

**Economic policy towards digitization:  
could we enhance the “goodies” and abate the  
“baddies”?**

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**European Central Bank conference  
“Challenges in the digital age”  
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# Plan of presentation

## Digitization – a double-edged sword

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### ➤ The concerns:

- **Employment** – *“robots” taking over?*
- **Concentration** – *“GAFA” (or “FAANG”) to rule globally?\**
- **Capacity to do harm** – *the return of uncertainty and mistrust?*

### ➤ The opportunity: affect the **direction** of Digitization,

- to **enhance human** capabilities
- to tackle humanity's **grand challenges**

Could we design **policies** to **address the concerns**, and **act upon the opportunities**? Yes: we shall **suggest some** here, but much more research (and action) needed...

\*GAFA: Google, Amazon, Facebook, Apple; FAANG: Facebook, Apple, Amazon, Netflix, Google



# *The rise of* a new **General Purpose Technology (GPT)**

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- We are on the eve of a new *GPT*, the **conjunction** of, Artificial Intelligence (**AI**) + Pervasive Digitization (**PD**) + Automation ("**robots**") – in short:  
*"D-GPT"*
- Previous waves of **innovation** brought economic **growth**, high **standards of living**, rising life expectancy, but also contributed to **serious** social, economic, political and environmental **ills**:
  - Rising **inequality**, stagnation at the bottom
  - **Environmental** degradation, stifling **congestion**
  - **Diminishing trust** in democracy, resurgence of **populism**
  - **Backlash** against globalization, challenges to the world order

*Will this time be the same?  
can we do something about it?*



## Distinctive characteristics of *D-GPT*

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- Affects **everybody, directly, everywhere, quickly** - iPhone, digital interfaces, IoT, online shopping, etc. unprecedented reach!
- It is a **two-way street** – we are constantly interacting with *D-GPT* (not so with previous GPT, e.g. electricity)



**D-GPT** will have profound **impact**, potential huge **benefits** *and* great **dangers**, hence try not just to study consequences, but **influence its course** in real time


- Focus first on **concerns**, and how to address them



# Concerns I - employment

*Luddites all over again... ?*

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- Since the steam engine, GPT's have **replaced** some **human capabilities** (and complemented others):
  - Physical **strength**, dexterity, coordination
  - **Clerical** skills, **computational** skills, ...,
  
- Now, *D-GPT* capable of autonomous **action** based on self-**learning**, **prediction** and intelligent **decision making**,  

- Probably **displacement** of *many* workers, disappearance of occupations, narrowing of employability (*3.5 m. truck drivers in the US ...*)
- Changes in **skills and competencies**, many left-out

*Anything left strictly human... ?*



## *D-GPT* impact on employment, political economy aspects

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- **New GPTs:** always winners & **losers**, still no effective tools to ameliorate impact & handle large flows of **GPT-displaced workers**
- This time **macro impact:** can't afford mass **displacement & aging**
- **"Democratization of expectations"**: harder for losers to accept fate

*"We enjoy higher standards of living because we are standing on the broken backs of those that paved the way for tech progress, but did not live to benefit from it"*  
*(paraphrasing Newton's "...standing on the shoulders of giants)*



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- This time **macro impact:** can't afford mass **displacement & aging**
- **"Democratization of expectations"**: harder for losers to accept fate
- Already **high inequality**, acute socio-political **tensions** – dangerous!
- **Wider societal costs:** If divide between winners & losers coincide w/**political** divide: **threatens fabric of democracy**



**Governments** need assume wider **responsibility to deal with D-GPT disruption: *min* "losers", *max* "winners"**

# Policies to minimize potential “losers”

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- Strive for **inclusion of existing workers in D-GPT** (very different from macro approach to classic unemployment),

*key:*

- **Retrain** mid-career workers (aged 40-55), need vast programs of *D-literacy* (e.g. how to work with automation, ML).
  - OECD countries spend **5-6%** of GDP on **formal education** for the young, but then spend **little on** maintaining **human capital**
  - **“Non-formal” education & (re)training (NF-ET)** badly needed because of acceleration of tech, aging, pensions
  - **Employers** provide **36% of NF-ET** for working adults in EU, but **moral hazard** prevents required investment...**need Gov.**



# minimize potential “losers”

## continued...

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- Employment and wage **flexibility for older** workers, extend **working age**
- For all: not just employment – also **sense of purpose, belonging, community**
- Corrective & systemic action at **regional/local level: depressed communities** because of **dependence on few** employers, obsolete occupations.

