The EU Framework Programme for Research and Innovation

HORIZON 2020

Public Research for Open Innovation

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2. Horizon 2020: More than a Research and Innovation programme

Horizon 2020

- The European Union programme for research and innovation for 2014-2020 with a budget of €79 billion

- Rationale: R&D is increasingly complex, interdisciplinary, costly, requiring critical mass
- Europe = 28 countries: need for increased collaboration

- Overarching ambition of Horizon 2020:
  - Respond to the economic crisis to invest in jobs and growth
  - Address people's concerns about their livelihoods, safety and environment
  - Strengthen the EU's global position in research, innovation and technology

Three priorities

In addition 8% are invested in the EIT and in the JRC

European Commission

Priority 1.
Excellent science

- **Why:**
- World class science is the foundation of tomorrow's technologies, jobs and wellbeing
- Europe needs to develop, attract and retain research talent
- Researchers need access to the best infrastructures

Proposed funding (€ million, 2014-2020) = 31%

54 %

11 %

European Research Council (ERC) Frontier research by the best individual teams	**13 095**
Future and Emerging Technologies Collaborative research to open new fields of innovation	**2 696**
Marie Skłodowska-Curie actions (MSCA) Opportunities for training and career development	**6 162**
Research infrastructures *(including e-infrastructure)* Ensuring access to world-class facilities	**2 488**

10 %

25 %

Priority 2.
Industrial leadership

- **Why:**
- Strategic investments in key technologies (e.g. advanced manufacturing, micro-electronics) underpin innovation across existing and emerging sectors
- Europe needs to attract more private investment in research and innovation
- Europe needs more innovative small and medium-sized enterprises (SMEs) to create growth and jobs

Proposed funding (€ million, 2014-2020) = 22%

80 %

17 %

Leadership in enabling and industrial technologies (LEITs) (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)	**13 557**
Access to risk finance Leveraging private finance and venture capital for research and innovation	**2 842**
Innovation in SMEs Fostering all forms of innovation in all types of SMEs **4% - 20%**	**616** + complemented by expected 20% of budget of societal challenges + LEITs and ***'Access to risk finance'*** with strong SME focus

* **Additional funding for nuclear safety and security from the Euratom Treaty activities (2014-2018)**

Priority 3.
Societal challenges

- **Why:**
- Concerns of citizens and society/EU policy objectives (climate, environment, energy, transport, etc) cannot be achieved without innovation
- Breakthrough solutions come from multi-disciplinary collaborations, including social sciences & humanities
- Promising solutions need to be tested, demonstrated and scaled up

Proposed funding (€ million, 2014-2020) = 39%

Health, demographic change and wellbeing	**7 472**	**24%**
Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the Bioeconomy	**3 851**	**12%**
Secure, clean and efficient energy *	**5 931**	**19%**
Smart, green and integrated transport	**6 339**	**20%**
Climate action, environment, resource efficiency and raw materials	**3 081**	**10%**
Inclusive, innovative and reflective societies	**1 310**	**4%**
Secure societies	**1 695**	***5%***
Science with and for society	*462*	*1%*
Spreading excellence and widening participation	*816*	*3%*

* **Additional funding for nuclear safety and security from the Euratom Treaty activities (2014-2018)**

Horizon 2020 and partnering

Public private partnerships:

- Through Joint Technology Initiatives or other formal structures (Art. 187)
- Through contractual agreements, which provide inputs for work programmes
- Only when criteria met, e.g. clear commitments from private partners

Public public partnerships:

- Through ERA-NET COfund action for topping up individual calls/actions (replacing current ERA-NET, ERA-NET Plus, Inco-NET, Inno-NET)
- Through participation in joint programmes between Member States (Art. 185)
- Supporting agendas of Joint Programming Initiatives when in line with Horizon 2020
- Only when criteria met, e.g. financial commitments of participating countries

European Innovation Partnerships:

- Not funding instruments, but for coordination with broader policies and programmes

Benefits of Partnerships

Joint Technology Initiatives (with industry)

- **Industry driven research agenda**
- **Fixed budget for 7 years to leverage more industry investment**
- Sector structuring to achieve impact
- Coverage of longer value chains and interrelated sectors
- Higher level of SME participation (30%) than in FP7
- Links and synergies with Structural and Investment Funds

Joint programmes (with Member States)

- **Link to national programmes**
- **Leverage effect**
- **Industry involvement**
- **Cross-border collaboration**

Research and innovation – a growing priority for the EU

"Horizon 2020 must deliver"

- **You should perform EXCELLENT research and innovation**
- **Your project must have an IMPACT**
- **Show ADDED VALUE, be multidisciplinary and well-implemented**

Reflected in the evaluation criteria

There are many ways to measure impact

Evidence based policy making

Medicines for children

Health Technology Assessment

ATMP

and many others…

Taking the lead in new areas of growth

Personalised medicine

Responding to emergencies

INFECTIOUS DISEASES

Ebola drug trials lurch ahead

Changing epidemiology and hints of success alter studies of experimental treatments

By **Kai Kupferschmidt** *and* **Jon Cohen**

ven the researchers whose trial of a po- | of the epidemic in September when more than 700 cases were reported in a single week in West Africa.

Knowledge creation and exploitation

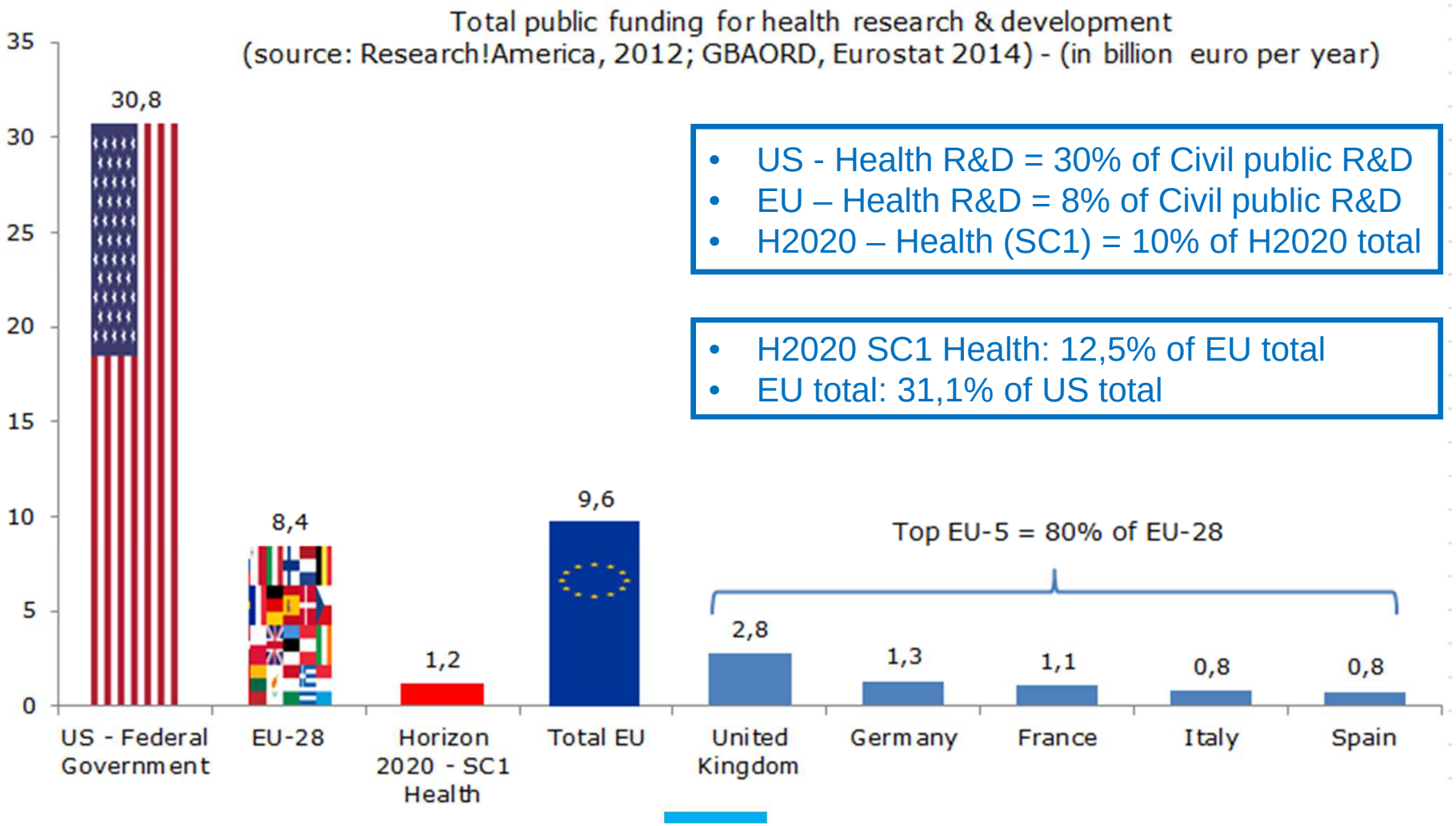
SME

SMALL & MEDIUM ENTERPRISES

Health research in Horizon 2020

European Commission

Health R&D in Europe and in US



- US - Health R&D = 30% of Civil public R&D
- EU – Health R&D = 8% of Civil public R&D
- H2020 – Health (SC1) = 10% of H2020 total

