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VALUE CREATION WHEEL: **A META FRAMEWORK FOR INNOVATION, DECISION-MAKING AND PROBLEM SOLVING**

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RECENT CASES ON FARMING AND AGRICULTURE SERVICES,
EARTH OBSERVATION AND SPACE BUSINESS

POWERED BY VCW



Horizon2020
European Union Funding
for Research & Innovation

Edited by
**Luis Filipe Lages, Álvaro Dias
and Carlos Reis-Marques**

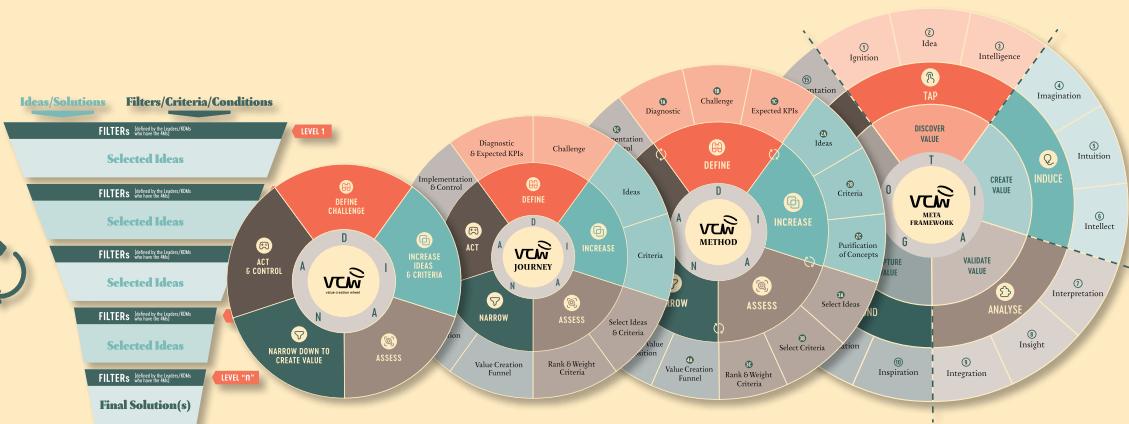
2nd Edition



NEXTLAND
GROW YOUR GAINS

How to innovate, make decisions and solve challenges using the Value Creation Wheel?

Degree of challenge complexity, customization, and co-creation sophistication
 Requirement of human resources, budget, time and motivation (4Ms- manpower, minute, money, motivation)



2-3 hours

VCW FUNNEL:
 “Workshops to break the ice and initially address the challenge”

4-7 hours

VCW SPRINT:
 “Workshops for simple challenges”

1 - 2 days

VCW JOURNEY:
 “Workshops for moderate challenges”

3 days – 5 months

VCW METHOD:
 “Courses, Workshops, Consulting, Complex projects”

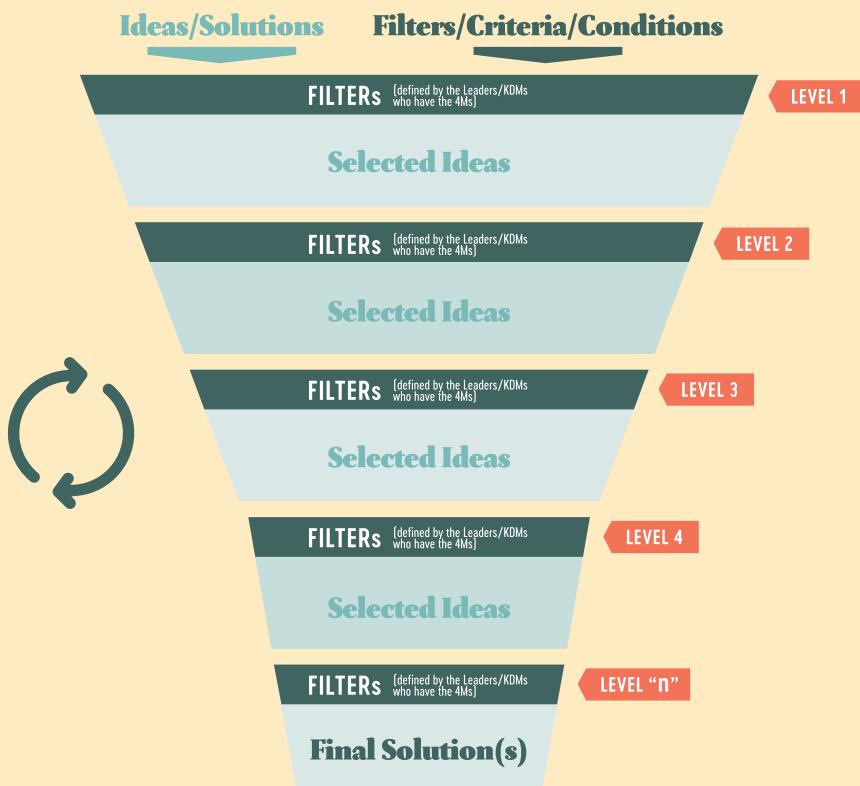
6 months - 4 years

VCW META FRAMEWORK:
 “EC Horizon projects, Innovation Ecosystems, Consulting, Workshops”

VCW Funnel

The Value Creation Wheel Funnel (VCW Funnel) is a powerful tool that breaks the ice and empowers the co-creation team. It aligns them toward a common goal and solution for a specific problem, fostering a sense of engagement and motivation.

The VCW Funnel is not only effective but also efficient in addressing challenges, even with limited resources. Its cyclical and iterative approach ensures that the final solution developed within a very short period is robust, innovative, and aligned with the organization's strategic goals, providing reassurance about its effectiveness.



What is the Value Creation Funnel?

The Value Creation Wheel Funnel (VCW Funnel) is a strategic tool to help organizations solve simple problems, innovate, and create value.

Its main purposes are:

1. Problem-Solving

The VCW Funnel helps address simple organizational problems. Analyzing small and manageable problems facilitates the development and analysis of alternative solutions.

2. Innovation

The VCW Funnel fosters creativity and innovation by encouraging diverse perspectives, brainwriting, use of artificial intelligence, and collaborative brainstorming within a short period. It helps participants and key decision-makers to think outside the box and “without a box” and develop novel solutions that can lead to significant improvements or breakthroughs.

3. Value Creation

The VCW Funnel creates value for stakeholders, whether customers, employees, shareholders, or the community, within a short period. Aligning problem-solving and innovation efforts with value creation ensures that the outcomes are meaningful and beneficial.

4. Strategic Decision Making

The VCW Funnel aids in making informed and strategic decisions by providing a structured framework that guides the analysis and evaluation of different options and respective implementation (4Ms: Manpower, Minute, Money & Motivation).

5. Collaboration and Alignment

The VCW Funnel promotes teamwork and alignment among different organizational departments or stakeholders. Involving diverse groups ensures that various viewpoints are considered and integrated into the final solution.

6. Adaptability and Flexibility

The VCW Funnel is not just a tool. It's a versatile framework that can be adapted to different contexts and industries. Its flexibility makes it a confident choice for various strategic initiatives, instilling a sense of trust in its adaptability.

Overall, the VCW Funnel is the first step to enhance an organization's ability to systematically create value through innovation and strategic alignment.



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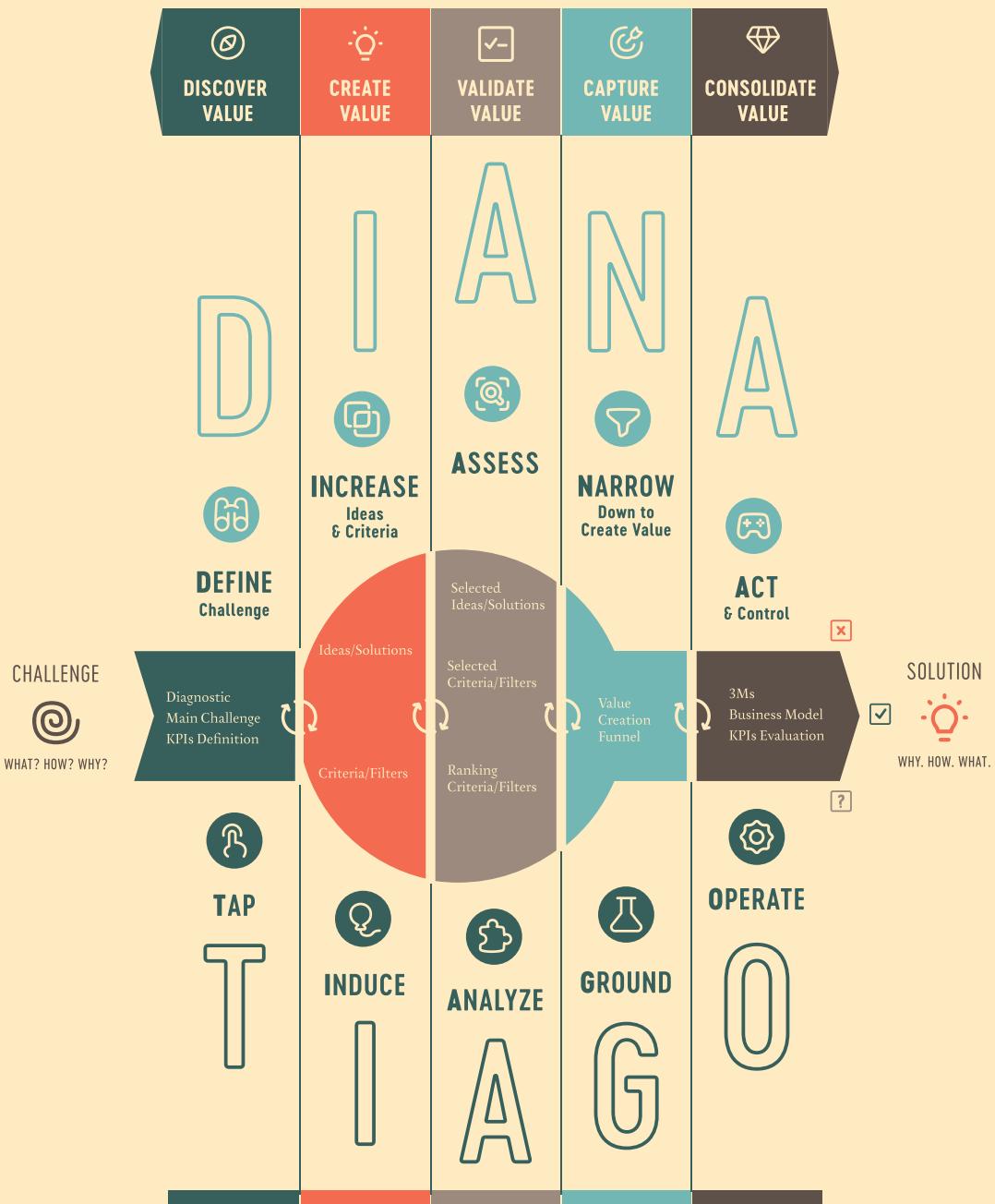
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Source: Lages, Luis Filipe (2016), "VCW—Value Creation Wheel: Innovation, technology, business, and society", *Journal of Business Research*, 69(11): pp. 4849-4855.

Introduction

THE VCW META FRAMEWORK for innovation, decision making and problem solving is the focus of this book. This book is composed by two main chapters. In the first chapter numerous tools for each one of the phases of the VCW Meta Framework are presented. In the second chapter, the VCW Meta Framework is applied to the H2020 NextLand project and will help to solve some of its challenges.

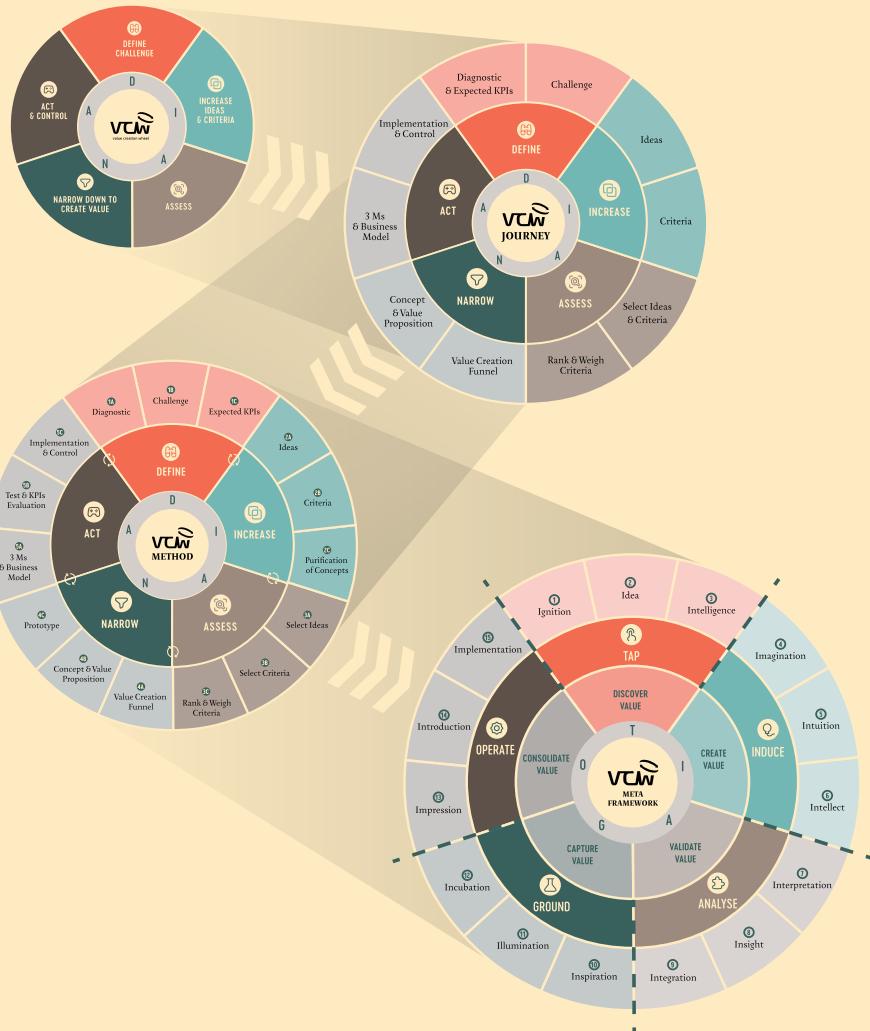
Context

THE VCW-VALUE CREATION WHEEL® includes DIANA and TIAGO frameworks (Lages 2016; www.VCW.pt). While the three DIANA frameworks (VCW Sprint, VCW Journey, VCW Method) were analyzed in a different book, the TIAGO VCW Meta Framework is the focus of this book and builds on the DIANA frameworks.

The right VCW framework to be used for innovation, decision making and problem solving, depends on a series of factors such as required resources to solve the challenge (3Ms - manpower, minutes, money), degree of complexity and customization of the problem/challenge to be solved, the tacit know-how of the team about the VCW, existing databases of ideas/solutions and criteria/filters, size of the teams, number of internal and external stakeholders engaged, know-how about the context, diversity/alignment of the teams, among others (see Lages et al. 2023). The VCW Meta Framework is the most complex approach and requires more resources. We strongly recommend starting all the VCW projects with a VCW Funnel (see pages 5, 6) and then, if necessary, moving sequentially to the VCW Sprint, VCW Journey, VCW Method, and finally, the VCW Meta Framework (see following picture)

Innovation, Decision-Making & Problem Solving

- REQUIRED RESOURCES (3MS)
- DEGREE OF COMPLEXITY & CUSTOMIZATION



Source: Lages, Luis Filipe et al. [2023], “Solutions for the commercialization challenges of Horizon Europe and Earth Observation Consortia: Co-creation, innovation, decision-making, tech-transfer, and sustainability actions”, Electronic Commerce Research.

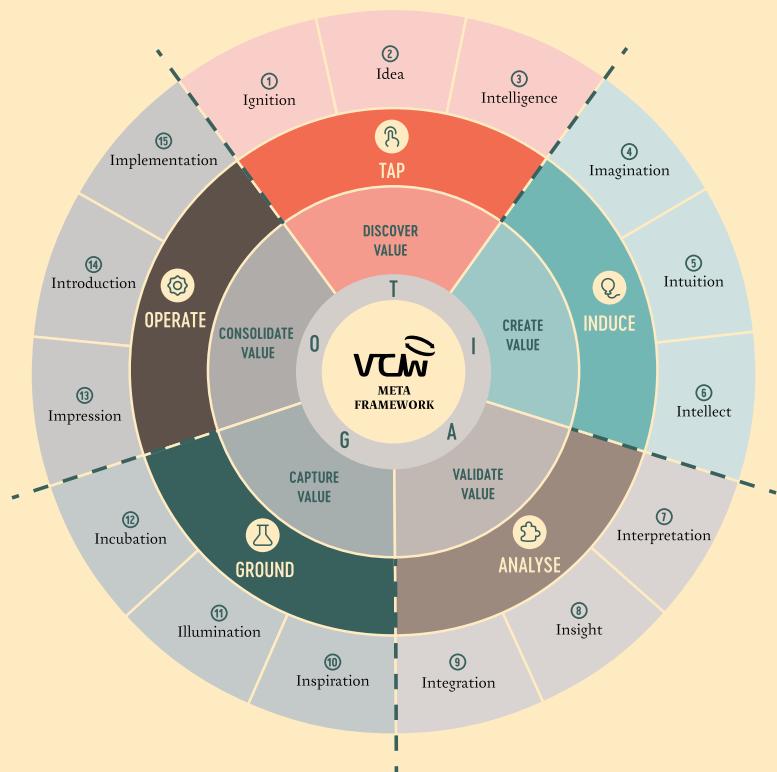
More specifically, the VCW Sprint is a fast approach to decision making. A VCW Sprint consists in the application of a very reduced number of tools from the VCW Method. It can be applied in situations which require fast solutions with very limited resources. Artificial Intelligence (A.I.) is particularly useful in these cases for generating ideas and filters. VCW Sprints are particularly recommended for experienced VCW users. The VCW Journey is a fast approach to effective and efficient decision making. A VCW Journey consists of the application of A.I. and a selected number of tools from the VCW Method. It is often applied in one or two-days workshops involving a significant degree of co-creation. The VCW Method is an effective and efficient method to support in-depth projects. It is frequently used to solve complex challenges which require the full support of Key Decision Makers while engaging the surrounding internal and external stakeholders. It provides a holistic approach to problem-solving by incorporating A.I. as well as a wide range of methods and managerial tools. It is typically applied in educational, research and consultancy projects which range from three full days to five months.

The VCW Meta Framework

THE VCW META FRAMEWORK is composed of the 15Is of Innovation. Depending on the challenge as well as the input provided by KDMs, internal and/or external stakeholders, the tools of the 15 Is of innovation should be customized to each specific case.

The VCW Meta Framework is an in-depth customized framework to support long and complex projects. It allows for the integration of established tools, methods, and theories and a wide range of information systems (i.e., the combination of software, hardware, and telecommunication networks to collect data). This Meta Framework appears as a chameleon framework, completely customized to each specific case and problem. It is capable of complementing, be integrated and/or integrating A.I., existing frameworks, models and tools across different fields.

It might be used in very long teaching programs (e.g., one-year programs integrating different courses), consultancy and research projects. The resources (e.g., 3Ms- Manpower, Minutes, and Money) for this type of projects are often quite large, involve numerous stakeholders, last some years and might have budgets of several € millions.



Sources: Lages, Luis Filipe [2016], “VCW—Value Creation Wheel: Innovation, technology, business, and society”, Journal of Business Research, 69(11): pp. 4849–4855.

Lages, Luis Filipe et al. [2023], “Solutions for the commercialization challenges of Horizon Europe and Earth Observation Consortia: Co-creation, innovation, decision-making, tech-transfer, and sustainability actions”, Electronic Commerce Research, 23: pp. 1621–1663.

THE VCW META FRAMEWORK AND THE 15iS OF INNOVATION

CHAPTER 1

By Luis Filipe Lages and Álvaro Dias

THIS CHAPTER PROPOSES a toolbox for the VCW Meta Framework. It presents possible tools that might be used in each one of the different 15Is of Innovation.

The VCW Meta framework has five phases and each one of these phases is composed by 3Is of Innovation.

- 1.** Discover Value (Tap) – Performing a diagnostic, identifying the challenge/problem, and establishing KPIs. 3Is: Ignition, Idea, Intelligence
- 2.** Create Value (Induce): Generation of ideas/solutions and criteria/filters to solve the challenge. 3Is: Imagination, Intuition, Intellect
- 3.** Validate Value (Analyze): Selection and ranking of ideas/solutions and criteria/filters. 3Is: Interpretation, Insight, Integration
- 4.** Capture Value (Ground): The selected ideas go through a funnel of ranked filters until finding the final solution(s), which will then be conceptualized and/or prototyped. 3Is: Inspiration, Illumination, Incubation
- 5.** Consolidate Value (Operate): The 3Ms and business model is validated, the final solution(s) are implemented, KPIs and execution is monitored. 3Is: Impression, Introduction, Implementation

While some tools presented in this Chapter take several days/weeks to execute, others can be done in just a few minutes (e.g., A.I. tools). The selection of tools depends on several factors such as the available resources, complexity of the challenge to be solved and personnel skills.

The authors provide a wide range of tools for each VCW phase. However, VCW users are encouraged to select the most adequate tools for each specific case and apply the presented tools only in cases where they provide added value to solve the problem at hand.

Discover Value-Tap

A. Ignition

A1 Perceptual mapping

What is it?

A perceptual map is a visual technique used to capture consumers' perceptions and understandings in a diagram. A perceptual map allows an understanding of how consumers differentiate between brands in their minds and what their perspectives and feelings are in relation to several brands or products.

The main idea is to make comparisons of attributes that are important to customers.

Objectives

- To understand a brand or product's competitive positioning
- To make comparisons of attributes important to customers
- To identify strengths and weaknesses in our (and competitors') products
- To build a marketing strategy

How does it work?

1. Conduct qualitative and/or quantitative market research to customers and potential customers. Identify the attributes important to customers and their perception of product performance, brand image, packaging, price, etc.
2. Plot one or more (better) perceptual maps combining different attributes on graph axes.



Complementary reading

- Fox, R. J. [1988]. Perceptual mapping using the basic structure matrix decomposition. *Journal of the Academy of Marketing Science*, 16[1], 47-59.
- Grundström, C. [2015]. Perceptual mapping. Wiley Encyclopedia of Management, 1-2.
- Teas, R. K., & Grapentine, T. H. [2004]. Testing market positioning themes: a perceptual mapping approach. *Journal of Marketing Communications*, 10[4], 267-288.

A2 4 corners (competitive future strategy)

What is it?

4 corners is a predictive tool for analyzing competitors' future actions and objectives by assessing their strategic environment using four dimensions: drivers, management assumptions, strategy, and capabilities.

Considering the model on the next page, the left part concerns the competitors' motivations. It's the starting point to analyze the competitors' future strategy. The motivations are divided into (i) **drivers** - their objectives (or perceived objectives), organizational culture and structure, and type of leadership give some insights about future actions. For example, if the competitor is entering the market, one should expect actions that differ from those of an established market leader. (ii) **management** assumptions or perceptions. This includes understanding the way competitors' management teams perceive their organizations' internal and external situations and will influence its strategic decisions.

The right part of the model is related to competitors' actions. These are divided into (i) **current strategy** - a company is more likely to adopt strategies and actions that yielded better results in the past. As such, it is important to collect information about their past strategies and respective results. (ii) **capabilities**. Competitors' actions depend on the bundle of capabilities they possess, which determines the ability to respond to competitors' actions and changes in environmental forces.

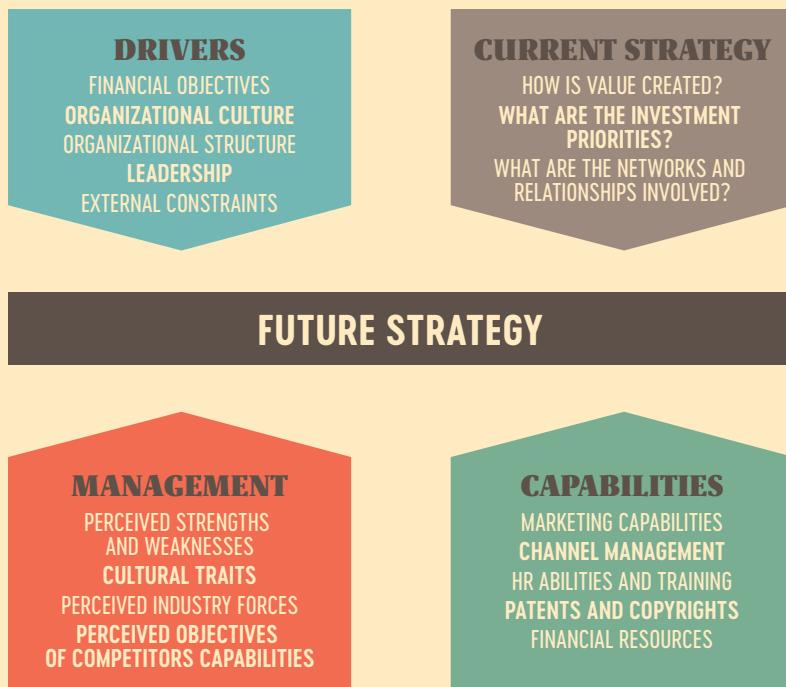
Objectives

- To think through the competitor's mind
- To predict future moves of the competitor
- To evaluate future scenarios

How does it work?

1. Identify which competitors should be considered.
2. Collect information from several sources (formal and informal) to use in the analysis:
 - Past actions of the competitors and their results;
 - Main customers;
 - Management team profile;

- Capabilities and core competencies: operational, innovation, HR, marketing, etc.
 - Strategies and objectives
3. Analyze the information collected to predict the competitor's future strategy and incorporate it into your own strategy.



Complementary reading

- Mohapatra, S. (2012). IT and Porter's competitive forces model and strategies. In Information Systems Theory (pp. 265-281). Springer, New York, NY.
- Porter, M. (1979). E.(1979). How competitive forces shape strategy. Harvard Business Review, 57(2), 137-145.

A3 Questioning assumptions

What is it?

Often we just accept things, ideas, or solutions as they are. In other words, the assumptions are taken for granted. We don't question them. The VCW is a very open minded tool based on questioning the status quo. This tool helps the team to focus on the overlooked dimensions and challenge the assumptions to develop new approaches to the problem.

Objectives

- To promote disruptive idea generation
- To look at the 'big picture' and understand the real problems
- To overcome stuck situations

How does it work?

1. State clearly the product or the problem to be solved.
2. The team brainstorm a list of all the related assumptions. Point to at least 10 assumptions.
3. Question each assumption. Some of them are really true.
4. Write down the modification of each assumption.
5. Use them to generate new ideas or solutions.

‘UNQUESTIONABLE’ ASSUMPTIONS



A milk carton is always a liter!



It's impossible to produce this product more rapidly!



A carton of eggs must have 6 or 12 eggs!

Complementary reading

Lohnes, S., & Kinzer, C. [2007]. Questioning assumptions about students' expectations for technology in college classrooms. *Innovate: Journal of Online Education*, 3[5].

Paul, R., & Elder, L. [2007]. Critical thinking: The art of Socratic questioning. *Journal of Developmental Education*, 31[1], 36.

A4 5C

What is it?

This is a technique used to conduct situation analysis by focusing on 5 Cs: Company, Collaborators, Customers, Competitors, and Climate. The technique incorporates the micro and the macro-environmental and the internal situation.

Objectives

- To identify all relevant internal and external factors that affect the current and future situation
- To evaluate the risk exposure to the environmental factors
- To improve awareness of the company's external and internal situation

How does it work?

To carry out the 5C analysis it will be important to develop research to understand the business, industry, and market in considerable depth. To do this it is important to contact the ecosystem and get a range of perspectives from business partners, customers, and the team. Market studies and assessment of competitors are essential.

COMPANY - analysis of the internal situation of the firm/organization: Goals and Objectives; Positioning; Performance; Product line; and Culture, to identify strengths and weaknesses

CUSTOMERS - analysis of market size and segments; customer satisfaction; customer wants and needs; buying patterns; preferred retail channels

COMPETITORS - Analysis of actual and prospective competing organizations, competitors' strengths, weaknesses, and prediction of their future initiatives

COLLABORATORS - external stakeholders such as agencies, suppliers, distributors, alliances, and partners

CLIMATE / CONTEXT - Analysis macro-environmental factors. (see PESTEL)

Complementary reading

Winer, R. S. (2008). *Analysis for marketing planning*. Tata McGraw-Hill Education.

A5 Army design methodology

What is it?

Army design methodology (ADM) includes the use of proficiency, imagination, creativity, and intuition to plan and conduct the projection and use of forces in series of interconnected operations over time and space to achieve the desired goal and end state.

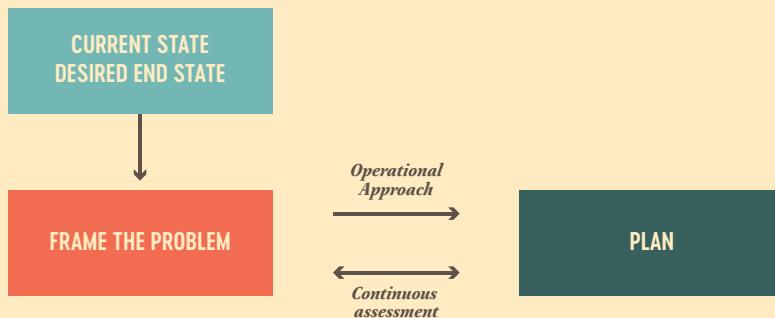
ADM is part of the integrated planning process. It must inform and be informed by the detailed planning component. This is part of recognizing that problems must be understood and resolved at the conceptual level (through ADM) and then detailed.

Objectives

- To approach operational problems from multiple perspectives
- To develop a holistic understanding of the problem
- To promote a continuous reflection and reframing of the problem

How does it work?

1. Establish the team, which must include an expert in the issues to be addressed and possess creative and investigative thinking skills;
2. Create an open minded context with enough room for new ideas;
3. Assign roles among participants;
4. Define and provide the resources needed for the session (maps, whiteboards....);
5. Establish goals and outputs;
6. Conduct the session using, for example, the questions:
 - What's happening in the environment?
 - What is the desired end state?
 - What difficulties prevent us from reaching the desired end state?



Complementary reading

Graves, T., & Stanley, B. E. [2013]. Design and operational art: A practical approach to teaching the army design methodology. *Military Review*, 93(4), 53.

Grome, A., Crandall, B., Rasmussen, L., & Wolters, H. [2012]. *Army Design Methodology: Commander's Resource* [No. ARI-RP-2012-01]. U.S. Army Research Institute for the Behavioral and Social Sciences, Arlington, VA.

B. Idea

B1 5 Why

What is it?

It's a very simple tool. By asking 'why' five times (or more) it's possible to explore in depth the root of a problem or a challenge, going beyond the obvious. By going deep into the causes of the problem, 5 Why helps you to explore actions more effectively in order to solve the problem.

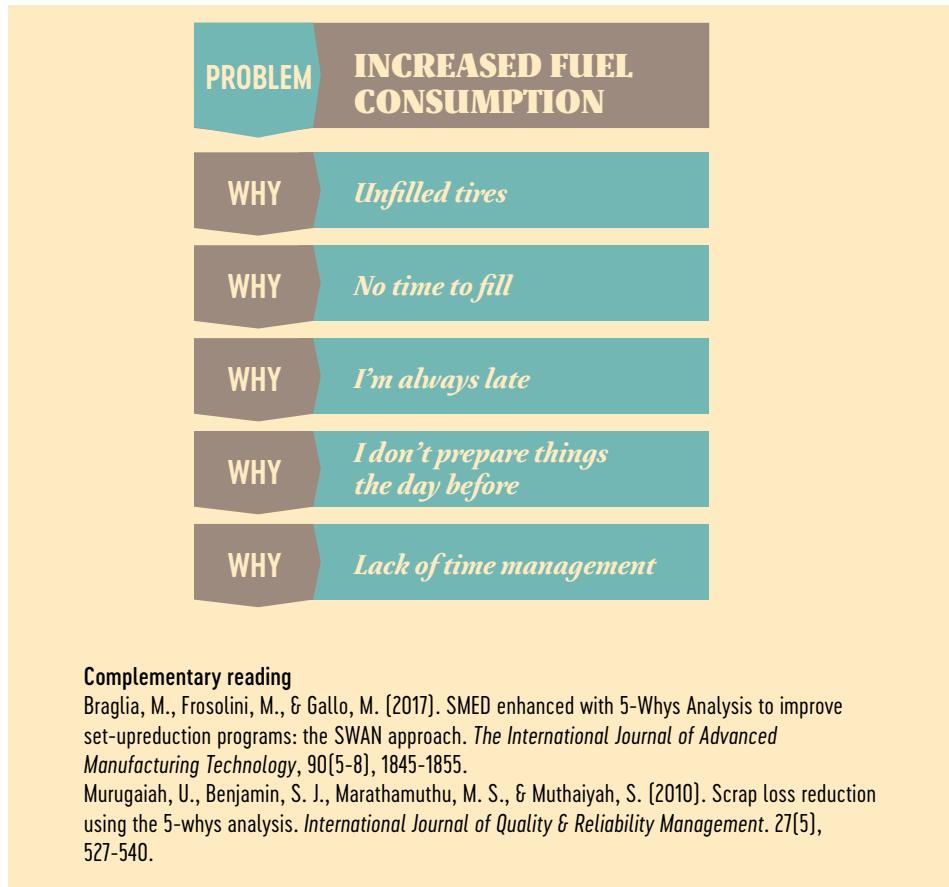
Objectives

- To get to the root of the problem/challenge
- To reach a broader vision of the problem, increasing the ability to comprehend the problem and taking more sustained decisions

How does it work?

1. Bring together a group of people (around 10) giving preference to elements that bring a variety of perspectives;
2. Define clearly the problem or challenge (for example, it can be a threat or an opportunity?);
3. Run the first round of ‘why’.
4. Record the ideas generated in a visible place to all the participants – they are the basis for the next step.
5. Run the second round of ‘why’, and so on, until the group runs out of ideas.

Highlight: *Why not 6 why?*



Complementary reading

Braglia, M., Frosolini, M., & Gallo, M. [2017]. SMED enhanced with 5-Whys Analysis to improve set-upreduction programs: the SWAN approach. *The International Journal of Advanced Manufacturing Technology*, 90[5-8], 1845-1855.

Murugaiah, U., Benjamin, S. J., Marathamuthu, M. S., & Muthaiyah, S. [2010]. Scrap loss reduction using the 5-whys analysis. *International Journal of Quality & Reliability Management*. 27[5], 527-540.

B2 3M

What is it?

3M is a mnemonic for the three key core resources, Manpower, Money, and Minutes. 3M is a simple tool to analyze the feasibility or define the resources needed for a project or strategy.

MANPOWER corresponds to men and women, quantity, expertise, and capabilities in relation to a specific challenge or task.

MONEY means the financial dimension or budgeting.

MINUTES represents time allocation, schedules, and deadlines.

Objectives

- To rapidly evaluate the resources needed for a specific project or action
- To use a quick filter for decision making

How does it work?

3M can be used in a number of different ways. See the next page for some frequent uses of 3M.

USES OF 3M

1 As a marketing auditing tool

2 To identify the internal resources required

3 As a resource planner

Complementary reading

Smith, P. R. (2003). *Great answers to tough marketing questions*. Kogan Page Publishers.

B3 KPI definition

What is it?

A Key Performance Indicator (KPI) is a quantifiable measure used by organizations to evaluate how effectively a company is performing.

KPIs should act as a performance measurement allowing the monitoring of progress toward the intended objectives or results.

KPIs are almost infinite as they can be tailored to specific firms, departments, or activities. They can be applied to the overall performance of the organization, but they can also be more concrete topics like employee, processes, inputs, outputs, or projects.

Objectives

- To evaluate organizational success at reaching business objectives
- To improve communication, as they promote concrete actions
- To stay focused on strategic and operational improvement
- To track the progress toward the targeted results
- To compare performance (with past performance, within departments or individuals, between competitors)

How does it work?

The main topic in defining a KPI is its value for organizational performance measurement. Sometimes industry KPIs can be very useful (allowing to compare), but in some organizations, they don't always reflect the business essence. To avoid this common error, KPIs must be defined collectively, starting from analyzing organizational objectives and strategies to reach them. That's the reason they are the 'key' link to the main objectives.

A second step is to evaluate who is responsible for reaching the outcomes and how to measure their progress. Then define short and long-term KPIs. Finally, review the alignment with the strategy.

HERE ARE SOME RULES:

- As the objectives, KPIs must be well-defined and quantifiable (or SMART)
- KPIs must serve as a communication mechanism through the organization.

- KPIs must contribute to improving decision making
- KPIs must be crucial to monitor objectively the progress toward intended results
- KPIs must be linked to core business and strategic objectives
- Quality is better than quantity. Use the minimum number of KPIs possible. Focus on the ‘key’ ones
- KPIs must allow comparing several dimensions: time, competitors, employees, etc.

Examples of KPI

- | | |
|--|--|
| <ul style="list-style-type: none"> • Turnover • Profit • Customer Satisfaction • Product time-to-market • Sales By Region/client/ product | <ul style="list-style-type: none"> • Customer Lifetime Value (CLV) • Employee Turnover Rate • Employee Satisfaction • Churn Rate • EBITDA |
|--|--|

Complementary reading

Marr, B. [2012]. *Key Performance Indicators (KPI): The 75 measures every manager needs to know*. Pearson UK.

Parmenter, D. [2015]. *Key performance indicators: developing, implementing, and using winning KPIs*. John Wiley & Sons.

B4 Cause-effect diagram (or Ishikawa diagram)

What is it?

The diagram is a problem-solving tool used to identify possible causes of an effect or problem. Also called a fishbone diagram, the diagram considers that the head is the effect or problem and the spines are the root causes or categories. Once the causes of the problem are identified, possible solutions become easier to identify.

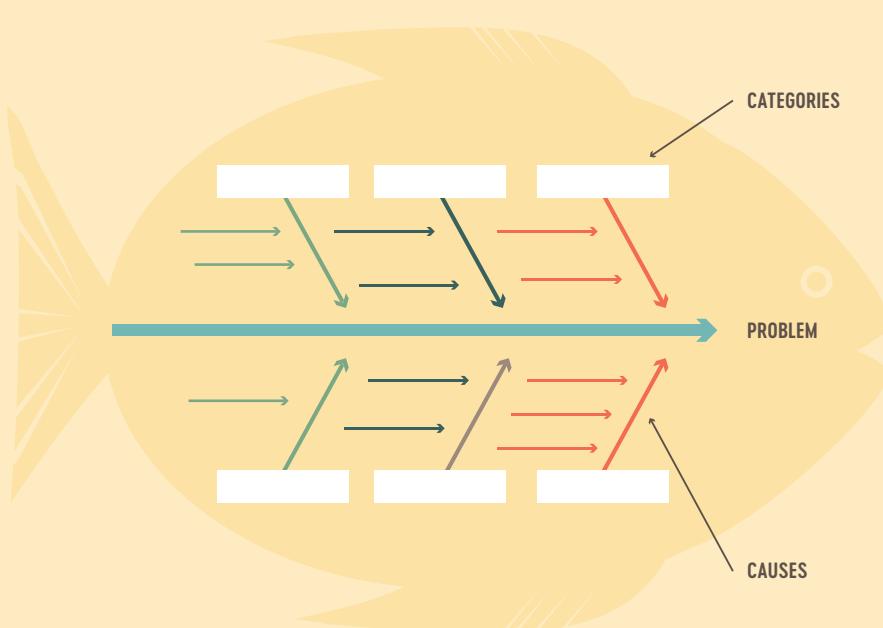
It can also be used in new product development to identify market problems.

Objectives

- To solve problems or challenges keeping the team focused on the causes rather than the symptoms
- To develop new products
- To identify and prevent quality problems

How does it work?

1. Make sure that you have space for a discussion and a whiteboard.
2. Clearly state the problem to be solved.
3. Brainstorm possible causes and write them down on sticky notes (combination with the 5 why will be helpful).
4. Use multi-voting technique to identify the root causes or categories and the linked causes. Usually the root causes are: Machines, Methods, Materials, Measurement, Environment, and Personnel.



Complementary reading

Doshi, J. A., Kamdar, J. D., Jani, S. Y., & Chaudhary, S. J. [2012]. Root Cause Analysis using Ishikawa diagram for reducing radiator rejection. *International Journal of Engineering Research and Applications*, 2[6], 684-689.
 Ishikawa, K. [1982]. Guide to quality control [No. TS156. I3713 1994.]

C. Intelligence

C1 SWOT

What is it?

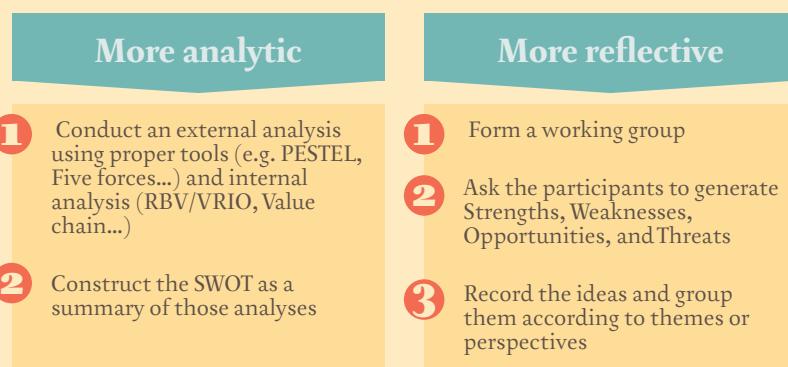
SWOT stands for Strengths, Weaknesses, Opportunities, and Threats. It's a table summarizing the result of external and internal analysis. The idea is to register Opportunities and Threats resulting from external analysis and Strengths and Weaknesses resulting from the internal analysis.

Objectives

- To illustrate in a single place the 'big picture' representing the firm or organization situation and its external context
- To allow the group a rapid and uniform visualization of the situation
- To facilitate strategic reflection and option generation

How does it work?

Among others, two main possibilities can be considered.



Complementary reading

- Humphrey, A. (2005). SWOT analysis for management consulting. *SRI alumni Newsletter*, 1, 7-8.
- Pickton, D. W., & Wright, S. (1998). What's swot in strategic analysis? *Strategic change*, 7(2), 101-109.
- Valentin, E. K. (2001). SWOT analysis from a resource-based view. *Journal of marketing theory and practice*, 9(2), 54-69.

C2 Systemic SWOT / TOWS

What is it?

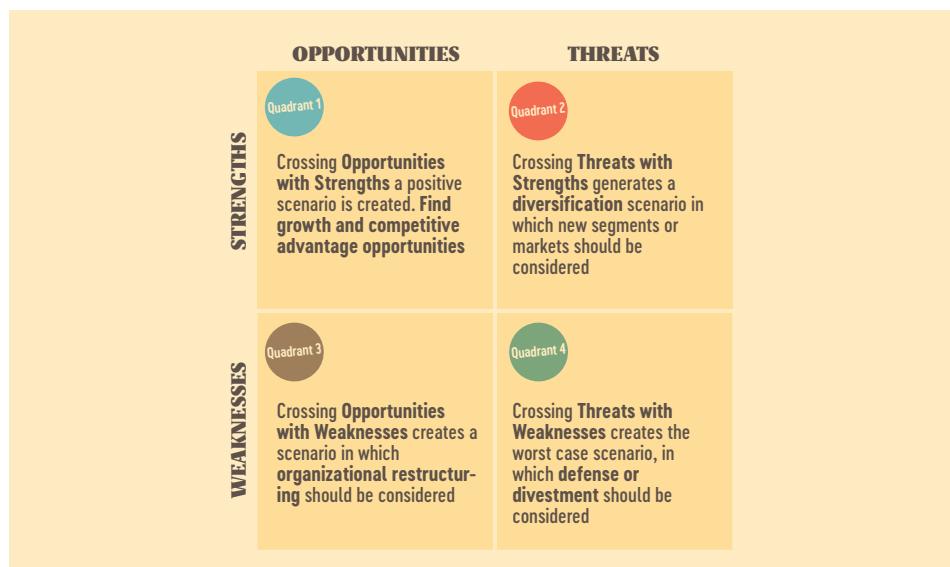
It's a complement to 'regular' SWOT. Considering SWOT as a matrix, several scenarios can be created crossing the external with the internal dimensions. As such, a diagnosis of each quadrant allows better guidance for the main concerns related to the present and future situation of the firm/organization.

