

# Master in Innovation and Research for Sustainability

## Evaluation and Management of R&I Projects

### Module IV: R&D+I Portfolio Management


#### Lecture 10 : Optimizing R&D+I Contributions to Strategic Objectives & Performance Metrics for R&D and Innovation

Ana Casaca, 2024

# Next Classes

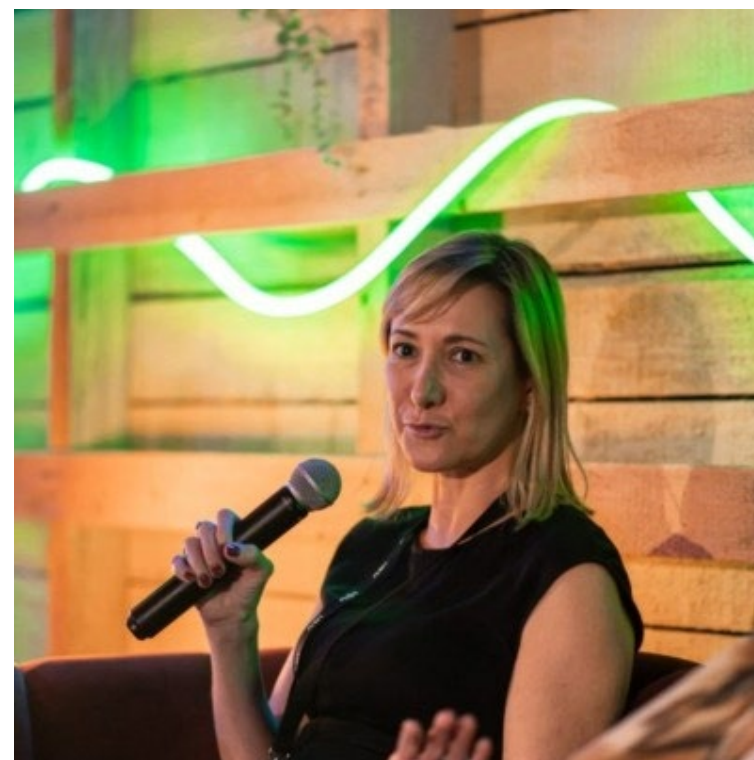


## 7 of May – Lecture 11

 [Venture Capital Evaluation: What VCs Look for in a Winning Project](#)

### Rita Villas Boas

Partner @ Angel Investment  
(<https://angelinvest.ventures/>)

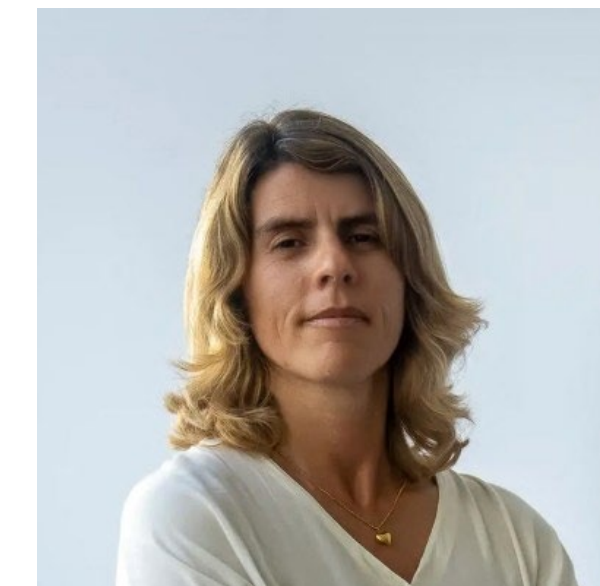


## 14 of May Session – Lecture 12

 [How to manage Innovation from the perspective of ONG Accelerator](#)

### Inês Sequeira

Director Casa do Impacto  
(<https://casadoimpacto.scml.pt/>)



 [How to manage innovation from the perspective of a Startup?](#)

### Paulo Dimas

VP of Product Innovation @Unbabel  
(<https://unbabel.com/>)



# Welcome back

## 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

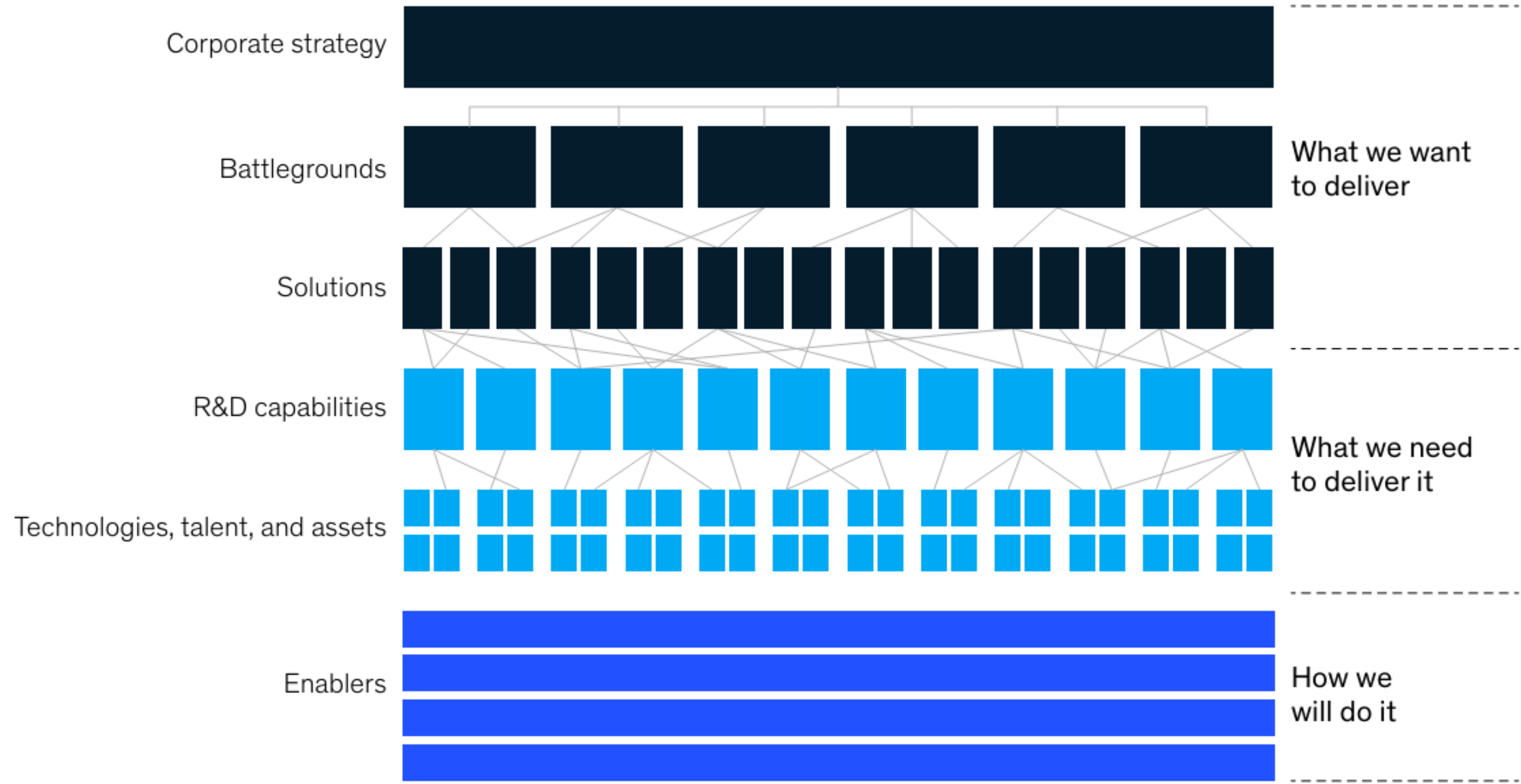
### Lecture 12: Real-World Applications and Case Studies

