
Disrupt or be Disrupted: Research Findings from the CDO Project & Policy Implications

David A. Wolfe, Ph.D.

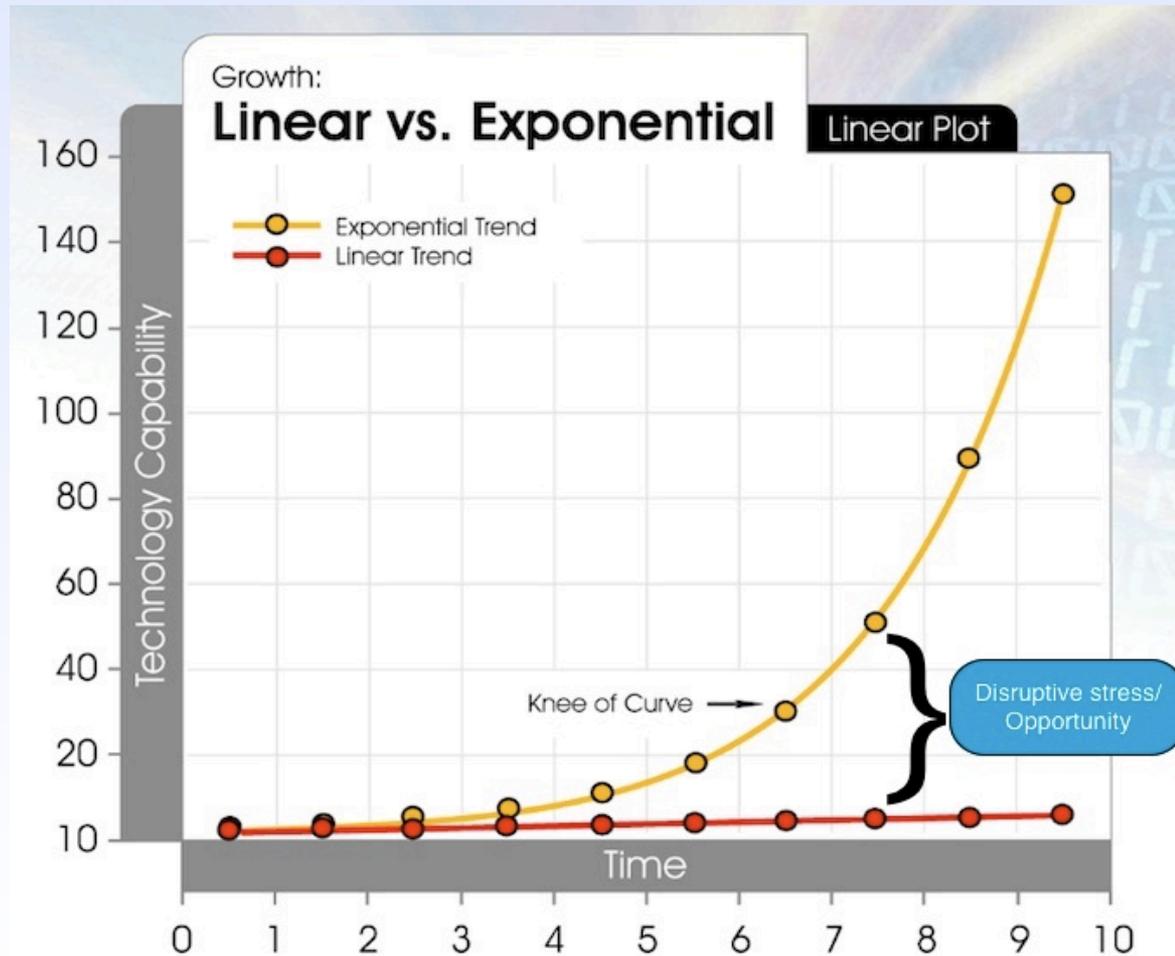
Co-Director, Innovation Policy Lab
Munk School of Global Affairs
University of Toronto

Presentation to Annual Meeting of
The Creating Digital Opportunity Research Partnership
Wosk Centre, Vancouver, BC, April 25, 2018

Overview of the Presentation

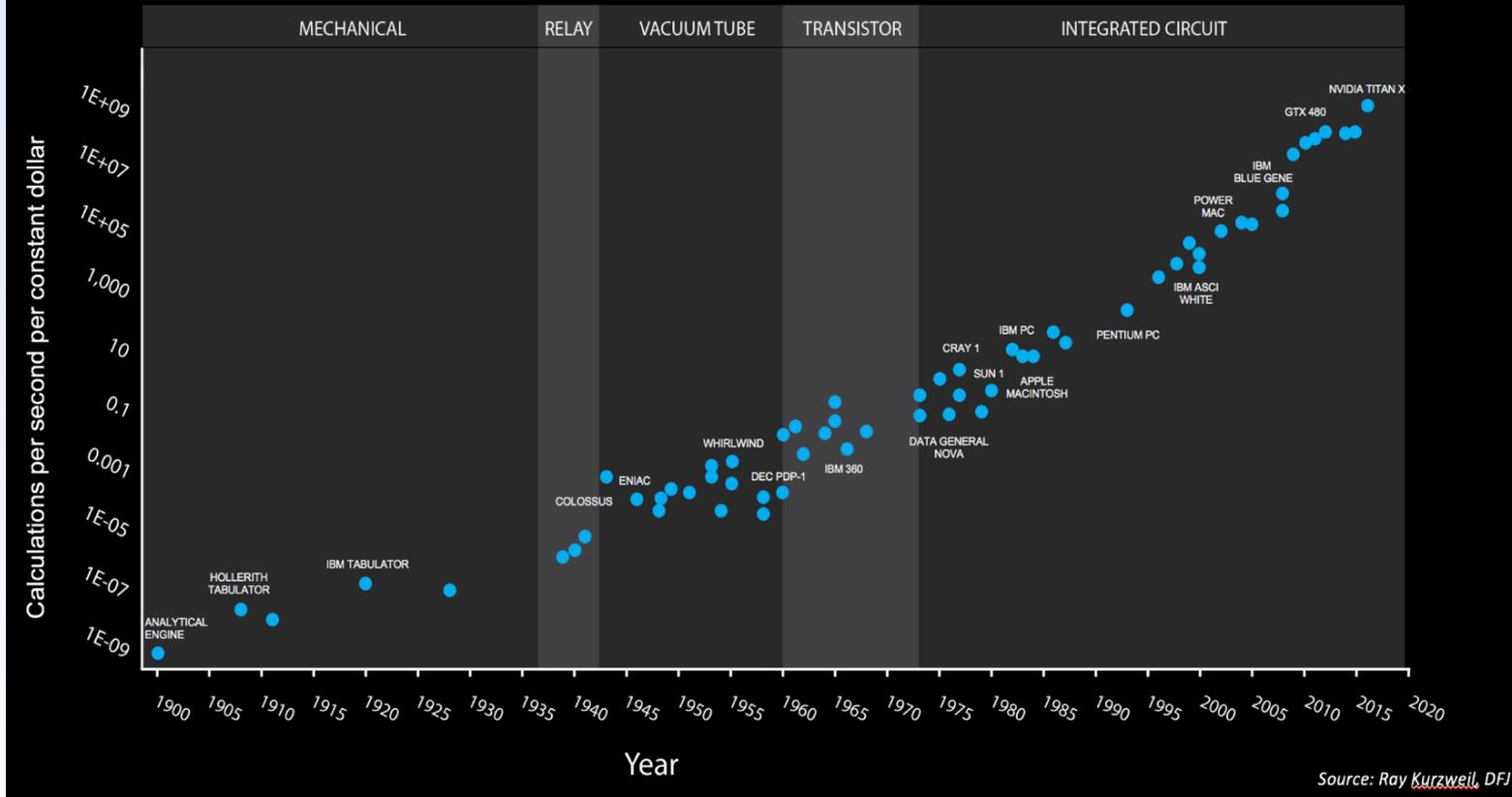
- Era of Exponential Growth
- Rise of the Platform Economy
 - Growing gap between digitally enabled firms & the rest
- Key Findings from Research Themes
- Policy Implications
- Conclusions

The Age of Exponential Growth



“Rate of change & rate of growth are accelerating at the same time”

120 Years of Moore's Law



"I used to say that this is the most important graph in all the technology business. I'm now of the opinion that this is the most important graph ever graphed." — Steve Jurvetson

Broad Societal Implications

- Mooly Eden, head of Intel for Israel
 - Foresees end of Moore's law
 - new materials or quantum computers
 - How many neurons in the brain – 100 billion
 - 2 billion transistors on a microprocessor in 2016
 - Predicts 120 billion transistors on a microprocessor by 2025-26
 - No doubt humans have embedded processors in their bodies
 - William Gibson predicted this in 1984
 - “Our goal is to take the fiction out of science fiction and make it science”

Rise of the Platform Economy

- Digital technology at stage of “foundational technology”
 - Brian Arthur forecasts spread of the second “neural” economy
 - Third morphing of digital era – cheap & ubiquitous sensors
 - Internet of Things
 - Embedding of hardware functionality in software
 - Growing importance of “intangible capital” – IP, software, standards
- Platforms scale more efficiently than pipelines
 - Due to network effects - driven by:
 - Proliferation of mobile devices – 2007 is inflection point
 - Provides easy access & generates terabytes of data
 - Increased networking & bandwidth – cloud computing
 - Growing adaptability of software – easing to reprogram
 - Data analytics – Machine learning & reinforcement learning
 - But Artificial General Intelligence is still 20 to 30 years off

Key Challenge for CDO Project

- Rate of technological change is accelerating faster than capacity of socio-political institutions that govern economy & society to keep pace
 - Can learning systems, management systems, social safety net & governance regime keep pace with exponential rate of change?

Initial Findings from Theme I

- Cdn firms weakly embedded in Japan/East Asia
 - Initial research turned up weak evidence of linkages
 - Limited presence of Canadian firms in South Korea
 - CanAsia Map – <https://munkschool.utoronto.ca/canasiafootprint/>
 - Presence of micro-multinationals in East Asia – some going to Asia first
 - Recent research findings from Japan:
 - Takes long time to establish in Japan – relationships/networks
 - Design chip sets & semiconductors in Japan, manufacture in Taiwan, sales in North America
 - No shortage of startup capital – problem is finding capital to scale up
 - Challenges with control of IP in Chinese market
 - Hardware is hard for Cdn firms to do in Asia, but opportunities in software – partner with US & Asian hardware firms
 - A few large hardware firms – with footprint in Japan

Theme II: Vibrant Innovation Ecosystems Across Country

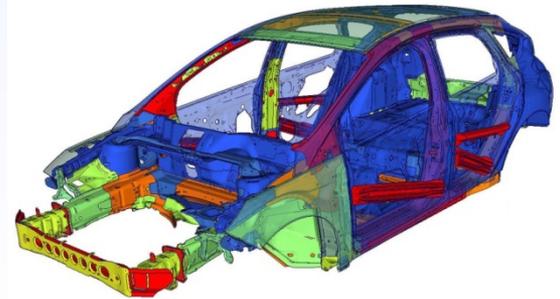
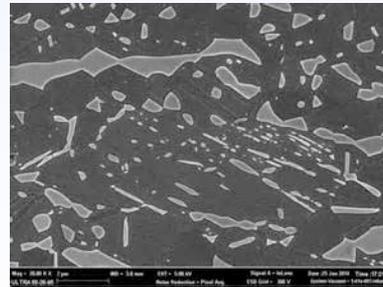
- Vancouver
 - Thriving gaming sector & software development
 - Digital supercluster bid shows great strength
 - Waterloo – life after RIM
 - Evidence of strong new firm formation
 - Explosion of Toronto
 - Major scale up scene in CBD, huge interest in AI (Vector Institute), plus new investments by MNEs
 - Montreal – Ubisoft ecosystem & AI & ICT's
 - Atlantic Canada – digital oceans
 - St. John's – offshore oil & gas cluster going digital

Theme III: Impact Across Economy

- No sector left untouched by rise of platform economy
 - Rapid diffusion across all sectors of economy
 - Creative & Cultural industries
 - impact of Netflix – governance is adrift
 - Transportation – Uber & AVs – TaaS
 - Growing integration of ICTs into autos
 - Advanced manufacturing & materials science
 - Fashion & Design
 - Mining & oil & gas

AM: Interface of Advanced Materials & Software

- Advanced Materials:
 - Not just specialized and price premium
 - Micro-behaviour of the materials determines macro-behaviour of the product
- Role of Software
 - Research, visualize and compose materials
 - Micro-structural manufacturing



Theme IV: Key characteristics of the concept of 'smart city'

- Governance & management at core
- ICT enabled
- Civic Engagement
- Economic development
 - Equitable distribution of job & opportunities
- Places that are left behind
 - 'place-based' development strategies critical to ensure their success

Theme IV: smart city characteristics from residents' perspective (3300)

- Online Municipal Services (43%)
- Strong Focus on Environmentally Sustainable Development and Management of Natural Resources (29%)
- Strong Economic Development (28%)
- Other services residents associate with 'smart city'
 - Business incubator (27%)
 - Community health services (26%)
 - Access and training to technology (23%)
- Broader Implications:
 - Technology is not an outcome of the future,
 - Residents want to see a focus on transparent & accountable government
 - Resident perspectives matter.
 - Digital policy change needs to consider these voices

Policy Implications for Canada

- Policy Supports for Digital Economy
 - Federal Innovation Agency
 - Scale-up Strategy for Global Expansion
 - Intellectual Property Strategy
 - National Data Strategy
 - Embed Digital Technology in all Sectors of Economy
 - Strengthen Regional Innovation Ecosystems
 - New Urban Policy Agenda

Policy Gaps

- Challenge of scaling-up & sustaining indigenous ICT-related & digital firms is critical
 - Startup financing is available, but need follow on financing
 - All firms are digital!, not just those in ICT sector
- Diffusion of digital technology across the economy
 - Some success with DTAP and BDC Smart Technology Service – but we need more & on a broader scale
 - Linked to Innovation Canada Platform?
- Proliferation of Incubators & accelerators - CAIP
 - But are we assessing their effectiveness?
- Schumpeterian Development Agency for Canada
 - Like DARPA, SITRA or Israel Innovation
- IP & Standards are critical part of “intangible capital”
 - We lack a coordinated strategy

Creating Digital Opportunity Research Project

- Thanks to SSHRC & our partners, including ISED for making this possible
- All network presentations & papers available on CDO website:
 - <https://munkschool.utoronto.ca/ipl/creating-digital-opportunity/>