- H2020 SC1 Health: 12,5% of EU total
- EU total: 31,1% of US total

Health research in Horizon 2020

Collaborative health research (SC1)

Health research in Horizon 2020

European

Collaborative health research (SC1)

imi innovative medicines initiative

Public-private partnership

erc European Research Council

Frontier research

EDCTP

AAL PROGRAMME

JPND research
EU Joint Programme – Neurodegenerative Disease Research

jpiamr

Public-public partnerships

SME Instrument

EASME
Executive Agency for SMEs

Support to innovation

HBP **Human Brain Project**

Modelling & predictive (neuro)sciences

InnoLife

eit Health

Research Education Innovation

ESFRI European Strategy Forum on Research Infrastructures

Health research infrastructures

InnoVFin
EU Finance for Innovators

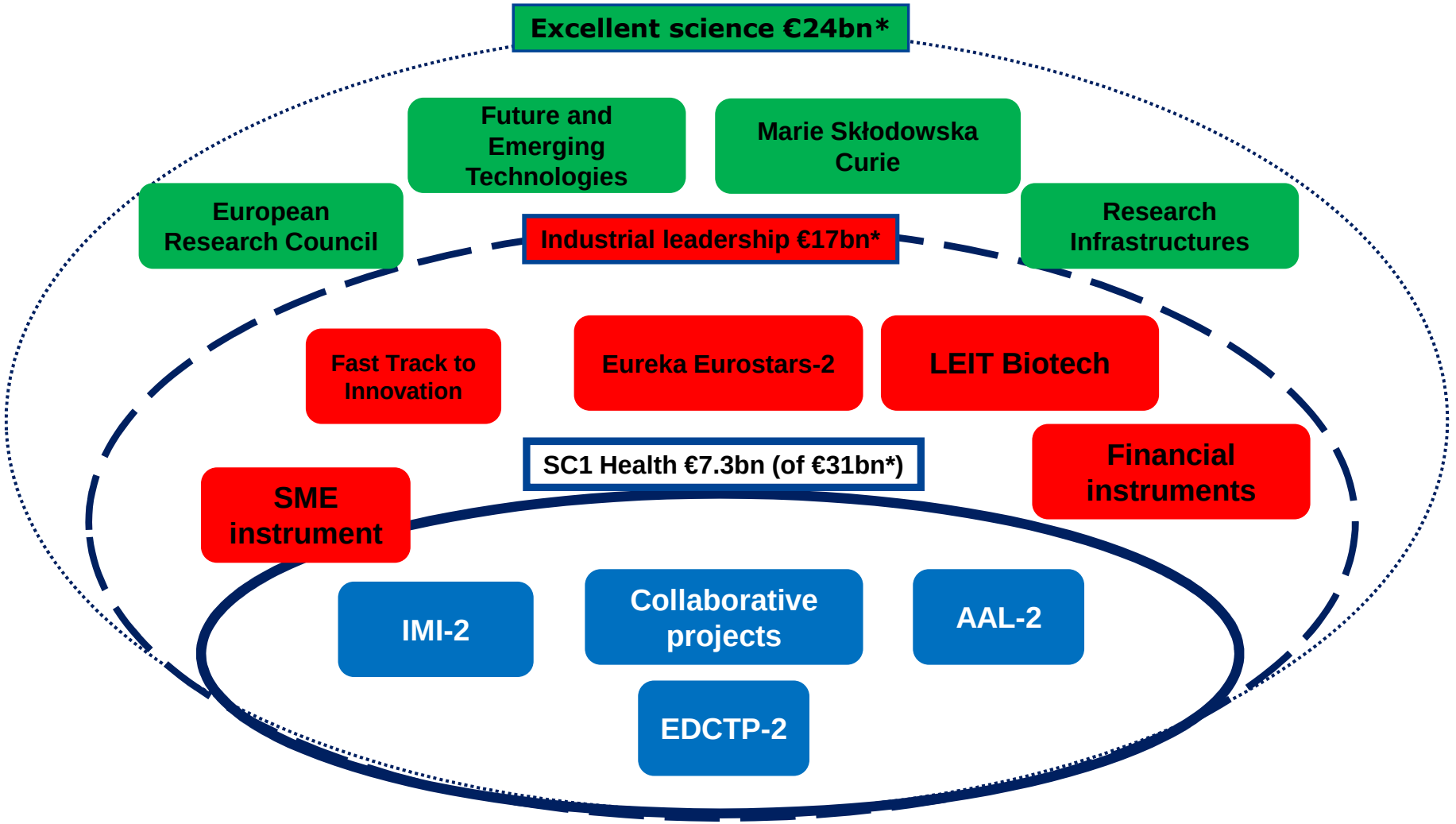
European Investment Bank

THE JUNCKER PLAN FOR INVESTMENT IN EUROPE

Loans for de-risking R&I

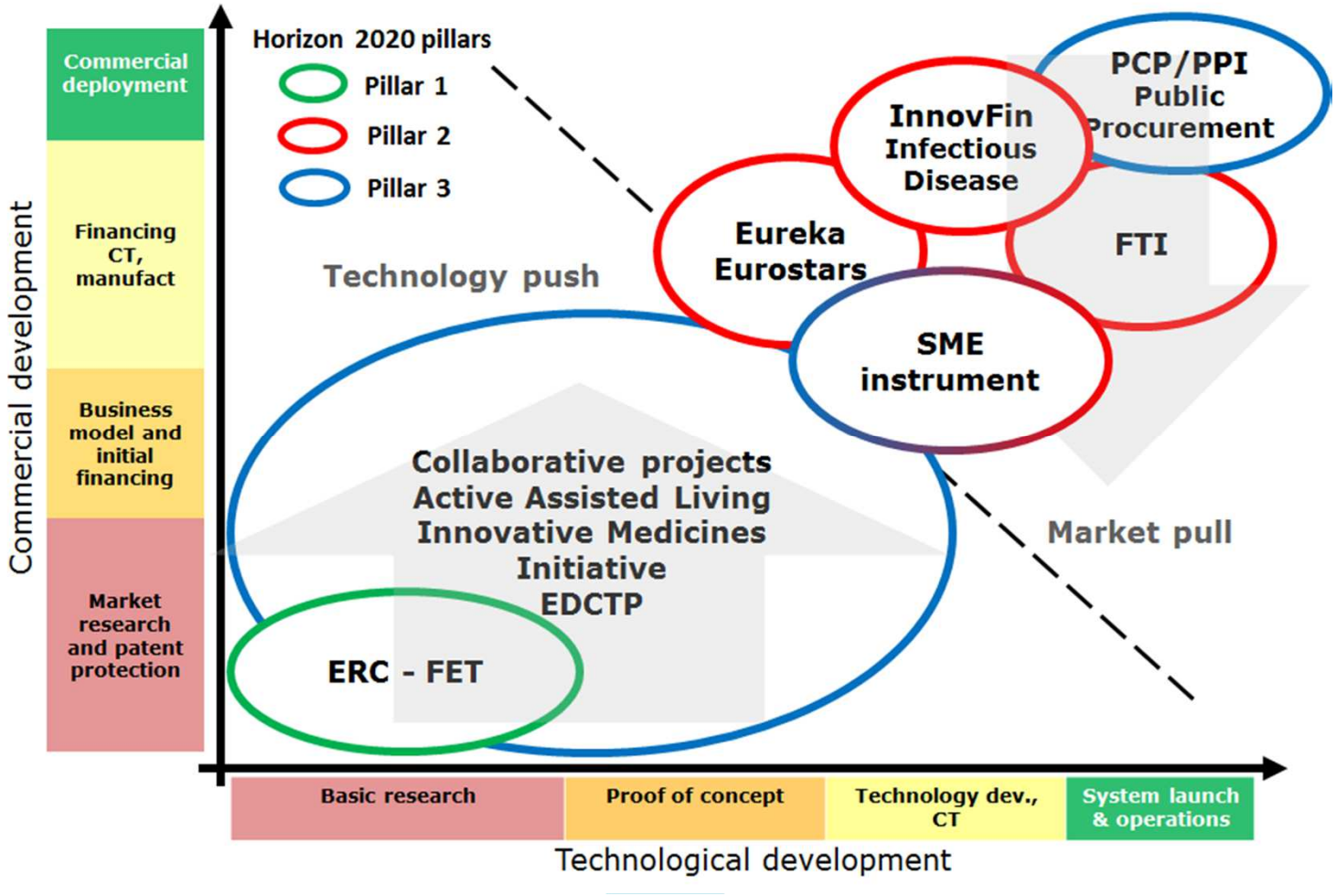
Deployment of innovative solutions

Health Research in H2020



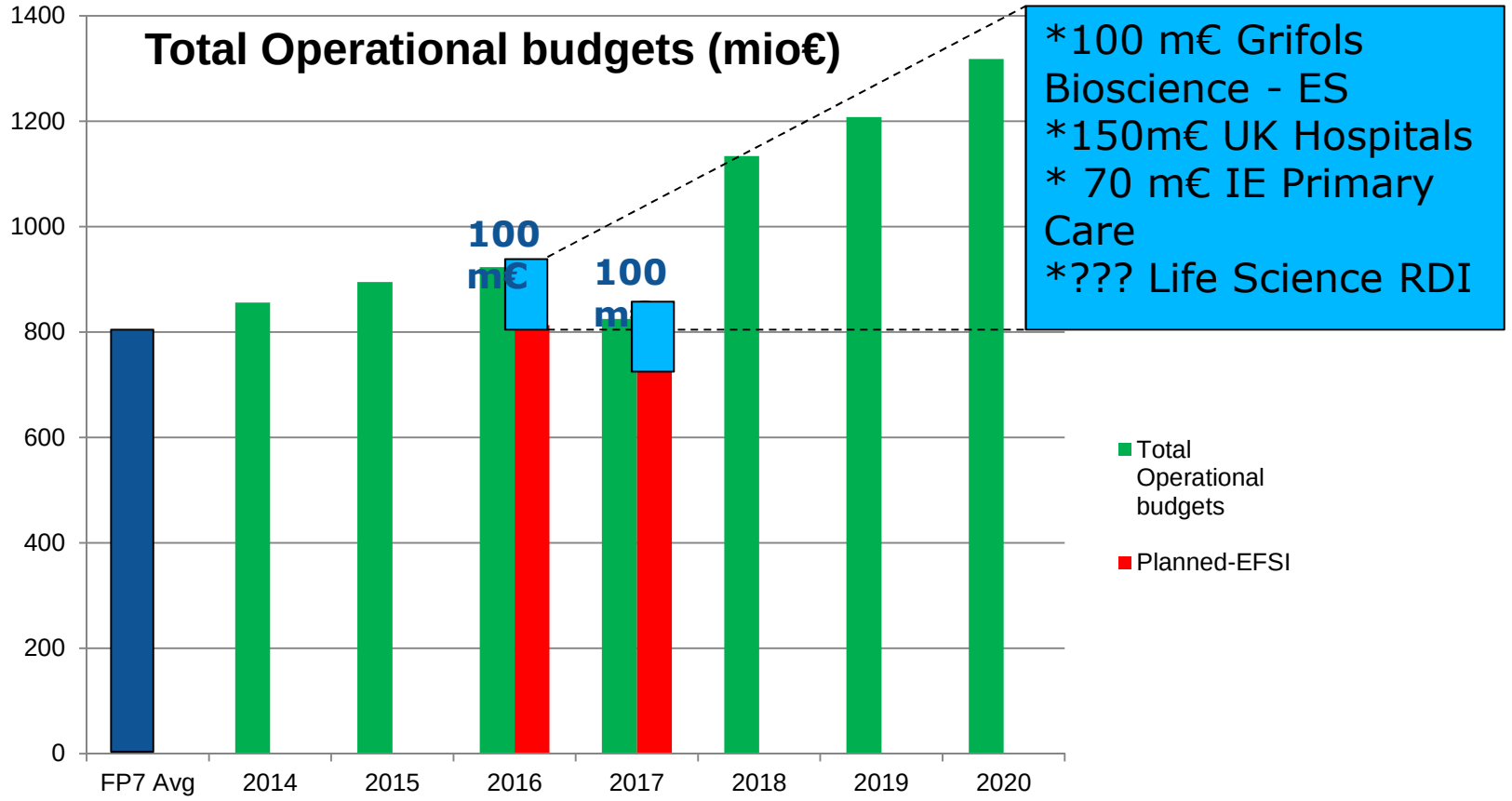
*** Figure to be updated following EFSI investments in 2016-2017 and FP7 recovery in 2016**

Various instruments along the value chain



SC1 Investment Plan: impact of the EFSI* plan

Impact on 2016-2017 work programme (15% for RTD, 20% for CNECT) (Mio€)

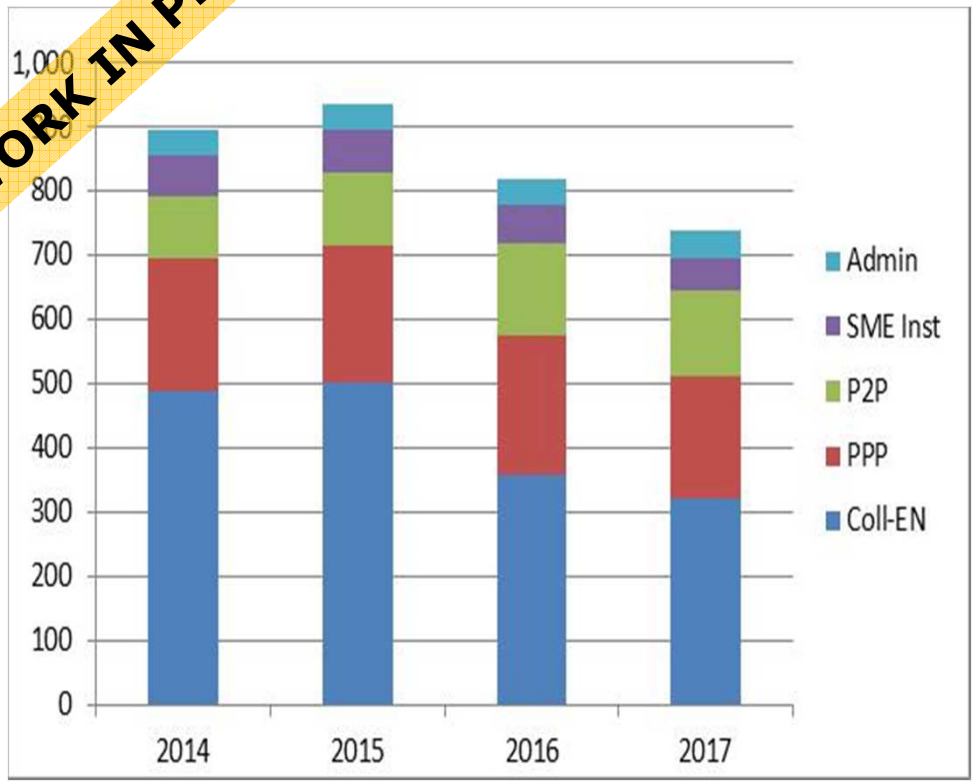


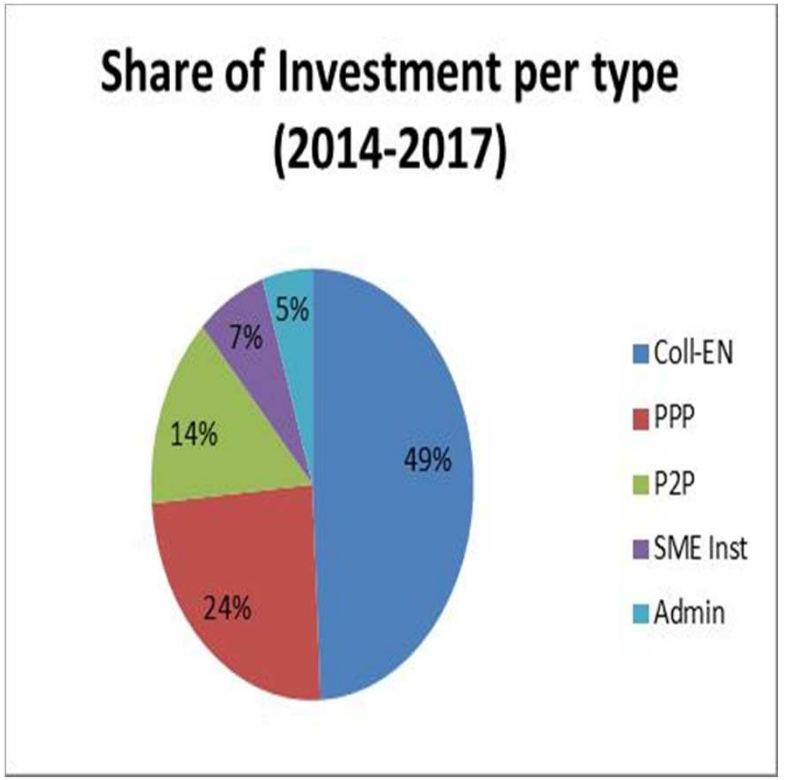
***European Fund for Strategic Investment (President Juncker Investment Plan)**