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

# Essential Recap

Companies can set the direction of their R&D strategies by answering a series of questions about how the components fit together.

### Strategy elements



### 👉 What we want to deliver

The R&D strategy & the corporate strategy must be in sync while answering questions such as: At the highest level, what are the company's goals? Which of these will require R&D in order to be realized? In short, what is the R&D organization's purpose?

### 👉 What we need to deliver

The R&D strategy needs to determine what capabilities and technologies the R&D organization must have in place to bring the desired solutions to market and answering questions such as: What capabilities and technologies the R&D organization must have in place to bring the desired solutions to market

### 👉 How we will do it

The choices of **operating model** and **organizational design** will ultimately determine how well the R&D strategy is executed.

But HOW ABOUT... HOW WE MEASURE WHAT WE DELIVER?



***What gets measured, gets DONE!***

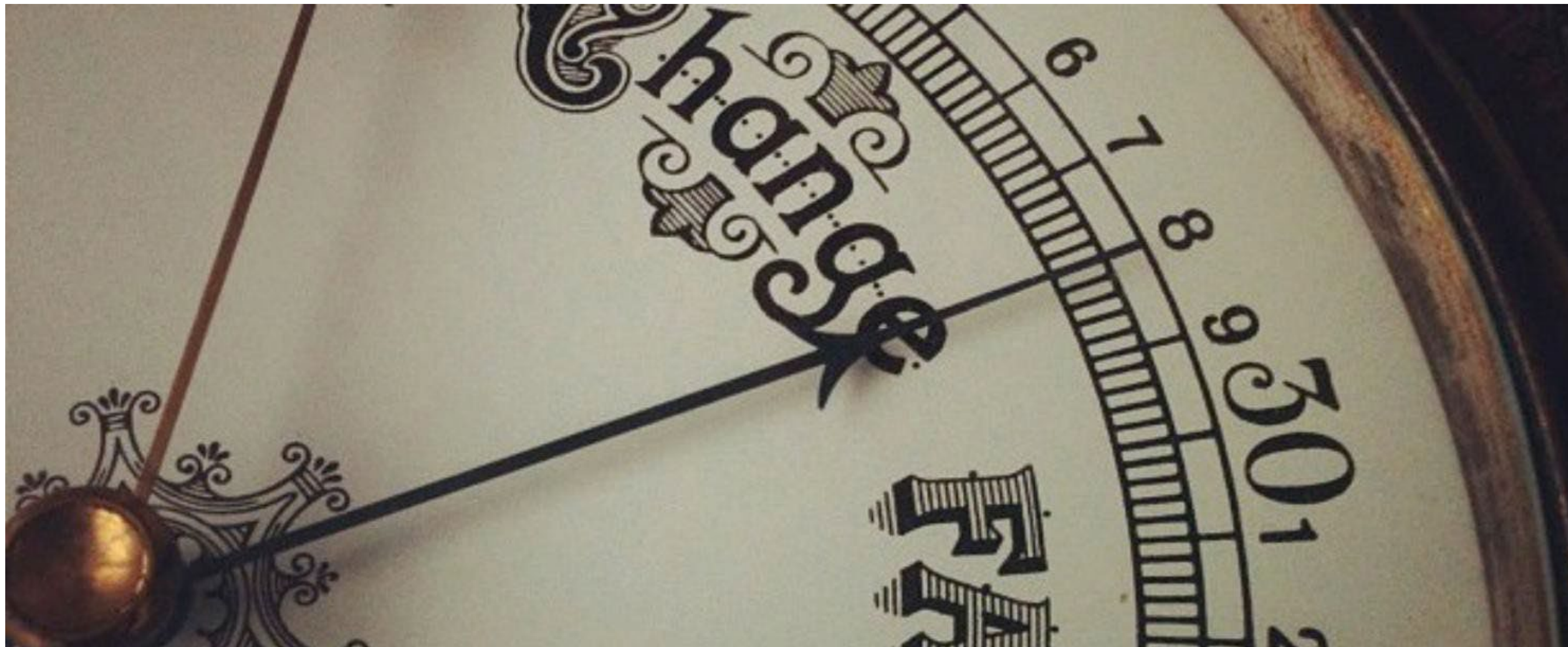
# *Evolution of Metrics for R&D and Innovation*

**Back to the Past 90's to 2020...**

Traditional Innovation Models  
(pure R&D models)

vs

New Innovation Models with  
Broader Scopes



# Evolution of Metrics for R&D and Innovation

## 1<sup>st</sup> Generation

R&D Expenses  
Investment  
R&D size team

...

## 2<sup>nd</sup> Generation

Patents  
Scientific Publications  
New Products  
Quality Impact

...

