Responsible Innovation via Lifelong Learning: Artificial Intelligence Opportunities and Challenges

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Remarks at *Artificial Intelligence – Opportunities and Challenges Forum* organized by *The New Economy Task Force* part of *Jobs for America Task Forces*

The Capitol
Washington DC
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Program
1429 Longworth House Office Building, room (H-137)
2:00pm talk to **Bill Rockwood**
2:30pm talk to Congressman **Darren Soto**
2:45pm join forum together
3:00pm Forum
4:00pm Press

Congressmen:

Joseph Crowley	**Linda T. Sánchez**
Chairman, House Democratic Caucus	Vice Chair, House Democratic Caucus
Suzan K. DelBene	**Debbie Dingell**
Member of Congress (WA-01)	Member of Congress (MI-12)
Co-chair, New Economy Task Force	Co-chair, New Economy Task Force
Raja Krishnamoorthi	**Darren Soto**
Member of Congress (IL-08)	Member of Congress (FL-09)
Co-chair, New Economy Task Force	Co-chair, New Economy Task Force

Guests:
- **Frank Torres** - Director of Consumer Affairs, **Microsoft**
- **John Maddox** - President and CEO, **American Center for Mobility**
- **Jehan Wickramasuriya** - Senior Software Architect, Chief Technology Office, **Motorola**
- **Dr. Ivan Garibay** - Professor, University of Central Florida, Department of Computer Science

Introduction

My name is Ivan Garibay, I am an Assistant Professor at the University of Central Florida (UCF) where I direct the Complex Adaptive Systems Laboratory where my colleagues and I conduct research on Artificial Intelligence, Machine Learning, Big Data and on Innovation and Economic Prosperity (with projects currently funded by National Science Foundation, DARPA, Microsoft and Amazon among others). I have over 20 years of of experience in the artificial intelligence and computer science fields at academic and industry environments.

At UCF I also direct two educational programs in partnership with industry (Fortune 100 companies) focused on retraining technology workforce using lifelong learning approaches: one on data analytics and one on deep learning.

UCF is a public university in Orlando. It is one of the largest Universities in the country with more than 66,000 students enrolled.

Artificial Intelligence Opportunities and Challenges

Here are my thoughts on the subject. **We need to embrace Technological Innovations**--- Artificial Intelligence innovations included. Societies that restrain or curtail innovation inevitably are destined to decline while competing powers that cease these same innovations rise. We need to embrace AI and promote the growth of AI. We are at the dawn of the "AI revolution", a revolution that will touch every industry in the years to come and that could drastically reshape our economic landscape.

(Example of (1) ottoman empire, printing press, example of (2) DARPA=internet, = Google, Facebook, are the envy of the world because we created and embraced key innovations and lead the world).

But, Innovation must be embraced responsibly. "Creative Destruction" is a term originally coined by the economist Joseph Schumpeter to explain the disruptions produced by the introduction of new technological innovations. At the industrial revolution, and later at the computer revolution, many jobs types disappeared and many new types of jobs were created. The same will be true for the AI revolution. Market forces will work to adjust the discrepancy between the new skills needed and the skills offered in the labor market over the long term, but in the short term there is a risk of a high social cost in the form of unemployment of dislocated low-skill workers.

Here are the Opportunities

- AI is Good for the economy as most economists agree it would bring productivity gains, GDP growth, high-paying jobs and new types of jobs

- AI is also Good for society. With new technologies such as "Deep Learning", we provide hope to solve previously intractable societal maladies such as disease, climate change, social problems, etc.

- As a result it is a big opportunity to not only embrace AI but to commit to continue to be the leader in AI by systematically investing in basic science research in AI and to build on our leading industrial base composed by world leaders such as Microsoft, Facebook, Google, Amazon, IBM to name a few. (2015: $2.5Billion invested by industry, $400M by NSF)

Here are the Challenges

- Productivity gains due to AI automation could benefit few, contributing to income inequality

- AI could increase unemployment of low-skill workers. Estimated 375M workers displaced by 2030 globally (McKinsey, 2017)

