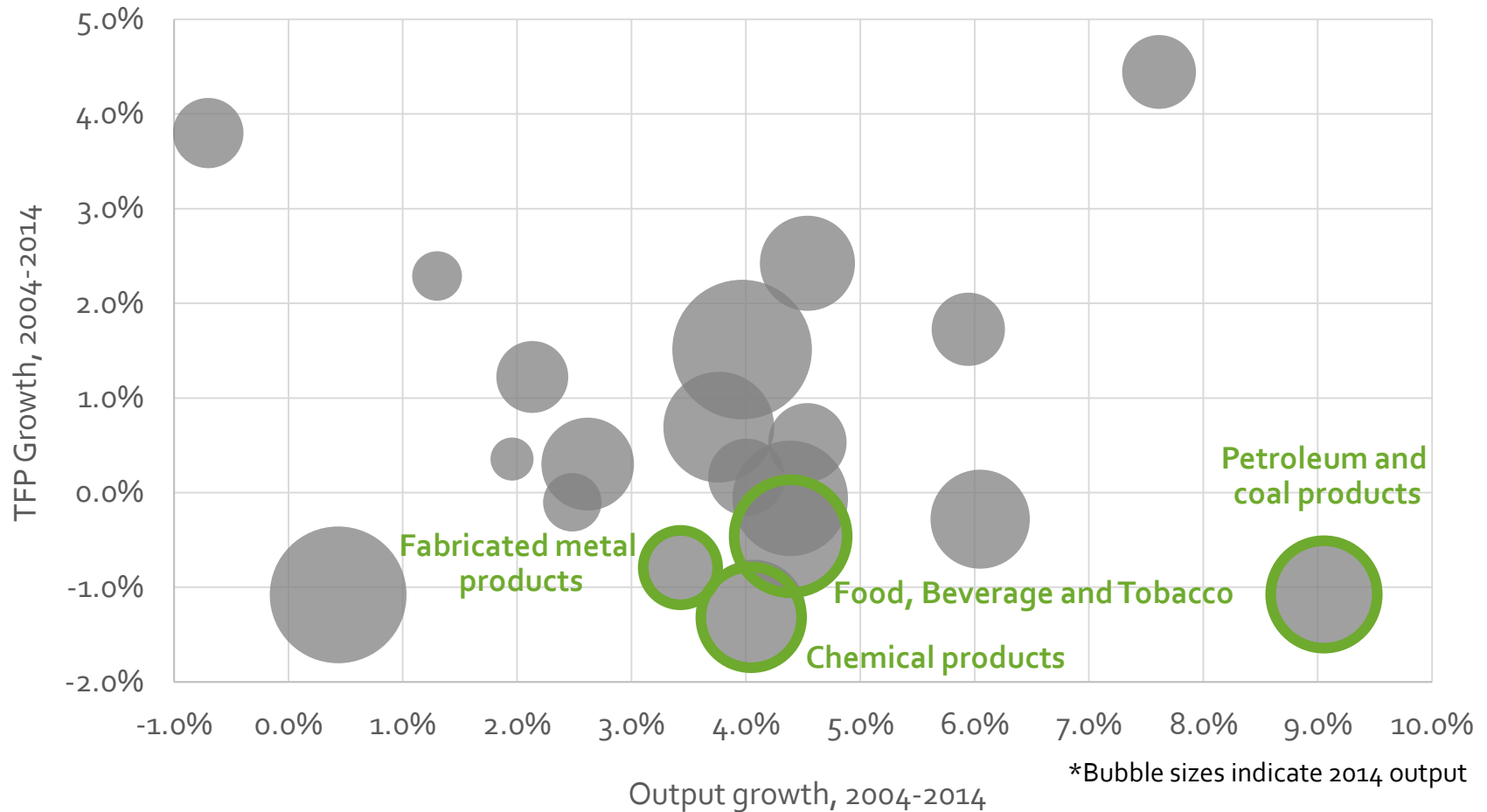
**lux** executive summit



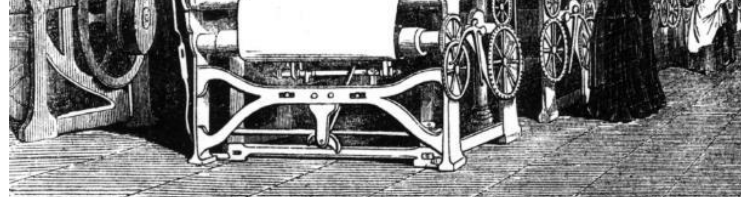
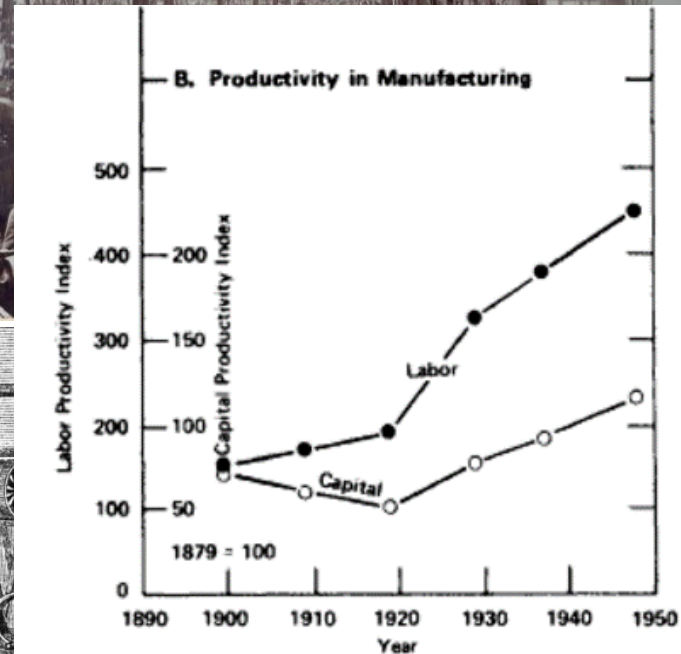
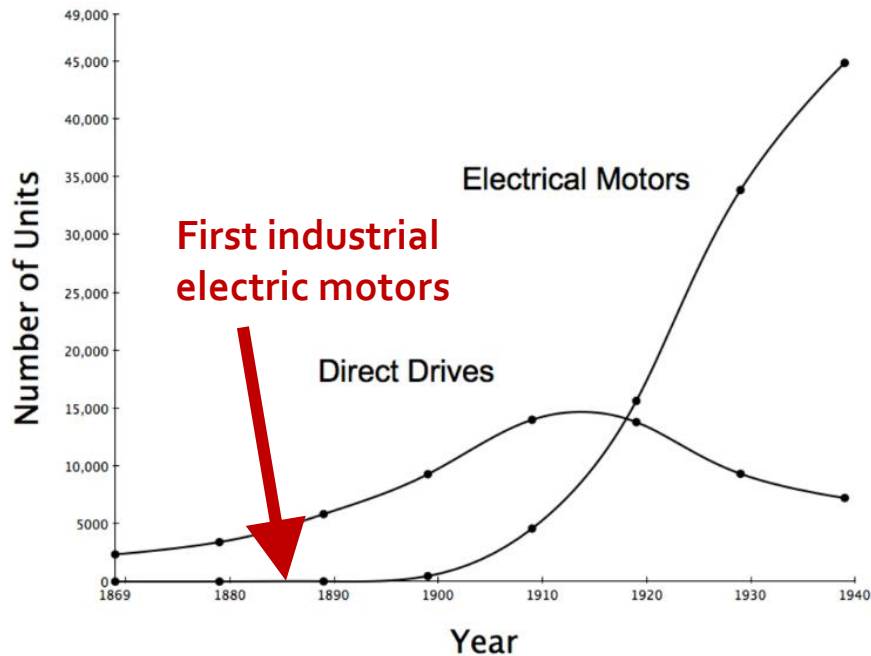
**~\$10,000 – Levittown prices!**  
(actually Levittown house ~\$80k in 2017 dollars)