## 3<sup>rd</sup> Generation

Innovation Index  
Benchmarks.  
Innovation Surveys

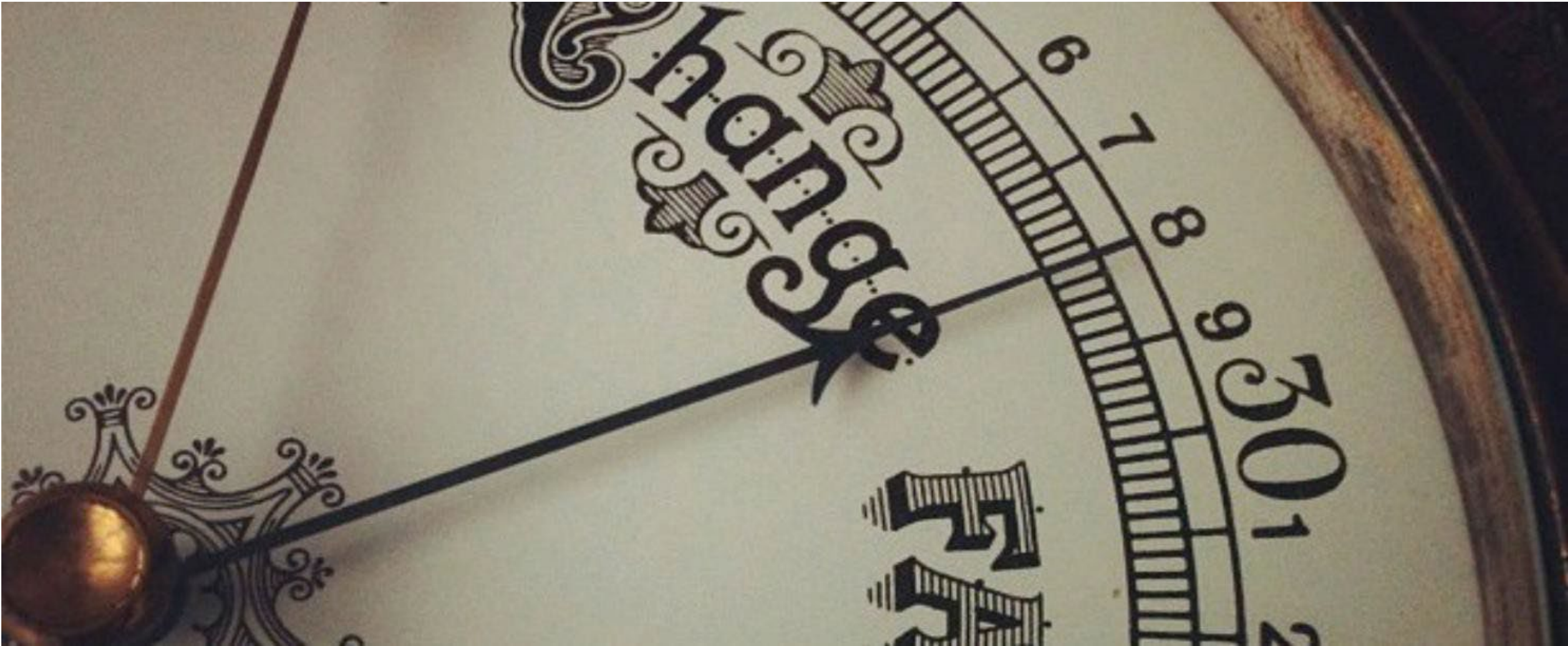
...

## 4<sup>th</sup> Generation

Revenue Growth  
Success Ratio  
Percentage of Sales from new products

...

...



Fonte: White Paper "Innovation Metrics: Measurement to Insight" Milbergs e Vonortas, 2004

# But how do Innovation Metrics Contribute to Innovation Performance?

Guarantee that the governance & THE METRICS are aligned with what you want to achieve

**👉 Investing in innovation talent:** The leadership team signals a strong commitment to innovation through investments of resources and time to recruit, develop and retain innovation talent

**👉 Encouraging prudent risk-taking:** Innovative firms foster a tolerance for risk throughout the organization by encouraging learning from innovation disappointments

**👉 Adopting an outside-in innovation process:** Growth leaders start with deep insights into customers to anticipate emergent needs and likely responses to innovation

**👉 Aligning metrics and incentives with innovation activity:** An innovation dashboard creates a credible and transparent link to rewards and recognition for innovation accomplishments

