USES 2
Uses of UltraSonic Embedded Sensors

Project 101072599 — HORIZON-MSCA-2021-DN-01

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Entrepreneurship

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AGENDA

- OPTIONS AT THE END OF THE ROAD…
- Entrepreneurship
- Lab to market - Business Opportunity
- Marketing
- Christopher Lovelock flower
- Disruptive technologies
- Startup market data
- Conclusions

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OPTIONS AT THE END OF THE ROAD

- After finishing the education and make a phd, an important milestone needs to be solved…
  - Continue research in the same topic…or other different topics…
    - Research without (apparently) any direct application (Higgs boson)
    - Applied research…having in mind improve the future focus in a topic

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OPTIONS AT THE END OF THE ROAD

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OPTIONS AT THE END OF THE ROAD

- After finishing the education and make a phd, an important milestone needs to be solved…
  - Continue research in the same topic…or other different topics…
  - Became university professor…in any level
  - Joint to a company…and pray to apply your knowledge!
    - The main goal of a private company is typically to generate profit for its owners by offering goods or services to meet market needs.
    - Innovative solutions typically increase in performance and profit metrics…however, disruptive and innovative solutions pose to existing lines of business

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Entrepreneurship

- Entrepreneurship
  - Cambridge dictionary definition

    “skill in starting **new** businesses, especially when this involves seeing **new** opportunities”

  - Wikipedia definition

    “Entrepreneurship is the creation or extraction of economic value in ways that generally entail beyond the minimal amount of **risk** (assumed by a traditional business), and **potentially** involving values besides simply economic ones. ”

  - Stanford definition

    “*individual or a small group* of partners who **strike out** on an **original path** to create a new business. An aspiring entrepreneur actively seeks a particular business venture and it is the entrepreneur who assumes the greatest amount of risk associated with the project. As such, this person also stands to benefit most if the project is a success.”

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Entrepreneurship

Entrepreneurship is the process of **designing**, **launching**, and **managing** a new business or venture, typically involving innovation, risk-taking, and the goal of creating value—whether financial, social, or cultural. It encompasses **identifying opportunities**, **developing creative ideas and new products or processes**, and **bringing them to market by taking on the responsibility and uncertainty of a new enterprise.**

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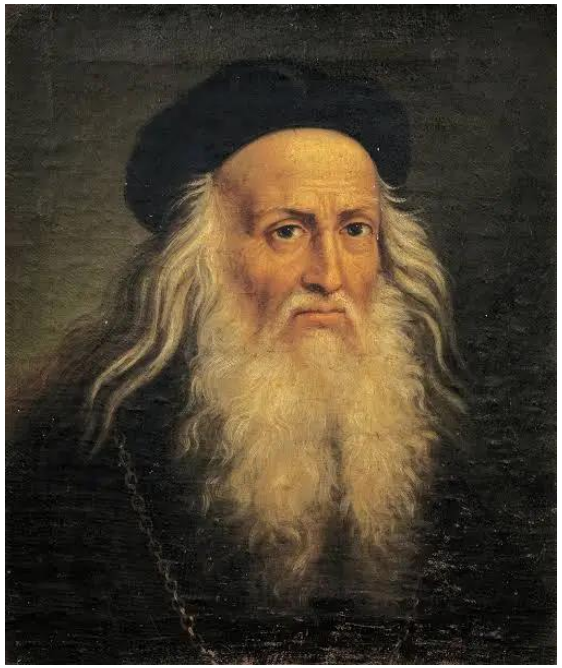
Entrepreneurship - Characteristics of an entrepreneur

Entrepreneur must be able to fully understand (not master!) of how business works — including from a **financial** and **operational perspective**— with a drive for innovation

A successful entrepreneur will possess many abilities and characteristics, including the ability to be:

- Curious
- Flexible and adaptable
- Persistent
- Passionate
- Willing to learn
- A visionary
- Motivated



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Entrepreneurship - Previous examples....

Jeff Bezos (Amazon)

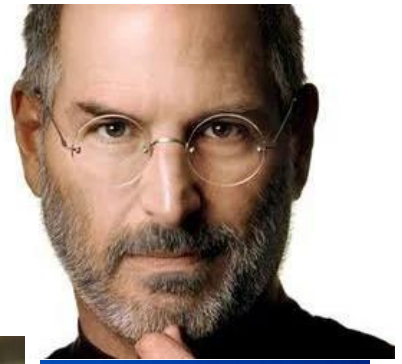
Larry Page y Sergey Brin (Google/Alphabet)

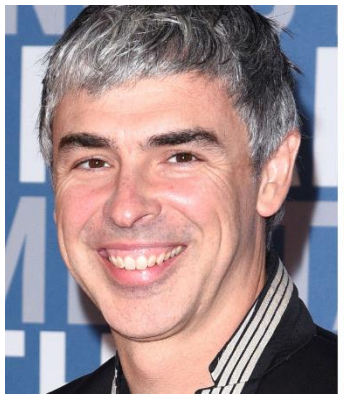
Mark Zuckerberg (Facebook/Meta)

Steve Jobs (Apple)

Bill Gates (Microsoft)

Elon Musk (Tesla, SpaceX)





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Lab to market - Business Opportunity

A technology can be an opportunity when…

- Technology
  - It's oriented toward solving a problem,
  - In a money-making sector,
  - There are competitive advantages,
  - The right people to carry it out,
  - Who have already done things to prove it
- Initial resources
  - The facilities allow for the development of a prototype,
  - It has adequate protection,
  - There is funding but ownership is retained,
  - Agents interested in the development,
  - And also a plan for evolution

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Lab to market - Business Opportunity

Team

- They bring differentiating capabilities,
- They have the right commitment,
- They demonstrate industry experience,
- A solid network of contacts,
- And they have access to new resources

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Lab to market - Business Opportunity

Business Model needs to clearly answer the following basic questions:

- What?
- How?
- Who and why?
- How much?

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Lab to market - Business Opportunity

Clients

- It doesn't matter what you offer but what the other needs
- Users vs customers. Who is the customer?
- Who makes the purchasing decision?
- Is the solution a priority for the customer?
- What is market potential?
- Determine how you will get the first customer

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Lab to market - Business Opportunity

Business Competitor

- Don’t make the big mistake
- How many are there and what are their strengths
- Are you competing against any giants?
- Determine the weaknesses of your competitors
- Locate a market niche
- Strengthen yourself in that niche