# Where to focus for opportunities ?

Productivity and output growth of select U.S. industries



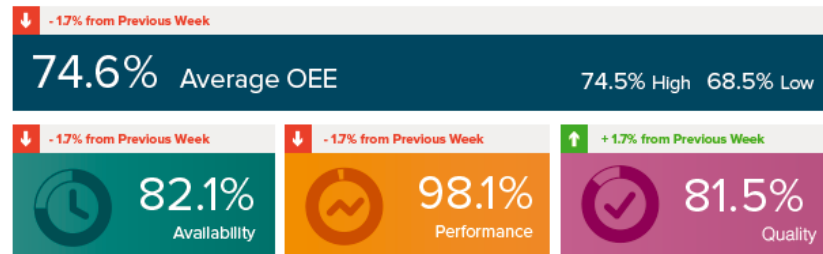
# Manufacturing: From electrification...



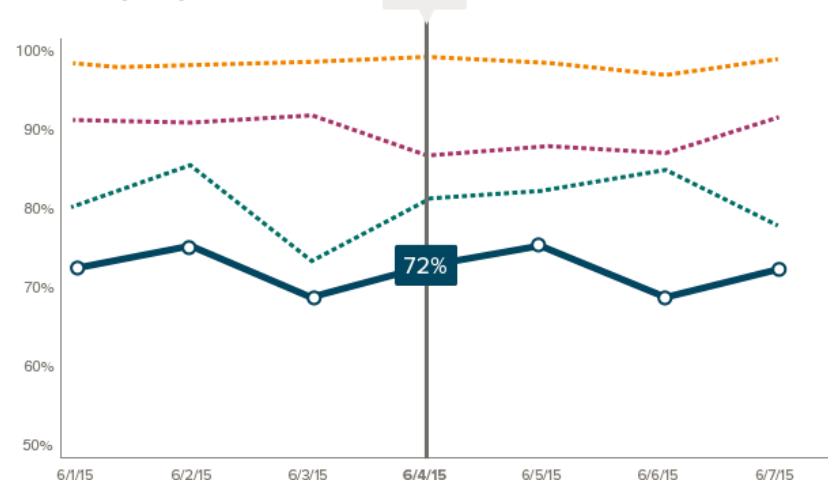
# ...to sensing and connectivity...