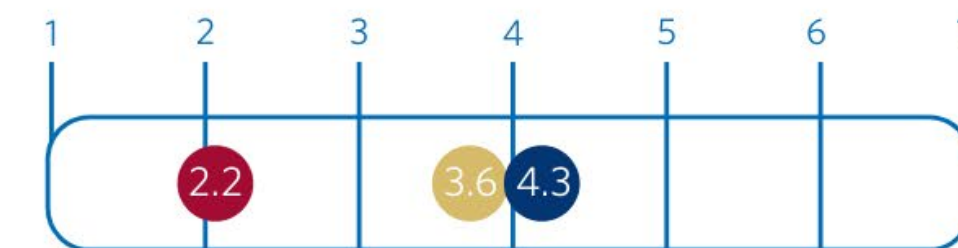
## Profiling Growth Leaders

Developing innovation talent is not a priority



We invest heavily to develop and retain our talent in innovation activities

Our culture is highly risk-averse and does not cope well with failure



Our culture encourages risk-taking and learning from disappointments

We are poor at listening to customers and anticipating their needs



Every senior manager is attuned to the voice of the customer


Our incentives are not linked to innovation performance





Rewards and recognition are strongly linked



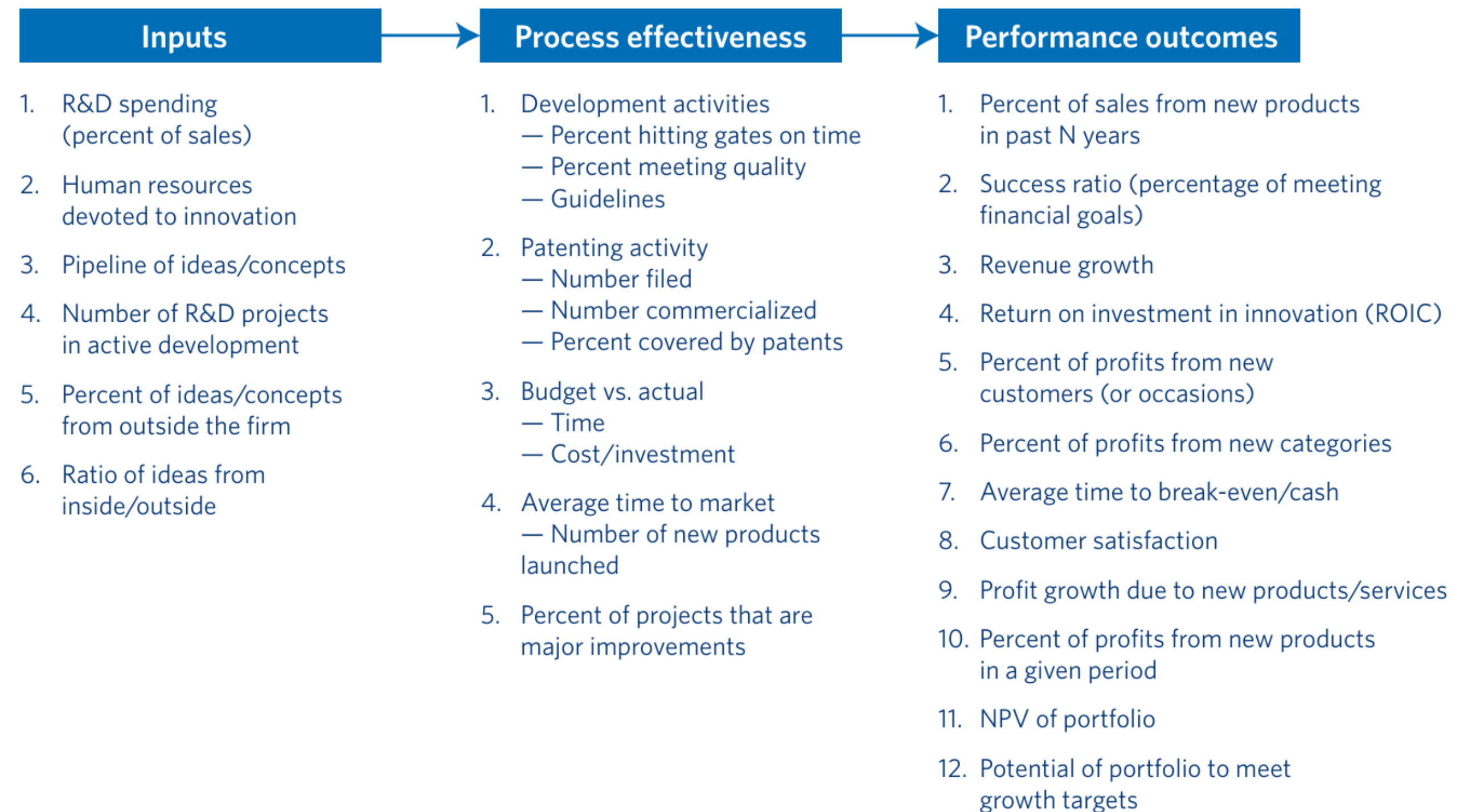
# To Define Indicators, think Innovation as (industrial) process

 **Inputs:** such as R&D spending as a percentage of sales, number of R&D projects, number of ideas or concepts in the pipeline, and the percent of ideas sources from outside the company

 **Process measures:** including patenting activity, percent of projects hitting their gates on time, budget verses actual spending, average time to market, and the percent of projects that are major improvements. These measures were aimed at understanding the effectiveness of the innovation processes that yielded the performance outcomes.

 **Performance outcomes:** such as percent of sales from new products in past N years (this was usually three years) success rates, revenue growth, due to organic sources, customer satisfaction, net present value of the portfolio, and average time-to-breakeven.

## Possible Metrics in an Innovation Dashboard



# *And in the end cut at least in half..*

On average companies use seven metrics (max.)

The best performers are the ones that make the connection between their innovation investments to shareholder value creation

## Most Popular Innovation Metrics



# Keep in mind that we have golden rules to define Metrics for R&D + Innovation

## Four rules for *better* metrics



### Leading

- “If we do more of this, it will lead to growth.”



### Actionable

- “Our employees can make this happen.”



### Benchmarkable

- “We can compare to others and year-to-year.”



### Impactful

- “Improvement will *significantly* drive growth.”



### Leading

“If we do more of this, we’ll get more of the results we want.” Let’s be clear about those results for an innovation metric: We want **rapid, profitable, sustainable growth from market-facing innovation**. So yes, a good leading metric should result in increasing vitality index levels. But more important, it should drive rapid, profitable, sustainable growth



**Actionable:** Innovation metrics should tell the team what they should do while their multi-functional team is developing a new product. And should guide them between projects, to develop capabilities—skills, methods, and tools—to do it even better with future projects



**Benchmarkable:** Any new innovation metric must allow you to compare your performance year-over-year. And needs to let you compare your performance against other companies



**Impactful:** Any metric must help the team to make a big difference in growth. There are many possible metrics that could distract or dilute your objective

***In reality... Let's see how we can  
establish metrics for an  
innovation department***

## A real case study

- We want to launch a startup engagement program that can bring **visible results** and that will allow the organization to be recognized as a ***player* relevant in the innovation european ecosystem**
- In the context of this need, **PROGRAM X** needs to **define metrics for evaluating its impact**
- The main objective of defining these metrics is **to systematically measure and evaluate the impact of PROGRAM X** both on the Company and for the Startup Ecosystem
- To do this, it will be necessary **to develop, define and collect** a set of metrics