# Policies to *max* potential winners: education revolution

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- 19<sup>th</sup> century **industrial revolutions** ↔ **education revolution**.  
**Ever since** more of the same “**factory model** of education”  
(more years, more hours, more fields of study)
- Need **new education revolution** for 21<sup>st</sup> century *D-GPT*,
  1. **away from just imparting knowledge**, to *D-skills*:
    - “type I”: creative, decision making, adaptive
    - “type II”: interpersonal, communication
    - “type III”: emotional, self confidence

# Top skills for employment in the D-GPT era

“type I”: creative, decision making, adaptive

UNICEF 10 life skills	MyStartJob.com	top10onlinecolleges.org
<ol style="list-style-type: none"><li>1.problem solving</li><li>2.critical thinking</li><li>3.effective communication</li><li>4.decision making</li><li>5.creative thinking</li><li>6.interpersonal relationship</li><li>7.self-awareness</li><li>8.empathy</li><li>9.coping w/stress</li><li>10.coping w/emotions</li></ol>	<ol style="list-style-type: none"><li>1.Communication Skills</li><li>2.Analytical &amp; Research</li><li>3.Flexibility-Adaptability</li><li>4.Interpersonal Abilities</li><li>5. Decision making</li><li>6. Plan, Organize, Prioritize</li><li>7. Wear Multiple Hats</li><li>8.Leadership/Management</li><li>9.Attention To Detail</li><li>10. Self confidence</li></ol>	<ol style="list-style-type: none"><li>1.Sense Making</li><li>2.Social Intelligence</li><li>3.Novel Adaptive Thinking</li><li>4.Cross Cultural Competency</li><li>5.Computational Thinking</li><li>6.New Media Literacy</li><li>7.Transdisciplinary</li><li>8.Design Mindset</li><li>9.Manage Cognitive Load</li><li>10.Virtual Collaboration</li></ol>

Most of these skills **neither imparted** in the **K-12** system, **nor in academia** => losing relevance, consuming budgets



# revolution in education, *cont.*

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2. **Pre-school - invert the pyramid!** invest much more in **early-childhood education** (birth to 6); critical **skills acquired very early on**, hard to remedy later.
  
  3. **In School: uniformity out, personalized education in**, relying on D-GPT
  
  4. **In Academia:**  
what's a **career** for the "**z-generation**", with a **life expectancy** of ~ **100 years**? do they care for long, rigid academic degrees, or rather **modular sequences** of courses? MOOCS?
- **Long lags from** changes in education system to employability; **resistance** to change – hence **urgency!**



## Concerns II:

# increasing concentration, global power

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- Emergence & growth of huge *supra-national* businesses, that develop & **control** key aspects of **D-GPT** – 4-5 tech companies (“GAFA” or “FAAG”)\* more powerful than states?
- **Sources of concentration** (after initial tech advantage) – huge **economies of scale & scope**, and **troubling business model**
- **Not classic “monopoly power”**, but control of **vital resource** of *K*-economy: **detailed data** on, & unlimited **access** to each user.
- **Avoidance of taxation** -> inequities, deprive governments of much needed income to provide services, invest in infrastructure

\*GAFA: Google, Amazon, Facebook, Apple; FAANG: Facebook, Apple, Amazon, Netflix, Google



# Policies to deal with concentration and its consequences /

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- **Classic anti-trust** won't work, but can **block M&A & extension of scope**. Requires **new paradigm!** see **Lina Khan**, M. Delrahim, Booth Report\*
- **Taxation:** need international coordination and enforcement, establish clear rules – **where to tax what**.