Objectives

- To simplify SWOT based on scenarios
- To identify the major concerns and generate strategic options

How does it work?

1. To conduct a systemic SWOT, a 'regular' SWOT must first be prepared.
2. Form a group.
3. Design SWOT as a matrix.
4. Simplify SWOT evaluating in each quadrant what the major concerns are.
5. Detail those scenarios.
6. Generate strategic options to respond to the challenges identified in each quadrant.



Complementary reading

- Ravanavar, G. M., & Charantimath, P. M. [2012]. Strategic formulation using tows matrix—A Case Study. *International Journal of Research and Development*, 1[1], 87-90.
- Weihrich, H. [1982]. The TOWS matrix—A tool for situational analysis. Long range planning, 15[2], 54-66.

C3 PESTEL**What is it?**

It's a tool which provides a systematic approach to evaluate the external present and future environment in which the firm and its industry operate. It's not market research. It's an analysis of the external forces that can influence the strategic landscape positively or negatively.

The acronym stands for Political, Economic, Sociocultural, Technological, Environmental, and Legal.

Objectives

- To create the panoramic picture about the environment they operate in (or intend to in the near future)
- To identify actual and future constraints to the development of the industry and/or the firm
- To be aware of the main scenarios

How does it work?

1. Form a group to evaluate each of the PESTEL components.
2. Substantiate and write down the main factors that influence or may influence the future of the sector.
3. Avoid recording opinions like 'I think ...' and collect evidence to substantiate each fact.
4. It is intended to give a panoramic picture. So it's not about details, it's about the big picture, the main concerns (not necessarily negative).

POLITICAL

What are the political intentions of the government in relation to the industry?
 What other political aspects can affect the industry?

-

-

...

ECONOMIC

What are the main economic tendencies and how can they affect the industry?

-

-

...

SOCIOCULTURAL

What are the social and cultural trends? What consequences on the industry can be identified?

-

-

...

TECHNOLOGICAL

Which technological innovations are considered disruptive? How do they affect the industry?

-

-

...

ENVIRONMENTAL

Are consumers, local authorities, and other players demanding more environmentally friendly products or services?

-

-

...

LEGAL

What are the main expected changes in the legislation that can affect the industry?

-

-

...

Complementary reading

- Richardson, J. (2012). A Brief Intellectual History of the STEPE Model or Framework [ie, the Social, Technical, Economic, Political, and Ecological]. Retrieved from <http://polaris.gseis.ucla.edu/jrichardson/STEPE.htm>.
- Walden, J. (2011). Comparison of the STEEPLE Strategy Methodology and the Department of Defense's PMESII-PT Methodology. *Haettu*, 10, 2019.

C4 VRIO

What is it?

It's a tool based on the Resource-Based View (RBV) theory. It permits analyzing internal organizational resources, capabilities, and core competencies by evaluating their strategic importance.

According to J. B. Barney, in order to obtain superior and sustainable competitive advantage, a firm's resources, capabilities, and core competencies should be cumulatively: Valuable (contribution to business performance), Rare (available to only a limited number of firms/organizations), Inimitable (imitation by competitors is costly), and Organized to capture value (the ability of the organization to reach the potential of its VRIO resources, capabilities, and competencies – one thing is the ownership, another is competitive advantage money with them).

So, if the resources, capabilities, and competencies are not even valuable, the organization has a competitive disadvantage. If they are valuable but are not rare, the organization is in a situation of competitive parity. If they are valuable and rare, but not inimitable or organized, the competitive advantage is only temporary.

Objectives:

- To analyze internal organizational resources, capabilities, and core competencies by evaluating their strategic importance
- To determine the source of sustainable competitive advantage
- To conduct more strategically focused decisions

How does it work?

1. List all the internal organizational resources, capabilities, and core competencies (see the table on the next page for examples);
2. Evaluate or quantify each according to each of the VRIO criteria;
3. Identify which are the most important;
4. Find out how your firm is organized to explore and exploit the resources and capabilities.

	DEFINITION	EXAMPLES
RESOURCES	<ul style="list-style-type: none"> Tangible and intangible assets 	<ul style="list-style-type: none"> Physical (Equipment, location) Financial (capital, borrowing capacity) Technological (Software, database) Human (Knowledge, trust) Organizational (Systems, routines) Reputational (Brand, reputation with clients/suppliers) Innovation (Ideas, scientific capabilities)
CAPABILITIES	<ul style="list-style-type: none"> The capacity to deploy a combination of resources to achieve the desired end state Are developed and honed over time 	<ul style="list-style-type: none"> HR motivation Effective customer service Effective distribution Envisioning leadership Product quality
CORE COMPETENCIES	<ul style="list-style-type: none"> Resources and capabilities that contribute to surpassing rivals 	<ul style="list-style-type: none"> Depends on each competitive set

Complementary reading

Barney, J. B., & Hesterly, W. S. [2010]. VRIO framework. *Strategic management and competitive advantage*, 68-86.
 Lin, Y., & Wu, L. Y. [2014]. Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of business research*, 67(3), 407-413.

C5 Value chain

What is it?

A value chain is a tool that allows analyzing the contribution to the value of internal organizational activities. Developed by M. E. Porter, the value chain permits identifying which activities contribute to achieving more value and, consequently a source of competitive advantage. This means that the activities performed by organizations don't contribute in the same amount to value, and in fact, some don't contribute at all. As such, the decision maker's attention

should be focused on the most valuable. A weakness in these activities leads to a competitive disadvantage.

Furthermore, the value chain also permits identifying patterns linking two or more activities that orchestrate the creation of more value. In other words, it is possible that some activities reinforce themselves, creating vectors that are the source of competitive advantage.

Objectives:

- To analyze the contribution to the value of internal organizational activities
- To determine the situation of the most valuable activities
- To identify patterns linking two or more activities that orchestrate the creation of more value

How does it work?

1. Consider the nine generic activities presented in the figure;
2. State what the customer ‘value’ in your activity is. For example, it can be price, quality, fast service, customer relationship, etc.;
3. Evaluate the contribution of each activity to customer value;
4. Analyze the most valuable activities, searching for strengths and weaknesses;
5. Identify possible links between activities;
6. Develop strategies to increase customer value.



Complementary reading

Porter, M. E. (2001). The value chain and competitive advantage. *Understanding Business Processes*, 50-66.

Porter, M. E. (2008). *On competition*. Harvard Business Press.

C6 Five forces

What is it?

It's a tool for conducting a line-of-business industry analysis with the final purpose of determining the intensity of the competition and the attractiveness of a specific industry in terms of profitability.

Another instrument proposed by M.E. Porter incorporating five dimensions (or forces): industry rivalry, buyer power, supplier power, the threat of new entrants, and threat of substitute products.

As part of the firm environment, these forces drive the ability to serve clients and make a profit. As such, this tool is important to monitor firms' environment. Any change in this landscape requires re-assessing each force and determining their impact and strategic response.

Objectives

- To conduct a line-of-business industry/micro-environmental analysis
- To determine the intensity of the competition
- To evaluate the industry profitability level

How does it work?

1. Specify which line-of-business is to perform the analysis
2. Consider the table on next page
3. Collect data, statistics and, other information that allows forming a judgment about the strength of each force and how they affect the industry rivalry and profitability.

Sample topics to consider in each force

	DEFINITION
INDUSTRY RIVALRY	<ul style="list-style-type: none"> • High number of competitors • Market slow growth rate (or negative) • Low competitors/product differentiation • High exit barriers ...

	DEFINITION
BUYER POWER	<ul style="list-style-type: none"> • Few buyers • Price sensitive • Low switching costs • Customers buying in large quantities ...
SUPPLIER POWER	<ul style="list-style-type: none"> • Few suppliers • Large suppliers • High switching costs • Customers buying in low quantities ...
THREAT OF NEW ENTRANTS (entry barriers)	<ul style="list-style-type: none"> • Existence of weak scale economies • Competitors/product low differentiation • Regulations do not limit entrance • Low level of investment
THREAT OF SUBSTITUTE PRODUCTS	<ul style="list-style-type: none"> • Buyers can easily find substitutes • Low switching costs between substitutes ...

Complementary reading

Porter, M. E. [1980]. *Competitive Strategy: Techniques for Analyzing Industries and Competitors.* Boston: Harvard Business Publishing

Porter, M. E. [1983]. *Cases in competitive strategy.* Simon and Schuster.

C7 Wargaming

What is it?

Wargaming exercises are an important tool to train military officers. More recently, war games have been adapted to assist business strategy and decision making. The group is divided into several teams that compete among each other to deal with business environmental changes, to develop new products, or to launch new ideas and solutions to solve problems. The main idea is to develop strategies and solutions through a simulated market, with teams

responding to the actions of their ‘competitors’ and to market conditions that can be changed to predict and analyze strategic responses. It’s also especially useful for detecting firm or product weaknesses.

The exercises can be done during meetings or team building activities or can be performed over the internet. Depending on the complexity of the ‘war’ topic, wargaming can last a few hours or several days and should be moderated by a facilitator.

Objectives

- To simulate several years of market changes and competitor actions
- To evaluate the sustainability of new products
- To predict the competitors’ responses
- To test strategic plans

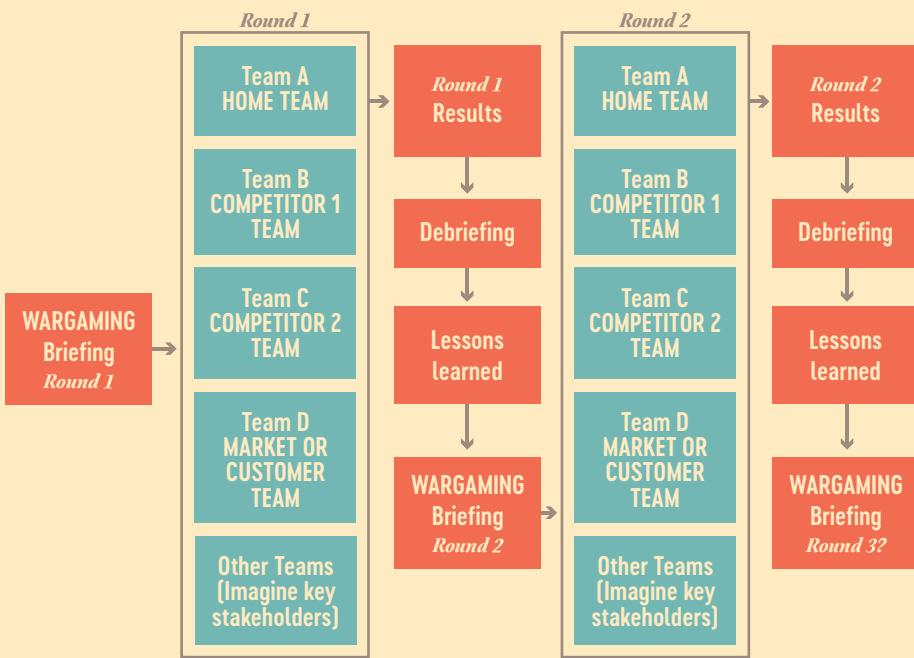
How does it work?

Before the session

1. Assign a group to participate and define a period of time for wargaming (prepare for several days)
2. Divide the group into homogenous teams and assign roles (see figure)
3. Prepare and communicate a briefing with relevant information about the context and each team role and capabilities

During the session

4. Define the facilitator. This must be a person familiarized with this tool.
5. Assure that each team acts as supposed. For example, the team assigned to be competitor A must act according to its culture and capabilities, not with home firm culture.
6. Round 1. Each team generates actions and strategies. For example, they launch new products, eliminate an existing product, enter new markets or segments, develop aggressive marketing campaigns, etc.
7. Make a debriefing analyzing the results obtained.
8. Conduct subsequent rounds until the objectives of wargaming are attained.



Complementary reading

- Oriesek, D. F., & Schwarz, J. O. (2008). *Business wargaming: securing corporate value*. Gower Publishing, Ltd.
 Schwarz, J. O. (2009). Business wargaming: developing foresight within a strategic simulation. *Technology Analysis & Strategic Management*, 21(3), 291-305.

Create Value-Induce

A. Imagination

A1 Brainstorming

What is it?

It's a simple but structured group idea generation tool. The main goal is to generate aggregate spontaneous ideas – as many as possible. Brainstorming is especially useful for thinking out of the box. This tool might become even more effective and efficient if supported by A.I.

Objectives

- To generate the maximum number of ideas to solve problems
- To promote generalized participation without discussion
- To avoid a situation in which the ‘talkers’ dominate the option generation and to allow ‘active listeners’ to participate equally

How does it work?

1. Form a group (about 8 to 12 persons) and define clearly the problem or topic in discussion.
2. Elect a facilitator who will ensure that the brainstorming rules are applied.
3. The participants take turns presenting one idea at a time. Each participant should have the same opportunity as the others to present her/his ideas.
4. If a participant is out of ideas, he/she can pass.
5. Record the ideas in a table or other visual means.
6. Allow a sufficient number of rounds for all participants to run out of ideas.
7. Discuss the ideas at the end (and only now) grouping in topics, eliminating the redundant or inadequate ones.

BRAINSTORMING RULES

1. Avoid criticism during idea brainstorm, otherwise it will become a discussion
2. All participate equally.
3. Generate ideas freely. All ideas are welcome. Don't think about constraints or costs. Go beyond obvious. Fly.
4. There are no winners. It's not a competition.
5. During idea discussion avoid personalization. The group is discussing ideas, not judging persons.

Complementary reading

- Dugosh, K. L., Paulus, P. B., Roland, E. J., & Yang, H. C. (2000). Cognitive stimulation in brainstorming. *Journal of Personality and Social Psychology*, 79(5), 722.
- Furnham, A. (2000). The brainstorming myth. *Business Strategy Review*, 11(4), 21-28.
- Rawlinson, J. G. (2017). *Creative thinking and brainstorming*. Routledge.

A2 Brainwriting

What is it?

It's a version of brainstorming whereby a group of people record solutions in writing to solve a problem, develop a project, or improve an existing situation. Sometimes brainstorming presents limitations to achievement that can range from the fear of exposure of some of the participants to the delay associated with the process of generating one idea at a time. Brainwriting allows for more speed in the process.

Objectives

- To generate the maximum number of ideas to solve problems;
- To accelerate the brainstorming process;
- To assure the participation of timid people or in organizational cultures in which people are afraid to express divergent ideas.

How does it work?

1. Introduce the method and the problem;
2. Spread out a sheet of paper for each person;
3. Specify the brainwriting times: the first round is five minutes, subsequent ones are three minutes. This means that after each round the participants pass the paper to the left/right colleague for inspiration.
4. Collect the brainwriting pages and post them for discussion.

The challenge to overcome is:

or The problem to solve is:

	IDEA 1	IDEA 2	IDEA 3
PERSON 1			
PERSON 2			
PERSON 3			
PERSON 4			

Complementary reading

Heslin, P. A. (2009). Better than brainstorming? Potential contextual boundary conditions to brainwriting for idea generation in organizations. *Journal of Occupational and Organizational Psychology*, 82(1), 129-145.

VanGundy, A. B. (1984). Brain writing for new product ideas: an alternative to brainstorming. *Journal of Consumer Marketing*, 1(2), 67-74.

A3 3-6-5

What is it?

Instead of verbalizing ideas through a brainstorming process, the same principles can be applied by writing down the ideas to a particular problem or idea. The acronym refers to 3 ideas, 6 participants, 5 minutes. In its essence, it's similar to brainstorming, but in a written form, eventually allowing a more objective session. This tool might become even more effective and efficient if supported by A.I.

Objectives

- To generate the maximum number of ideas on paper
- To reduce criticism or debate on reflection sessions

How does it work?

1. Form a group of six persons (can be more). Each one should have a paper and a pen.
2. Choose a facilitator. He or she can also participate in the idea generation but has also to control the time (5 minutes for each round).
3. State clearly what the problem or challenge is.
4. Start the first round. It is expected that each participant writes three or more ideas on the paper, in 5 minutes.
5. At the end of the round, it is expected that the papers rotate clockwise among the participants. After each participant reads the ideas from the preceding participant start a new round of 5 minutes, and so on until all the ideas are recorded.

INITIAL PROBLEM:

ROUND 1.

Idea 1: _____
 Idea 2: _____
 Idea 3: _____
 Idea ...: _____

ROUND 3.

Idea 1: _____
 Idea 2: _____
 Idea 3: _____
 Idea ...: _____

ROUND 2.

Idea 1: _____
 Idea 2: _____
 Idea 3: _____
 Idea ...: _____

ROUND ...

Idea 1: _____
 Idea 2: _____
 Idea 3: _____
 Idea ...: _____

Complementary reading

- Murman, C. (2015). Brainwriting: The Team Hack to Generating Better Ideas. Agile Alliance.
 Rohrbach, Bernd (1969). *Kreativ nach Regeln – Methode 635, eine neue Technik zum Lösen von Problemen. Absatzwirtschaft*, 12, 73–75
 Rundi, A. (2016). Brainwriting 6–3–5. In *The Innovation Tools Handbook, Volume 2* [pp. 67-72]. Productivity Press.

A4 Gap filling

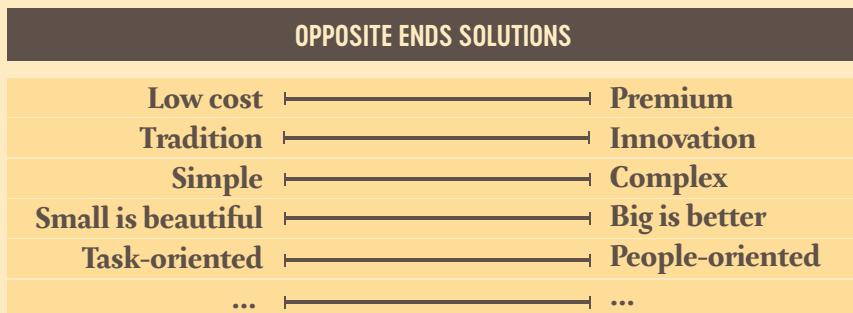
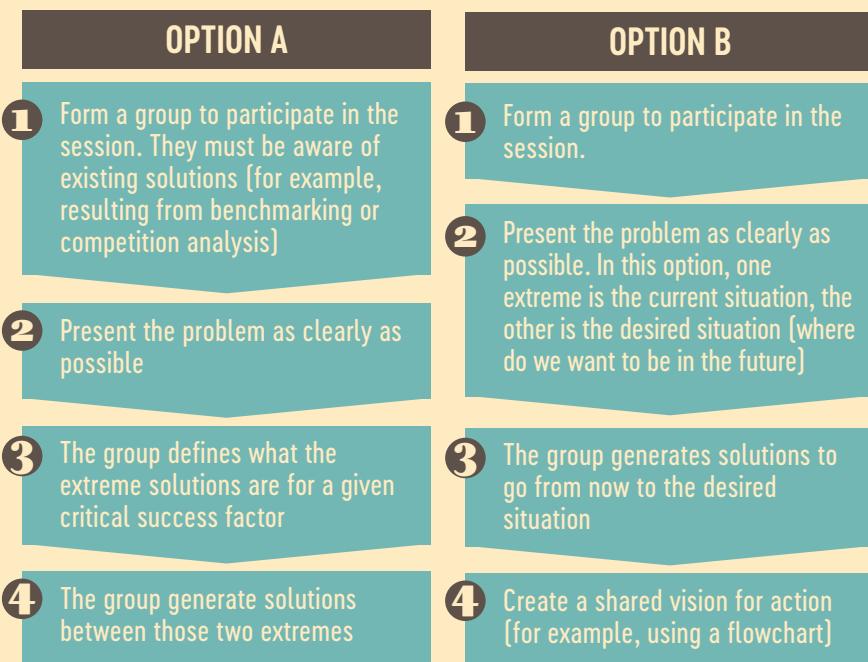
What is it?

It's a tool to generate ideas/solutions when existing solutions are at opposite ends. The reflection is related to finding solutions in the middle, filling the gap. This tool might become even more effective and efficient if supported by A.I.

Objectives

- To generate ideas based on polarized existing solutions
- To focus idea generation on existing solutions

How does it work?



Complementary reading

<https://www.bcg.com/publications/2013/innovation-growth-proven-idea-generation-practices.aspx>

A5 Wishing

What is it?

Wishing is an interesting tool to think outside the box by legitimizing idea generation that otherwise might be considered to be unsuitable.

The basic idea is that wishing for things may take the creativity to a different level, involving fantasy and going beyond what is practical and feasible.

Objectives

- To think outside the box
- To stimulate people to generate ideas that could compromise their image/career
- To diverge from traditional thinking

How does it work?

It's very simple. Combine with another tool (e.g. brainstorming) and ask participants to generate ideas or solutions starting the sentence using "I wish" (to accelerate writing use IW) or 'Wouldn't it be nice if' (to accelerate writing use WIBNI).

Participants should think as children, as if playing a game.

I wish	Wouldn't it be nice if
IW it worked faster.	WIBNI there were no sugar added.
IW this product were healthier.	WIBNI it were free.
IW...	WIBNI...
IW...	WIBNI...

Complementary reading

<http://creatingminds.org/tools/wishing.htm>

<https://www.cleverism.com/18-best-idea-generation-techniques/>

B. Intuition

B1 Crowdsourcing

What is it?

It's a practice of engaging an open and large group or a 'crowd' to solve a problem or to innovate. It is usually an online based tool, giving it the opportunity to reach people with the right skills and expertise. It can be used for funding, information, or other content.

Objectives

- To quickly obtain funding, information, or other content
- To leverage the knowledge base to solve problems, by involving customers and other stakeholders
- To simultaneously promote the company
- To enable a process of co-creation

How does it work?

1. Identify the issue to address: a problem, a project, a product.
2. Choose the connection point on the web (see the next page).
3. Define what kind of compensation to provide to participants: money, products, information, transparency, etc.
4. Prepare the online link and control the responses until sufficient (or insufficient) goal accomplishment.

USEFUL PLATFORMS FOR CROWDSOURCING

PLATFORMS	CAN BE USED AS
 WIKIPEDIA	Crowdsourcing for content
 KICKSTARTER	Crowdsourcing for creativity or new products using crowdfunding
 MECHANICAL TURK	Crowdsourcing marketplace linking individuals and businesses to outsourcing processes.
 FIVERR	Another crowdsourcing marketplace
 CLOUDFLARE	Micro jobs site

Additional commentary: There is a control risk since the participants are not employees.

Complementary reading

Muhdi, L., Daiber, M., Friesike, S., & Boutellier, R. (2011). The crowdsourcing process: an intermediary mediated idea generation approach in the early phase of innovation. *International Journal of Entrepreneurship and Innovation Management*, 14(4), 315-332.

Sun, L., Xiang, W., Chen, S., & Yang, Z. (2015). Collaborative sketching in crowdsourcing design: a new method for idea generation. *International Journal of Technology and Design Education*, 25(3), 409-427.

B2 25/10

What is it?

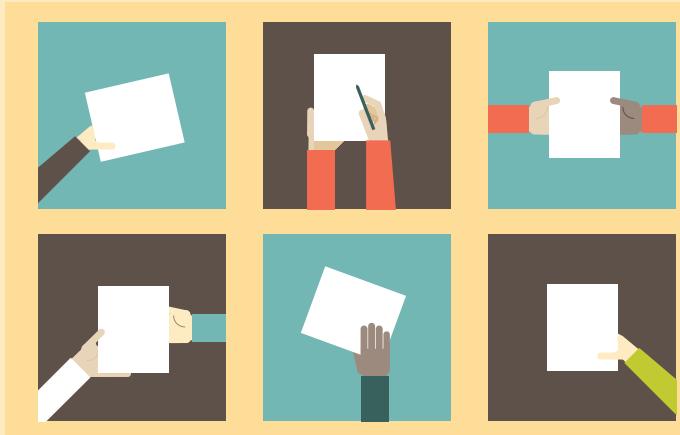
It's an activity that promotes the rapid generation of innovative ideas in less than 30 minutes. The activity also allows selecting the best ideas.

Objectives

- To innovate in large groups
- To rapidly reach consensus about the best ideas
- To innovate informally and have fun

How does it work?

1. Select an open space and invite the participation of the persons envisaged.
2. Distribute a paper card and a marker to each participant.
3. State the problem and ask participants to write it down.
4. Ask the participants to write their solution or idea on the card.
5. Ask the participants to change the cards among them. Make sure all the participants have one card.
6. The participants should read the received card and score from 1 to 5 the idea (they should write the number on the back of the card).
7. Allow four more rounds of each and score.
8. Ask the participants to add the five scores and rate from 25 to 5 the ideas.



Complementary reading

<http://www.liberatingstructures.com/12-2510-crowd-sourcing/>

B3 Networking

What is it?

Organizations can amplify their knowledge and idea base by simply networking with customers, suppliers, competitors, or other stakeholder firms. Meeting with people formally or informally allows sharing past successes and mistakes. Generally, many heads think better than one - this is not an absolute truth, but usually works.

So, networking permits collective thinking and idea sharing. Furthermore, we are already part of some networks.

Objectives

- To amplify the basis of idea generation outside the organization
- To promote divergent creativity
- To identify new opportunities and insights

How does it work?

There are two main options:

1. Generate ideas using an ‘organic’ network, which means establishing contact with your/ the team’s existing network of contacts: colleagues, friends, relatives, and so on. It can be expanded using a snowball effect, by contacting a friend of a friend.
2. Using more formal approaches. There are many companies, APPs, and websites offering meetings, conferences, workshops, group discussions, business breakfasts, etc.

IDEAS TO BRING DIVERSITY TO YOUR NETWORK IDEA GENERATION SESSION

Think about bringing different people with different backgrounds to an idea generation session. Here are some examples.

- Age (why not children or adolescents?)
- Gender
- Hierarchy within firms
- Perspective of the world
- Way of life
- Talent
- Knowledge about the topic

...

B4 Mind mapping

What is it?

It's a tool to draw a diagram to take notes and map ideas. The drawing is built around a central topic.

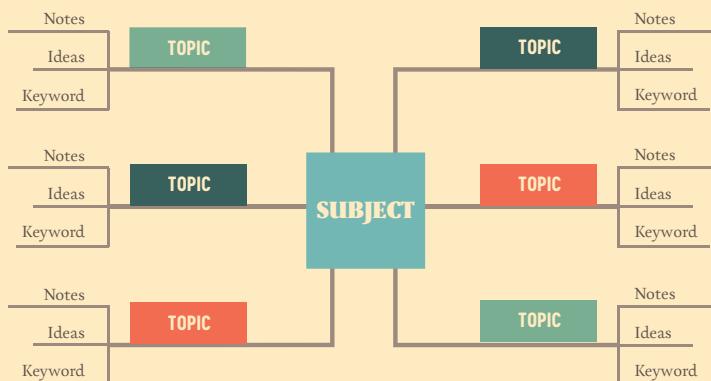
Objectives

- To structure idea generation
- To develop ideas starting from a specific problem
- To take notes during meetings

How does it work?

There is a great deal of software for this purpose. To do it by hand, think of a tree and follow these steps:

1. Create a central image: the problem or idea. This is the trunk of the tree.
2. Then, the main branches (words, concepts, ideas) represent the main themes emerging from the central image.
3. Radiating from the main branches, the twigs represent sub-topics.
4. And so on. The branches and twigs are connected through a nodal structure.



Complementary reading

Buzan, T. [2006]. *Mind mapping*. Pearson Education.

Davies, M. [2011]. Concept mapping, mind mapping and argument mapping: what are the differences and do they matter?. *Higher Education*, 62(3), 279-301.

Mento, A. J., Martinelli, P., & Jones, R. M. [1999]. Mind mapping in executive education: applications and outcomes. *Journal of Management Development*. 18(4), 390-416.

B5 Create hybrids

What is it?

It's a tool to create new options by combining parts of existing solutions and find several matches that generate new solutions. This tool might become even more effective and efficient if supported by A.I.

Objectives

- To generate alternative viable solutions
- To create a different tool to generate ideas/solutions focusing on existing solutions

How does it work?

1. Form a group to participate in the session. They must be aware of alternative solutions (for example, resulting from benchmarking or competition analysis)
2. Present the problem as clearly as possible
3. The group divides existing solutions into two or more parts
4. The group combines the parts forming new solutions
5. The group analyzes the new solutions, selecting the viable

Part A	+	Part B	=	
Part A	+	Part C	=	
Part B	+	Part C	=	
Part B	+	Part D	=	

C. Intellect

C1 Delphi

What is it?

It's a forecasting method based on the results of multiple rounds in which a group of experts is asked to anonymously answer a questionnaire. It's a multi-round method, meaning that after each round feedback is provided to participants. Then the process is repeated until consensus is reached. For this reason, it is also known as 'interactive survey'. The questionnaires sent anonymously to a panel of experts (known as 'panellists') are selected with special attention to their expertise on a topic.

The model was developed by Rand Co.

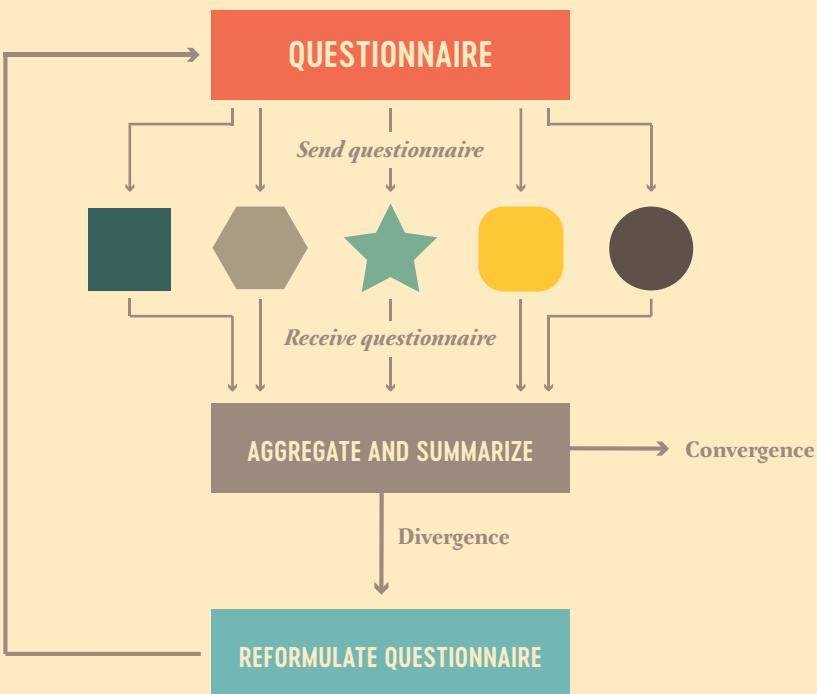
The feedback is based on the experts' responses, which are aggregated and then shared with the group after each round.

Objectives

- To reach consensus on complex topics
- To explore the diversity of opinions on a topic
- To explore business and market tendencies
- To explore new forms of dialog/communication in organizations where other forms are lacking or blocked

How does it work

1. The first step is to elect a facilitator familiar with the method.
2. With the help of other organizational members the facilitator selects a group of experts on the topic
3. Ask for participants' confirmation. Ensure anonymity.
4. Prepare the question or questions and send them to experts for a first round.
5. Obtain the responses and prepare feedback by aggregating and summarizing the information.
6. Send this report as a basis for a second round. By doing so, experts are encouraged to revise their earlier responses.
7. Repeat steps 5 and 6 one or more times. It is expected that the responses will converge into consensus.



Complementary reading

Gordon, T. J. (1994). The delphi method. *Futures Research Methodology*, 2(3), 1-30.

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The delphi method* (pp. 3-12). Reading, MA: Addison-Wesley.

C2 Lag-user method

What is it?

The term Lag-User refers to the last group of users to adopt a product or a service. This tool recognizes them as a source of new ideas to develop innovative products and services. This tool might become even more effective and efficient if supported by A.I.

Objectives

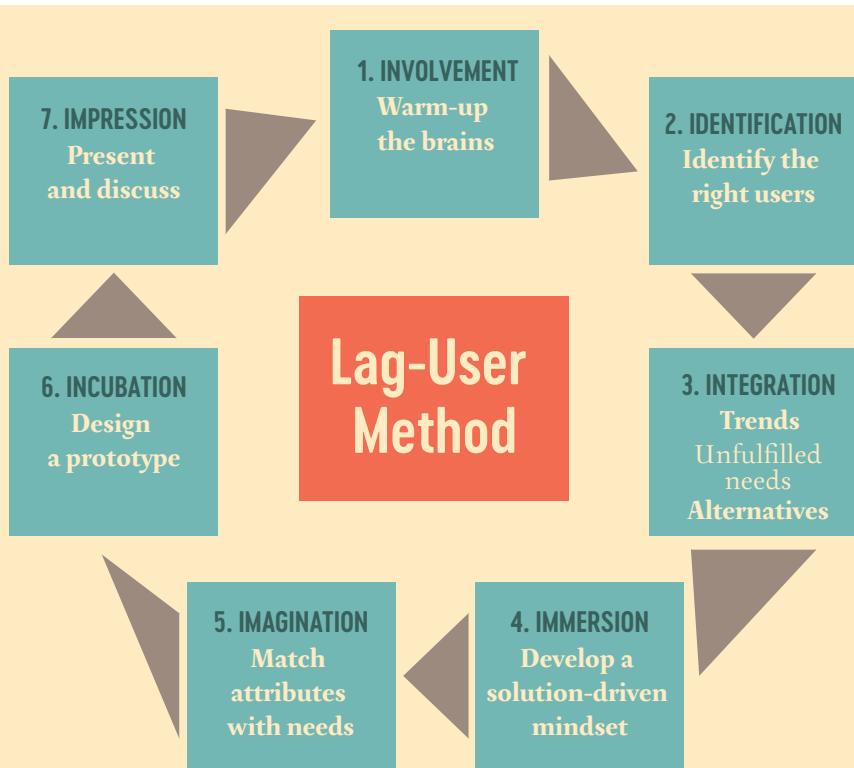
- To generate new ideas from a different mindset
- To play the devil's advocate
- To involve customers who are resistant to innovations in idea generation and new product development

How does it work?

This method follows seven steps:

- 1.** Involvement (warm up the brains). Ask the group to think about an object that they use on a regular basis and identify its problems. Then come up with solutions to solve each problem.
- 2.** Identification. Working individually, each participant should identify goods or services for which they consider themselves to be innovators, majority, or laggards.
- 3.** Integration (Group activity). During this step participants are informed which product or service they will be working on for this project. They are expected to develop a description about three units of analysis: market, product, and themselves as consumers.
- 4.** Immersion (Group activity). Here participants are encouraged to develop a solution-driven mindset. They are asked to focus on top common and recurring needs and/or problems of their product/service and then identify at least one opportunity for each problem and identify one or more hurdles to seizing that opportunity.
- 5.** Imagination (Group activity). In this step, participants start to design their dream product/service. They are asked to determine how general ideas could be applied to create solutions.

6. Incubation (Group activity). In this stage, while creating solutions, participants identify three inputs: need, expected form and shape, and finally, the technology or service used to create the solution.
7. Impression. In the final step, participants present their prototypes, discuss takeaways from the project, and share lessons learned with other participants.



Source: Jahanmir, S. F., & Lages, L. F. (2015). The lag-user method: Using laggards as a source of innovative ideas. *Journal of Engineering and Technology Management*, 37, 65-77.

C3 Firm DNA

What is it?

The DNA is the essence of the firm. The DNA represents what the firm stands for and gives a sense of purpose for collaborators and stakeholders. It's the firm's identity and source of idiosyncrasy. It can be a classic perspective, using Mission, Vision, and Corporate Values as a framework. Or it can be a DNA statement summarizing what the firm's point of view is (not the points of difference).

Objectives

- To establish a pattern for decision making
- To align decision with firm point of view

How does it work?

The DNA metaphor can be defined according to several perspectives. An important issue is that the DNA should be as short as possible. Long paragraphs do not motivate anyone. Furthermore, people don't acknowledge the message.

A short and memorable sentence is key. Remember that this is strategy at its highest level of abstraction. On the next page, there are three options guiding DNA formulation.

Classic	Storytelling	Pure DNA
<p>Mission statement - The ultimate goal of the organization</p> <p>Vision statement - A picture with two futures: the organization's future and the market future</p> <p>Core values - The main principles guiding the organization</p>	<p>Using storytelling for transmitting the DNA helps to increase emotional links to collaborators, customers, and other stakeholders.</p> <p>It allows a better understanding of the DNA.</p>	<p>Compose a sentence that represents the firm's identity, point of view, and collective focus</p>

Complementary reading

- Govindarajan, V., & Trimble, C. [2005]. Organizational DNA for strategic innovation. *California Management Review*, 47(3), 47-76.
- Neilson, G., Pasternack, B. A., & Mendes, D. [2004]. The 7 types of organizational DNA. *Strategy+ Business*, [35], 95-103.

C4 Sensemaking (Cynefin framework)

What is it?

The word Cynefin comes from the Welsh language referring to the context in which we live and which we do not always understand. This model was developed by Dave Snowden and Mary Boone to contextualize decision making in different situations. It assumes that decision making is not always done in the same way and in the same context. As such, Cynefin is based on the prevailing context in each environment, through the nature of the relationship between cause and effect of the events that occur there. The four different types of context identified are shown on the next page.

The contexts ‘simple’, ‘complicated’, ‘complex’, and ‘chaotic’ consider that the decision-makers diagnose the situation and act in contextually appropriate ways. The disorder context applies when it is undetermined which of the other four contexts prevails.

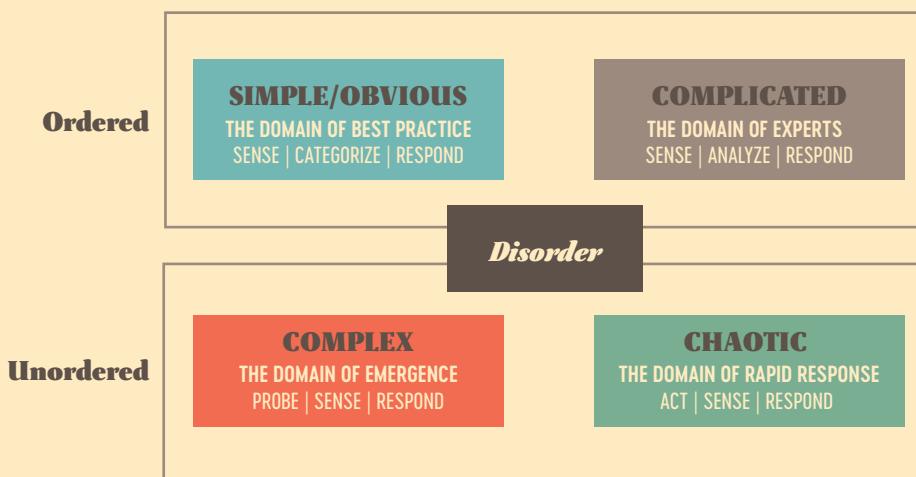
Objectives

- To make sense of complex problems
- To improve decision-making
- To help managers sense which context operates

How does it work?

Due to its complexity, this framework is difficult to use. However, we suggest the following steps:

1. Identify the problem to be solved
2. Detect the type of context the problem is embedded in
3. Follow the guidelines suggested by the model



Complementary reading

McLeod, J., & Childs, S. [2013]. The Cynefin framework: A tool for analyzing qualitative data in information science? *Library & Information Science Research*, 35(4), 299-309.

Snowden, D. J., & Boone, M. E. [2007]. A leader's framework for decision making. *Harvard Business Review*, 85(11), 68.

Validate Value-Analyze

A. Interpretation (idea selection)

A1 Morphological analysis (design parameter combination)

What is it?

It's a structured tool that helps to discover new relationships or combinations to create value and develop new products.

By considering the parameters of the product, service, or idea it's possible to create a table in which the parameters are column headings and the cells below are different variations that can be combined to form new solutions.

Objectives

- To explore new and different ideas
- To focus participants toward a specific path
- To analyze the limits of the conditions and explore new solutions and contexts

How does it work?

1. Define the product, service, or idea parameters (perhaps using brainstorming): they can be parts, qualities, or design elements
2. Create a table in which the parameters are column headings
3. In the cells below identify possible values for each parameter (possibly unconventional values)
4. Use the table as a matrix to generate new parameter combinations

The proposed matrix is to help group discussion. This tool is also used in a more advanced context, using computers to combine.

ABOUT THE DISPOSABLE KITCHENWARE...

Parameter 1 [e.g. cost]	Parameter 2 [e.g. material]	Parameter 3 [use]
Premium	Paper	Single use
...	Plastic	
...	Wood	
Low cost	Bamboo	Frequent/Washable

Complementary reading

- Geum, Y., Jeon, H., & Lee, H. [2016]. Developing new smart services using integrated morphological analysis: integration of the market-pull and technology-push approach. *Service Business*, 10(3), 531-555.
- Storbacka, K., & Nenonen, S. [2012]. Competitive arena mapping: Market innovation using morphological analysis in business markets. *Journal of Business-to-Business Marketing*, 19(3), 183-215.

A2 Leadership styles

What is it?

Leadership style can be understood as a strategic option rather than a function of personality. Furthermore, by adopting appropriate leadership styles, managers can improve trust, engagement, and strong teams, and consequently boost business results. In other words, instead of adopting leadership styles according to their character, managers must excel in the ability to adapt from several styles depending on the context and select the most suitable at each moment.

Goleman (2000) suggests that successful leaders are skilled in emotional intelligence consisting of five fundamental capabilities:

- Self-awareness
- Self-regulation
- Motivation
- Empathy
- Social skill

Goleman's leadership styles are:

- Coercive leader – demands the compliance of the team
- Authoritative leader – mobilize the team toward a vision
- Affiliative leader – builds emotional bonds and promotes harmony
- Democratic leader – seeks consensus through participation
- Pacesetting leader – establishes the standards for excellence, then promotes self-direction
- Coaching leader – develops team members for the future

Objectives

- To select ideas and filter the one(s) best suited to the context
- To interpret generated ideas based on their connection with team engagement and results

How does it work?

1. Know yourself as a leader (include how you see yourself and how your colleagues see you)

- 2.** Analyze current and future work context (think about the organization, competitors, actions, stakeholders....)
- 3.** Take into account the organization objectives in the short and long term
- 4.** Look especially at your team members: their motivation, skills, autonomy, and so on.
- 5.** Define the style(s) according to the results of the previous analysis

	COERCIVE	AUTHORITATIVE	AFFILIATIVE	DEMOCRATIC	PACESETTING	COACHING
LEADER ATTITUDE	Demands compliance	Mobilizes in direction of a common vision	Builds harmony and emotional bonds	Creates consensus	Sets standards for high performance	Develops human potential
THE STYLE IN A PHRASE	“Do what I tell you.”	“Come with me.”	“People come first.”	“What do you think?”	“Do as I do, now.”	“Try this.”
BEST SUITABLE	Crisis or need for a quick response	When a clear direction is needed	Motivate in stressing conditions	To reach consensus	Obtain quick results from a motivated team	Develop individual competences
IMPACT	Negative	Most positive	Positive	Positive	Negative	Positive

Source: adapted from Goleman (2000).

Complementary reading

Goleman, D. (2000). Leadership that gets results. *Harvard Business Review*, 78(2), 4-17.

A3 Reverse thinking

What is it?

This tool allows looking at the problem from a different perspective. Instead of searching for solutions, the group is focused on finding a solution for the opposite idea or to achieve the opposite result of what was expected. This tool might become even more effective and efficient if supported by A.I.

Objectives

- To focus on a problem and think about it in a completely different way
- To combine idea generation and fun (people think it's easier and funnier to generate negative ideas)

How does it work?

