

Master in Innovation and Research for Sustainability

Evaluation and Management of R&I Projects

Module III: Assessing R&D and Innovation Projects

Lecture 7: Evaluating R&D+I Projects

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Summary for today



Module I: Introduction to R&D+I Management

Lecture 1: Crafting an R&D+I Strategy

- Overview of R&D + Innovation: Its importance and impact
- Exploring Innovation Types: Understanding the diversity in innovation

Lecture 2: Applying R&D+I Management

- Developing R&D+I Capabilities: Techniques to enhance innovation
- Implementing R&D+I: Strategies for effective teamwork and innovation

Module II: Project Lifecycle in R&D and Innovation

Lecture 3: R&D+I Project Fundamentals: From Conception to Market

- Project Initiation: Scope definition and scientific and technical merit
- Project Planning: Strategy development, identifying challenges, and risk assessment

Lecture 4: R&D+I Project Fundamentals: From Conception to Market

- Project Execution: Leading RD&I teams, fostering creativity, managing change, and overseeing project progress.
- Project Closure: Capturing lessons learned and assessing project impact on value creation.

Module III: Assessing R&D and Innovation Projects

Lecture 5: Evaluating R&D+I Projects

- Value proposition and value capture process
- Core definition and evaluation elements: Understanding the fundamentals in project assessment – from technology to investment appraisal criteria
- Decision making process: Approaches for project selection and handling incomplete data

Lecture 6: Evaluating R&D+I Projects

- Design a business model: phase analysis, investment phases, accounting outcomes, and impact prediction considering both financial outcomes and social impact
- Financial Metrics: Discussing profitability, cost of capital, and their roles in economic and financial assessments
- How to define a Minimum Viable Product

Lecture 7: Evaluating R&D+I Projects

- Risk Management: Techniques for analyzing and mitigating project risks
- Funding mechanisms for Academia & Corporate

Lecture 8, 9: Real-World Applications

- Analysis of a R&D+I evaluation case study to illustrate concepts

Module IV: R&D+I Portfolio Management

Lecture 10: Optimizing R&D+I Contributions to Strategic Objectives

- Aligning R&D projects with strategic goals beyond financial metrics

Lecture 11: Performance Metrics for R&D and Innovation

- Evolution of Performance Measurement Systems: Historical perspective and current trends
- Comparative Analysis of R&D Measurement Approaches

Lecture 12: Real-World Applications and Case Studies

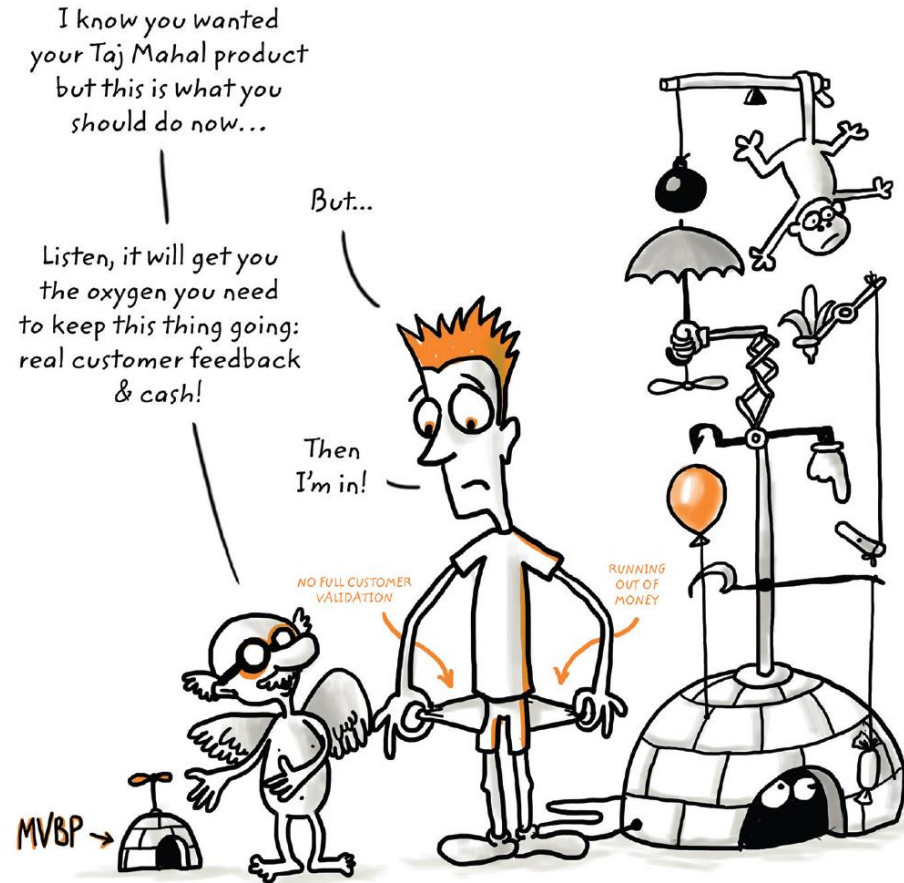
- In-depth discussion & analysis of R&D+I case studies to how to manage a R&D+I portfolio

Minimum Viable Product

How to define an MVP



- Working prototype to test the waters,
- Avoid spending too much time and money building something you're not pretty sure is going to succeed,
- Only has the core functionalities of the product and/or service,
- Demonstrate that the functionality of the product meets the expectations of some early customers,
- Early costumers represent the larger target market,
- Not finished - still requires an investment of time and resources,
- Not a tool to test the market,
- Ultimate tool to test the market!



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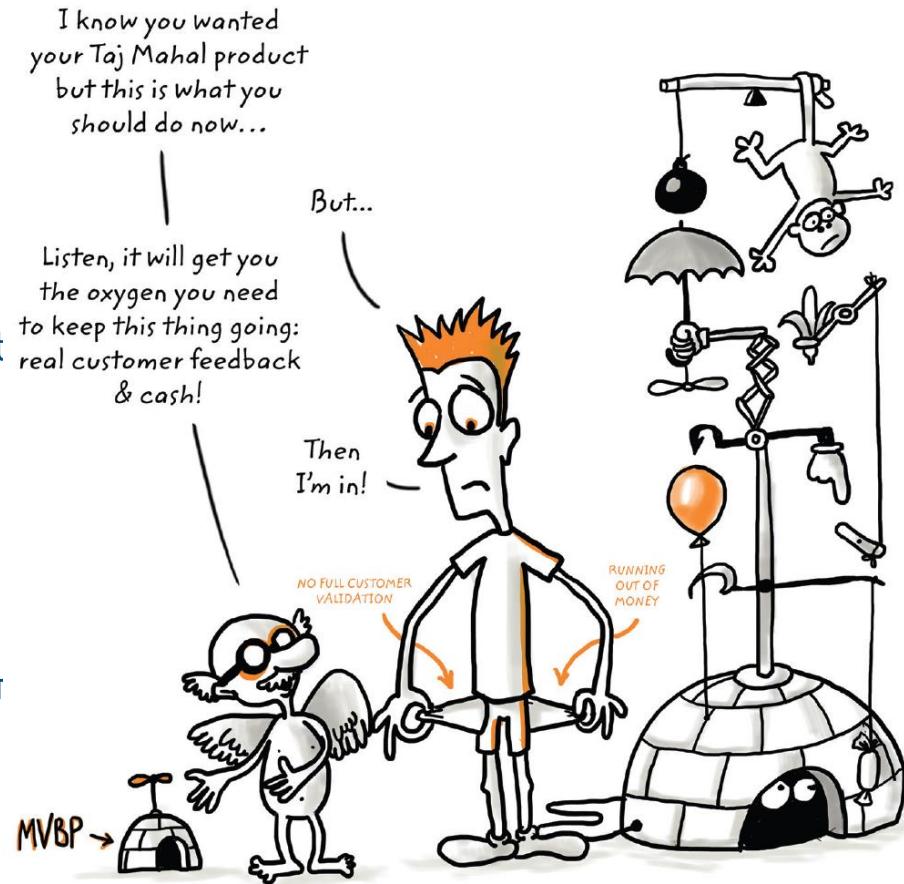
Minimum Viable Product