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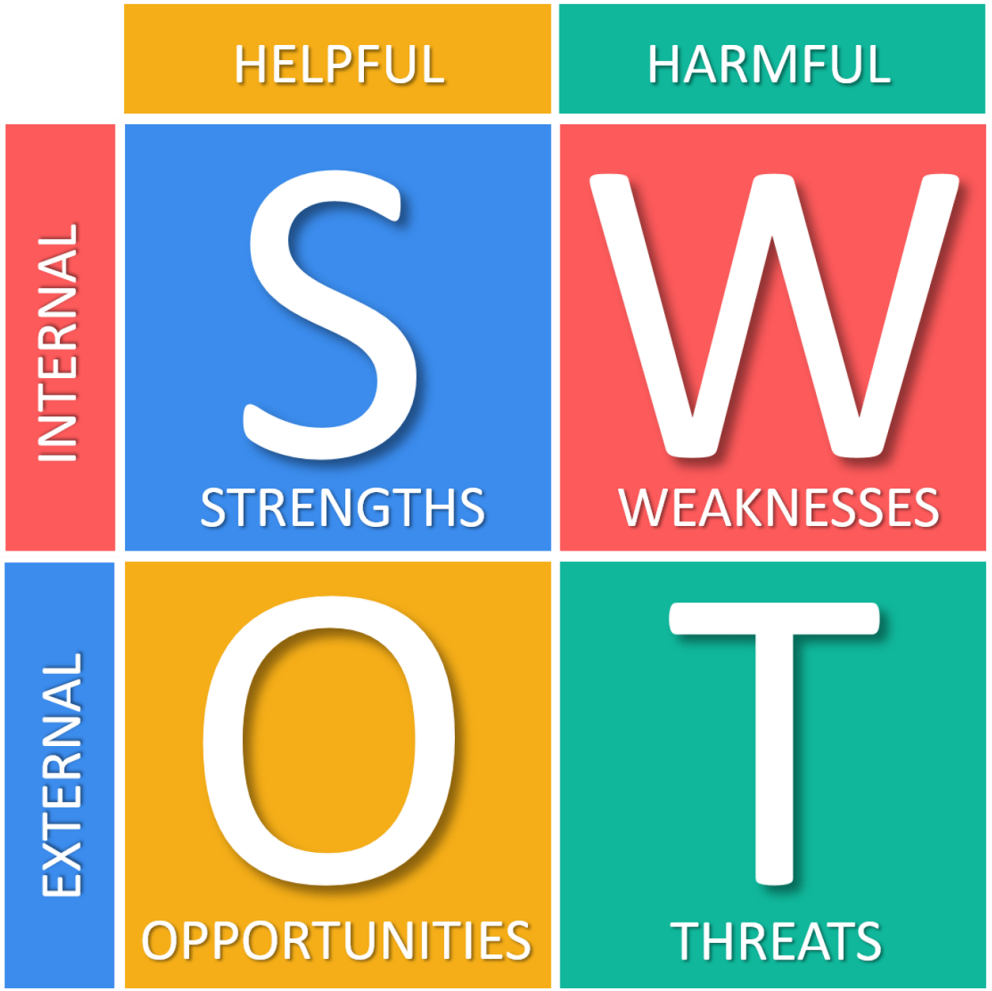
Lab to market - Strategic analysis of the environment

SWOT Matrix



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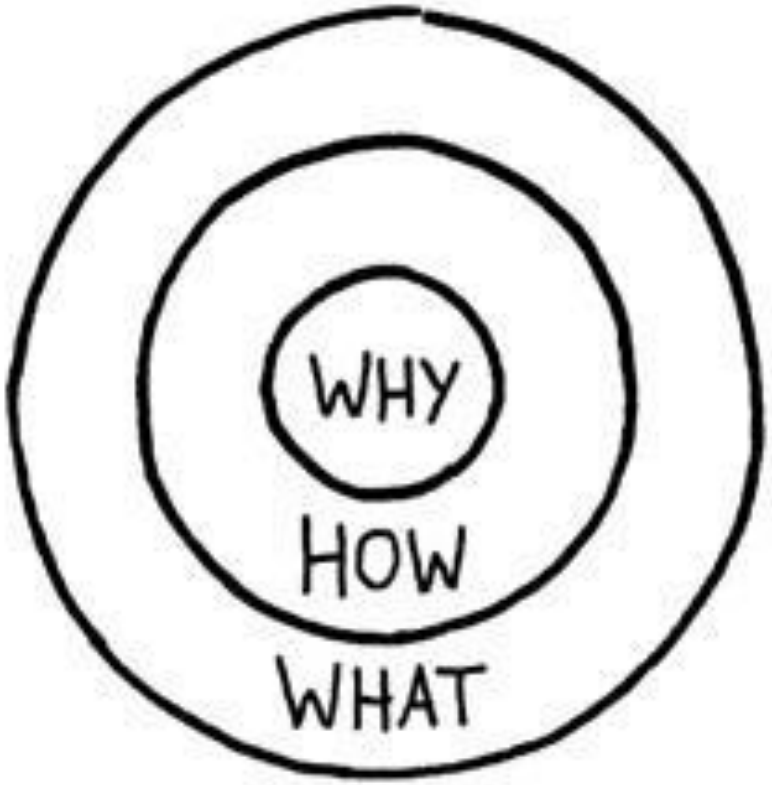
Lab to market - Strategic analysis of the environment

Macro environment, micro environment, and technological solution



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Lab to market - Strategic analysis of the environment

Macro environment & PEST analysis

- Political
- Economic
- Social
- Technological
- Environmentalist

The external factors of the macroenvironment provide us with information about potential threats and opportunities that may affect the commercial development of technology.

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Lab to market - Strategic analysis of the environment

In any case, we will only consider those relevant factors that directly impact our income statement:

- In the revenue
- In the expected profits
- In the way we make money

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Lab to market - Strategic analysis of the environment

- Micro environment & Porter’s five forces
  - Clients
  - Current competitors
  - Potential competitors
  - Substitutes
  - Suppliers

The external factors of the microenvironment provide us with an analysis of the sector and again information about possible threats and opportunities in our immediate environment.