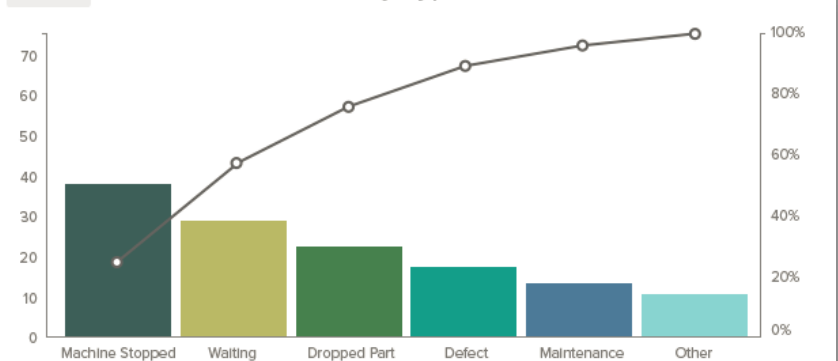
## OEE ▾ Last 7 Days



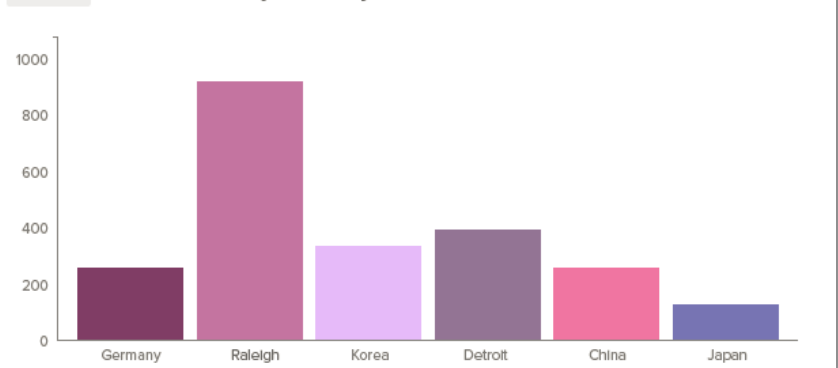
## OEE ▾ By Day ▾



## 6/4/15 Downtime Events ▾ By Type ▾



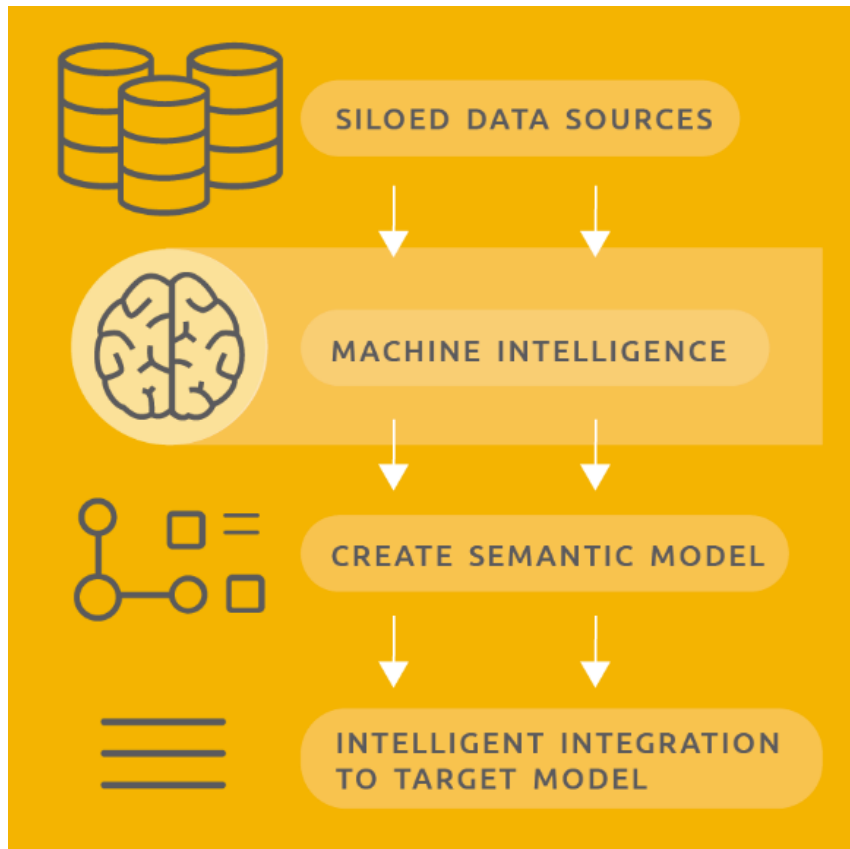
## 6/4/15 Defects ▾ By Factory ▾





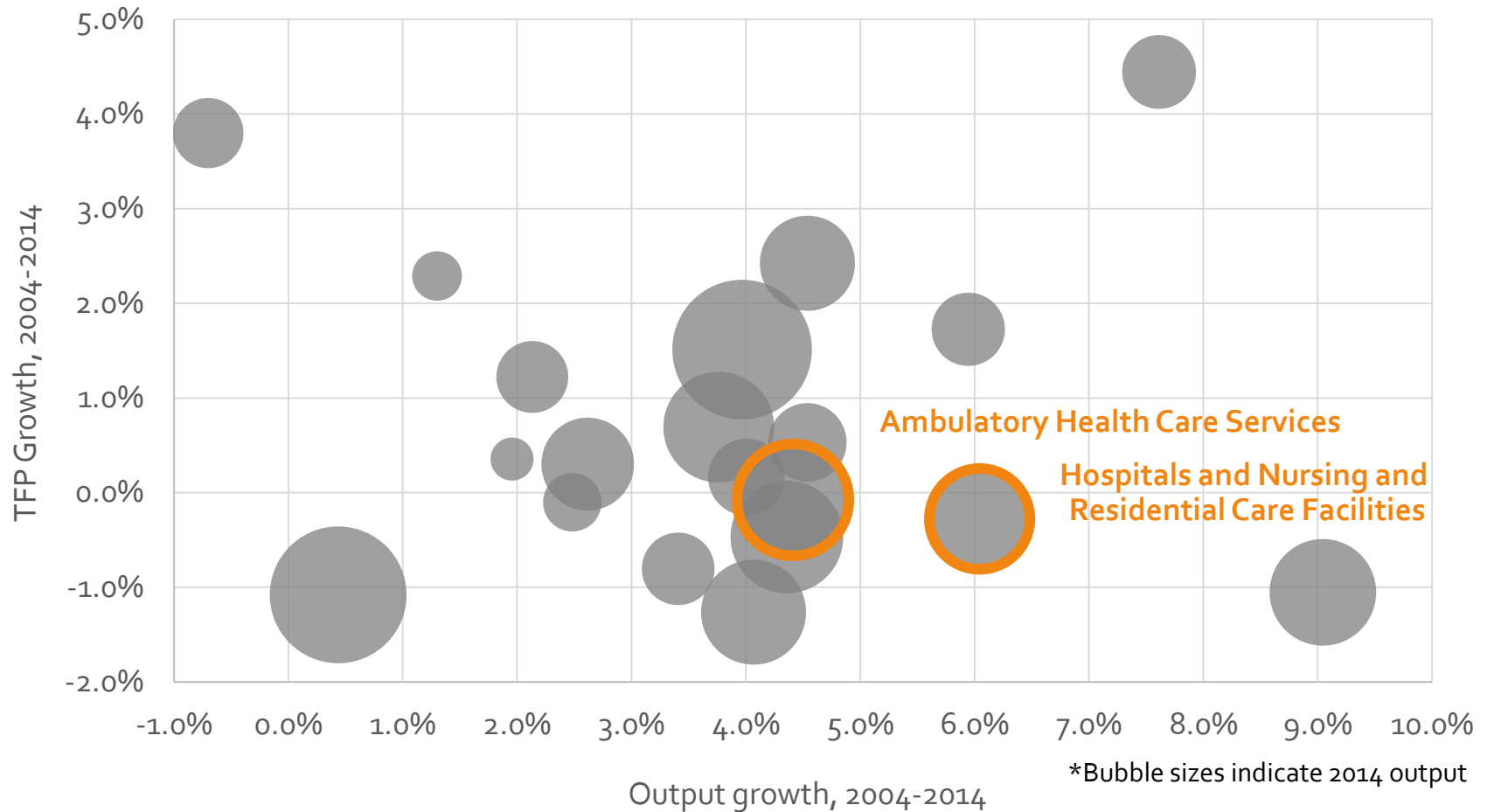
# ...to ease of integration

**BITSTEW**  
SYSTEMS

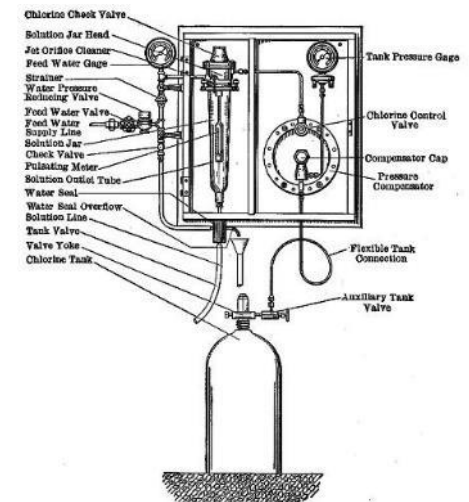
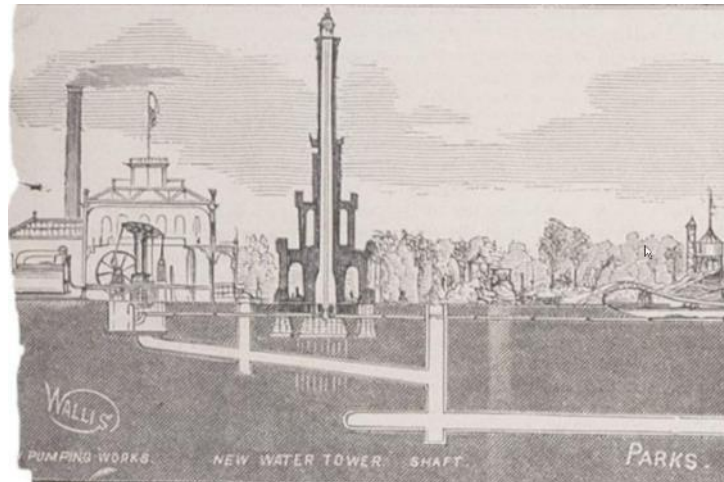
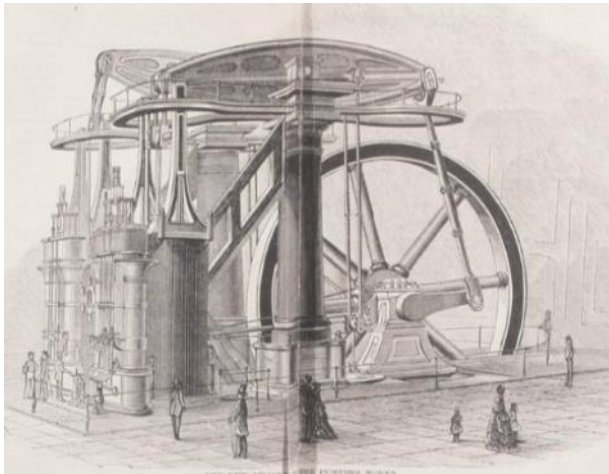
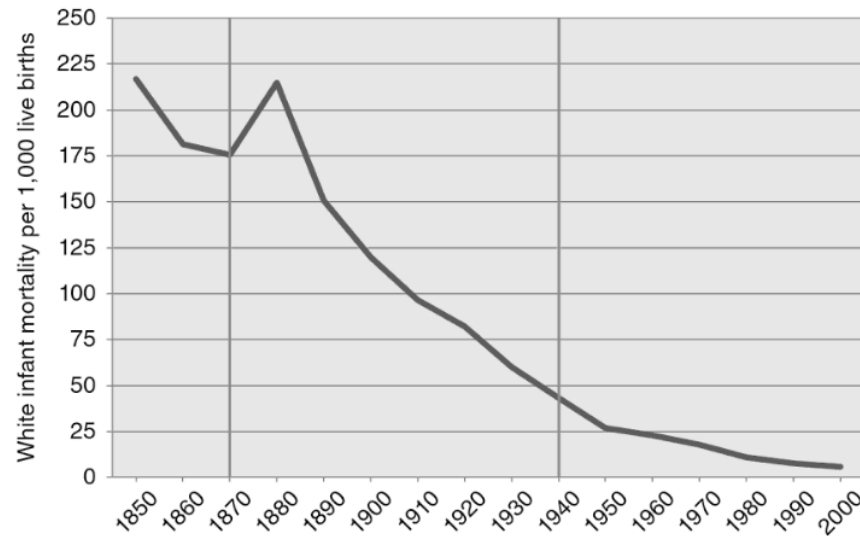