How to define an MVP



Create an MVP = your goal is to do the least amount of work possible to achieve three key objectives:

1. The customer gets value out of your product — you validate your work and quantify the Value Proposition,
2. The economic buyer pays for the product — you're probably not maximizing short-term profit yet, but you're showing a willingness of the economic buyer to pay something greater than zero,
3. You start a meaningful feedback loop with your customer to understand if your product works, and what is missing or needs to be refined — definition of priorities,



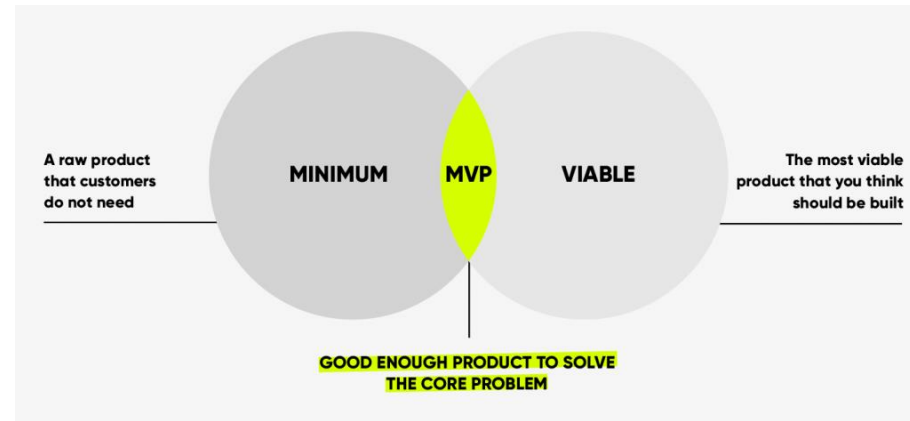
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Minimum Viable Product

How to define an MVP



- Product not prototype - Do not allow to think that this is simply a test,
- “Fake it until you make it” – no investment or very limited investment in the first phase – Concierge MVP
 - Amazon – started selling books with no inventory or agreement
 - Took orders and ran to the store before shipping it
 - Lost money but tested the market – invested in real market data
- MVP level depends on the industry
 - Software companies say that if you are not embarrassed when you ship your first product, you shipped it too late
 - Medical equipment's... need to be final products



©kreatik

Minimum Viable Product

Types of MVP



MVP Archetype	Description	Metrics	Observation depth	Hypothesis validation
Concierge	Hand-created experience you want a customer try	Qualitative observations of the individual steps of the experiment	High	Low
Wizard of Oz	Interface with a human under behind the curtain making things happen	Subject interaction with the interface and affinity for experience	Medium	Medium
Sales	Selling something before actually having it	General growth metrics: click-through, sign up, opened / responded emails	Low	High
Explainer videos	Videos describing how complex product works and what is special about it	Track engagement and analyze the demand	Low	Medium
Landing page	A page explaining the advantages of the product with an option to buy it	Analyze the demand and user behavior	Low	High
Piecemeal MVP	A usable product composed of already available tools instead of building new ones	Analyze the demand and validate the hypothesis	Medium	Medium
Single-feature product	Creating a product with only the core functionalities	Narrow down a target group, analyze feedback	Medium	Medium

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Minimum Viable Product

Examples



Minimum Viable Product

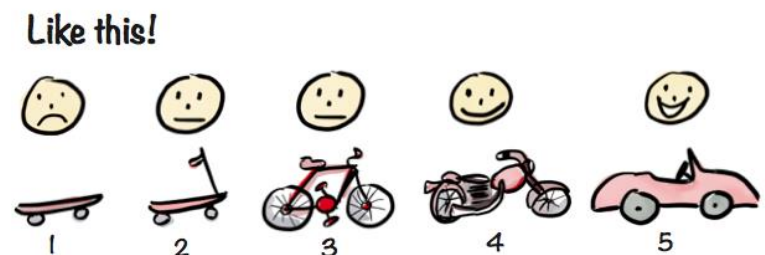
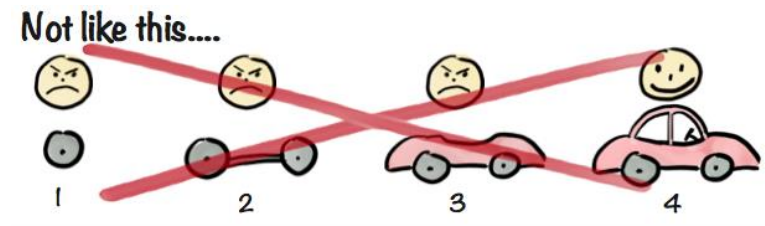
Exercise 9



Do an Internet search to find an example of a company that *concierged* elements of their MVP

Make sure you find an example where the product fulfills all three criteria of an MVP — customer gets value, economic buyer pays for it, you engage customer in a feedback loop.

- What is their value proposition?
- What elements of the MVP did they concierge?
- How did they plan to automate those functions in a later release?
- How effective was their strategy?
- What would you have done differently?



Minimum Viable Product

Do you need an MVP?