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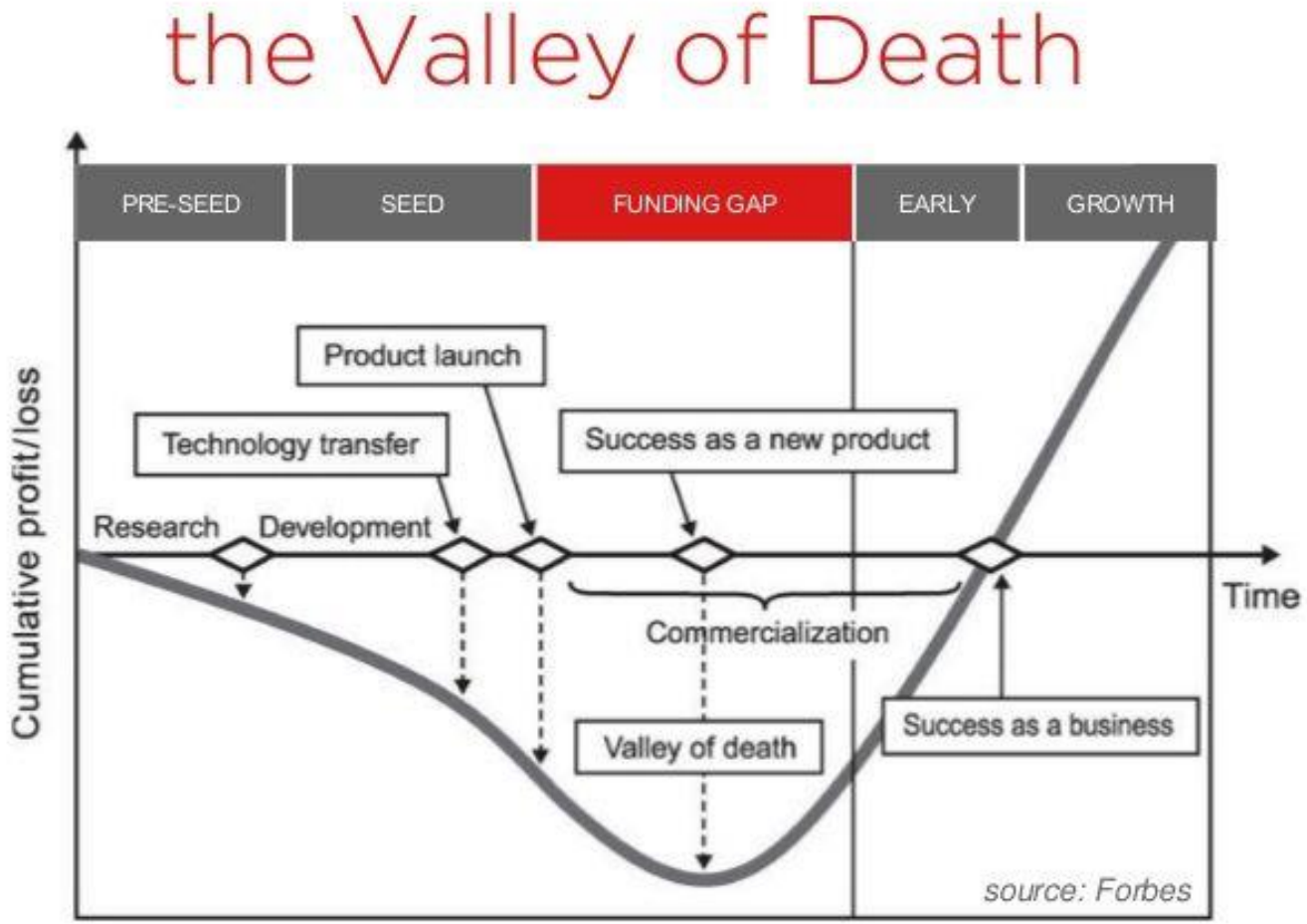
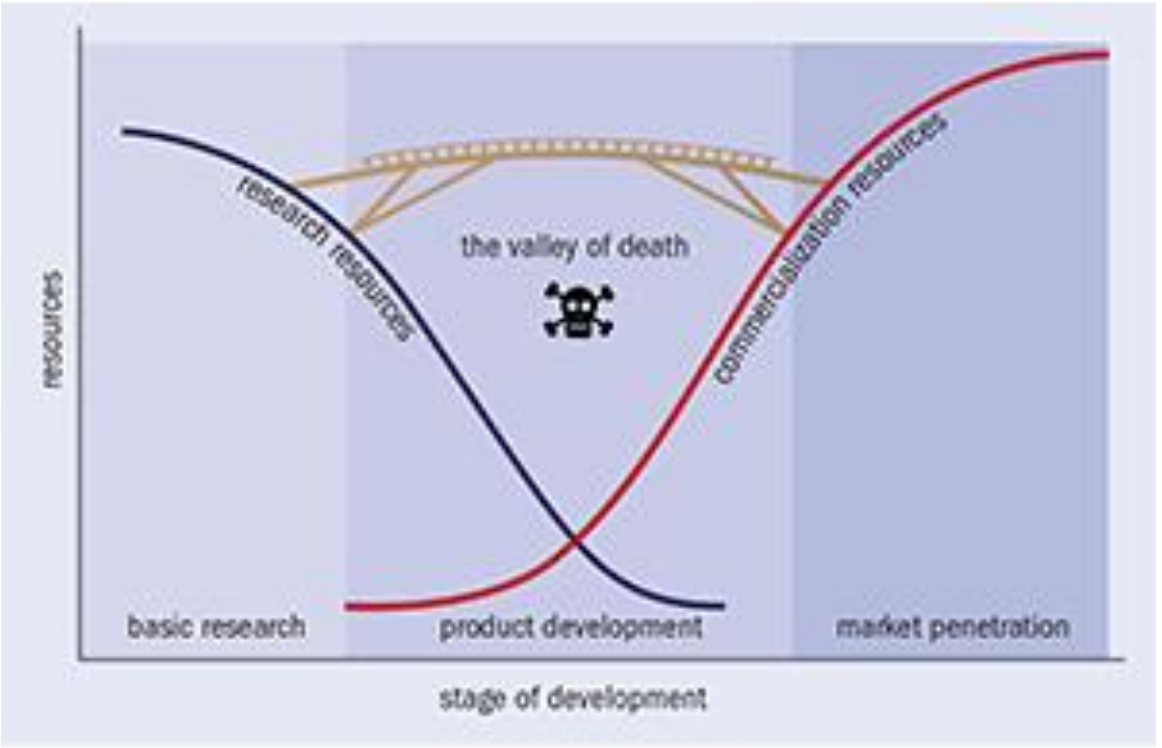
Lab to market - Strategic analysis of the environment





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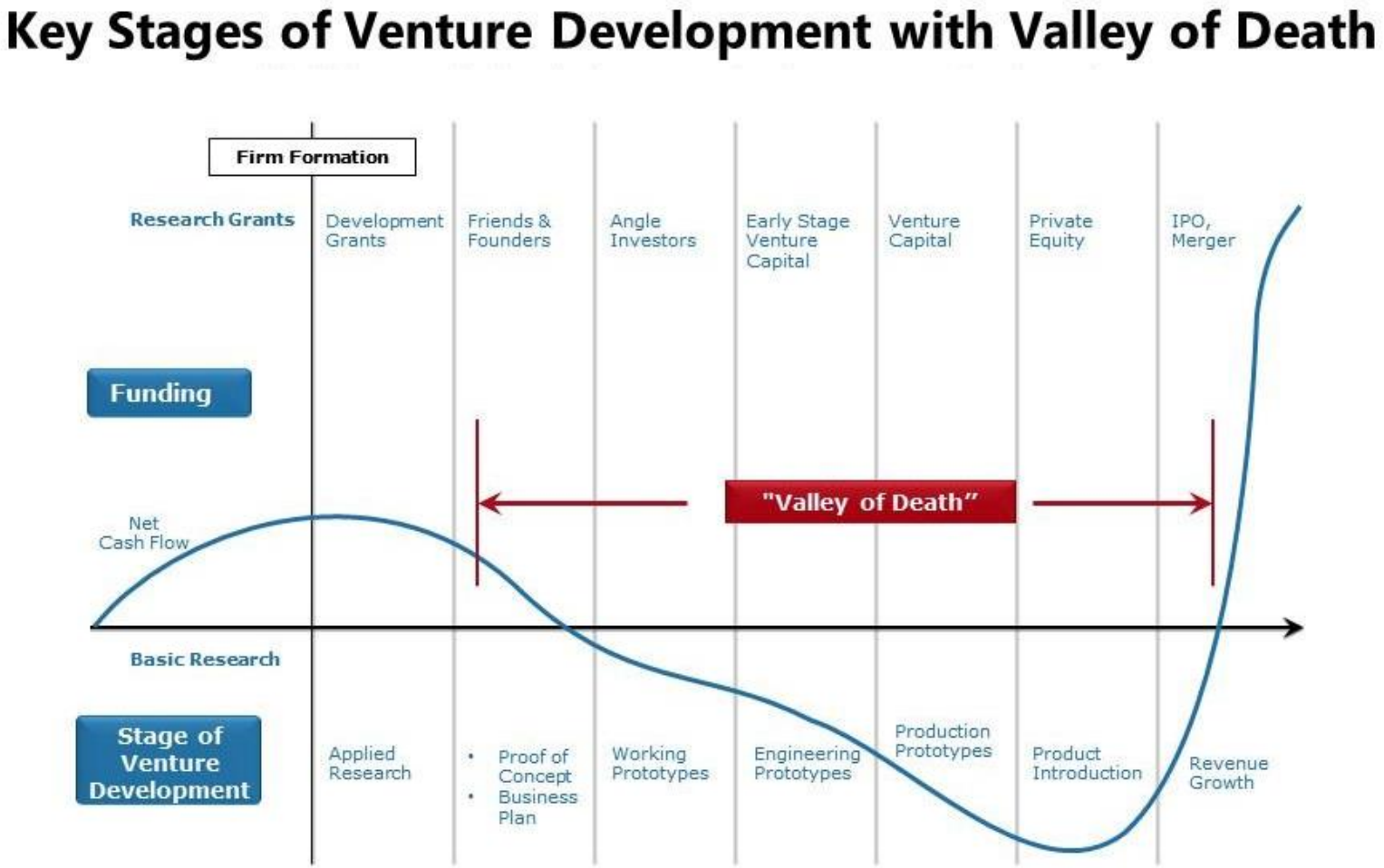
Lab to market - Strategic analysis of the environment



