



Summary report of the roundtable

*“Man and Machine:
The Impact of Technology on Employment”*

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And thanking for their generous support:



Introduction

In the 21st century, humanity is facing severe difficulties at the societal (global warming, financial stresses), economic (globalization, innovation) and personal levels (employability, happiness). Technology's exponential growth could be compounding the problems, via the impact on employment of automation and off-shoring.

This strand of work with Economists, by the [Center for Curriculum Redesign](#) (CCR), aims at exploring the depth and breadth of the impact of technology on automation and offshoring. The first [colloquium](#) was held on February 24, 2012 and the second [colloquium](#) on February 28, 2013.

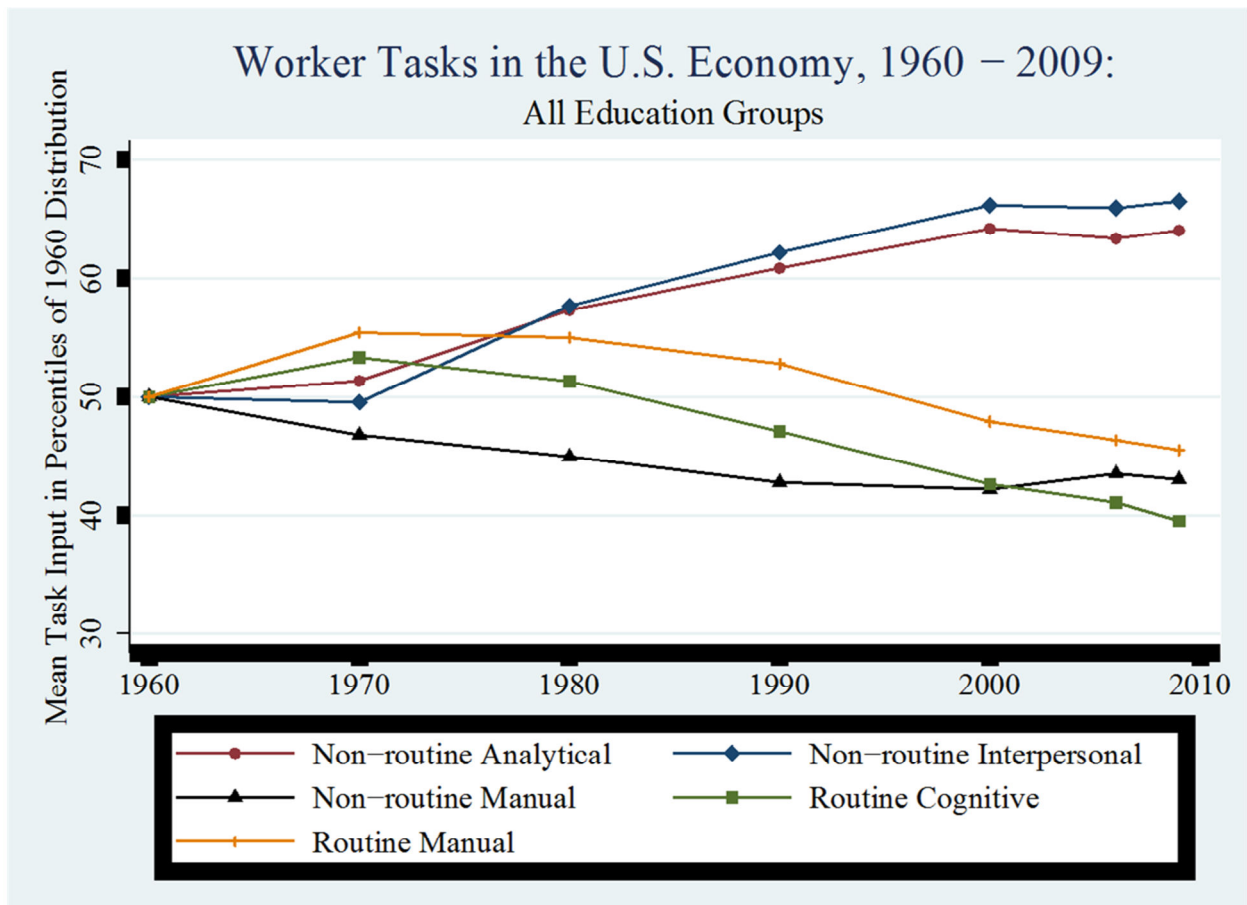
The second colloquium explored the following key questions:

1. Do different models of economic analysis adequately factor in the disruptive impact of technological changes?
2. What are the labour market consequences – short-term and long-term?
3. What types of jobs get substituted, and importantly, which ones get added?
4. Are some professions/fields more conducive to overall job creation than others?