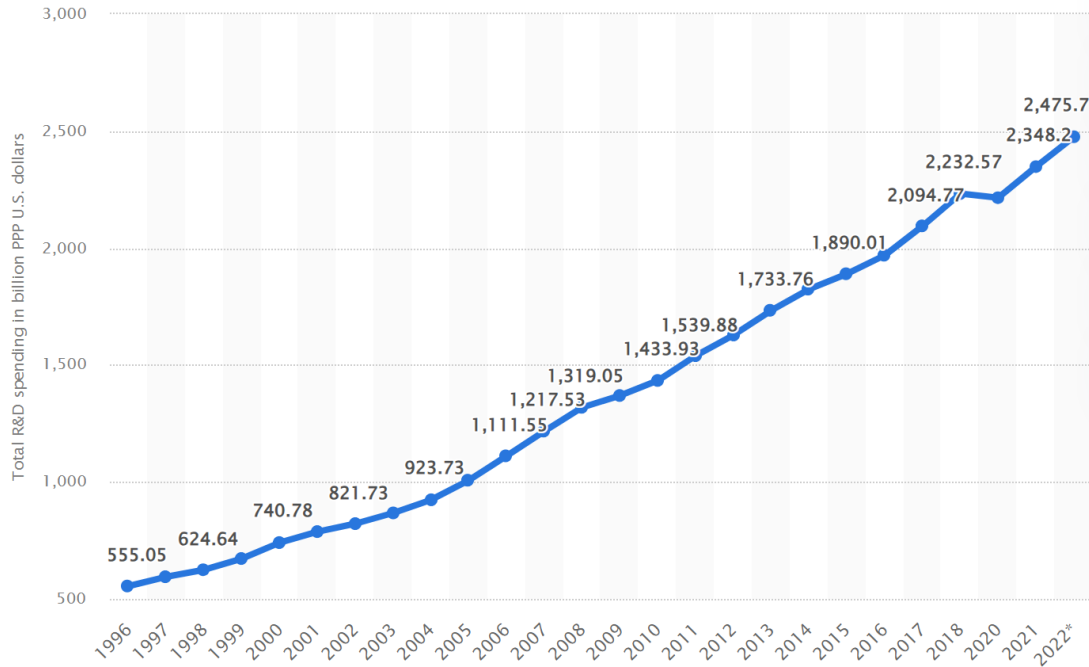


Not really...

- Market test – validation,
 - Following Primary Market Research,
 - Quantified Value Proposition (QVP),
- High-level product specification,
- Verify how people respond by building a “mouse trap” usually through an early-stage proxy to qualify your prospect,
- Obtain data from probable buyers,
- Gain and/or increase engagement,
- Result interpretation following clear benchmarks and market assumptions

Funding

Total global spending on R&D from 1996 to 2022



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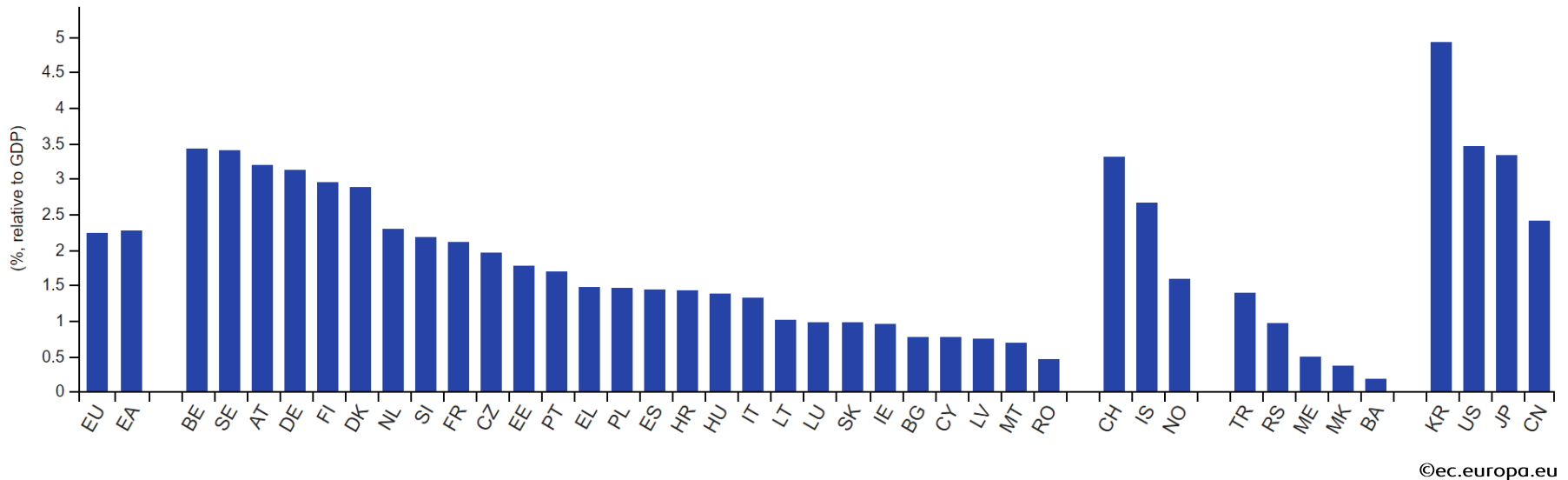
- R&D expenditure globally is significant, highlighting the importance of research and innovation,
- The exact amount varies yearly and across different regions and sectors,
- This substantial investment demonstrates the dedication of governments, businesses, and organizations worldwide to advance scientific knowledge,
- Fostering innovation is key to stimulate economic growth,

Funding

Bigger economies tend to fund more RD&I



Gross domestic expenditure on research and development, 2022



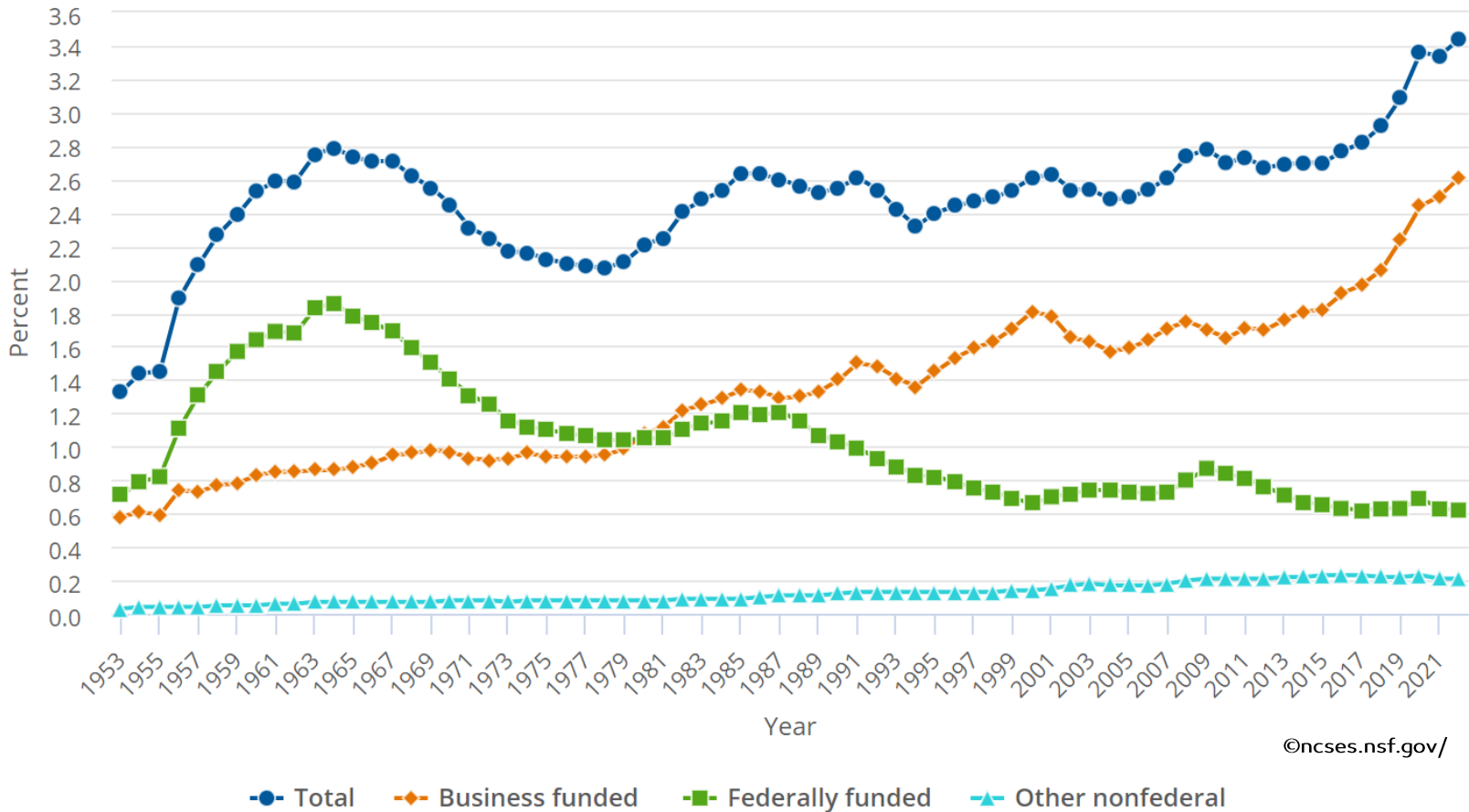
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Funding

