



Berkeley Roundtable on the International Economy
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WORK IN THE DIGITAL ERA: CHOOSING A FUTURE

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Where will Work Come from in the Era of the Cloud and Big Data
John Zysman and Martin Kenney January 2015



Utopia / Dystopia: Pioneers and Skeptics

- **The Pioneers: Creating a Utopia**
 - Noyce, Jobs, Sanders, Sporck (Gates in Seattle)
- **Skeptics: Generating a Dystopia**
 - Vonnegut (Player Piano)



How Revolutionary is the Digital Revolution?

WHAT NEW ECONOMY AND SOCIETY
WILL WE SHAPE
WITH OUR DIGITAL TOOLS
??????



Takeaways

- Technology does not dictate:
 - Consequences depend on *deployment*, how it is used



Takeaways

- Technology does not dictate:
- Deployment strategies and work organization:
 - Are workers asset to be promoted or simply cost to be contained:



Takeaways

- Technology does not dictate:
- Deployment strategies organization matter:
- The People Factor: Answer to The Algorithmic dilemma:
 - The Routine can be automated
 - Automation can be copied
 - Sustained innovation requires human imagination and implementation



Takeaways

- Technology does not dictate:
- Deployment strategies and work:
- The algorithmic dilemma: Anything routine
- Deployment outcomes rest on policy, as well as corporate strategy:
 - Regulating Protections: Workers, Communities, Clients
 - Social policy: Markets, Employment, Citizenship
 - Competition Policy: Who gains and how do we compete



Technology and Work in the Digital Economy

- The Algorithmic Revolution:
 - The services transformation and the internet
- The Cloud Acceleration/ The Platform Era:
 - Algorithms live in the Cloud as Platforms

Where Will Work Come from in A Digital Age John Zysman and Martin Kenney
<http://www.brie.berkeley.edu/>

I.

The Algorithmic Revolution

- Aspects of activities can be converted into:
 - Formalizable, codifiable, processes
 - Often with clearly defined rules for their execution
 - These are computable algorithms
- Software layer over everything: Evident throughout the economy

Services with Everything: The Digital Transformation of Services

<http://brie.berkeley.edu/publications/wp187a.pdf>

The Algorithmic Revolution: The 4th Services Transformation: Communications of the ACM, Vol. 49
No. 7,

available at: <http://www.brie.berkeley.edu/publications/wp171.pdf>

Algorithms: Software Layer Across Production

- Control Systems for Manufacturing
- ICT tools applied to services/markets/
social activities
 - Services with Everything
 - Automated
 - Augmented Human Services
 - Hybrid



The Algorithmic/Services Dilemma

- The Routine can be automated
- Automation can be copied
- Sustained innovation requires human imagination and implementation:
 - The high road adaptation to the algorithmic revolution is effectively using People



II. Algorithms Go to Live in the Cloud: The Era of the Platform



Cloud Computing Will Accelerate the Production Transformation

- Architecture (how) not just geography (where)
- The IT platform in an era of “computing resource” abundance



The Cloud Computing “Stack”

Software as a Service

- **Delivery model**

Platform as a Service

- **Development model**

Infrastructure as a Service

- **Management model**



What is Distinct about Cloud? The Magic of Abstraction

- Layers of abstraction enable loosely-coupled architectures
 - Loose-coupling enables elastic scaling and resource pooling
 - Program state, data and logic decoupled from each other
 - Applications decoupled from Infrastructure



Cloud Computing

- Delivers: **elastic computing services** - data storage, computation and networking - to users at the time, to the *location and in the quantity they wish to consume, with costs based only on the resources used.*
- Procure: **only the computing needed**
- Provides: **the illusion of infinite resources on demand**
- Moves: Computing costs from **CapEx to OpEx**



Implications of Cloud Computing: A First Cut

- Users:
 - Radically lowers the cost of access and use
 - Digitally based Tools widely available
 - For SMEs and individuals
 - For larger firms:
 - Time to value will be crucial
- Providers: A competitive offering
 - Scale matters
 - The flavor matters
 - The “rules” of provision matter
 - The Providers are principally American



Algorithms, as Platforms, Go to Live in the Cloud:

- Platform is a computing framework in which a range of activities can be conducted.
 - Platforms are then, can be, sources of new work or methods for reorganizing the existing work
- Platforms Grow on Platforms



Algorithms Go to Live in the Cloud: An Era of Platforms

- Platform for Platforms: Amazon Web Services
- App Stores: Apple/Android
- Globally biddable work: Odesk
- Transforming traditional business:
- Converting personal consumption goods into investment
 - Uber
 - Airbnb
- Occasional work:
 - Task Rabbit
- Virtual consignment: Ebay
- Finance and independent start up projects
 - Kickstarter



Tool Cost and Availability: Lowered?

- Cloud
- Open source
- Tech Shop model with software layer



And, therefore.... Questions

- How Value is Created?
- Who Captures the Gains?
- What Happens to Work?



Work in the Platform/Digital Age

- We know: Routine will be automated
 - (over time-usually)
- We Don't know
 - Entirely new products will emerge
 - Services, platform based markets, manufactures
 - Production processes for them
 - Skills and reorganizing existing production
- The balance? To Be Determined



Work in the Digital Era

- We know: Routine will (over time-usually) be automated
- We Don't know what will emerge
- Consider Internet of Things– Smart Building:
 - Designing; Developing; Maintaining; Building out; Innovating
- Consider 3D printing and Tech Shops: Automation on the classic shop floor, but
 - Lower costs for prototypes
 - Designers become key

Work Outcomes Depend on Deployment

- RFID (radio frequency ID) in retail
 - Denmark v. Walmarts
- Industrie 4.0/ Smart Services Welt
 - German v. US



How is Work Packaged in A Era of Platforms and Algorithms

- How is work “packaged”: How will work be Repackaged?
 - Employment?
 - Contractors?
 - Gigs?
- The “packages” matter-- issues include:
 - **Who bears risks and responsibilities**
 - **Are contractors entrepreneurs or vulnerable gig workers**



Technology Deployment strategies influence:

- How many jobs
- What the tasks consist of
- How work is organized
- Labor markets. Serve whose interests organized by whom?



Shaping Outcomes: Policy and Work in the Platform Age

- **Protections/regulations**
 - Protect the client
 - Protect the workers
 - Protect the community
- **Social protections and arrangements**
 - Welfare rights tied to employment?
 - Welfare rights tied to citizenship?
- **Terms of competition and taxation**



Related Materials

Related materials can be found at:

<http://www.brie.berkeley.edu/>