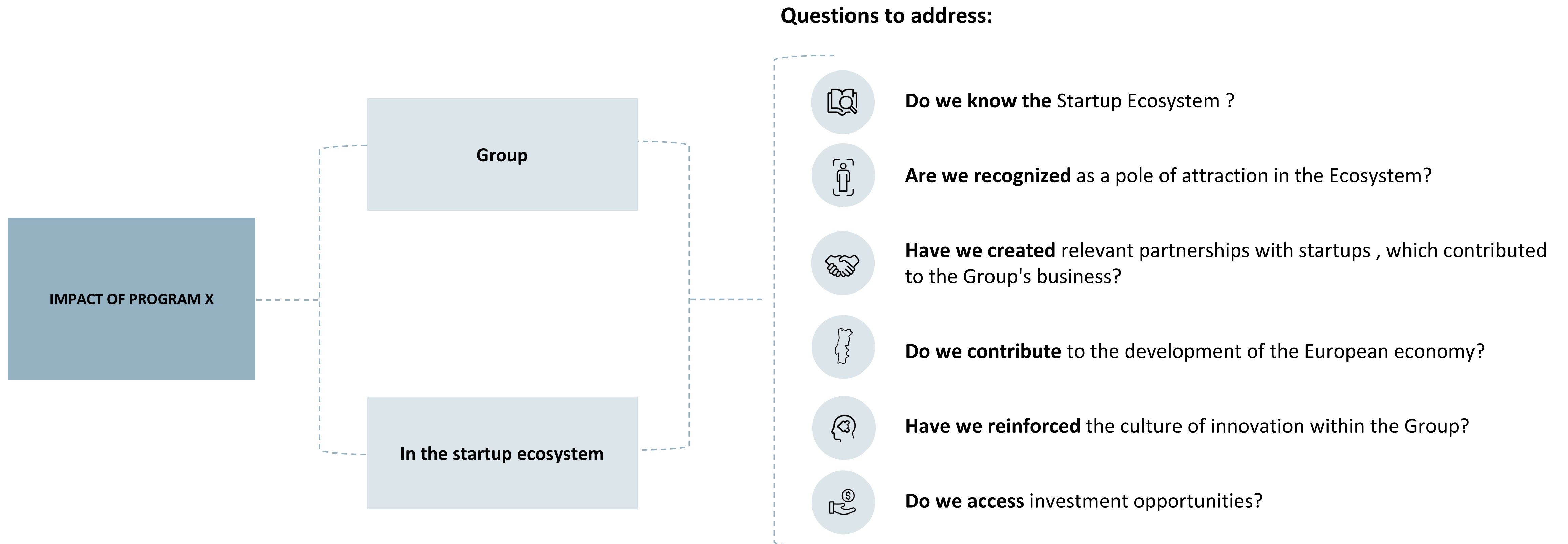
### **PROGRAM X objectives**

#### **Positioning the company as a key player & Create Impact**

- A.** Guarantee pilots with startups have impact for the company
- B.** Activate a Mentor Network
- C.** Start the participation in specific ecosystem initiatives
- D.** Gain visibility in the ecosystem
- E.** Launch a strong internal communication policy

## PROGRAM X impact assessment metrics

We want to measure the **impact of PROGRAM X** on the **Group** and on the **Startup Ecosystem**, in the way its results respond to the objectives initially outlined



# Project timeline



1.3 Definition of metrics [1/2]

		METRICS	Startup	Be recognized and a pole of attraction in the Ecosystem	Create "partnerships" ( field tests ) relevant with startups	Contribute to the development of the Portuguese economy	Reinforce the culture of innovation within the Group	Access investment opportunities
Reach and Reputation	External	Events with active participation of Group employees	✓	✓			✓	
		PROGRAM X's reputation in the initiatives in which it participates or organizes		✓	✓			
		Recognition of the Group (PROGRAM X) as a relevant player in the innovation ecosystem		✓	✓	✓		✓
	Internal	Areas involved in pilots					✓	
		Employees "affected" by PROGRAM X					✓	
		Organization feedback/perception regarding PROGRAM X					✓	
Activity		Startups analyzed	✓				✓	
		Investment opportunities analyzed	✓	✓		✓		✓
		Startups supported with mentorship	✓	✓	✓	✓	✓	✓
		Investments in the ecosystem		✓		✓		
Direct Financial Impact		Financial impact of pilots/contracts on Group companies			✓			
		Valuation of investments			✓			✓
Results	Impact on the Ecosystem	Success stories		✓		✓		
		Magnitude of the startups we are supporting (jobs)		✓		✓		
		Magnitude of the startups we are supporting (investment received)		✓		✓		
	Of activity	Pilots (tested solutions)		✓	✓	✓	✓	✓
		Contracts signed with startups		✓	✓	✓	✓	✓
		Startups invested by the Group		✓		✓		✓



## 1.3 Definition of metrics [2/2]

METRICS	DESCRIPTION	GRADES
<b>Events with active participation of Group employees</b>	Number of events in which (within the scope of Grow) employees of the Group have actively participated as speakers, juries or mentors	Includes PROGRAM X team and others
<b>PROGRAM X's reputation in the initiatives in which it participates or organizes</b>	Global classification of surveys carried out as part of PROGRAM X's participation or organization in any ecosystem initiative	(detailed ahead) <b>A</b>
<b>Recognition of the Group (PROGRAM X) as a relevant player in the innovation ecosystem</b>	Result of a market study on PROGRAM X's reputation	( detailed ahead ) <b>B</b>
<b>Areas involved in pilots</b>	Number of areas involved in the pilot development process	<b>Process:</b> from the first pitch to the end of the pilot
<b>Employees "affected" by PROGRAM X</b>	Number of people who were exposed to innovation topics within the scope of PROGRAM X (actively – speakers; mentors; juries <b>or</b> passively – spectators)	<b>Examples of events where this count must be done:</b> Board Meeting, Web Summit , Innovation talks Sessions , ...
<b>Organization feedback/perception regarding PROGRAM X</b>	Result of feedback to Group employees about their perception of PROGRAM X	( detailed ahead ) <b>W</b>
<b>Startups analyzed</b>	Number of startups analyzed by (at least) one member of the PROGRAM X <i>core team</i>	<b>Analysis</b> = there has been at least one conversation with the startup
<b>Investment opportunities analyzed</b>	Number of investment opportunities in startups analyzed and presented to (at least) one top Director of the company in question	
<b>Startups supported with mentorship</b>	Number of startups supported with <i>mentorship</i> in (at least) one of the 3 levels: <i>office hours</i> , <i>expertise sharing</i> or ongoing mentoring	Valid for Mentors Exchange members and others
<b>Investments in the ecosystem</b>	Value attributed to startups for: (1) supporting pilots and (2) contracting/providing services/products	
<b>Financial impact of pilots/contracts on Group companies</b>	Value that reflects the financial impact of pilots on business	Take into account the value of the pilots (if applicable)
	Valuation of investments made within the scope of PROGRAM X	This value will not be expressed in the first years
<b>Valuation of investments</b>	Verification of the existence of (at least) 2 criteria that make a startup a "success case"	( detailed ahead ) <b>D</b>
<b>Success stories</b>	Total number of employees of companies supported by PROGRAM X with pilots and/or contracts	
<b>Magnitude of the startups we are supporting (jobs)</b>	Total investment raised by companies supported by PROGRAM X with pilots and/or contracts	
<b>Magnitude of the startups we are supporting (investment received)</b>	Number of startups that tested their solutions (pilots) in the Group	
<b>Pilots (tested solutions)</b>	Number of contacts made between startups and the Group	Includes startups with and without a prior pilot
<b>Contracts signed with startups</b>	Number of startups in which investments were made by a company in the Group	Excludes monetary value attributed to supporting pilots

## 2.1

## Definition of the data collection process

An analysis of the results status is expected to be carried out quarterly, with some metrics only being updated every six months.