# Where to focus for opportunities ?

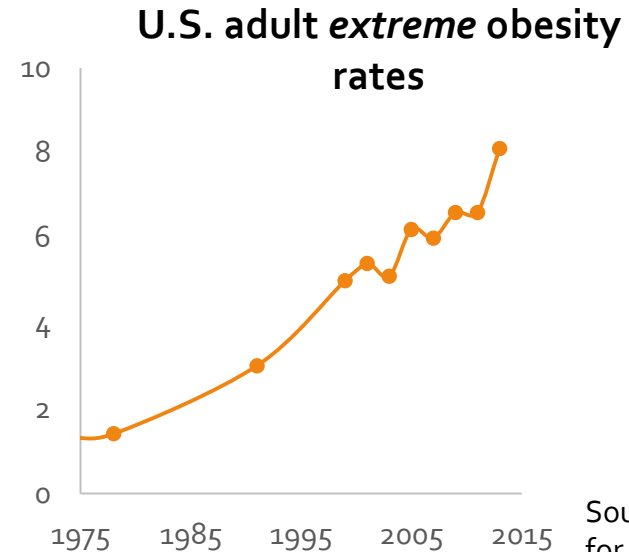
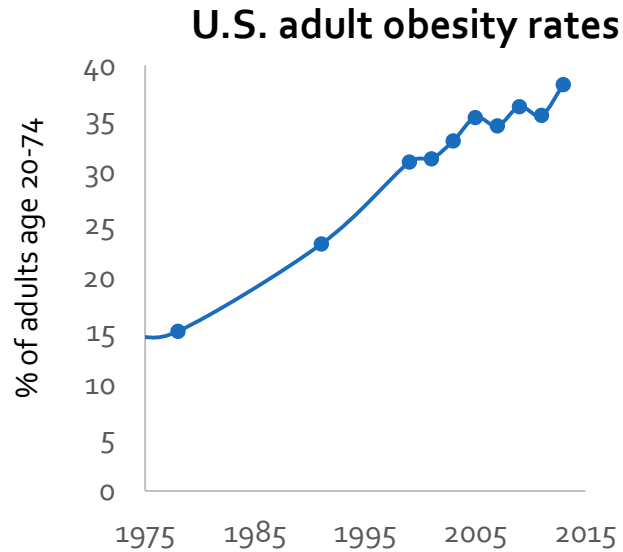
Productivity and output growth of select U.S. industries



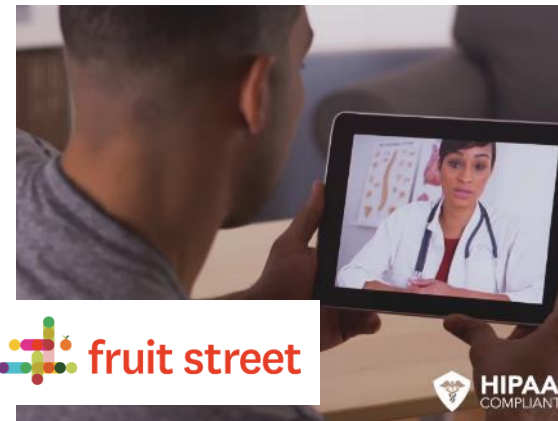
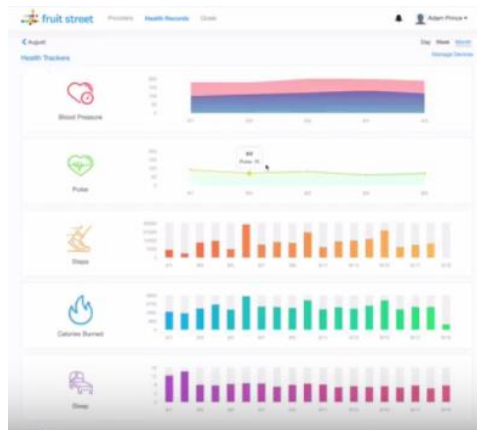
# Health: From saving us from bad water...



# ...to saving us from bad food...

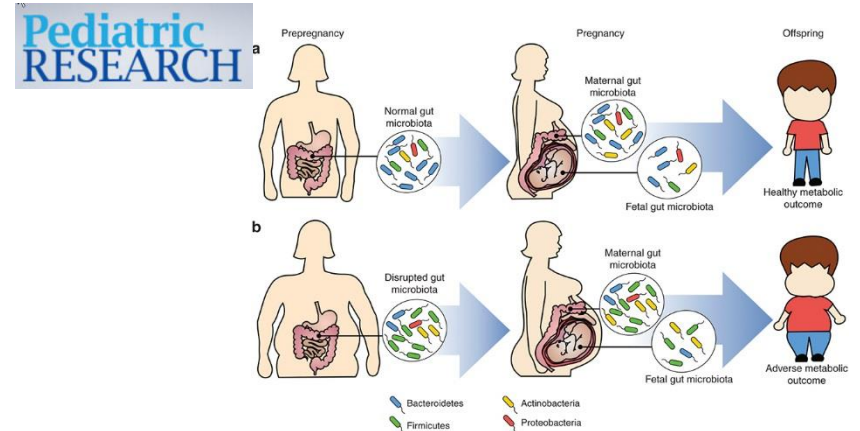
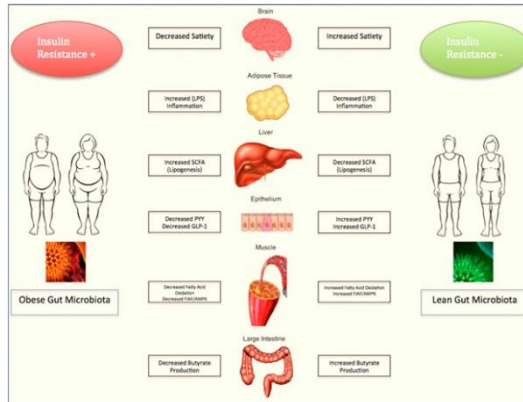