Overall Colloquium Results

The colloquium highlighted the following:

- Projections have been notoriously riddled with unforeseen effects, which have discouraged many from continuing to attempt forecasting.
- The most telling data, historical in nature, was presented by David Autor, showcasing an update to the eponymous Autor/Levy/Murnane data on “the changing task composition of the US labor market”.



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This data highlights that there seems to be a “new normal” settling in, in the USA:

- Non-routine interpersonal and analytic tasks have roughly plateaued in the last decade.
- Routine tasks are continuing to decline.

¹ “The Changing Task Composition of the US Labor Market: An Update of Autor, Levy, and Murnane (2003)” June 20, 2013 by David H. Autor, MIT and NBER Brendan Price, MIT

- Non-routine manual tasks ceased their multi-decade decline in the 1990s and slightly reversed direction in the 2000s.

These patterns are consistent with the findings of other work about employment polarization done by Autor, Dorn, Acemoglu, and others.² This polarization has potentially profound consequences on the continued existence of a middle-class in America – the qualifying bar may have shifted higher.

But what explains the flattening of the demand for non-routine skills? Four potential explanations:

1. Adverse shifts in pool of college grads; the types of graduates have not matched the job market requirements.
2. Conversely, a collapse of demand for both high and low skills.
3. Skill demands increasingly skewed towards highest skills; the demands of the job markets only favour the uppermost skilled.
4. Occupational tasks are changing internally; for instance a biologist spends a lot less time pipetting, an accountant spends a lot less time calculating – both have moved on to higher-level functions requiring new skills. These changes are not observable in the Dictionary of Occupational Titles (used by the Autor data and others) since the point in time snapshot offered by the DOT means that the task content of occupations must be treated as static.

This fourth hypothesis appears plausible, and could be further analysed via O*NET data, as well as European data (Germany in particular, where the IAB/BIBB data offer an opportunity to study the evolution over time of job tasks within occupations).

² Acemoglu, Daron, and Autor, David H. 2011. Skills, Tasks and Technologies: Implications for Employment and Earnings. *Handbook of Labor Economics*, 4(11), 1043–1171.

Autor, David, and David Dorn. forthcoming. "The Growth of Low Skill Service Jobs and the Polarization of the U.S. Labor Market." *American Economic Review*.

Beaudry, Paul, David A. Green and Benjamin Sand. 2013. "The Great Reversal in the Demand for Skill and Cognitive Tasks." NBER Working Paper No. 18901, March.

Implications for Education Systems

This report focuses on the implications to K-12 Education systems.

From the colloquium conversations and the data presented by Autor³, it can be understood that:

- Given the “new normal” of disparity, the returns on Education (non-routine interpersonal and analytical skills) are at their highest during the period examined, and most likely the highest they have ever been. The critical, continued importance of analytical and interpersonal skills cannot be understated.
- But the types of occupations that achieve a middle-class income have been changing: for instance, auto manufacturing, office workers are being automated out. The new types of occupations seem to require a certain technical proficiency, coupled with flexibility/adaptability within occupational tasks. For instance:
 - The so-called “new artisan” jobs that pair technical skills with a significant level of human interactions such as medical paraprofessionals, and teachers, are on the rise⁴. They are, naturally, harder to offshore and automate⁵.
 - Skilled trade and repair work, which is in short supply.
- Although college education represents a huge bifurcation in earnings potential, this should not be understood as necessarily 4-year degrees, particularly in disciplines that are witnessing lower demand (e.g.. Humanities as contrasted to higher demand i.e. Science/Technology/Engineering/Maths).

All this seems to indicate that, more than ever, education systems need to pay attention to the demand for Skills such as critical thinking, communication, collaboration, creativity. And the development of such skills occurs in an authentic, project-based environments, not merely didactic ones; hence the need for the Deeper Learning approaches as developed by several school systems that are part of the Hewlett Foundation team.

³ “The Changing Task Composition of the US Labor Market: An Update of Autor, Levy, and Murnane (2003)” June 20, 2013 by David H. Autor, MIT and NBER Brendan Price, MIT

⁴ http://www.bls.gov/emp/ep_table_203.htm

⁵ As conjectured by Princeton’s Alan Blinder in “How Many U.S. Jobs Might Be Offshorable?” CEPS Working Paper No. 142, March 2007

Suggested next steps

There are profound consequential questions that are still lingering. Among the critical questions:

- How do labor markets deal with disruptions?
 - What happens to people who got displaced? What new types of jobs got created, with what new skills requirements?
 - What skills requirements have changed *within* occupations?
- What facets of an education are paying off or not?
 - What college type (2- vs. 4-year, type of major) leads to what job potential?
 - What is the impact of internships and apprenticeships on skills development?

We recommend a more comprehensive research effort involving a multi-disciplinary team of Economists, Technologists (to understand where technology is going), and Sociologists (to understand human motivation), to at least attempt at better framing the space of changes to come. Given the enormous potential impact on humankind, this seems to be a worthwhile endeavor.