METRICS	RESPONSIBLE FOR REGISTRATION*	METHOD
Events with active participation of Group employees	Name a person	Daily log (if applicable)
PROGRAM X's reputation in the initiatives in which it participates or organizes	Name a person	Ad Hoc Surveys
Recognition of the Group (PROGRAM X) as a relevant player in the innovation ecosystem	Name a person	Biannual market study
Areas involved in pilots	Name a person	Daily log (if applicable)
Employees "affected" by PROGRAM X	Name a person	Daily log (if applicable)
Organization feedback/perception regarding PROGRAM X	Name a person	Semiannual survey
Startups analyzed	Name a person	Daily log (if applicable)
Investment opportunities analyzed	Name a person	Daily log (if applicable)
Startups supported with mentorship	Name a person	Daily log (if applicable)
Investments in the ecosystem	Name a person	Daily log (if applicable)
Financial impact of pilots/contracts on Group companies	Name a person	Estimate on pilot approval and quarterly update (?)
	Name a person	Estimate on pilot approval and quarterly update (?)
Valuation of investments	Name a person	Quarterly (?) update with startups
Success stories	Name a person	Quarterly (?) update with startups
Magnitude of the startups we are supporting (jobs)	Name a person	Quarterly (?) update with startups
Magnitude of the startups we are supporting (investment received)	Name a person	Daily log (if applicable)
Pilots (tested solutions)	Name a person	Daily log (if applicable)
Contracts signed with startups	Name a person	Daily log (if applicable)

# Metrics [detail]

## PROGRAM X's reputation in the initiatives in which it participates or organizes

A

goal	In the context of analyzing PROGRAM X's impact, we want to assess <b>PROGRAM X's reputation</b> in the ecosystem initiatives in which it participates or organizes
Information collection method	At the end of each initiative, PROGRAM X teams launch surveys to as many participants as possible
Final classification	<p>This metric will have as its final rating the average rating given to a set of questions. Examples:</p> <ul style="list-style-type: none"> <li>▪ "On a scale of 1 to 7, rate the impact of PROGRAM X on this meeting"</li> <li>▪ "On a scale of 1 to 7, rate the performance of PROGRAM X's participation in this meeting"</li> <li>▪ "On a scale of 1 to 7, how useful is this meeting"</li> </ul>

## Recognition of the Group (PROGRAM X) as a relevant player in the innovation ecosystem

B

goal	In the context of analyzing the impact of Grow, we want to assess the level of <b>recognition of the Group (PROGRAM X)</b> as a relevant <i>player</i> in the innovation ecosystem
Information collection method	Conduct a market study of the ecosystem: incubators, accelerators, corporate accelerators, startups , universities and others
Final classification	(to be defined)

# Metrics [detail]

## Organization feedback/perception regarding PROGRAM X

goal

In the context of analyzing the impact of Grow, we want to assess the **perception of the Group's employees about PROGRAM X**

Information collection  
method

Carry out a biannual survey of a broad group of employees who had direct and indirect interaction with PROGRAM X activity

Final classification

(to be defined)

## Success stories

goal

In the context of analyzing the impact of PROGRAM X, we want to assess how many “success cases” we have among the startups we work with (pilots or contracts)

Information collection  
method

Interview startups quarterly with some questions about their activity

Final classification

Verification of the existence of (at least) 2 criteria that make a startup a “success case”. Examples:

- Number of employees:** + 50 (since they started working with Grow)
- Number of customers:** +20% (since they started working with Grow)
- Investment received:** minimum 3x the amount startups raised before working with Grow
- Internationalization:** launch of 1 more location (since they started working with Grow)
- Innovation:** new product development (since they started working with Grow)

W

D

***Metrics can be like... shopping  
lists...***

# Indicators collected [list] v1

- # of solutions identified
- # of solutions selected
- # of experiments (field tests) run
- # of customers exposed to a new solution
- # of customer interviews
- # of prototypes/ MVPs built
- # of acceleration initiatives held
- Experiment results
- Cost-per-learning
- Time-cost-per-learning
- Learning velocity
- Validation velocity
- # of products in pipeline
- # of applications submitted
- # of decisions made
- # of products moving stages
- Average amount spent per stage
- Stage-gate criteria
- Assumption-to-knowledge ratio
- % of products at problem-solution fit
- % of products at product-market fit
- % of products ready to scale
- # of products by innovation type (core, adjacent, transformational)
- # of products per substage (problem, solution, business)
- % of products aligned to thesis
- # of patent fillings
- Partnerships and collaborations
- Process improvement metrics
- Number of patents granted
- New business models ready to scale
- Cost savings
- Innovation talks

## Indicators collected [list] v2

- # training in the field of innovation
- Level of team availability to tackle PROGRAM X themes
- Awareness of teams about what PROGRAM X has done
- # internal participants
- Level of Top Management involvement
- Level of engagement and motivation of teams with PROGRAM X
- Talent retention
- Budget allocated to PROGRAM X
- Amount allocated to each phase of the pilots
- Value allocated to ecosystem events
- Return on investment
- # discussions about the possible application of the identified solutions to other businesses
- # pilots
- # participation in Ecosystem events
- % success of pilots
- # contracts with products/services
- Customer satisfaction with products/services
- PROGRAM X Reputation
- Recognition of the Group as a relevant player in the Ecosystem