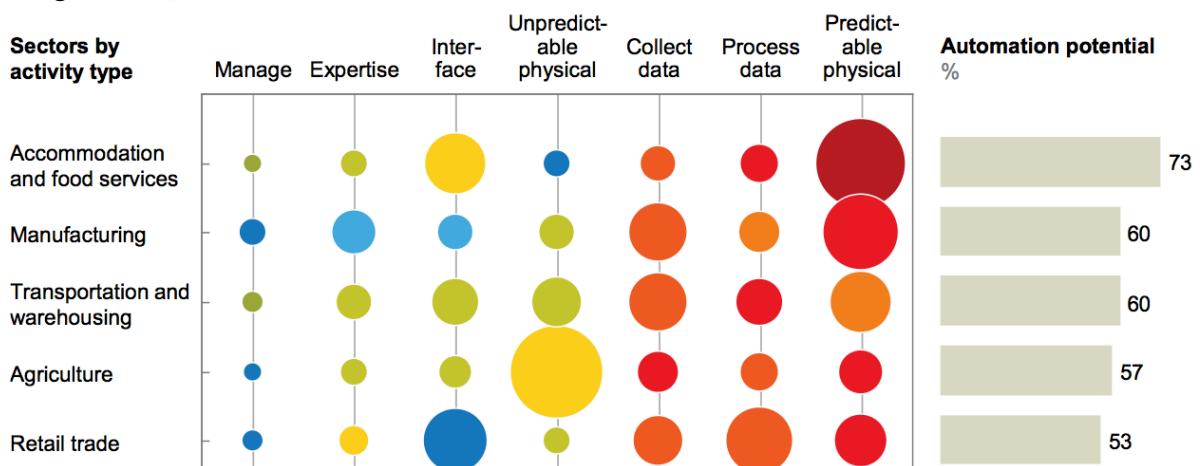**The Way Forward is Responsible Innovation via Lifelong Learning**

We need a coordinated support for the workforce from corporate, academic and government entities to:

1. **Invest in research** and innovation: key for economic success

2. **Educate** in AI to prepare our workforce for the jobs of the new economy

   a. Emphasis on Science Technology Engineering and Mathematics (STEM) education

   b. Welcome students from all places, including international students

   c. Promote AI from K-12 and beyond

3. **Lifelong Learning approach to reskill** the current technology workforce (UCF examples) and to aid and retrain dislocated non-technology workers so they can also participate in the new economy. At UCF we have been working on Lifelong Learning to reskill technology workers at no cost, or at little cost to them, and in partnership with industry:

   a. UCF Data Analytics Masters (Artificial Intelligence workforce re-skilling). A Fortune 100 corporate partner pays 100% of the educational cost of his employees enrolled.

   b. UCF Deep Learning Initiative (Artificial Intelligence workforce re-skilling). Another Fortune 100 corporate partner will pay 100% of the cost of retraining its employees via a customized graduate-level education program.

   c. New models of education:

      i. Linear model: get a college degree and then get a good paying job may not be adequate any longer for an innovation-driven economy.

      ii. New model needed: Lifelong Learning: The accelerated pace of innovation requires a new type of workforce. A work force that is constantly learning and retraining. Support for this new paradigm from corporate, academia, and government would be essential.

   In summary, In the innovation economy, life long earning requires life long learning.

Q&A

1. Something about the cutting edge of AI technologies (Answer from an [article in Forbs](#))
   1..1. Deep Learning: allowed great improvements on machine vision (driverless cars), speech recognition (Siri, Alea) and natural language translation (google translate).
   1..2. Intelligent Agents: Simulating entire online social media behavior via intelligent agents that approximate how people behave online.
   1..3. Intelligent Agents: can revolutionize economics and social science: use them to model social and economic behavior to obtain better social and economic models
2. How you think AI will develop in the next 10-20 years (answer from an [article in salesforce](#))?

   - Pervasive, every sector, just like the computer revolution, there will be no business that is not affected by AI
   - Computational power and data will continue increase the power of AI
   - No "singularity" in our lifetimes.

3. Some of the industries AI will particularly effect: From McKinsey report on "Automation, Employment and Productivity:
   - Analyzed over 2000 work activities and 800 occupations
   - 5% of occupations can be automated entirely (replacement)
   - 60% of occupations have at least 30% of activities that can be automated (enhancement)
   - Top activities subject to automation: predictable physical, data collection and processing
   - Top industries affected: Accommodation and food services, Manufacturing, Transportation, Agriculture, Retail.

Sectors by activity type	Manage	Expertise	Inter-face	Unpredict-able physical	Collect data	Process data	Predict-able physical	Automation potential %
Accommodation and food services								73
Manufacturing								60
Transportation and warehousing								60
Agriculture								57
Retail trade								53

4. What are some of the things we can do to better prepare for the coming AI economy (answer from an [article in The Conversation](#))

   1. Invest, this is the future, we need to lead

   2. Educate,

1. Attract students to STEM, national and international

2. Promote AI on campuses and schools

3. Lifelong Learning: New paradigm in education to assist and reskill dislocated workers enable them to benefit from the AI economy
   1. More flexible
   2. Apprenticeships
   3. Not cascade but agile education 4. Entrepreneurship