Mission Oriented Innovation
reframing the *direction* of economic growth

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Rethinking the ‘direction’ of growth

• European Union Horizon 2020
  – Smart growth (better innovation)
  – Sustainable growth (more green)
  – Inclusive growth (less inequality)

• United Nations SDGs

• The return of ‘industrial strategy’
Levelling the playing field?
standard policy mantra

Set the rules of the game

De-risk, enable, incentivise, ‘facilitate’ private sector

Fix market and system ‘failures’ (then get out of way)

Lender of last resort
Just fixing failures?

- **Coordination failures**
  - e.g. pro-cyclical investment

- **Public goods**
  - e.g. knowledge, clean air

- **Negative externalities**
  - e.g. pollution

- **Information failures**
  - e.g. SME finance

- **Imperfect competition**
  - e.g. monopolies
the assumption

private sector

vs.

public sector
But market failure policies did not get us the GPTs

- ‘mass production’ system
- aviation and space technologies
- IT and internet
- nuclear power
- nanotechnology and AI
- green technology
... and won't get us the SDGs
Investor of first resort
Risk-taking and market making along entire innovation chain

1. research
2. concept/invention
3. early stage technology development
4. product development
5. production/marketing

Angel investors, corporations, technology labs, SBIR, NASA
VC, SBIR, InQtel, NIH, ARPA-E, Yozma
Corporate venture funds, equity, commercial debt

NSF, NIH, DARPA
Corporate research

Source frequently funds this technological stage
Source occasionally funds this technological stage

source: adapted from Auerswald/Branscomb, 2003
Creating **missions not fixing markets**

**NASA**’s **mission** is to “*Drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.*” NASA 2014 Strategic Plan

“*Creating* breakthrough technologies for national security is the **mission** of the Defense Advanced Research Projects Agency (**DARPA**).”

“The **ARPA-E mission** is to **catalyze** the development of transformational, high-impact energy technologies.”

**EMPRAPA**’s **mission** is to provide research, development, and innovation solutions for the sustainability of agriculture and for the benefit of Brazilian society…responding to the demands of agriculture while anticipating and facing global challenges of the future.”

“The **mission** of the **KfW Group** is to support change and encourage **forward-looking ideas** – in Germany, Europe and throughout the world.”
We measure success by how many risks we have been willing to take (with inevitable failures) and whether the successes actually matter.

Cheryl Martin, ex-Director ARPA-E, 2014
what makes the iPhone so ‘smart’?

Source: Mazzucato (2013), p. 109, Fig. 13
Total NIH spending, 1936-2011 in 2011 dollars = $792 billion

NIH budget for 2012 = $30.9 billion

Source: http://officeofbudget.od.nih.gov/approp_hist.html
Figure 4: Risk-capital intensity classification of RE finance

Boundary of the present study: asset finance

- Low Risk
  - High Capital Intensity
    - (project finance/existing firms)
- High Risk
  - High Capital Intensity
    - (Hard to fund)
- Low Risk
  - Low Capital Intensity
    - (existing firms/bank debt)
- High Risk
  - Low Capital Intensity
    - (Venture Capital)

CDB founded CDB Capital, a ‘public equity’ fund with $US 5.76 bn to finance innovative start-ups from the energy and telecom sectors.

Yingli Green Energy received $1.7 bn from 2008 through 2012 with a $5.3 bn line of credit opened for it. LDK Solar ($9.1 bn); Sinovel Wind ($6.5 bn); Suntech Power ($7.6 bn); and Trina Solar ($4.6 bn),
Direct government funding and tax support for business R&D, 2015

As a percentage of GDP


Data on tax incentive support not available for Israel, Poland and Sweden.
Business R&D spending (BERD)
Warren Buffet

“I have worked with investors for 60 years and I have yet to see anyone — not even when capital gains rates were 39.9 percent in 1976-77 — shy away from a sensible investment because of the tax rate on the potential gain. People invest to make money, and potential taxes have never scared them off. And to those who argue that higher rates hurt job creation, I would note that a net of nearly 40 million jobs were added between 1980 and 2000. You know what’s happened since then: lower tax rates and far lower job creation.”