Source: U.S. Centers for Disease Control



# ...to giving us better food

## Clinical and Translational Gastroenterology

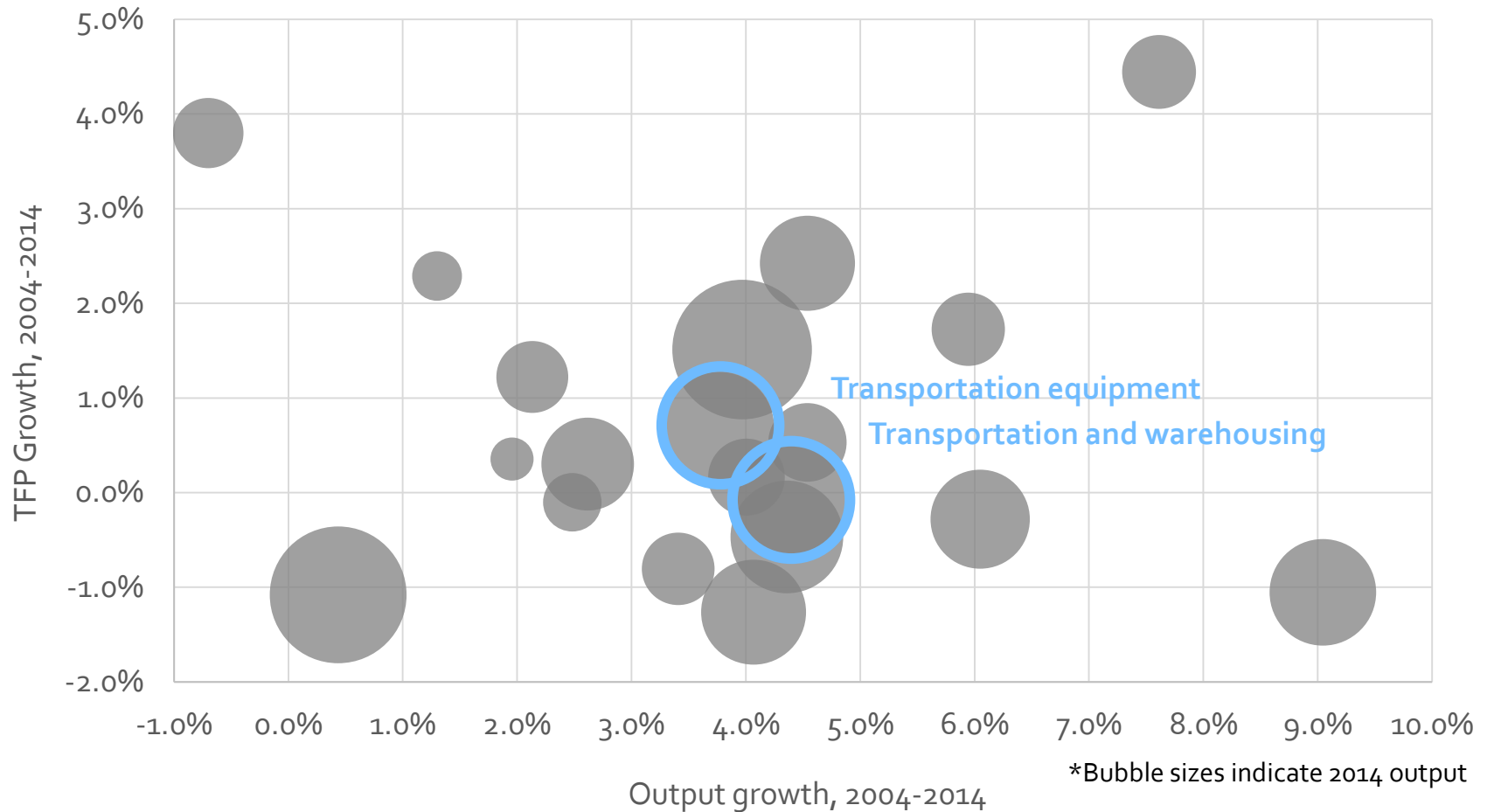


**OptBiotix<sup>®</sup>**  
HEALTH PLC  
BETTER SCIENCE, BETTER HEALTH



# Where to focus for opportunities ?

Productivity and output growth of select U.S. industries





# Transportation: From cars....

## The First Global Urban Planning Conference Was Mostly About Manure



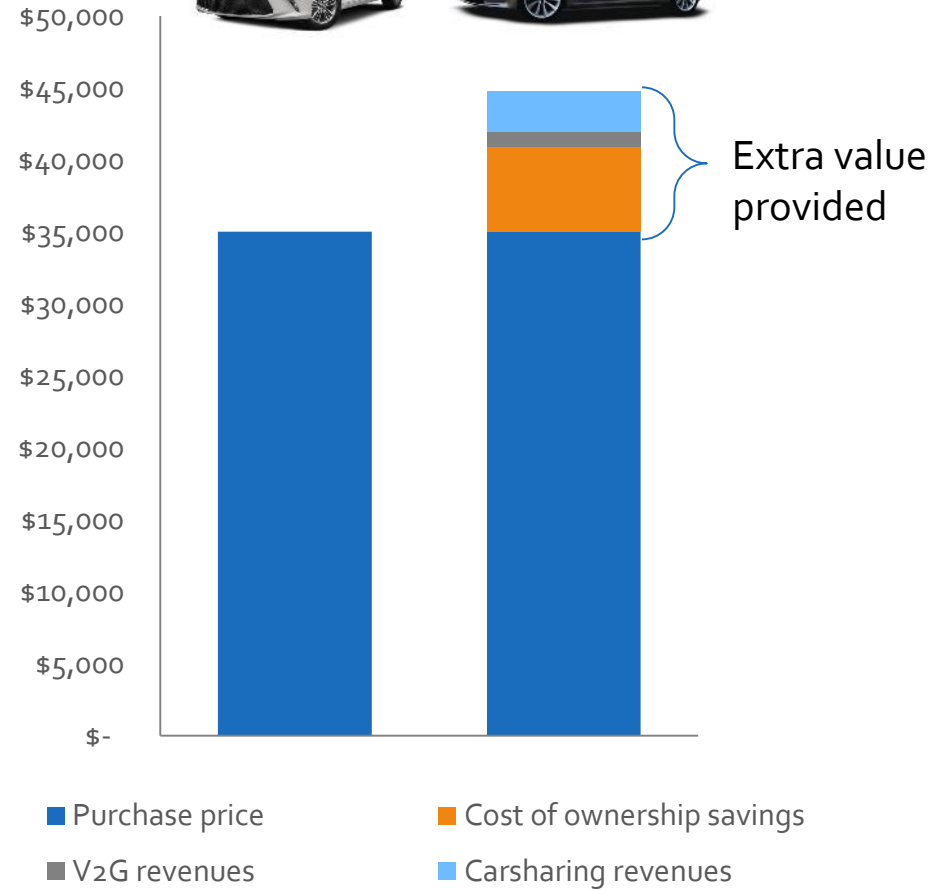
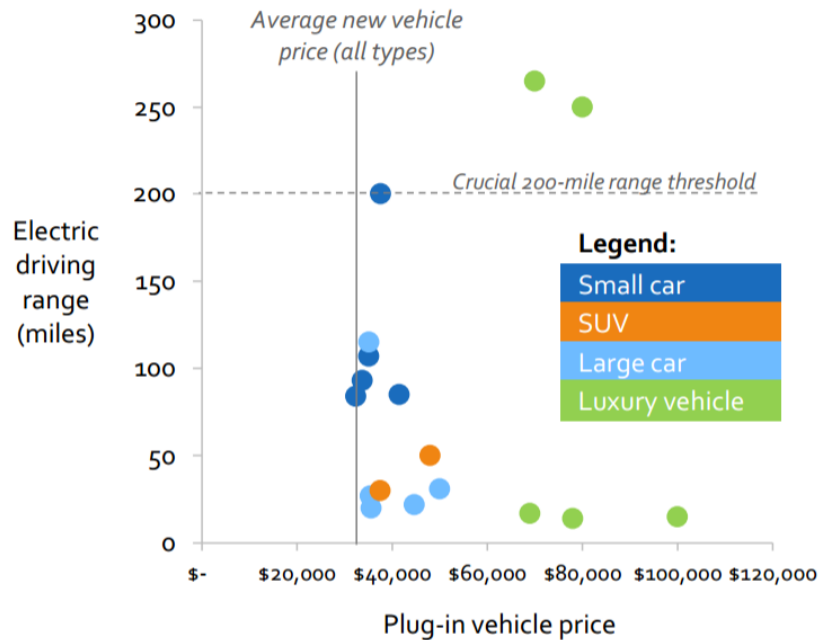
## The Great Horse Manure Crisis of 1894