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Lab to market - Technological solution

- Determination of key competitive advantages
- Resources needed for technology development
- Strengths and weaknesses of the technological solution

- The internal analysis of our technological solution must yield those critical factors that determine the strengths and weaknesses of the technological solution.

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Lab to market - Technological solution

- In any case, we will consider those critical success factors that are **essential to carry out the activity**:
  - Of all the factors analyzed, we must select those that are significant enough to become critical success factors for their introduction in the market in the sector.
  - All factors are necessary; it is about choosing those in which superior performance is more relevant for achieving success in the activity.

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Lab to market - Technological solution

	Relevant Characterize 1	RC2	Brand Image	RC4	Sales Force	RC6	Social Benefit	RC8	Profitability	Prize	Cost Model	Growth Potential	Industrialization	Business Model
Our Company	✓✓✓	✓✓✓	✓	✓	X	✓	✓✓✓	✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✓✓✓
Relevant Competitor 1	X	X	✓	✓✓✓	✓✓✓	✓✓	✓	✓✓✓	✓	✓	✓	✓	✓	✓
CompR2	X	X	✓✓	✓✓	✓	✓	✓	✓✓	✓✓	✓	✓✓	✓	✓✓	✓✓
CompR3	X	X	✓	✓✓	✓	✓	✓	✓	✓✓	✓	✓	✓	✓	✓
CompR4	X	✓	✓	✓	✓	✓	✓	✓	✓✓	✓	✓	✓	✓	✓
CompR5	✓	✓	✓	✓	✓	✓	✓	✓	✓✓	✓	✓✓	✓	✓	✓
CompR6	✓✓	✓✓	✓	✓	X	✓	✓✓	✓	✓	✓✓✓	✓✓✓	✓✓	✓	X
CompR7	✓✓	✓✓	✓✓	✓✓	X	✓✓	✓✓	✓	✓	✓✓✓	✓	X	X	✓✓
CompR8	✓✓	✓✓	✓	✓	X	X	✓✓	✓	✓	✓✓	✓	✓	✓	✓✓
CompR9	✓✓✓	✓✓✓	✓✓✓	✓✓	✓	✓✓✓	✓✓✓	✓	✓✓	✓✓✓	✓✓✓	X	X	X
CompR10	✓✓✓	✓✓	✓	✓✓	✓	✓	✓✓	✓	✓✓	✓✓	✓✓✓	✓✓	✓✓✓	X

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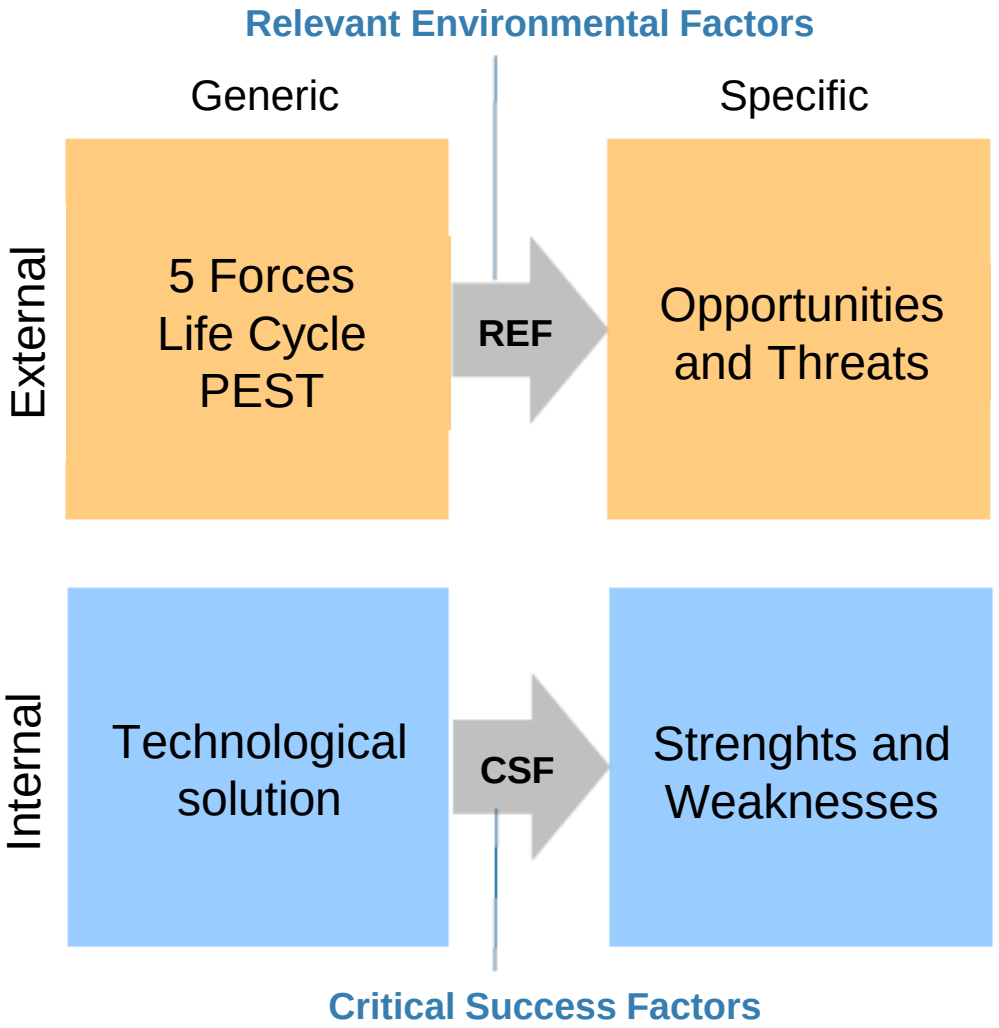
Lab to market - Technological solution



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Lab to market - Technological solution

Conclussions

- Macro environment and micro environment vs technological solution
- How prepared we are to compete
- You have to bet on the relevant factors
- The SWOT matrix is used to compare and cross:
  - Strengths and Weaknesses
  - Opportunities and Threats
- Strategic analysis has to motivate actions

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Marketing

Marketing is customer orientation

Customer's needs:

- Define your customer
- What needs do they have, that is,
  - What problems concern them
  - To do this: Research, ask, inform yourself

- DO NOT invent needs
- DO NOT imagine needs
- DO discover needs

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Marketing

Opportunities

- There is a problem to solve
- Someone is willing to pay for the solution
- How is this currently covered?
- Is it improvable?