Bigger economies tend to fund more RD&I



Ratio of U.S. R&D to GDP, by source of funds for R&D: 1953–2022



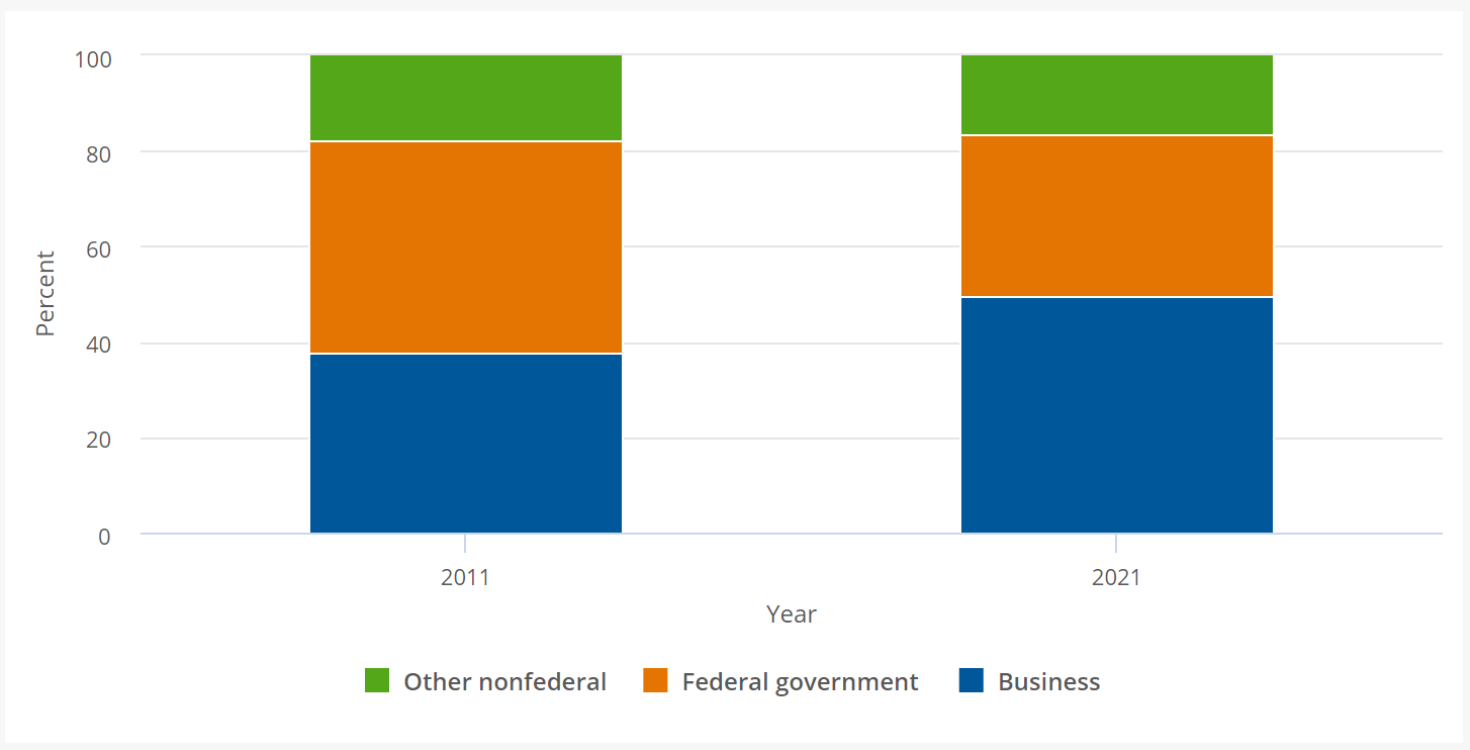
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Funding

Companies do understand the need for RD&I



U.S. research expenditures, by source of funds: 2011 and 2021



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Remember? What is value in Innovation?



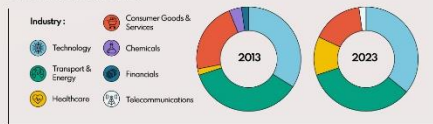
THE MOST INNOVATIVE COMPANIES IN 2023

Boston Consulting Group (BCG) has released the latest edition of their Most Innovative Companies ranking.

- Industry
- Technology
 - Transport & Energy
 - Healthcare
 - Consumer Goods & Services
 - Telecommunications

Rank	Change in Rank (1 year)	Company	Rank	Change in Rank (1 year)	Company
1	▲1	Apple	26	▲8	P&G
2	▲3	TESLA	27	▲22	Nestle
3	—	amazon	28	▲1	3M
4	—	Alphabet	29	▲2	mi
5	▲3	Microsoft	30	New	Honeywell
6	▲1	moderna	31	▲22	SONY
7	▼1	SAMSUNG	32	New	Siemens
8	—	Huawei	33	▲6	HITACHI
9	Returned	BYD	34	Returned	McDonald's
10	▲10	SIEMENS	35	Returned	MERCK
11	▲7	pfizer	36	—	ByteDance
12	▲15	Johnson & Johnson	37	▲11	BOSCH
13	Returned	SPACEX	38	▲24	DELL
14	▲1	NIVIDIA	39	New	GLENCORE
15	Returned	ExxonMobil	40	New	stripe
16	▲5	Meta	41	New	glaxo smith kline
17	▲5	Nike	42	▲6	Coca-Cola
18	▲3	IBM	43	Returned	Mercedes-Benz
19	▲18	3M	44	▲22	AMGEN
20	Returned	TATA	45	▲32	Walmart
21	Returned	Roche	46	New	PetroChina
22	▲3	ORACLE	47	New	NTT
23	New	BIONTECH	48	▲24	Lenovo
24	Returned	shutterstock	49	Returned	United
25	New	Schneider Electric	50	—	United

How has the ranking changed over the past decade?