MORTON STREET, CORNER OF BEDFORD, LOOKING TOWARD BLEECKER STREET,  
MARCH 17, 1893.



## ... to more valuable cars...





...to self-driving and flying cars



# Agenda

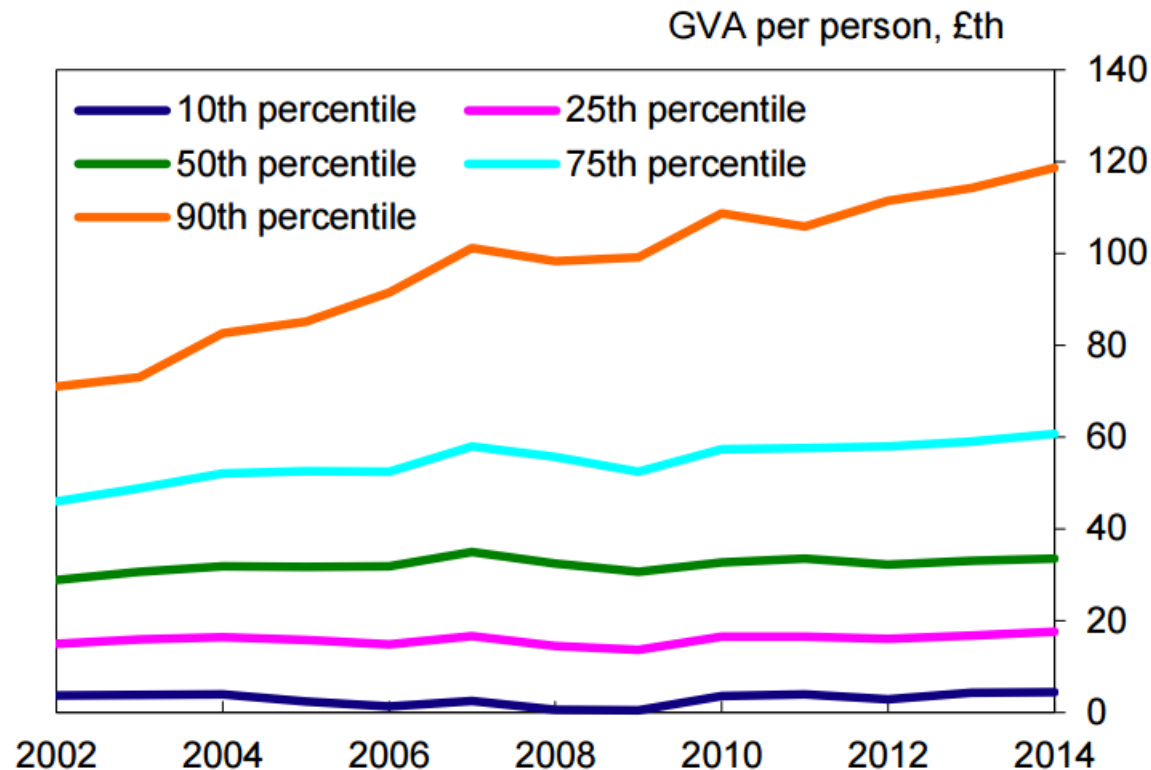
- Challenges to growth
- Innovations to fight back
- **Strategies to succeed**

## Why do we need a new approach?

**The future is already  
here – it's just not  
evenly distributed yet**



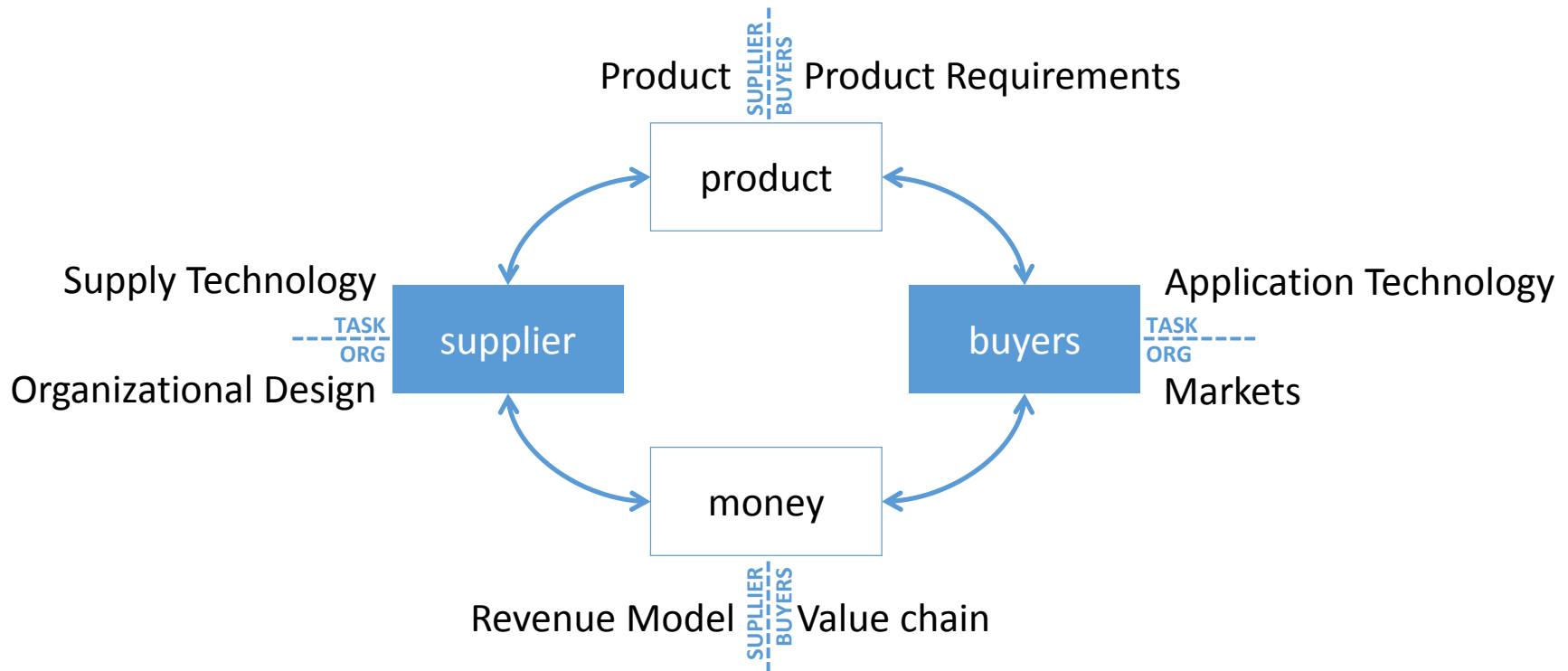
# Leading firms *are* seeing productivity growth, but most others are flatlining