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Marketing

- Generate Value

- What is your proposal?
- Why you?
- Do you have any competitive advantage?
- In what way does your product or service improve the existing one?
- What messages will you send?

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Marketing

- To survive in the face of Competition:
  - We must overcome the best proposals
  - not through advertising, colors, and announcements
  - but by perfectly understanding the needs of the customers
  - and providing magnificent responses: products or services.

Javier Sánchez Álvarez (L´Oréal)

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Marketing

- Once we have a clear understanding of the business opportunity (the problem to solve, the customer willing to pay, and the value proposition), we need to clarify what we are selling, whether it is a product, a service, or software, at what price we are going to sell it, where we can be found, and what we are going to do to make ourselves known.
  - What are we going to sell
  - At what price
  - Where are we going to be present
  - What are we going to do to make ourselves known

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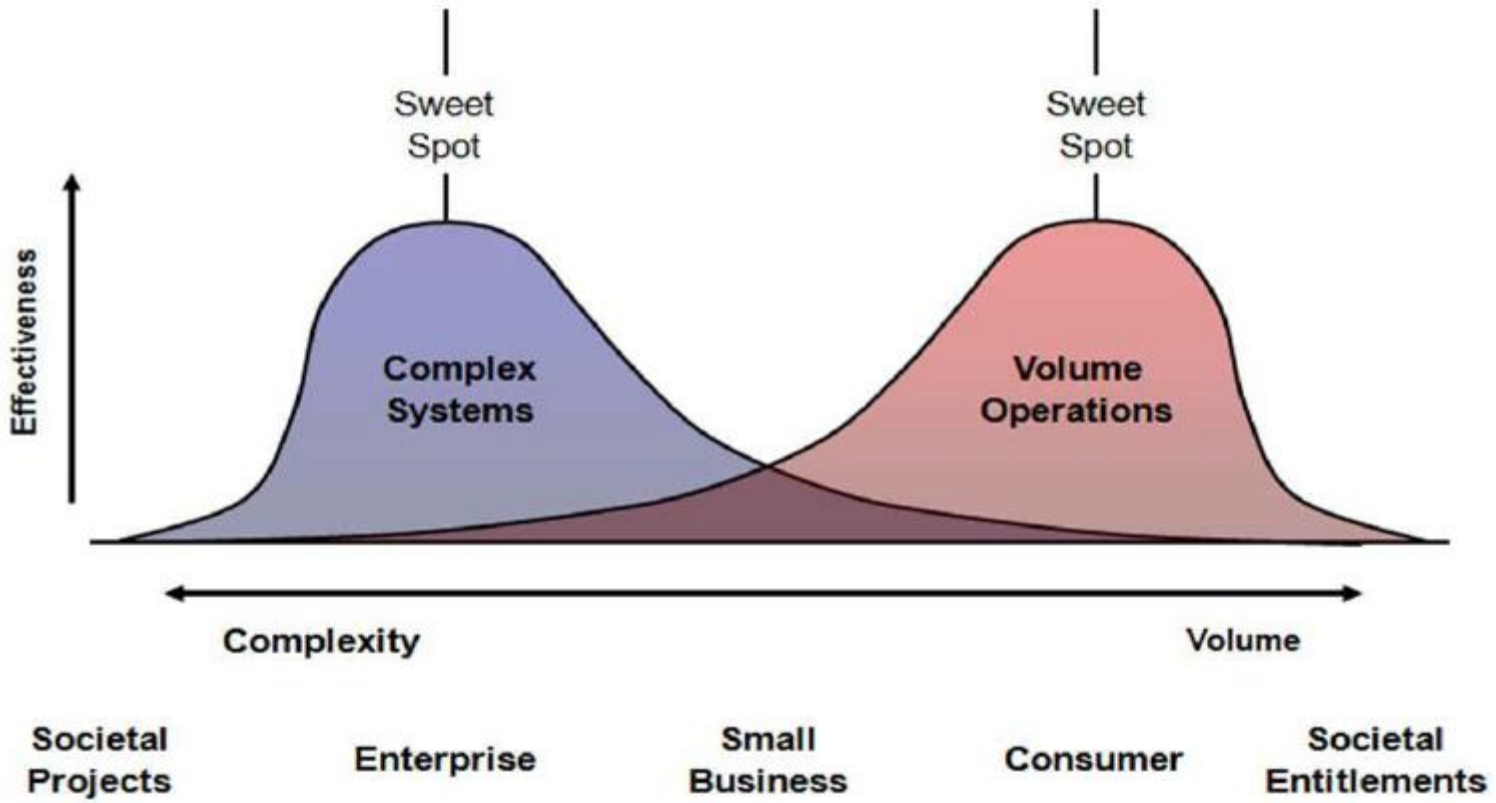
Marketing

Complex Systems vs. Volume Operations



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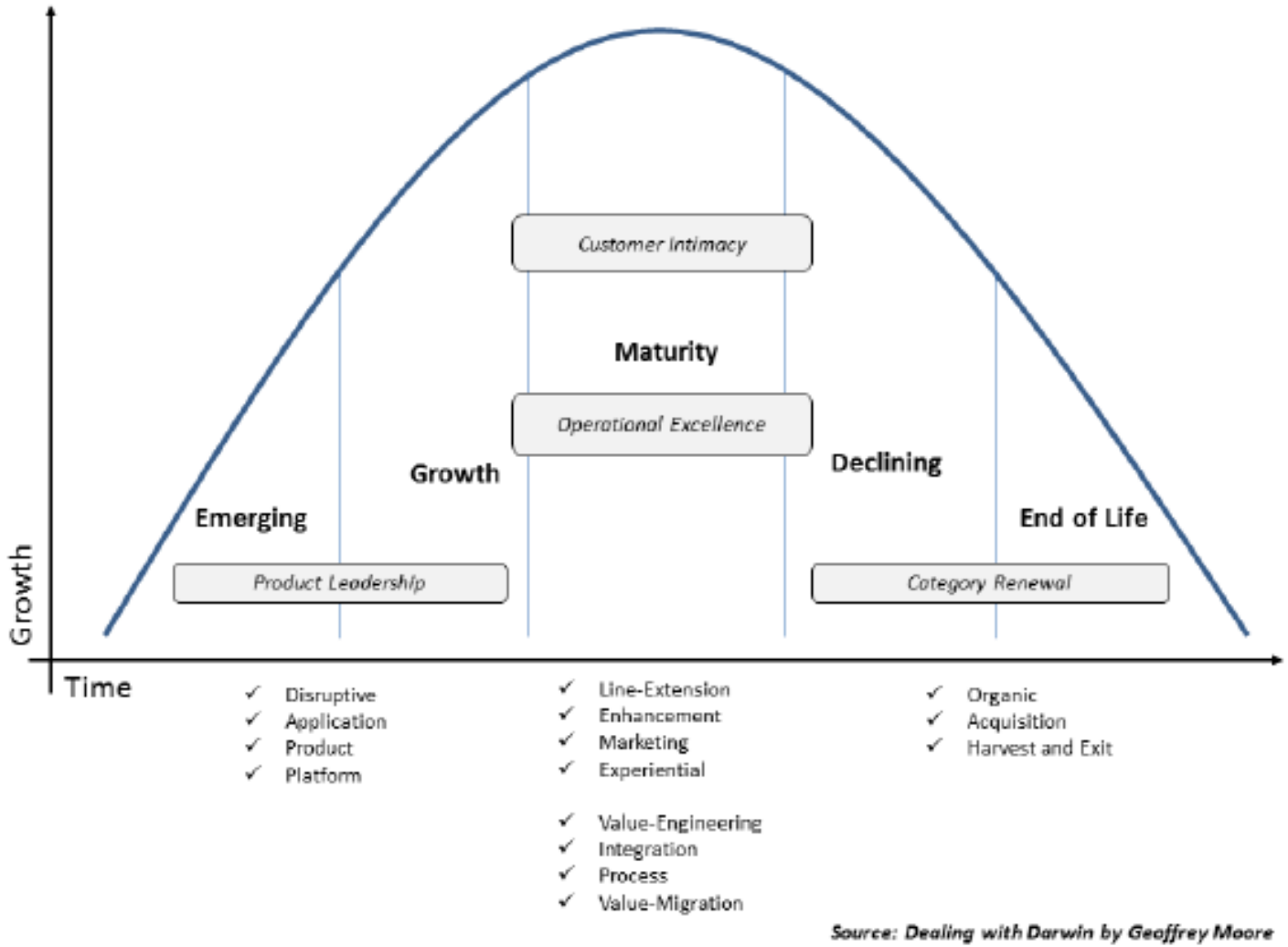
Marketing