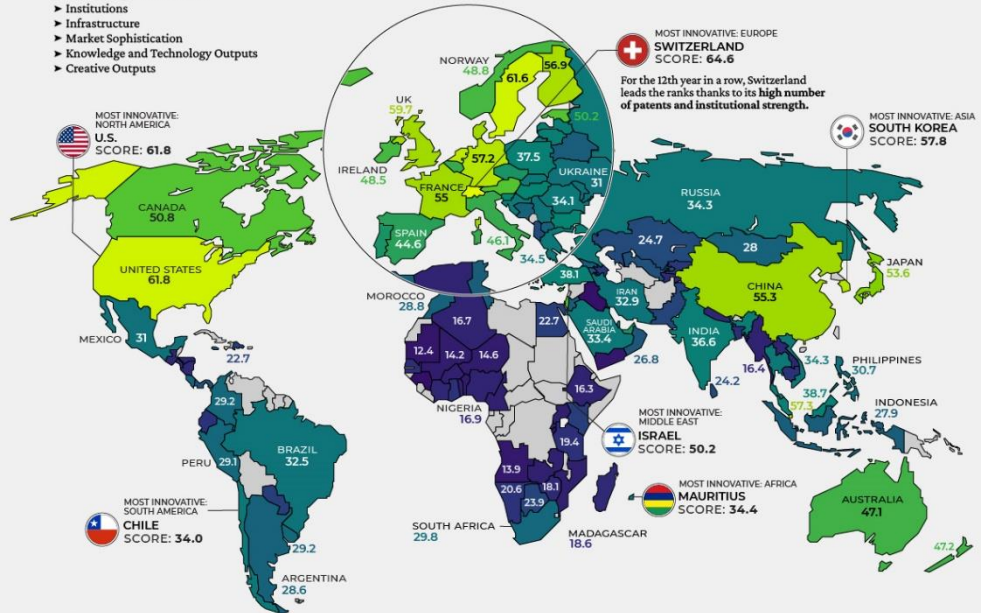


Based on survey of over 1,000 innovation executives who were polled in Dec 2022 and Jan 2023. Company performance was assessed on four dimensions: (1) Global Mindset, (2) Industry Peer View, (3) Industry Disruption, (4) Value Creation.

Global Innovation Index 2022

Below, we show the most innovative economies in the world, based on analysis from the WIPO Global Innovation Index.

- Scores are based on the following 7 categories:
- Business Sophistication
 - Human Capital & Research
 - Institutions
 - Infrastructure
 - Market Sophistication
 - Knowledge and Technology Outputs
 - Creative Outputs



TOP 10 COUNTRIES:



SOURCE: Global Innovation Index 2022

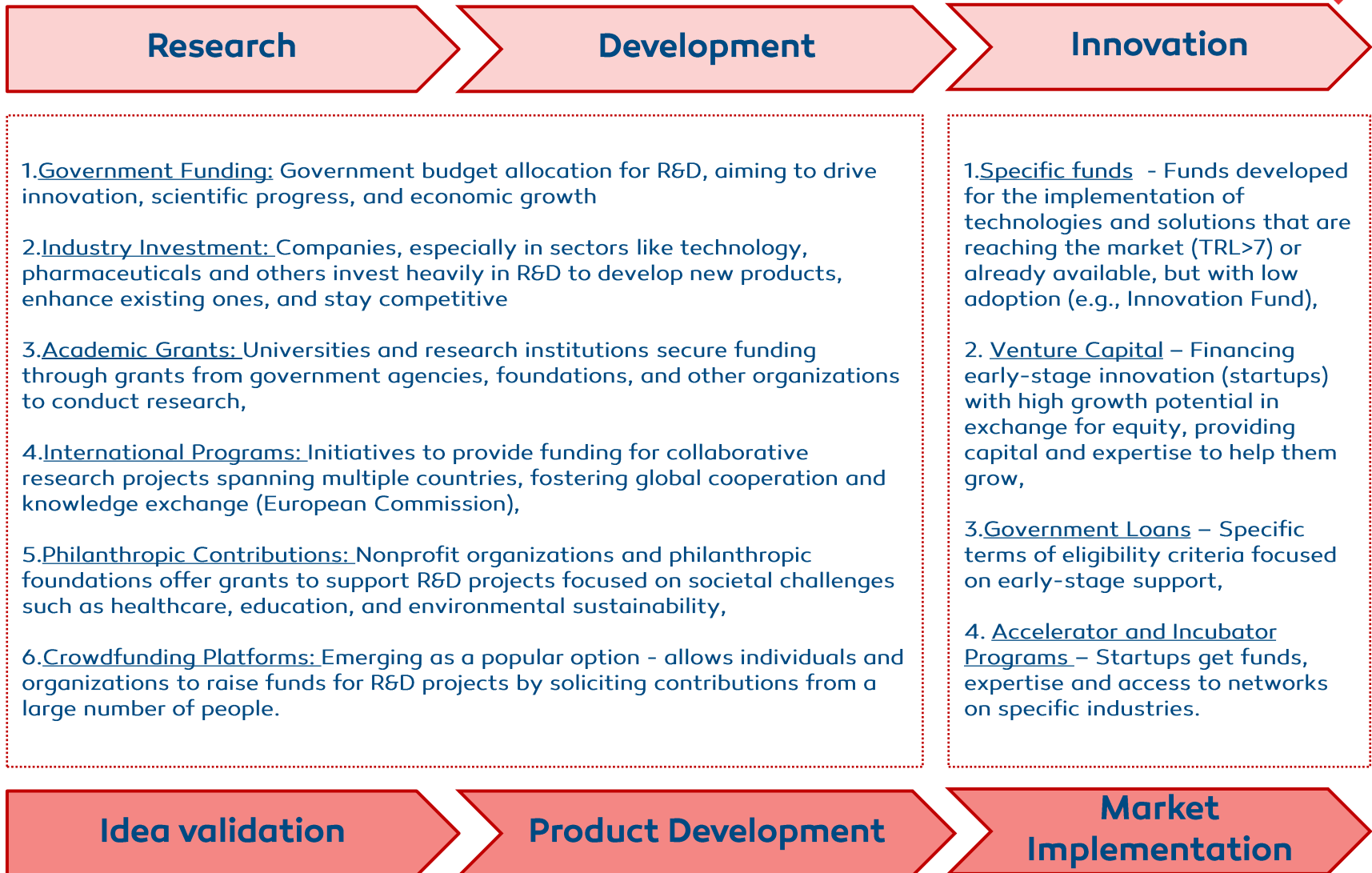


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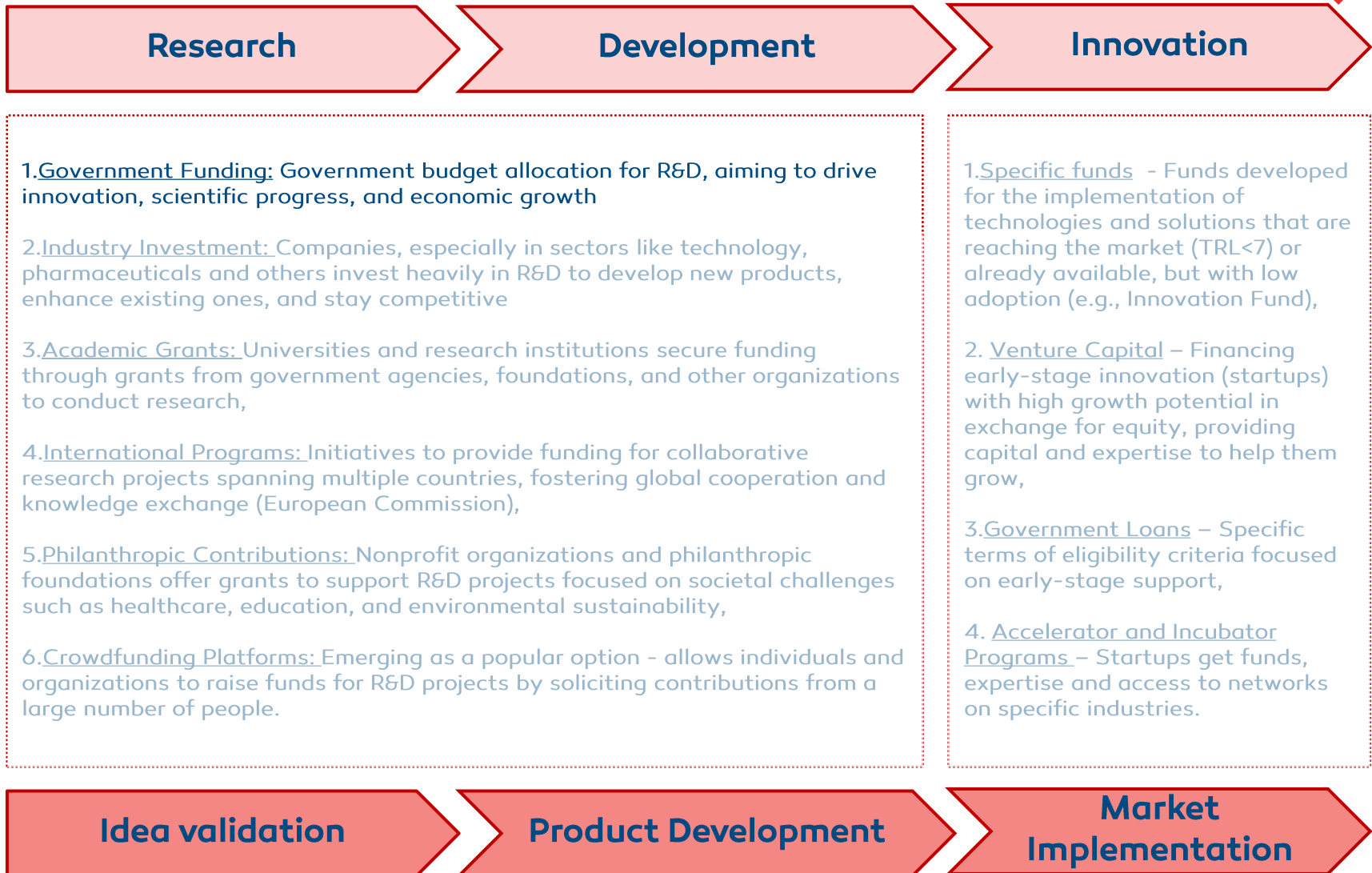
Funding Mechanisms

Value Chain Approach



Funding Mechanisms

Government Funding – The case of Horizon Europe



Funding Mechanisms

Government Funding – The case of Horizon Europe



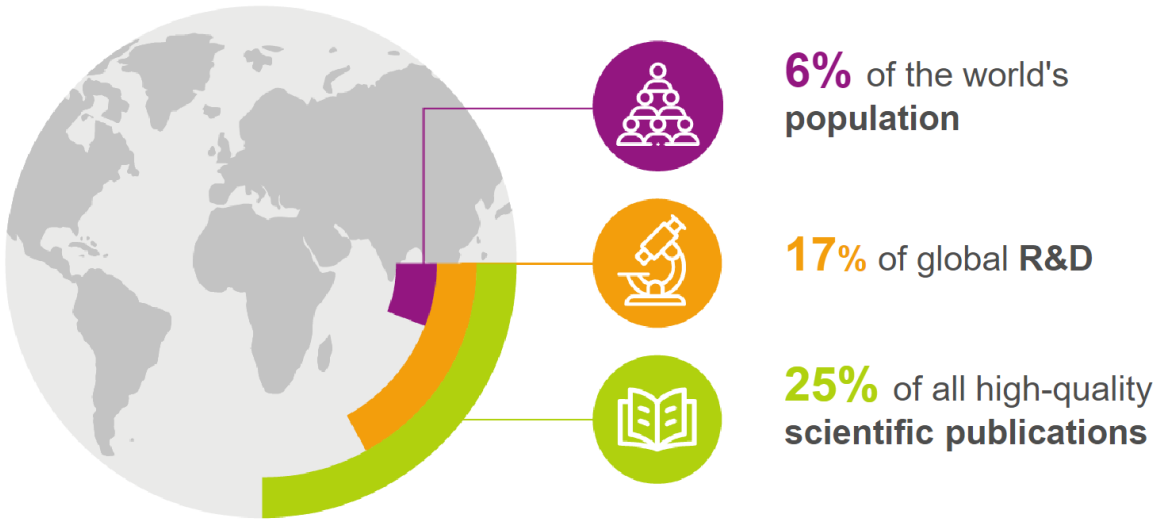
- Horizon Europe is the EU’s key funding programme for research and innovation with a budget of €95.5 billion,
- Tackles climate change and boosts the EU’s competitiveness and growth,
- Facilitates collaboration and strengthens the impact of research and innovation in developing, supporting and implementing EU policies,
- It supports creating and better dispersing of excellent knowledge and technologies,
- Creates jobs, fully engages the EU’s talent pool, boosts economic growth, promotes industrial competitiveness and optimises investment
- Legal entities from the EU and associated countries can participate



Funding Mechanisms

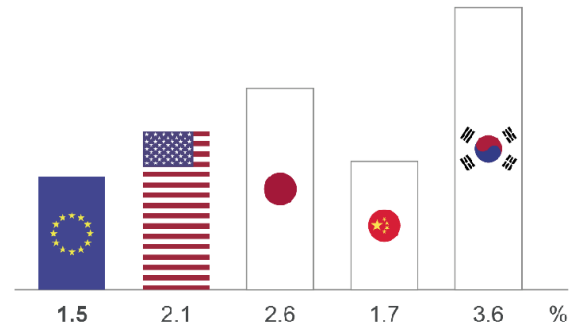
Government Funding – The case of Horizon Europe

