



Berkeley Roundtable on the International Economy
University of California, Berkeley

From Chips to Gen AI:

The Interplay of Digital Technology and Society

Presented at:

***Digitalization of the World of Work
(Work-Reform-Repeat)***

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Generative AI: The current popular focus

Jobs & Work

- What sort of work will emerge?
- How might existing jobs change?
- Automation or augmentation?

Power & Politics

- Will power concentrate? Will Gen AI will re shape policy and governance.
- What impact on global inequality?

Society

- What is truth? How do we trust?
- Disinformation and information integrity?
- Surveillance Capitalism.

Augmentation or Automation?

What will Gen AI bring?

And

What should we be studying and doing?

Embed Gen AI in a Longer Story:



A Digital Trajectory: Work / Reform / Repeat

Chips

- Transformation of technology and work
- The US-Japan trade conflict

Cloud & Platform

- The rise of the platform economy
- The emergence of Big Data and AI as differentiators

AI & Gen AI

- Current challenges
- What will the future be?



Enduring Questions along the way

How is technology embedded in economy and society?

- What does technology dictate?

or

What is the interplay of technologies and society?

- Deployment strategies matter

A Complex and Diverse Debate at each phase

Competing Goals

Promoting Technology

- Managing markets
- Guiding State promotion

Managing Risks

- What balance between innovation and protection?
- Who Decides?

Distribution:

- Gains and losses-
 - Who wins and loses
- Social equity and economic equality

Tensions within the goals themselves!

Promoting Technology

But to what end?

Private gain

- x

Public goals and social benefits

- Economic growth and infrastructure (roads)
- Climate change

National power

- x

Tensions within the goals themselves!

Promoting Technology

Who Decides

Who decides, and why?

- Is there more than one best way to collect garbage?
- Is there more than one best way to route traffic?

Who Benefits? Who is Discomfited?

What we have learned over the years:

Complex interdiscipinary Studies

Technology itself does not dictate

- Consequences depend on **deployment** - how it is used.

Deployment strategies and work organization matter:

- Are workers an asset to be promoted, or simply a cost to be contained?

The “People Factor”

- Algorithmic dilemma
 - “The Routine” can be automated.
 - Automation can be copied.
 - Sustained innovation requires human imagination and implementation.
- AI changes the game.
 - Balance augmenting and automating.
 - Educate ultimate deployers.
 - Consider the distinctive problem of AI regulation.

The Narrative (for me) Started in France

From French Tech through Chips to Gen AI

Tracking the Transformation

The Puzzle

The Collision: What to do, and When

- **Organization Tradition-- centralization**
 - Collides with
- **Innovation Imperatives? -- decentralization**



French Tech: The Beginning

French Industry between Market and State

Two Threads

- Organizational sociology:
 - How do institutions shape Values and Behavior ?
- Political Economy:
 - State and Industry Policy: When does industrial promotion succeed?

French Tech:

How Institutions Shape Values and Behavior

The Collision: An analytic problem

- What happens when the irresistible force (global markets) meets the immovable object (French organizational principles)?
- Centralized structures meet market demands for decentralization.

The findings: politics and markets-driven culture

- Those dominated by the state and state markets replicated structure.
- Those exposed to markets adapted.

French Tech:

Politics Shaped The Institutions

- Political Control
- Horror of Face to Face

French Promotion of Industry

What technology development does well in France?

- Aircraft/Trains, and once upon a time, steel

Stable-tech

What is Problematic?

- From Mainframes on....

Electronics

Digitalization of the World of Work

March 11-13, 2024

***The Digital Transition, for me,
Began in Berkeley***



The Semiconductor Revolution

American Industry in International Competition

Highpoint of the cases: The Semiconductor Industry

*Founding of BRIE
(Berkeley Roundtable on the International Economy)*



Utopia and Dystopia

Competing Visions from the Beginning

The Pioneers/Early Tech Crowd: Creating Utopia

- Noyce, Jobs, Sanders, Sporck (Gates in Seattle)

Skeptics: Generating a Dystopia

- Vonnegut (Player Piano)

The Chip Story in Brief

Three Dimensions

1

Technological Revolution

- Analog to digital / electro-mechanical to digital

2

Social and Organizational

- New way of doing things
 - Organizations
 - Skills
 - Market Strategies
- Slow unfolding
 - The infrastructure had to develop, including the ecosystem that is Silicon Valley