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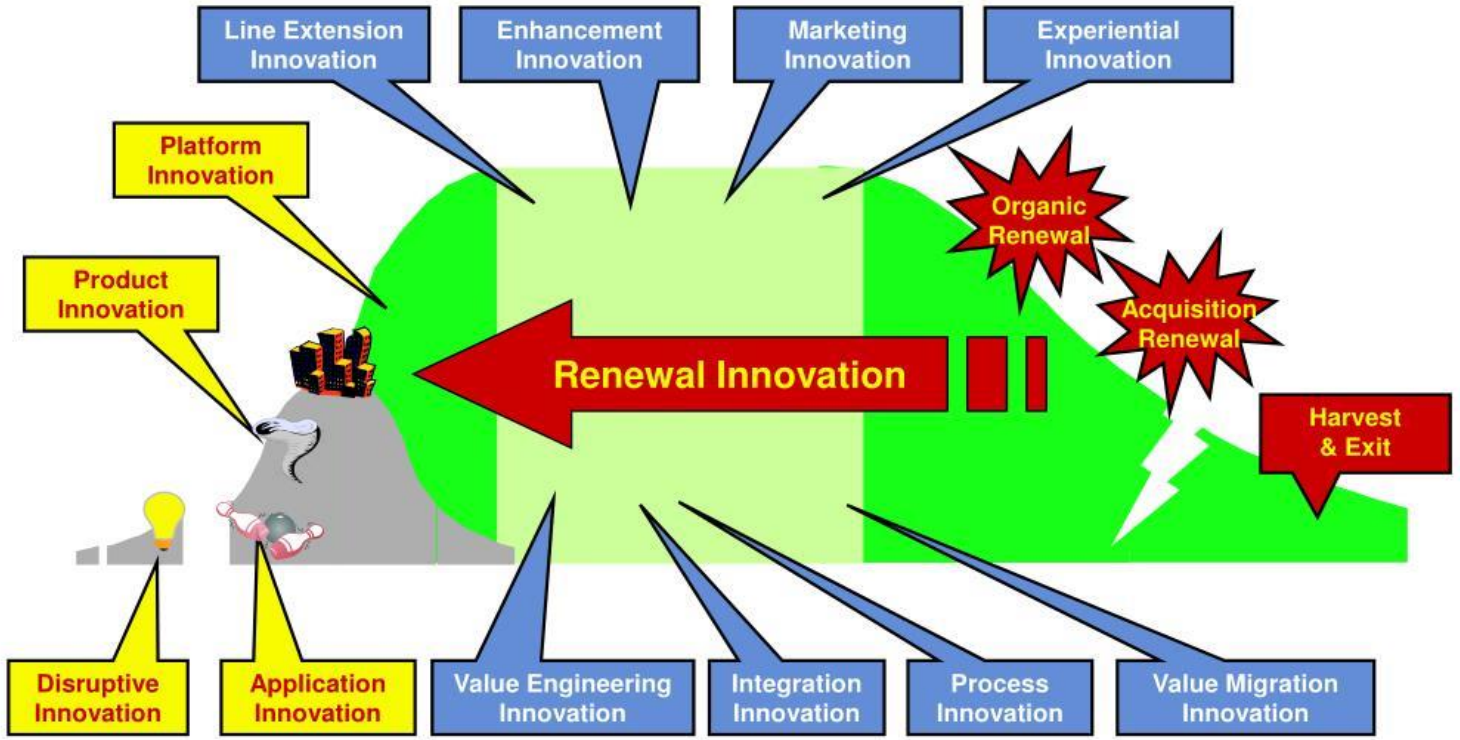
Marketing

A Broad Universe of Innovation Types



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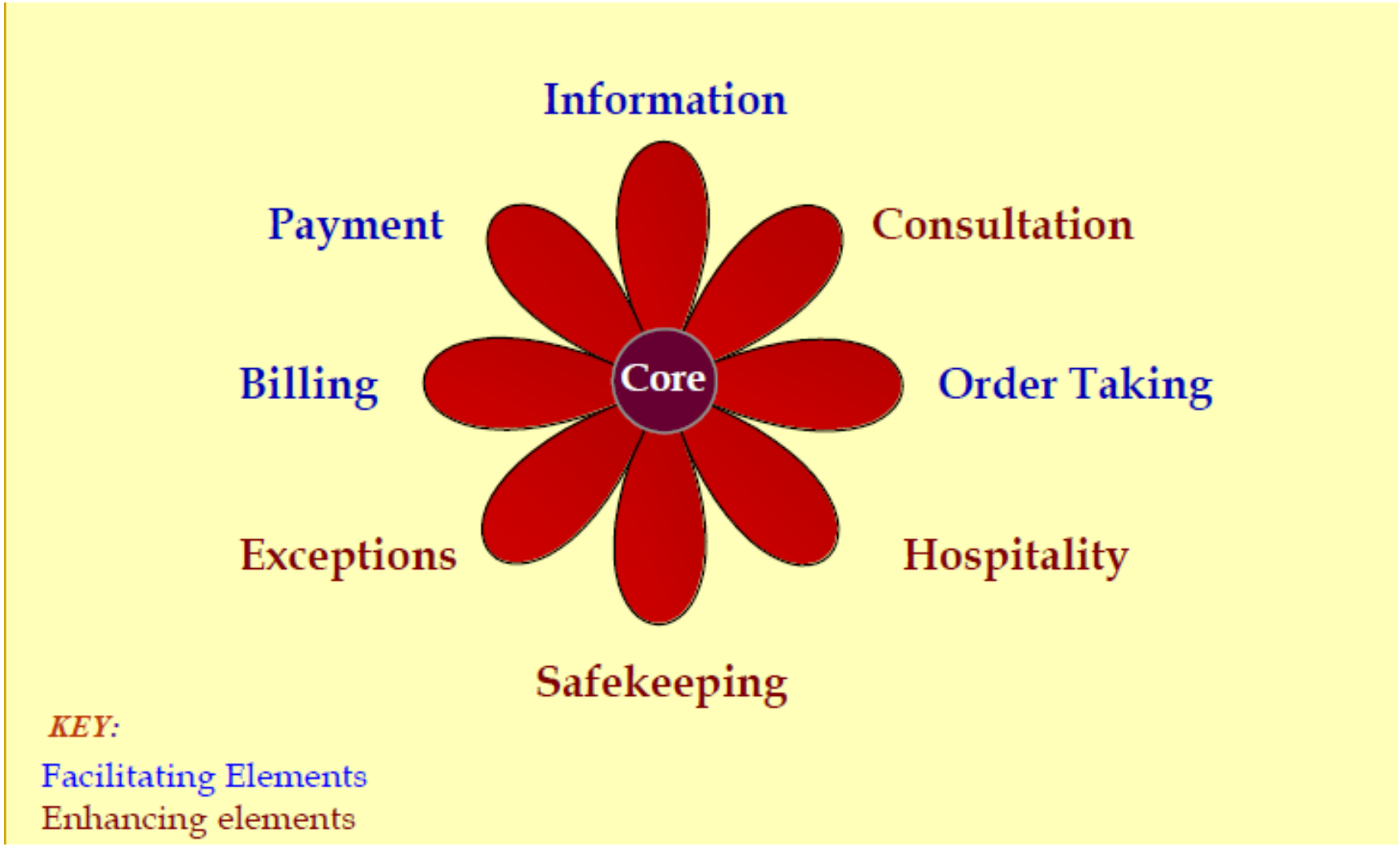
Marketing - Christopher Lovelock flower – Full product



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Marketing - Christopher Lovelock flower – Information

- Direction to service site
- Schedules/service hours
- Prices
- Reminders
- Warnings
- Conditions of sale/service
- Notification of changes
- Documentation
- Confirmation of reservations
- Summaries of account activities
- Receipts and tickets

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Marketing - Christopher Lovelock flower – Consultation

- Customized advice
- Personal counseling
- Tutoring/training in product use
- Management or technical consulting

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Marketing - Christopher Lovelock flower – Order Taking

Applications
- Memberships in clubs/programs
- Subscription services (e.g., utilities)
- Prerequisite based services (e.g., financial credit, college enrolment)

Order Entry
- On-site order fulfillment
- Mail/telephone/e-mail/web order

Reservations and Check-in
- Seats/tables/rooms
- Vehicles or equipment rental
- Professional appointments

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Marketing - Christopher Lovelock flower – Hospitality

Greeting
Food and beverages
Toilets and washrooms
Waiting facilities and amenities
- Lounges, waiting areas, seating
- Weather protection
- Magazines, entertainment, newspapers

Transport
Security

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Marketing - Christopher Lovelock flower – Safekeeping

Caring for Possessions Customer Bring with Them

- Child care, pet care
- Parking for vehicles, valet parking
- Coat rooms
- Baggage handling
- Storage space
- Safe deposit boxes
- Security personnel

Caring for Goods Purchased (or Rented) by Customers

- Packaging
- Pickup
- Tranportation and delivery
- Installation
- Inspection and diagnosis
- Cleaning
- Refueling
- Preventive maintenance
- Repair and renovation

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Marketing - Christopher Lovelock flower – Exception

Special Requests in Advance of Service Delivery
- Children's needs
- Dietary requirements
- Medical or disability need
- Religious observances

Handling Special Communications
- Complaints
- Compliments
- Suggestions

Problem Solving
- Warranties and guarantees
- Resolving difficulties that arise from using the product
- Resolving difficulties caused by accidents, service failures
- Assisting customers who have suffered an accident or a medical emergency

Restitution
- Refunds and compensation
- Free repair of defective goods

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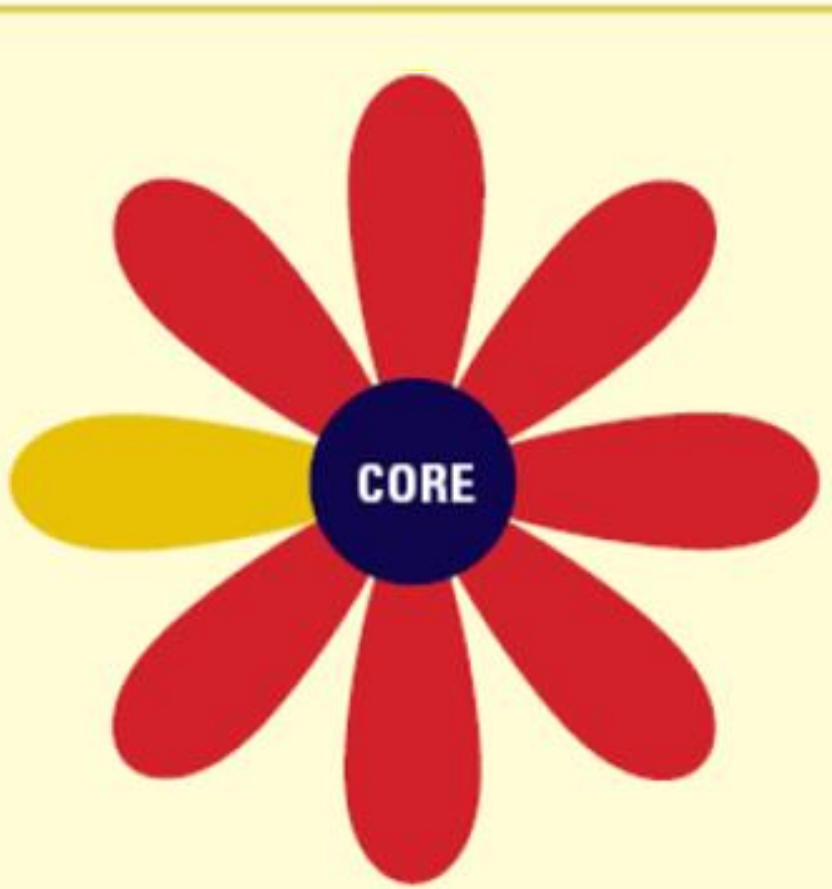
Marketing - Christopher Lovelock flower – Billing



- Periodic statements of account activity
- Invoices for individual transactions
- Verbal statements of amount due
- Self-billing (computed by customer)
- Machine display of amount due

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Marketing - Christopher Lovelock flower – Payment

Self-Service
- Insert card, cash or token into machine
- Electronic funds transfer
- Mail a check
- Enter credit card number online

Direct to Payee or Intermediary
- Cash handling or change giving
- Check handling
- Credit/charge/debit card handling
- Coupon redemption

Automatic Deduction from Financial Deposits
- Automated systems (e.g., machine-readable tickets that operate entry gate)
- Human systems (e.g., toll collectors)