While benefiting from world-class research and strong industries... Our knowledge and skills are our main resources



...Europe can do better at transforming this into **leadership in innovation** and **entrepreneurship**

1.5% EU business R&D investment



*EU figure is for 2019
 Figures for USA, Japan, China and South Korea are for 2018. Figures represent R&D as % of GDP*

Horizon Europe legislation defines three types of impact tracked through **Key Impact Pathways**

1. Creating high-quality new knowledge
2. Strengthening human capital in R&I
3. Fostering diffusion of knowledge and Open Science

Scientific Impact



4. Addressing EU policy priorities & global challenges through R&I
5. Delivering benefits & impact via R&I missions
6. Strengthening the uptake of R&I in society

Societal Impact



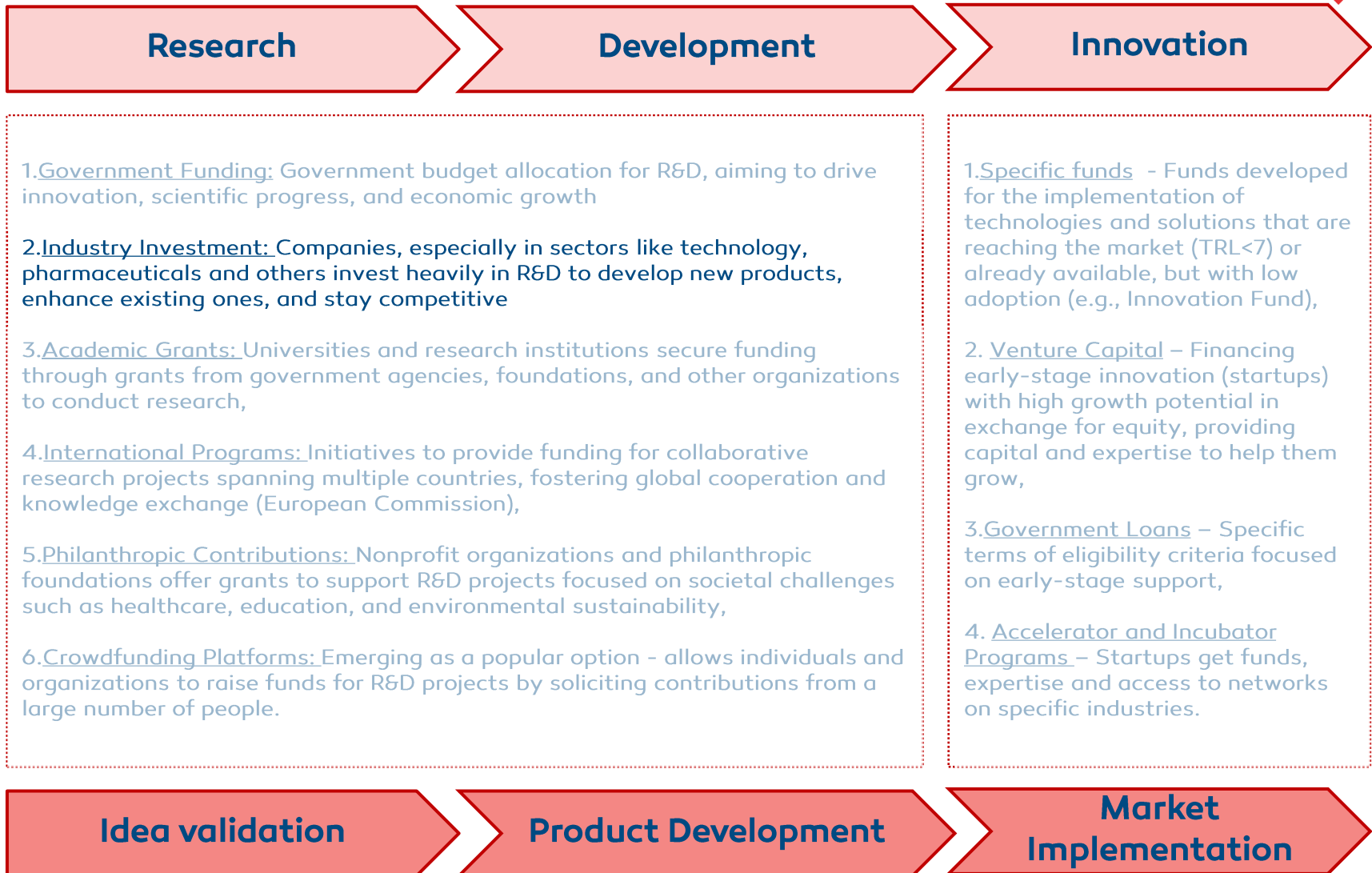
7. Generating innovation-based growth
8. Creating more and better jobs
9. Leveraging investments in R&I

Economic Impact



Funding Mechanisms

Industry Investment – When regulators set the tone



Funding Mechanisms

Industry Investment – When regulators set the tone



- Regulatory Requirement in O&G Industry
- In Brazil, the ANP mandates O&G companies to invest a percentage of their revenues in RD&I projects related to the energy sector,
- Objective of stimulating technological advancements, enhance competitiveness, and foster sustainability within the industry,
- Focus Areas based on the energy sector with projects being developed by accredited institutions such as Universities, Tech Centers and other companies,
- More than 3950 projects until today,
- Overall investment of 4B\$
- Main driver for the development of academia in Brazil





Funding Mechanisms

Specific Funding – The Innovation Fund



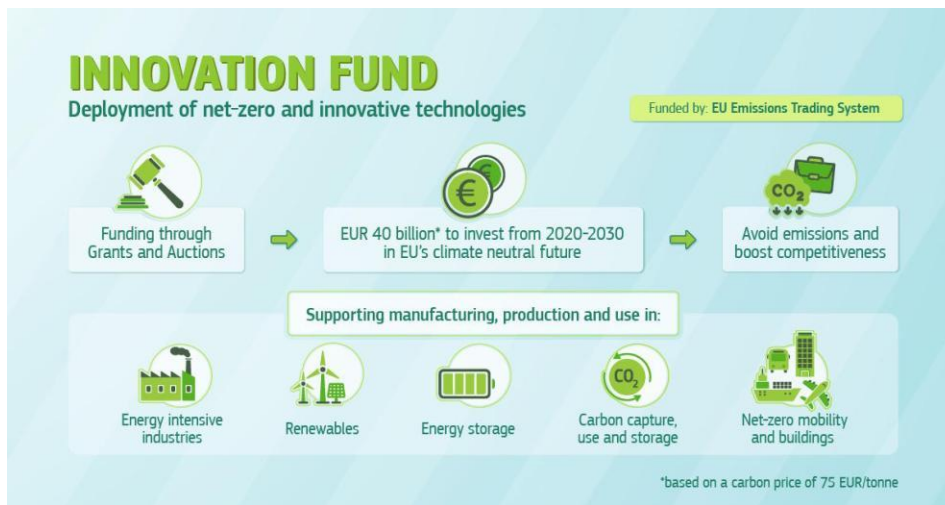
- 1. Government Funding: Government budget allocation for R&D, aiming to drive innovation, scientific progress, and economic growth
- 2. Industry Investment: Companies, especially in sectors like technology, pharmaceuticals and others invest heavily in R&D to develop new products, enhance existing ones, and stay competitive
- 3. Academic Grants: Universities and research institutions secure funding through grants from government agencies, foundations, and other organizations to conduct research,
- 4. International Programs: Initiatives to provide funding for collaborative research projects spanning multiple countries, fostering global cooperation and knowledge exchange (European Commission),
- 5. Philanthropic Contributions: Nonprofit organizations and philanthropic foundations offer grants to support R&D projects focused on societal challenges such as healthcare, education, and environmental sustainability,
- 6. Crowdfunding Platforms: Emerging as a popular option - allows individuals and organizations to raise funds for R&D projects by soliciting contributions from a large number of people.