"The ease with which multinationals seem able to avoid tax, and the three-decade long decline in corporate tax rates, undermines faith in the fairness of the overall tax system. The current international corporate tax architecture is fundamentally out of date." **IMF chief C. Lagarde 3-19**

- **Privacy rules** – the **default should be "no"**, to provide data should be difficult (at least as difficult as it is to opt out now...)



- Respect of **Privacy limits capacity** of firms to **acquire personal data**, hence **restricts** their ability to exploit **monopoly power**.

\*<https://www.yalelawjournal.org/note/amazons-antitrust-paradox> assistant Attorney General **Makan Delrahim**  
: <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-antitrust-new-frontiers?smid=nytcare-ios-share> <https://www.judiciary.senate.gov/imo/media/doc/market-structure-report-15-may-2019.pdf>



## Policies to deal with concentration //

### Challenge business model

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- Current **business model**: Offer valuable service “**for free**”, in exchange of **relinquishing privacy** & providing **data** sold to **advertisers**. **Instead**:
  - providers would be allowed to charge *only* for service provided directly (e.g. search for Google), and **not for ads**.
  - In particular, “**behavioral ads**” would be banned, “**contextual ads**” may be allowed in some cases.

<https://www.nytimes.com/2019/06/19/opinion/facebook-google-privacy.html>



- **Blunts absolute scale advantage** of data on behavioral history, may allow for **competitive entry** on merits of service and pricing; lowers risks and extent of “**manipulation**”

Such change in the business model is probably the most effective way to counteract negative effects of GAFSA, but hard(est?) to bring about

## Concerns III:

# capacity to do harm

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- **D-GPT: unprecedented** capacity to inflict **systemic harm** (*“the unbearable lightness of harm doing...”*)
    - To almost **everybody everywhere**, with **little resources**
    - **Vulnerability**: all intricately connected, mostly unaware of it
  - In particular, **D-GPT** unwittingly facilitates:
    - **Fake** news, fake anything; stealing **identities, hacking**
    - Loss of **privacy**, constant monitoring (“social ranking” in China)
    - Interference in **democratic elections** (real threat to democracy)
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- Spread of **uncertainty**, suspicion, **mistrust**: erosion of **social capital** --► harm **econ** performance (after decades of *reducing uncertainty*, was key dimension of progress)
  - The new **“arms race”**, key confrontation between superpowers?



# The threat of *faking* in public discourse, the need for “arbiters of truth”

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- Our institutions predicated on **assumption** that:  
*True information => right actions*



Thus the **threat**:

*Fake information => wrong actions*

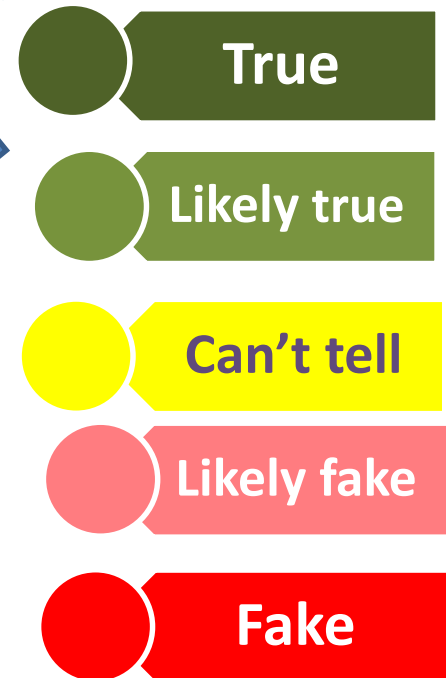
- We have mechanisms to ensure functioning of sectors affected by **asymmetric information**, in need of verification:
  - **FDA** for Pharmaceuticals and Medical Devices
  - Peer review in **science**
  - **Financial**: SWIFT; SEC; S&P; FED rules (*but see 2008...*)
- But virtually **none** for establishing “**true/fake**” (T-F) in **public discourse!** (some in media such as NYT)

# AI to the rescue?

The **paradox**:

- w/**D-GPT** much **easier to disseminate Fake info**,  
but **D-GPT** could also greatly **improve the sorting out T-F**.
- Does the market provide **incentives** to do that?