3

Geo-Political Story: US and Japan

- American industry in international competition

The Chip Story in Brief

The US Japan Conflict

A Political Economy Problem

- Entrance of Japan, a vital competitor.
 - Differing structures
 - Global trading system
- The importance of Closed markets in phase 1, and the trap in phase 2
 - Closed Japanese and the downpouring of exports
 - Export-oriented growth
 - Note the difference from China
- The closed market trap in phase 2

The Silicon Valley Story

From Orchard to Village to Metropolitan Eco-system

- Venture capital
- Human capital
- University industry ties
- Professional services ecosystem
- Government support
- Industrial structure and ecosystem



Fast Forward/Skipping Past

Manufacturing Matters

- Control requires production. -- resurfaces with TSMC
- The Boeing story

Production Networks and Supply Chains

- Neo-liberal political economy meets digital possibilities

Financialization and Neo-Liberalism:

- Both cause and effect

Service Economy Emerges

- IcT enabled services

Rise of Mobility



From Cloud to Platform

The Cloud



Cloud Computing: *Origin*

- Expansion of IT services
 - Google
 - Microsoft
 - Sales Force
- Computing as a commodity
 - For sale-- AWS

Cloud Computing:
Logic

What is Distinct about the Cloud?

The Magic of Abstraction

- **Era of Abstraction**
 - Applications decoupled from infrastructure
 - Loose coupling, abstraction, enabled elastic scaling and resource pooling
- **Opens 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

Cloud Computing:
Consequences

Cloud Computing: Era of Abundance

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**



The Platform Economy

The Platform Economy

Built in the Cloud / Deploys AI



The Platform Economy: The Rise

Cloud is the intermediary step

AI is the Essential Tool

- **What do Platforms consist of?**
 - Digital infrastructures that mediate transactions and exchanges of goods, services or data (Gawer, 2014)
 - Data
 - AI Algorithms
 - Computing Power
 - Networking
- **Business model to deploy/exploit the above:**
 - Salesforce
 - Google
 - Facebook



Online Platforms: The Maturation

Digital infrastructures that mediate transactions and exchanges of goods, services or data (Gawer, 2014)

Key organizing institutions for contemporary capitalism globally??

Pervasive

- Present in 70 percent of service sectors in the US

Transformational

- Market enablers
- Affect value creation, competition, power relationships, and governance structures



Recasting Economy and Society?

Is the **platform** to the **digital economy** what the **factory** was to the **industrial economy**?

Platforms Influence Society

Privacy/Surveillance

Information/Misinformation

Social fragmentation

- Everyone can organize
- Everyone can broadcast



Platforms Affect Market Competition

Dependent Entrepreneurs

Platform Terms and Conditions

- Define contemporary markets
 - The fight over App store fees is just the surface

Dependent Entrepreneurs

- Do firms exist:
 - If they cannot be found by Google?
 - Or found on Google maps?

Gig work as Petite Bourgeoise?

Types of Platform Work:

Gig, Influencers, Labor Markets and more

Narrow Perspective	Broad perspective
<p>Gig Workers</p> <ul style="list-style-type: none">• Remunerated labor• Transportation, delivery, house-work• Gig work contracted through the platform	<p>Beyond Gig Workers</p> <ul style="list-style-type: none">• A broader swath directly affected<ul style="list-style-type: none">◦ Those who build the platforms◦ The Ghostworkers who handle the data• New categories<ul style="list-style-type: none">◦ You tubers◦ influencers• The transformed legacy industries?<ul style="list-style-type: none">• From Shopfloor to warehouse

Platforms and Work:

Gig, And the so-called "sharing" economy

A Sharing Economy?

- Reality **OR** Ideology

Labels Matter

- Rules (and identity) come along with labels
 - Gig workers or Petty Bourgeois. Ask a Paris taxi medallion owner
 - Employee? Contractor? Temp Worker?

Policy & rules, not technology, set distributional outcomes

Automation, AI, and Work

Who Wins and Loses?

From Manufacturing to Services and IcT Enabled Services

The latest wave of automation

- Optimization, not job displacement
- The impact will be on services, not factories

IcT Enabled Services

- Value creation shifts
 - The iPod as Transition
 - Port management services
 - Url and the waiter

Multiple Possible Automation Trajectories: Flexible Production/Delivery

1

*Production Based
Flexibility: Industrie 4.0?*

2

*Distribution Based Flexibility
Schein*

First Stop at the AI Station





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**Catalyzing technology-enabled
solutions for society's most pressing
challenges.**

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Center for
Human-Compatible
Artificial
Intelligence



Stuart Russell



Pieter Abbeel



Anca Dragan



Bart Selman



Joseph Halpern



Michael Wellman



Satinder Singh Baveja



Tania Lombrozo



Tom Griffiths



Andrew Critch



Jonathan Stray



Alison Gopnik



Brian Christian



Charis Thompson



Dawn Song



Demian Pouzo



Jacob Steinhardt



Jakob Foerster



John Zsman



Juliana Schroeder



Ken Goldberg



Lara Buchak



Mariano Florentino



Marion Fourcade



Michael Littman



Moritz Hardt



Nika Haghtalab



Niko Kolodny



Rediet Abebe



Rosie Campbell



Siddharth Srivastava



Vincent Coruble



Wesley Holliday



Thomas Krendl
Gilbert



Dylan Hadfield-
Menell



Karthika Mohan



Vael Gates



Rohin Shah



Jaime Fernandez
Fisac



Dorsa Sadigh



Mark Nitzberg



AI: The Several Flavors

Narrow / Gen AI

General AI is for Tomorrow, if at all

Narrow AI is for today

- Can do many remarkable things
- But there is hype

LLM/Gen AI blur things

- Operates on the same statistical logic

Narrow, i.e. Limited AI, is for Today

- Narrow AI automates **specific** tasks at or above human capacity using advances in computation and algorithms
 - Machine learning enables AI to achieve human-comparable results on expanding tasks
 - Current AI applications have little ability to transfer “learning” from one problem to another, so deployment is limited to narrow, task-specific applications with reliable results and no major harms
 - Newer Gen AI tools promise human-level performance across many tasks, but remain narrow

From the AI Winter - To Generative AI

1

Machine Learning and Neural Network

- Big Data
- Processing power
 - Nvidia rises
- Algorithms and weighting

Generative AI and Transformers

- Attention
- Scale

AI: Significant General Features

Statistical Foundations of today's AI Systems (neural nets, including Gen AI)

Hence:

- There is no explicit design
- Logic is not guaranteed
- You can't trace and correct misbehavior

What did ML based AI Change in the World of Work?

The Prior Trends in Automation Stayed the Same

RBTC on Steroids

- There will be jobs: The question is what kind
 - Cognitive Tasks affected
- Job Impact Centrally on Services,
 - Traditional and IcT Enabled

What did ML based AI Change in the World of Work?

Displacement was a central debate

In Both Manufacturing and Services



Gen AI Emerges

Gen AI Emerges

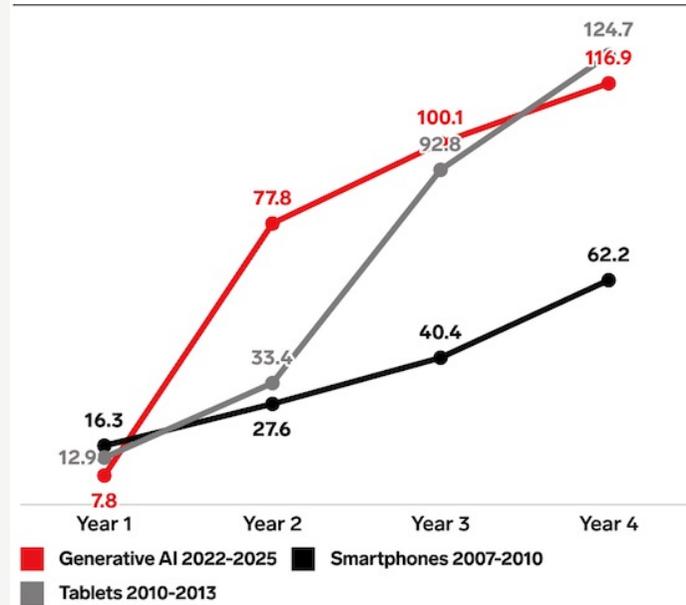
Augmentation or Automation?
Is there a chance for something new?