And….why did capital gains fall in 1976?
“Businessmen have a different set of delusions from politicians, and need, therefore, different handling... You cold do anything you liked with them, if you would treat them (even the big ones), not as wolves or tigers, but as domestic animals by nature, even though they have been badly brought up and not trained as you would wish.”
Think Again!

private sector

vs.

don't look at yourselves!

public sector
ROAR

ROUTES & DIRECTIONS. How to use policy to set direction of change and enable bottom up experimentation?

ORGANIZATIONS. How to build explorative public sector organizations that learn-by-doing, and welcome trial and error?

ASSESSMENT. How to evaluate public investments which create and shape new markets, doing more than just ‘crowding in’?

RISKS AND REWARDS. How to form new deals between public and private sectors, socializing both risks and rewards?
Figure 1 below illustrates the movement from broad challenges to specific missions.

Figure 1. From Challenges to Missions Image: RTD - A.1 based on Mazzucato (2017)
CLean Oceans

A Plastic-Free Ocean

Reduction of 90% of plastics entering the marine environment and collection of more than half of plastics present in our oceans, seas and coastal areas by 2025

Areas of interest & cross-sector

R&I Projects

Grand Challenge

Mission

Chemical industry

Social innovation

Biotech

Human health

Marine life

AI technology

Design Sector

Waste management

Autonomous ocean stations to remove plastic pollution

Re-use of packing items through personalised collection services

Re-usable and biodegradable plastic substitutes

Image recognition and deep learning waste separation system for domestic and marine waste

Plastic and micro plastic digestion mechanism
CLIMATE CHANGE

100 CARBON NEUTRAL CITIES BY 2030
Reach net zero greenhouse gas emissions balance of 100 European cities by 2030

Areas of interest & cross-sector

R&D Projects

Grand Challenge

Mission

Real Estate

Energy

Mobility

Social Sector

Construction materials

Environment

Food

Behavioural econ

Buildings with carbon-absorbing components

Clean urban electric mobility

Carbon neutral urban food industry connecting city and agriculture

Citizen carbon-ID: e-government streamlining of carbon footprint
CITIZEN HEALTH AND WELLBEING

DECREASING THE BURDEN OF DEMENTIA
Halving the human burden of dementia by 2030

- Innovative techniques for personalized diagnosis of Alzheimer's
- AI support for physical and intellectual patient independence
- Improved understanding of probability of acquiring neurodegenerative diseases
- New personalized treatments for neurodegenerative diseases
- Social standards and caregiving approaches

Medical Sector
Social Sector
Pharmaceutical Sector
Service Sector
Tech Sector
Consumer Goods
Design Sector
Behavioural

Grand Challenge
Mission
Areas of interest & cross-sector
R&I Projects
Criteria for selecting missions

- Bold and addressing societal value
- Concrete targets: you know when you got there!
- Involving research and innovation: technological readiness over limited time frame.
- Cross-sectoral, cross-actor, cross disciplinary
- Multiple competing solutions
How to implement missions

- Selection (who decides?)
- Impact-driven (targets / milestones)
- Pro-active portfolio management (DARPA style)
- Flexibility and adaptability
- Accountability
- Connecting and engaging citizens
- Public sector capacity building and relationship to industrial strategies of member states
rethinking how public value is created, nurtured and evaluated
Private wealth creators encouraged to

- invest in capabilities
- take risks & welcome uncertainty
- learn from trial and error
- make strategic choices (MBA)
- be hungry & foolish!
Public servants encouraged to

- facilitate
- de-risk
- level the playing field
- redistribute value
- fix market failures then get out of the way!

(then criticised as *boring, slow, bureaucratic*)
Better ‘deal’ between public & private

- reinvesting profits (and limiting share buybacks)
- retaining golden share of IPR
- capping prices (Bayh Dole act allows it)
- negotiating conditions (generics)
- income contingent loans
- Investment/quality conditions attached to outsourcing contracts
- retain some equity (Tesla & Solyndra lesson)
- % payback into an ‘innovation fund’
- State investment banks

(discussed in Mazzucato, 2015; 2016)
Busting the myths about value creation
The Entrepreneurial State: debunking public vs. private sector myths (2013)

The Value of Everything: makers and takers in the global economy (2018)

Financing renewable energy: who is financing what and why it matters (2017), Technological Forecasting and Social Change, with G. Semieniuk