Suppose a social media platform offered to flash a  
“**T-F signal**” next to every posting, based on **AI**. 



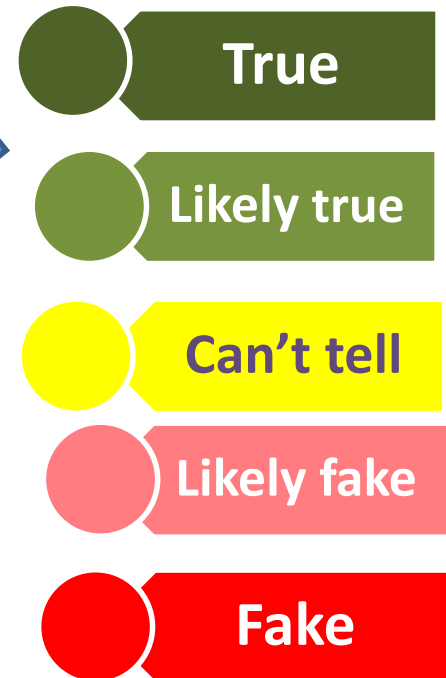
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Suppose a social media platform offered to flash a **“T-F signal”** next to every posting, based on **AI**. 

1. Would **consumers want it**? How much would they be **willing to pay** for it?
2. Would **competition** push others to offer it also?
3. Will **algorithms** have to be **“transparent”**?
4. Could this be **decentralized**, without **Gov regulation**? Will the public trust **for-profit** self-appointed **arbiters of “T-F”**?



Probably not, hence need novel policies,  
& research to back them - **EU** more likely than **US**

# The OECD has announced a set of 5 principles for the development of AI

*at a meeting of the OECD Forum in Paris on 22.5.2019*

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1. AI should benefit people and the planet by driving **inclusive growth, sustainable development and well-being**.
2. AI systems should be designed in a way that **respects the rule of law, human rights, democratic values** and diversity, and they should include appropriate safeguards to ensure a fair and just society.
3. There should be **transparency** and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
4. AI systems must function in a robust, **secure and safe** way throughout their life cycles and potential risks should be continually assessed and managed.
5. Organizations and individuals developing, deploying or operating AI systems should be held **accountable** for their proper functioning in line with the above principles.

# The Opportunity

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Affect the **direction** of the evolving *D-GTP*,

- to tackle head-on **humanity's grand challenges**
- to develop **human enhancing innovations**, not human replacing...

*troubling disparity in STI (science, technology and innovation):*  
**quest for  $\Delta$ GDP trumps social concerns**

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- **STEM research:** seeking mainly **material** (or academic) rewards, *NOT* addressing **social challenges** per se
- The **Social Sciences:** often (*mostly?*) **inward-oriented**, **ignoring** issues affecting society
- A fundamental **change is needed:**
  - “ageing populations, climate change,..., give rise to “**grand societal challenges**” that shape expectations of the **contribution of STI.**”  
OECD Forum, Michael Keenan Nov 2018
  - “There are growing demands on **innovation...to address a wide range of global challenges** reflected in the Sustainable Development Goals (SDGs)” **Angel Gurría, OECD STI Outlook 2018**

# Lever D-GPT to address grand challenges

*not just as byproduct, not just as research tool*

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- For the first time ever, the **emerging GPT** has the potential to help **tackle directly** the **pressing** social, economic, political and environmental **challenges** of the 21<sup>st</sup> century.
- **D-GPT can contribute to:**
  1. **Health Care** – smarter policies, better treatments w/existing cures
  2. **The new urbanism** - the twin crisis of transportation and housing
  3. **Education** – personalized education, education continuum; MOOCS+
  4. **Ending the hegemony of GDP growth**
  5. **Reinventing government** – Moneyball, nudge, corruption...