1. Define the problem and rephrase it creating a new problem (see examples next page)
2. Generate ideas to solve the new (negative) problem
3. Invert the negative solutions
4. Convert these solutions into winning actions

INITIAL PROBLEM	INVERTED PROBLEM
How to maintain profitable customers	How to lose profitable customers
How to make a UAU presentation	How to make a boring presentation
How to engage stakeholders	How to avoid stakeholder cooperation
...	...

Complementary reading

Huthwaite, B. [2007]. *Rules of Innovation*. Inst. for Lean Innovation.

Owen, J. [2019]. The strategist: Reverse Thinking. *Company Director*, 35(8), 36.

A4 Portfolio analysis

What is it?

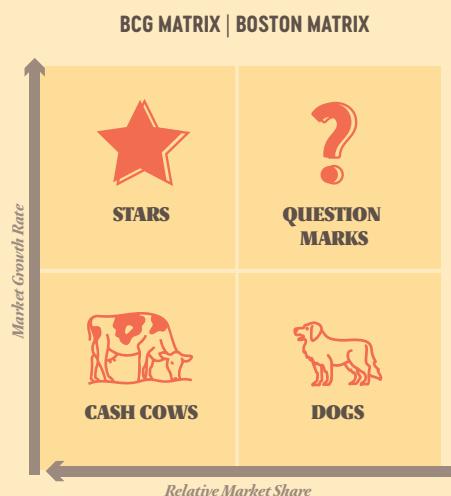
It's a matrix of approaches that seek to simplify the results of external and internal analysis. Essentially, the matrices place in one axis the competitive position of the company and in another context of the market or the surrounding environment. It's named portfolio analysis because it seeks to perceive the situation of the product or SBU portfolio. Considering that in each one of the axes one can consider a continuum (weaker-stronger), four, nine or more quadrants may result. Among the various options we emphasize the following: BCG (the classic), ADL, GE-Mckinsey, and Peter Drucker.

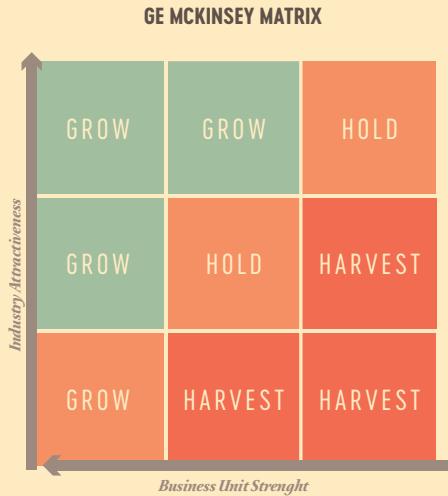
Objectives

- To allow a quick view of the context
- To typify possible actions to be taken in each of the quadrants

How does it work?

1. Conduct an external and internal analysis (presented in phase 1.)
2. Define the competitive position of the product/SBU and the environment/market attractiveness
3. Plot the portfolio in the matrix based on the values obtained in step 2
4. Analyze and discuss the situation and future actions





Complementary reading

Barksdale, H. C., & Harris Jr, C. E. (1982). Portfolio analysis and the product life cycle. *Long Range Planning*, 15(6), 74-83.

Hambrick, D. C., MacMillan, I. C., & Day, D. L. (1982). Strategic attributes and performance in the BCG matrix—A PIMS-based analysis of industrial product businesses. *Academy of Management Journal*, 25(3), 510-531.

A5 Causal mapping

What is it?

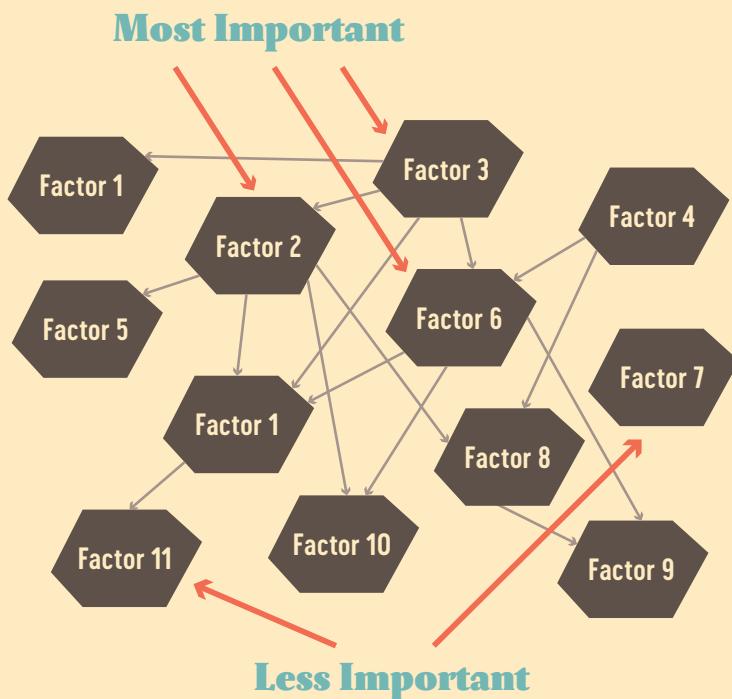
It's a diagram that outlines the causal or influence relationships between various factors. The diagram is constructed by linking ideas or statements when there is a cause-and-effect relationship. In the end, the relationships that have the highest number of links (or relationships) are the ones that will have the greatest expression in the strategic equation.

Objectives

- To help strategic thinking
- To evaluate the importance of the multiple strategic factors

How does it work?

1. Use a tool to diagnose the situation, for example, SWOT
2. Place the set of factors or ideas identified on a large sheet of paper or computer monitor.
3. Identify the causal relationships between all factors using an arrow (allows you to see who/what influences who/what).
4. Evaluate the architecture generated with attention to the key factors



Complementary reading

- Hodgkinson, G. P., Maule, A. J., & Bown, N. J. (2004). Causal cognitive mapping in the organizational strategy field: A comparison of alternative elicitation procedures. *Organizational Research Methods*, 7(1), 3-26.
- Markiczy, L., & Goldberg, J. (1995). A method for eliciting and comparing causal maps. *Journal of Management*, 21(2), 305-333.

A6 SMART Objectives

What is it?

It's an acronym that provides the five criteria for setting out clearer objectives: specific, measurable, achievable, realistic, and time-based goals.

Criteria S, M, and T basically tell us that the objectives should be quantified and defined over time: specific, because the objectives must correspond to a specific area or activity; measurable because what cannot be measured cannot be managed. It means that the metrics associated with the objectives must be measurable. This quantification should not be associated with a moment in time (time-based). Is a growth of 200K expected after a month or after a quarter?

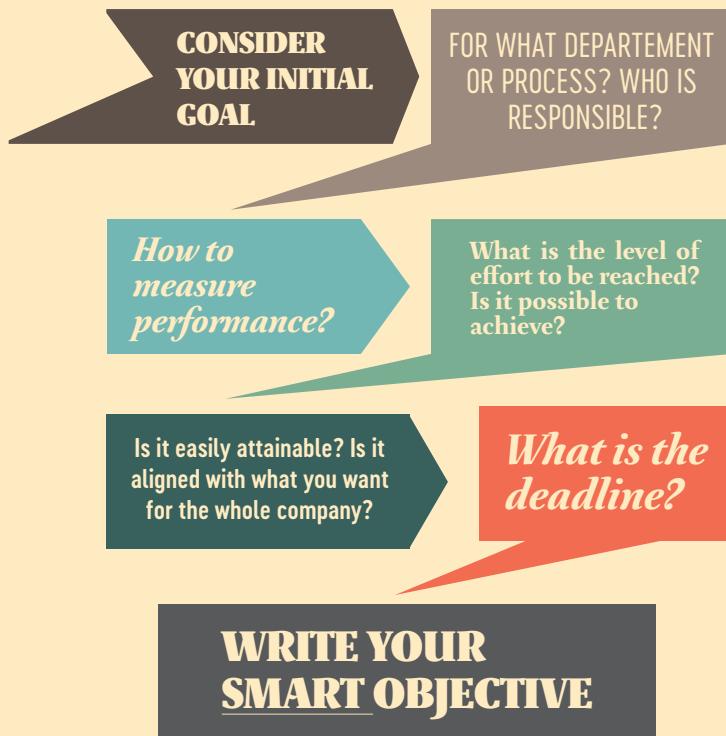
Criteria A and R are related to the motivational dimensions. Achievable means that they should be established in a way that requires a mobilizing effort, but one that is achievable. Realistic, because it should require that effort and not be set too low to be easily achieved.

Objectives

- To set out clearer objectives
- To create objectives easier to understand

How does it work?

Assemble the team and follow the steps identified on the next page.

**Complementary reading**

- Bjerke, M. B., & Renger, R. (2017). Being smart about writing SMART objectives. *Evaluation and Program Planning*, 61, 125-127.
- Doran, G. T. (1981). There's a SMART way to write management's goals and objectives. *Management Review*, 70(11), 35-36.

B. Insight (filter selection)

B1 Six thinking hats

What is it?

It's a tool proposed by Edward de Bono that stimulates the use of different types of thinking. We all know people who are emotional and others who are rational. This tool takes the best from both (as well from other thinkers). This tool might become even more effective and efficient if supported by A.I.

Six thinking hats uses six hats with different colors (imaginary or real - real is better) to promote specific characteristics from the participants.

Objectives

- To explore distinct perspectives of an idea or problem
- To use different types of thinking
- To stimulate participants in areas in which they feel inhibited

How does it work

1. Choose a facilitator. He/she must be familiar with the tools, conduct the session, and distribute and change the hats.
2. About the use of the hats. There are two general options. First, the participants can use and change the hats themselves. For example, one can start a sentence with 'using the red hat I can say that ...'. Second, the facilitator assigns the hats, forcing the participants to play a specific role. A combination can also be used: start by assigning a hat to a participant and then allow participants to change among them.



Complementary reading

De Bono, E. [2010]. *Lateral thinking: a textbook of creativity*. Penguin UK.

De Bono, E. [2017]. *Six thinking hats*. Penguin UK.

Osborn, A. [2012]. *Applied Imagination-Principles and Procedures of Creative Writing*. Read Books Ltd.

B2 Six sigma

What is it?

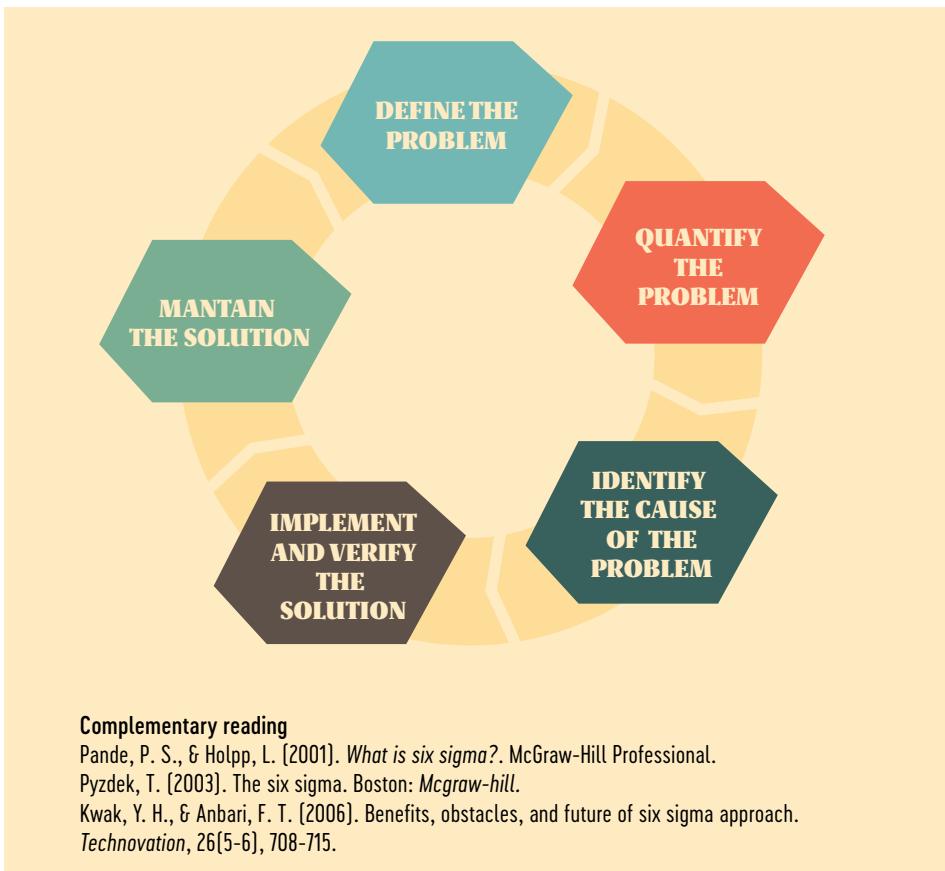
Often associated with lean management techniques, it's a set of practices developed to systematically improve processes by reducing the probability that an error will occur. Six Sigma consists of a statistical-based and data-driven approach technique. In this vein, the name sigma is associated with the term given to a measure of deviation in statistics. Six stands for the value of 3.4 defects per million observations.

Objectives

- Reduce organizational costs
- Significantly increase the quality and productivity of products and services
- Increase and retain customers

How does it work?

The implementation of a Six Sigma program through a formalized problem-solving process generally follows the acronym DMAIC: Define, Measure, Analyze, Improve, and Control.



B3 Risk Analysis

What is it?

Risk Analysis is a process of identifying, analyzing, and managing potential situations that could adversely affect the business or a project. This process might become even more effective and efficient if supported by A.I.

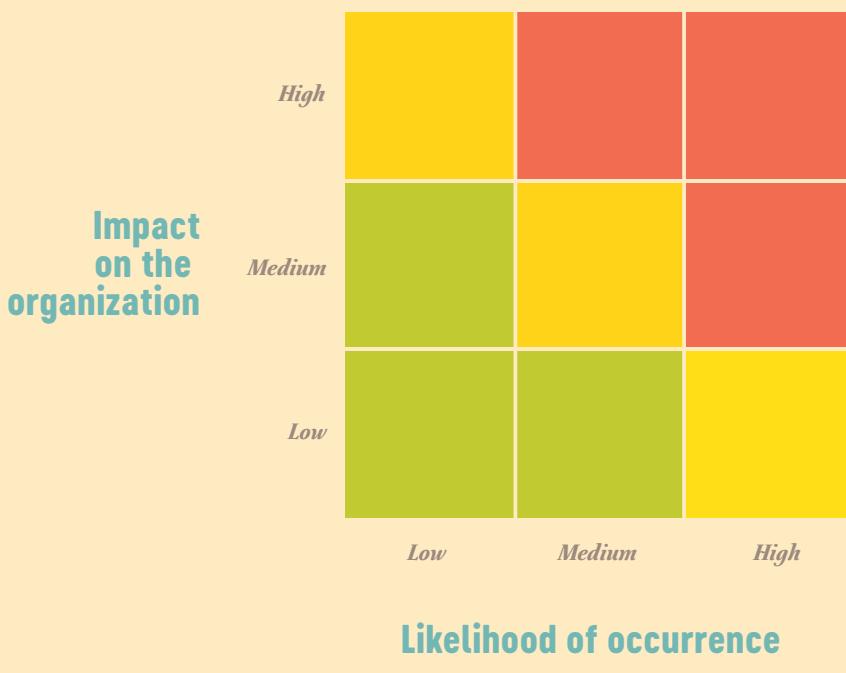
It can be a complex process, as it involves gathering a wide range of information (information acts as a reducer of uncertainty), and is an essential step toward better decision making. It avoids financial, time, human, and reputational losses.

Objectives

- To anticipate and avoid possible problems
- To improve decision making
- To prepare the organization for future situations that may occur, such as catastrophes or crises

How does it work?

1. Identify potential threats by conducting a risk assessment with managers and other key decision-makers. Use, for example, the matrix on the next page.
2. Evaluate the risk (consequences, costs, impact on the objectives, who may be harmed)
3. Decide what measures to take (avoid, share, accept ...) and develop a risk action plan
4. Implement and control the plan



Complementary reading

- Aven, T. (2012). *Foundations of risk analysis*. John Wiley & Sons.
 Aven, T. (2015). *Risk analysis*. John Wiley & Sons.
 Vose, D. (2008). *Risk analysis: a quantitative guide*. John Wiley & Sons.

B4 Blue Ocean Strategy CANVAS

What is it?

Blue ocean strategy CANVAS is a diagnostic tool developed by Chan Kim and Renée Mauborgne that gives a strategic visual snapshot, making a comparison between the current strategic landscape and organization performance.

Basically it's a line graph plotting functions or competitive factors, valuing the performance of the firm or organization and the industry.

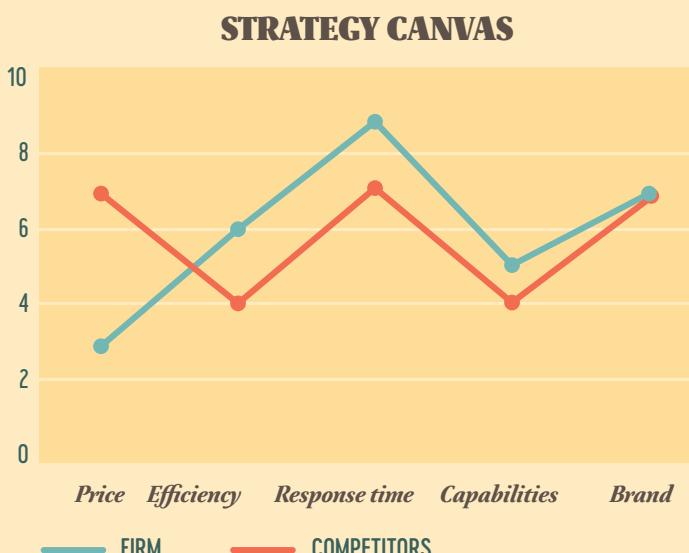
Objectives

- To identify competitive gaps
- To evaluate the current competitive landscape
- To perform an internal analysis using industry benchmarks

How does it work?

The authors provide a browser-based tool to create the strategy canvas. However, the canvas can also be created by following these steps:

1. Create the horizontal axis by capturing the range of critical success factors (price, product performance, efficiency, response time, capabilities, brand...)
2. Generate the vertical axis by using a scale (e.g. 1 to 10 or 1 to 20) to measure the performance of the firm and the competitors across those critical success factors
3. Draw two lines, visualizing the firm and its competitors along the graph.



Complementary reading

- Kim, W. C. (2005). Blue ocean strategy: from theory to practice. *California Management Review*, 47(3), 105-121.
- Kim, W. C., & Mauborgne, R. (2014). *Blue ocean strategy, expanded edition: How to create uncontested market space and make the competition irrelevant*. Harvard Business Review Press.
- Mauborgne, R., & Kim, W. C. (2005). Blue ocean strategy. *Harvard Business Review*, 1, 256.

C. Integration

C1 Balanced Scorecard

What is it?

It's a management system created by Kaplan and Norton to track and monitor the evolution of core strategic goals, focusing on key metrics. The Balanced Scorecard (BSC) is a measurement and performance management methodology that translates the mission and strategy of a business unit into tangible objectives and measures. The designation of 'balanced' is due to the inclusion of dimensions other than financial performance (a more equilibrated or balanced view of performance).

The four perspectives are:

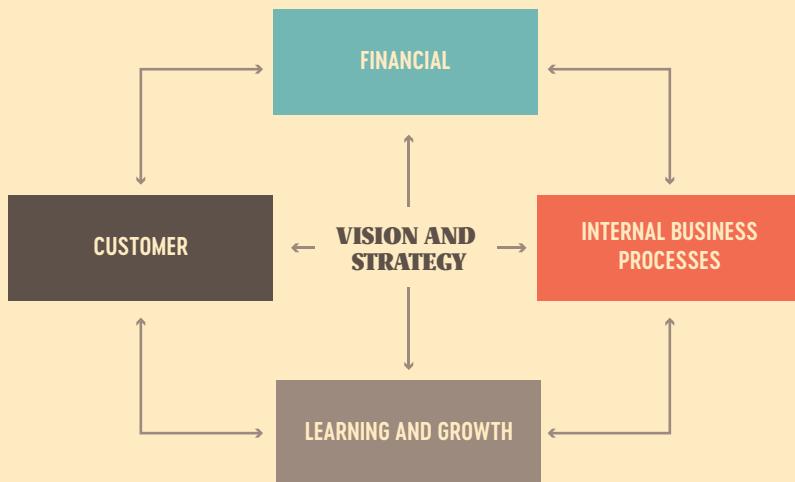
- 1. Financial:** the BSC encourages business units to link their financial goals to corporate strategy. The financial goals serve as the basis for all other BSC perspectives.
- 2. Customer:** refers to the identification of the target audience and the value proposition in serving it.
- 3. Internal Processes:** refers to processes that should be highlighted in order to satisfy customers and stakeholders.
- 4. Employees' Learning and Growth:** refers to the skills and tools employees need to help the company execute the strategy.

Objectives

- To evaluate the performance of organizations
- To clarify and communicate the strategy of the company as well as to manage it in order to measure and follow up its future performance, identifying aspects that must be improved by it

How does it work?

- 1.** The first step is to understand how the various perspectives are integrated. There is usually a chain that begins with learning, which allows having better internal processes seeking to increase customer satisfaction and loyalty. Financial results appear at the end of this chain.
- 2.** Establish strategic objectives for each perspective (e.g. increase profitability).
- 3.** Link the strategic objectives, using, for example, the strategic mapping.



Complementary reading

- Budde, J. [2007]. Performance measure congruity and the balanced scorecard. *Journal of Accounting Research*, 45(3), 515-539.
- Kaplan, R. S., & Norton, D. P. [1992]. The balanced scorecard-measures that drive performance. *Harvard Business Review*, 70(1), 71-79.
- Kaplan, R. S., & Norton, D. P. [1996]. Strategic learning & the balanced scorecard. *Strategy & Leadership*, 24(5), 18.

C2 Cost/benefit analysis

What is it?

This is a systematic tool for evaluating the strengths and weaknesses of the several options. Using it you can select the option that gives you the best results and that allows you to save costs. This is an important tool, but must be based on a reliable estimate of the benefits and costs of each option.

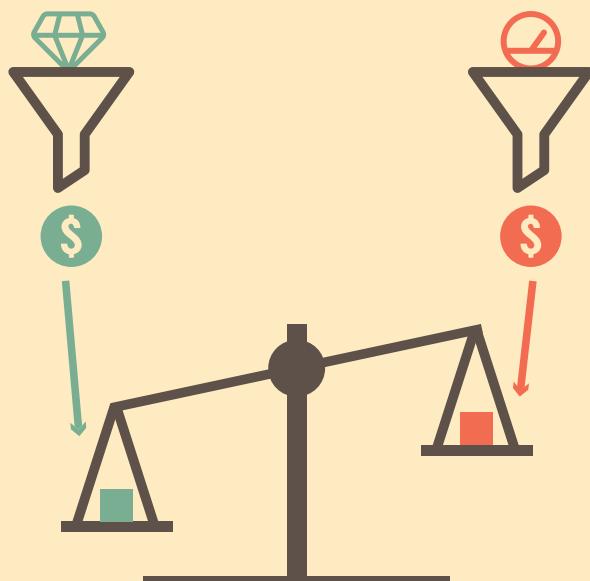
Objectives

- To compare options
- To establish a ranking of options based on a benefit/cost ratio

How does it work?

To conduct a cost–benefit analysis we suggest that you:

1. Define the objectives of the action
2. Outline the parameters of the analysis
3. List alternative options
4. Identify and calculate the costs and benefits over the relevant time period (use a common monetary measure to convert all the costs and benefits)
5. Calculate the net present value of each option
6. Perform sensitivity analysis.
7. Select the best or most balanced option



$$\text{BENEFITS} - \text{COSTS} = \text{NET BENEFITS}$$

Complementary reading

Layard, P. R. G. [1994]. *Cost-benefit analysis*. Cambridge University Press.

Mishan, E. J., & Euston. Quah. [1976]. *Cost-benefit analysis* [Vol. 454]. New York: Praeger.

C3 Ansoff Product/Market Matrix

What is it?

It's a framework proposed by Igor Ansoff in 1957 used to determine the growth opportunities. Also known as the Product/Market Matrix, it's a tool used to analyze and plan growth strategies. This framework might become even more effective and efficient if supported by A.I.

Objectives

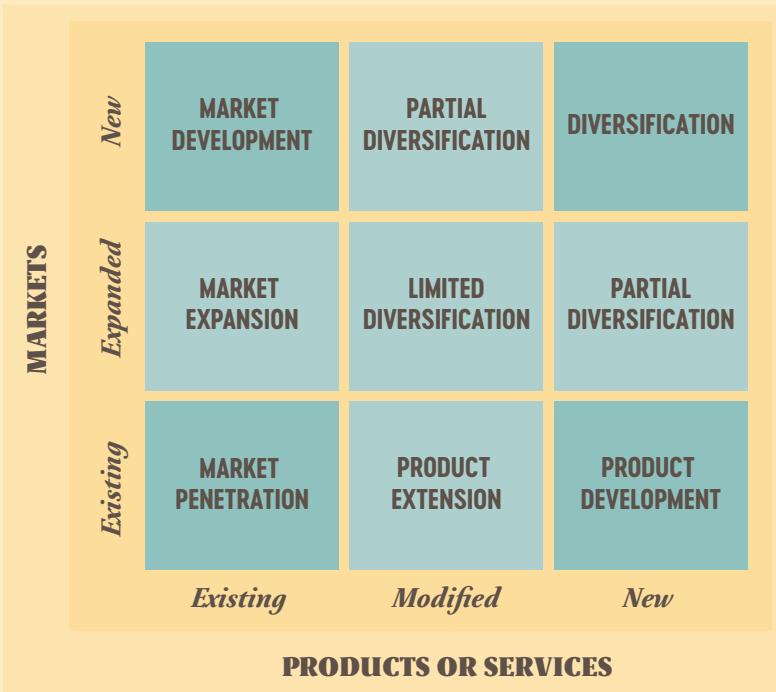
- To identify growth opportunities
- To analyze and plan growth strategies

How does it work?

1. Select from the matrix the options that are most aligned with the strategy and main goals
2. Analyze the situation and risk in each case
3. Select the best option and develop the strategy



THE EXPANDED ANSOFF MATRIX



Complementary reading

- Meldrum, M., & McDonald, M. (1995). The Ansoff Matrix. In *Key Marketing Concepts* (pp. 121-126). Palgrave, London.
- Watts, G., Cope, J., & Hulme, M. (1998). Ansoff's Matrix, pain and gain. *International Journal of Entrepreneurial Behavior & Research*. 4(2), 101-111

C4 Wigs (Wildly important goals)

What is it?

Too often firms set a wide variety of goals to achieve. In other situations, they do not define any. The result is that employees cannot identify or separate what is really important to achieve (Wildly important goals).

Accomplishing all goals is often more than what an organization and its people can do. This means that you must be very clear about what you really want to improve.

We are referring to the major strategic goals. This means that at the operational level there may and should be more specific goals to consider.

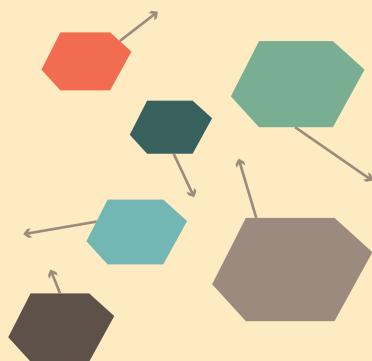
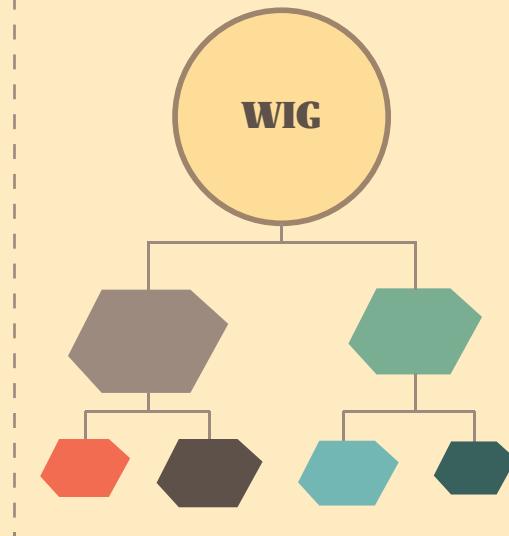
Thus, WIGS means that managers must focus their attention on a very small number of highly important goals in order to be able to monitor their achievement in the midst of daily turmoil.

Objectives

- To focus the team on high-performance goals
- To avoid defining many objectives by trying to establish goals for everything

How does it work?

1. Define the most important areas of performance
2. Analyze the teams and organizational strengths and weaknesses
3. Define two (maximum three) WIGS for each team
4. Establish the actions that need to be taken to achieve the company's WIGS. This means that there may be WIGS at the lower levels, but it is very important that there is a clear link to the achievement of WIGS at the higher levels.

BUSINESS DAILY LIFE 'MESS'**FEW AND CLEARLY STATED GOALS****Complementary reading**

- Covey, S. R., & Fox, L. (2004). Closing the Execution Gap. *The Practice of Leadership*, February.
- McChesney, C., Covey, S., & Huling, J. (2012). *The 4 disciplines of execution: Achieving your wildly important goals* [Vol. 34, No. 10]. Simon and Schuster.

C5 Strategy map

What is it?

A strategy map is a representation of the organization's strategy in a single diagram. This visual scheme presents the main objectives of the organization and how they relate to each other. According to Kaplan and Norton (2004), the strategy map is organized into four perspectives:

- Finance
- Customer
- Internal Processes
- People/Learning & Growth

Objectives

- To describe and communicate the strategy
- To identify and link the drivers of business performance
- To focus the team around the main objectives
- To support the implementation of a balanced scorecard

How does it work?

To build the strategy map we suggest taking a top-down approach (after that we can read from a bottom-up perspective). The suggested approach is as follows:

1. Define financial and customer objectives
2. Define Internal Processes and People/Learning & Growth objectives that are competing with the financial and customer objectives
3. Plot them on a diagram (see next page) considering the four perspectives (horizontal alignment)
4. Align the objectives by themes (vertical alignment)
5. Add arrows linking the objectives (cause and effect chain)
6. Monitor performance by comparing the forecasted objectives with real performance

	Theme 1 (e.g. Sustainability)	Theme 2 (e.g. Market Pioneer)
FINANCE	SHAREHOLDER VALUE	INCREASE REVENUE
CUSTOMER	INSPIRE LOYALTY	IMPROVE CUSTOMER EXPERIENCE
INTERNAL PROCESSES	CREATE QUALITY RELATIONSHIPS	DEVELOP ATTRACTIVE PRODUCT AND SERVICES
PEOPLE/ LEARNING & GROWTH	ACQUIRE LOCAL TALENT	ENCOURAGE HIGH PERFORMANCE CULTURE

Complementary reading

- Kaplan, R. S., Kaplan, R. E., Norton, D. P., Davenport, T. H., & Norton, D. P. (2004). *Strategy maps: Converting intangible assets into tangible outcomes*. Harvard Business Press.
- Kaplan, R. S., & Norton, D. P., [2004]. *Strategy maps: Converting intangible assets into tangible outcomes*. Harvard Business Press.

Capture Value-Ground

A. Inspiration

A1 Customer Journey Mapping

What is it?

Basically it's a diagram representing the story of the customer's experience. In other words, it shows the steps a customer takes during his/her relationship with the firm/organization.

By collecting insights of customer experience, this tool helps to design the total experience from the initial contact to a long-term relationship. Each dot on the map describes a customer experience.

Objectives

- To define customer experience
- To understand customer needs and pain points
- To define customer relationship strategy and procedures

How does it work?

There is one important starting rule. The more touchpoints the company has, the more complex the customer journey mapping can be. The map can be designed to illustrate the overall customer experience, or it can be created, for example, for specific interactions with the product.

There are some software and web-based tools to help defining the map, but the main principles are:

1. The first thing to do is clarify the steps and describe the expected experience.
2. Then prepare the sequence and customer role in the experience (think about co-creation)



Complementary reading

- Richardson, A. [2010]. Using customer journey maps to improve customer experience. *Harvard Business Review*, 15(1), 2-5.
- Rosenbaum, M. S., Otalora, M. L., & Ramírez, G. C. [2017]. How to create a realistic customer journey map. *Business Horizons*, 60(1), 143-150.
- Temkin, B. D. [2010]. Mapping the customer journey. *Forrester Research*, 3.

A2 Segmentation and Targeting

What is it?

In strategic marketing the aim is to narrow down content to reach the central marketing strategy, which is characterized by the STP model, i.e., segmentation, target, and positioning. Given that positioning is covered in another section of this book, we will focus on the ST.

Segmentation is the identification of consumer groups with homogeneous needs. It is also part of the segmentation to identify the profile of the segments. Therefore, it's not a decision.

Based on the identification of the profiles, it is possible to make a ranking, perceiving the attractiveness of each segment. The resulting choice is called targeting.

Objectives

- To accurately evaluate the best segments to target
- To focus the marketing strategy

How does it work?

Essentially segmentation consists of two main steps:

- 1.** Choosing the segmentation criteria (age, income, region, level of education, degree of utilization, brand loyalty, etc.);
- 2.** Describing the profile of each segment (size, competition, behaviors, etc.)

Targeting includes:

- 1.** Assess the attractiveness of each segment
- 2.** List the ranking of the segments and select those that best allow the achievement of the intended objectives

Complementary reading

Cahill, D. J. (1997). Target marketing and segmentation: valid and useful tools for marketing.

Management Decision, 35(1), 10-13

Hassan, S. S., & Craft, S. H. (2005). Linking global market segmentation decisions with strategic positioning options. *Journal of Consumer Marketing*, 22(2), 81-89.

A3 Hackathon

What is it?

The word Hackathon comes from a combination of two words: ‘hack’, which means break, change, or have access to a file or network, and ‘marathon’.

Despite being very associated with technology and in particular with software development, this tool can be applied in several situations, namely the concretization of solutions for the development of new products. This framework might become even more effective and efficient if supported by A.I.

In practice it consists of a very dynamic event involving a big team for two days. It’s a competition in which several teams from the firm (or not) compete to present a solution, non-stop.

Objectives

- To co-create solutions
- To build testable prototypes
- To focus the team around specific topics

How does it work?

The preparation of a Hackathon must be planned in advance.

The first step is to clearly define the product, idea, or service to be performed in the event.

The second step is to build up the teams that will compete in the realization of the projects. The teams can be composed of the employees themselves or defined by the leadership to ensure multidisciplinarity. As a motivational factor, a prize for the participants might be considered.

In the third step, it is essential to safeguard the conditions for the event. Given that Hackathons can involve teams working without interruption (night included), it is important to ensure the minimum conditions of comfort, safety, and food.

Finally, the teams create their concepts or solutions. They can (and should) be tested with real customers.



Complementary reading

Kienzler, H., & Fontanesi, C. [2017]. Learning through inquiry: A global health hackathon. *Teaching in Higher Education*, 22(2), 129-142.

Linnell, N., Figueira, S., Chintala, N., Falzarano, L., & Ciancio, V. [2014, October]. Hack for the homeless: A humanitarian technology hackathon. In *IEEE Global Humanitarian Technology Conference (GHTC 2014)* (pp. 577-584). IEEE.

A4 Rapid prototyping

What is it?

Rapid prototyping is a group of techniques used to rapidly create a real-scale prototype. By using CAD or other open source software it's possible to produce a small scale production using several technologies, such as 3D printing, laser cut, water cut, milling, drilling, and casting, among many others. This technique might become even more effective and efficient if supported by A.I.

Objectives

- To realize prototypes more quickly
- To go beyond the mere visualization of a product
- To make real product tests and design validation

How does it work?

This tool skips the need for molds. Instead, the piece must be created in software and then printed or cut.

ADDITIVE MANUFACTURING	SUBTRACTIVE MANUFACTURING
Selective Laser Sintering (SLS) It's based on a powder bed fusion. Laser equipment builds the piece one layer at a time.	Milling Uses a cutting tool in high-speed rotation, removing material from the base (wood, metal, plastic...).
Fused Deposition Modeling (FDM) This is the most common 3D printer. It uses a plastic filament that is melted in the printing nozzle to build the piece.	Turning Consists of a moving cutting tool. In this case, the material is removed from a base which is placed in high-speed rotation.

Complementary reading

Chua, C. K., Leong, K. F., & Lim, C. S. (2010). *Rapid prototyping: principles and applications* (with companion CD-ROM). World Scientific Publishing Company.

Pham, D. T., & Gault, R. S. (1998). A comparison of rapid prototyping technologies. *International Journal of Machine Tools and Manufacture*, 38(10-11), 1257-1287.

B. Illumination

B1 SCAMPER

What is it?

SCAMPER is an acronym referring to seven challenges. The purpose is to add innovation to an existing product or service. This technique might become even more effective and efficient if supported by A.I. The seven challenges or questions function as triggers for creative ideas. The seven challenges are:

- Substitute
- Combine
- Adapt
- Modify (magnify or minify)
- Put to other uses
- Eliminate
- Reverse

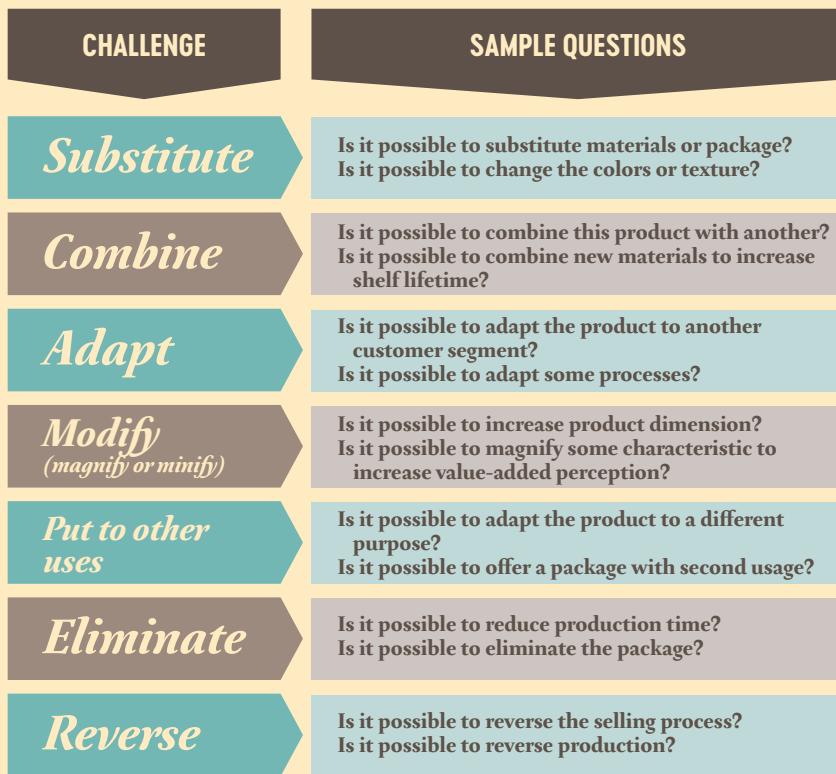
Objective

To generate ideas for new products and services

How does it work?

This tool is put in practice simply by responding to the seven challenges about existing products. A more structured approach could be:

1. Select a product, service or idea for improvement.
2. Run the seven challenges list. Combine with an idea generation tool. Go through all dimensions: store, website, product attributes, advertising, services, and so on.
3. Analyze the answers selecting viable ideas.



Complementary reading

- Buser, J. K., Buser, T. J., Gladding, S. T., & Wilkerson, J. [2011]. The creative counselor: Using the SCAMPER model in counselor training. *Journal of Creativity in Mental Health*, 6(4), 256-273.
- Serrat, O. [2017]. The SCAMPER technique. In *Knowledge Solutions* (pp. 311-314). Springer, Singapore.

B2 Googling

What is it?

This is the simplest tool described in this book, but that does not detract from its importance. Googling essentially consists of a search on keywords, images, ideas, business models, products, movies, or other media using search engines on the Internet. Googling might become even more effective and efficient if complemented with A.I.

Objectives

- To visualize an idea
- To become aware of existing solutions
- To create a visual ‘prototype’ of the intended solution

How does it work?

Just search Google or use another search engine using the initial idea or problem as a keyword. To narrow results, you can use the suggestions on the next page.

SUGGESTIONS FOR GOOGLING (AND NARROWING THE SEARCH)

- Use “quotation marks to search for concrete sentences”
- Use terms that are as specific as possible
- Use minus (-) before a word to eliminate the most common terms
- Use plus (+) to force a specific word to appear in the search. For example, in situations where common words (a, and, or...) are usually ignored.
- Use tilde (~) before a word to include synonyms
- Take the most advantage from the AutoComplete function of the search engine
- Diversify using other search engines (Yahoo!, Bing, ...)

B3 Positioning/repositioning

What is it?

This refers to the place a brand occupies in the client's mind. In other words, customers are able to (subjectively) identify the position of the various brands they know. For example, some brands are known for being premium. Others, we know they are low cost. The act of positioning consists of preventing the client from doing it alone. To this end, positioning is the ability to influence the customer's perception of our brand in comparison with the alternatives.

Put in a more technical way, it consists of creating, in the consumer's mind, a significant and distinctive image about our brand. Repositioning consists of changing the place the brand occupies in the consumer's mind. It's a risky task. After a long period of reinforcing a certain idea in relation to the brand, to come and say that now it is different may generate discrediting or confusion. This strategy might become even more effective and efficient if supported by A.I.

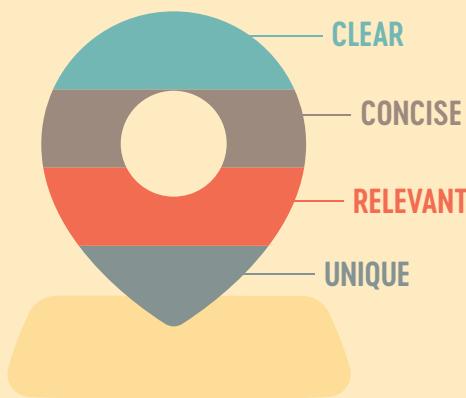
Objectives

- To establish a general direction of marketing strategy
- To complete the marketing strategy through the process of STP - Segmentation, Targeting, and Positioning

How does it work?

Positioning is a long shot. The whole concept must be carefully thought out and planned. Once positioned, any change or repositioning is very difficult to do and can destroy the brand credibility.

- 1.** Evaluate the current positioning of your company as well as that of your competitors.
- 2.** Conduct a comparative analysis.
- 3.** Analyze customer priorities.
- 4.** Identify what makes your brand unique.
- 5.** Establish the best positioning arguments. Select those that allow a clear distinction from competitors. Use, for example, perceptual mapping.
- 6.** Build the positioning statement (statement, not a paragraph).
- 7.** Revise the statement considering that positioning should help to improve customer perception brand as favorable, different, and credible.



Complementary reading

- Dou, W., Lim, K. H., Su, C., Zhou, N., & Cui, N. [2010]. Brand positioning strategy using search engine marketing. *MIS Quarterly*, 261-279.
- Gwin, C. F., & Gwin, C. R. [2003]. Product attributes model: A tool for evaluating brand positioning. *Journal of Marketing Theory and Practice*, 11(2), 30-42.
- Pechmann, C., & Ratneshwar, S. [1991]. The use of comparative advertising for brand positioning: Association versus differentiation. *Journal of Consumer Research*, 18(2), 145-160.

B4 Value proposition

What is it?

Put simply, the value proposition results from the answer to the following question: why will the customer buy our product instead of the competition's?

In a more formal definition, it is a promise of value to be delivered and communicated to the customer, making the benefits of the product or service perfectly clear. Thus, the value proposition becomes a central part of marketing, serving as a pattern for decision making.

In a context where the customer's attention is almost non-existent, the company has very limited time to quickly tell you what is special to offer. This is the essence. This strategy might become even more effective and efficient if supported by A.I.

Objectives

- To clarify what is actually intended to be offered (often not clear to entrepreneurs and businesses)
- To identify the domains the marketing activity should focus on

How does it work?