Source: Andrew G Haldane, Chief Economist, Bank of England



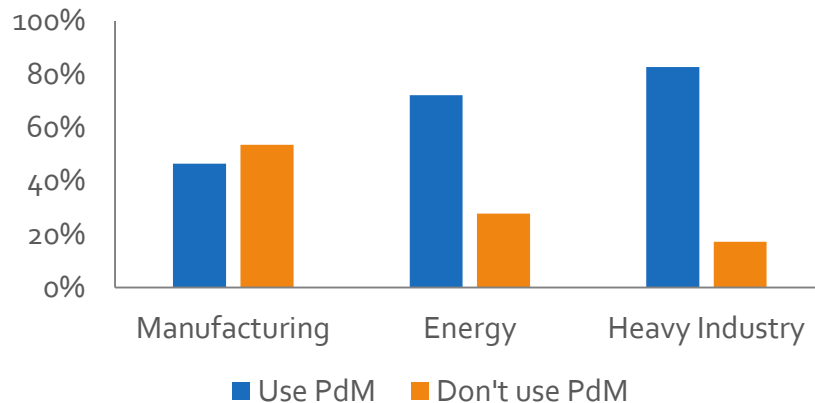
# Business model innovation can help the leaders bring laggards along



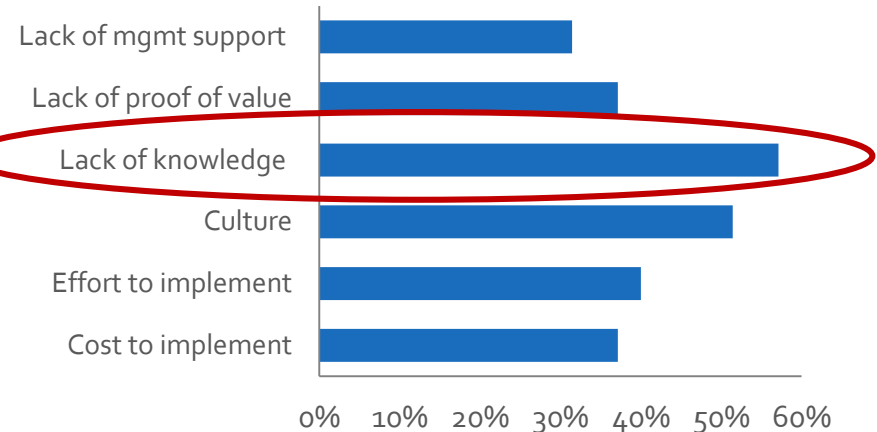
Source: Lux Research, "[Business Model Innovation: Industry's Latest Fad or a Useful Approach to Strategy?](#)"

# Bringing manufacturing analytics to the masses

Manufacturing lacks in adopting predictive maintenance (PdM)



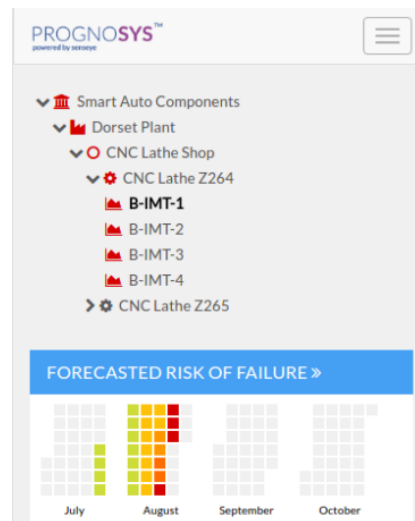
Non-adopters lack know-how



Source: Lux Research, [Predictive Maintenance: The Art of Uptime](#)



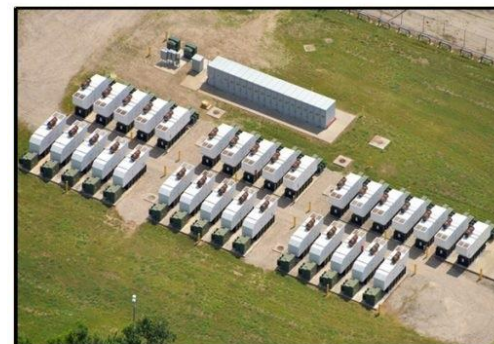
“the idea was to take the expensive approaches (which often cost more than \$10 million ...) and make them more affordable”



## SENSEYE, UPTIME AS A SERVICE

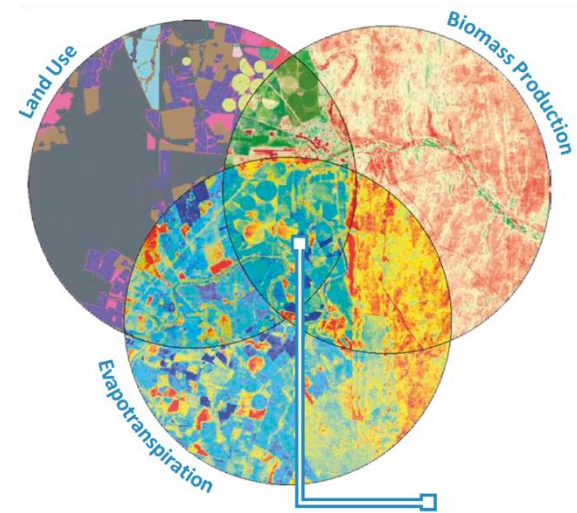
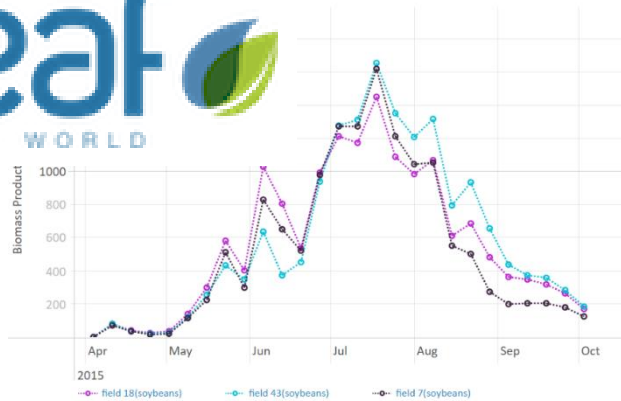