## Collected indicators [list] v3

- # training within the scope of PROGRAM X
- Level of team availability to tackle PROGRAM X themes
- Level of Top Management involvement
- # people allocated to PROGRAM X
- # internal participants
- # external participants
- mentorship
- # office hours (mentors)
- Talent retention
- # new partners established
- Level of engagement and motivation of teams with Grow
- awareness regarding PROGRAM X activities
- Budget allocated to PROGRAM X
- Value allocated to each phase of the pilots ( scouting , pilot, award, ...)
- Value allocated to ecosystem events
- Return on investment (ROI) for pilots
- # discussions about the possible application of the identified solutions to other businesses
- # scouting initiatives
- # startups contacted
- # participation in Ecosystem events
- # pilots
- # contracts with products/services
- # transversal solutions
- Customer experience with products/services
- PROGRAM X Reputation
- Recognition of the Group as a relevant player in the Ecosystem



## Collected indicators [list] v4

- Employees dedicated to PROGRAM X
- Employees involved in PROGRAM X initiatives
- Employees with access to training within the scope of PROGRAM X
- Employees with effective mentorship experience
- Level of team availability to tackle PROGRAM X themes
- Level of top management involvement
- Level of engagement and motivation of operational teams with PROGRAM X
- Awareness of employees regarding PROGRAM X activities
- External stakeholders involved in PROGRAM X initiatives ( e.g. Advisory Board)
- Hours of mentoring provided ( mentorship + office hours )
- Global budget allocated to PROGRAM X
- Values allocated to each of the pilot phases ( scouting , pilot, award, ...)
- Pilot ROI
- Value allocated to ecosystem events
- PROGRAM X's contribution to the development of new companies ( e.g. pilot financing)
- Solutions that responded to platform challenges/gaps
- Discussions about the transversality of the identified solutions
- Solutions transversal to other Group platforms
- Group presence at ecosystem events
- Scouting
- Startups analyzed
- Startups contacted
- Pilots accomplished
- Contracts with startups
- Customer experience in relation to the contracted products/services
- Established partners ( players )
- PROGRAM X Reputation
- Recognition of the Group as a relevant player in the Ecosystem

## Collected indicators [list] v5

- # Group employees involved in training ( e.g. Mentor/ Investor Training Academy )
- # PROGRAM X's participation in initiatives ( e.g. GITR)
- Value attributed to sponsorship of initiatives ( ex : #LIS18)
- # established partnerships ( ex : Cisco)
- PROGRAM X Reputation
- Recognition of the Group (PROGRAM X) as a relevant player
- # of mentors with effective mentorship experience
- # hours of mentoring provided ( office hours + mentorship )
- Value attributed to supporting pilots
- Customer experience in relation to the contracted products/services
- # employees involved in the pilot process
- # solutions that responded to the Group's challenges/gaps
- # meetings with startups
- # tested solutions (pilots)
- # contracts made with startups
- # startups with investment after pilot with PROGRAM X
- # contributors dedicated to PROGRAM X
- # employees involved in PROGRAM X initiatives
- Awareness of employees regarding PROGRAM X activities
- Level of engagement and motivation of teams with PROGRAM X (top management and operational)
- Return on Investment (ROI)
- Total value of investments

# ***Ex. Group discussion: R&D Metrics for Ethics and AI Research Center***

*Let's break into groups of 5 and discuss* ⌚ 60 min.

**Objective:** Develop a set of actionable, specific, and measurable R&D metrics that align with the organization's mission to advance research in ethics and artificial intelligence

## **Instructions: (5 minutes)**

Create a framework of metrics that will help the organization measure the impact and effectiveness of its R&D activities in the field of ethics and AI

## **Brainstorming Metrics (15 minutes) – ROUND 1**

Briefly write the **mission & 3 strategic objectives** of the organization to ensure that we all have a clear understanding of the context. Identify **metrics** that could be used to measure the success of the organization's R&D efforts.

Please remember to various aspects such as **innovation, societal impact, engagement, and academic contribution**

## ***Outcome***

Leave the session with a clear set of defined R&D metrics that are aligned with the organization's strategic goals

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Please remember to various aspects such as **innovation, societal impact, engagement, and academic contribution**

## Brainstorming Metrics (20 minutes) – ROUND 2

Elect **3 metrics** to present to your BOARD and explain why those metrics and not others

### Suggested areas to develop metrics around include:

Innovation Rate: Number of new methodologies or frameworks developed | Impact Factor: Influence on policy changes or adoption of ethical guidelines by tech companies | Engagement Metrics: Level of collaboration with academic institutions, tech companies, and other nonprofits | Publication Metrics: Number and quality of research papers published | Outreach Effectiveness: Reach and engagement of workshops, seminars, or webinars conducted

## Group Presentation (20 minutes)

Please explain why they chose these metrics and how they align with the organization's goals.

## Outcome

Leave the session with a clear set of defined R&D metrics that are aligned with the organization's strategic goals

# Key Takeaways

- ✓ Align metrics and incentives with innovation activity
- ✓ Define a clear innovation dashboard to gain credibility and transparency
- ✓ When defining metrics... simplicity is the ultimate sophistication