1. First of all, it will be important to define the customer's problem to be solved.
2. Check if this problem is really a problem and if it is worth solving.
3. Write the value proposition considering the elements on the next page.
4. Make it a standard in decision making and in strategy.

KEY INGREDIENTS

- Explain the benefits the product provides, and for who - list the benefits.
- Explain how the product solves customer problems - link the benefits to the product.
- Clarify how it is better than the alternatives - pinpoint uniqueness and relevance.

ARCHITECTURE

- First: The caption - short sentence containing the central benefit
- Second: The explanation - short paragraph identifying the target, differentiation and other benefits
- Third: Use bullets, image, movie, or an infographic to underline key benefits and how they link to the product

KEY CHARACTERISTICS

- Being relevant to the target
- Being clear
- Being quickly understood

KEY ERRORS

- Confusing with brand strategy - Value proposition is just a part of the overall strategy
- Confusing with positioning - see positioning section
- Confusing with a slogan - a slogan can be a way of communicating the value proposition

Complementary reading

Anderson, J. C., Narus, J. A., & Van Rossum, W. (2006). Customer value propositions in business markets. *Harvard Business Review*, 84(3), 90.

Emerson, J. (2003). The blended value proposition: Integrating social and financial returns. *California Management Review*, 45(4), 35-51.

Frow, P., & Payne, A. (2011). A stakeholder perspective of the value proposition concept. *European Journal of Marketing*, 45(1-2), 223-240.

C. Incubation

C1 Smith and Colgate Model

What is it?

The authors Smith and Colgate presented a framework for creating value for the customer. They define customer value as the difference between what customers get (benefits, quality, worth, utility) versus what they pay (price, costs, sacrifices). This model might become even more effective and efficient if supported by A.I. The proposed model pinpoints four types of value that can be created by organizations for their customers. They are the following:

- Functional/instrumental value: linked to the attributes of the product itself: useful and generate appropriate outcomes or performance
- Experiential/hedonic value: related to appealing to the senses, or the generation of appropriate emotions or facilitating social relationships
- Symbolic/expressive value: associated with the creation of psychological meaning for a product or enhancing self-identity, self-concept, and self-worth
- Cost/sacrifice value: regarding the cost or sacrifice associated with the use of the product, or the minimization of the psychological investment of customers (ease of use, simplicity)

Objectives

- To create new product or services concepts
- To identify new product or services opportunities

How does it work?

1. Conduct market and competitor research to identify customer preferences and rivals' value creation strategies
2. Create value, overlapping the types of value with the sources of value (see the next page)

SOURCES OF VALUE

according to Smith and Colgate

1.

INFORMATION

(can be created using advertising, public relations, etc.)

2.

PRODUCT

(generated through new product development, R&D, etc.)

3.

RELATIONS

(resulting from training, recruitment, or service quality that enhances the interactions between customers and the firm personnel)

4.

ENVIRONMENT

(produced by investing in the shop atmosphere, interior design, etc.)

5.

OWNERSHIP

(built by facilitating the delivery or contracting)

Complementary reading

Smith, J. B., & Colgate, M. (2007). Customer value creation: a practical framework. *Journal of Marketing Theory and Practice*, 15(1), 7-23.

C2 Daydreaming

What is it?

This tool is very simple and assumes that some of the best ideas come up when one least expects them. There is also a negative perception in some managers about daydreaming, associated with a distracted or lazy worker.

Essentially, this tool promotes creativity by simply stimulating daydreaming, but it needs to be focused. What matters is that it is aimed at solving a specific problem in the organization.

Objectives

- To boost creativity
- To promote a creative problem solving culture
- To increase job satisfaction

How does it work?

1. Identify a problem to be solved
2. Collect a package of information, which enable participants to become aware of the problem or situation and begin to generate possible, impossible, imaginary ideas, ‘out of the box’ by daydreaming.
3. Switch off and let your mind have fun

Complementary reading

Gurteen, D. (1998). Knowledge, creativity and innovation. *Journal of knowledge Management*, 2(1), 5-13.
 Heye, D. (2006). Creativity and innovation: Two key characteristics of the successful 21st century information professional. *Business Information Review*, 23(4), 252-257.

C3 4P/8P

What is it?

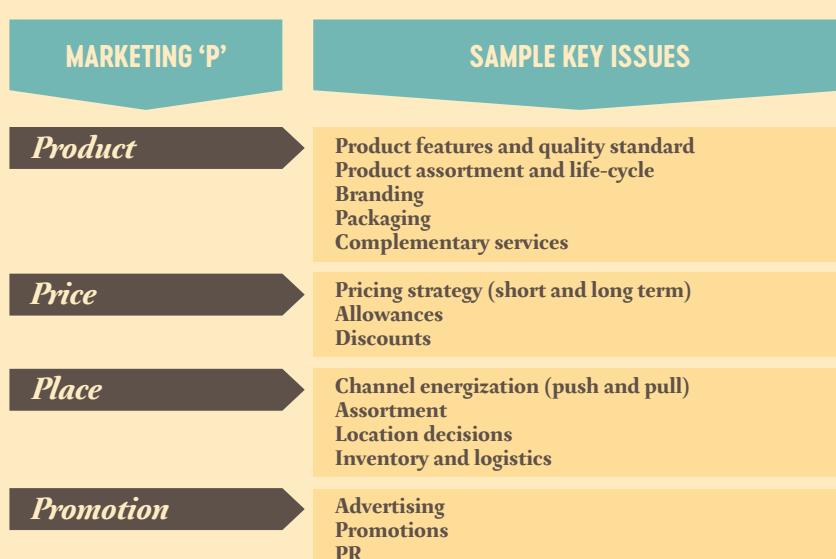
The original marketing mix dates back to the 1960s, considering the 4Ps of marketing: product, price, place, and promotion. With the evolution of service marketing, another 3P were included: process, people, and physical evidence. Usually an eighth P - performance is included.

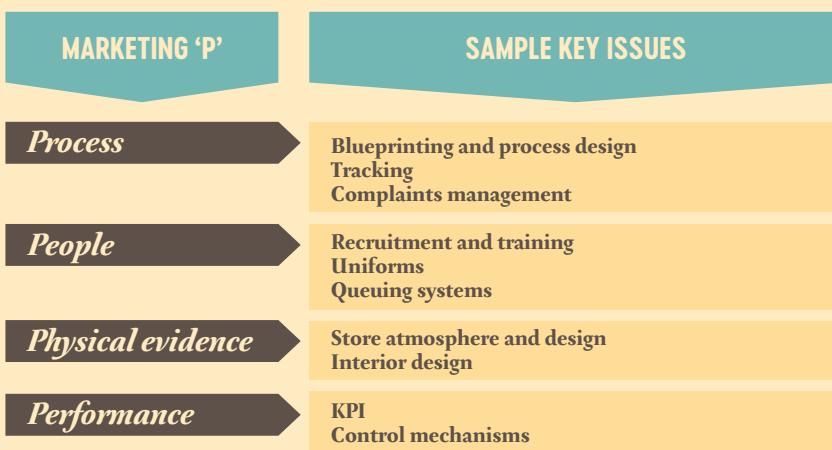
Objectives

- To help define the several marketing decisions
- To promote coherence between the various Ps

How does it work?

1. The first step is then to define the strategy for each F;
2. Then, there must be internal coherence between each strategy, seeking synergies and avoiding ruining what is intended to be done in one P because in another P a different strategy has been outlined.
3. Third, frame the strategies and the articulations between them in a chronogram over the desired term.





C4 Servqual

What is it?

SERVQUAL is a multidimensional survey instrument that allows evaluating the service quality that has been experienced and compare that with the expected service quality. Service quality is measured based on five dimensions: tangibles, reliability, responsiveness, assurance, and empathy.

If we change the order, the model is also known by the acronym RATER:

- * Reliability
- * Assurance
- * Tangibles
- * Empathy
- * Responsiveness

Objectives

- To evaluate the firm service quality experienced by customers
- To diagnose possible problems in the service quality model
- To explore the five gaps (see the next page)

How does it work?

The main difficulty is to obtain a statistically reliable sample. In fact, the measure or questionnaire consists of 22 questions to assess the five dimensions. However, those questions are paired (22 to evaluate the expectation items and 22 for the perceptions items). If we add the demographic questions to obtain more information about the respondents, it will take a while to respond to the questionnaire.

1. Define a sample and run the survey, preferably face-to-face
2. Analyze the results and compare them with the actual standards and service.

The Gaps to explore with SERVQUAL

1. KNOWLEDGE GAP

This is related with the firm's lack of knowledge about the customer expectations. One thing is what customers expect, another is what you think they expect.

2. STANDARDS GAP

This gap refers to the actual specification of the customer experience. If the assumptions are wrong they are incorrectly translated into the service quality model. As such, managers need to make estimates or to take decisions about the preconditions concerning level of service.

3. DELIVERY GAP

This is related to the difference between the firm's level of service quality and the consumer expectation. It is associated with incorrect implementation.

4. COMMUNICATIONS GAP

This corresponds to the difference between the firm's level of service quality and what is communicated to the customers. Marketing strategies often overemphasize well above what they can actually deliver.

5. SATISFACTION GAP

Refers to the gap between the customer perception of service quality and his/her expectation of the service.

Complementary reading

- Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing*, 41-50.
- Zeithaml, V. A., Berry, L. L., & Parasuraman, A. (1996). The behavioral consequences of service quality. *Journal of Marketing*, 31-46.

C5 FAB LAB

What is it?

A Fab lab is a co-work platform for innovators and creative people, providing a stimulus for local entrepreneurship. Another characteristic is hosting a community of creative people, researchers, innovators, businesses, educators, and curious people (and many others). They usually are part of a global network linking the Fab Lab in many countries.

Objectives

- To access a specialized platform for rapid prototyping
- To reduce investment in technological equipment
- To obtain skilled help for design and product finishing

How does it work?

A Fab Lab is equipped with an array of electronic tools and low tech equipment controlled (usually) by open source software and programs.

Fab Labs are generally open to the community. Some are paid (monthly fees, by the hour or other), others are free, at least for students (material consumed is paid). So, it's easy to access these platforms. The problem is programming the software, which usually requires specific skills, not accessible to everyone. However, most Fab Labs have specialized educators. They can help with this task.



Complementary reading

Troxler, P., & Wolf, P. (2010, September). Bending the rules. The Fab Lab innovation ecology. In *11th International CINet Conference, Zurich, Switzerland* (pp. 5-7). Walter-Herrmann, J., & Büching, C. (Eds.). (2014). *FabLab: Of machines, makers and inventors*. transcript Verlag.

C6 Design thinking

What is it?

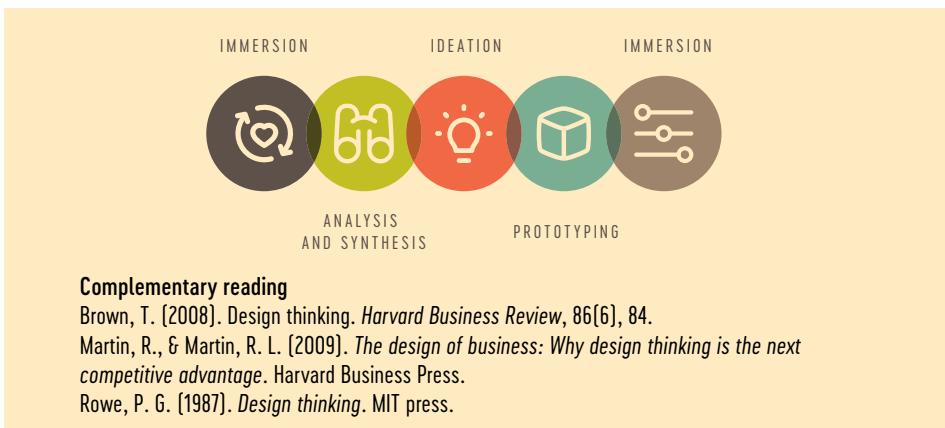
Design Thinking is a way of solving problems, and developing products and projects based on designers' thinking: the abductive. In this type of thought, the goal is to formulate questions to be answered from the information collected during the observation of the universe that permeates the problem.

Objectives

- To help change our mental state and stimulate us to solve problems with new perspectives
- To find solutions and give answers by always putting people at the center of decisions

How does it work?

1. Immersion: Understanding the approach and the context of the object.
2. Analysis and synthesis: it aims to organize the data visually in order to point out patterns that help in understanding the whole and identifying opportunities and challenges.
3. Ideation: seeks to generate innovative ideas through collaborative activities that stimulate creativity.
4. Prototyping: The ideas created are then selected and validated at this stage. There is, therefore, the tangibilization of ideas, in order to provide continuous learning and possible validation of the solution.
5. Development: the application.



Complementary reading

Brown, T. (2008). Design thinking. *Harvard Business Review*, 86(6), 84.

Martin, R., & Martin, R. L. (2009). *The design of business: Why design thinking is the next competitive advantage*. Harvard Business Press.

Rowe, P. G. (1987). *Design thinking*. MIT press.

C7 New Product Development

What is it?

It concerns the entire process of bringing a product to the market. It's a structured process involving several steps from the determination of an opportunity to the launch of the new product. This process might become even more effective and efficient if supported by A.I.

The central idea is to focus on the process in order to avoid unnecessary costs and waste of time by working on an *ad hoc* approach.

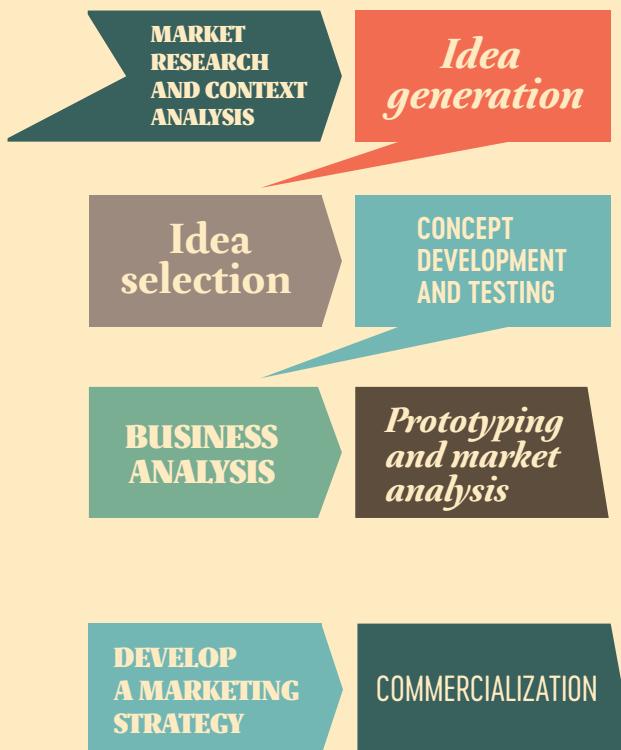
The main phases are presented on the next page.

Objectives

- To develop a customer-driven approach in product development
- To increase the odds of new product success
- To differentiate
- To find new ways to solve customer problems

How does it work?

1. Define a multidisciplinary team for NPD
2. Establish a vision for NPD
3. It is important to focus on one or very few products. Otherwise the development team will fall into one of the NPD pitfalls: developing too many products
4. It will be important to appoint a project manager
5. Draw up a critical path and a timetable to follow the steps presented on the next page.



Complementary reading

- Hoyer, W. D., Chandy, R., Dorotic, M., Kraftt, M., & Singh, S. S. [2010]. Consumer cocreation in new product development. *Journal of Service Research*, 13(3), 283-296.
- Takeuchi, H., & Nonaka, I. [1986]. The new new product development game. *Harvard Business Review*, 64(1), 137-146.
- Trott, P. [2008]. *Innovation management and new product development*. Pearson Education.

Consolidate Value-Operate

A. Impression

A1 Branding

What is it?

According to Kotler and Keller (2015) branding is endowing products and services with the power of a brand. As such, it's the process of giving a meaning to a specific company, product, or service by shaping the way in which it is perceived. In other words, it consists of developing the brand recognition and reputation in consumers' minds.

Objectives

- To attract ideal customers
- To increase marketing effectiveness
- To expand customer value
- To enhance employee pride

How does it work?

1. Define the brand strategy - what is the brand's purpose? What differentiates it from its competitors? What is the target audience? (see the next page for additional topics)
2. Integrate the brand into every aspect of the business
3. Stay consistent and monitor your brand

KEY DECISIONS IN BRANDING

- Brand definition: mission, purpose, values, promise
- Tagline and brand positioning statement
- Brand visual identity design: typography, iconography, colors...
- Communications: traditional or digital
- Product and packaging design
- Sponsoring and partnerships
- Workspace experience
- Customer service
- Pricing

Complementary reading

- Clifton, R. [2009]. *Brands and branding* [Vol. 43]. John Wiley & Sons.
- Keller, K. L., & Lehmann, D. R. [2006]. Brands and branding: Research findings and future priorities. *Marketing Science*, 25(6), 740-759.
- Kotler, P., & Keller, K. L. [2015]. *Marketing management, global edition*. Pearson Education UK.

A2 Sales team development

What is it?

It's a complex process involving many strategic decisions. Indeed, the development of a sales force involves the hiring of people who will have to be integrated into the team, increased costs, wage policy, and training, among other things.

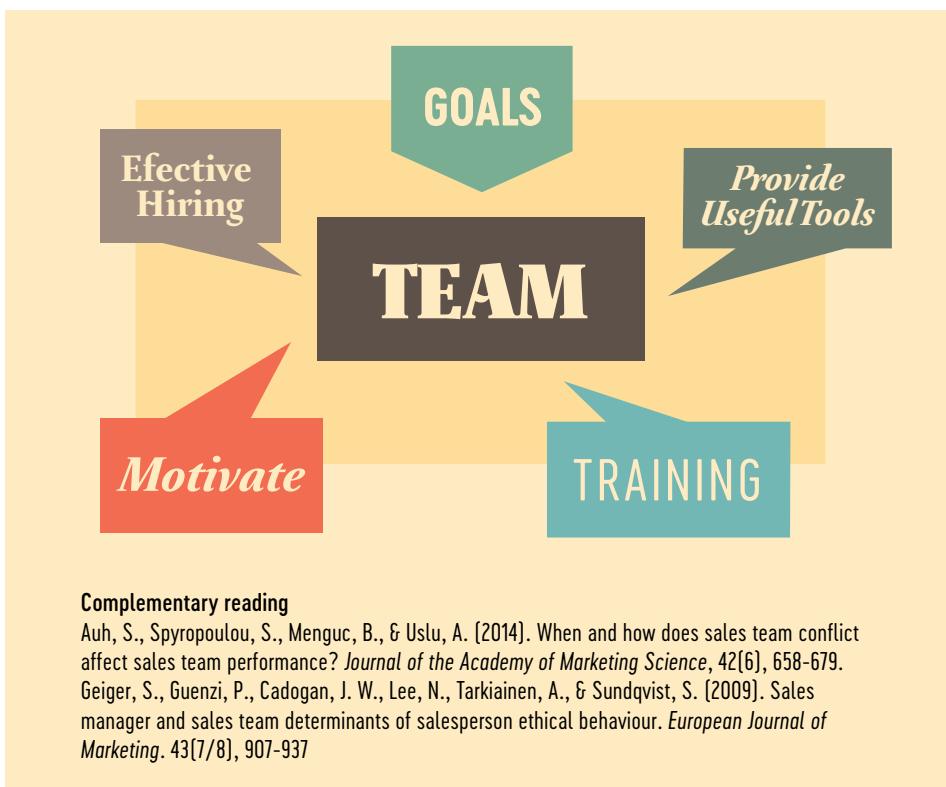
Objectives

- To define inbound and outbound sales strategy
- To increase sales force efficiency

How does it work?

To develop a sales team the following steps are essential:

1. Define the type of team: number of persons, inside sales and/or field sales...
2. Hire the right people: more important than personality or qualifications is the willingness to participate in the team and align with the objectives and aspiration of the company
3. Develop a training and compensation team
4. Motivate the team members and provide them with the adequate tools to succeed



Complementary reading

- Auh, S., Spyropoulou, S., Menguc, B., & Uslu, A. (2014). When and how does sales team conflict affect sales team performance? *Journal of the Academy of Marketing Science*, 42(6), 658-679.
- Geiger, S., Guenzi, P., Cadogan, J. W., Lee, N., Tarkainen, A., & Sundqvist, S. (2009). Sales manager and sales team determinants of salesperson ethical behaviour. *European Journal of Marketing*. 43(7/8), 907-937

A3 Marketing Plan

What is it?

The marketing plan is a document that details the actions needed to achieve one or more marketing objectives and may be planning for the brand, for a product or service, or for the product lines.

Objectives

- To guide in the elaboration of detailed actions directed to a market of action to capture clients, and increase the sales and profitability of the business. It does this through market analysis, adapting to its constant changes and identifying trends
- To help answer what will be done, how it will be carried out, by what means, with what expenses and in what form its results will be measured

How does it work?

The marketing plan is accomplished through three steps: planning, implementation, and evaluation/control.

1. In the planning stage the marketing environment is analyzed, with the objective of evaluating the external and internal factors that can influence the business; the definition of the target audience; market positioning of brand. In this way, it is possible to define the objectives and goals and to outline the marketing strategies, that is, in the actions necessary to determine the way in which the marketing compound, i.e. the main marketing elements (product, price, communication, point of sale/distribution, and people) are combined at the same time.
2. In the second step, to implement the marketing strategy, it is necessary to define an Action Plan containing the (i) actions, identifying the activities to be carried out; the period, with the execution period of each activity; define how the activities should be carried out; the person responsible; and the estimated cost.
3. Finally, in the evaluation and control stage, it is sought to reduce the difference between the desired performance and the actual performance and, when necessary, corrective and preventive actions are proposed.

SOSTAC, A MNEMONIC FOR MARKETING PLAN SEQUENCE.



Complementary reading

- Cohen, W. A. (2005). *The marketing plan*. John Wiley & Sons.
 Piercy, N. F., & Morgan, N. A. (1994). The marketing planning process: behavioral problems compared to analytical techniques in explaining marketing plan credibility. *Journal of Business Research*, 29(3), 167-178.
 Westwood, J. (2013). *How to write a marketing plan*. Kogan Page Publishers.

B. Introduction

B1 Elevator pitch

What is it?

Its a quick presentation of an idea, business opportunity, or value proposition to obtain the interest of another party (investor or client) for its business in such a fast way, that it could be made during the ride on an elevator. Depending on the objectives an elevator pitch session takes three or five minutes, but a pitch of 30 seconds is generally accepted.

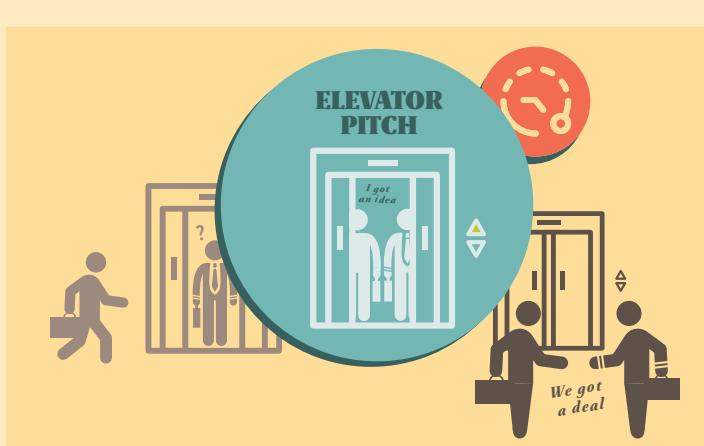
Objectives

- To present an idea, a business, product, service, or a project so that the investor or client engages or is convinced in a short time

- To highlight the main points and what makes the product, service, or idea different
- To generate a great positive impact in this moment of interaction, catching the attention of anyone to what you offer and inciting them to know your work better. So, in addition to being useful for raising funds, this brief speech also helps you prospect clients

How does it work?

1. A simple, direct, and thought-provoking speech is used, with essential and differentiated information, focused on the value of the project and its capacity to generate benefits for those who decide to invest in the idea, project, or business or to acquire their products.
2. It is necessary, therefore, to make a quick presentation in an effective way, associating the time to the seconds that an elevator trip takes so that people follow the narrative in a fluid way and that has basic information that arouses interest and generates impact. As an example: the value proposition or the competitive differential to stand out from the competition; the company; to which market it is directed; what is sought to solve; the product or service; results and real consequences, if possible in numbers; and what advantages and benefits.



Complementary reading

- David, T. [2014]. Your elevator pitch needs an elevator pitch. *Harvard Business Review*. Retrieved from <https://hbr.org/2014/12/your-elevator-pitch-needs-an-elevator-pitch>.
- Denning, P. J., & Dew, N. [2012]. The myth of the elevator pitch. *Communications of the ACM*, 55(6), 38-40.
- Pincus, A. [2007]. The perfect (elevator) pitch. *Bloomberg Business Week*, 18.

B2 5W2H

What is it?

It's a mnemonic concerning "What?", "Why?", "Where?", "When?", "Who?", "How?" and "How much?". The 5W2H, also known as the action plan, is a structured tool to facilitate the planning of any activity. Through a checklist of activities, deadlines, and responsibilities, it guides from simple decisions to the implementation of various decisions in an organized way.

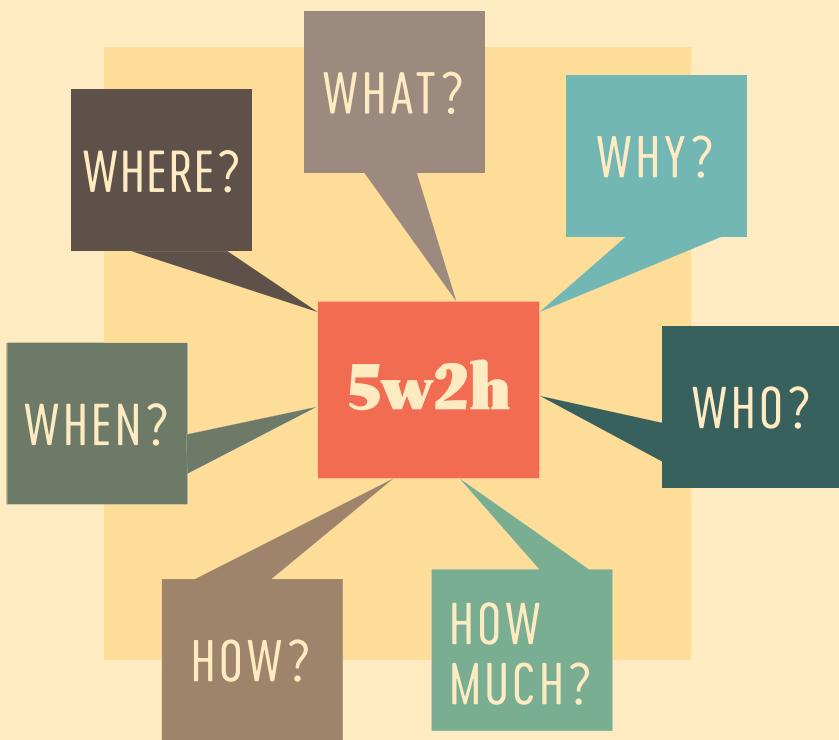
Objectives

- To assist in the elaboration of action plans and to realize ideas and projects, since the tool addresses the main guidelines involved to execute each phase of the plan and control tasks, assigning responsibilities and determining how the work should be conducted
- To present clarity, through the matrix, in the elements and seek better results in the management of projects and tasks. The tool is widely used for quality management, process control, and project design, for example

How does it work?

The 5W2H tool is structured as a matrix and consists of seven fields in which the following information must be included:

- 1. What** - What will be done / the main purpose of the action
- 2. Why** - why it will be done / justification for action and a description of why it is useful
- 3. Where** - Where it will be held / place of accomplishment of the action
- 4. When** - When it will be performed / action execution time, determining the start and end date of the process and the schedule
- 5. Who** - Who will be assigned the action / who or which area will be responsible
- 6. How** - What activities, procedures, or steps will be performed and the status of each, indicating the phase that it is
- 7. How much** - How much does it cost / total cost of the action
- 8. For this**, it is necessary to clarify the action, problem or challenge to which the tool will apply. Once defining it, it is enough to respond to the questions in a strategic way.

**Complementary reading**

Rodrigues, A. N., & dos Santos, S. C. [2016]. A framework for applying problem-based learning to Computing Education. In *2016 IEEE Frontiers in Education Conference (FIE)* (pp. 1-7). IEEE.

B3 Canvas Business Model

What is it?

The Canvas Business Model is a strategic management tool, proposed by Alexander Osterwalder, that allows developing and sketching business models. It's a graphic model, using four axes: as (infrastructure); what (offer); who (client); and how much (finance), the tool presents nine blocks, considered as key factors of an enterprise, namely: key partnerships, key activities, key resources, value proposition, relationship, channels, customer segments, structure of costs, and sources of income.

Objectives

- To help you plan business in a simple and intuitive way, allowing a business to be viewed on a single page
- To enable an integrated view of the business, to organize ideas, and to structure a business model
- To assist both entrepreneurs at the time of creating their business and segmenting customers, as well as existing companies, helping them in the planning and evaluation of business performance, since it allows the visualization and elicits reflections from information about several aspects of the organization

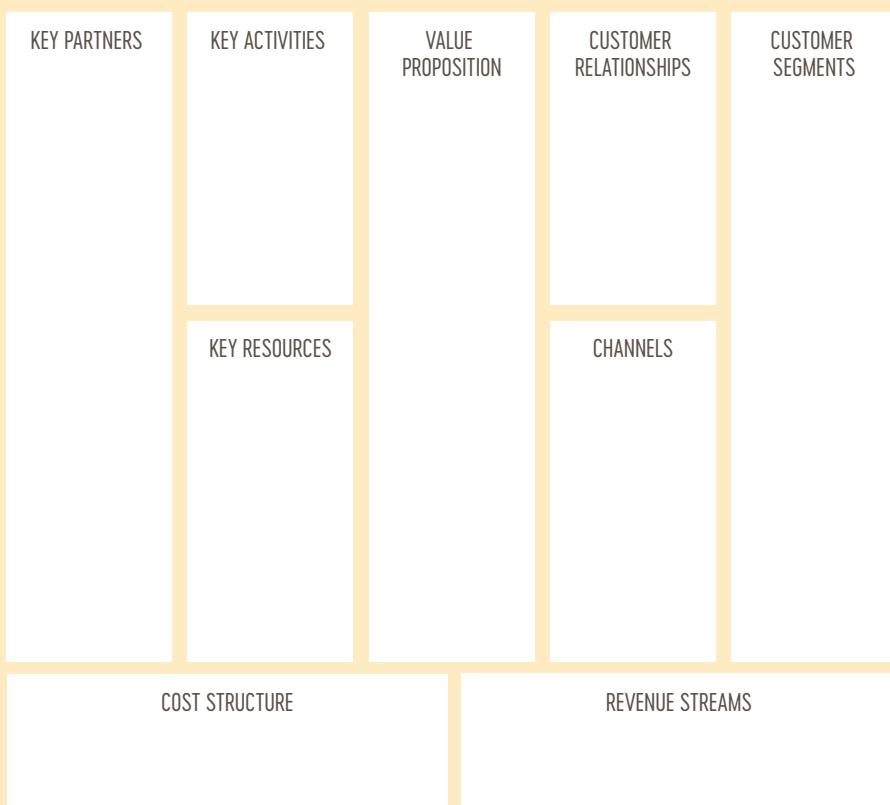
How does it work?

Based on the pre-formatted visual map, users fill out the nine blocks or key factors that represent how the company intends to act and generate value to customers:

- 1. Value proposition:** the reason people buy products and services, such as price, accessibility, performance, customization, and convenience
- 2. Customer Segment:** Which customer segments will be the focus of your business
- 3. Channels:** how the customer buys and receives their product and service, and can be operated by the owners of the business, that is, private or can be operated through partners
- 4. Relationship with customers:** how your company will relate to each customer segment? How your company will maintain a good relationship with customers? How will your company prevent customers

from leaving the company in favor of competitors?

- 5. Key activity:** the essential activities to be able to deliver the Value Proposition
- 6. Key resources:** the resources needed to carry out the key activities
- 7. Key Partners:** allies to optimize and reduce business risk
- 8. Revenue Streams:** ways to earn revenue through value propositions, how much and how customers will pay for what is offered
- 9. Cost structure:** the relevant costs involved in the operation of the business



Complementary reading

- Joyce, A., & Paquin, R. L. [2016]. The triple layered business model canvas: A tool to design more sustainable business models. *Journal of Cleaner Production*, 135, 1474-1486.
- Osterwalder, A., & Pigneur, Y. [2012]. Designing business models and similar strategic objects: the contribution of IS. *Journal of the Association for Information Systems*, 14[5], 3.

C. Implementation

C1 Financial plan

What is it?

It's a document that allows us to understand how the company will afford to achieve its strategic objectives. It is a critical document for the performance of an organization because it allows predicting future needs and surpluses, allowing the company to prepare for times of financial need and to carry out its operations smoothly. It also validates the business plan. As such this document quantifies the activities, material, resources, and investments needed to achieve the organizational goals in a specific time frame.

Objectives

- To determine capital requirements and ensure availability of funds
- To determine the most appropriate capital structure
- To establish a base for financial and operational control
- To avoid business shocks

How does it work?

The main steps are:

1. Link with the overall strategy by assessing the business environment and defining the vision and objectives
2. Identify and quantify the activities, labor, equipment, materials, and other resources needed to achieve the objectives in a specific time frame
3. Summarize the costs to create a budget
4. Analyze the document to identify capital shortfalls, risks, and surpluses.

Pro Forma Profit and Loss	▼ Year 1	▼ Year 2	▼ Year 3
Income			
Total income	\$0	\$0	\$0
Total Cost of Sales	\$0	\$0	\$0
Gross Margin	\$0	\$0	\$0
Expenses			
Total Salaries and Wages	\$0	\$0	\$0
Business Expenses			
Advertising	\$0	\$0	\$0
Car and Truck Expense	\$0	\$0	\$0
Credit Card Charges	\$0	\$0	\$0
Insurance	\$0	\$0	\$0
Legal and Accounting	\$0	\$0	\$0
Office Expenses	\$0	\$0	\$0
Postage and Shipping	\$0	\$0	\$0
Rent on Business Property	\$0	\$0	\$0
Rent on Equipment	\$0	\$0	\$0
Repairs	\$0	\$0	\$0
Suplies	\$0	\$0	\$0
Telephone	\$0	\$0	\$0
Travel	\$0	\$0	\$0
Utilities	\$0	\$0	\$0
Miscellaneous Expenses	\$0	\$0	\$0
Amortized start-up Expenses	\$0	\$0	\$0
Depreciation	\$0	\$0	\$0
Total Business Expenses	\$0	\$0	\$0
Total Interest Expense	\$0	\$0	\$0
Net Operating Income	\$0	\$0	\$0
Less Income Taxes	\$0	\$0	\$0
Net Profit (Loss)	\$0	\$0	\$0

Complementary reading

- Blazek, J. [2008]. *Nonprofit financial planning made easy* [Vol. 220]. John Wiley & Sons.
 Lee, A. C., Lee, J. C., & Lee, C. F. [2009]. *Financial analysis, planning and forecasting: theory and application Second Edition*. World Scientific Publishing Company.

C2 Sustainability plan

What is it?

It's a roadmap to achieve goals toward financial, societal, and environmental sustainability. It involves outlining where the firm aims to be and how it intends to get there. Further guidelines and inspiration can be obtained by consulting the UN 17 Sustainable Development Goals (SDGs) that set out the priorities for contributing to global development.

Objectives

- To achieve cost savings and reduce business and legal risks
- To create positive brand association
- To improve the environment and the society
- To meet demands for eco-friendly products and services

How does it work?

1. Identify the areas of improvement and what needs to be sustained: the outcomes the firm wants to sustain (check the compliance with the law and global trends)
2. Identify opportunities (innovation, cost reduction...)
3. Create strategic guidelines by defining the organization's DNA, values, and mission/vision
4. Define the technology, capabilities, capital, and training needed to achieve those goals
5. Identify potential partners (for funding or for cooperation)
6. Define the plan with specific action steps: communicate clearly, change policies, and get feedback

**IMPORTANT TOPICS TO ADDRESS
ON A SUSTAINABILITY PLAN**

VISION STATEMENT

CONTEXT

FUNDING SOURCES

SUSTAINABILITY GOALS

SUSTAINABILITY AREAS

KEY PARTNERS

TIME FRAME

Complementary reading

Hitchcock, D. E., & Willard, M. L. (2008). *The step-by-step guide to sustainability planning: how to create and implement sustainability plans in any business or organization*. Earthscan.

Winnard, J., Adcroft, A., Lee, J., & Skipp, D. (2014). Surviving or flourishing? Integrating business resilience and sustainability. *Journal of Strategy and Management*, 7(3), 303-315.

C3 Business plan

What is it?

A business plan is a document that describes the market, operational, marketing, and financial strategies and actions. It acts as a roadmap for how to structure, run, and grow a new or existing business.

To write a business plan we don't necessarily have to go through a long and painful process. Often the important thing is to help in the purposes for which it is being done: to function as a roadmap or to facilitate access to funding or partners.

Objectives

- To guide entrepreneurs and managers in finding detailed information about their business, the products and services they offer, customers, competitors, and suppliers
- To identify the viability of an idea
- To help get funding or bring in new business partners

How does it work?

On the next page we suggest a structure of the plan. It does not have to be strictly followed. Instead, it must suit your needs and be adequate for those who will read it..

THE DOCUMENT MAY FOLLOW THE FOLLOWING STRUCTURE:

- 1. The executive summary:** brief description of the company; how the idea of creating the company came about; presentation of the business concept (products or services that will be sold, what clients and markets and with what competitive advantages), and definition of value proposition
- 2. Company and market analysis.** Market analysis involves at least three dimensions: the current and potential consumer market, current and potential suppliers, and current and potential competitors

- 3. Organization and management.** Company structure and management team
- 4. Service and product line.** Describe what you sell or what service you offer
- 5. Marketing plan:** to define the brand, products or services, or for the product lines
- 6. Operational plan:** consists of organizing the whole productive process of the business
- 7. Financial plan:** with information to provide direction and meaning to financial decisions and build scenarios and strategic evaluation
- 8. Appendix**

Complementary reading

- Berry, T. [2003]. *Hurdle: the book on business planning: how to develop and implement a successful business plan*. Palo Alto Software, Inc.
- Chwolka, A., & Raith, M. G. [2012]. The value of business planning before start-up—A decision-theoretical perspective. *Journal of Business Venturing*, 27(3), 385-399.
- Delmar, F., & Shane, S. [2003]. Does business planning facilitate the development of new ventures? *Strategic Management Journal*, 24(12), 1165-1185.

AN APPLICATION OF THE THE VCW META FRAMEWORK: WHICH INTERNATIONAL MARKETS ARE MORE ATTRACTIVE FOR NEXTLAND SERVICES?

CHAPTER 2

By Luis Filipe Lages and Carlos Reis-Marques

1. Introduction

1.1. Project Overview

NEXTLAND PROJECT has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 869520. NextLand strives to develop a complete set of operational midstream agriculture and forestry services. EO-based services are under a shared service delivery platform, leveraging GEOSS and Copernicus data and products complemented by the absorption of other very high-resolution EO and in situ data streams. This set of services are co-designed with:

1. Representative downstream service providers composed of entities that deliver precision farming and forestry services to farmers and forestry stakeholders.
2. Interface associations representing a large number of farmers and forest managers.
3. Public institutions with responsibilities in monitoring and implementation of these services.
4. Large agriculture and forestry companies with R&D capabilities.

NextLand store will create an ecosystem to demonstrate European service providers' strengths throughout the whole value chain of the high-tech agriculture and forestry sector.

NextLand is an Online Store for organizations with technological know-how to serve the agriculture and forestry markets. This Online Store will provide added value by being a) a one-stop shop for added value service providers (AVSPs) and end-users, b) where they can find unique or bundled earth observation (EO) services for their specific needs. These EO services must have high accuracy and up-to-date information as well as be rapid-on-demand, highly customizable, and offered at a competitive pricing. This one-stop-shop facilitates service providers offer to the downstream market (e.g., value-added ser-

vice providers, consultants) and end-users with technological know-how in forestry/agriculture (e.g., large agriculture/forestry companies with R&D capabilities, interface associations, and public institutions)."

NextLand Online Store vision is to create a better way for EO service providers supplying the EO downstream market and end-users with technological know-how in forestry/agriculture. NextLand's vision originates from the users' needs for verifiable accuracy of the products and consistency of the EO products. NextLand is based on seasonal data takes, tailor-made solutions that may be easily integrated into existing users' chain of decision and implementation, free and easily accessible input EO data, and personal support services. Processes and services have to be reliable; results have to be reproducible and accepted as surrogates to existing time and resource-consuming practices.

GENERAL INFORMATION	
Project Title	Next Generation Land Management services for Agriculture and Forestry
Starting Date	1st June 2020
Duration in Months	36
Call (part) Identifier	H2020-EO-2020 EO-2-2020
Topic	EO Big Data Shift
Fixed EC Keywords	Visual techniques / Visual analytics / Intelligent data understanding, Earth Observation / Services and applications, Space data exploitation, Data mining and searching techniques, Downstream industr
Free Keywords	Big Data Challenges, EO Big Data

1.2. Scope

THE AGRICULTURAL AND FORESTRY sectors need to address several challenges when facing increasing technological developments, market demand, competition, and extreme weather conditions. One emerging practice to address these challenges is the use of satellite technology. In Europe, the Copernicus program allows free access to satellite images. NextLand, an expert consortium of eleven institutions, uses these data to provide several services that bring innovation to the agricultural sector and address sustainable development goals.

NextLand aims to co-design services with Alpha and Beta users, considering their needs for new or improved EO-based services. These Alpha and Beta users are representative of the four target markets and will help us to validate NextLand's sales potential for both agriculture and forestry services.

Once NextLand co-design is concluded and NextLand has mature services and a solid online store, the first sales will emerge next to alpha- and beta-users. After these initial sales, a natural question will emerge: Now that NextLand has proven its sales potential, which geographical market is the most attractive to find new buyers?

The findings presented in this document will be used in a later stage of the project to feed the development of the deliverables related to marketing and commercial strategy, sales, and upscaling to beta testers.

2. Background

2.1. EO Industry

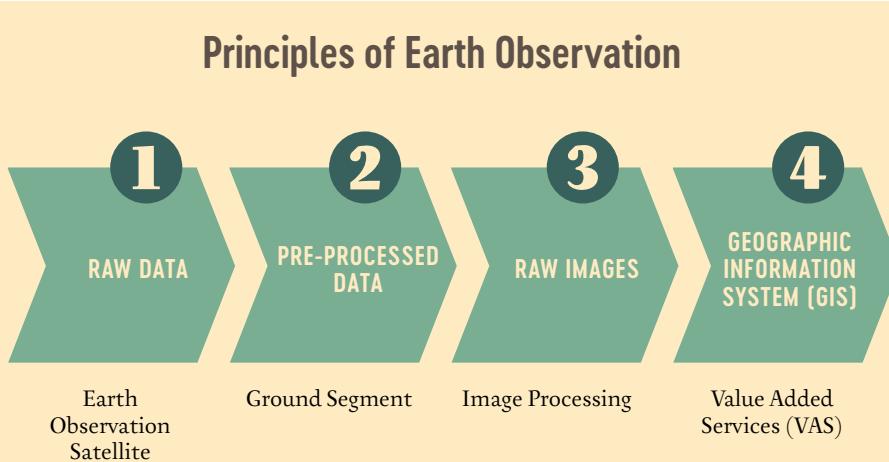
ACCORDING TO EUROPEAN COMMISSION (2019), Earth Observation (EO) refers to the application of remote sensing technologies to monitor land, marine (rivers, lakes), and atmosphere. Satellite-based EO relies on satellite positioned payloads to gather imaging data about the Earth's properties. The images are then pro-

cessed and examined to obtain different information types to assist an extensive range of applications and industries.

In 2017 the global EO market was between EUR 9.6 and 9.8 billion, distributed between EO satellite sales (the upstream section of the supply chain) and the EO data procurement, processing, and transformation into information products for end-users (the downstream area). The global market is principally driven by upstream demand, which constitutes about 70% of the total revenues. The global EO downstream market is estimated to be between EUR 2.6 and 2.8 billion, mainly driven by governmental applications representing 50% and 60% of the revenues (European Commission, 2019). The downstream market exhibits constant growth at an anticipated CAGR of seven up to 2022.

The EO downstream business is experiencing strong trends like changes in business models towards near-real-time applications, more and more integrated solutions, cloud computing, and computer science to enhance analytics' value. EO 2.0 players are joining the market with an innovative entrance. These stakeholders, vertically integrated, have in-house capabilities to manufacture satellites, handle the information, and develop and offer services (European Commission, 2019).

Figure 1. Principle of Earth Observation (European Commission, 2019)



2.2. EO Value Chain (Upstream, Midstream and Downstream, End-Users)

THE TERM “VALUE CHAIN” is associated with a set of interdependent economic activities creating added value around a product, process, or service and a group of interlinked economic actors, operating in a strategic network across firms of different sizes, sectors, and borders.

- To better understand the Value Chain in which NextLand operates, the Earth Observation (EO) market was divided in three categories of EO industry players plus the final EO end-users:
- EO Upstream Industry - simply composed of satellite data, providing the infrastructure and input for any services.
- EO Midstream Industry (e.g., Deimos, VITO, DHI Gras, Vandersat) - EO experts or intermediary users gathering, storing, and processing EO data, partly already creating value-added services (VAS).
- EO Downstream Industry (e.g., SoilEssentials, BDB, S&T, Forest Design) - service providers or consultants that create VAS from EO-based data (data transformation) advises the end-users on EO-based products for their business addressing their tailored needs.
- EO End-Users in agriculture/forestry (e.g., European Forest Institute, Finish Forest Center, JCyl).

EO end-users include all businesses and institutional players (e.g., large companies with R&D capabilities, interface associations, public entities) for which EO-derived products are input, but whose core activity is not centered on EO. Thus, they typically rely on experts to access relevant input information and products. (European Union, 2019)

The following figure shows the three main categories which are the focus of the EO NextLand Value Chain.

Figure 2. NextLand Value Chain

NextLand Value Chain



NextLand has no partners associated with Upstream Industry.

In the table below are presented examples of NextLand partners and stakeholders associated with NextLand Value Chain (EO Midstream, EO Downstream and End-Users):

Table 1. NextLand partners and stakeholders present in the NextLand Value Chain

EO MIDSTREAM INDUSTRY	EO DOWNSTREAM INDUSTRY	END-USERS
ELECNOR DEIMOS GROUP	SOILESSSENTIALS	EUROPEAN FOREST INSTITUTE
VITO	BDB (SSB- Soil Service Belgium)	Interface Associations
DHI GRAS	S&T	Public Institutions
VANDERSAT	FOREST DESIGN	Large companies with R&D capabilites

Nova SBE will support the value chain in different dimensions, namely by implementing the go-to-market, sales and sustainability strategies which will cross the different levels of the value chain.

2.3. Assessment of EO Market in Agriculture and Forestry

2.3.1. Organizations

WE ANALYZED 155 EO companies' sites in order to better understand the needs and trends in EO agriculture and EO forestry markets. The table below presents the 155 websites randomly selected which have been analyzed, their operating areas (A-Agriculture; F-Forestry), and respective links.

Table 2: Organizations Operating in EO in the fields of Forestry and Agriculture.

ORGANIZATIONS OPERATING IN EO

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
1	Airbus (Space)	A+F	www.intelligence-airbusds.com/monitoring-services-for-agriculture
2	Ariespace	A	www.ariespace.com
3	Agrivi	A	www.agrivi.com/en/farm-management
4	Agroapps	A	http://agroapps.gr/en/projects/completed/
5	Assimila	A	http://www.assimila.eu/
6	Azavea	A+F	www.azavea.com/work/
7	Agromonitoring	A	www.agromonitoring.com
8	ACRI-ST	A	www.acri-st.fr/about-us/
9	Boeing	A	www.boeing.com/space/
10	Brockmann Consult	A+F	www.brockmann-consult.de/portfolio/idepix/
11	CS Group	-	www.uk.c-s.fr/Geoinformation-Image-Processing_a529
12	cgi-group	A+F	www.cgi-group.co.uk/en-gb/video-and-space/industrialise-your-application-geodata360
13	Cloudeo	A+F	www.nor.cloudeo.group/
14	CloudFerro	A+F	https://creodias.eu/what-is-creodias
15	CNES	A	www.cesbio.cnrs.fr/en/homepage-2/

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
16	Consortis	A	www.consortis.gr/en/applications
17	DataPink	A	www.datapink.com/expertise.html
18	Descartes Labs	A	www.descarteslabs.com/#Applications
19	Deimos Imaging	A+F	www.deimos-imaging.com/industry/agriculture/
20	DRAXIS	A+F	http://envi4all.eu/
21	EOAnalytics	A	http://eoanalytics.ie/
22	earthi	A+F	www.earthi.space/industries/agriculture/
23	Esri	A+F	www.esri.com/en-us/arcgis/products/arcgis-online/overview
24	Euroconsult	A	http://www.euroconsult-ec.com/about
25	European Space Imaging	A+F	www.euspaceimaging.com/agriculture-forestry
26	EOS	A	www.eos.com/lv/
27	ENGESAT	A	http://www.engesat.com.br/
28	Eurosense	A+F	www.eurosense.com/products/
29	e-geos	A+F	www.e-geos.it/#/hub/hubPlatforms/platform/platform-agrigeo
30	ExoLabs	A+F	www.exolabs.ch/
31	Flyby	A	www.i-emsat.co.uk/
32	FarmBlick	-	www.farmblick.de/
33	FDC	A+F	http://www.fdc.fr/expertise/earth-observation
34	GAF AG	A	www.gaf.de/content/agroview
35	Geo4i	A+F	http://geo4i.com/en/nos-services#Revente
36	geocento	A	www.geocento.com/earthimages-satellite-imagery-search-tool/
37	GET	A	www.getmap.eu/business-units/earth_observation/
38	Geosys (Urthecast)	A	www.urthecast.com/geosys/
39	Geosystems Hellas S.A.	A+F	www.geosystems-hellas.gr/category/products-en/hexagon-geospatial-software-en/remote-sensing/
40	GEOSYSTEMS Polska	A+F	www.geosystems.pl/en/hexagon-geospatial/
41	GeoVille	-	www.geosystems-hellas.gr/category/products-en/hexagon-geospatial-software-en/remote-sensing/
42	gim	A	www.gim.be/en/products/gis-software-1

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
43	gisat	A	http://www.gisat.cz/content/en/applications/agriculture
44	GMV	A+F	www.gmv.com/en/Products/Space/
45	Hexagon Geospatial	A	www.hexagongeospatial.com/products/power-portfolio/erdas-imagine
46	Hisdesat	A	www.hisdesat.es/
47	iABG	-	www.iabg.de/en/business-fields/space/
48	ICEYE	-	www.iceye.com/
49	iCON	A	http://www.icon.ie/
50	IGN FI	A+F	www.ignfi.fr
51	ibisa	A	www.ibisa.network
52	insar	A	www.insar.space
53	isardsat	A	www.swicca.eu
54	eopages.	A	www.eopages.eu
55	Kleffmann Group	-	www.kleffmann.com/en/analytical-tools/kleffmann4you/amsisseid--amiscrop-protection/
56	Kongsberg	A	www.spacetec.no/
57	KAST	F	www.ksat.no/services/earth-observation-services/
58	latitudo40.	A	www.latitudo40.com/
59	maptailor	A	www.maptailor.net/
60	MDA Corporation	A	www.mdacorporation.com/geospatial/international/markets/agriculture/
61	MAXAR	A	www.maxar.com/industries/earth-observation
62	Metria	A	www.metria.se/branschanpassade-losningar/skog/
63	NEO	A	www.neo.nl/oplossingen/signaleyes-landelijk-gebied
64	neuropublic	A	www.neuropublic.gr/
65	NOVELTIS	F	www.noveltis.fr/en/products-and-services
66	oikon	F	www.oikon.hr
67	open-cosmos	A	www.open-cosmos.com/
68	orbitaleos	-	www.orbitaleos.com/
69	Planet	A+F	www.planet.com/products/platform/

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
70	planetek	A+F	www.planetek.it/eng/products/all_products/erdas_imagine
71	PML	-	www.pml-applications.co.uk/
72	ProvEye	A	http://proveye.ie/#
73	ReSAC	A	http://www.resac-bg.org/index.php/en
74	Rezatec	A+F	www.rezatec.com/about
75	rheagroup	A+F	www.rheagroup.com/
76	rss-hydro	-	http://www.rss-hydro.lu/2018/02/core-skills-and-activities.html
77	SILEX	-	http://silexclouds.com/
78	Sinergise	A	www.sinergise.com/sites/default/files/attachments/turnkey_gis_agriculture_leaflet_web.pdf
78	SIRS	A+F	www.sirs-fr.com/sirs/en/
79	SkyfloX	A	www.skyflox.eu/products/
80	Space Applications Services	-	www.spaceapplications.com/systems-services
81	space4environment	-	www.eurogeographics.org/
82	SPACE4GOOD	A+F	www.space4good.com/projects
83	SESONOMIC	A	www.sensonomic.com/
84	Spacenus	A	www.spacenus.com/home-em
85	Satellogic	A	www.satellogic.com/about/
86	Satagro	A+F	www.satagro.pl/#start
87	Satcom	-	www.satcomglobal.com/
88	spaceseed	-	http://spaceseed.eu/
89	spacesur	A+F	www.spacesur.com/
90	Spatial Services	-	http://www.spatial-services.com/en/spatial-services-ltd/
91	Smart Agriculture (SMAG)	A	https://en.smag.tech/
92	Spectator	A	www.spectator.earth/
93	specto-natura	-	http://www.specto-natura.co.uk/
94	Spottitt	-	www.spottitt.com/about/spottitt-environment/normalized-difference-vegetation-index-ndvi/

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
95	Sobolt	A	www.sobolt.com/
96	Telespazio	A	www.e-geos.it/#/hub/hubPlatforms/platform/platform-agrigeo
97	Terradue	A+F	www.terridue.com/portal/
98	terranis	A	http://terranis.fr/en/about-us/
99	TerraSigna	A	http://www.terrasigna.com/
100	UrtheCast Corp	A+F	www.urthecast.com/geosys/precision-ag-farm-services/
101	Vito	A+F	www.remotesensing.vito.be/applications/remote-sensing-agriculture
102	20tree	F	www.20tree.ai/
103	OneSoil	A	www.onesoil.ai/en/
104	Data Farming	A	www.datafarming.com.au/
105	Sarmap and Cropix	A	www.cropix.ch/
106	SSB-Soil Service Belgium	A	www.bdb.be/eng/rubriek/00/
107	HRL Forests – Copernicus Land Monitoring Service	F	www.land.copernicus.eu/pan-european/high-resolution-layers/forests
108	The Global Forest Watch	F	www.globalforestwatch.org/
109	Forest-TEP	F	www.f-tep.com/
110	Global Surface Intelligence	-	www.gwis.jrc.ec.europa.eu/
111	The European Forest Fire Information System (EFFIS)	F	www.effis.jrc.ec.europa.eu/
112	tool CSLIM	A	www.qsm.com/problems-we-solve
113	expert system EPIPRES	A	www.expertsystem.com/products/cogito-intelligence-platform/
114	ALPHA Consultants	-	www.alphacons.eu/#:~:text=ALPHA%20Consult%20is%20a%20European,Unmanned%20Aerial%20Vehicles%20[UAVs].
115	BEIA Consult International	-	www.beiaro.eu/services/
116	BHO Legal	A+F	www.bho-legal.com/en/geoinformation/

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
117	ConsultingWhere	-	www.Consultingwhere.com/what-we-offer/
118	COWI	-	www.cowi.com/
119	CybELE	F	https://www.cybele-project.eu
120	GEO University	-	www.geo.university/
121	Harris	A	www.l3harris.com/
122	ICUBE-SERTIT	-	www.earsc.org/2007/07/08/sertit-ulp-observer/
123	DHI-GRAS	F	www.dhi-gras.com/
124	Jeobrowser	-	www.mapshup.com/
125	Nerco	F	www.earsc.org/2018/08/28/nerco/
126	NearMap	-	www.play.google.com/store/apps/details?id=eu.bischofs.photomap&hl=en
127	PWC	-	www.pwc.fr/en/industrie/secteur-spatial/
128	Randbee	A	www.randbee.com/
129	Rasdman	-	www.rasdaman.com/product.php
130	Serco Italia	-	www.onda-dias.eu/cms/
131	Spacemetric	-	http://spacemetric.com/
132	SpaceTec Partners	-	www.spacetec.partners/
133	TAKT-IKI	-	http://www.rst-tto.com/index_en.html
134	TechWorks Marine	-	www.techworks.ie/en/
135	TerraScan	F	http://www.terrassolid.com/products/terrascanpage.php
136	TFE Energy	-	www.tfeConsulting.com/
137	Thales Alenia Space	-	www.youtube.com/watch?v=D1T1sfcmml
138	TNO	-	www.tno.nl/en/focus-areas/defence-safety-security/
139	Visioterra	-	www.visioterra.fr/?VtWeb
140	Wasat	A	www.wasat.pl/en/projekty/services-for-precision-farming/
141	Jallco	A	https://eopages.eu/company/jallco-ltd
142	GMV	F	gwis.jrc.ec.europa.eu/
143	Global Wildfire Information System	F	gwis.jrc.ec.europa.eu/

N.o	COMPANY NAME	AGRICULTURE /FORESTRY	LINK
144	Tesselo	A	https://tesselo.com/
145	Space-Intelligence	F	www.space-intelligence.com/
146	Astrosat	A	www.astrosat.space/
147	Orbital Insight	A	orbitalinsight.com/
148	terraspatium	A+F	http://www.terraspatium.gr/
149	termodron	A	http://www.termodron.si/
150	Tesselo	A+F	
152	Kleffmann Group	A	https://www.kleffmann.com/en/analytical-tools/kleffmann4you/amisseed--amiscrop-protection/
153	HERMESS	-	http://www.hermess.nl/
154	GeoVille	-	www.geosystems-hellas.gr/category/products-en/hexagon-geospatial-software-en/remote-sensing/
155	Elecnor Deimos	A+F	https://elecnor-deimos.com/projects/

Our qualitative analysis of 155 sites revealed that both Agriculture and Forestry are popular themes among EO organizations, with 101 EO organizations offering services in Agriculture and 50 organizations offering services in Forestry.

2.3.2. Market Trends

OVER A PERIOD of three months, we went through the different websites and analysed them intensively. This analysis of 155 sites also revealed that there are different technological trends in agriculture and forestry. The most relevant ones are:

TECHNOLOGICAL TRENDS

- Drones
- Big data

- Artificial intelligence
- Cloud platforms
- Open data sources
- Machine-learning
- Agriculture robots
- Smart agriculture
- Integrated farm management
- Satellite imagery
- UAVS imagery
- Internet of things (IoT)
- Footage from aeroplanes
- Food traceability market

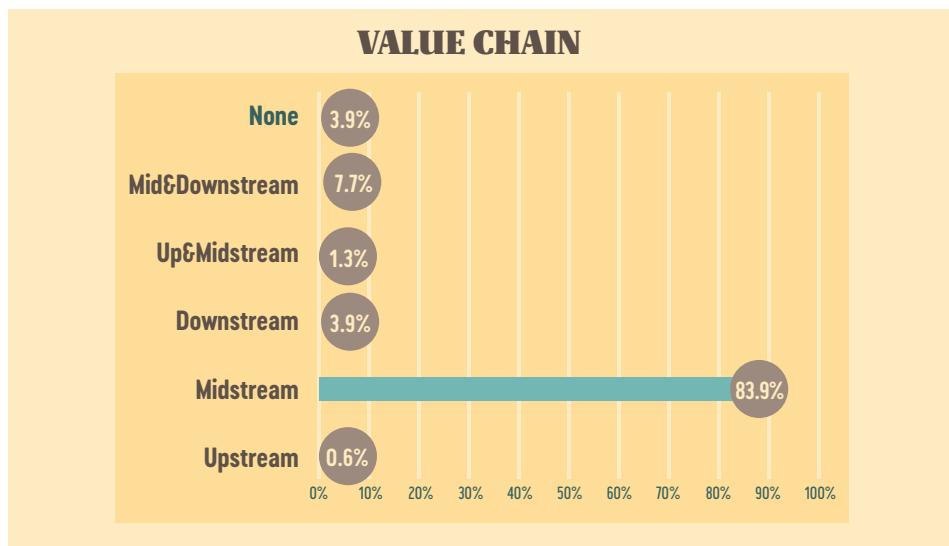
THESE TRENDS/SOLUTIONS ARE BEING PRESENTED IN THE 155 WEBSITES

- System to provide real-time irrigation maps and custom weather forecasts.
- Software for farm management
- System to easily monitor and analyse all farm activities
- Earth observation systems for irrigation and crop growth monitoring
- A solution to environmental monitoring, modelling, and prediction decisions
- Satellite images to support farmers' management decisions
- Sensors to measure production evolution
- Platform to search, view, and process satellite products
- Algorithms and models to transform businesses quickly, efficiently, and cost-effectively
- A solution to forecast air pollution data customized
- Intelligent location for mapping and analysis
- High-resolution images for viewing areas
- Satellite data fusion and big data analysis
- Intelligent management systems
- Imagery and geoinformation services
- Land monitoring and location analysis
- Secure satellite communications
- Assurance to commercial and government organizations
- Processing software for remote sensing applications
- Multi-mission satellite data diagnostic
- Systems to support everyday decisions

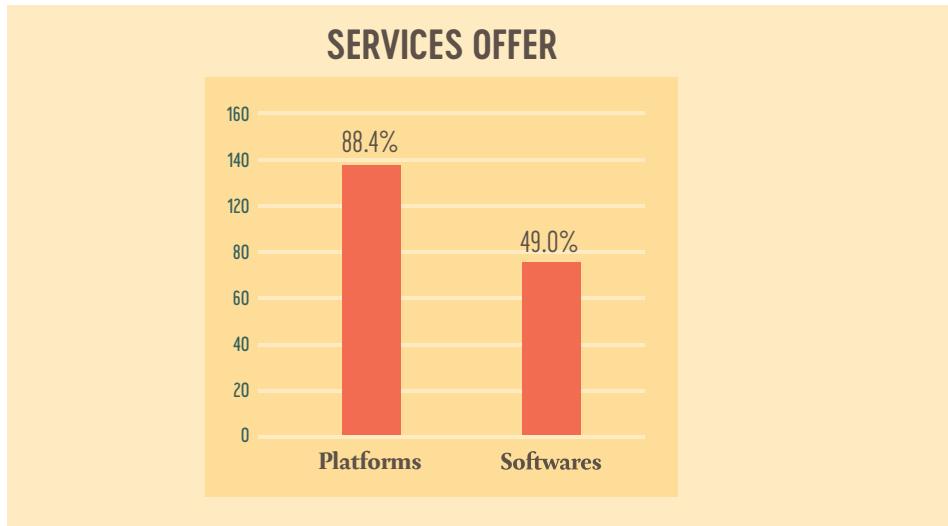
- Geospatial assessments
- Crop information
- Digital image data
- Remote sensing applications
- Geoinformation services based on Earth Observation
- Monitoring ecological parameters and environmental telemetry.

After an in-depth analysis of 155 companies' EO sites, Figure 3 demonstrates that the great majority of EO companies are positioned as Midstream (84%) EO companies.

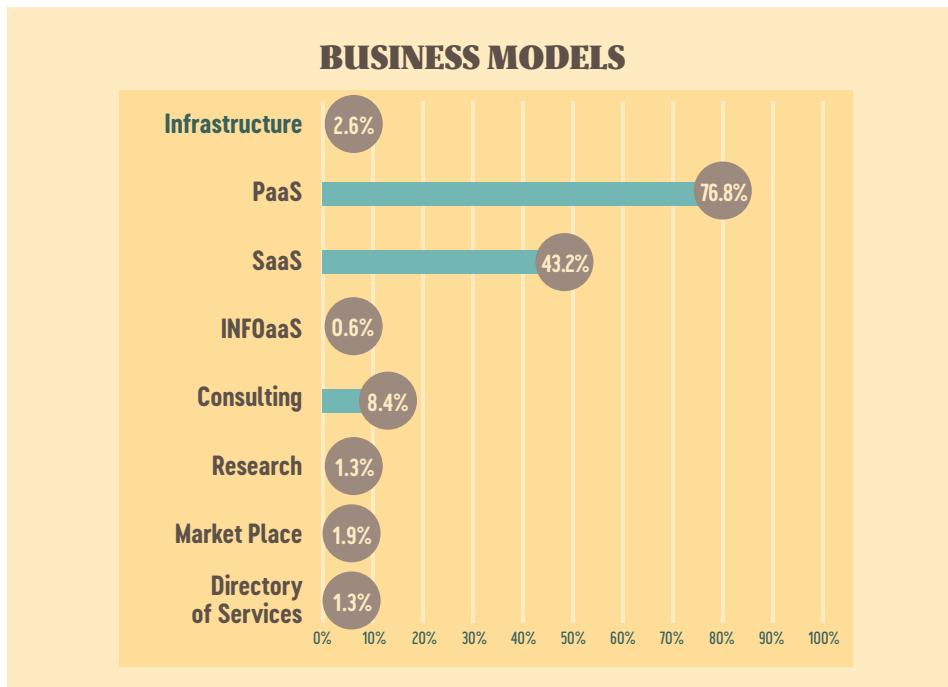
Figure 3. Value Chain in EO.



Also, the majority of companies' services are based on platforms (88%). 49% provide software solutions simultaneously (see Figure 4).

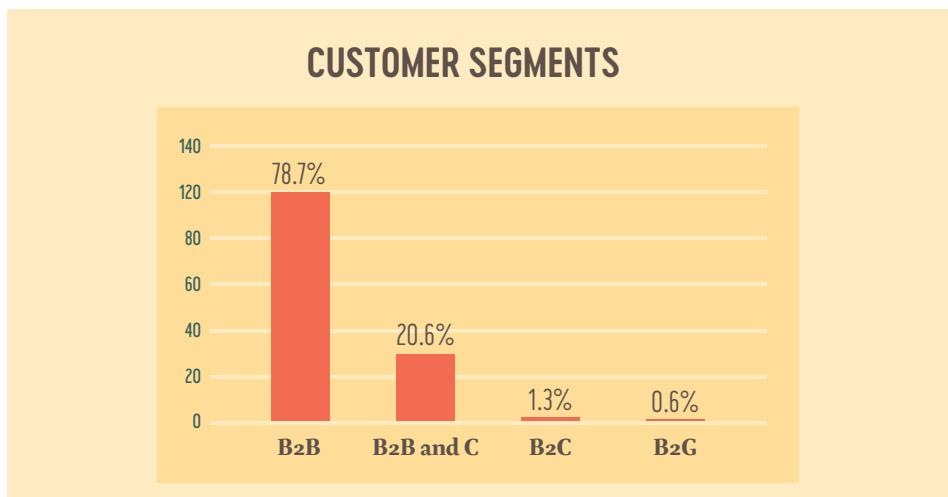
Figure 4. Services Offer in EO.

The majority of business models identified are based on PaaS (76.8%), followed by SaaS (43%) and Consulting (8.4%) (see Figure 5).

Figure 5. Business Models in EO.

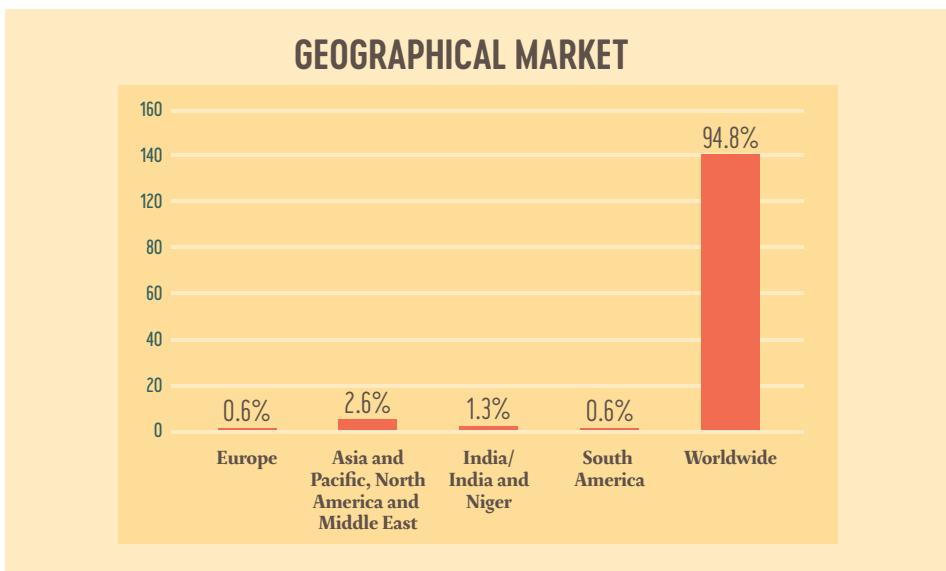
In terms of EO customer segments, 78.7% of the companies are doing business in Business to Business (B2B) markets. More than 20% focused on B2B and Business to Consumer (B2C). A minority of companies operate exclusively on B2C (1.3%) and, surprisingly, only 0.6% concentrate on Business to Government (B2G) (see Figure 6).

Figure 6. Customer Segments in EO.



An in-depth analysis of the 155 sites, suggests that the majority of companies (95%) are promoting their business globally without focusing on specific geographical markets. The rest of the sample focused on Europe (0.6%), Asia and Pacific, North America and the Middle East (2.6%), India and Niger (1.3%), and South America (0.6%) (see Figure 7).

Figure 7. Geographical Markets In EO.



2.4. Copernicus Programme

AN IMPORTANT recent development is the initiation of the Copernicus programme. With approximately €8.2 billion of co-investments between the European Commission and the European Space Agency until 2020, Copernicus represents the European Union's flagship EO programme. It aims to provide high-resolution and frequent data to support the developments of various environmental-related applications that benefit both public authorities and commercial businesses.

Copernicus data is generated by satellites, through the Sentinels and supporting missions, and through in-situ sensors located on the earth's surface (land and sea) as well as in the air, providing a continuous stream of valuable data. Six thematic services (Land, Marine, Atmosphere, Climate, Emergency and Security) are available that allow the development of various related applications. The data is processed and analyzed by the Copernicus services and complemented with data from other sources to offer Geo-Information System (GIS) to a range of users. The provided data and services thereby not only support added value in space-related areas, but many different user segments related to various industries, amongst them are Forestry and Agriculture (Copernicus 2019).

3. Why EO in Agriculture?

3.1. Market Diagnosis

THE EO INDUSTRY is a flourishing industry with a revenue stream of 1.38 billion and 575 individual companies only within the EU market (EARSC, 2020). State-of-the-art technology provided through EO offers great opportunities to address potential food shortages, improve resource management, and better handle the SDGs in an agriculture context.

In 2017, an estimated 866 million people were officially employed in the agricultural sector (FAO, 2018). When looking specifically at the EU, there are approximately 9.7 million people working in agriculture (Eurostat, 2018). The agriculture worker's average income across EU member states amounted to €28 500 (European Commission, 2018). China and India were the largest contributors to the global agricultural industry, with an output of \$5,084,800 million in 2018, contributing respectively 19.49% and 7.39% of the worldwide output (Statistics Times, 2018). Considering the global magnitude of individuals who make a living from farming, and the global market value from agriculture production, this suggests that the EU market size is quite small in global terms.

The growing population number pressures the agriculture industry to extend its production efficiency and outcome. To extend global food production while providing a preserved environment, agriculture will have to increase its productivity by using innovative technologies, like EO-data solutions (European Commission, 2019). The agriculture sector plays a vital role in the global economy. It's rapidly evolving thanks to the emergence and development of various techniques, especially in the face of a changing environment. In the coming years, agriculture will tackle several significant pressures, including a rise in the world population, the threat of global climate change, and the intensifying competition for increasingly scarce land, water, and energy resources.

The world's population is projected to grow from 7.4 billion in 2018 to 9.7 billion by 2050, causing a necessity to extend food production from 8.4 billion tons to around 13.5 billion tons a year (European Commission, 2019). Climate change could cut crop yields, especially in most food-insecure regions.

Agriculture accounts for 70% of water use while generating unsustainable levels of pollution and waste. A report by the Food and Agriculture Organization of the UN (FAO, 2018) found that the amount of hungry and malnourished people increased from around 804 million in 2016 to 821 million in 2017 – and has been rising since 2014 (European Commission, 2019). Malnutrition can cause illness or health crises. These challenges have led to a push for sustainable agriculture supported by EO solutions.

The agricultural sector is beginning to emphasize sustainability in the face of global challenges, including climate change, population growth, and the increasing competition for land, water, and energy resources. Today, European farmers face the dilemma of providing food to ensure food security and profitability, while also trying to cut back their impact on the environment and climate and protect the encircling biodiversity. The Common Agricultural Policy (CAP) seeks to support farms and improve their productivity while ensuring they'll make an inexpensive living. It also aims to tackle global climate change and, therefore, the sustainable management of natural resources. To learn from CAP, farmers must ensure they're compliant with the policy's goals, including the environmental and sustainability aspects, and are able to integrate technology into their daily operations. Besides, the implementation of measures to accomplish the European Green Deal needs also to be tackled by farmers, especially through actions to increase healthy soil and biodiversity, as well as healthy and affordable food.

3.2. Major Stakeholders

AN ANALYSIS of the EO agriculture sector revealed the existence of seven major stakeholders:

- Leading investors (major public and private investors)
- Leading suppliers (e.g., European Space Agency, Canadian Space Agency, AIRBUS, CAST)
- Leading customers (e.g., downstream customers/consultants, farmers, farming associations, insurance, traders, food organizations)
- Leading intergovernmental organizations (e.g., European Union, United Nations, World Trade Organizations)

- Leading non-governmental organizations (e.g., FAO, UNODC)
- Leading R&D institutes (universities, research institutes, and development centres)
- Employees in the agriculture sector

EO end-users include public players (e.g., governmental authorities which need precise information to monitor specific issues for specific policies and regulations) and private players (e.g., agricultural corporations, food companies, agronomic advisors, etc.).

Farmers, who might be critical end-users of EO data farming products, may face difficulties accessing or paying individually for the service. Thus, in many cases, the direct clients of intermediate users are agricultural associations and cooperatives, which will then distribute the products to their farmers. Farmers may also struggle to implement these services due to digital knowledge or a lack of infrastructure (e.g., strong broadband connection) (European Commission, 2019). Through our competitive analysis and benchmarking of different EO players, we identified that numerous EO-enabled agriculture service providers have serious difficulties in translating EO data in ways that are easy to use by the final end-user without technical know-how (e.g., farmers). There are often serious difficulties in translating the technical language for the final users of the services. Bridging this gap between EO players and the users is one of the most significant challenges to be solved in EO in the coming years.

3.3. Market Opportunities

THE MARKET CONDITIONS for the use of EO technology in Agriculture seem to be favourable overall. Three main drivers for the adoption of satellite-based agricultural technology can be identified:

As a first driver, there is a strong global push for the promotion of sustainable agriculture in the past years. The overall goal of the efforts is thereby to enable economically profitable farms that are at the same time socially responsible and have a minimum negative impact on the environment. EO technologies can play a key role in supporting these efforts and helping achieve these goals. Examples include the use of satellites in water

management applications, as well as measuring and preventing pollution of the ground, water, and air.

Global issues related to food security, especially prevalent in developing countries, represent the second driver. In some parts of the world, extreme natural conditions might make traditional farming methods difficult, with unforeseen weather events (such as drought) ruining crops that a large amount of the local population heavily relies on. EO data can help to better forecast and monitor the impact of such occurrences. As an example, the global initiative Group on Earth Observations Global Agricultural Monitoring Initiative (GEOLAM) is amongst others already tasked with monitoring countries at risk of food security and provides early warning systems on general food shortages as well as detection of hot spots that will affect the farmer's livelihood.

The third and final driver is public authorities increasingly shifting toward the use of monitoring services based on EO data. Public end-users such as governmental bodies and local authorities are both increasingly using EO solutions to monitor, identify and measure important crop production areas to ensure farmers are complying with responsible farming policies. Automated monitoring solutions based on EO-data help to reduce costs and improve overall efficiency, as traditional methods have been relying on on-the-spot checks, which are both costly and limited in scale (Copernicus 2019).

3.4. Applications, Benefits, and End-Users

AGRICULTURE REPRESENTS one of the sectors with the longest historic use of EO technology. To give some more concrete examples of how satellite data has been used in this industry and show how End -users benefit from EO, three types of EO applications in Agriculture will be highlighted: smart/precision agriculture, detailed crop monitoring and water management & drought monitoring solutions (Copernicus 2019):

- **Smart/precision agriculture**

Precision farming is noted to be the most prominent domain where satellite data is used for providing significant benefits in agriculture. In this case, EO data enables farmers to gain valuable insights related

to the identification and quantification of various farming inputs across their managed fields or farms. These inputs include water, seeds, fertilizers or pesticides. Having detailed information about these allows farm managers or farmers to tailor their farming practices accordingly. The major benefit, in terms of profitability and cost-efficiency, is the increased overall productivity through the optimized use of water fertilizers, and seeds. Lastly, by reducing the use of e.g fertilizers in the fields, precision agriculture applications allow farmers to protect the environment by reducing soil and water pollution. Apart from farmers, agricultural cooperatives play a key role as end-users in distributing satellite solutions to their members.

- **Crop monitoring**

In the area of crop monitoring, EO data can for example support the recurring, seasonal mapping of cultivated crops over a large area. Classifying land use through satellite data makes it possible to access crop location changes on a large scale and quickly identify any troubling changes or trends that might occur. This is critical for any national or regional public authority responsible for food security. Monitoring through EO data can also help with subsidy controls, such as the Common Agricultural Policy (CAP). Traditionally, the requirements for farmers to obtain subsidies under the CAP were verified on the spot. This incurred high costs for the monitoring body and made it impossible to be carried out frequently and on a large scale. Satellite data makes it possible to monitor large areas on a regular basis and therefore presents an efficient and cheaper solution for this purpose. Therefore, especially public authorities that provide these subsidies, and farmers who perform the controls can greatly benefit from EO applications.

- **Water management & drought monitoring**

In the context of water & drought monitoring, EO data can be applied to provide wetness indicators, helping to identify changing levels of irrigation needs within a larger field. This greatly contributes to more efficient use of water. In addition to wetness indicators, satellite-based monitoring of crops and the surrounding land area can reveal unhealthy vegetation and areas with a critical lack of water. This information is key to better monitoring or entirely preventing droughts in the first place. Lastly, spotting an algae bloom in a nearby body of water can hint at the heavy use of fertilizers in the region, resulting

in soil and water pollution. Early identification of such events can help to prevent pollution of broader water systems. In all the above-mentioned cases, EO applications are supporting national public authorities or international bodies in carrying out their essential work to make the agriculture industry more sustainable.

3.5. Strengths and Weaknesses of Copernicus Data in Agriculture

THE EUROPEAN UNION'S COPERNICUS program has been credited with bringing various benefits to the agriculture industry.

One of its main advantages is the free and open data policy. Frequently updated satellite imagery can be accessed by any organization or individual to be further processed and analysed for use in a variety of applications. This has led to the creation of numerous start-up companies offering EO-based solutions in agriculture. These monitoring and decision-support solutions are key in helping farmers manage their crops more efficiently, while simultaneously minimizing the overall ecological impact, helping to achieve the EU's directive on achieving a more sustainable farming sector. Additionally, the free nature of Copernicus data results in more cost-efficient EO solutions, giving farmers a strong incentive to use the related services, as they are generally unwilling to pay premium prices for high-tech products. Lastly, cost-efficiency also presents itself on the side of governmental institutions, e.g. in the form of assessing farmers' eligibility for subsidies under the Common Agricultural Policy (CAP). Copernicus satellite data enables the requirements to be monitored automatically and therefore in a more resource-efficient way, instead of relying on manual assessment and heavy paperwork.

The quality and reliability of Copernicus's data represent another strong point of the program. Good resolution and quick revisit times allow for detailed insights and continuous data updates, enabling a wide range of applications that address many sub-sectors of agriculture, such as precision farming and water management techniques or useful products for public authorities, as described in greater detail in the previous chapter.

Even though the Copernicus program presents major strengths in re-

lation to the Agriculture industry, one major drawback is the limit in spatial resolution provided by the current generation of Sentinel satellites. While very specific applications such as vineyard monitoring require resolutions in the scale of 3-5m per pixel to give any meaningful insights, the Copernicus program's resolution is currently limited to 10m per pixel. This leads certain EO service providers to acquire data from other, commercial data providers offering higher spatial resolution (Copernicus 2019).

3.6. Competitor Analysis

TO BETTER UNDERSTAND the market, it is wise to look at the market through Porter's lens: Competitive rivalry, the threat of new entrants, the threat of substitutes, bargaining power of buyers, and suppliers' bargaining power. Figure 8 illustrates the summary of Porter's five forces EO in agriculture.

Figure 8. Porter 5 Forces EO in Agriculture.

Porter 5 Forces EO in Agriculture



The EO industry has been harvesting steady growth rates driven by government and private stakeholders. However, a few key players dominate the market using strong relationships with government organizations or using mergers and acquisitions to strengthen their position.

Many companies can obtain publicly provided EO data, and it is their

job to quantify and forecast the best methods for agriculture. Thus, we would characterize value-adding companies as having a relatively high level of intensity of rivalry. In the case of NextLand, it is required to find innovative ways to process the data since rivals can have access to similar data.

The threat of new entrants in the industry is high because EO data can be retrieved from open access. Examples of public sources are COPERNICUS in Europe and EOSDIS in the USA. Entering the market as an end-user player for a specific segment is not costly as many start-ups are doing it. Therefore, the EO industry is getting increasingly segmented due to the entrance of multiple start-ups that aim to deliver specialized intelligence-as-a-service instead of delivering only data. The entrance of new players will force prices down in the coming years. However, to require data from public sources, companies must comply with some conditions. Value-adding companies who entered into the EO industry at an earlier time have an advantage in their reputation for trustworthiness and excellence in providing accurate data analysis.

The threat of substitutes in the EO industry is moderate. Substitutes for the agricultural sector might include aerial images taken from drones, planes, or any other type of aerial remote sensing, in situ observations such as terrestrial measurements and inventories, GPS measurements, existing maps, and databases. Some of these methods are more precise than satellite and also much more time-consuming and more expensive. The imagery products provided by public sources operators are increasingly cheaper to obtain, with better quality, and the capabilities to implement and process the data are getting better.

There is also the need to account for the budgetary constraints and the lack of incentive on the government to invest in the agriculture sector using new technologies such as EO features versus the more “traditional” methods. As technology continues to improve, it would not be surprising if other forms of technology, specifically drones/aerial technology, will begin to provide more enhanced imaging of the current landscape. Nevertheless, EO value-adding companies are necessary for the continued improvement of agriculture throughout the world and to gain a more comprehensive understanding of the landscape.

Buyers in the EO agriculture sector, such as service providers, associations, large end-user companies with R&D capabilities, and public authorities, have medium bargaining power towards EO data and specialized intelligence. Even though these organizations could freely access EO images, the processing, analysis, study, and implementation of intelligence obtained from satellites require specialized service and highly trained users to do so. In the coming

years, with the increasing amount of data being produced by EO techniques and EO substitutes, the bargaining power of buyers is likely to increase as they will be less dependent on the service provider.

The EO midstream industry and value-adding service providers do not hold that much power in the market because of various government regulations and a plethora of value-adding companies who are competing to sell data to different agricultural organizations and larger farmers throughout the world. As time progresses and choices continue to expand, the overall power that suppliers have over the market will continue to diminish. As such, we would characterize the power of suppliers as being relatively low.

4. Why EO in Forestry?

4.1. Market Diagnosis

AS A PRIMARY STEP to better understand the forestry industry, vital facts were researched. Forests cover 30.8% of the world's acreage (FAO, 2020). Evidence shows that forests and trees contribute to the world economy regarding livelihoods and food security for several rural areas. They are critical for temperature change mitigation, wood production, and employment. It is estimated that the worth of the world's forests is approximately \$150 trillion (BCG, 2020; Muller Eva, 2018). Forests encompass a wide range of ecosystems that vary considerably in their characteristics, such as in species composition, structure, and the extent of modification by humans and by non-human factors. Thus, forest area is an insufficient parameter, on its own, for identifying important trends and assessing progress towards sustainable forest management. In terms of forest categories, we might consider regenerating forests and planted forests. Regenerating forests generally contributes more to biodiversity conservation and provides a wider range of benefits than planted forests. Nevertheless, when sustainably managed, planted forests can help reduce harvesting pressure on natural forests and may provide an important

ecosystem service. Several industries are connected to forestry, such as timber harvesting (which provides a continuous supply of trees for wood production), furniture, fuel-wood supplies, as well as indirect applications (e.g., service forest management and certification).

The European Union accounts for approximately 5% of the world's forests and the forested area of the EU is slowly increasing. In Europe, the area of naturally regenerating forests has increased in each of the last three decades, although the rate of gain slowed by almost half in 2010–2020 compared with 2000–2010, from 155 000 ha per year to 87 400 ha per year (UNECE and FAO, 2010).

However, forestry's valuable global asset is endangered by several threats. The UN estimates that about 3.9 million square miles of forest were lost since the start of the 20th century. Each second, a bit of forest such as a soccer field's dimensions is lost (Guardian, 2018). Natural fires are becoming very intense. Human-lit fires are usually accustomed to clear land for agricultural use. Valuable timber is harvested, and then the remaining vegetation is burned to create a way for crops like soy or cattle grazing (Derouin, S, 2019). By 2050 the planet's population is anticipated to achieve 9,8 billion, while income per capita is predicted to triple. This can cause increased wood harvesting. Using wood (including wood waste and residues) more efficiently to satisfy this demand is crucial to achieving a more resource-efficient, circular, and bio-based economy. In this sense, forest management and certification might play a significant role in ensuring efficient protection, development, and forest resource utilization. To handle these challenges, forestry-related EO companies might play a major role and generate €53.3 million (Copernicus, 2019). Moreover, EO might become an essential tool for forest managers to manage resource inventory, monitor, and forecast.

EO data is very useful for a wide range of forestry stakeholders, namely governmental authorities. Globally, 80% of forest areas are under government control, where the emphasis is often on forest management in terms of conservation and protection. Global initiatives, such as the UN's Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD), require participating countries to obtain highly accurate and precise data on forests and represent opportunities for intermediate users. Intermediate EO data users in the forestry domain include several private players (from micro-companies to larger players), public research institutions, and forestry management organizations. While public end-users represent 90%, private end-users represent only 10% In terms of the usage of EO forestry service solutions (Copernicus, 2019).

4.2. Major Stakeholders

AN ANALYSIS of the EO forestry sector revealed the existence of seven major stakeholders:

- Leading investors (Both public and private investors)
- Leading sponsors/suppliers (eg., Europe Space Agency, Canadian Space Agency, AIRBUS, CAST)
- Leading customers (g., public authorities, wood and fibre companies, downstream customers/consultants, private owners, insurance, traders)
- Leading intergovernmental organizations (e.g., United Nations, European Union, World Trade Organizations)
- Leading non-governmental organizations (e.g., FAO, UNODC, WWF)
- Leading R&D institutes (universities, research institutes, and development centers)
- Employees in the forestry sector

EO end-users include public players (e.g., governmental authorities which need precise information to monitor specific issues for specific policies and regulations) and private players (e.g., large organizations with R&D capabilities). The direct clients of intermediate users might be associations and cooperatives, which will then distribute the products to their members. Members may also struggle to implement these services due to their lack of digital knowledge or a lack of infrastructure (e.g., strong broadband connection) (European Commission, 2019). Similarly to EO applied to the farming sector, through our competitive analysis and benchmarking of different EO players, we identified that numerous EO-enabled forestry service providers have serious difficulties in translating EO data in ways that are easy to use by the final end-user without technical know-how (e.g., forestry owners). There are often serious difficulties in translating the technical language for the final users of the services. Bridging this gap between EO players and the users is one of the most significant challenges to be solved in EO in the coming years.

4.3. Market Opportunities

THE MARKET CONDITION for the use of EO technology in Forestry seems to be favourable overall. Three main drivers for the adoption of satellite-based forestry technology can be identified:

The first driver is represented by the significant cost reduction for monitoring the compliance with forest management best practices. Since various rules have been implemented by national forest agencies to prevent private owners from depleting national forest assets, the ability to monitor forest owners' compliance with the law is critical. EO-based solutions such as clear-cut maps enable authorities to enforce these rules within the forestry sector.

The ability to improve and preserve forest ecosystems and green infrastructures is the second main driver for EO in forestry. The preservation of forest ecosystems and green infrastructures are key for people's well-being, as they are responsible for hosting a variety of biodiversity. Additionally, they provide significant benefits to society and the economy in the form of ecosystem services such as soil erosion protection, watershed and climate regulation, carbon storage as well as water and air purification. Forest authorities can use EO data to accurately map a country's forest. By using satellite imagery collected over long periods, these authorities can easily detect changes in land cover or land use within forest areas, which helps to identify and act against e.g. illegal clearcutting.

The third driver is the enabling of higher yields in the forest industry due to EO data. To manage a forest sustainably, different activities must be conducted. For example, new trees should be planted within three years after clear-cutting an area, and newly planted forestry must be thinned within a decade before any commercial use can take place. For private forest owners, these represent costly investments with very low short-term returns. However, when looking at the long-term (80 years) the profitability of a forest is greatly improved by following the rules of sustainable forest asset management, as significantly more wood will be available for the final clearcut. EO-based monitoring applications can lead to greater yields within the forestry sector, as private owners' compliance with these sustainable practices can be assessed and enforced efficiently (Copernicus 2019).

4.4. Applications, Benefits, and End-Users of EO in Forestry

APART FROM the previously mentioned main drivers, there is a set of other EO-based applications that benefit private owners and forest authorities alike, namely resource mapping and resource monitoring (Copernicus 2019):

- **Resource Mapping**

Forest managers can accurately map their forest areas using satellite data. This is particularly useful for conducting inventories and validations of a current forest stand. Other applications include storm damage assessment after a weather event. With regards to the overall change of a forest and its ecosystem, satellites can provide forest authorities with time series of images, enabling the detection of changes in land cover or land use within a forest area, e.g., illegal logging or clear-cutting, or any urban expansion threatening the local ecosystem. Several EU policies aimed at sustainability managing and safeguarding Europe's Forest resources can thereby be supported through EO data. This capability is particularly important to governmental institutions or NGOs.

- **Resource Monitoring**

Satellite-based EO data represents a critical tool for generating statistics on land-use change or deforestation. Thereby, it is a key element for ongoing monitoring efforts of sustainable forest development on local, national, regional, and global scales. Applications may range from monitoring timber harvesting operations to prevent deforestation, supporting silviculture by generating insights on vegetation health or allowing for better management of wildfires by monitoring land use and post-fire erosion. Due to the broad range of possible applications in monitoring forest resources, multiple end-users can implement EO data to support their work. Possible users include commercial forest and timber managers, as well as governmental institutions and NGOs.

4.5. Strengths and Weaknesses of Copernicus Data in Forestry

IN CONTRAST to the limitations in resolutions observed within the Agriculture industry, Sentinel satellite data represent significant advantages over previous open-source satellites for Forestry applications. These technological advances make applications like forest resource mapping or the monitoring of forest variations more accurate. The Forestry industry again benefits greatly from the free data policy. Especially NGOs and SMEs that can use free Copernicus data to develop experimental EO-based projects before committing additional resources to deepen their EO skills. These organizations often lack the budget or financial resources to purchase commercial EO data without knowing the likelihood of success for their projects beforehand.

An additional contributing factor to bringing Copernicus data to both intermediate- and end-users is the Data and Information Access Services (DIAS). These cloud-based platforms allow for centralized access to Copernicus data and processing tools. The convenience of DIAS compared to solutions by other free data providers such as LandSat (US) is credited with raising the total share of forest restoration data based on Copernicus data to 30-40% worldwide.

While Copernicus data is popular for forest restoration applications, overall awareness for other application areas is somewhat lacking. While DIAS represents a centralized data access hub, its interface and data download channels can look complex to a non-technical (or non-expert) audience. In these cases, commercial data with very user-friendly download or visualization interfaces can be considered more attractive to non-technical users. Another current weakness is the difficulty of integrating Copernicus data into existing algorithms based on older datasets, e.g. LandSat. Especially the integration of data for monitoring certain variations such as deforestation can prove challenging due to differences in resolution and characteristics of the data (Copernicus 2019).

4.6. Competitor Analysis

TO EVALUATE the external environment, we performed Porter's Five Forces competitor analysis. The key takeaways are that suppliers' bargaining power is low because of the open-data policy within the EO industry and, therefore, with good potential partnerships between the midstream and the downstream sector. The threat of substitutes is considered moderate since there are some substitutes available only at more significant labor and resource intensity. The bargaining power of buyers is also thought to be low since many potential customers and only a limited number of EO downstream companies. The threat of the latest entrants, on the other hand, is estimated to be high, mainly thanks to the low entry costs to the downstream industry. The rivalry among existing competitors is high because of the competitors and their differentiated service offerings.

Figure 9. Porter 5 Forces EO in Forestry.



The intensity of rivalry is at a high level within the market. This is often because of its fragmentation, where both global and native players of varied sizes compete against one another. A high degree of experience is characteristic of some others, given their long-standing presence within the industry. The EO industry has been harvesting steady growth rates driven by government and private stakeholders. However, a few key players dominate the market using strong relationships with government organizations or using mergers and ac-

quisitions to strengthen their position. Many companies can obtain publicly provided EO data, and it is their job to quantify and forecast the best methods for forestry. Thus, we would characterize value-adding companies as having a relatively high level of intensity of rivalry. In the case of NextLand, it is required to find innovative ways to process the data since rivals can have access to similar data.

There are low entry costs in the EO industry because EO data can be acquired free of charge. There are high investment possibilities due to the number of funds provided by different organizations (e.g., EC, ESA). Public and personal investments are rising thanks to the increasing demand for EO solutions across various industries (Little, 2018) and thanks to the event of low-cost satellite constellations (SpaceWatch.Global, 2018). In 2019, USD 800M were fundraised (Euroconsult, 2020). Entering the market as an end-user player for a specific segment is not costly as many start-ups are doing it. Therefore, the EO industry is getting increasingly segmented due to the entrance of multiple start-ups that aim to deliver specialized intelligence-as-a-service instead of delivering only data. However, there are low-profit margins as demand is still being created. The entrance of new players will force prices down in the coming years.

The current players in the EO industry are facing a relatively moderate threat of substitution. There are various companies providing remote sensing services that might be presented as alternative solutions. Substitutes for the forestry sector might include aerial images taken from drones, planes, or any other type of aerial remote sensing, in situ observations such as terrestrial measurements and inventories, GPS measurements, existing maps, and databases. However, some of these methods are much more time-consuming and less precise than the information geo-satellites can retrieve from space. The imagery products provided by public sources operators are increasingly cheaper to obtain, with better quality, and the capabilities to implement and process the data are getting better. As technology continues to improve, it would not be surprising if other forms of technology, specifically drones/aerial technology, will begin to provide more enhanced imaging of the current landscape for affordable pricing. The EO market is also facing several disrupting trends, including the increasing need from end-users of EO solutions to have user-friendly insights from the data provided. They are not technical experts. This requires current EO players to invest in digital transformation. Many EO companies are reluctant to invest in projects needed for such digital transformation as they imply large costs.

The EO market has different types of buyers with different needs. The intermediate users, which make EO data usable for the end user's specific needs, public authorities, and the end-user companies (e.g., forestry-related companies producing timber, paper and pulp, and furniture). Our analysis of 155 EO organizations revealed that the number of companies operating in the forestry sector is well below the number of companies operating in the agriculture sector. Out of 11 analyzed organizations, 21% are operating both in Agriculture and Forestry, 43% of companies are operating exclusively in Agriculture, and 11% exclusively in Forestry. This suggests that potential buyers in forestry do not have as many options as they would have in agriculture. In the coming years, with the increasing amount of data being produced by EO techniques and EO substitutes, the bargaining power of buyers is likely to increase as they will be less dependent on the service providers.

The EO forestry market is heavily subsidized and generally encourages an open data policy and cooperative environment. Funding is easily accessible, and various EO data providers are willing to hand out data for free. Value-adding companies do not hold that much power in the market because of various government regulations and a plethora of value-adding companies who are competing to sell data. As time progresses and choices continue to expand, the overall power that suppliers have over the market will continue to diminish. As such, we would characterize the power of suppliers as being relatively low.

5. Business Cases to Identify the Most Attractive Markets for NextLand Services

THE IDENTIFICATION of the most attractive geographical markets for NextLand products and services was done based on real data and market analysis. The methodology applied was based on the creation of business cases and the application of the VCW-Value Creation Wheel method (Lages, 2016; Lages et al, 2020, 2023), as described in the following points.

5.1. Strategy for geographical target market analysis

WHILE BUILDING on the seven NextLand user scenarios and the four target markets identified since the beginning of the proposal, we had to identify the most attractive geographical markets to sell NextLand services.

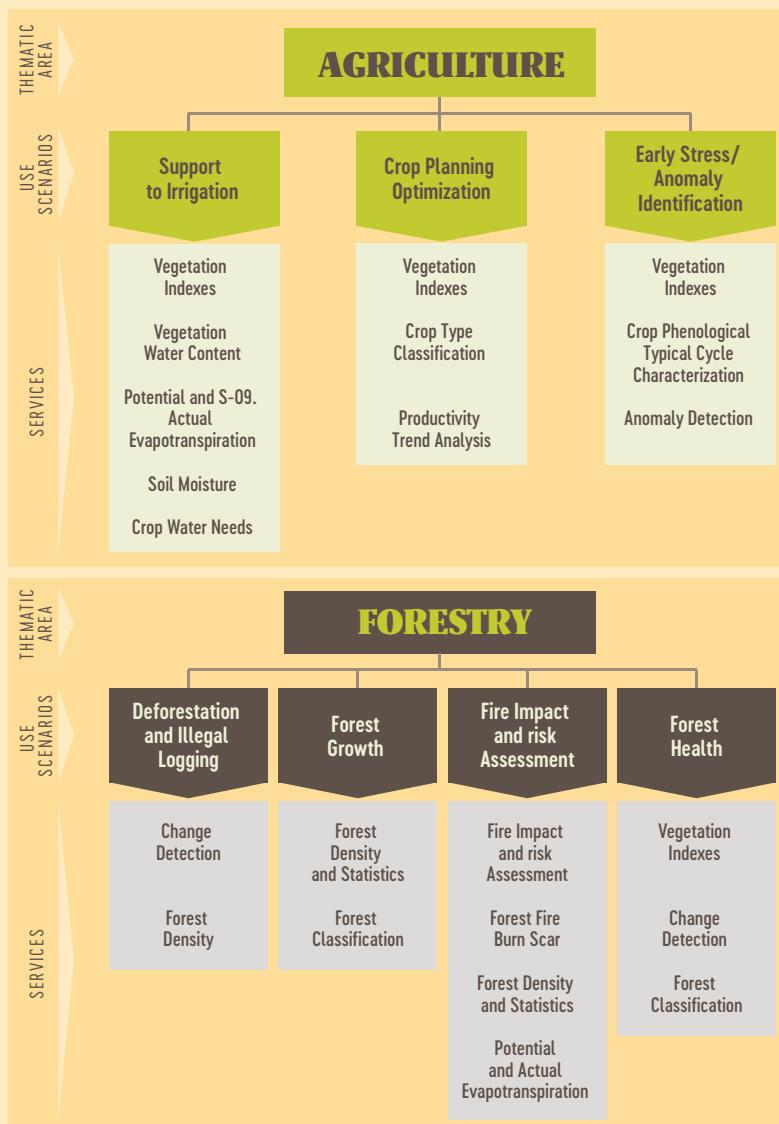
This process happened in three sequential steps:

- User scenarios selection
- Business cases definition: a combination of a user scenario and target market
- Geographical markets identification for each business case

5.2. User scenarios selection

THE SELECTION of the user scenarios was supported by the initial user scenarios submitted in the original proposal to the EC (Fig. 10). Some minor modifications occurred because of the co-creation workshops.

Figure 10. Initial user scenarios.



The “selected” user scenarios to support the business cases are:

In Agriculture

- Support to irrigation – same user scenario as the initial one
- Crop planning optimization – same user scenario as the initial one
- Early stress/anomaly identification – same user scenario as the initial one
- Crop monitoring and yield prediction (including water stress) – it was slightly modified after the co-creation workshops, with the inclusion of the following services:
 - Vegetation indices
 - Crop phenological typical cycle characterization
 - Crop water needs
 - Crop type classification
 - Anomaly detection

In Forestry

- Deforestation, illegal logging & unsustainable detection – the initial scenario was Deforestation and illegal logging. It was modified after the co-creation workshops, with the following services:
 - Change detection
 - Forest density
- Forest growth (supports forest management and/or monitoring) – same user scenario as the initial one
- Fire impact and risk assessment – same user scenario as the initial one
- Forest health (supports forest management and/or monitoring) – same user scenario as the initial one

5.3. Business cases definition

THE BUSINESS cases’ definition resulted from a combination between the previously mentioned user scenarios and the four target markets initially defined:

- Service providers;
- Large end-user companies with R&D capabilities;

- Collective entities/associations;
- Public authorities;

For each business case, a service benchmark was selected, which helped to better define the marketplace in which NextLand was operating.

While building on the analysis of competing for EO organizations operating in agriculture and forestry industries, it became simpler to better understand the type of target market that could become more appropriate for each user scenario.

As a result, each business case was created based on the real analysis of players in the different target markets and the type of existing, or potential use, for the services included in each use case.

The final result was a set of 10 business cases, 5 in agriculture and 5 in forestry, which represent potential market opportunities to be explored by NextLand to sell its services. For each business case, it was identified the most attractive geographical market to transfer NextLand technology. The following table summarizes the 10 business cases as well as the user scenario, target market, and an existing benchmark used in each business case. The benchmarks belong to service providers from inside and outside the NextLand consortium.

Table 3: Summary of the 10 business cases.

INDUSTRY	BUSINESS CASE	USER SCENARIO	TARGET MARKET	BENCHMARK
AGRICULTURE	#1	Crop monitoring and yield prediction (including water stress)	Large end user companies with R&D capabilities in agriculture	SoilEssentials
	#2	Support to Irrigation	Interface/associations for agriculture	DHI Gras - Crop Water Monitoring Solution
	#3	Crop planning optimization	Public authorities in agriculture	OneSoil - Productivity Zones
	#4	Early Stress/ Anomaly Identification	Service providers (e.g. consultant firms in agriculture)	VITO - Smarter Farming
	#5	Crop planning optimization	Large end-user companies with R&D capabilities in agriculture	OneSoil - Crop Mapping

INDUSTRY	BUSINESS CASE	USER SCENARIO	TARGET MARKET	BENCHMARK
FORESTRY	#6	Deforestation, illegal logging & change detection (sustainability)	Large End-User companies with R&D capabilities in forestry (e.g. timber, pulp and paper companies)	e-GEOS Forest Monitoring Services
	#7	Forest Health (supports forest management & monitoring)	Interface/associations for Forestry - Conservation agencies	DHI GRAS - Forestry Monitoring with satellites
	#8	Forest Growth (supports forest management & monitoring)	Large End-User companies with R&D capabilities in forestry (e.g. timber, pulp and paper companies)	One Soil - Assisting businesses in assessing crop conditions
	#9	Fire Impact & Risk Assessment	Public authorities in forestry (e.g national and international operational centers for crisis management)	Noveltis - Forestry Services-Tech for Fire
	#10	Deforestation, illegal logging & change detection (sustainability)	Forestry service providers (e.g. consultants such as NGOs or private companies)	DHI GRAS - Assisting people with forest monitoring

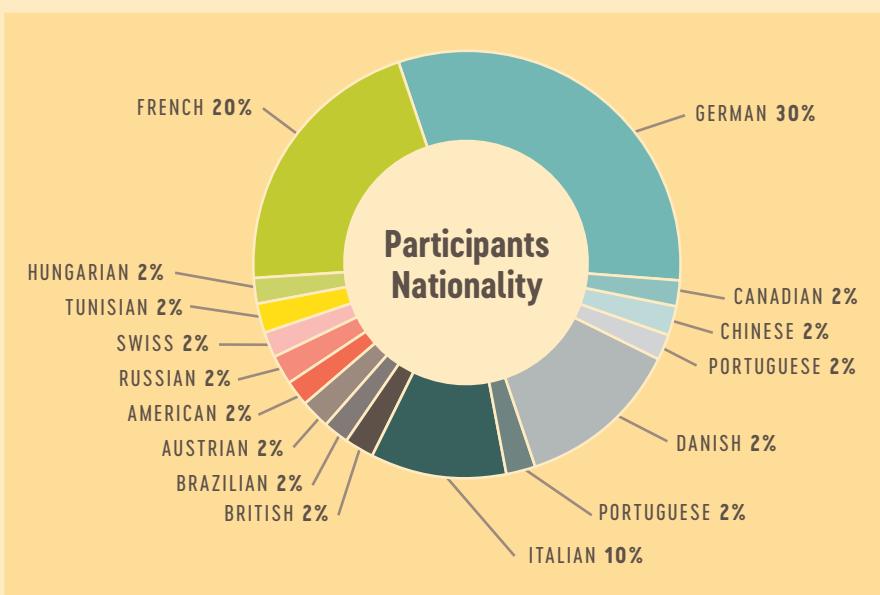
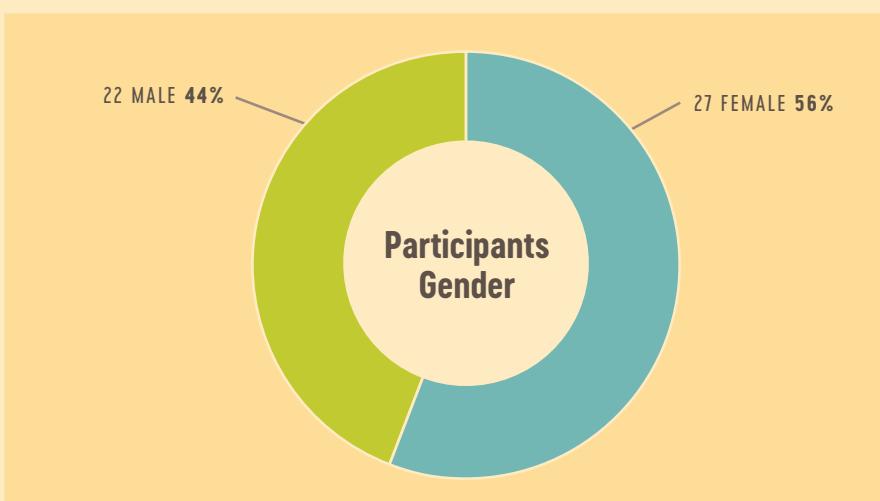
The ten business cases are now presented in the following section.

6. NextLand Business Cases in Agriculture

6.1. Identification of Geographical Markets for Potential Users in Agriculture

ONE OF THE MAJOR GOALS of NextLand was to develop dedicated workshops and training sessions with the larger community, where the services will be explained, advertised, and validated considering the interests and knowledge of the communities. During this project, we organized a total of 10 co-creation workshops involving 49 people over a period of 2 months (October 2020 and November 2020) to go through the different phases of the VCW framework. Each workshop was composed of ten teams (five teams in agriculture and five forestry teams). Due to the Covid-19 situation and corresponding travel restrictions, we decided to conduct all the workshops in the same institution (Nova SBE), benefiting from the fact of having a wide range of students from different nationalities interested in the topic.

To bring innovative and multi-cultural perspectives to the projects, teams were mixed in background, gender, and nationality (See Figures 11 and 12). Overall, the ten workshops were closely supervised by Luis Filipe Lages and Carlos Reis-Marques from the NextLand team and had participants (56% female and 44% male) from 16 different nationalities: American (2%), Austrian (2%), Brazilian (2%), British (2%), Canadian (2%), Chinese (2%), Danish (2%), French (20%), German (30%), Hungarian (2%), Italian (10%), Moroccan (2%), Portuguese (12%), Russian (2%), Swiss (2%) and Tunisian (2%).

Figure 11. Participants Nationality in 10 co-creation workshops**Figure 12. Participants Gender in 10 co-creation workshops**

All the 10 teams participating in the co-creation workshops were introduced to the numerous EO challenges (see Figure 13).

Figure 13: Nuno Catarino (NextLand Coordinator) presenting current EO challenges to workshop participants.



After 10 sessions of 3 hours, each one of the 5 agriculture teams defended its business cases applying their own global and local filters (see Figure 14).

Figure 14: Final presentations of agriculture workshops.



In this section, we present the five business cases in agriculture. The final goal was to apply the [VCW Meta Framework](#) to identify the most attractive geographical target market for a particular user scenario in agriculture. We highlight in this section the final geographical target market(s) for each business case, resulting from Multi-Criteria Decision Analysis (MCDA) and the Value Creation Funnel (VCF). In order to have a better overview of potential targets, we also present other finalist markets that did not pass the last filter. Since NextLand is an EO-funded project composed of 11 European organizations, we provide special attention to the European markets with more potential.

The purpose of these co-creation workshops was to make the EO service as understandable and convenient as possible. Simultaneously, business cases should contribute to achieving the United Nations' sustainable development goals (UN, 2020a). An analysis of the five agriculture business cases presented in Table 4, revealed that the majority aimed at contributing to the following SDG's:

- 2: Zero Hunger
- 6: Clean Water and Sanitation
- 9: Build Resilient Infrastructure, Promote Inclusive and Sustainable Industrialization and Foster Innovation
- 12: Responsible Production and Consumption
- 13: Climate Action
- 15: Life on Land
- 17: Partnerships for the Goals

Table 4: SDGs and business cases in agriculture.

INDUSTRY	BUSINESS CASE	USER SCENARIO	SUSTAINABLE DEVELOPMENT GOALS
AGRICULTURE	#1	Crop monitoring and yield prediction (including water stress)	2, 8, 9, 12, 13 and 17
	#2	Support to Irrigation	2, 6 and 12
	#3	Crop planning optimization	2, 6, 9, 12, 13, 15 and 17
	#4	Early Stress/Anomaly Identification	2
	#5	Crop planning optimization	1, 2, 9, 12 and 15

6.1.1. Business-Case 1: Market for User Scenario “Crop monitoring and yield prediction (including water stress)” & Large end-user companies with R&D capabilities in Agriculture

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Cristina Marianne Sophia Geisler, Paulina Clara Otto, Sophie Rabel, Constantin Maximilian Bruhn, and Francesca Stabile under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

6.1.1.1. Agriculture Service

Yield prediction and crop monitoring are critical for agri-management as input to yield models, disease models, monitoring fields, and comparing different areas. It works based on remote sensing technology. Farmers need to make timely decisions to avoid losses. Specifically, in crop management, a single failure in assessing problems may lead to a total loss of the crop. Farmers can forecast crop yields and control vegetation. They can also do smart fertigation by using this technology. Farmers can track crop development. An agronomist can predict the exact harvesting time.

The traditional method includes an on-field assessment every week. Then, manually analyzing data which may lead to human errors. The on-field study is a cumbersome and time-consuming process. So, delay in decision-making is a common sight. Besides, the large landholding needs more human resources to carry out the assessment.

Climate change has a rising unpredictability of crop yields and growing price volatility in agricultural markets, which decrease overall crop management and natural resources management efficiency. This is additionally fueled by a globally growing population number and the growing pressure of governments and intergovernmental organizations to achieve sustainable practices.

EO Data is important in the crop industry because:

1. Might be used for crop management.
2. Crop management is relevant to identify anomalies and avoid loss of productivity.
3. Anomalies and loss of productivity are prevented through crop monitoring and yield predictions.

4. Crop monitoring and yield prediction empower users to enhance operational efficiency in crop management.
5. Crop monitoring enables the user to support and contribute to the SDGs. Specifically, numbers 2, 8, 9, 12, 13, and 17.

6.1.1.2. Potential Customers

NextLand aims to create value for farmers with R&D capabilities by offering tailor-made EO services to enhance crop yields and improve overall resource management by using a variety of high-quality technologies to provide state of the art irrigation optimization (primary focus) as well as detailed crop monitoring, detailed yield prediction, variable rate application, vegetation indices, and anomaly detection.

The UN officially acknowledged 193 countries in the world, and we have chosen to look for large organizations in all of these countries as they have the potential to implement the offered service. A list of the initial identified potential customers for business case #1 across the globe are presented in Table 5.

Table 5: Business Case #1 Potential Customers.

N.o	POTENTIAL CUSTOMERS	LINK
1	Yara International	https://www.yara.com/
2	Bosch Agriculture Products and Services	https://www.bosch-india-software.com/en/products-and-services/innovation/agriculture/
3	Prospera	https://www.prospera.ag/?ref=Welcome.AI
4	CropX Company	https://www.cropx.com/
5	Climate FieldView	https://climate.com/features
6	Trimble Agriculture	https://agriculture.trimble.com/
7	Teralytic	https://order.teralytic.com/
8	Gamaya	https://www.gamaya.com/
9	EnGenious AG	https://www.engeniousag.com/
10	AgroScout	https://agro-scout.com/platforms/
11	AgroOp	https://www.agroop.net/en/whatwedo
12	Smartfarm	https://www.cropin.com/smartfarm/
13	Farmer-Pro	https://agriculture.trimble.com/product/farmer-pro/
14	Climate	https://climate.com/

N.o	POTENTIAL CUSTOMERS	LINK
15	Sigfox	https://www.sigfox.com/en/agriculture
16	Taranis Technologies	https://taranis.ag/technologies/
17	Dilepix	https://dilepix.com/
18	CropOM	https://cropom.com/#services
19	Exolabs	https://www.exolabs.ch/
20	Latitudo40 Technology	https://www.latitudo40.com/technology-latitudo40/
21	Neo Crop Parcel Monitoring	https://www.neo.nl/crop-parcel-monitoring/
22	DynaCrop	https://dynacrop.worldfromspace.cz/
23	Eleaf	https://eleaf.com/?page_id=3309
24	Hummingbirdtech	https://hummingbirdtech.com/
25	AgroApps Services	http://agroapps.gr/en/farm-management-advisory-services/
26	Bayer – Cropsscience	https://www.cropscience.bayer.com/glossary#crop-protection
27	Topcon Agriculture	https://www.topconpositioning.com/agriculture
28	AgLeader SMS Software	https://www.agleader.com/farm-management/sms-software/
29	Elgad-Agro Background	https://www.elgad-agro.com/precise-agriculture/background

6.1.1.3. Market Assessment and Final Target Markets

In order to find the most attractive geographical market, 20 filters were applied to 193 countries worldwide, and most countries passed through the first two filters. After filter 3, where the country needs to have at least 18% of temporary cropland, 52 countries remained for further consideration.

With the introduction of filter 6, the digitalization of the countries was considered. By doing so, more countries were irrelevant. Hence, the list of countries of interests declined to 20. Only 7 countries remained after the application of filter 9 (related to the download availability per country). Moreover, filter 18 lead to the removal of one additional country. Eventually, the final 4 countries, **Denmark, Germany, Poland, and Spain**, passed all filters, including the last filters' thresholds for R&D capabilities per country and fulfilling GDP requirements.

After having 193 countries running through 20 filters, 4 countries were identified to have the most suitable and attractive geographical target market for business case 1.

While the main regions per country were identified, 6 local filters focusing on agricultural and irrigable metrics per region as well as on R&D capabilities were used.

The first two filters, which focused on the utilized agricultural area, were applied and resulted in the purification of 57 regions. As such, only 3 regions managed to pass through all conditions. Further to that, the remaining three key regions remained until filter 6, when regional R&D capabilities were considered. As a result, only **one local region in Spain, Castilla y León, passed the last filter** (See Figure 15).

Figure 15. The final solution for business case #1.



Based on the MCDA and VCF analyses and on the filters presented in the following section, we present the final solution for business case #1 and present in bold other highly attractive European markets.

- **Spain:**

- Castilla y León (Northwestern Spain)
- Cataluña (Northeastern Spain)
- Andalucía (Southern Spain)

- **Poland:**

- Dolnośląskie (Southwestern Poland)
- Lubelskie (Southeastern Poland)

- **Denmark:**

- Midtjylland (Central Denmark)

- **Germany:**

- Schleswig-Holstein (North Germany)

6.1.1.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Crop production index of at least 80 (Wordbank, 2006)
- 2. Filter G2:** Countries with at least 20% agriculture land (% of land area) (The World Bank, 2016a)
- 3. Filter G3:** Countries with at least 18% of temporary crop land (% of land area) (The World Bank, 2016b)
- 4. Filter G4:** Land under cereal production of at least 500,000 hectares (land usage) (The World Bank, 2017a)
- 5. Filter G5:** Cereal production of at least 1,500,000 (metric tons) (The World Bank, 2016c)
- 6. Filter G6:** Digital Readiness Index 2019 of at least 11.90 (CISCO, 2019)
- 7. Filter G7:** Global Innovation Index ranking of at least 30 (Global Innovation Index, 2019)
- 8. Filter G8:** Fixed broadband subscription of at least 12 (per 100 people) (The World Bank, 2019b)
- 9. Filter G9:** Countries with at least 25mbps download availability providers (Fastmetrics, 2017)
- 10. Filter G10:** Level of water stress per country of at least 1 (Hannah Dormido, 2019)
- 11. Filter G11:** At least 100 renewable internal freshwater resources per capita (cubic meters) (The World Bank, 2017b)
- 12. Filter G12:** World risk index per country below or equal 5,4% (Archer & Rahmstorf, 2011)
- 13. Filter G13:** Fertilizer consumption of at least 100 kg per hectare of ar-

- able land (Food and Agriculture Organization, 2015a)
- 14. Filter G14:** SDGs performance score of at least 70 (UN, 2020a)
- 15. Filter G15:** Ease of doing business indicator below or equal (The World Bank, 2015)
- 16. Filter G16:** Political stability in a country of at least 0.016 (The World Bank, 2020c)
- 17. Filter G17:** Control of corruption in a country of at least 0.2 (The World Bank, 2020c)
- 18. Filter G18:** At least 100 patent applications per country from residents (The World Bank, 2019e)
- 19. Filter G19:** At least 100 patent applications per country from non-residents (The World Bank, 2019d)
- 20. Filter G20:** GDP per capita at least 15,000 dollars (current US dollars) (World Bank & OECD, 2018a)

6.1.1.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Main farmland uses for crops – utilized agricultural area of at least 232,570 hectares. (Eurostat, 2019a)
- 2. Filter L2:** Main farmland uses for crops – farm area (holding) of at least 3,910 units (number of farms) (Eurostat, 2019a)
- 3. Filter L3:** Metric tons of common wheat (wheat & spelled) of at least 1 (Eurostat, 2013b)
- 4. Filter L4:** Share of irrigable areas of at least 10% (Eurostat, 2013a)
- 5. Filter L5:** Share of conventional tillage practices in tillable areas of at least 61% (Eurostat, 2010)
- 6. Filter L6:** Research and Development expenditures per region of at least 763€ (Eurostat, 2016)

6.1.2. Business-Case 2: Market for User Scenario “Support to irrigation” & Collective entities/Interface Associations

The original business case summarized in this section was developed by Theo Goldfarbe, Ana Carolina Linto, Yannik Rosenlehner, Michele Sotana and Lisa Strub under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

6.1.2.1. Agriculture Service

Support to irrigation is a critical NextLand user scenario. By 2050, the world population is anticipated to grow by almost 40% to 9.6 billion people (Dongoski, 2018). To serve this dramatically growing population, the agricultural industry will have to provide about 70% more food by 2050 (United Nations News Service, 2013). At the same time, water scarcity will become even more important (United Nations Water, 2018). Given that agriculture is considering for the majority of the world's fresh water consumption, it is necessary to find innovative solutions for a more sustainable form of food production in the future. Business case 2 addresses precisely this demand and tries to develop the efficiency of water usage in agriculture by tailoring Earth observation (EO) data to local needs and making it reasonable for end-users. Admittedly, according to EY Agribusiness Leader Dongoski (2018), new technologies can only offer the agri-industry an opportunity to improve productivity if they provide data to be shared and properly understood.

In sum, it is critical to develop sustainable food production as well as improve farmers' water-saving, crop productivity, and fertilizer usage by applying top-notch EO satellites, big data, and machine learning, due to the following trends:

- **Population Growth:** Today's global population of 7.6bn people will rise to about 9.8bn by 2050. Increased food demand will require farmers to produce around 1.4% more grain every year, representing an increase in agricultural productivity of 70% by 2050 (United Nations News Service, 2013).
- **Urbanization:** Urbanization continues, leading to a further reduction of arable land and stress for biodiversity and resources (Satterthwaite et al., 2010).
- **Water Scarcity:** Water scarcity continues, whereby agriculture is the largest consumer of freshwater (consumption of approx. 70% of the world's fresh water) (United Nations Water, 2018).

6.1.2.2. Potential Customers

The UN officially acknowledged **193 countries** in the world, and We have analyzed market data for all the 193 countries as they have the potential for business case 2 to implement the offered service. 24 filters were applied to 193 countries worldwide, and most countries passed through the first two filters.

After filter 3, Land area equipped for irrigation (thousands of HA) (> 500), 43 countries remained for further consideration. With the introduction of filter 7, countries' Water Stress Level (<30), the list of countries declined to 22. Another filter that purified many countries was filtered 9, related to Soil fertility, measured in Nutrient phosphate (> 20 kg/ha) available per country. As such, only 9 countries remained after the application of filter 9. Filter 16 lead to the failure of one additional country. Additional filters led to 4 countries (Australia, France, Brazil, Turkey) for business case 2. However, the only country that passed all 24 filters was Australia.

In Australia, while the main regions per country were identified, 4 local filters were used. The first filter focused on Local Water Shortage – Area-average rainfall (<300 mm per year) of 57 regions. As such, only 4 regions managed to pass through all conditions. After the application of filter 4 (Water use on-farm - total volume applied > 898457 ML), only one local region in **Australia, New South Wales**. Some of the identified potential customers are presented in Table 6 for business case #2.

Table 6. Business Case #2 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	Onesoil	https://onesoil.ai/en/
2	Up42	https://up42.com/
3	Agriculture Associations	https://www.science.co.il/agriculture/international-associations.php

6.1.2.3. Market Assessment and Final Target Markets

The application of the global funnel determined Australia as the most attractive market. Indeed, looking at the Multi-Criteria Decision Analysis (MCDA) indicates that Australia is the most interesting solution, with a slight advantage over France, Canada, and the US.

After applying the local funnel to all 8 states of Australia yielded New South Wales (NSW) as the target market. The MCDA analysis gave the insight that besides NSW (Score: 10), only Victoria reached a score above 5.

Based on the MCDA and VCF analyses and on the filters presented in the

following section, we underline below the final solution for business case #1 and present in bold other highly attractive European markets.

- **Australia**

- New South Wales
- Western Australia
- Aragon
- Northern Territory
- South Australia
- Australian Capital Territory
- Queensland
- Tasmania
- Victoria

- **France**

- **Turkey**

- Brazil
- Japan
- United States of America

Figure 16.Final solution in business case #2



6.1.2.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Drought frequency ($-1,5 < X < 1,5$) (SPEI, 2019)
- 2. Filter G2:** Precipitation mm/year $< 2000\text{mm}$ (Food and Agriculture Organization of the United Nations, 2016)
- 3. Filter G3:** Land area equipped for irrigation (thousands of HA) (> 500) (FAO, 2019)
- 4. Filter G4:** Crop Land in HA (Millions of HA) $> 1\,000\,000\text{ HA}$ (Nation-Master, 2020)
- 5. Filter G5:** GDP in agriculture (Millions of \$) (> 600) (World Bank, 2019a)
- 6. Filter G6:** Cereal and Crop quantity (> 3000000) (World Bank, 2019b)
- 7. Filter G7:** Water Stress Level (< 30) (FAO, 2020f)
- 8. Filter G8:** Internet Development Index: IDI Score (> 5) (ITU, 2017)
- 9. Filter G9:** Soil fertility, measured in Nutrient phosphate ($> 19,23\text{ kg/ha}$) (FAO, 2020a)
- 10. Filter G10:** EPI – Environmental Performance Index ($> 41,9$) (Index, 2019)
- 11. Filter G11:** Total population (2019) ($> 7\text{ Million}$) (The World Bank, 2019f)
- 12. Filter G12:** Government Expenditure in Agriculture (millions of \$) (2015) (> 200.000) (Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, 2019)
- 13. Filter G13:** SDG Alignment: 2019 SDG Global Index Score (0-100) (> 50) (Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, 2019)
- 14. Filter G14:** Average Temperature $> 0^\circ$ (> 10) (NASA/GISS, 2019)
- 15. Filter G15:** Network readiness level: (> 50) (Dutta et al., 2019a)
- 16. Filter G16:** World Risk Index ($< 7,52$) (Radtke et al., 2019)
- 17. Filter G17:** Not Classified as “Least developed countries in the world” by UN (1 = not in the List of least developed counties) (United Nations, 2018)
- 18. Filter G18:** Total credit to agriculture (Millions of \$) (> 60000) (FAO, 2020b)
- 19. Filter G19:** Country is member of FAO (1 = member of FAO) (FAO, 2020b)
- 20. Filter G20:** No ongoing civil Wars (0 = no) (< 1) (Sambanis, 2004)
- 21. Filter G21:** Economic growth in % ($> 1\%$) (The World Bank, 2019c)
- 22. Filter G22:** Corruption Index (> 40) (Transparency, 2020)

- 23. Filter G23:** Country Risk Classification (≤ 2) (AA = 1, A = 2; BB = 3; B = 4; C = 5, D = 6) (Euler Hermes, 2020)
- 24. Filter G24:** English Proficiency Level (EF Education First, 2020)

6.1.2.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Local Water Shortage – Area-average rainfall (<300 mm per year) (Australian Bureau of Meteorology, 2019)
- 2. Filter L2:** Average Farm size >4152 ha (ABARES, 2019a)
- 3. Filter L3:** Presence of Agriculture's consulting companies (yes) (The Queensland Times, 2020)
- 4. Filter L4:** Water use on-farm - total volume applied (ML) (ABS, 2011a)

6.1.3. Business-Case 3: Market for User Scenario “Crop Planning Optimization” & Public authorities in Agriculture

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Isabell Klein, Chloé Afanassieff, Jihene Herrouz, Martin Buhl, and Pedro Gamelas under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

6.1.3.1. Agriculture Service

The world is increasingly facing challenges at every stage of food production. Global food requirement is projected to double in 30 years due to rising populations (UN, 2009). Moreover, global warming decreases water availability worldwide, leading to plant diseases and, thus, crops lost (UN, 2020b). Rising population and global warming are putting a lot of pressure on farmers, as they are expected to do more with less by improving productivity from limited resources and inputs. Agriculture is an important machine that needs to be reinvented to boost shared prosperity, feed the growing population, and meets climate goals.

In this regard, the purpose of this section is to recognize the most attractive geographical market for business case 3, which is related to “Crop Planning Optimization.” Through the VCW framework, Andalusia (Spain) has been selected as the most suitable market for business case 3. This region is characterized by heavy water deficiencies and poor water management, which influences the quality and quantity of crops. The proposed business case 3, allows farmers to manage resources and increase crop output effectively. This has a direct added value for large end-user companies in Andalusia and supports them to address the Sustainable Development Goals (SDGs), specifically numbers 2, 9, 6, 12, 13, 15, and 17. These SDGs have been developed by the United Nations General Assembly in 2015 to serve as a guideline to “achieve a better and more sustainable future for all” until 2030 (the United Nations, 2020)

6.1.3.2. Potential Customers

Crop planning examines “what, when, where and which plants to grow concerning their demands for space, sunshine, water, maturation, a season of planting and tolerance for each other” to obtain an immeasurable harvest (Department of Agriculture Philippine, 2019). Anticipating rotation cycles and rigorous planning assures a healthy environment for plants to grow throughout the years. Unfortunately, most farmers face challenges in obtaining reliable information on the impact of their compost usage and water management practices.

Business case 3 helps large end-user companies advance their crop management and guide them on improving their production sustainably. Target companies are recognized as those with a significant number of different crops to keep track of or have large areas of fields to cover. These companies have a strong focus on growth and innovation, and the market requires them to be aware of their impact on the environment.

The companies GARO Acetuna Verde S.L. and Sovena can be the main potential customers in the selected region. This is because not only both companies operate huge olive (oil) farms in Andalusia, but the production and cultivation of olives require subsequent amounts of water, which is why they may cope with water shortage (Cooperativa Alta Alcarria, 2020). Additionally, research has revealed that Andalusia is homeward to about 20.000 companies focused on agriculture-related consulting, irrigation equipment, engineering, intensive farming, hydroponic crops, and various biotech companies (Magrama, 2019). The region’s R&D infrastructure offers many research and technology

centers that are all practiced in agriculture. It is important to build powerful partnerships. A particular focus should be paid to the Tecnova Technology Centre for Auxiliary Agriculture Industry as a possible partner with regards to R&D. They encourage innovation and technological development to add value to companies in agriculture. Some of the identified potential customers in Spain are presented in Table 7 for business case #3.

Table 7. Business Case #3 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	Acesur	http://acesur.com/en
2	Technology and Innovation Centre of the Agro-industry	https://agri-epicentre.com/about/agri-tech-centres-of-agricultural-innovation/
3	Agro-Industry Innovation and Technology Centres (Sevilla & Malaga)	https://www.juntadeandalucia.es/
4	Research Center for Agrifood Quality	https://www.juntadeandalucia.es/
5	Fruit and Vegetables R&D Laboratory	https://www.juntadeandalucia.es/
6	Technology Centre for Auxiliary Agriculture Industry	https://www.juntadeandalucia.es/
7	AB Mauri	https://abmauri.es/
8	Dargal	https://www.daregal.fr/accueil/
9	Euralis	https://euralis-seeds.com/
10	Cargill	https://www.cargill.com/
11	Refresco	https://www.refresco.com/en/node/2/
12	Sovenia	https://www.sovenagroup.com/en/

6.1.3.3. Market Assessment and Final Target Markets

Ten filters on a global level and 7 filters on a local level were selected. These filters had to be adjusted with the service offerings and target market. For example, to distinguish large agriculture companies, the total crop production, and fertilizer usage by country/region have been considered. Moreover, we selected countries that have a high digital adoption history. Finally, coun-

tries influenced by climate change and water shortage have been prioritized.

The purpose was to discover a country and region that would be more likely to benefit from technology while still beginning a profitable market. Starting with 193 possible solutions, 10 filters were continuously applied on a global VCF. We concluded with Spain as a target market.

Seven local filters were employed to recognize the most attractive region within **Spain**. They indicated **Andalusia** as the most favorable region to expand to. The final decision has been made between Andalusia and Extremadura, based on a powerful indicator for the profitability of the selected region related to a larger total amount of agriculture companies.

Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and present in bold other highly attractive European markets.

- **Spain:**

- **Andalucía (Southern Spain)**
- Extremadura
- Castilla-La Mancha
- Castilla y León (Northwestern Spain)
- Murcia
- Aragon
- Cataluña (Northeastern Spain)

- **Austria**

- **Germany**

- **Netherlands**

- **Portugal**

- **Switzerland**

- **United Kingdom**

- United States

Figure 17. Final solution in business case #3



6.1.3.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

1. **Filter G1:** Crop Production Index > 90 (Wordbank, 2006)
2. **Filter G2:** GDP per Capita > 18.000 € (World Bank & OECD, 2018a)
3. **Filter G3:** Use of Chemical and Fertilizers > 138 kg per hectare of arable land (The Global Economy, 2020)
4. **Filter G4:** Political Stability Index > 0 (World Bank & The Global Economy, 2017)
5. **Filter G5:** SDGs Performance Score > 70 (Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, 2019)
6. **Filter G6:** Digital Adoption Index > 0,5 (The-World-Bank, 2016)
7. **Filter G7:** Governmental Spending in R&D > 1% (World Bank, 2017)
8. **Filter G8:** Average Size of Agricultural Holding > 10 ha (Lowder et al., 2016)
9. **Filter G9:** Climate Risk Index < 50 (Sönke et al., 2020)
10. **Filter G10:** Water Stress Index > 3 (Hofste et al., 2019)

6.1.3.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Crop Production > 2.000 (Agricultura, 2017)
- 2. Filter L2:** Water Stress Index > 3 (Hofste et al., 2019)
- 3. Filter L3:** Number of Farms > 50.000 (Eurostat, 2020a)
- 4. Filter L4:** Amount of Arable Land > 20% (LAVERDAD, 2019)
- 5. Filter L5:** Number of Funding Projects granted to improve Farming Practices > 7 (magrama, 2019)
- 6. Filter L6:** Usage of water for irrigation systems > 1.400.000 (1000m³) (Agricultura, 2017)
- 7. Filter L7:** Amount of Large End Users in the crop industry with revenues above \$5M > 9 (ZoomInfo, 2020)

6.1.4. Business-Case 4: Market for User Scenario “Early Stress / Anomaly Identification” & Service providers in Agriculture [e.g. Consultant such as NGOs or private companies]

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Jeanne Chomarat, Lara Valentina Freitas Machado, Jannika Mock, Rudi Morgan Penvhyn La Rocca, and Patrick Eberhard Paul under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

6.1.4.1. Agriculture Service

Due to climate change and other environmental factors, farmers are faced with the increasing impact of drought, pests, and diseases on agriculture. This often drives to lower crop productivity. Farmers cannot identify early enough the causes for anomalous crop development. Business case 4 helps service providers and consulting firms in agriculture to generate valuable information to improve crop productivity, early stress identification, and identify anomalies.

This case identifies consultant firms in Australia, Victoria as the most interesting target market to protect crops. This case is aligned with sustainable development goals, namely it is trying to fight for the SDG of “Zero Hunger.” Zero Hunger means: end hunger, achieve food security, advanced nutrition, and promote sustainable agriculture. Vegetation indices improve plant productivity and consequently might assist in detecting poor plant growth. Also, disease warning systems prophesies crop phenology and anomaly detection. Forecasting provides better growth rates, possible disease warning, and development of accuracy.

6.1.4.2. Potential Customers

Some potential customers are presented in Table 8 for business case #4.

Table 8. Business Case #4 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	GMATICS	https://www.gmatics.eu/
2	DynaCrop API	https://dynacrop.space/en/
3	Agrosmart	https://agrosmart.com.br
4	Semios	https://semios.com/
5	AGRIvision Consultants	https://www.agrivation.net.au/
6	PeritusAg	https://peritusag.com.au/
7	Premier Ag Consultancy Group	https://www.premierag.com.au/
8	RMCG	https://www.rmcg.com.au/
9	Australian Government	https://www.awe.gov.au/

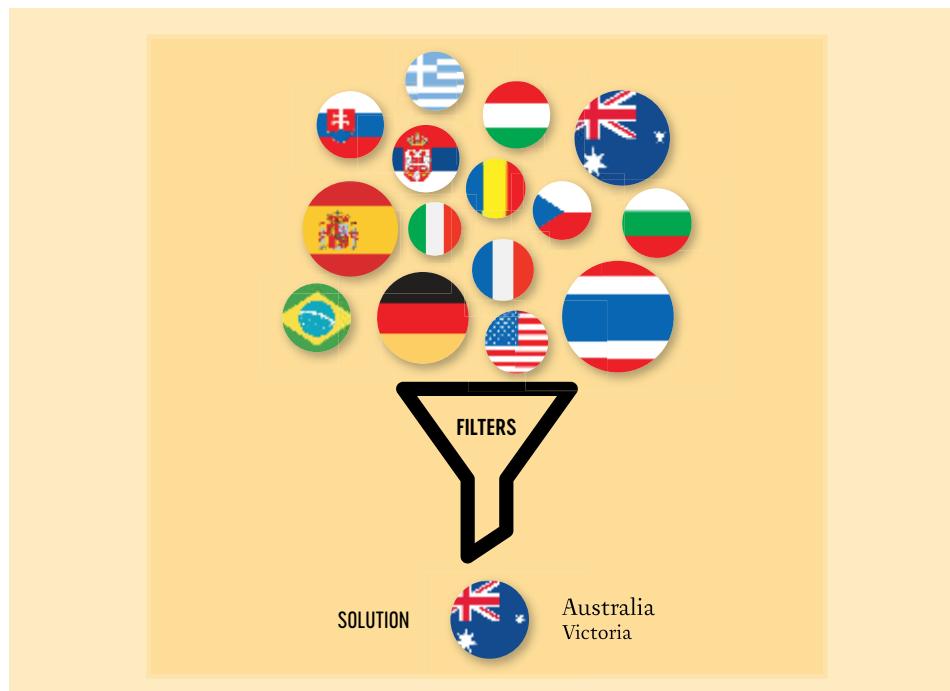
6.1.4.3. Market Assessment and Final Target Markets

Both MCDA and VCF were performed to select the most interesting geographic target market. Based on the MCDA and VCF analyses and on the filters presented in the following section, we present Australia as the final solution for business case #4 and present Czech Republic (in bold) as an highly attractive European market:

- **Australia,**
- **Czech Republic,**
- Thailand,
- Canada,
- Chile.

To get a more accurate overview of where it would be the best to implement the service in Australia, four filters have been selected and ranked: Crop production in 2018-2019 (kl), areas equipped for irrigation (ha), number of agricultural businesses, and percentage of the land used for crop compared to the size of the state. After applying these filters **Victoria's** state appeared as the most attractive region.

Figure 18. Final solution in business case #4



6.1.4.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Blocking the global flow data (how many types of data blocked) $X < 3$ (Cory, 2017)
- 2. Filter G2:** Agricultural productivity Index $97 < X < 124$ (USDA, 2019)
- 3. Filter G3:** Global Innovation Index $X > 33,83$ (Global Innovation Index, 2019)
- 4. Filter G4:** Number of satellites owned $X > 1$ ([N2YO.com](#), 2020)
- 5. Filter G5:** Potential risk by climate change (in 1999 - 2018) $X > 90,76$ (Germanwatch, 2020)
- 6. Filter G6:** Droughts, floods, extreme temperatures (in % of population) $X < 1,2$ (World Bank, 2018)
- 7. Filter G7:** Agriculture land (% of land area) $X > 45$ (The World Bank, 2020)

6.1.4.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Crop production in 2018-2019 (in kl) (ABARES, 2019b)
- 2. Filter L2:** Area equipped with irrigation (ha) (Creek-stromlo et al., 2013)
- 3. Filter L3:** Number of agricultural businesses (ABS, 2011b)
- 4. Filter L4:** Percentage of land used for crop compared to size of the state (ABS, 2011b)

6.1.5. Business-Case 5: Market for User Scenario

“Crop planning optimization” & Large end-user companies with R&D capabilities in Agriculture

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Miriam Limbeck, Felix Hugo Hoelter, Léo Humel, Kaylan Holst-Roness, and Xenia Kadar under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

6.1.5.1. Agriculture Service

Business Case 5 allows large companies to use EO services to define their most productive zones and produce more efficiently. According to the World Bank (2014), 78% of people in the world live under the poverty line and are highly dependent on agriculture for revenue and food. These people must be elevated from poverty and agriculture might play a major role by producing by 2050, 50% more to feed the population. As such, agriculture might be critical to raise the poor’s incomes and quality of life. It might become part of a global solution to solve many of the world’s most pressing development issues.

6.1.5.2. Potential Customers

Within this context, the final target market for Business Case #5 was India. After applying the local funnel we arrived to the state of Uttar Pradesh. Providing local governments and public authorities with the technological tools to increase their productivity creates economic and social value in different ways:

- The country can increase its growth and competitiveness in the agriculture market,
- Increasing productivity is particularly essential for countries that face high growth regarding their population. An increase in agriculture productivity might help:
 - farmers to lower their opportunity costs, lower prices versus others, which will eventually lead to an increase in customer acquisition,
 - the country to decrease poverty, stabilize the food supply, increase industry’s salaries, and simultaneously decrease food prices.

Some of identified potential customers are presented in Table 9 for business case #5.

Table 9. Business Case #5 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	SatSure	https://www.satsure.co/agriculture.html
2	Fasal	https://fasal.co/
3	Aibono	http://www.aibono.com/
4	Intello Labs	https://www.intellolabs.com/
5	The Indian Department of Agriculture, Cooperation and Farmers Welfare	http://agricoop.nic.in/

6.1.5.3. Market Assessment and Final Target Markets

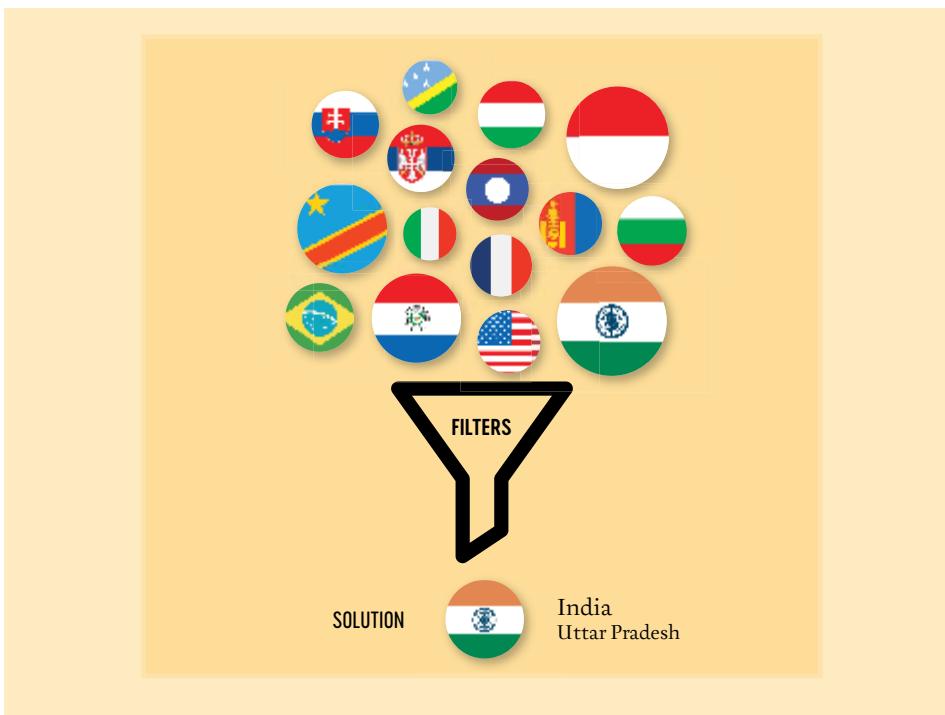
The application of the global funnel determined **India** as the most attractive market. MCDA results revealed that India has a slight advantage over Paraguay.

Applying the local funnel to all 28 states of India yielded Uttar Pradesh as the final target market. The MCDA analysis gave the insight that besides **Uttar Pradesh**, Gujarat, Haryana are interesting states as target markets.

- **India**

- **Uttar Pradesh**
- Gujarat
- Haryana
- Andhra Pradesh
- Punjab
- Tamil Nadu
- Telangana
- Kerala
- Paraguay
- Republic of the Congo
- Indonesia
- Laos
- Mongolia
- Solomon Islands

Figure 19. Final solution in business case #5.



6.1.5.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Agriculture industry as a percentage of GDP > 25% (The World Bank, 2019a)
- 2. Filter G2:** GDP per capita > 1724,8 (World Bank & OECD, 2018b)
- 3. Filter G3:** Geo-Political stability index > -1,52 (World Bank & The Global Economy, 2017)
- 4. Filter G4:** Agricultural industry as a percentage of total employment > 15% (Roser, 2013)
- 5. Filter G5:** Food supply stability < 60 (The Economics Group, 2020)
- 6. Filter G6:** Prevalence of undernourishment as a percentage of the total population > 5% (Hazra, 2009)
- 7. Filter G7:** Agriculture land (Percentage of land area) > 50% (World bank, 2013)
- 8. Filter G8:** Countries using the exact same technology (World bank, 2013)

6.1.5.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** State-wise percentage coverage of area under principal crops (total cereals) 2014/2015 > 50% (Sataloff et al., 2018)
- 2. Filter L2:** Internet penetration across India 2019 by state > 30% (Statista, 2019a)
- 3. Filter L3:** State-wise Estimated Consumption of Fertilizer (Nitrate, Phosphorus & Potassium) Kg per Hectare (2017-2018) > 128,02 Kg/he (Sataloff et al., 2018)
- 4. Filter L4:** Percentage of Agricultural Households to Rural Households > 57,8% (Sataloff et al., 2018)
- 5. Filter L5:** State with the highest number of fields with size > 2.7 He (Sataloff et al., 2018)

7. NextLand Business Cases of EO in Forestry

7.1. Identification of Geographical Markets for Potential Users in Forestry

ONE OF THE MAJOR GOALS of NextLand was to develop dedicated workshops and training sessions with the larger community, where the services will be explained, advertised, and validated considering the interests and knowledge of the communities. During this project, we organized a total of 10 co-creation workshops involving 49 people over a period of 2 months (October 2020 and November 2020) to go through the different phases of the VCW framework. Each workshop was composed of ten teams (five teams in agriculture and five forestry teams). Due to the Covid-19 situation and corresponding travel restrictions, we decided to conduct all the workshops in the same institution (Nova SBE), benefiting from the fact of having a wide range of students from different nationalities interested in the topic.

Overall, the ten workshops were closely supervised by Luis Filipe Lages and Carlos Reis-Marques and had participants (56% female and 44% male) from 16 different nationalities: American (2%), Austrian (2%), Brazilian (2%), British (2%), Canadian (2%), Chinese (2%), Danish (2%), French (20%), German (30%), Hungarian (2%), Italian (10%), Moroccan (2%), Portuguese (12%), Russian (2%), Swiss (2%) and Tunisian (2%). To bring innovative and multi-cultural perspectives to the projects, teams were mixed in background, gender, and nationality (See Figure 17 and 18).

In this section, we present the business cases in forestry. The final goal was to apply the VCW Meta Framework to identify the most attractive geographical target market for a particular user scenario in forestry. After 10 sessions of 3 hours, each one of the 5 forestry teams defended its business cases while applying their own global and local filters (see Figure 20).

Figure 20. Group Presenting Final Projects Results in Forestry.

We highlight in this section the final geographical target market(s) for each business case, resulting from Multi-Criteria Decision Analysis (MCDA) and the Value Creation Funnel (VCF). To have a better overview of potential targets, we also present other finalist markets that did not pass the last filter.

Business cases should contribute to achieving the United Nations' sustainable development goals (the United Nations, 2020). This is because many countries have signed up to these goals, which raises local governments' interest and, therefore, local demand for a service that contributes to achieving these goals. An analysis of the five forestry business cases presented in Table 10, revealed that the majority of business cases aimed at contributing to the following SDG's:

- 1: No Poverty
- 9: Build Resilient Infrastructure, Promote Inclusive and Sustainable Industrialization and Foster Innovation
- 12: Responsible Production and Consumption
- 13: Climate Action
- 15: Life on Land

Table 10. SGD s and business cases in forestry.

INDUSTRY	BUSINESS CASE	USER SCENARIO	SUSTAINABLE DEVELOPMENT GOALS
FORESTRY	#6	Deforestation, illegal logging & change detection (sustainability)	12,13 and 15
	#7	Forest Health (supports forest management & monitoring)	7, 12, 13 and 15
	#8	Forest Growth (supports forest management & monitoring)	9, 12 and 15
	#9	Fire Impact & Risk Assessment	1, 3, 6, 8, 10, 11, 13, 16, and 17
	#10	Deforestation, illegal logging & change detection (sustainability)	1, 2, 9, 12 and 20

7.1.1. Business-Case 6: Market for User Scenario

“Deforestation, Illegal logging and Change Detection [Sustainability]” & Large end-user companies with R&D capabilities in Forestry (e.g. Timber, pulp and, paper companies)

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Sebastian Borde, Lea Raible, Sara Mendonça, Pauline Gabrielli and Joshua Harrington under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

7.1.1.1. Forestry Service

Based on our contextual analysis, it became clear that forestry-related companies face the following problems:

- Wasting money and time while gathering information about a large area by applying inefficient measures,
- Difficulty in detecting illegal logging and struggling in finding or mapping changes, especially over large areas,

- Having difficulties with interpreting large amounts of data and developing specific strategies.

Business case 6 can help add value to the forestry industry by:

- detecting deforestation, illegal logging, and unsustainability,
- ensuring that forestry companies act in an appropriate way.
- identifying areas where illegal logging is prominent are a risky investment and may discourage local or international buyers of forestry products.

Therefore, offering transparent and reliable sourcing of wood is key to the company's success. This can also be measured through international certifications such as the FSC. Additionally, illegal logging can damage a forest company's wood reserves and cause long-term financial damage as well as a bad overall image. The business case 6 would ensure companies to monitor any suspicious activity, react quickly and take future precautions.

Although SDG number 13 does not state actions related to business case 6 activity, this service targets illegal logging and deforestation. Both practices are detrimental to overall forest health and the capability to bind CO₂ through photosynthesis and decrease the risk of floods and landslides. These aspects ultimately contribute to combating climate change and its impact. Both SDG 12 and SDG 15 have specific aspects that sustain the alignment with business case 6. Such as "sustainable management and use of natural resources" Sustainable consumption would refer to the transparency and certainty of purchasing legally sourced wood and wooden products. SDG 15 points to "protect, restore and promote sustainable use of terrestrial ecosystems."

Forests do not only harbor a majority of life on land. They are key to maintaining biodiversity for flora and fauna, but they also play a significant role in reducing the risks of natural disasters. Sustainability is a crucial topic when considering forests and their management by large companies. Forests are currently endangered through several external factors, even though they significantly contribute to our global climate and living space for flora & fauna. Therefore, all aspects of the developed service offering should be aimed to be aligned with UN SDGs 12, 13, and 15. Goal 12 encircles the responsible consumption and production, 13 climate action, and 15 the life on land (United Nations, n.d.). By working towards these goals, Business case 6 has the overarching goal of promoting sustainable use of ecosystems by providing their customers with the necessary tools to combat deforestation and illegal logging.

7.1.1.2. Potential Customers

After applying 18 filters, only one country was left: Brazil. This indicated Brazil to be the most attractive target market for business case 6, focusing on illegal logging and deforestation. During extensive market research, it became apparent that Brazil is the country with the largest net loss of forest area globally, with an economic value of \$22.5 billion. This translates into 1.1% of Brazil's Gross Domestic Product (United Nations, 2018). These aspects, combined with the fact that 53.1% of its forests are privately-owned, make Brazil a desirable target market for the business case.

Eldorado Brazil, Suzano, Klabin, Duratex, and Visiona are the identified potential customers (Table 11) for business case #6.

Table 11. Potential Customers for Business Case #6 .

N.o	POTENTIAL CUSTOMERS	LINK
1	Eldorado Brasil	http://www.eldoradobrasil.com.br/
2	Suzano	https://www.suzano.com.br/
3	Klabin	https://klabin.com.br/
4	Duratex	https://www.duratex.com.br/
5	Visiona	https://www.visionaespecial.com.br/

We will now introduce each one of these companies:

Eldorado Brasil: São Paulo

- Is one of the most superior and competitive pulp firms worldwide
- Exports account for approximately 90% of sales
- The main product is the pulp, which has several application areas.
- Strong focus on sustainability: Its self-managed forests, certified by the Forest Stewardship Council® (FSC®), and the self-generated energy from biomass, reuse of resources, and low carbon footprint, are some of the characteristics that differentiate the company from other industry players.

Suzano: São Paulo

- It is a forestry-based publicly held company, the fourth largest in the world.
- Acquired one of the major industry players in 2018 (Fibria Celulose)
- Product lines: paper, pulp, eucafluff, hygiene, lignin.
- Strong focus on sustainability, e.g., ensures reduction of waste and environmental impacts throughout the supply chain, invests in the preservation of native forests, and conducted one of Brazil's largest restoration programs.

Klabin: São Paulo

- Brazil's largest paper manufacturer and exporter and the country's leading producer of papers and paperboard.
- 1st pulp and paper producer in the Southern Hemisphere to be certified by the FSC® - Forest Stewardship Council.
- Business units: forestry, pulp, paper, and packaging.
- Strong focus on sustainability: Forestry and industrial operations are based on a concept to help preserve biodiversity and the ecological balance of the ecosystems surrounding their operations.

Duratex: São Paulo

- Brazil's largest producer of wood panels.
- Products ranging from laminate for floors to wood furniture and walls.
- Strong focus on sustainability, e.g., is currently responsible for 200k hectares of planted forest which are regularly assessed by international firms and given maximum evaluation scores.

Visiona Tecnologia Espacial: São Paulo

- Brazilian space systems integrator.
- Initiative by the Brazilian Government to stimulate the creation of an integrating company in the space industry,
- A joint venture between Telebras, a mixed economy company in the telecommunications sector, and Embraer, a leading private company in the aerospace sectors and defense.

7.1.1.3. Market Assessment and Final Target Markets

The UN officially acknowledged 193 countries globally. We have analyzed market data for all the 193 countries as they have the potential for business case 6 to implement the offered service. 18 filters were applied to 193 countries worldwide. Most countries passed through the first two filters. After filter 3,

where the percentage of deforestation >0.16 , 22 countries remained for further consideration. With the introduction of filter 7, the countries GDP per capita $>\$13168.17$ was considered. By doing so, more countries were irrelevant. Hence, the list of countries of interests declined to 2. Eventually, the final 2 countries, **Brazil** and **Estonia**, passed all filters, including Filter 9: Land area affected by fires >12922.06 . If we consider market dimension, then Brazil becomes the most attractive market.

Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and present in bold other highly attractive European markets.

- **Brazil**
- **Estonia**
- **Finland**
- **Sweden**
- **Austria**
- **France**
- **Germany**
- **Latvia**

Figure 21. Final solution in business case #6.



7.1.1.4. Countries Market Assessment and Filters to Select the Final Target Market[s]

- 1. Filter G1:** Forest cover >48.06 (The World Bank, 2016d)
- 2. Filter G2:** GDP related to forestry-activities >0.7 (Lebedys & Li, 2014)
- 3. Filter G3:** Percentage of deforestation >0.16 (Our world in data, 2020)
- 4. Filter G4:** GDP per capita >\$13168.17 (World Bank Group, 2019)
- 5. Filter G5:** Political Risk Index >0.53 (PRS Group, 2019)
- 6. Filter G6:** Network Readiness Index (NRI) >49.84 (Dutta et al., 2019b)
- 7. Filter G7:** Forest area managed privately >8923.6 (FAO, 2020c)
- 8. Filter G8:** Legality of EO (Yes) (Trisnadi, 2011)
- 9. Filter G9:** Land area affected by fires >12922.06 (FAO, 2020d)
- 10. Filter G10:** Proportion of forest with long-term management plans <43.20% (Our world in data, 2010)
- 11. Filter G11:** Forestry companies present (Yes) (Estonian Timber, 2016; PMC, 2014)
- 12. Filter G12:** Protected land area >15.99% (Zhang & Liu, 2014)
- 13. Filter G13:** Minimum wage per hour >\$1.22 (Wikipedia, 2021)
- 14. Filter G14:** Yale Environmental Performance Index >54.8 (Index, 2019)
- 15. Filter G15:** Percentage of threatened tree species compared to total species in forest >0.02 (Forests, 2015)
- 16. Filter G16:** Annual production of Roundwood per million m³ >880.5 (Eurostat, 2020b)
- 17. Filter G17:** Less competitors present (EARSC, 2019)
- 18. Filter G18:** National space budget as % of GDP >0.01 (OECD, 2014)

7.1.1.5. Local Market Assessment and Filters to Select the Final Target Market[s]

Since Brazil is a very large country, it has been decided to focus on the headquarters of the potential customers. All the headquarters were based in São Paulo.

7.1.2. Business-Case 7: Market for User Scenario “Forest Health (supports forest management & monitoring) & Collective entities/associations (e.g. conservation agencies)

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Alice Neves, Fabio Maroto Lopez, Maria H. Bastiansen, Omar Rguibi, and Rafaela Sampaio under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

7.1.2.1. Forestry Service

Today, forests cover more than 30% of the Earth's surface and provide vital habitats for more than 80% of all terrestrial species of animals, plants, and insects. They provide a vital source of clean air and water for humans and are crucial for combating climate change by absorbing greenhouse gases (WWF, 2020). Consequently, healthy forests are an important part of our planet as they provide important basic and economic benefits to people and nations around the globe. A healthy forest has great biodiversity, provides ecosystems, and can bounce back from disturbances and disruptions (School of Forest Resources & Conservation, 2020).

The World Bank concludes that since the beginning of the 1990s, about 1,3 million square kilometers of forests have been lost – equivalent to the size of South Africa (TABARY, 2016). With more than 64.100 wildfires and 6,8 million acres burned annually, it stresses how big a challenge this is (Hoover & Hanson, 2018). Apart from wildfires being one of the greatest mitigators of forest health, biotic disturbances, and diseases are projected to account for forest loss of around 20 million hectares by 2050 (BCG, 2020). These losses affect human and animal life, but they also cause another challenge as forests have major importance in storing carbon and thus, purifying air and water for humans.

Promoting healthy forests is crucial for life on earth and to maintain a green future. Consequently, this is the challenge that our business case 7 seeks to address by providing Earth Observation to conservation agencies. This solution provides forest monitoring to estimate forest cover area and forest cover changes over large areas. Using satellite imagery, we can help identify specific unhealthy trees, changes in forests' health and thus support the prevention of biotic outbreaks or wildfires. To ensure the greatest impact on the SDGs and

promotion of healthy forests, the core of our challenge is to find the most attractive geographical market to enter for our business case 7.

At the core of our business is sustainability and environmental health, and our business thus builds upon a great relation to the Sustainable Development Goals defined by the UN (the United Nations, 2014). Business case 7 are mainly focused on three SDG's: 12; Responsible Consumption and Production, 13; Climate Action, and 15; Life on Land. SDG 12 is addressed through data analysis on consumption patterns to find wasteful gaps and work towards more sustainable forest consumption. We address SDG 13 by supporting data-driven decision-making and based on this data, finding initiatives to promote climate action and prevent climate change. By monitoring the changes in forest health it will be possible to make recommendations for our customers. Finally, we address SDG 15 by providing accurate data on forests to mitigate the destruction of the ecosystems and reverse the effects of land overuse.

7.1.2.2. Potential Customers

The identified potential customers are presented in Table 12 for business case #7.

Table 12. Business Case #7 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	NSW National Parks & Wildlife Service (NSW National Parks, 2020)	https://www.nationalparks.nsw.gov.au/
2	Australian Wildlife Conservancy (Conservancy, 2020)	https://www.australianwildlife.org/
3	WWF – Australia (WWF, 2016)	https://www.wwf.org.au/#gs.vhxmek
4	Nature Conservation Council (Wales, 2020)	https://www.nature.org.au/
5	Bush Heritage Australia (Bush Heritage Australia, 2020)	https://www.bushheritage.org.au/
6	NPWS	https://www.nationalparks.nsw.gov.au/
7	NSW Environment, Energy and Science	https://www.environment.nsw.gov.au/

Some main traits were identified after choosing these potential customers. Common traits were that the conservation agencies in New South Wales: (1) are non-profit organizations funded by donations or governmental subsidies, (2) have employees with a low or non-technical background (mainly scientists, field staff, administration staff, etc.), and (3) assess and monitor their forest health mainly by ground data.

Consequently, the question was which of the seven potential customers is the most attractive one. It is our understanding that the **National Parks & Wildlife Service** is the most desirable customer because it manages over 9% of NSW's total land area and is partly governmental. A large area can be monitored and gather data to improve the service. Still, the government's connection could help expand and sell the service to other governmental conservation agencies and other states, which makes it the most attractive potential customer.

7.1.2.3. Market Assessment and Final Target Markets

The UN officially acknowledged 193 countries globally. We have analyzed market data for all the 193 countries as they have the potential for business case 7 to implement the offered service. 9 filters were applied to 193 countries worldwide. Most countries passed through the first four filters. After filter 6, SDGs Performance Score, 4 countries remained for further consideration. Eventually, the final country was Australia as the most interesting target market for business case 7. Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and present Finland as a highly attractive European market (in bold).

- **Australia**

- **New South Wales**
- Western Australia
- Aragon
- Northern Territory
- South Australia
- Australian Capital Territory
- Queensland
- Tasmania
- Victoria

- Finland
- Mexico
- Peru
- China
- Indonesia
- Turkmenistan
- Canada
- Argentina
- Colombia

Figure 22. Final solution in business case #7.



7.1.2.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

1. **Filter G1:** Size of Forest (FAO, 2020e)
2. **Filter G2:** Forest Cover loss (Statista, 2019b)
3. **Filter G3:** Doing Business Indicator (The World Bank, 2015)

- 4. Filter G4:** Countries where drones are legal (drone-spot, 2019)
- 5. Filter G5:** Drought Risk (WRI, 2020)
- 6. Filter G6:** SDG Performance Score (Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, 2019)
- 7. Filter G7:** Environmental Performance Index (Index, 2019)
- 8. Filter G8:** Global Innovation Index (Global Innovation Index, 2019)
- 9. Filter G9:** Political Stability (World Bank & The Global Economy, 2017)

7.1.2.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Forest Cover Area (ABARES, 2019c)
- 2. Filter L2:** Forest Area Burnt (Australian Bureau of Statistics, 2015)
- 3. Filter L3:** Gross State Product (WorldAtlas, 2019)

7.1.3. Business-Case 8: Market for User Scenario “Forest growth (supports forest management & monitoring)” & Large end-user companies with R&D capabilities in Forestry (e.g., timber, pulp and paper companies)

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Cáecilia Hemmerich, Oscar Aidan, Aymeric de La Presle, Gregorio V. Gancia, and Laura Kürschner under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

7.1.3.1. Forestry Service

Business case 8 highlights that today's large-end user companies with R&D capabilities in forestry face critical challenges, regarding resource scarcity and the fast-changing economy. These companies often lack the internal knowledge, digital know-how, and technological facilities to make more sustainable, efficient, and accurate forestry management decisions. They are expected to foster sustainable forestry by supporting their clients in forest monitoring and management, namely to enhance forestry in areas that create proper forest management, reforestation, growth, and nurturing of forests. To

guide customers in assessing forest conditions, business case 8 aims to provide the most comprehensive, reliable, and sophisticated B2B forestry monitoring and management service platform to enable profound, sustainable, more reliable, and accurate decisions, increasing process efficiency, enriching operations, and drive success. Business case 8 aims at contributing to the following three SDG's: 9, 12, and 15.

7.1.3.2. Potential Customers

Existing companies related to the forestry sector are 1,683,938 at the global level (Orbis, 2020). They are mainly involved in timber, pulp, logging, plywood, chipboards, paper, and paperboards. The major reference markets are China and Finland (more than 158,562 companies per country), followed by Russia, the USA, and Sweden (between 90,053 and 158,562 companies per country) (Orbis, 2020). After applying several filters (see the following sections), Sweden emerged as the final target market. The identified potential customers from Sweden are presented in Table 13.

Table 13. Business Case #8 Potential Customers.

N.o	POTENTIAL CUSTOMERS	LINK
1	Ahsltrom-Munksjö Aspa Bruk	https://www.ahlstrom-munksjo.com/Contact-us/?type=all&country=Sweden
2	Ahstrom-Munksjö Paper	https://www.ahlstrom-munksjo.com/sv/
3	Arctic Paper Grycksbo	https://www.arcticpaper.com/en/Home/Arctic-Paper1/Our-Mills/Arctic-Paper-Grycksbo/About/
4	Arctic Paper Munkedal	https://www.arcticpaper.com/en/Home/Arctic-Paper1/Our-Mills/Arctic-Paper-Munkedals/About-us/
5	BillerudKorsnäs	https://www.billerudkorsnas.com/
6	BillerudKorsnäs Frövi	https://www.billerudkorsnas.se/skog
7	BillerudKorsnäs Gävle	https://www.billerudkorsnas.se/om-billerudkorsnas/vara-produktionsanlagningar/gavle
8	BillerudKorsnäs Skärblacka	https://www.billerudkorsnas.se/om-billerudkorsnas/vara-produktionsanlagningar/skarblacka
9	Domsjö Fabriker	http://www.domsjo.adityabirla.com/Sidor/Startsida.aspx
10	Fiskeby	https://www.fiskeby.com/?lang=en

N.o	POTENTIAL CUSTOMERS	LINK
11	Holmen Paper, Bravikens Pappersbruk	https://www.holmen.com/en/forest/sustainable-and-responsible-forestry
12	Iggesunds Paperboard	https://www.iggesund.com/
13	Karlsborg	https://www.billerudkorsnas.com/about-us/our-production-units/karlsborg
14	Metsä Board Sverige, Husums fabriker	https://www.metsaboard.com/About-Us/Husum-board-and-pulp-mill/Pages/default.aspx
15	Nordic Paper Bäckhammar	https://www.nordic-paper.com/about-us/production-units/backhammar
16	Rottneros Bruk	https://www.rottneros.com/
17	SCA Munksund	https://www.sca.com/en
18	SCA Obbola	https://www.sca.com/en/about-us/This-is-sca/Our-businesses/obbola-paper-mill/expansion-obbola/
19	SCA Ortvikens Pappersbruk	https://www.sca.com/en/about-us/This-is-sca/Our-businesses/ortviken-paper-mill/
20	SCA Östrands Massafabrik	https://www.sca.com/sv/om-oss/Detta-ar-sca/vara-verksamheter/ostrands-massafabrik/
21	Smurfit Kappa Piteå	https://www.smurfitkappa.com/se/locations/sweden/smurfit-kappa-pitea-mill
22	Södra Cell Mönsterås	https://www.sodra.com/sv/se/om-sodra/vara-verksamheter/
23	Södra Cell Mörrum	https://www.sodra.com/sv/se/massa/produktion/sodra-cell-morrum/
24	Södra Cell Värö	https://www.sodra.com/massa
25	StoraEnso Pulp AB, Skutskärs Bruk	https://www.storaenso.com/en/about-stora-enso/our-forest-holdings
26	StoraEnso Fors	https://www.storaenso.com/en/about-stora-enso/stora-enso-locations/fors-mill
27	StoraEnso Hylte Bruk	https://www.storaenso.com/en/about-stora-enso/stora-enso-locations/hylte-mill
28	StoraEnso Kvarnsvedens bruk	https://www.storaenso.com/
29	StoraEnso Nymölla	https://www.storaenso.com/
30	StoraEnso Skoghall	https://www.storaenso.com/en/about-stora-enso/stora-enso-locations/skoghall-mill
31	Vallviks Bruk	https://www.rottneros.se/om-rottneros/organisation/vallviks-bruk/

N.o	POTENTIAL CUSTOMERS	LINK
32	Waggeryd Cell	https://www.waggerydcell.se/
33	Mondy Dynäs	https://www.mondigroup.com/en/about-mondi/where-we-operate/europe/sweden/mondi-dynaes-ab/
34	Holmen Paper, Hallsta Pappersbruk	https://www.holmen.com/en/career/work-for-holmen/here-is-holmen/hallstavik/hallsta-paper-mill/

7.1.3.3. Market Assessment and Final Target Markets

The UN officially acknowledged **193 countries** globally. We have analyzed market data for all the 193 countries as they have the potential to implement the offered service. 13 filters were applied to 193 countries worldwide. Most countries passed through the first four filters. After filter 4 (World risk index below 5%), 22 countries remained for further consideration. With the introduction of other filters, more countries became irrelevant. Eventually, the final country was Sweden as the most interesting target market for business case 8.

There are 195 pulp and paper mills, sawmills, and companies in Sweden. Applying three other local filters, such as being a member of the Swedish Forest Industries Federation, led us to 34 target companies for business case 8. Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and present in bold other highly attractive European markets.

- **Sweden (34 target companies)**
- Belarus
- Bulgaria
- Croatia
- Italy
- Poland
- Portugal
- Australia
- Canada
- United States

Figure 23. Final solution in business case #8.



7.1.3.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Forest area designated for production higher than 400k ha (Lugten, 2008)
- 2. Filter G2:** Corruption perceptions index above 35/100 (Transparency, 2019)
- 3. Filter G3:** Political stability above -0.5 (World Bank & The Global Economy, 2017)
- 4. Filter G4:** World risk index below 5% (Behlert et al., 2020)
- 5. Filter G5:** Annual deforestation below 500,000 ha (The World Bank, 2020a)
- 6. Filter G6:** Forest area on territory above 0.9 Million km² (The World Bank, 2016d)
- 7. Filter G7:** Weight of forest production on GDP higher than 5% (The World Bank, 2016d)

- 8. Filter G8:** Geographical area with more than 5,000 target B2B companies
- 9. Filter G9:** Fixed broadband connection higher than 72 Mbps in download speed (Fastmetrics, 2017)
- 10. Filter G10:** Valid data protection and privacy legislation available? (Yes)
- 11. Filter G11:** SDG index for goal 12 (Yes) (Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, 2019)
- 12. Filter G12:** Global innovation index ranking of at least 30.94 (Global Innovation Index, 2019)
- 13. Filter G13:** Policies supporting SFM (yes)

7.1.3.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Members of the Swedish Forest Industries Federation
- 1. Filter L2:** Privately-owned company
- 1. Filter L3:** Production capacity higher than 100,000 m³

7.1.4. Business-Case 9: Market for User Scenario “Fire Impact and Risk Assessment” & Public Authorities in Forestry (e.g. National and international operational centers for crisis management)

THE ORIGINAL business case summarized in this section was developed by Cristina Marianne Sophia Geisler, Constantin Maximilian Bruhn, Sophie Rabel, Paulina Clara Otto, and Francesca Stabile under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

7.1.4.1. Forestry Service

According to WWF (2020), every year around 2% of the world's surface burns due to wildfires. Technicians confirm this number will increase by up to 600% in some forests. Moreover, wildfires interact in a vicious cycle with climate change in which drier weather conditions increase wildfires and wildfires. They remove native species of trees and vegetation, which can also boost drier conditions. In sum, wildfires endanger human lives, altering soil fertility, killing and displacing wildlife, and altering water cycles. The difficulty is that the usual approach to wildfires is rather reactive than preventive and very disorganized. Our firefighting efforts have limitations by not having a structured plan for assessing risks, endangered areas, and forecasts. Consequently, a preventive approach with more active monitoring could significantly reduce human, environmental and economic losses.

Business case 9 offers a new service that aims to change the way the world handles wildfires by providing better governments' tools to fight them. The main goal is to reduce human, environmental and economic losses while boosting sustainable forests and communities. Providing an EO service of fire risk assessment, fire sources' evaluation and damages' forecast will advise end-users on their business addressing their need for monitoring and protecting from fires. The target customers will initially be public authorities responsible for forestry issues, specifically regional authorities. The public authorities will have the opportunity to boost sustainable development in their communities by preserving the forests and the businesses dependent on them. In the long-term, we expect to expand services to target private companies that explore forestry products in their value chain.

The potential impact of business case 9 can be assessed by aligning it with several of UN's Sustainable Development Goals: Specifically, SDGs 1, 3, 6, 8, 10, 11, 13, 16, and 17. Business case 9 desires to bring awareness and create incentives to local communities and governments in developing sustainable practices that mitigate the risks of wildfires. In this context, sustainable practices can expand sustainable communities' emergence and help fight poverty and reduce inequalities by uncovering new sustainable business opportunities. Furthermore, the solution can play a role in fighting hunger through stimulating sustainable land management. More sustainable practices in land management can also limit pollution of soil water, improving general water quality. Furthermore, as smoke from fires can be extremely harmful to people's health and even boost the emergence of breathing diseases, EO solutions will have an

impact on health and well-being. Also, preserving forests and its ecosystem is an important climate action. Forest authorities can operate alongside private owners bringing awareness and cooperation towards preserving this ecosystem and developing a more efficient production and destruction. Finally, the coordination of all these actions by public authorities can also address the goal of creating stronger institutions with more engaged justice and guaranteeing citizens' well-being.

7.1.4.2. Potential Customers

Business case 9 would be beneficial to Andalucia public authorities and regional government to manage the forestry resources. By knowing exactly the fire's spreading pattern, regional authorities and fire-fighters will be able to put more effort and reinforce the supervision of one specific area that is being more affected. This will also help them manage to better manage their resources.

Some of identified potential customers are presented in Table 14 for business case #9.

Table 14. Business Case #9 Potential Customers

N.o	POTENTIAL CUSTOMERS	LINK
1	Junta del Andalucía (Regional government of Andalucía)	https://www.juntadeandalucia.es/
2	City Council of Huelva	http://www.huelva.es/portal/
3	City Council of Málaga	http://www.malaga.eu/
4	City Council of Sevilla	https://www.sevilla.org/
5	Dirección General de Protección Civil y Emergencias	http://www.interior.gob.es/el-ministerio/funciones-y-estructura/subsecretaría-del-interior/direccion-general-de-proteccion-civil-y-emergencias
6	Regional Ministry of Agriculture, Fisheries and Environment	https://www.nationalparks.nsw.gov.au/
7	NSW Environment, Energy and Science	https://www.mapa.gob.es/es/

7.1.4.3. Market Assessment and Final Target Markets

In business Case #9, we selected 7 filters on a global level, 4 filters on a local level, and 3 filters on a province level. These filters had to be adjusted with the business case 9 service offerings and target market. The purpose was to discover a country and region that will most likely benefit from the technology while still beginning a profitable market. Starting with 193 possible solutions, 7 filters were continuously applied on a global VCF. We concluded that Spain was the most attractive target for immediate development. Other attractive countries were Andorra, Sweden, Poland, and Portugal.

Eventually, 4 local filters were employed to recognize the most attractive region within **Spain**. They indicated **Andalusia** as the most favorable region to expand to. 3 local filters were employed to recognize the most attractive province within. Huelva, Sevilla, and Malaga are the most interesting and attractive solutions based on province filters.

Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and present in bold other highly attractive European markets.

- **Spain: Andalucía (Southern Spain)**

- Extremadura
- Castilla-La Mancha
- Castilla y León (Northwestern Spain)
- Murcia
- Aragon
- Cataluña (Northeastern Spain)

- **Andorra**

- **Sweden**

- **Poland**

- **Portugal**

- Canada

- Australia

- Russia

- USA

- Angola

Figure 24. Final solution in business case #9.



7.1.4.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter G1:** Forest area (% of land area) > 15% (The World Bank, 2016d)
- 2. Filter G2:** Average Precipitation per year <1100 (The World Bank, 2020b)
- 3. Filter G3:** Forest fires Frequency (per year) >7000 (US EPA, 2015)
- 4. Filter G4:** SDGs Index > 75 (Global Innovation Index, 2019)
- 5. Filter G5:** Ease of doing business > 75% (The World Bank, 2015)
- 6. Filter G6:** Agriculture, forestry, and fishing as a % of GDP > 1% (Lebedys & Li, 2014)
- 7. Filter G7:** Government Expenditure on Environmental Protection as % of GDP >0,71% (Eurostat, 2019b)

7.1.4.5. Local Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter L1:** Ratio forest area in each region/national forest area > 6% (PLEIF, 2016)
- 2. Filter L2:** Number of forest fires > 674 (ESTADÍSTICAS, 2019)
- 3. Filter L3:** Participation in national GDP > 4% (INE, 2018)
- 4. Filter L4:** Number of sustainable projects in forestry area < 700 (PLEIF, 2016)

7.1.4.6. Province Filters to Assess and Select the Final Target Market(s)

- 1. Filter P1:** Considered danger zone according to Junta de Andalucia (PLEIF, 2016)
- 2. Filter P2:** Number of forest fires > 1ha (Territorio, 2020)
- 3. Filter P3:** Damaged area (as % of total land area of Andalucia) (Territorio, 2020)

7.1.5. Business-Case 10: Market for User Scenario “Deforestation, Illegal Logging and Change Detection (Sustainability) & Governmental Organizations and NGOs

THE ORIGINAL BUSINESS CASE summarized in this section was developed by Camille Domart, Tommy Sou Royer, Pauline Zeiger, and Rian Yan under the supervision of Luis Filipe Lages and Carlos Reis-Marques.

7.1.5.1. Forestry Service

The world bank calculates that about 3.9 million square miles of forest have been destroyed since the start of the 20th century. In the past 25 years, forests shortened by 502,000 square miles, an area larger than South Africa's size. Human-lit fires are commonly used to clear land for agricultural

use. First, precious timber is cut, then the remaining vegetation is burned to make way for crops like soy or cattle grazing (Derouin, S, 2019). To respond to these concerns, business case 10 addresses the use of EO services to reduce deforestation, dangerous incidents, and activities related to inadequate supervision and monitoring. For business case 10, our main target audiences were NGOs. With business case 10, we contribute to SDG 13 Climate Action and SDG 15 Life on Land.

7.1.5.2. Potential Customers

This business case targeted NGOs in Brazil. Brazil skyrocket regarding illegal logging and human-lit fires. As of August 2019, over 80,000 fires burned within the Amazon, a rise of virtually 80% from 2018 (National Geographic, 2019). The main goal was to create a business case providing EO satellite technology and data to fight against deforestation, illegal logging and identify change detection. The identified potential customers (Table 15) for business case #10 are:

Table 15. Business Case #10 Potential Customers.

N.o	POTENTIAL CUSTOMERS	LINK
1	RSS	http://www.rss.sd23.bc.ca/Programs/Forestry/Pages/default.aspx
2	Chico Mendes Institute	https://www.gov.br/icmbio/pt-br
3	IPAM amazonia	https://ipam.org.br/glossario/forest/
4	WWF	https://wwf.panda.org
5	Greenpeace	https://www.greenpeace.org/international/
6	We forest	https://www.weforest.org/
7	Rioterra	https://www.globalcitizen.org/en/content/organizations-donate-amazon-rainforest/
8	Reforest'Action	https://www.reforestaction.com/en
9	Aquaverde	https://www.aquaverde.org/en/
10	SOS Amazonia	https://sosamazonia.org.br/
11	Imazon	https://sosamazonia.org.br/

7.1.5.3. Market Assessment and Final Target Markets

13 filters on a global level were selected. These filters had to be adjusted with the business case 10 service offerings and target market.

The purpose was to discover a country and region that will most likely benefit from the technology while still beginning a profitable market. Starting with 193 possible solutions, 13 filters were continuously applied on a global VCF. “Filter G13: Change in forest cover < -100“ led to Brazil as the winning country.

Based on the MCDA and VCF analyses and on the filters presented in the following section, we underline below the final solution for business case #3 and other markets with high potential.

- **Brazil**
- Peru
- Colombia
- Indonesia
- China
- Mexico

Our potential targeting market for business case 10 will be around 193 countries with large, forested areas globally. The countries with the most extensive forest area in 2020 are the Russian Federation, Brazil, Canada, the United States of America, China, Australia, the Democratic Republic of the Congo, Indonesia, Peru, and India. (Forest area, world bank, 2020 & Countries by Forest Area, 2019) The main goal is to create a business case providing EO satellite technology and data to fight against deforestation. Additionally, to contribute to SDGs through a more productive and sustainable way of forest supervision. The main challenge was how to choose the most attractive country to fight deforestation with the EO satellite technology. And as a solution, we find out that we need to develop a turnkey solution in Brazil to help our future customers access and process EO satellite data on the forest.

According to our filters and our strategy to firstly target NGOs, Brazil has 6 NGOs specialized in environment accredited by the UN, much more than in Peru, which has only 2 big NGOs accredited by the UN. So, **Brazil** seems the most attractive geographical market for our business case.

Figure 25. Final solution in business case #10.



7.1.5.4. Countries Market Assessment and Filters to Select the Final Target Market(s)

- 1. Filter Global 1:** Gross Domestic Income > 20.00 bn (WBS, 2020)
- 2. Filter Global 2:** Rural population (% of total population) > 12.5% (Bank, 2019)
- 3. Filter Global 3:** Share of global annual deforestation (Tutorial, 2019)
- 4. Filter Global 4:** Risk of wildfire: High/Medium/Low (Statista, 2017)
- 5. Filter Global 5:** Agriculture, forestry and fishing, value-added annual growth >1% (World Bank, 2019a)
- 6. Filter Global 6:** GDP per capita PPP >10,000 (World Bank Group, 2019)
- 7. Filter Global 7:** Proportion of forest area with a long-term management plan (Ritchie & Roser, 2021)
- 8. Filter Global 8:** Proportion of forest area within legally established protected areas (Ritchie & Roser, 2021)

- 9. Filter Global 9:** Supporting of NGOs in environment /accredited) : implemented (UNEP, 2020)
- 10. Filter Global 10:** Fertilizer consumption (kilograms per hectare of arable land) > 120 (Food and Agriculture Organization, 2015b)
- 11. Filter Global 11:** Forest area (%) > 50% (The World Bank, 2016e)
- 12. Filter Global 12:** Plant species (higher), threatened > 200 (Wordbank, 2018)
- 13. Filter Global 13:** Change in forest cover < -100 (Mongabay, 2020)

7.2. Business cases: Summary of findings

THIS DELIVERABLE presents a global market assessment of the forestry and agriculture industries in an EO context. This global market assessment was developed with the aim of finding critical target markets across the globe to launch NextLand services in a later stage.

Two parallel in-depth analyses were conducted, one targeted at the EO forestry market and the other at the EO agriculture market. This phase was critical to gain market, technical, and practical knowledge about both sectors. It was made an assessment of the market potential and potential stakeholders within both sectors.

Ten business cases were conducted (see Table 16). Each of the ten business cases (5 in Forestry and 5 in Agriculture) presents a worldwide market assessment in 193 UN countries. First, we arrived at a list of criteria/filters to select the best geographical markets while using different primary and secondary research sources. Then, while applying Multi-Criteria Decision Analysis (MCDA) and the Value Creation Funnel (VCF), we crossed the 193 potential target markets with the ranked criteria, leading to the final targets with the highest potential for NextLand services as well as potential customers for those markets.

Table 16: Summarized Findings of Business Cases.

AGRICULTURE						
BUSINESS CASE	USER SCENARIO	TARGET MARKET	MOST ATTRACTIVE COUNTRY	REGION	OTHER ATTRACTIVE COUNTRIES	POTENTIAL CUSTOMERS (TOTAL: 121)
#1	Crop monitoring and yield prediction (including water stress)	Large end-user companies with R&D capabilities in agriculture	Spain	Castilla y León	Denmark, Germany, Poland	29
#2	Support to Irrigation	Interface associations for agriculture	Australia	New South Wales	France, Turkey, Brazil, Japan, USA	3
#3	Crop planning optimization	Public authorities in agriculture	Spain	Andalucía (Southern Spain)	Austria, Germany, Netherlands, Portugal, Switzerland, United Kingdom, USA	12
#4	Early Stress/ Anomaly Identification	Service providers (e.g. consultant firms in agriculture)	Australia	Victoria	Czech Republic, Thailand, Canada, Chile	9
#5	Crop planning optimization	Large end-user companies with R&D capabilities in agriculture	India	Uttar Pradesh	Paraguay, Republic of the Congo, Indonesia, Laos, Mongolia, Solomon Islands	5
FORESTRY						
BUSINESS CASE	USER SCENARIO	TARGET MARKET	MOST ATTRACTIVE COUNTRY	REGION	OTHER ATTRACTIVE COUNTRIES	POTENTIAL CUSTOMERS (TOTAL: 121)
#6	Deforestation, illegal logging & change detection (sustainability)	Large end-user companies with R&D capabilities in forestry (e.g., timber, pulp and paper companies)	Brazil	São Paulo	Estonia, Finland, Sweden, Austria, France, Germany, Latvia	5
#7	Forest Health (supports forest management & monitoring)	Interface associations for forestry conservation agencies	Australia	New South Wales	Finland, Mexico, Peru, China, Indonesia, Turkmenistan, Canada, Argentina, Colombia	7

BUSINESS CASE	USER SCENARIO	TARGET MARKET	MOST ATTRACTIVE COUNTRY	REGION	OTHER ATTRACTIVE COUNTRIES	POTENTIAL CUSTOMERS (TOTAL: 121)
#8	Forest Growth (supports forest management & monitoring)	Large end-user companies with R&D capabilities in forestry (e.g., timber, pulp and paper companies)	Sweden	national level	Belarus, Bulgaria, Croatia, Italy, Poland, Portugal, Australia, Canada, USA	34
#9	Fire Impact & Risk Assessment	Public authorities in forestry (e.g., national and international operational centers for crisis management)	Spain	Andalucia [Southern Spain]	Andorra, Sweden, Poland, Portugal, Canada, Australia, Russia, USA, Angola	6
#10	Deforestation, illegal logging & change detection (sustainability)	Forestry service providers (e.g., consultants such as NGOs, private companies)	Brazil	national level	Peru, Colombia, Indonesia, China, Mexico	11

Overall, we found a total of 121 potential customers for the 10 markets with the highest potential.

8. References

- ABARES. [2019a]. *Agricultural commodities and trade data*. Commonwealth of Australia. <https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#2019>
- ABARES. [2019b]. *Agricultural commodities and trade data*. Commonwealth of Australia. <https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#agricultural-commodities>
- ABARES. [2019c]. *Agricultural commodities and trade data*. Commonwealth of Australia. <https://www.agriculture.gov.au/abares/research-topics/agricultural-outlook/data#agricultural-commodities>.
- ABS. [2011a]. *Water use on Australian farms* Australian Bureau of Statistics [cat. no. 4618.0]. <https://www.abs.gov.au/statistics/industry/agriculture/water-use-australian-farms/latest-release#water-used-on-australian-farms>
- ABS. [2011b]. *Water use on Australian farms* Australian Bureau of Statistics [cat. no. 4618.0]. <https://www.abs.gov.au/statistics/industry/agriculture/water-use-australian-farms/latest-release>
- Agricultura, D. E. [2017]. *Informe Anual de Indicadores : y Medio Ambiente*.
- Archer, D., & Rahmstorf, S. [2011]. The climate crisis: An introductory guide to climate change. In *The Climate Crisis: An Introductory Guide to Climate Change* [Vol. 9780521407]. <https://doi.org/10.1017/CBO9780511817144>
- Australian Bureau of Meteorology. [2019]. *Annual Climate Statement 2019*. Australian Bureau of Meteorology. <http://www.bom.gov.au/climate/current/annual/aus/2019/#tabs=Rainfall>
- Australian Bureau of Statistics. [2015]. *Australian Bureau of Statistics*. National Health Survey: First Results 2014-15. <https://www.abs.gov.au/statistics>
- Bank, W. [2019]. *Rural population (% of total population) | Data*. Open Data. <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?view=chart>
- BCG. [2020]. *The Staggering Value of Forests—and How to Save Them* | BCG. <https://www.bcg.com/publications/2020/the-staggering-value-of-forests-and-how-to-save-them>
- Behlert, B., Diekjobst, R., Felgentreff, D. C., Manandhar, T., Mucke, P., Pries, P. D. L., Radtke, D. K., & Weller, D. [2020]. *WorldRiskReport 2020*. <https://reliefweb.int/sites/reliefweb.int/files/resources/WorldRiskReport-2020.pdf>
- Bush Heritage Australia. [2020]. *Healthy Country Protected Forever - Bush Heritage Australia*. <https://www.bushheritage.org.au/>
- CISCO. [2019]. *Cisco Digital Readiness 2019*. https://www.cisco.com/c/m/en_us/about/corporate-social-responsibility/research-resources/digital-readiness-index.html#/
- Conservancy, A. W. [2020]. *Wildlife - AWC - Australian Wildlife Conservancy*. <https://www.australianwildlife.org/>
- Cooperativa Alta Alcarria. [2020]. *Aceite de oliva virgen extra Pantocrator*. <https://www.aceitunaverde.com/>

- Copernicus. [2019]. LEGAL NOTICE Market report. In *Market report*. <https://doi.org/10.2873/011961>
- Cory, N. [2017]. Cross-Border Data Flows: Where Are the Barriers, and What Do They Cost? *Information Technology & Innovation Foundation*, May, 1–42. <https://itif.org/publications/2017/05/01/cross-border-data-flows-where-are-barriers-and-what-do-they-cost>
- Creek-stromlo, W., Creek-stromlo, W., & Creek-stromlo, W. [2013]. *Global Map of Irrigation Areas Created : March 2013 Global Map of Irrigation Areas* [Issue March].
- Department of Agriculture Philippine. [2019]. *Home / Official Portal of the Department of Agriculture*. Department of Agriculture, Republic of Philippines. <https://www.da.gov.ph/>
- Dongoski, R. [2018]. Digital agriculture: enough to feed a rapidly growing world? *EY Global*, 1–10. https://www.ey.com/en_gl/digital/digital-agriculture-data-solutions
- drone-spot. [2019]. *Drone-Spot: Find your next spot to fly your drone and learn about aviation regulations*. <https://www.drone-spot.tech/>
- Dutta, S., Lanvin, B., Rossini, C., & Bratt, M. [2019a]. *The Network Readiness Index 2019: Towards a future-ready society*.
- Dutta, S., Lanvin, B., Rossini, C., & Bratt, M. [2019b]. *The Network Readiness Index 2019: Towards a future-ready society*.
- EARSC. [2019]. *Industry Facts & Figures – EARSC*. <https://earsc.org/industry-facts-figures/#1594128142073-72e5fefe-002d>
- EARSC. [2020]. *Industry Facts & Figures – EARSC*. <https://earsc.org/industry-facts-figures/>
- EF Education First. [2020]. English Proviency Index. In Ef Epi.
- ESTADÍSTICAS. [2019]. *Estadísticas Forestales*. <https://sites.google.com/gl.miteco.gob.es/estadisticas/estadisticas-forestales>
- Estonian Timber. [2016]. *Estonia is a country of forest - Statistics*. <https://estoniantimber.ee/statistics/>
- Euler Hermes. [2020]. *Country Risk Ratings*. https://www.eulerhermes.com/en_US/resources/country-reports.html
- Euroconsult. [2020]. *Earth Observation | Euroconsult*. <https://www.euroconsult-ec.com/earthobservation>
- European Commission. [2018]. *Strengthening Strategic Value Chains*.
- European Commission. [2019]. *Copernicus Market Report - February 2019*. <https://doi.org/10.2873/011961>
- Eurostat. [2010]. *Agri-environmental indicator -tillage practices Statistics Explained*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_tillage_practices
- Eurostat. [2013a]. *Agri-environmental indicator - irrigation - Statistics Explained*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Agri-environmental_indicator_-_irrigation
- Eurostat. [2013b]. *Structural business statistics at regional level - Statistics Explained*. https://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture_statistics_atRegional_level#Cereals

- Eurostat. [2016]. *Eurostat - Data Explorer*. https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdreg&lang=en
- Eurostat. [2019a]. ECAS. <https://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>
- Eurostat. [2019b]. *General government expenditure by function [COFOG]*. https://ec.europa.eu/eurostat/databrowser/view/gov_10a_exp/default/table?lang=en
- Eurostat. [2020a]. *Statistics Explained*. https://ec.europa.eu/eurostat/statistics-explained/index.php?title>Main_Page
- Eurostat. [2020b]. Wood Products - Production and Trade. *Agriculture, Forestry and Fishery Statistics*, 3[April], 1–12. https://ec.europa.eu/eurostat/statistics-explained/index.php/Wood_products_-_production_and_trade#Wood-based_industries
- FAO. [2019]. FAOSTAT. FAOSTAT. <http://www.fao.org/faostat/en/#data/RL/metadata>
- FAO. [2020a]. FAOSTAT. FAOSTAT. <http://www.fao.org/faostat/en/#data/EF>
- FAO. [2020b]. FAOSTAT. FAOSTAT. <http://www.fao.org/faostat/en/?#data/IC>
- FAO. [2020c]. FRA platform. <https://fra-data.fao.org/W0/assessment/fra2020/forestOwnership/>
- FAO. [2020d]. FRA platform. <https://fra-data.fao.org/W0/assessment/fra2020/areaAffectedByFire/>; %0AEstonia: <https://rib.msb.se/Filer/pdf/28777.pdf>
- FAO. [2020e]. Global Forest Resources Assessment. In *Reforming China's Healthcare System*. <https://doi.org/10.4324/9781315184487-1>
- FAO. [2020f]. *Indicator 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources*. <https://data.worldbank.org/indicator/ER.H2O.FWST.ZS>
- Fastmetrics. [2017]. *Internet Speeds by Country - Fastest Internet In The World Map*. Fastmetrics. <https://www.fastmetrics.com/internet-connection-speed-by-country.php>
- Food and Agriculture Organization. [2015a]. *Fertilizer consumption [kilograms per hectare of arable land] | Data | Table*. The World Bank Group. <https://data.worldbank.org/indicator/AG.CON.FERT.ZS?view=chart>
- Food and Agriculture Organization. [2015b]. *Fertilizer consumption [kilograms per hectare of arable land] | Data | Table*. The World Bank Group. <https://data.worldbank.org/indicator/AG.CON.FERT.ZS?view=chart>
- Food and Agriculture Organisation of the United Nations. [2016]. *AQUASTAT database - Ghana*. United Nations. <http://www.fao.org/aquastat/statistics/query/index.html>
- Forests, S. of E. [2015]. FOREST EUROPE.
- Germanwatch. [2020]. *Globaler Klima-Risiko-Index 2020* | Germanwatch e.V. <https://www.germanwatch.org/de/17307>
- Global Innovation Index. [2019]. *Global Innovation Index 2019*. In *Organización Mundial de la Propiedad Intelectual*. <https://www.globalinnovationindex.org/gii-2016-report#>
- Hannah Dormido. [2019]. *These Countries Are the Most at Risk From a Water Crisis*. Bloomberg. <https://www.bloomberg.com/graphics/2019-countries-facing-water-crisis/>

- Hazra, A. [2009]. Hunger and Under-Nourishment in India. *Social Development*, 1[1]. <https://ourworldindata.org/hunger-and-undernourishment>
- Hofste, R. W., Reig, P., & Schleifer, L. [2019]. *17 Countries, Home to One-Quarter of the World's Population, Face Extremely High Water Stress*. World Resources Institute [[Https://Www.Wri.Org](https://www.wri.org/)]. <https://www.wri.org/blog/2019/08/17-countries-home-one-quarter-world-population-face-extremely-high-water-stress>
- Hoover, K., & Hanson, L. A. [2018]. Wildfire Statistics. *Congressional Research Service*, 2. www.crs.gov%7C7-5700
- Index, E. P. [2019]. *Environmental Performance Index*. Yale University. <https://doi.org/10.4324/9781315226675-5>
- INE. [2018]. *INEbase / Economía /Cuentas económicas /Contabilidad regional de España / Resultados*. [Www.ine.Es. https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736167628&menu=resultados&idp=1254735576581#](https://www.ine.es/dyngs/INEbase/es/operacion.htm?c=Estadistica_C&cid=1254736167628&menu=resultados&idp=1254735576581#)
- ITU. [2017]. ``2017 {Global} {ICT} {Development} {Index}``. In *United Nations*. <https://www.itu.int/net4/ITU-D/idi/2017/index.html#idi2017rank-tab>
- LA VERDAD. [2019]. *La Región, comunidad con mayor superficie de tierra cultivada | La Verdad*. <https://www.laverdad.es/murcia/region-comunidad-mayor-20200218170746-nt.html>
- Lebedys, A., & Li, Y. [2014]. Contribution of the Forestry Sector to National Economies, 1990-2011. *FAO Report*, 168.
- Little, A. D. [2018]. *A sky full of eyes – Commercial opportunity in Earth observation | Arthur D Little*. <https://www.adlittle.com/en/insights/viewpoints/sky-full-eyes---commercial-opportunity-earth-observation>
- Lowder, S. K., Skoet, J., & Raney, T. [2016]. The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development*, 87, 16–29. <https://doi.org/10.1016/j.worlddev.2015.10.041>
- Lages, L.F. [2016], “VCW—Value Creation Wheel: Innovation, technology, business, and society”, *Journal of Business Research*, 69 [11], 4849–4855.
- Lages, L.F., A. Ricard, A. Hemonnet-Goujot & A.-M. Guerin [2020] “Frameworks for innovation, collaboration and change: Value Creation Wheel, Design Thinking, Creative Problem Solving, and Lean”, *Strategic Change*, 29[2], 195–213.
- Lugten, G. [2008]. Food and agriculture organization. *International Journal of Marine and Coastal Law*, 23[4], 761–767. <https://doi.org/10.1163/157180808X353939>
- magrama. [2019]. *[Grants and subsidies]* - - magrama.gob.es. <https://www.mapa.gob.es/app/ayudas/>
- Mongabay. [2020]. *The Rainforest: tropical forest facts, photos, and information*. <https://rainforests.mongabay.com/>
- Muller Eva, K. A. et al. [2018]. the *World 'S Forests*.
- N2YO.com. [2020]. *Satellites by Country or Organization*. <https://www.n2yo.com/satellites/?c=&t=country>

- NASA/GISS. [2019]. Global Temperature | Vital Signs – Climate Change: Vital Signs of the Planet. In *Nasa* (p. 1). <https://climate.nasa.gov/vital-signs/global-temperature/>
- NationMaster. [2020]. *Countries Compared by Agriculture > Arable land > Hectares. International Statistics at NationMaster.com.* <https://www.nationmaster.com/country-info/stats/Agriculture/Arable-land/Hectares>
- NSW National Parks. [2020]. *What we do / NSW National Parks.* <https://www.nationalparks.nsw.gov.au/about-npws/what-we-do>
- OECD. [2014]. The Space Economy at a Glance 2014. In *The Space Economy at a Glance 2014*. OECD. <https://doi.org/10.1787/9789264217294-en>
- Our world in data. [2010]. *Proportion of forest area with a long-term management plan*, 2010. <https://ourworldindata.org/grapher/proportion-of-forest-area-with-long-term-management-plan?tab=table>
- Our world in data. [2020]. *Annual deforestation as a share of forest area*, 2015. <https://ourworldindata.org/grapher/deforestation-share-forest-area?tab=table&stackMode=absolute&time=2015..latest®ion=World>
- PLEIF. [2016]. *Municipios en Zona de Peligro y Planes Locales de Emergencia por Incendios Forestales*. CMA.
- PMC. [2014]. *Forest industry in Latvia*. <http://www.latinamerica.fi/forest-industry-in-brazil>
- PRS Group. [2019]. Regional Political Risk Index - PRS Group. In *Regional Political Risk Index*. <https://www.prsgroup.com/regional-political-risk-index/>
- Radtke, K., Day, J., Forster, T., Himmelsbach, J., Korte, L., Mucke, P., Thielbörger, P., & Weller, D. [2019]. *WorldRiskReport 2019 Focus: Water Supply*.
- Ritchie, H., & Roser, M. [2021]. Forests and Deforestation. *Our World in Data*. <https://ourworldindata.org/org/forests-and-deforestation>
- Roser, M. [2013]. Employment in Agriculture. *Our World in Data*. <https://ourworldindata.org/employment-in-agriculture>
- Sachs, J., Schmidt-Traub, G., Kroll, C., Lafontaine, G., Fuller, G. [2019]. *Sustainable Development Report 2019*. <https://www.sdgindex.org/reports/sustainable-development-report-2019/>
- Sambanis, N. [2004]. *List of Civil Wars*. https://en.wikipedia.org/wiki/List_of_civil_wars
- Sataloff, R. T., Johns, M. M., & Kost, K. M. [2018]. *Agricultural Statistics at a Glance 2018*.
- Satterthwaite, D., McGranahan, G., & Tacoli, C. [2010]. Urbanization and its implications for food and farming. *Philos Trans R Soc Lond B Biol Sci.*, 2809–2820. <https://doi.org/10.1098/rstb.2010.0136>
- School of Forest Resources & Conservation. [2020]. *Forests, Natural Resources, Conservation Programs / School of Forest Resources & Conservation*. <http://sfrc.ufl.edu/forest/>
- Sönke, K., Eckstein, D., Dorsch, L., & Fischer, L. [2020]. *Global climate risk index 2020*. <https://germanwatch.org/en/download/7170.pdf>

- SpaceWatch.Global. [2018]. *Market for Earth observation data and services forecast to grow by 9% annually over next decade - SpaceWatch.Global.* <https://spacewatch.global/2019/11/market-for-earth-observation-data-and-services-forecast-to-grow-by-9-annually-over-next-decade/>
- SPEI. [2019]. *Data base: SPEI, The Standardised Precipitation-Evapotranspiration Index.* <https://spei.csic.es/database.html>
- Statista. [2017]. *Statista. Office of National Statistics UK.* <https://www.statista.com/search/?q=Number+of+wildfires&Search=&qKat=search&language=0&p=3>
- Statista. [2019a]. • *India - internet penetration among select states 2019 | Statista.* <https://www.statista.com/statistics/1115129/india-internet-penetration-by-state/>
- Statista. [2019b]. *Tree cover loss globally by select country 2018 | Statista.* <https://www.statista.com/statistics/1025472/tree-cover-loss-global-by-country/>
- TABARY, M. E. [2016]. Five forest figures for the International Day of Forests. In *The Data Blog.* <https://blogs.worldbank.org/opendata/five-forest-figures-international-day-forests>
- Territorio, O. D. E. L. [2020]. *DATOS ESTADÍSTICOS A 31 / 12 / 2019 PLAN INFOCA.*
- The-World-Bank. [2016]. *Digital Adoption Index.* World Development Report. <https://www.worldbank.org/en/publication/wdr2016/Digital-Adoption-Index>
- The Economis Group. [2020]. *Global Food Security Index (GFSI).* The Economist Intelligence Unit. <https://foodsecurityindex.eiu.com/Index>
- The Global Economy. [2020]. *Fertilizer use by country, around the world | TheGlobalEconomy.com.* https://www.theglobaleconomy.com/rankings/fertilizer_use/
- The Queensland Times. [2020]. *Agricultural and Farm Consultants Businesses | Queensland Times.* <https://www.qt.com.au/find-your-local/browse/all-locations/farming/agriculture/agricultural-and-farm-consultants/>
- the United Nations. [2014]. *United Nations member states.* <https://doi.org/10.18356/d3ce1729-en>
- the United Nations. [2020]. *Take Action for the Sustainable Development Goals – United Nations Sustainable Development.* United Nations Sustainable Development. <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- The World Bank. [2015]. *Ease of doing business index (1=most business-friendly regulations) | Data.* World Bank. <https://data.worldbank.org/indicator/IC.BUS.EASE.XQ?view=map>
- The World Bank. [2016a]. *Agricultural land (% of land area). 1–18.* <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?view=chart>
- The World Bank. [2016b]. *Arable land (% of land area).* Food and Agriculture Organization, Electronic Files and Web Site. <https://data.worldbank.org/indicator/AG.LND.ARBL.ZS?view=chart>
- The World Bank. [2016c]. *Cereal production data.* 2018. https://data.worldbank.org/indicator/AG.PRD.CREL.MT?end=2017&most_recent_value_desc=true&start=1961&view=chart
- The World Bank. [2016d]. *Forest area (% of land area) | Data.* Data. <https://data.worldbank.org/indicator/AG.LND.FRST.ZS>

- The World Bank. [2016e]. *Forest area (% of land area) | Data*. Data. https://data.worldbank.org/indicator/AG.LND.FRST.ZS?most_recent_value_desc=true
- The World Bank. [2017a]. *Land under cereal production (hectares)*. In The World Bank. <https://data.worldbank.org/indicator/AG.LND.CREL.HA?view=chart>
- The World Bank. [2017b]. *Renewable internal freshwater resources per capita (cubic meters)*. Retrieved from The World Bank. <https://data.worldbank.org/indicator/ER.H2OINTR.PC?view=chart>
- The World Bank. [2019a]. *Agriculture, value added (% of GDP) | Data*. https://donnees.banquemonde.org/indicator/NV.AGR.TOTL.ZS?end=2019&most_recent_value_desc=true&start=1960&view=chart
- The World Bank. [2019b]. *Fixed broadband subscriptions (per 100 people)*. <https://data.worldbank.org/indicator/IT.NET.BBND.P2>
- The World Bank. [2019c]. *GDP growth (annual %) | Data*. United Nations. <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>
- The World Bank. [2019d]. *Patent applications, nonresidents | Data*. World Intellectual Property Organization [WIPO]. <https://data.worldbank.org/indicator/IP.PAT.NRES?view=chart>
- The World Bank. [2019e]. *Patent applications, residents | Data*. <https://data.worldbank.org/indicator/IP.PAT.RESD?view=chart>
- The World Bank. [2019f]. *Population total Data*. The World Bank. <https://data.worldbank.org/indicator/SP.POP.TOTL>
- The World Bank. [2020a]. *Annual deforestation (% of change) | Data Catalog*. <https://datacatalog.worldbank.org/annual-deforestation-change>
- The World Bank. [2020b]. *Average precipitation in depth (mm per year) | Data*. <https://data.worldbank.org/indicator/AG.LND.PRCP.MM>
- The World Bank. [2020c]. *Worldwide Governance Indicators | DataBank*. The World Bank. <https://databank.worldbank.org/source/worldwide-governance-indicators#>
- Transparency, I. [2019]. *Corruption Perceptions Index 2019 - Publications - Transparency.org*. <https://www.transparency.org/en/cpi/2019/index/table>.
- Transparency, I. [2020]. *Corruption Perceptions Index 2020 for New Zealand - Transparency.org*. <https://www.transparency.org/en/cpi/2019/table/nzl#>
- Trisnadi, R. [2011]. GEO. *Agrivita Journal of Agricultural Science*, 33(2). <https://doi.org/10.17503/agrivita.v33i1.44>
- Tutorial, S. [2019]. Forests and Deforestation. In *Our World in Data*. <https://ourworldindata.org/forests-and-deforestation>
- UN [2009]. *Food Production Must Double by 2050 to Meet Demand from World's Growing Population, Innovative Strategies Needed to Combat Hunger, Experts Tell Second Committee | Meetings Coverage and Press Releases*. UN Meeting Coverage. <https://www.un.org/press/en/2009/gaef3242.doc.htm>
- UN [2020a]. *Sustainable Development Report 2020*. <https://dashboards.sdgindex.org/rankings>
- UN [2020b]. *Climate Change | UN-Water*. Unwater.Org. <https://www.unwater.org/water-facts/climate-change/>

- UNDP [2019]. *Goal 15: Life on land* | UNDP. United Nations Development Programme. <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-15-life-on-land.html>
- UNEP [2020]. *List of accredited organizations* | UNEP - UN Environment Programme. Civil Society Engagement. <https://www.unep.org/civil-society-engagement/accreditation/list-accredited-organizations>
- United Nations. [2018]. *UNCTAD / UN list of Least Developed Countries*. <https://unctad.org/topic/least-developed-countries/list>
- United Nations News Service. [2013]. *World must sustainably produce 70 per cent more food by mid-century – UN report*. United Nations. <https://news.un.org/en/story/2013/12/456912>
- United Nations Water. [2018]. World Water Development Report 2018 | UN-Water. In *United Nations*. <https://www.unwater.org/publications/world-water-development-report-2018/>
- US EPA, O. [2015]. *Climate Change Indicators: Wildfires*. <https://www.epa.gov/climate-indicators/climate-change-indicators-wildfires>
- USDA. [2019]. USDA ERS - Home. USDA. <https://www.ers.usda.gov/>
- Wales, N. C. C. of N. S. [2020]. *Members* | Nature Conservation Council of New South Wales Australia. <https://www.nature.org.au/members>
- WBS. [2020]. *Gross Domestic Income (Constant LCU)*. https://data.worldbank.org/indicator/NY.GDY.TOTL.KN?most_recent_value_desc=true
- Wikipedia. [2021]. *List of European countries by minimum wage* - Wikipedia. https://en.wikipedia.org/wiki/List_of_countries_by_minimum_wage
- Wordbank. [2006]. *Crop production index (2004-2006 = 100)*. <https://data.worldbank.org/indicator/AG.PRD.CROP.XD?view=chart>
- World bank. [2013]. *Agricultural land (% of land area)* | Data. The World Bank. <https://data.worldbank.org/indicator/AG.LND.AGRI.ZS?view=chart>
- World Bank. [2017]. *Research and development expenditure (% of GDP)* | Data. United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. <https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS>
- Wordbank. [2018a]. *Plant species (higher), threatened* | Data. <https://data.worldbank.org/indicator/EN.HPT.THRD.NO?view=chart>
- World Bank. [2018b]. *Droughts, floods, extreme temperatures (% of population, average 1990-2009)* | Data. <https://data.worldbank.org/indicator/EN.CLC.MDAT.ZS>
- World Bank. [2019a]. *Agriculture, forestry, and fishing, value added (current US\$)* | Data. Worldbank. <https://data.worldbank.org/indicator/NV.AGR.TOTL.CD>
- World Bank. [2019b]. *Cereal production (metric tons)* | Data. <https://data.worldbank.org/indicator/AG.PRD.CREL.MT?end=2017&start=2017>
- World Bank Group. [2019]. *GDP per capita, PPP (current international \$)* | Data. World Bank, International Comparison Program Database. https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?most_recent_value_desc=true

- World Bank, & OECD. [2018a]. *GDP per capita [current US\$] / Data*. World Bank Group US. <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?view=chart>
- World Bank, & OECD. [2018b]. *GDP per capita [current US\$] / Data*. World Bank Group US. https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?most_recent_value_desc=false
- World Bank, & The Global Economy. [2017]. *Political stability by country, around the world / TheGlobalEconomy.com*. 2017. https://www.theglobaleconomy.com/rankings/wb_political_stability/
- WorldAtlas. [2019]. *Richest And Poorest States Of Australia - WorldAtlas*. <https://www.worldatlas.com/articles/the-richest-and-the-poorest-states-of-australia.html>
- WRI. [2020]. *Aqueduct Country Ranking*. Baseline Water Stress. <https://www.wri.org/applications/aqueduct/country-rankings/?indicator=drr>
- WWF. [2016]. Importance of Forests | WWF. Wwf. https://wwf.panda.org/discover/our_focus/forests_practice/importance_forests/?
- WWF. [2020]. *Forests / WWF*. <https://explore.panda.org/forests>
- Zhang, Z., & Liu, Y. [2014]. *Land Indicator: Terrestrial Protected Areas of Total Land Area* (pp. 155–169). https://doi.org/10.1007/978-3-662-43591-5_16
- ZoomInfo. [2020]. *Search Crops Companies in Spain | ZoomInfo.com*. <https://www.zoominfo.com/companies-search/location-spain-industry-crops?pageNum=5>

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He received several awards including the “2018 American Marketing Association Research in Excellence Award”. This AMA Award recognized his JIBS paper as “an outstanding article published in a widely recognized and highly respected refereed journal that has made a significant contribution to the literature on global marketing in previous 10 years”.

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Further info about the VCW

- Lages, Luis Filipe [2015], “How to Grow, Create and Capture Value in Domestic and International Markets“, *Nova SBE Working Paper*, nr. 599. **Main topics:** POKER method; GloCalization.
- Lages, Luis Filipe [2016], “VCW—Value Creation Wheel: Innovation, Technology, Business, and Society“, *Journal of Business Research*, 69[11]: pp. 4849-4855. **Main topics:** VCW Model; Decision making; Case-studies; DIANA theoretical framework; TIAGO customized framework.
- Lages, Luis Filipe; Fonseca, Vânia; Paulino, Miguel [2018], “The VCW—Value Creation Wheel: A Framework for Market Selection and Global Growth“, In: Leonidou L., Katsikeas C., Samee S., Aykol B. (eds) *Advances in Global Marketing*. Springer, Cham.: pp 253-279. **Main topics:** VCW Case-Studies: Market selection; Global growth; Strategy; Innovation; Decision Making; Healthcare; Technology; Retailing; Start-Ups
- Lages, Luis Filipe; Ricard, Antonin; Hemonnet-Goujot, Aurélie; Guerin, Anne-Marie [2020], “Frameworks for Innovation, Collaboration, and Change: Value Creation Wheel, Design Thinking, Creative Problem-Solving, and Lean“, *Strategic Change*, 29[2], 195-213. **Main topics:** Value creation wheel; Design thinking; Creative problem-solving; Lean
- Lages, Luis Filipe et al. [2023], “Solutions for the Commercialization Challenges of Horizon Europe and Earth Observation Consortia: Co-Creation, Innovation, Decision-Making, Tech-Transfer, and Sustainability Actions“. *Electronic Commerce Research*, 23: 1621–1663. **Main topics:** VCW—Value Creation Wheel; VCW Sprint; VCW Journey; VCW Method; VCW Meta Framework; VCW Ecosystem; Innovation; eCommerce; Online Store; Business Models; Sustainability; Strategic Alliances; Earth Observation; Satellites; Horizon Europe; VCW Lab @ Nova SBE; NextLand; NextOcean
- Fonseca, Vânia; Lages, Luis Filipe; Kim, Philip H. [2018], “Deimos: Expanding to a New Market Using the Value Creation Wheel“, Case BAB370-PDF-ENG, Harvard Business Publishing. **Main topics:** VCW Case-Study and Teaching Note; Technology transfer; Innovation; International market selection; Decision-making; Aerospace; Farming
- Reis-Marques, Carlos; Lages, Luis Filipe; Caminati, V.V. [2019], “VCW for Social Impact in a Developing Country: Personal Development and Entrepreneurship in a Leadership Academy“, In: Basil D., Diaz-Meneses G., Basil M. (eds). *Social Marketing in Action*. Springer Texts in Business and Economics. Springer, Cham. pp 141-162. **Main topics:** VCW Case-Study and Teaching Note: Training in leadership and entrepreneurship; Social impact; Decision making; Personal development
- VCW site: www.ValueCreationWheel.com
- VCW YouTube channel: www.OpenVCW.com

VCW history and selection of papers critical for the development of today's VCW framework:

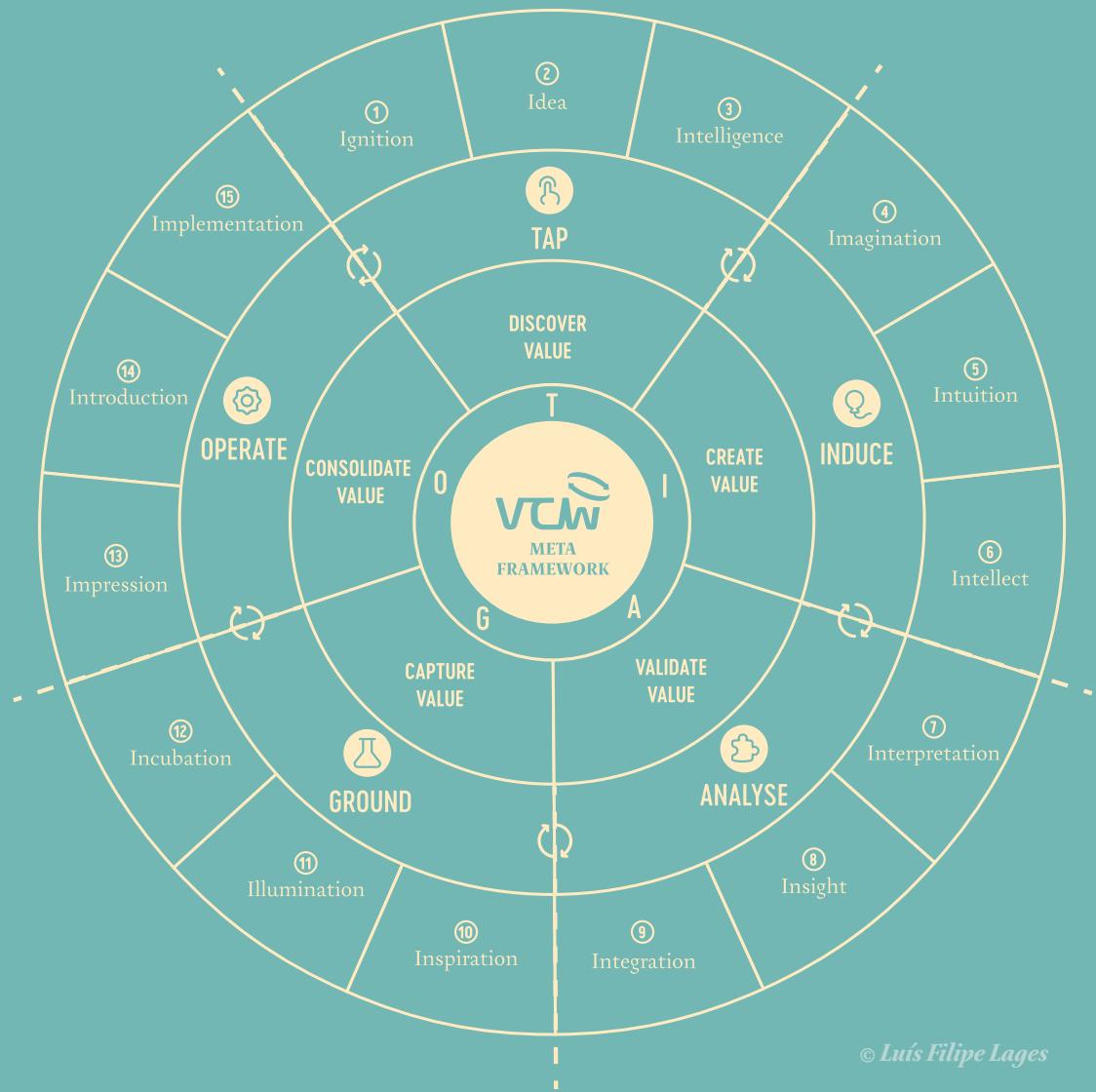
- Jahanmir, S. F., & Lages, L. F. (2015). The lag-user method: Using laggards as a source of innovative ideas. *Journal of Engineering and Technology Management*, 37, 65-77.
- Jahanmir, S. F., & Lages, L. F. (2016). The late-adopter scale: A measure of late adopters of technological innovations. *Journal of Business Research*, 69(5), 1701-1706.
- Lages, L. F. (1999). Marketing lessons from Portuguese wine exporters: The development and application of a conceptual framework. *Journal of Wine Research*, 10(2), 123-132.
- Lages, L. F. (2000). A conceptual framework of the determinants of export performance: Reorganizing key variables and shifting contingencies in export marketing. *Journal of Global Marketing*, 13(3), 29-51.
- Lages, L. F., & Montgomery, D. B. (2004). Export performance as an antecedent of export commitment and marketing strategy adaptation: Evidence from small and medium-sized exporters. *European Journal of Marketing*, 38(9/10), 1186-1214.
- Lages, L. F., Jap, S. D., & Griffith, D. A. (2008). The role of past performance in export ventures: a short-term reactive approach. *Journal of International Business Studies*, 39, 304-325.
- Lages, L. F., Silva, G. M., Canhoto, A. I., Martinez, L. F., & Jahanmir, S. (2024). Balancing people, planet and profit: Export strategies for sustainable value creation. *in print*.



Would you like to learn more about the Value Creation Wheel?

The VCW (Value Creation Wheel) Certification aims to equip individuals and organizations with the skills and knowledge to effectively use the VCW methodology for innovation, decision-making, problem-solving, transformation, and value creation. While the specific certification levels can vary, they generally follow a structured approach to ensure a comprehensive understanding and application of the VCW. Here's an overview of the different levels of VCW certification:

VCW Certification Level	VCW Certification	Total Hours	VCW Application	VCW Study
1 FOUNDATION	VCW Sprint	28	08h-16h	20h-12h
2 INTERMEDIATE	VCW Journey	98	24h-64h	74h-34h
3 ADVANCED	VCW Method	196	48h-128h	148h-68h
4 EXPERT	VCW Meta Framework	392	96h-256h	296h-136h
5 MASTER	VCW Innovation Ecosystem	784	192h-512h	592h-272h



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