



# Virtual Robotics Workshop Tuesday June 23, 2020

## Roadmap and Goals

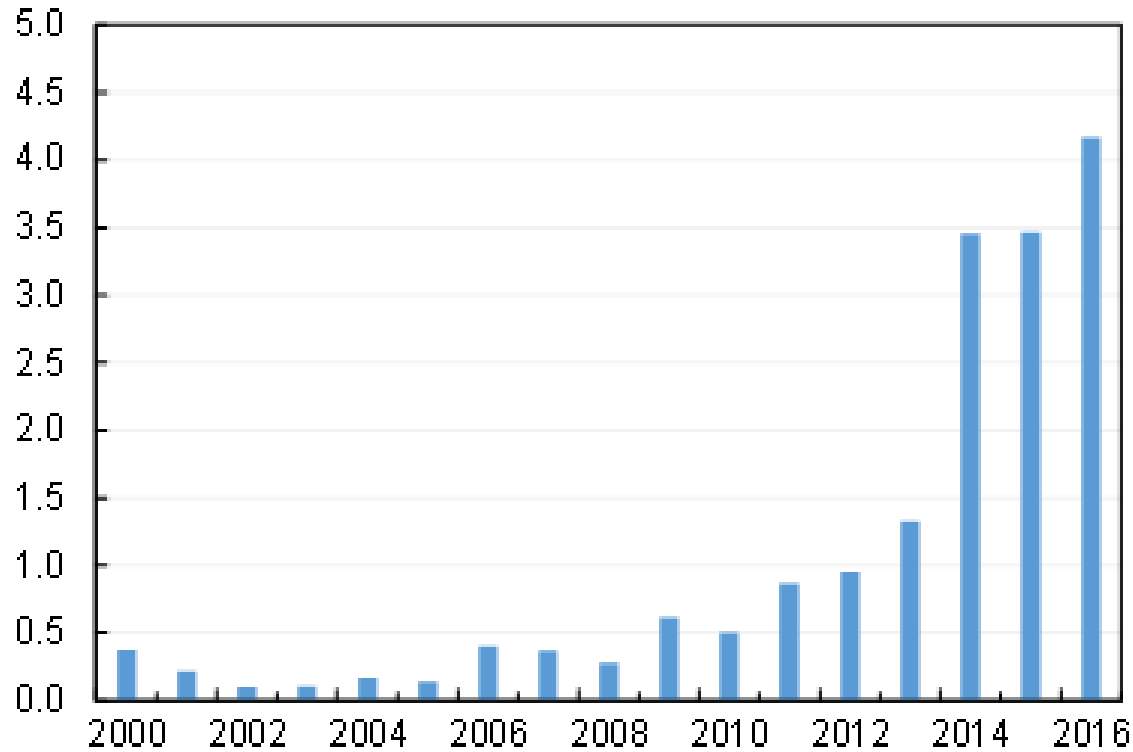
Javier Miranda – US Census Bureau  
Rob Seamans – NYU Stern School of Business

# Motivation: rapid adoption of AI and robots

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### Total AI Funding by Year

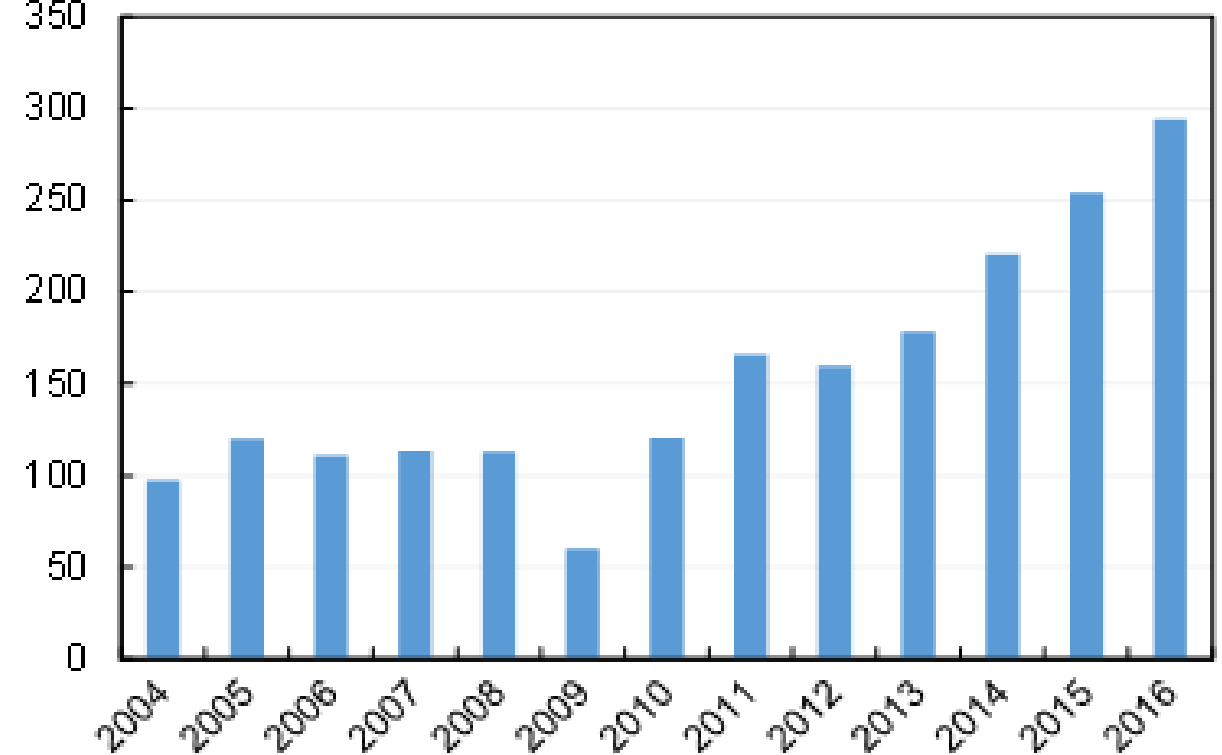
Billions of 2009 Dollars



Source: Crunchbase; Bureau of Economic Analysis.

### Worldwide Industrial Robot Shipments, 2004-2016

Thousands of Units



Source: International Federation for Robotics.

# Technology, productivity growth, labor

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- Prior episodes of automation have led to growth (Romer, 1990)
- In principle, AI is a general purpose technology; should boost innovation and growth (Cockburn, Henderson, Stern, 2018; Brynjolfsson, Syverson, Rock, 2020)
- In practice, too early to tell about AI. But, robots added an average of 0.4 percentage points of annual GDP growth 1993 - 2007 (Graetz and Michaels, 2018)
- Heterogeneous effects on labor
  - Direct effect may be negative (Acemoglu, Restrepo, 2017), but not always (Bessen, 2015)
  - Indirect and net effects may be positive (Autor and Salomons, 2018)
  - Effects vary by age, occupation, other demographics (Barth, Davis, Freeman, McElheran, 2020)
- Tease out mechanisms using establishment and firm level micro-data

# Census efforts

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- Historical:
  - Survey of Manufacturing Technology (1988, 1993; collab. with DoD)
  - Information & Communication Technology Survey via ACES (discontinued 2013)
  - Both used to address questions related to productivity growth, labor and skill biased technical change, technology management (Dunne, 1994; Mcguckin et al, 1996; Doms et al 1997; Lewis, 2005; McElheran, 2014, 2015)
- More recent:
  - Cognitive testing of robot questions for inclusion in ASM, ACES (See Buffington, Miranda, Seamans, 2018).
  - Cognitive testing of automation questions for inclusion in ABS
  - These efforts are thanks to generous funding from NSF, Google, Hewlett, Kauffman and generous support from NAM and RIA.

# Workshop goals

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- The goal of this workshop is simple: we want to get your feedback.
- To this end, we will:
  - Present early findings and future steps
  - Describe issues that are coming up (briefly)
  - Solicit feedback on some of these issues
  - Solicit feedback on experimental products
  - Hear your thoughts on next steps

# Caveats, qualifiers and disclosure

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- All the results are preliminary and there will be lots of qualifiers.
- The word “preliminary” is not window dressing. We need your feedback and these numbers will change as a result of your input.
- All the tables and figures have gone through Census disclosure.
- However, unless you receive explicit permission, please do not disclose these outside of this workshop. After all, the numbers will change, thanks to your feedback!

# Roadmap

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- Discussion of robotics questions in Annual Survey of Manufacturers (Javier Miranda, Census)
- Discussion of robotics questions in Annual Capital Expenditures Survey (Anne Russell, Census)
- Discussion of automation questions in Annual Business Survey (Aneta Erdie/Nik Zolas, Census)
- Moderated discussion to take your feedback (Rob Seamans, NYU)

# Logistics

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- Presentations will be about 20 minutes each.
  - Please don't interrupt during the presentation.
  - Time for a few brief clarification questions after each presentation.
  - Longer moderated Q&A once all presentations are done.
- During each presentation, use the chat feature to provide feedback and ask questions.
  - During the moderated Q&A at the end we will address as many as possible.
- Please also feel free to follow up with additional feedback to Javi and Rob ([Javier.Miranda@census.gov](mailto:Javier.Miranda@census.gov) and [rseamans@stern.nyu.edu](mailto:rseamans@stern.nyu.edu)).





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