The Sudden Arrival of Gen AI

Generative AI Has a Steeper Initial Adoption Curve Than Other Recent Technologies

millions of US users



Note: individuals of any age who use each technology at least once per month; Year 1 for smartphones corresponds with the June 2007 release of the iPhone; Year 1 for tablets corresponds with the April 2010 release of the iPad; Year 1 of generative AI corresponds with the November 2022 release of ChatGPT
Source: Insider Intelligence, June 2023



The Sudden Arrival of Gen AI

But Was it Really SO Sudden?

Why Gen AI arrived so suddenly:

The Infrastructure was there:

***From Chips to Cloud to Platform**

***Compare to Autos**

Generative AI

Its Power

Power at a Glance

- Improving human productivity
- Personalization at scale
- Accelerating research innovations
- Supercharged data analysis
- Enhanced creativity?

Generative AI

Its Power

Examples

- **Content Creation:**
 - Articles, marketing content, code.
- **Drug Discovery:**
 - Accelerating the identification of potential drug targets.
- **Personalized Education:**
 - Adapting learning materials to the individual.
- **Deepfakes:**
 - Generating realistic video and audio recordings.
- **Computer Software Development**
 - Boosts speed by 40% for mid-level coders
- **Venture Discovery**
 - Boosts exploration of new venture ideas by coupling adapted Gen AI system with subject matter experts

Generative AI

Its Limits and Risks

Limits and Risks at a Glance

- **Error prone**
 - *Statistical foundation, will go off the rails*
 - *No model of the world*
 - Uncharted territory regarding deceptive or harmful content
 - Amplifying biases present in training data
 - Intellectual property concerns

Generative AI

Its Limits and Risks

Examples

- **Errors with Major Consequences**
 - Air Canada
 - Barry's Resume
 - Michael Cohen's court submission
- **Deepfakes in Misinformation:**
 - Gen AI and its use in both political disinformation and targeted scams/fraud.
- **Plagiarism and Copyright Issues:**
 - AI-generated content that too closely resembles existing copyrighted materials.
- **Improper use in Critical Sectors:**
 - Biased AI models may show preferences for certain demographics, with major consequences in hiring, law enforcement, distribution of benefits, etc.



Generative AI

How will it Evolve

What Might We Expect?

- Ever greater power
- Persistence of errors?

***As Gen AI unfolds:
How do we Assess the Impact on Work***



Assessing the Impact of Gen AI on Work:

How to Go about it

There will be radical breakthroughs

There will be endless experiments

- From the top down, how to create value and advantage
- From the bottom up

Existing job structures are constraints or channels

Generative AI:

Where do People Fit: Are People in the Loop, the Processes, Essential?

Collaboration, not competition:

- Humans working alongside AI to enhance creativity, productivity, and decision-making - not against AI.

Need for oversight:

- Human-in-the-loop systems and robust oversight to ensure ethical use.

Curators and Editors:

- New opportunities for humans to play a crucial role in refining and contextualizing AI-generated content.

Labor Transformations:

- Gradually shifting towards a future where human labor is reduced overall.

Some propositions in the speculation about answers

Start at the beginning:

- Ask how tools are used to create competitive advantage or administrative benefit.
- Which sectors or which functions are most affected

Do not start at the end:

- Tasks and jobs are the outcomes
- Do not start at the end, with the catalogue of tasks, jobs, and work organization structures threatened by AI.

Augmentation or Automation?

Can we Influence the balance?

How Will Tools be Deployed?

Supporting Augmentation:
Dissuade/discourage Simplistic Automation

Influencing the Balance: ***Shape the Context***

- Conventional tools
 - Invest in People, not physical capital
- Regulate AI
 - Guardrails
 - Classic rules expanded
 - Sectors

Who Makes Deployment Decisions?

And Why?

Financial (MBAs? And Consulting firm logic focus on

- Cost Cutting
- Displacement

What Might be Done:

Consider The Importance of People in the Loop

- Analytic/theoretic consideration: Does Market Advantage rest on Augmentation?
 - Essential in an emerging era of skilled labor shortage?
- Cases studies: of the importance of keeping humans in the loop

Change the Framework of Decisionmakers

Educating, Training, and (Re)Training Those making Decisions

Suggestions, perhaps foolish:

- Foundation Prizes
- Fund business school courses
- A specialized consulting firm