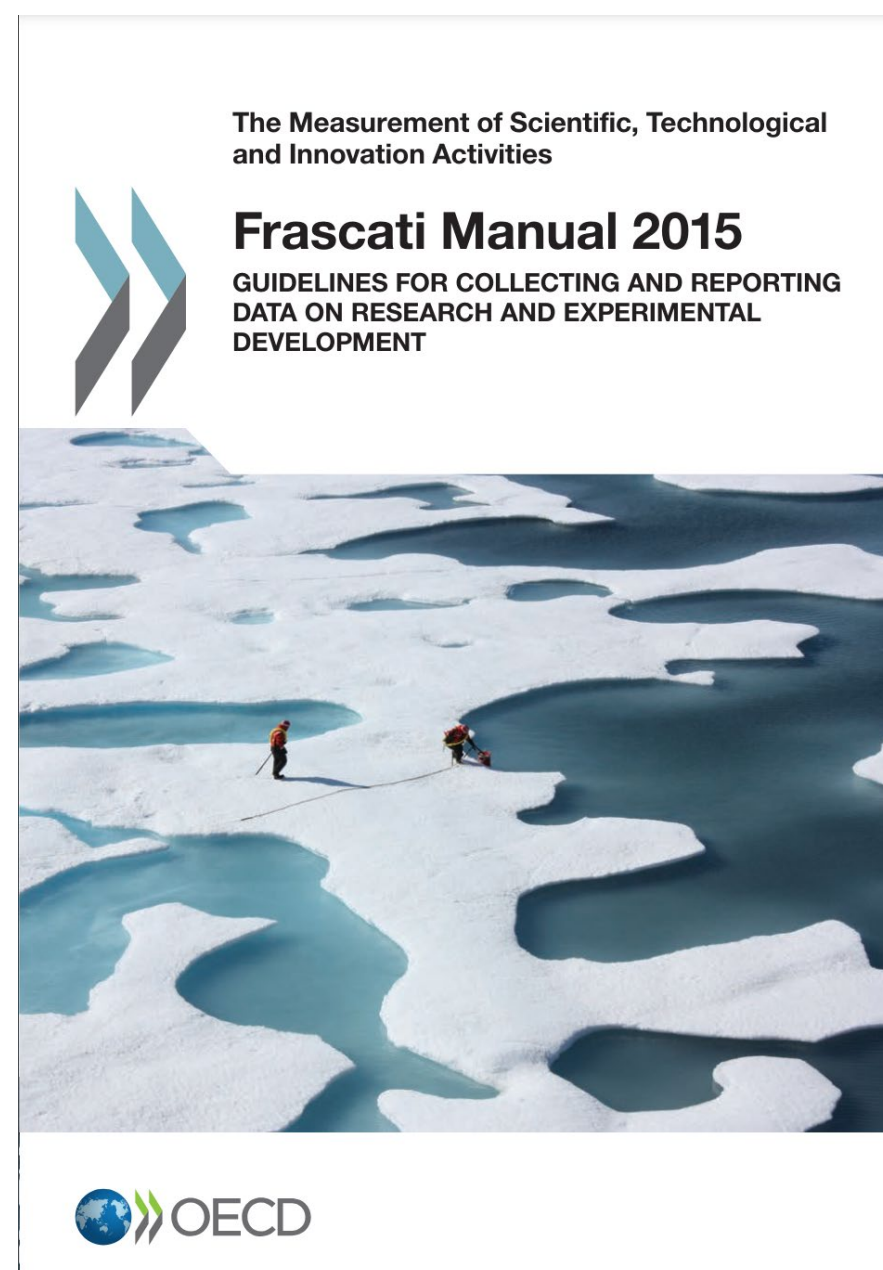
☞ Let's innovate in other topics beyond metrics...

*H. Edison et al in 2013, "The Journal of Systems & Software" identified 232 metrics on Innovation Management...*



# Highly Curated Reading List

Because you can't read everything all at once



<https://www.oecd.org/innovation/frascati-manual-2015-9789264239012-en.htm>

McKinsey  
& Company

Strategy & Corporate Finance Practice

## Building an R&D strategy for modern times

The age of the insular R&D organization is over. To serve as a company's innovation engine, R&D strategy needs to be equipped for today's fast-moving world.

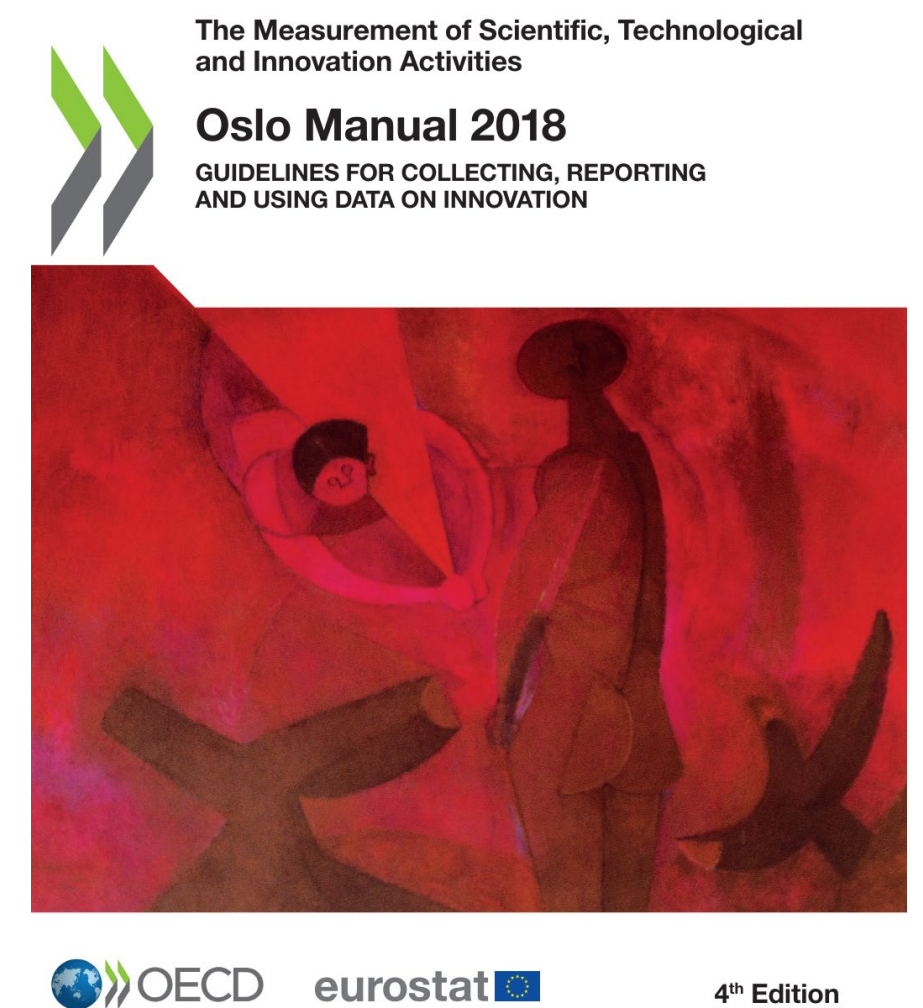
by Tom Brennan, Philipp Ernst, Josh Katz, and Erik Roth



<https://www.mckinsey.com/capabilities/strategy-and-corporate-finance/our-insights/building-an-r-and-d-strategy-for-modern-times>



<https://mackinstitute.wharton.upenn.edu/wp-content/uploads/2020/11/Metrics-for-Managing-Innovation-White-Paper.pdf>



<https://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm>