

Developing a Business Case for Space

A basic introduction and practical guide for start-ups and SMEs

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OVERVIEW

- Content overview
- Target audience & objectives

INTRODUCTION

- Space market
- Tech push vs. Market pull

CREATE VALUE

- Value proposition
- Products / Services
- Gains & Pains

COMPETITION

- Value chain
- Alternatives & competitors
- TAM, SAM, SOM

PLANNING

- Revenue v. costs
- Cash flow analysis
- ROI

CONCLUSION

- Are you ready?
- ESA's role
- Q&A

What is this training and who is it for?

- Highlight the importance of a Business Case in the **development plan** of a product/service,
- Shed light on the trajectory **from idea to project to product**, and ESA's involvement in all of them,
- Provide tools to guide you in your planning and forecast (defining **what comes next**).



OBJECTIVES

- **High-level** overview of the development of a Business Case – introducing concepts, but not comprehensively detailing on them
- Therefore, the course is not very suitable for/not sufficient for those with a strong business background. Instead, the target audience is:
 - ↳ **SMEs/Startups**, companies establishing their **first product** or expanding/spinning off to the Space market

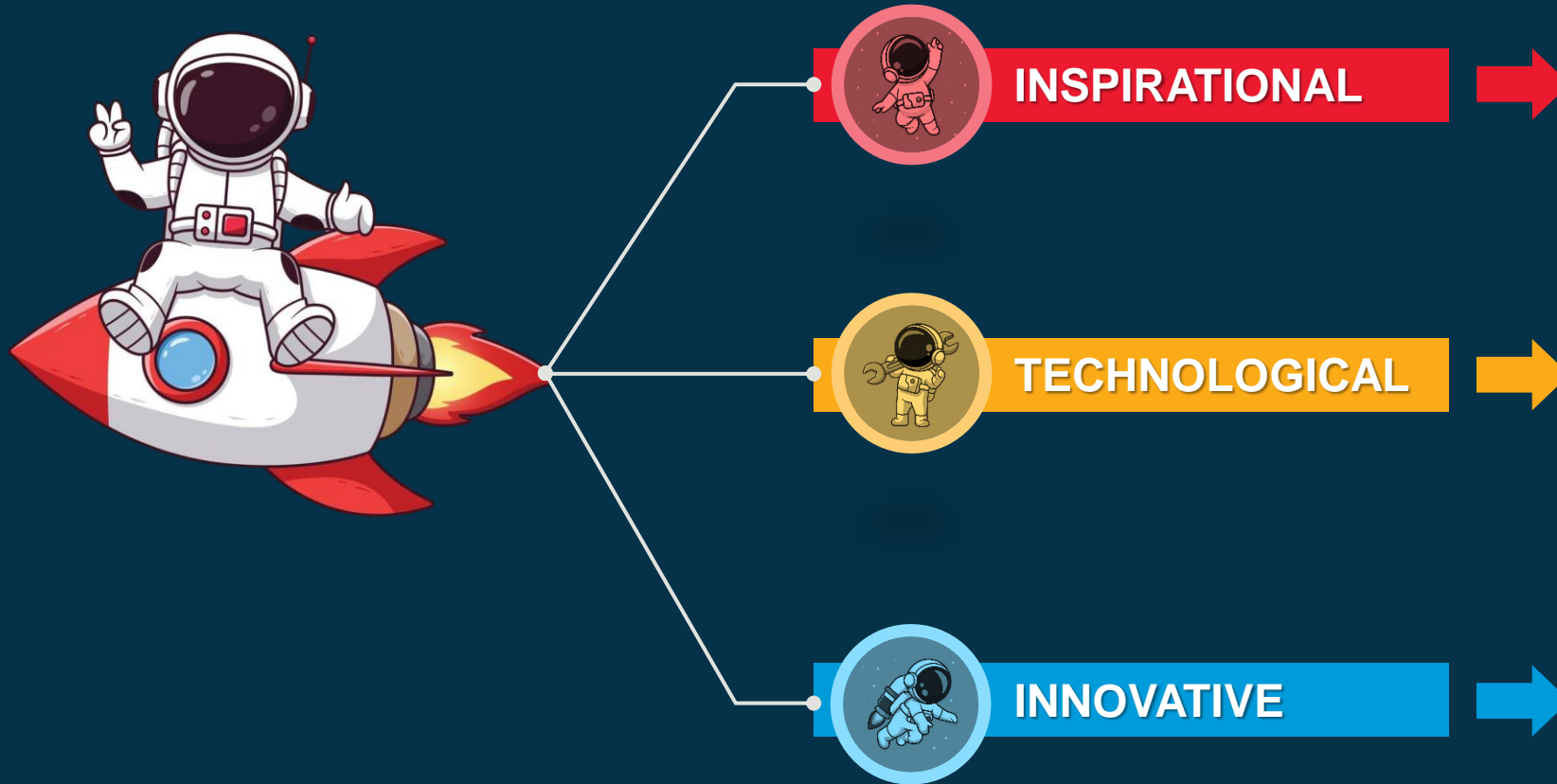


TARGET AUDIENCE



It will also help you to consolidate your business case (and get higher marks on Criterion 2)

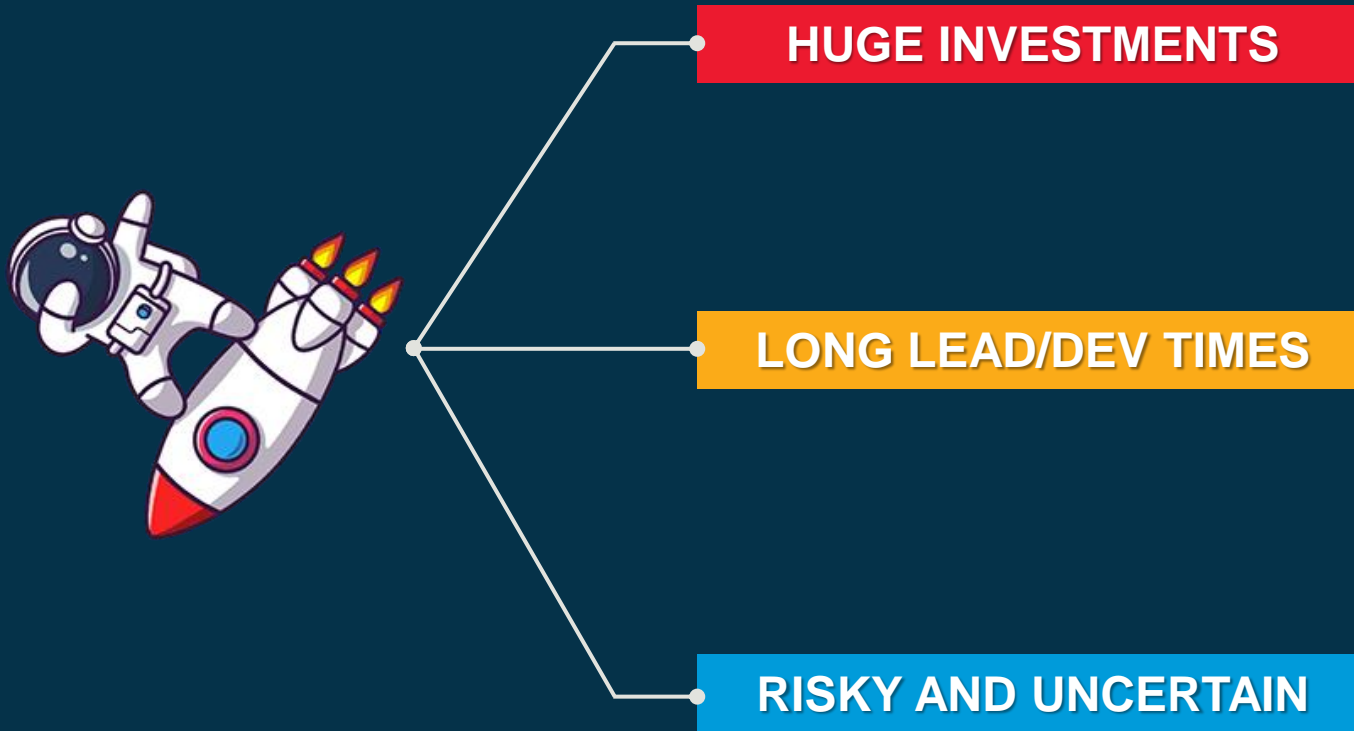
FROM IDEA TO VALUE



Audacious goals such as taking humanity to the Moon and Mars, delivering global internet, fighting climate change, etc.

Most of the workforce has a **higher education (post-secondary)** and is mostly linked to fields like engineering, astrophysics and astronomy, remote sensing, etc.

Space technologies continue to push the boundaries of knowledge even on Earth. This innovation also comes with a certain **degree of uncertainty and risk**



- Can be a **high-risk/high-reward** market
- High quality (rigorous testing) leads to long lead and development times resulting in a **long time to market**.
- **Government/Institutional funding** to overcome the risk.
- ESA prefers **recurring IOD products** (lower cost/risk) for our missions
- Focus on **developing (and qualifying) products and services** instead of funding research/one-offs.

“Game-changing” new products and services

- **Innovation** at the forefront, forward-thinking
- The goal is to **pioneer** changes that redefine market standards and consumer expectations
- By introducing new products and services that were previously unimaginable, has the risk of being deemed “**ahead of its time**”



TECHNOLOGY PUSH

Solving known customers’ problems

- Priority is the identification and satisfaction of existing **consumer needs and desires**
- Consumer-centric viewpoint, reactive approach
- Higher likelihood of **market acceptance**
- Tends to be improvements on the same solution (e.g. lower cost, higher performance, smaller)



MARKET PULL



In space, it usually tends to need more in-flight demos before the solution is accepted and taken up by the market.



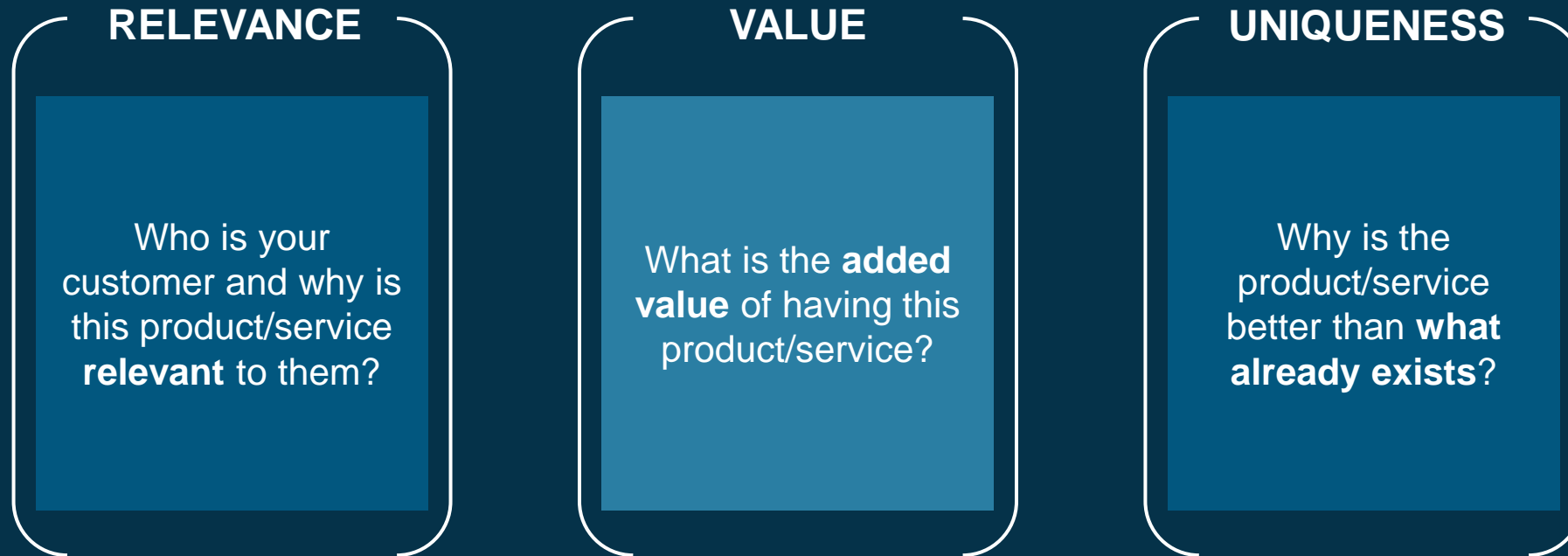
It’s crucial to define “improvement” in a metric that is relevant to the customer. This is why it is so important for us to have a customer involved in your ESA projects.

Technology Push vs. Market Pull

TECHNOLOGY PUSH

MARKET PULL

 No approach is better than the other. Finding a balance between these is crucial for a business's success



By stating the **RELEVANCE** and identifying your users/customers in Section 1.6 and the **UNIQUENESS** of the solution vs. the state-of-the-art in 1.4.1, it should become clear to any ESA reviewer what is its **VALUE**.

SpaceX **aims** to revolutionise space technology to enable people to live on other planets.

- Goal-oriented
- What is your objective as an organization

Mission Statement



Value Proposition

- Product/Service-oriented
- What you offer customers and why they should choose you

SpaceX's Falcon **offers** cost-effective, flexible and reliable access to space



You own a coffee shop.
What is the value proposition of your products?

- *What makes your product **relevant** to your customers?*
- *What makes it **better** than what already exists?*

Value Proposition – Our answers



Value Proposition – Our real answers



FAST & CHEAPER



Our staff has a proven background in handling our coffee machines. By lowering the need for maintenance, we can reduce costs and thus the price by 10%, and our delivery time is 20% better than competitors.

UNIQUE LOCATION



Our coffee shop is located near the beach, offering a beautiful view of the ocean. It is also the only coffee shop in this area, and thus the alternative for coffee lovers is driving 5km into town, making it very inconvenient.

PRODUCTS

“Selling coffee and baked goods in our coffee shop”

- Generally tangible items (something that customers can physically hold in their hands)
- Frequently one-off purchase
- Usually it can be returned (warranty)

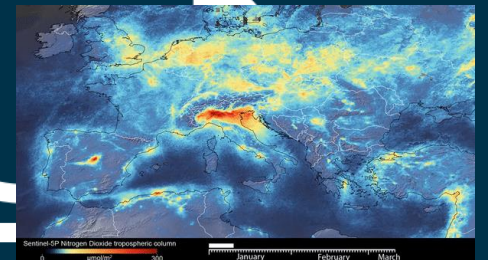
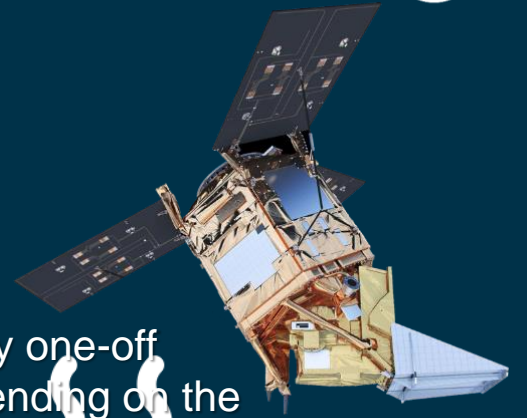
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SERVICES

“Providing coffee catering service for companies”

- Typically intangible (something that the business provides or performs for its customers)
- Frequently a recurring purchase (subscription)
- Usually it can be cancelled (notice period)

Products are **not** only one-off procurements – depending on the business, usually, the customers buy many times, but for different missions



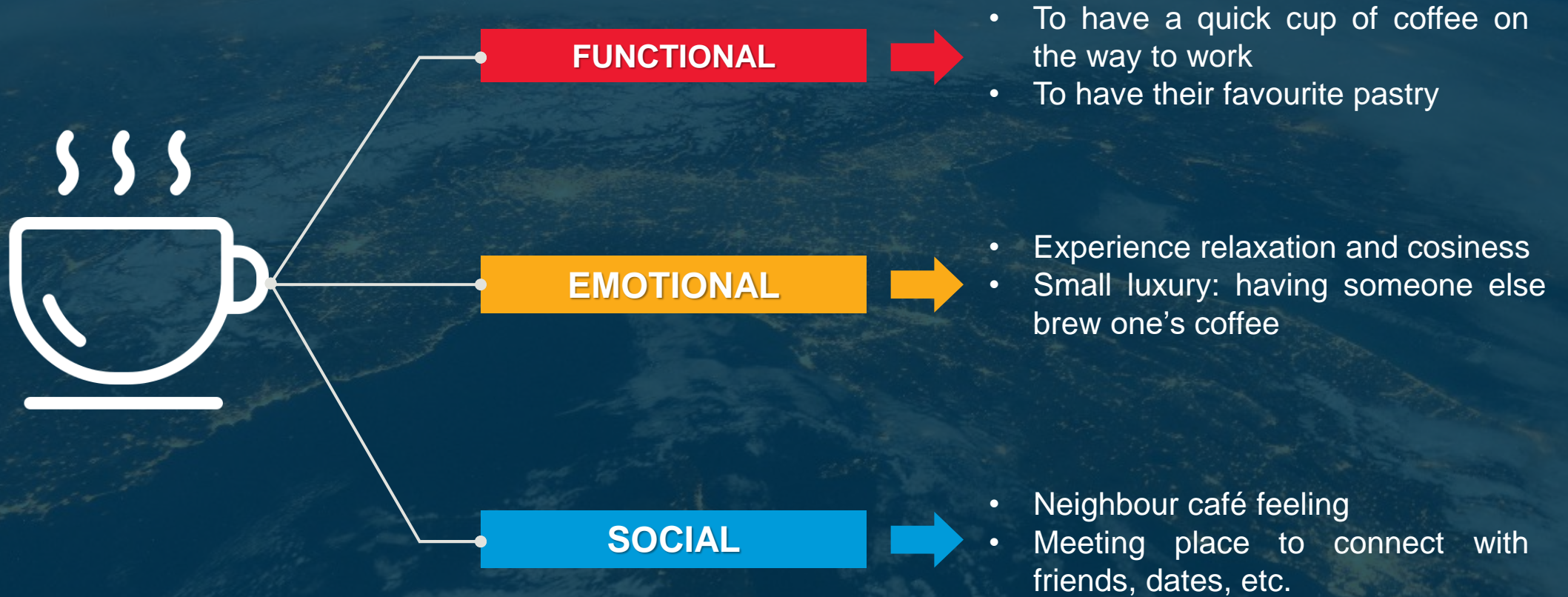
Services can be about providing **information** (e.g., downstream apps)

Same technology can be a service or a product



Let's go back to our coffee shop. Why are our clients there? What are they attempting to **get done**?

- *What are they doing with our products/services?*
- *What kind of **tasks** are they trying to complete?*
- *What **wants/needs** are they trying to satisfy?*





From our clients' point of view, what are their associated **pains and gains** when buying coffee?

- *What kind of **pains** are they trying to relieve/avoid?*
- *What potential **gains** can our clients have?*

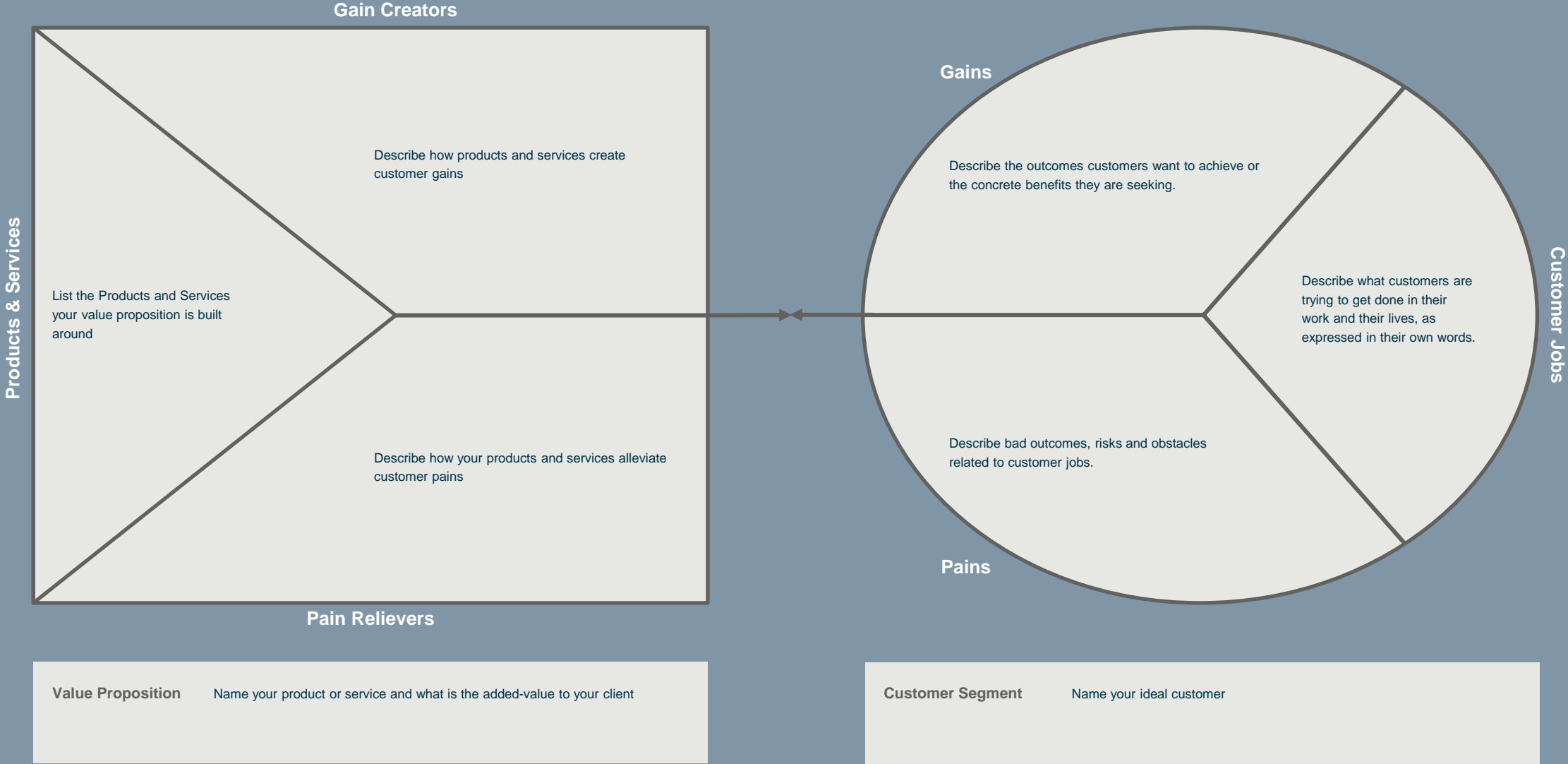






It's time for a **real** cup of coffee!

Value Proposition Canvas – Template



- Up until now, we have defined our value, products and services mostly as if we operated **in a vacuum**
- To show the unique value a business offers, one must understand **their customers** and **competitors/alternatives**
- To do so, we need to define our “**neighbours**” in the value chain



This information is crucial for a good mark in the State-of-the-Art section (Criterion 1) of ESA proposals!

Value Chain and Key Partners – Coffee Shop



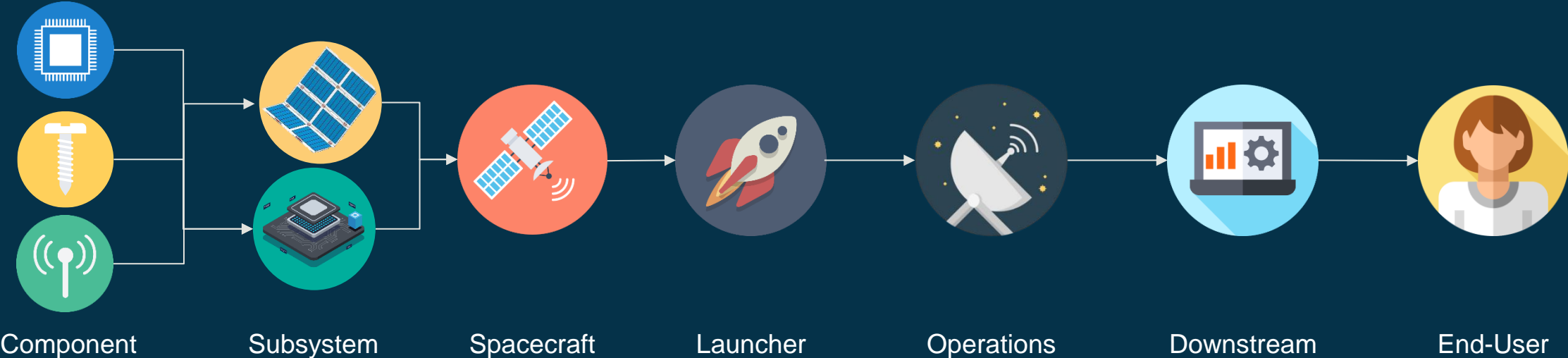
Value Chain and Key Partners – Coffee Shop



Value Chain and Key Partners – Coffee Shop



Value Chain and Key Partners – S/C Provider POV



Value Chain and Key Partners – S/C Provider POV



- **Coopetition:** To complicate matters, some component suppliers can have vertical integration up to subsystem level (or subsystem providers can double as spacecraft suppliers), which means that sometimes our competitors are also our suppliers or customers depending on the situation.
- **Lack of knowledge adds to risk:** it can become **complex or overwhelming** to determine who our neighbours are in the value chain and it's not uncommon to find **new key partners** throughout a product development process (e.g., unforeseen supply needs and thus costs).
- **Customer Relationship:** For upstream in particular, the market is built on **low volume, high-risk** business with **bespoke** solutions and thus customer relationship becomes key. It is a **trust-based** business, and this is built via **transparency** and **cooperation** (e.g., with more established players).





We strongly recommend selecting an end-user from this last group and engaging them as subcontractors

Source: EUSPA EO and GNSS Market Report | Issue 2, 2024



From Market to Target – Limiting Factors

28,800 satellites are forecasted to be launched between 2023 and 2032 for a total market of 400 USD Billion

Source: Euroconsult's satellites to be built and launched, 26th edition (2023)

Mega-constellations and other awarded contracts



13% of the total market is already restricted, as part of the 5 mega-constellations

Non-European (institutional) markets



The U.S. still manufactures the vast majority of commercially procured satellites (46% in 2023)

Different sizes, target applications



Satellites >50kg still account for a large portion of the market (estimated 336 USD Billion)

New Space vs. High Reliability



Different missions will have different (i.e., more or less strict) requirements

More established competitors



Airbus is the leading European market player (with 65% of the market share in 2022)



You can find ESA's market estimates (equivalent to SOM) from the Technology Harmonisation in this [link](#).



Who is the **target customer** of our coffee shop?

TIP: Let's do some reverse engineering: who can we exclude?

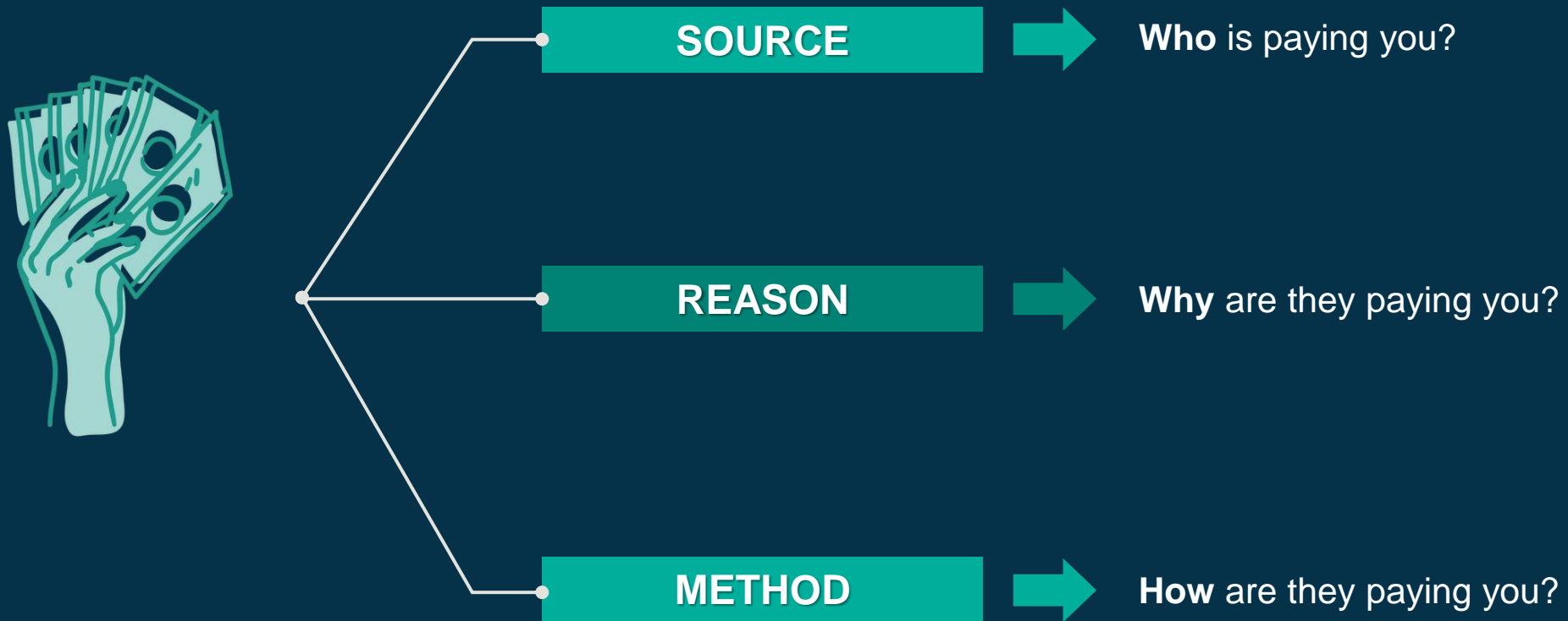


Potential limiting factors

- People who **don't like** coffee
- People who live **too far away** from Nicosia
- People who **cannot afford** it
- People with **medical conditions** (cardiovascular, immobile, etc.)
- People **unavailable** during the café's working hours (e.g., night shift)
- People with **existing brand loyalty**
- People **under the age of 10**
- ...

Some food for thought

- Tourists and one-off costumers
- Competition in the area
- ...





PRODUCT-BASED

Selling coffee and baked goods in our coffee shop

- Directly selling an item from stock to a customer (B2C)
- Revenue is obtained directly from the customer and exchanged for the good



SERVICE-BASED

Catering service for companies

- The customer is now another company (B2B)
- Revenue is obtained by agreeing to price a priori. Revenue can be obtained in several ways (e.g., 50 upfront and 50 after service, monthly fee, etc.)



Not all products follow this approach and there are several models, each with their own pros and cons.

We have now explored the answers to:

- **Who** is paying you?
- **Why** are they paying you?
- **How** are they paying you?

But how much are they paying you?

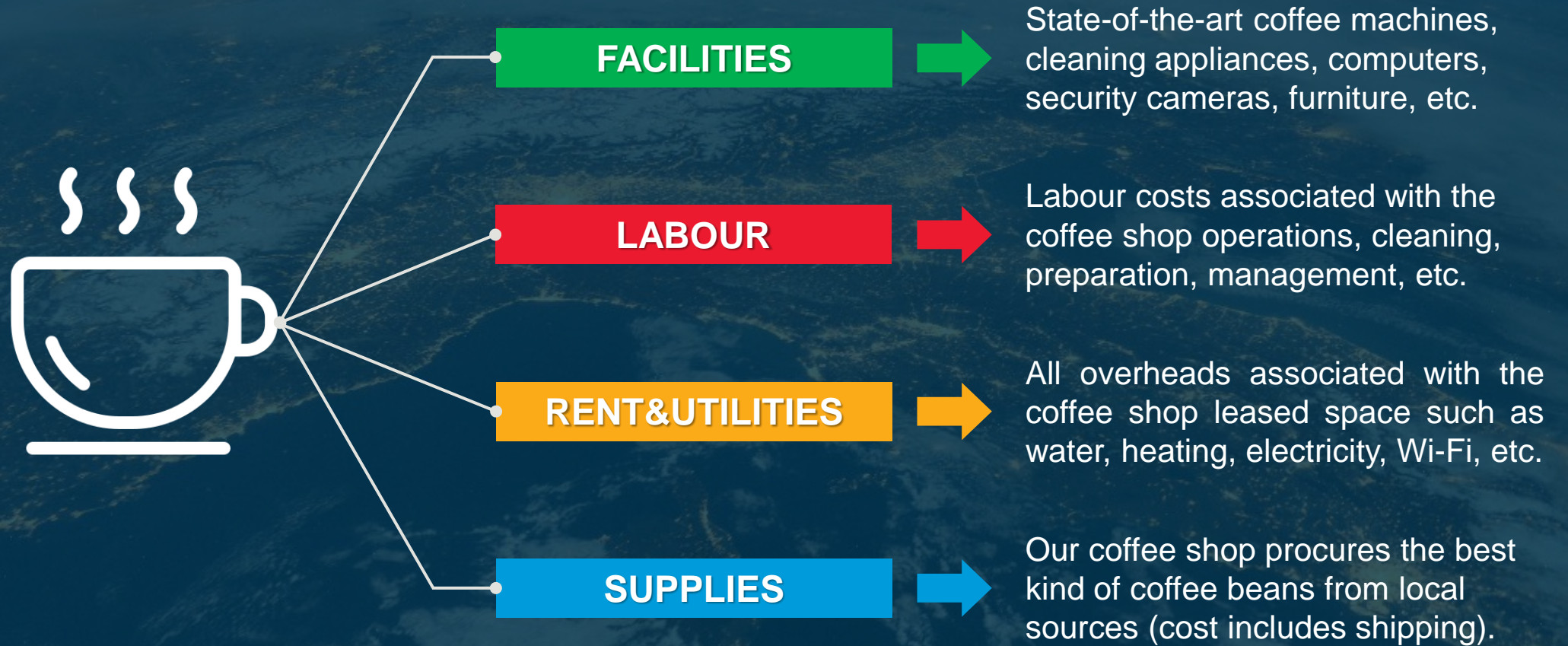




What are the **main costs** associated with running a coffee shop?

- What are the **key activities** involved in running a café?
- What are the **main resources** needed for our product/service?
- What kind of **costs** are associated with those?

Cost Structure – Our answers



- **Recurring Costs** are the regular, ongoing expenses required to conduct business operations. They typically include, rent, utilities, labour and supplies, among others
- **Non-Recurring Costs** occur infrequently or only once, being often related to the setup, expansion or significant changes in operations. Purchases of major equipment, furniture and unexpected repairs are examples of non-recurring costs
 - Amortization is the practice of spreading an intangible asset's cost over that asset's useful life (e.g. patents, franchise agreements, trademarks)
 - Depreciation involves expensing a fixed asset as it's used to reflect its anticipated deterioration.
 - The straight-line method is the most common for both. Imagine a bakery that buys a delivery van of **€50,000 with a useful lifetime of 10 years**. Following the straight-line method, it would cost **€5,000 per year** over the next 10 years.



- **Cost of the product will be made of various parts:**
 - Amortised own **infrastructure** investment
 - Amortised **Development** Costs (often paid by ESA for space)
 - Amortised advertising costs/ bidding costs and other **overheads**
 - Labour
 - Parts and materials
 - Licences and taxes
 - Wastage (e.g. due to minimum order quantities, mistakes, failures)
 - Transport
- **Coffee cup assuming 200,000 cups sold per year:**
 - Amortised Rent: €20,000 per year = €0.1/cup
 - Amortised Machine costs: €2,000 per year = €0.01/cup
 - Amortised Overheads: €20,000 per year = €0.1/cup
 - Labour: 5mins/cup at €12/hour = €1.0/cup
 - Parts and materials (milk, paper cup, beans, sugar etc) = €0.5/cup
 - Licences, insurance and taxes = € 0.2 / cup
 - Wastage = €0.05/cup
 - **TOTAL COST: €1.96 /cup**



We would need to charge at least €1.97 per cup to not make a loss

WHAT IS IT?

Cash Flow (CF) refers to the movement of money into and out of a business organisation at a certain moment in time.

$$CF = TCI - TCO$$

Where:

TCI is the Total Cash Inflow

TCO is the Total Cash Outflow



WHY IS IT IMPORTANT?


Cash flow planning is essential: you need cash in the bank to pay your bills.

Any lucrative business can experience short-term cash flow issues – e.g. if they have excessive costs while delivering a service while they wait to receive a payment from a customer.

Cash flow planning is also helpful to see if you can afford new investments (e.g. new products, bigger premises, or recruiting new staff, etc.)

In 2023, a bakery decided to expand its business operations and start selling coffee at its premises. To do so, it hired a barista and invested into a new espresso machine and seating area:

Operating Cash Flow Statement for 2023:


Cash inflows:	Cash outflows
<ul style="list-style-type: none">▪ Coffee sales: €90,000▪ Pastry sales: €60,000 	<ul style="list-style-type: none">▪ Payments to coffee bean suppliers: €10,000▪ Payments to baked goods suppliers: €20,000▪ Bakery labour costs: €60,000▪ Barista labour costs: €30,000▪ Rent and utilities: €10,000 ▪ New espresso machine: €10,000▪ New seating area: €20,000

$$\text{CF from Operations} = \text{€150,000} - \text{€160,000} = - \text{€10,000}$$

A business can operate with negative cash flow as long as it has cash reserves or access to funding to continue operations. But we want CF to be positive eventually!

*The bakery had cash reserves to cover the negative operating cash flow in 2023.
In 2024, it continued its operations with the following results:*

Operating Cash Flow Statement for 2024:

Cash inflows:	Cash outflows
<ul style="list-style-type: none">▪ Coffee sales: €90,000▪ Pastry sales: €60,000 	<ul style="list-style-type: none">▪ Payments to coffee bean suppliers: €10,000▪ Payments to baked goods suppliers: €20,000▪ Bakery labour costs: €60,000▪ Barista labour costs: €30,000▪ Rent and utilities: €10,000 ▪ New espresso machine: €10,000 (paid in 2023)▪ New seating area: €20,000 (paid in 2023)

$$\text{CF from Operations} = \text{€150,000} - \text{€130,000} = + \text{€20,000}$$

*With the non-recurring costs of the espresso machine and seating area behind,
the bakery started operating with a positive cash flow in 2024*

- **Return on Investment (ROI)** is a simple way of evaluating the efficiency of an investment relative to its cost
- Example: Before the bakery expanded its operations to start offering coffee, it performed an assessment of its potential return on investment with the following assumptions:

New espresso machine: €10,000 New seating area: €20,000
Annual barista labour costs: €30,000 Annual coffee bean costs: €10,000
Annual rent/utilities costs: €2,000 Annual Coffee sales: €50,000
Espresso machine and seating area useful lifetime: 10 years



$$\begin{aligned} \text{ROI} &= (\text{Revenues} - \text{Costs}) / \text{Costs} \\ &= (10 \times \text{€}50,000 - \text{€}10,000 - \text{€}20,000 - 10 \times (\text{€}30,000 + \text{€}10,000 + \text{€}2,000)) / \text{€}450,000 \\ &= 11\% \end{aligned}$$

- ROI has some limitations, e.g. it does not account for the time value of money
- A more advanced financial forecast, looking at **Pay Back period**, **Net Present Value** and **Internal Rate of Return**, can be performed with the help of [this template](#)

Business Model Canvas – Template



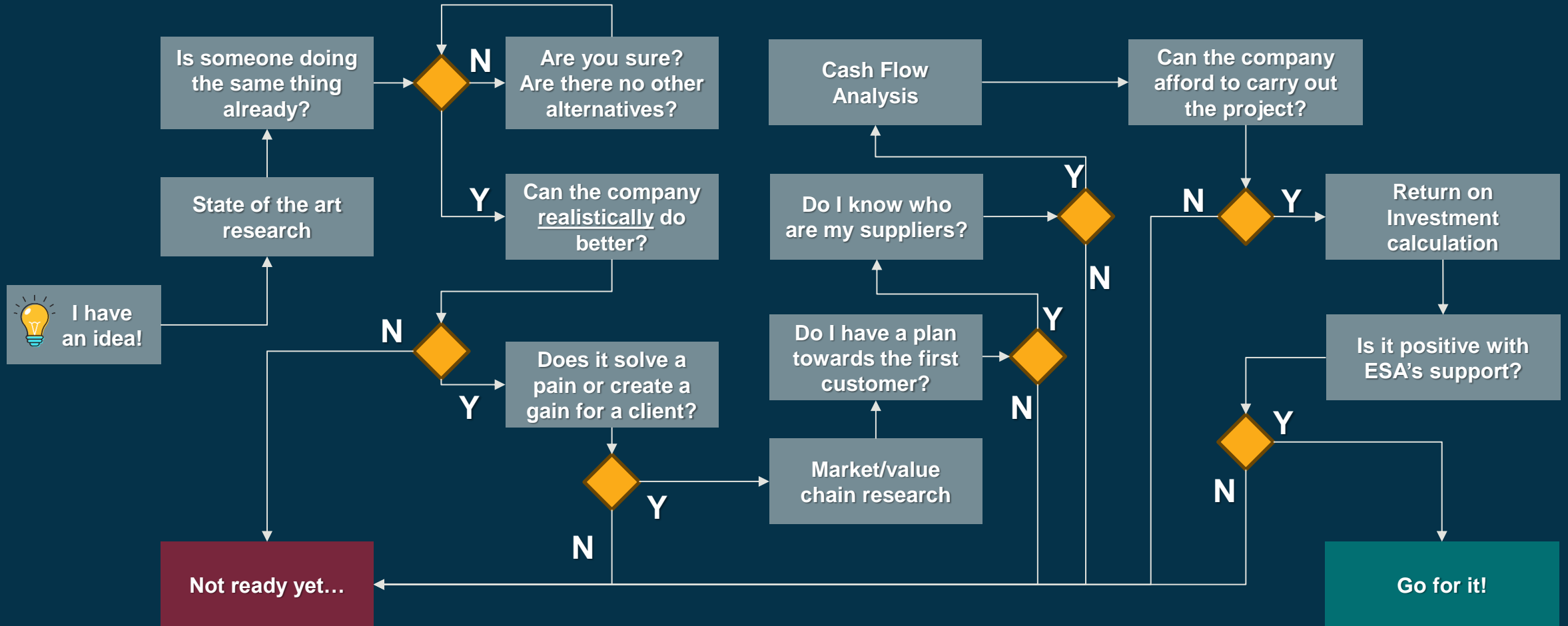
<p>Key Partners</p> <p>Who are our Key Partners? Who are our key suppliers? Which Key Resources are we acquiring from partners? Which Key Activities do partners perform?</p> <p>MOTIVATIONS FOR PARTNERSHIPS: Optimization and economy, Reduction of risk and uncertainty, Acquisition of particular resources and activities</p>	<p>Key Activities</p> <p>What Key Activities do our Value Propositions require? Our Distribution Channels? Customer Relationships? Revenue streams?</p> <p>CATEGORIES: Production, Problem Solving, Platform/Network</p>	<p>Value Proposition</p> <p>What value do we deliver to the customer? Which one of our customer's problems are we helping to solve? What bundles of products and services are we offering to each Customer Segment? Which customer needs are we satisfying?</p> <p>CHARACTERISTICS: Newness, Performance, Customization, "Getting the Job Done", Design, Brand/Status, Price, Cost Reduction, Risk Reduction, Accessibility, Convenience/Usability</p>	<p>Customer Relationships</p> <p>What type of relationship does each of our Customer Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</p>	<p>Customer Segments</p> <p>For whom are we creating value? Who are our most important customers? Is our customer base a Mass Market, Niche Market, Segmented, Diversified, Multi-sided Platform</p>
<p>Cost Structure</p> <p>What are the most important costs inherent in our business model? Which Key Resources are most expensive? Which Key Activities are most expensive?</p> <p>IS YOUR BUSINESS MORE: Cost-driven (leanest cost structure, low price value proposition, maximum automation, extensive outsourcing), Value-driven (focused on value creation, premium value proposition).</p> <p>SAMPLE CHARACTERISTICS: Fixed Costs (salaries, rents, utilities), Variable costs, Economies of scale, Economies of scope</p>		<p>Revenue Streams</p> <p>For what value are our customers really willing to pay? For what do they currently pay? How are they currently paying? How would they prefer to pay? How much does each Revenue Stream contribute to overall revenues?</p> <p>TYPES: Asset sale, Usage fee, Subscription Fees, Lending/Renting/Leasing, Licensing, Brokerage fees, Advertising</p> <p>FIXED PRICING: List Price, Product feature dependent, Customer segment dependent, Volume dependent</p> <p>DYNAMIC PRICING: Negotiation (bargaining), Yield Management, Real-time-Market</p>		



WHAT'S NEXT?

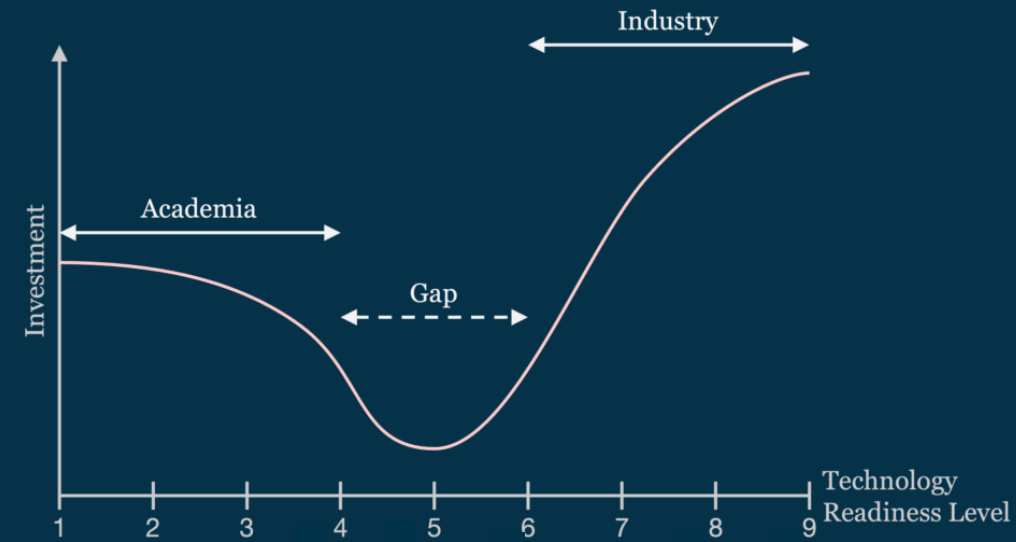


Are you ready to apply for an ESA project?



How can ESA help your business?

- TRL 1 Basic principle
- TRL 2 Application and Market formulated
- TRL 3 Proof-of-concept, partial BBs, all key reqs
- TRL 4 Functional and Performance verification
- TRL 5 Engineering Model
- TRL 6 Single unit generic qualification
- TRL 7 Customer tailoring and qualification
- TRL 8 Flight demonstrated/ Customer demo
- TRL 9 Operationally Flight Proven



How can ESA (PECS/RPA) help your business?





What is the best business pitch?

FINAL EXERCISE – INSTRUCTIONS

1. Hear the pitches from **three companies** and read through the provided information
2. Using the concepts we learnt today, discuss in groups and rate the three pitches from **best to worst**.
3. **Assign a representative to present your group's choices and justifications to everyone.**

SHARK TANK

FINAL EXERCISE – RECAP

1. KNOW YOUR MARKET AND YOUR NEIGHBOURS:

- Who are your competitors and alternatives?
- Who are your suppliers? Who are your clients?
- What is realistically your market share?

2. GENERATE VALUABLE PRODUCTS FOR YOUR CLIENT:

- Do you already have a first client? If not, who are they and what is the path towards them?
- What pains are you solving/gains are you adding?
- What is your competitive advantage (vs. others)?

3. MAKE SURE IT'S A GOOD INVESTMENT:

- What is your investment? Why do you need funding?
- What are the key resources needed for this product development? How much do they cost?
- How much revenue will you make with the product?

SHARK TANK

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