- 1. Specific funds - Funds developed for the implementation of technologies and solutions that are reaching the market (TRL<7) or already available, but with low adoption (e.g., Innovation Fund),
- 2. Venture Capital – Financing early-stage innovation (startups) with high growth potential in exchange for equity, providing capital and expertise to help them grow,
- 3. Government Loans – Specific terms of eligibility criteria focused on early-stage support,
- 4. Accelerator and Incubator Programs – Startups get funds, expertise and access to networks on specific industries.



Funding Mechanisms

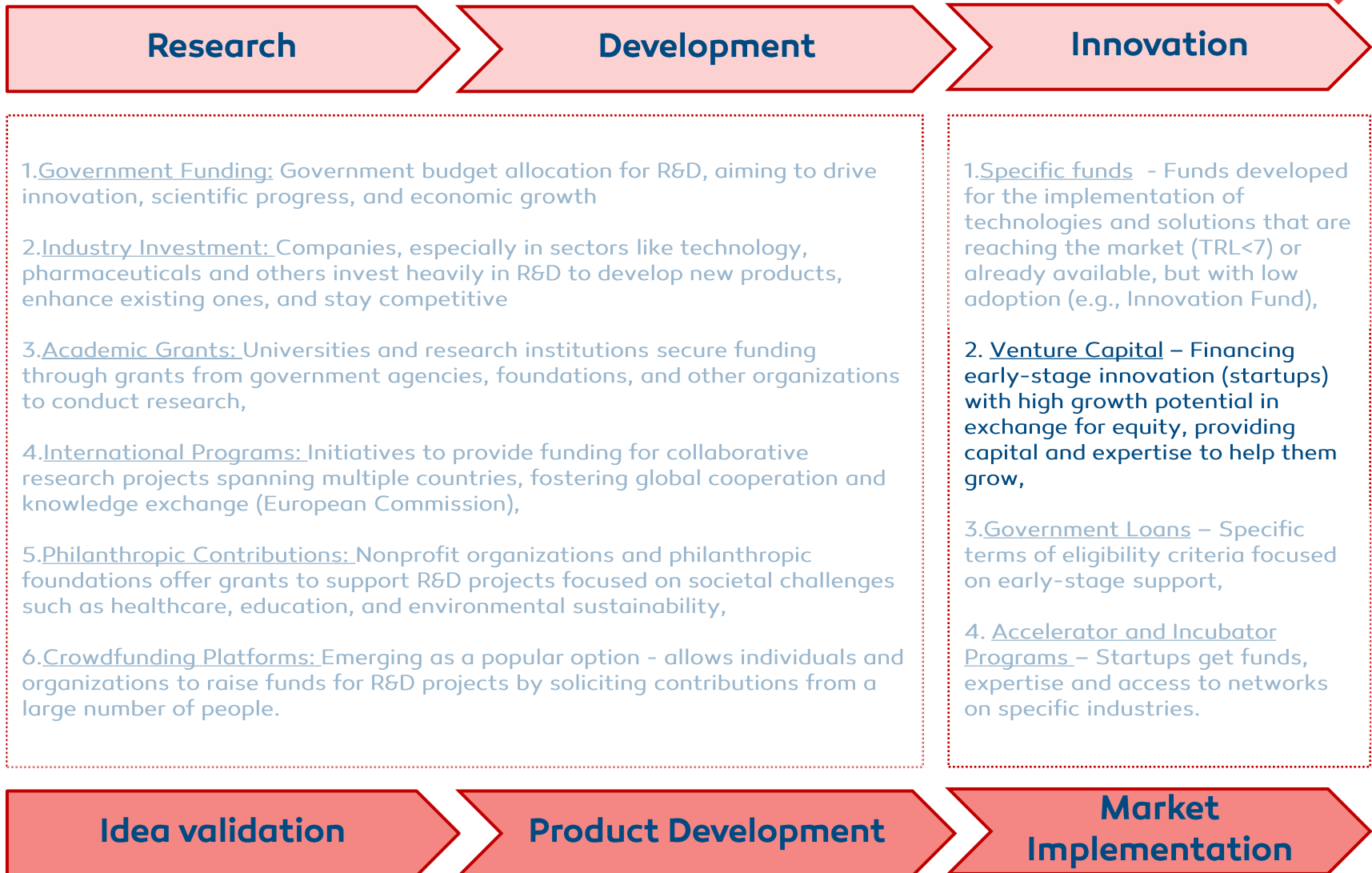
Specific Funding – The Innovation Fund



- The Innovation Fund is a key funding instrument for delivering the EU's economy-wide commitments under the Paris Agreement. Goals include:
 - help businesses invest in clean energy and industry
 - boost economic growth
 - create future-proof jobs
 - reinforce European technological leadership on a global scale
- This is done by funding innovative projects focusing on:
 - innovative low-carbon technologies and processes in energy-intensive industries,
 - carbon capture and utilisation – CCU
 - construction and operation of carbon capture and storage (CCS) facilities
 - innovative renewable energy generation
 - energy storage

Funding Mechanisms

Specific Funding – The Innovation Fund



Funding

Venture Capital – Funding for Equity



- Seed Funding: Initial capital provided to support the earliest stages of a startup, often used for product development, market research, and early operations,
- Series A: Funding round typically used to scale operations, expand market reach, and further develop products or service,
- Series B: Funding round focusing on accelerating growth, increasing market share, and building infrastructure,
- Series C: Funding round aimed at further expanding the business, entering new markets, or acquiring complementary companies,
- Series D and Beyond: Often used for global expansion, strategic acquisitions, or preparing for an initial public offering (IPO).

Types of Funding Rounds for your Startup				
Funding Round	Pre-Seed	Series A	Series B	Series C
Stage Focus	Proof of concept/ Prototype	Revenue Growth	Growth	Large scale expansions
Common Elements of Growth	Hiring	Development, Operations, Branding & Marketing	Hiring, Market expansion, Buying Businesses	Acquiring businesses, International markets
Amount of Investment	\$10K-\$1MM	\$10MM	\$15-25MM	~\$50MM

Read

- Paul Cheek - Market Testing Tactics, Venture Creation Tactics, 2023.

ISEC

Master in Innovation and Research for Sustainability

Evaluation and Management of R&I Projects