SC1 Investment: a balanced portfolio, innovative solutions

WORK IN PROGRESS

Leveraging investment in various type of instruments (Mio€, 2014 to 2017)





- PPP = Public-Private Partnership (IMI-2) = ~ 24% to date, +100% from industry
- P2Ps = (JPIs, Art.185, ERA-NETs, EJP) = ~14% to date, + at least 100 % by partners
- SME Instrument and Financial Instruments (FTI, EFSI, InnovFin ID) = ~7% to date
- Rest of Work Programme = 49 % to date

innovative medicines initiative

THE INNOVATIVE MEDICINES INITIATIVE

The Innovative Medicines Initiative (IMI) is Europe's largest public-private initiative aiming to speed up the development of better and safer medicines for patients.

IMI supports collaborative research projects and builds networks of industrial and academic experts in order to boost pharmaceutical innovation in Europe.

IMI is a joint undertaking between the European Union and the pharmaceutical industry association EFPIA.

efpia

IMI 2: ~€3.2 billion
EC: €1.6b
+ EFPIA €1.4b
+ other (€0.2b)

IMI2:

- Covers the entire medical research and innovation value chain
- Strategic Research Agenda is based on the WHO Priority Medicine Report renewed in July 2013
- Involves pharmaceutical industries as well as others (diagnostics, imaging, animal health, ICT **etc.**)
- Supports World class research and innovation leading to breakthrough vaccines, medicines and treatments

SC1 Investment: public-public partnerships with countries

E D C T P

European & Developing Countries Clinical Trials Partnership

EDCTP supports clinical trials and related research activities on PRDs, as well as capacity development for clinical trials and related research in sub-Saharan Africa.

EDCTP 2:
~€1.37 Billion
EC: €683 mio
+ MS: €683 mio

- Launched in December 2014
- Almost €700 million EU co-funding, matching the same Member States contribution
- Broader scope: including HIV, TB, malaria, neglected infectious diseases, all clinical phases, diagnostics and delivery optimisation
- Longer duration: 10 years

Public Public Partnerships in H2020, SC1

Overall investment by Member States: More than 2500 M€, 7 actions (Feb'16)

JPIs	TOTAL INVESTMENT in JOINT Calls and Actions (MS+EC)
Neurodegenerative Diseases (+CSA/ERA-NET)	27 Countries, 2009-2020, ~130 M€ + 10 M€ EC
Anti-Microbial Resis-tance (+CSA/ERA-NET)	22 Countries, 2011-2020, ~50 M€ + 7.8 M€ EC
More Years, Better Life (+CSA)	19 Countries, 2011-2020, < 10 M€ + 2 M€ EC
Heathy Diet for a Healthy Life (+CSA/ERA-NET)	25 Countries, 2010-2020, > 30 M€ + > 5 M€ EC
Total Investment	4 JPIs: ~200 M€ + > 25 M€ from EC
Art.185 Initiatives	TOTAL INVESTMENT in JOINT Calls and Actions (MS+EC)
Ambient Assisted Living (AAL)	22 Countries, 2006-2024, ~0.7 B€ + 0.5 B€ EC + Industry
EU & Dev. Cy Clinical Trials Partners. (EDCTP)	14+14 Countries, 2006-2024, ~1 B€ + 1 B€ EC + BM Gates
EU Metrology Pgm for Inno & Research (EMPIR)	28 Countries, 2006-2024, ~0.6 B€ + 0.6 B€ EC
Total Investment	3 Art.185: ~2.3 B€ + > 2 B€ from EC + Others

ERA-NET Cofund actions in H2020, SC1

Overall investment by Member States: More than 350 M€, 9 actions (Jan '17)

Co-Fund: ERA-NET & EJP	TOTAL INVESTMENT in JOINT Calls and Actions (MS+EC)
E-RARE 3 Rare Diseases Runs from **('15-'19)**	**17 Countries (19.5 + 5.8 + ~30 Additional Own calls) ~50 M€ (48M€ - 95 % done)**
JP cofund, Neurodegene-rative diseases ('15-'19)	**20 Countries (35 + 10 ? + ? additional) > 40 M€ (46 M€ done, more to do)**
TransCan2 Translational Cancer ('15-'19)	**19 Countries (17 + 6.7 + ~30 Additional Own calls) ~50 M€ (47 M€ - 95% done)**
ERACo-Sysmed System Biology Medicine ('15-'19)	**13 Countries (10 + 4 + Additional Own calls?) > 15 M€ (21 M€ --> More to do)**
ERA-NET NEURON Brain diseases ('16-'20)	**17 Countries (17 + 6.8 + ~40 Additional Own calls) ~60 M€ (40 M€ - 66% done)**
ERA-NET JPI Anti-Microbial resistance ('16-'20)	**18 Countries (21 + 7.8 + Additional Own calls?) > 26.4 (43 M€ done +more todo)**
ERA-CVD Cardiovascular Runs from **('16-'20)**	**18 Countries (11.4 + 2.5 + Additional Own calls?) ~20 M€ (14M€ --> More to do)**
PM-05-2016 EJP Human Biomonitoring Initiative	**26 Countries, 2017-2022, > 25 M€ + 50 M€ EC (70% fund.)**
HCO-03-2017 ERA-NET Personalised Medicine	**> 20 Countries, 2018-2023, > 12 M€ + 5-6 M€ EC**
Total Investment	**8 ERA-NET + 1 EJP: ~250 M€ + 100 M€ from EC**

Multi-lateral health research activities

IRDiRC
INTERNATIONAL RARE DISEASES RESEARCH CONSORTIUM

www.irdirc.org/

InTBIR
International Initiative for Traumatic Brain Injury Research

http://intbir.nih.gov/

IHEC
International Human Epigenome Consortium

http://ihec-epigenomes.org/

GACD
GLOBAL ALLIANCE FOR CHRONIC DISEASES
AN ALLIANCE OF HEALTH RESEARCH FUNDERS

www.gacd.org/

GloPID-R

Global Research Collaboration for Infectious Disease Preparedness

http://www.glopid-r.org/

International Cancer Genome Consortium

https://icgc.org/

Global Genomic Medicine Collaborative

http://www.iom.edu/Activities/Research/GenomicBasedResearch/Innovation-Collaboratives/Global_Genomic_Medicine_Collaborative.aspx

European Commission

The SC1 Work Programme 2016-17 in brief

Published on 14/10/15 on the Participant Portal, Updated on http://ec.europa.eu/research/participants/portal/desktop/en/funding/reference_docs.html#h2020-work-programmes-2016-17

Call 'Personalised Medicine'
21 topics (34 in 2014-2015): 10 in 2016, 10 in 2017, 1 open in 2016 & 2017

including 'coordination activities'
15 topics (17 in 2014-2015): 12 in 2016, 3 in 2017

€ 935 million

SME Instrument : 2 Topics
Other Actions: 12 items
(incl. InnovFin ID & "Birth Day Prize")
Focus Area Digital Security: 1 Topic
Focus Area Internet of Things: 1 Topic

European Commission

Our priorities

Personalised medicine

Call 2014-15:
EUR 1.4 B

Call 2016-17:
EUR 1.3 B

Healthy ageing
(2014-2017)

Health ICT
(2014-2017)

Infectious Diseases
(2014-2017)

Human biomonitoring
(2016-2017)

Research and Innovation

Maternal and child health
(2016-2017)

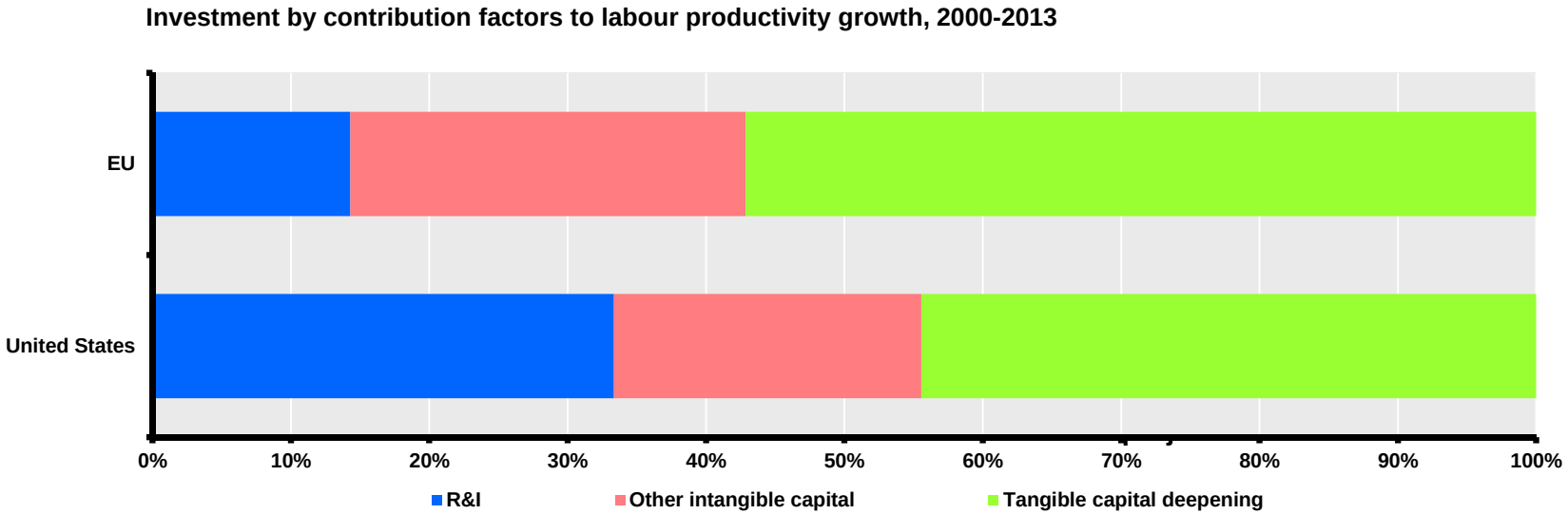
3. Open Innovation for Investing in Industry

TheEconomic Case of R&I Funding

Economic Case of R&I Funding – DG RTD 2017

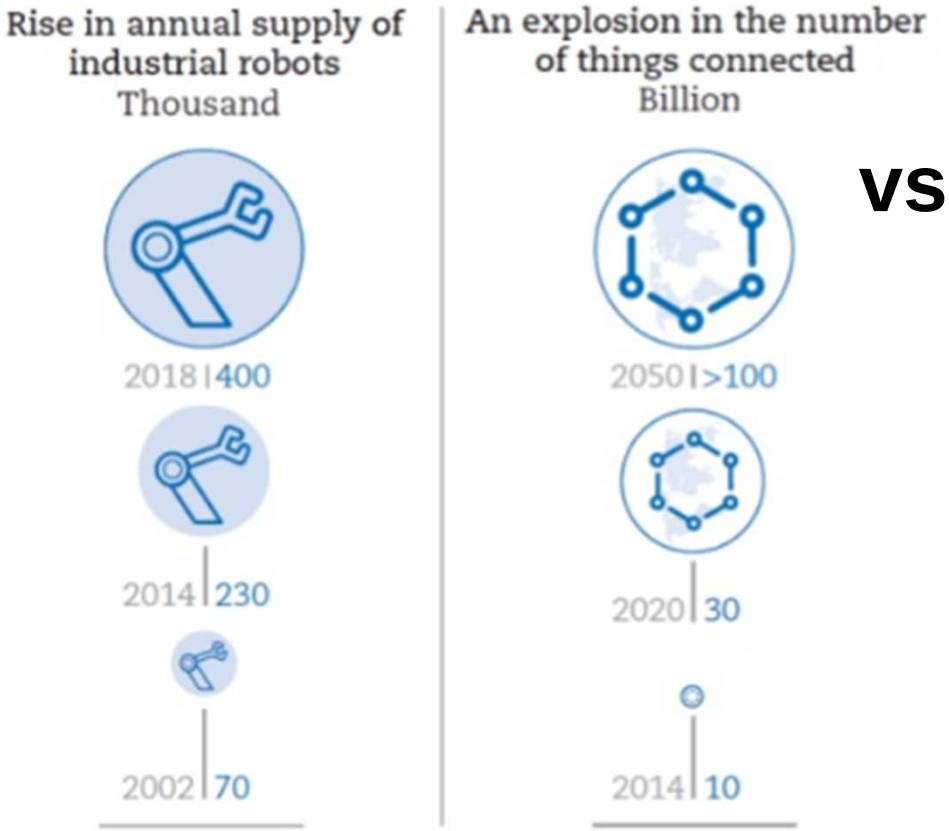
The meta-analysis finds positive and significant returns to R&D investment…

- **62% of economic growth in EU 1995 – 2007**
- **R&I key investment driving productivity growth**



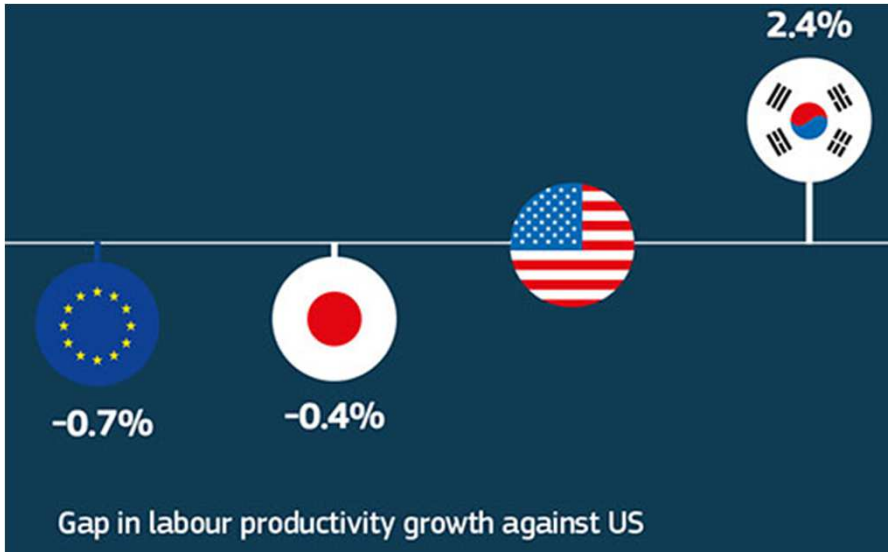
- **Private returns 10% - 30% (54% if R&D large investor)**

…and detects a "productivity paradox"



Source: OECD, STI Outlook 2016

vs.



Source: EC, SRIC Report 2016

Looks at what influences that impact…

1. Macroeconomic stability
2. Framework conditions/ financial conditions
3. Availability of human capital
4. Distance to the technological frontier

…at what slows down productivity…

1. Low innovation diffusion: frontier to laggards
2. Insufficient structural change
3. More negative spillovers due to fast pace and high complexity of innovation dynamics

…and points to a changes in innovation that affects innovation diffusion

1. **Celerity of change**
2. **Complexity of innovation process**
3. **Concentration of innovation benefits**
4. **Consumers as innovators**

The rationale for public R&I funding

Traditionally:

1. **Address market failures**
2. **Maximise positive spillovers (social returns estimated to be 2-3 times higher than private)**

Now (in addition to traditional arguments):

1. **Shape/ create markets**
2. **Support impacts all along the research-innovation process: from basic research to market-creating innovation**

The economic impact of public R&I funding

Econometric studies

- + impact on productivity (Guellec, 2004) and positive return 10%-15% (Sveikaukas, 2012)

Case studies

- Rate of return 20% - 50% (Georghiou, 2015)

Macro-economic modelling

- Some studies show high economic returns
- Misspecification and under-measurement
- Work on QUEST and other models on-going

The eco impact of EU R&I funding (FP7)

Large and positive economic impacts

- Growth: €50bn led to €500bn estimated effects from innovations, new techs/ products
- Jobs: 130000 direct (10 yy) and 160000 indirect (25 yy)

Better conditions for business R&I investments

- Improved scientific excellence and skills
- Leveraged industrial participation
- Improved knowledge flows and networks
- Large research infrastructures

Addressed societal challenges

- Supported the creation of new tech markets
- Boosted SME's to do groundbreaking innovation
- Enabled impactful public-private partnerships

First conclusions

✓ **Public R&I policy is fully justified by market failures, positive spill-overs and need to shape/create markets for innovation**

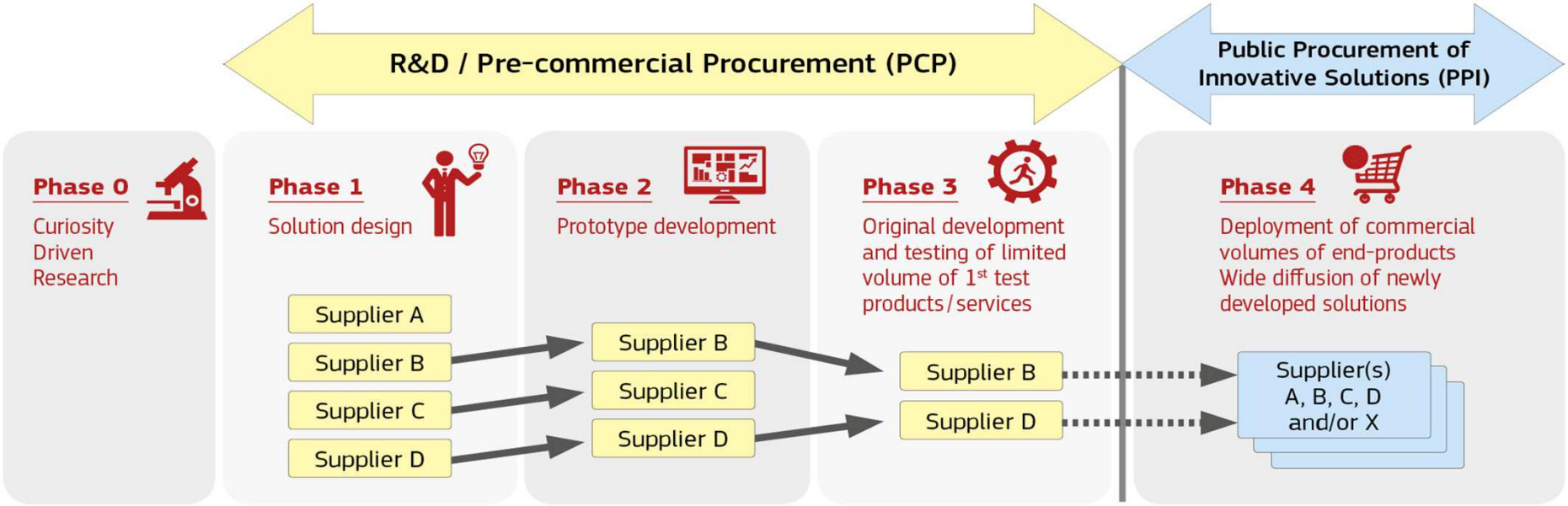
✓ **Its economic impacts are large and significant**

✓ **It needs to target faster and more effective the creation and diffusion of innovation**

Procurement for Innovation

European Commission

- PCP to steer the development of solutions towards concrete public sector needs, whilst comparing/validating alternative solution approaches from various vendors
- PPI to act as launching customer / early adopter / first buyer of innovative commercial end-solutions newly arriving on the market



Objectives:

- Price/quality products that better fit public sector needs
- Earlier customer feedback for companies developing solutions
- Better take-up/Wider commercialisation of R&D results

Research and Innovation

A New Financial Instrument for Infectious Diseases R&D

- **Jointly developed by EC and EIB**
- **Provides loans between EUR 7.5m and EUR 75m to innovative players active in developing vaccines, drugs, medical and diagnostic devices, and research infrastructures for combatting infectious diseases.**
- **No calls – demand-driven**
- **Launched 15 June 2015, 3 deals signed since**

InnoVFin Infectious Diseases

European Commission

European Investment Bank

Why Infectious Diseases?

- **Infectious Diseases (IDs) pose a major global health threat**
- **2nd leading cause of mortality: approx. 17% of all deaths globally**
- **Uncertain ID market perspective deters investment**
- **The support for the fight against ID constitutes a key public health priority**

Policy Aims

- **Support EC President Juncker's agenda for Jobs, Growth, Fairness and Democratic Change and his investment plan.**
- **Contribute to effective use of public finance and mobilise the private sector.**
- **Contribute to Europe's leadership in addressing global challenges.**
- **Ensure that new drugs, vaccines and medical and diagnostic devices are made available faster to people who need them.**

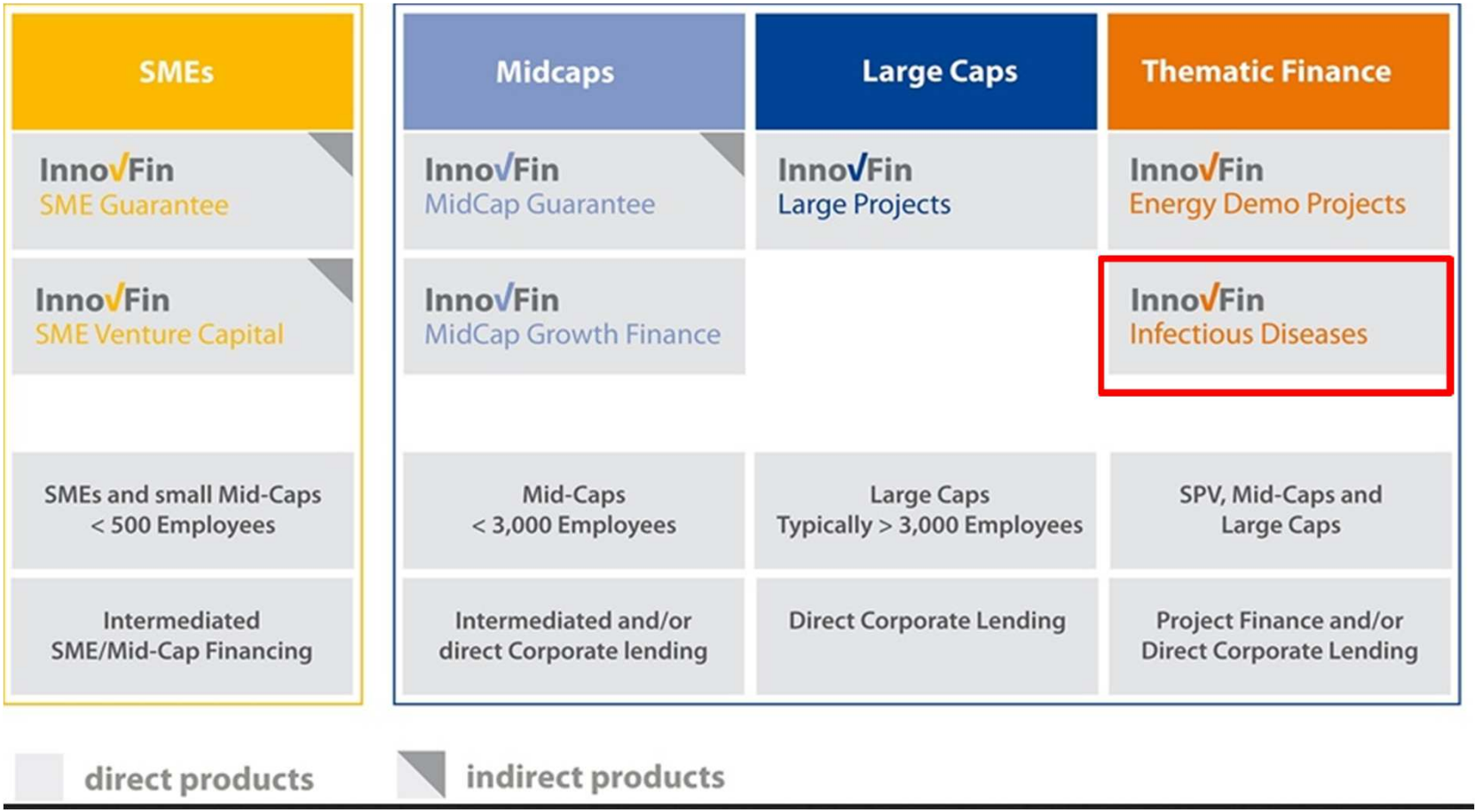
Research and Innovation

InnoVFin Infectious Diseases

European Commission

European Investment Bank

InnovFin - EU Finance for Innovators



http://www.eib.org/products/blending/innovfin/

Research and

InnoVFin Infectious Diseases

European Commission

European Investment Bank

Eligible Projects…

- **…must be in pre-commercial phase with proof-of-concept and pre-clinical research phases completed and clinical validation required for further development.**
- **…must have proven public health impact and potentially have market prospects.**
- **…should provide for the intellectual property created in the course of the project to remain in the EU**

http://www.eib.org/products/blending/innovfin/products/infectious-diseases.htm

Research and Innovation

Pipeline YTD

56 proposals submitted since launch:

- **18 Vaccine**
- **20 Drugs**
- **14 Devices**
- **4 Other**

- **8 projects rejected**
- **24 projects on hold (can be re-activated)**
- **21 projects under further consideration**
  - **16 at first interaction currently established/early evaluation**
  - **5 are in the assessment process (at various stages)**

3 projects signed

THE INVESTMENT PLAN FOR EUROPE

EUROPEAN FUND FOR STRATEGIC INVESTMENTS (EFSI)

European Investment Bank
The EU bank

European Commission

EUROPEAN INVESTMENT FUND

EU INVESTMENT PLAN: RATIONALE

EU INVESTMENT & COMPETITIVENESS GAP

HIGH LIQUIDITY IN THE MARKET

PUBLIC BUDGET CONSTRAINTS

FINANCIAL AND NON-FINANCIAL BARRIERS TO INVESTMENT

EU Investment Plan

EU/MS policy action + EU budget + EIB capacity to mobilise private sector funds towards strategic investments.

EU INVESTMENT PLAN: 3 PILLARS

1. MOBILISING FINANCE FOR INVESTMENT

- Mobilise at least €315bn over 3 years for investment in strategic projects and access to finance via the European Fund for Strategic Investments (EFSI) within EIB/EIF
- Cooperation with National Promotional Banks

2. MAKING FINANCE REACH THE REAL ECONOMY

- European Investment Project Portal
- European Investment Advisory Hub: technical assistance

3. IMPROVED INVESTMENT ENVIRONMENT

- Predictability and quality of regulation
- Removing non-financial, regulatory barriers in key sectors within EU Single Market
- Structural reforms at national level

Research and Innovation

1. European Fund for Strategic Investments (EFSI)

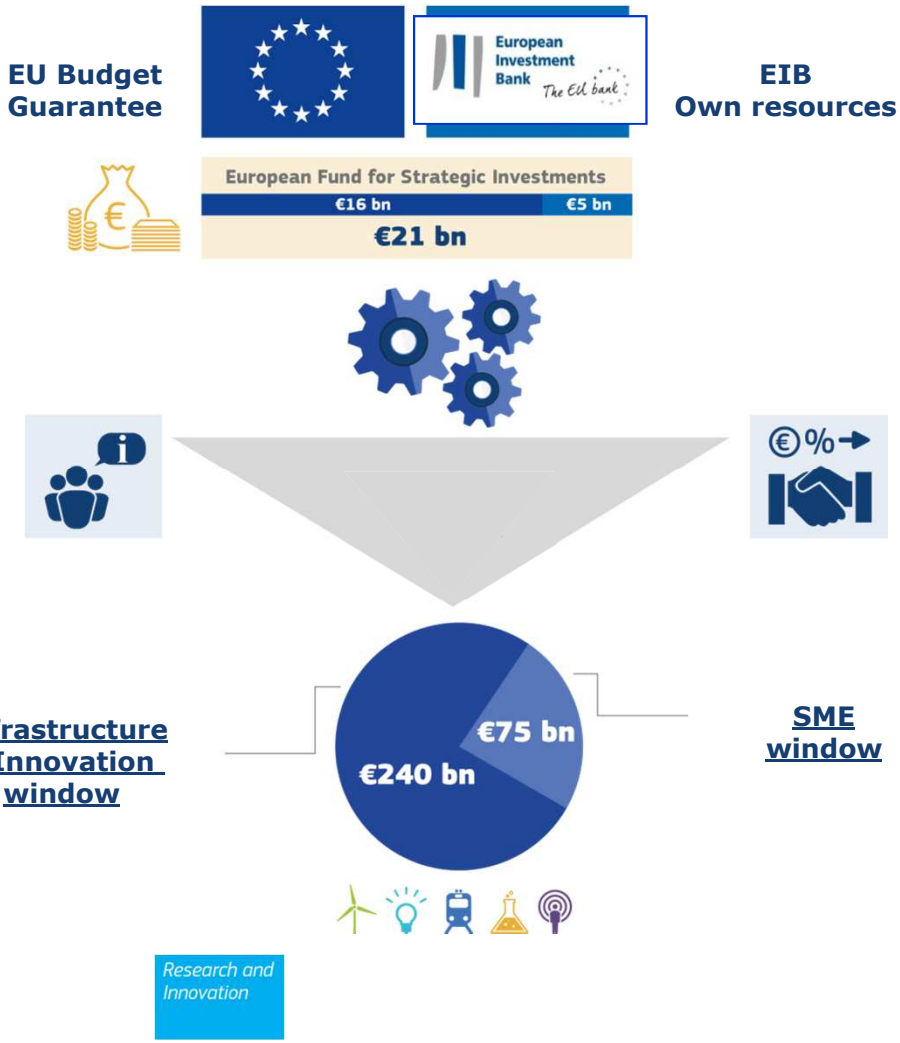
EFSI risk-bearing capacity
€ 21 bn

3x

EIB / EIF financing
~ € 61 bn

5x

Investments value over 3 years
~ € 315 bn



KEY FEATURES OF EFSI /1

- Focus on investments in real economy
  - Results on growth and jobs
  - Market-driven, no political interference
  - No geographic or sector pre-allocation
- Consistency with EU policies
- Leverage / crowd-in private sector and third parties
- Economic and technical viability
- Additionality vs existing instruments
  - Market failures and sub-optimal investment
  - Higher risk-taking than EIB normal activity in EFSI timeframe

KEY FEATURES OF EFSI /2

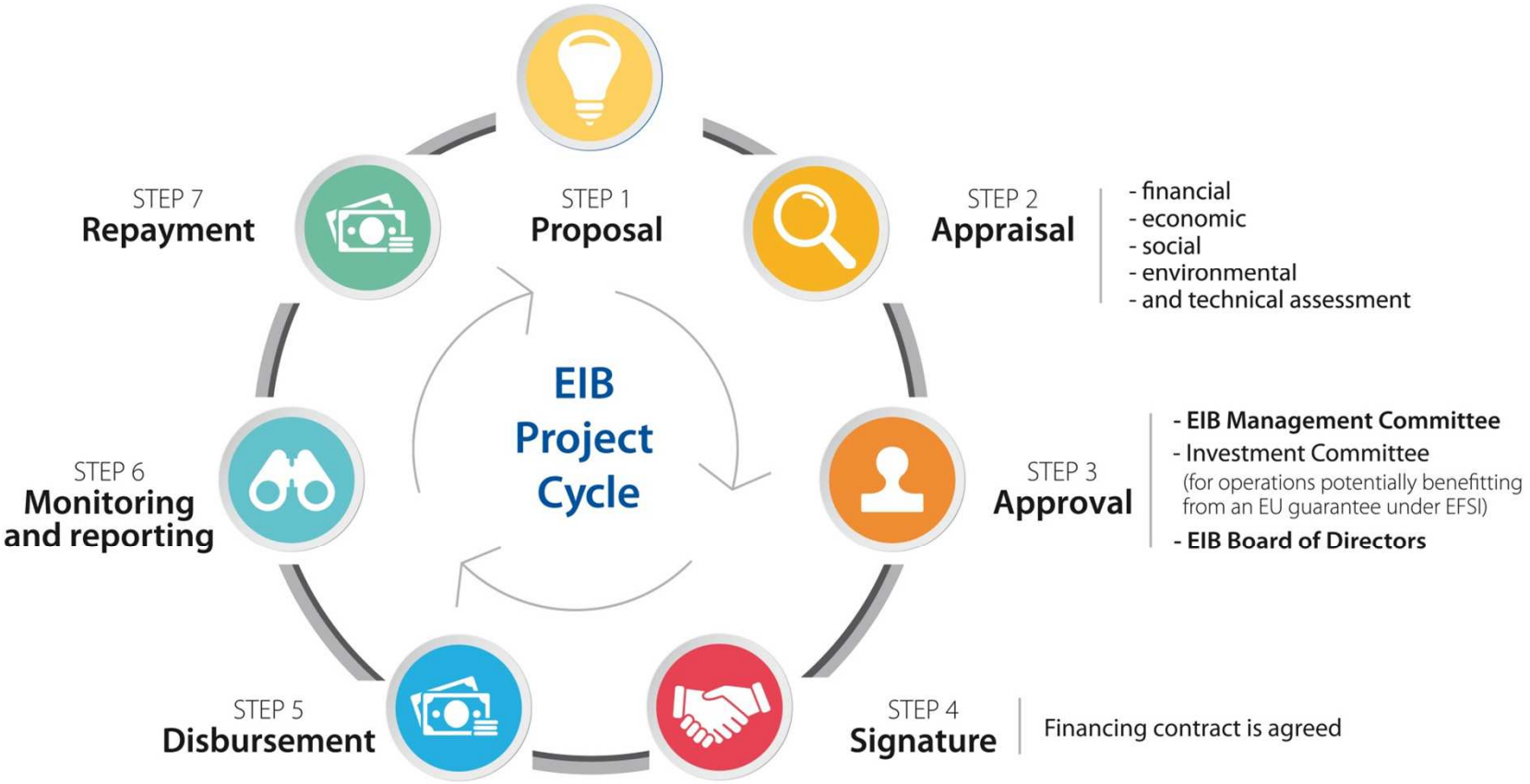
Size of investments

- EIB uses min €25m for individual loans
- Smaller schemes can be grouped into framework loans
- No size restriction for operations via Fin. Intermediaries (e.g. for SMEs)

Geographic scope

- EU28
- Projects involving an entity in a MS and extending to Enlargement (Western Balkans, Turkey), EU East/South Neighbourhood, EEA/EFTA (Norway, Switzerland, Liechtenstein), Overseas Countries and Territories.

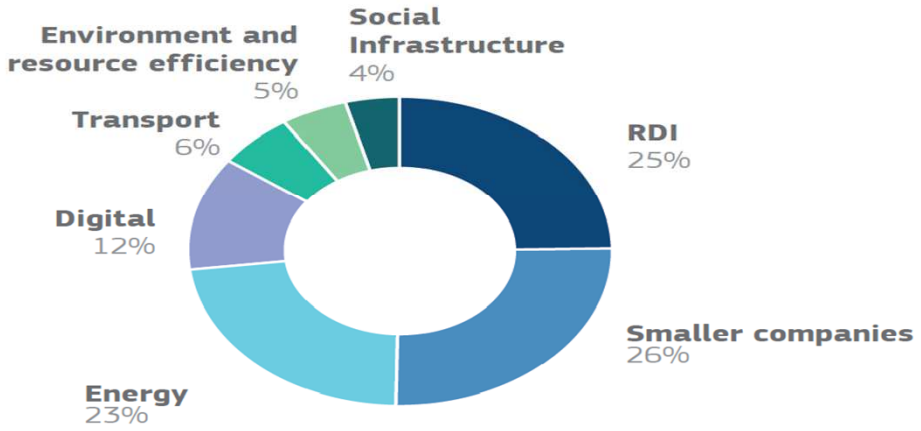
EIB Project cycle for an EFSI project



EFSI State of Play at July 2016 (1st Year)

- **Investments in line with plans – 30% investments made/approved**
  - **97 Infrastructure and innovation projects – €13.5 billion**
  - **192 SME Financing Agreements, 200.000 SMEs – €6.8 billion**

EFSI INVESTMENT BY SECTOR



ROLE OF DG RTD-E

1. Providing some of the budget Guarantee

2. Assessing projects in the RDI area

- **Grifols Bioscience - ES**
- **Primary care – IE (Bed washing facilities)**
- **RDI in Life Sciences – IE-UK (early-stage companies)**

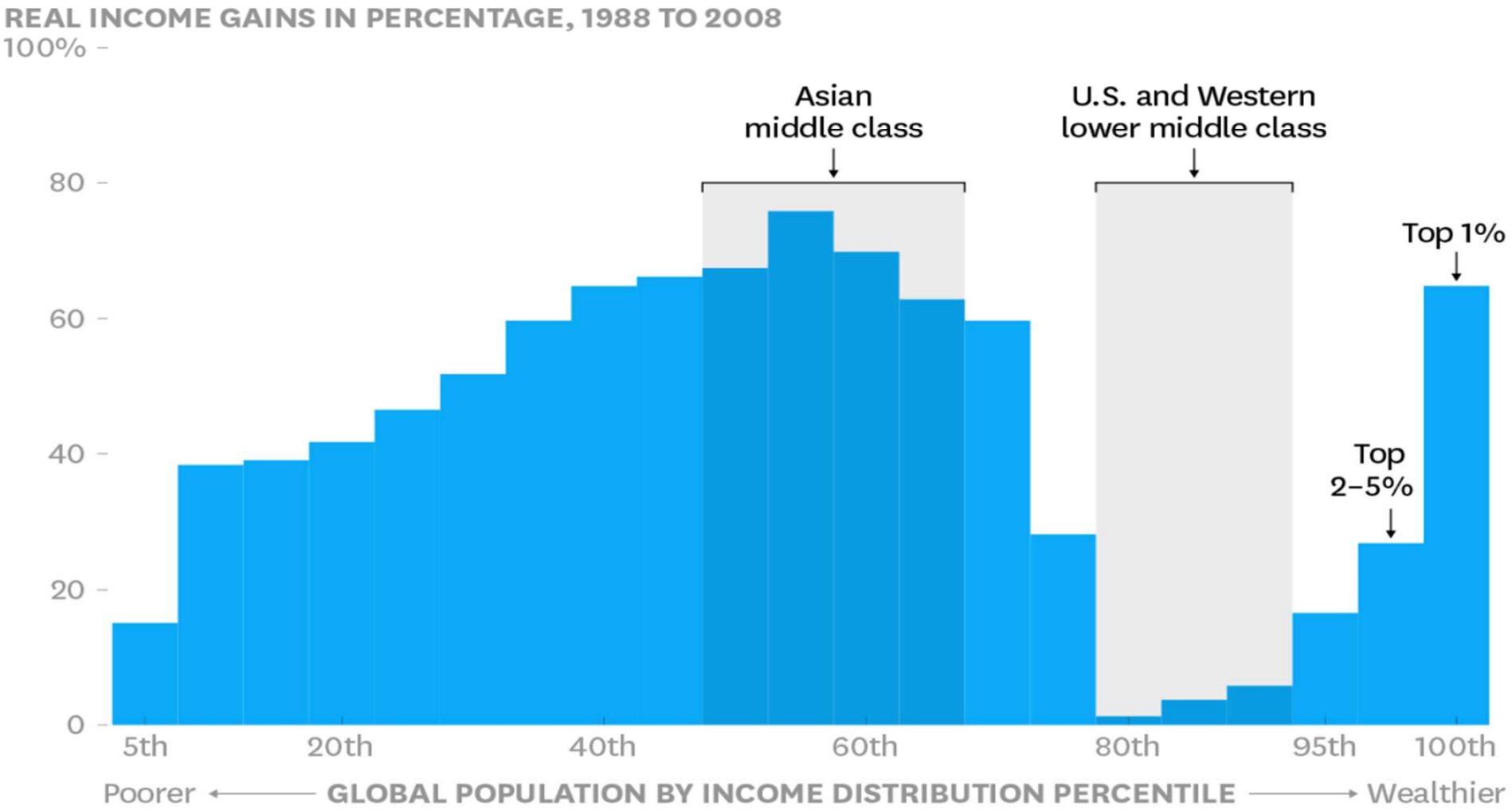
WHY INDUSTRIAL RESEARCH

- STRONG TRADITION and SKILLS
- STANDARDS and MANUFACTURING are an intergrated system
- RESHORING due to increasing transport costs + local markets
- TECHNOLOGY (3D printing) reduces printing costs
- Benefit from European strength in VOCATIONAL TRAINING, DESIGN and PATENTING
- Would allow ”TAMING THE ELEPHANT" which produced much insecurity in western societal and political structure

TAMING THE ELEPHANT

Who Has Gained from Globalization

The global 1% and the Asian middle class.



NOTE INCOMES ARE REAL, PPP-ADJUSTED, IN 2005 DOLLARS.
SOURCE BRANKO MILANOVIC

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