# Enabling adoption of distributed generation assets

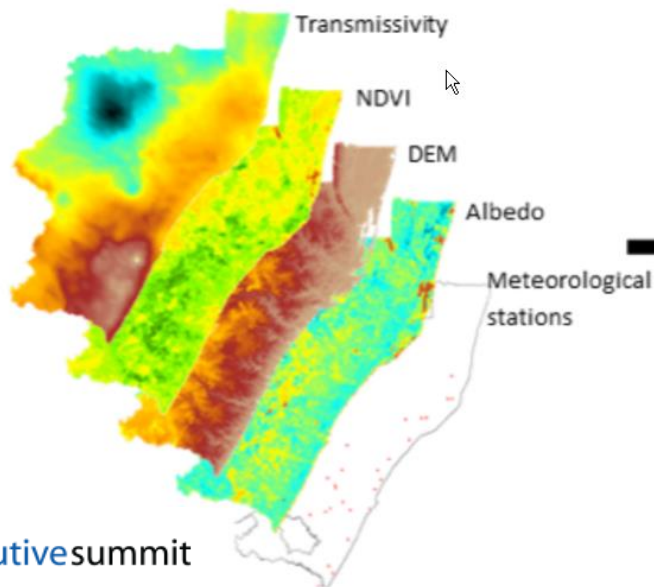




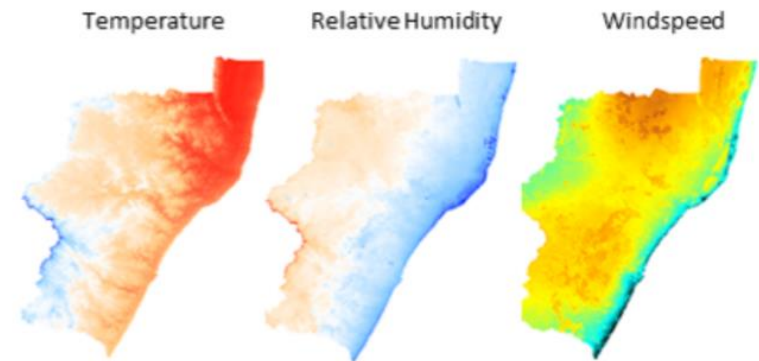
# Targeting the developing world



In:



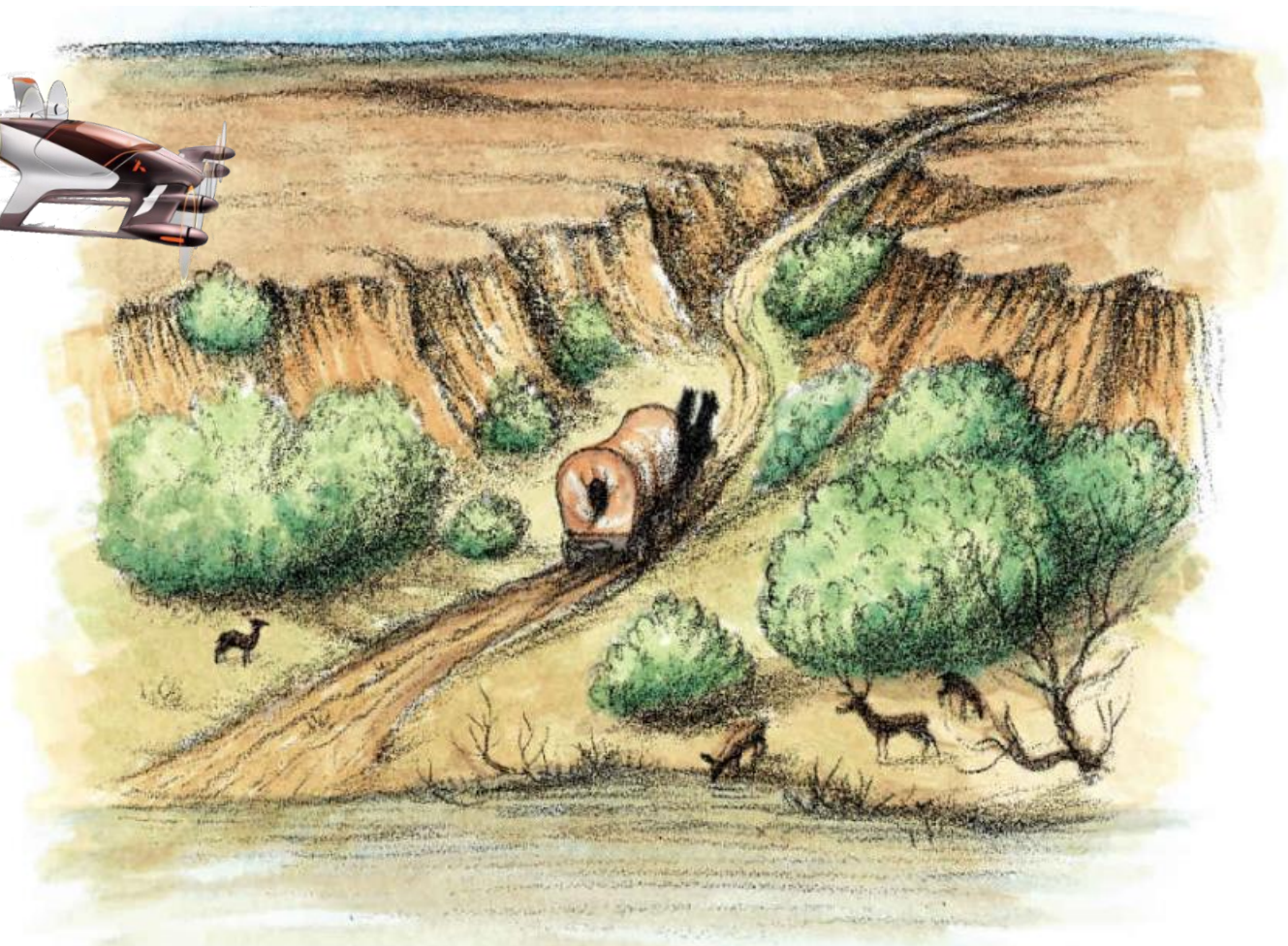
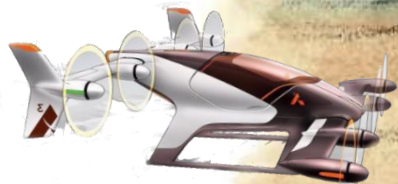
Out:



Per pixel of 250m

# Conclusions

- Declining productivity growth is a key megatrend affecting business opportunities and future prosperity
- Technologies emerging today can help address this trend – and generate strong new business opportunities
- Widespread adoption of these advances will require *business model innovation* as well



# Thank you



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+1 646 723 0161