**AI & Big Data:** transport demand management; mining EMR, preventive medicine, healthy aging; effectiveness of gov. programs; sharing economy

**Blockchain** – integrity of EMR & clinical trials, social impact in aid & development, new voting systems, tackle corruption in government.

*Change starting to happen:*

## **top young economists address grand challenges, aided by D-GPT**

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The most prestigious award in Economics for researchers under 40 in the US is the **Clark Medal** (*12 of the first 20 awardees received the Nobel*)

Of the last **10** recipients (4 at MIT, 3 at Stanford, 2 at Harvard, 1 at Berkeley),

- **8** do **policy-oriented research** addressing acute **social challenges** in education, health, poverty, discrimination, etc.
- **Of them, 7** have established and direct **institutes** aimed at providing **implementable solutions** to such challenges – most rely to some extent on **D-GPT**

These leading academic economists have brought back **social relevance**, reconnected academic research to challenges



## The *type* of D-GPT innovation:

### Human *enhancing* or human *replacing*?

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- **Human Enhancing Innovations - HEI**: those that **magnify** sensory, analytical & problem solving **human capabilities** (not “input saving”), e.g.,
  - **in medicine**: **D-GPT** for diagnostics → **better doctors!**
  - **in education**: **D-GPT** to track individual progress of pupils → **better teachers!**
- **HEI** can unleash new wave of **human creativity** & provide sense of **purpose**, **HRI** do **the opposite**: turn workers into **unthinking automatons...** (*see Walmart*)
- **Can Gov policy** promote **HEI**? *Yes*, e.g. **professionalization** of personal services, but with **caution!**

# Concluding remarks

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- ❖ D-GPT **powerful** tool that could be used not only for econ **growth**, but to improve other aspects of **society's wellbeing**:
  - the functioning of **democracy**
    - Basic **universal services** – health care, education, transport
    - fairness and **social trust**
- ❖ Not just ponder what **D-GPT may do** to employment or inequality (“**passive research**”, “enlightened bystanders”), but actively push for **D-GPT tools** to **tackle directly** pressing social, economic, and political issues.
- ❖ **D-GPT** has far-reaching **dual potential**, to **do good and to do harm**, can't assume markets are going to favor the former, we and our governments should....



*“Don’t ask what D-GPT can do for you,  
ask what you can do with it for the benefit of society”  
(paraphrasing John Kennedy...)*

*Thanks!*



## Even in **Economics**:

### 7 of 10 recipients of the Clark Medal in last decade, **direct policy-oriented centers**

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1. Parag Pathak – 2018, MIT: **education**, co-Director of *The School Effectiveness and Inequality Initiative* <https://seii.mit.edu/>
2. Dave Donaldson – 2017, MIT: **trade, development, environmental**, program director at *The International Growth Centre* (IGC) <https://www.theigc.org/>
3. Roland Fryer, 2015 – Harvard: **economics of race & education**, director of *EdLabs, the Education Innovation Laboratory*, <https://edlabs.harvard.edu/>
4. Raj Chetty, 2013, Harvard: **tax policy, education & housing**, Director of the *Harvard's Opportunity Insights* <https://opportunityinsights.org/>
5. Amy Finkelstein, 2012 – MIT: **Health Economics**, co-Scientific Director of *The Poverty Action Lab J-PAL North America*. <https://www.povertyactionlab.org/na>
6. Esther Duflo, 2010 – MIT: **Development Economics**, co-director of *The Poverty Action Lab at MIT*, <https://www.povertyactionlab.org/>
7. Emmanuel Saez, 2009, Berkeley: **Public Economics and inequality**, director of *the Center for Equitable Growth (CEG)*, <http://ceg.berkeley.edu/index.html>