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Disruptive technologies

Twelve potentially economically disruptive technologies

 **Mobile Internet**	Increasingly inexpensive and capable mobile computing devices and Internet connectivity
 **Automation of knowledge work**	Intelligent software systems that can perform knowledge work tasks involving unstructured commands and subtle judgments
 **The Internet of Things**	Networks of low-cost sensors and actuators for data collection, monitoring, decision making, and process optimization
 **Cloud technology**	Use of computer hardware and software resources delivered over a network or the Internet, often as a service

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Disruptive technologies

 **Advanced robotics**	Increasingly capable robots with enhanced senses, dexterity, and intelligence used to automate tasks or augment humans
 **Autonomous and near-autonomous vehicles**	Vehicles that can navigate and operate with reduced or no human intervention
 **Next-generation genomics**	Fast, low-cost gene sequencing, advanced big data analytics, and synthetic biology ("writing" DNA)
 **Energy storage**	Devices or systems that store energy for later use, including batteries

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Disruptive technologies

 **3D printing**	Additive manufacturing techniques to create objects by printing layers of material based on digital models
 **Advanced materials**	Materials designed to have superior characteristics (e.g., strength, weight, conductivity) or functionality
 **Advanced oil and gas exploration and recovery**	Exploration and recovery techniques that make extraction of unconventional oil and gas economical
 **Renewable energy**	Generation of electricity from renewable sources with reduced harmful climate impact

SOURCE: McKinsey Global Institute analysis

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Disruptive technologies

Speed, scope, and economic value at stake of 12 potentially economically disruptive technologies

	Illustrative rates of technology improvement and diffusion	Illustrative groups, products, and resources that could be impacted[1]	Illustrative pools of economic value that could be impacted[1]
 **Mobile Internet**	**$5 million vs. $400**[2] Price of the fastest supercomputer in 1975 vs. that of an iPhone 4 today, equal in performance (MFLOPS) **6x** Growth in sales of smartphones and tablets since launch of iPhone in 2007	**4.3 billion** People remaining to be connected to the Internet, potentially through mobile Internet **1 billion** Transaction and interaction workers, nearly 40% of global workforce	**$1.7 trillion** GDP related to the Internet **$25 trillion** Interaction and transaction worker employment costs, 70% of global employment costs
 **Automation of knowledge work**	**100x** Increase in computing power from IBM's Deep Blue (chess champion in 1997) to Watson (Jeopardy winner in 2011) **400+ million** Increase in number of users of intelligent digital assistants like Siri and Google Now in past 5 years	**230+ million** Knowledge workers, 9% of global workforce **1.1 billion** Smartphone users, with potential to use automated digital assistance apps	**$9+ trillion** Knowledge worker employment costs, 27% of global employment costs
 **The Internet of Things**	**300%** Increase in connected machine-to-machine devices over past 5 years **80–90%** Price decline in MEMS (microelectromechanical systems) sensors in past 5 years	**1 trillion** Things that could be connected to the Internet across industries such as manufacturing, health care, and mining **100 million** Global machine to machine (M2M) device connections across sectors like transportation, security, health care, and utilities	**$36 trillion** Operating costs of key affected industries (manufacturing, health care, and mining)
 **Cloud technology**	**18 months** Time to double server performance per dollar **3x** Monthly cost of owning a server vs. renting in the cloud	**2 billion** Global users of cloud-based email services like Gmail, Yahoo, and Hotmail **80%** North American institutions hosting or planning to host critical applications on the cloud	**$1.7 trillion** GDP related to the Internet **$3 trillion** Enterprise IT spend

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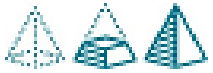
Disruptive technologies

	**Advanced robotics**	**75–85%** Lower price for Baxter[3] than a typical industrial robot **170%** Growth in sales of industrial robots, 2009–11	**320 million** Manufacturing workers, 12% of global workforce **250 million** Annual major surgeries	**$6 trillion** Manufacturing worker employment costs, 19% of global employment costs **$2–3 trillion** Cost of major surgeries
	**Autonomous and near-autonomous vehicles**	**7** Miles driven by top-performing driverless car in 2004 DARPA Grand Challenge along a 150-mile route **1,540** Miles cumulatively driven by cars competing in 2005 Grand Challenge **300,000+** Miles driven by Google's autonomous cars with only 1 accident (which was human-caused)	**1 billion** Cars and trucks globally **450,000** Civilian, military, and general aviation aircraft in the world	**$4 trillion** Automobile industry revenue **$155 billion** Revenue from sales of civilian, military, and general aviation aircraft
	**Next-generation genomics**	**10 months** Time to double sequencing speed per dollar **100x** Increase in acreage of genetically modified crops, 1996–2012	**26 million** Annual deaths from cancer, cardiovascular disease, or type 2 diabetes **2.5 billion** People employed in agriculture	**$6.5 trillion** Global health-care costs **$1.1 trillion** Global value of wheat, rice, maize, soy, and barley
	**Energy storage**	**40%** Price decline for a lithium-ion battery pack in an electric vehicle since 2009	**1 billion** Cars and trucks globally **1.2 billion** People without access to electricity	**$2.5 trillion** Revenue from global consumption of gasoline and diesel **$100 billion** Estimated value of electricity for households currently without access
	**3D printing**	**90%** Lower price for a home 3D printer vs. 4 years ago **4x** Increase in additive manufacturing revenue in past 10 years	**320 million** Manufacturing workers, 12% of global workforce **8 billion** Annual number of toys manufactured globally	**$11 trillion** Global manufacturing GDP **$85 billion** Revenue from global toy sales

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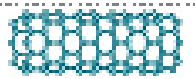
Disruptive technologies

	**Advanced materials**	**$1,000 vs. $50** Difference in price of 1 gram of nanotubes over 10 years **115x** Strength-to-weight ratio of carbon nanotubes vs. steel	**7.6 million tons** Annual global silicon consumption **45,000 metric tons** Annual global carbon fiber consumption	**$1.2 trillion** Revenue from global semiconductor sales **$4 billion** Revenue from global carbon fiber sales
	**Advanced oil and gas exploration and recovery**	**3x** Increase in efficiency of US gas wells, 2007–11 **2x** Increase in efficiency of US oil wells, 2007–11	**22 billion** Barrels of oil equivalent in natural gas produced globally **30 billion** Barrels of crude oil produced globally	**$800 billion** Revenue from global sales of natural gas **$3.4 trillion** Revenue from global sales of crude oil
	**Renewable energy**	**85%** Lower price for a solar photovoltaic cell per watt since 2000 **19x** Growth in solar photovoltaic and wind generation capacity since 2000	**21,000 TWh** Annual global electricity consumption **13 billion tons** Annual CO_2 emissions from electricity generation, more than from all cars, trucks, and planes	**$3.5 trillion** Value of global electricity consumption **$80 billion** Value of global carbon market transactions

1 Not comprehensive; indicative groups, products, and resources only.
2 For CDC-7600, considered the world's fastest computer from 1969 to 1975; equivalent to $32 million in 2013 at an average inflation rate of 4.3% per year since launch in 1969.
3 Baxter is a general-purpose basic manufacturing robot developed by startup Rethink Robotics.

SOURCE: McKinsey Global Institute analysis

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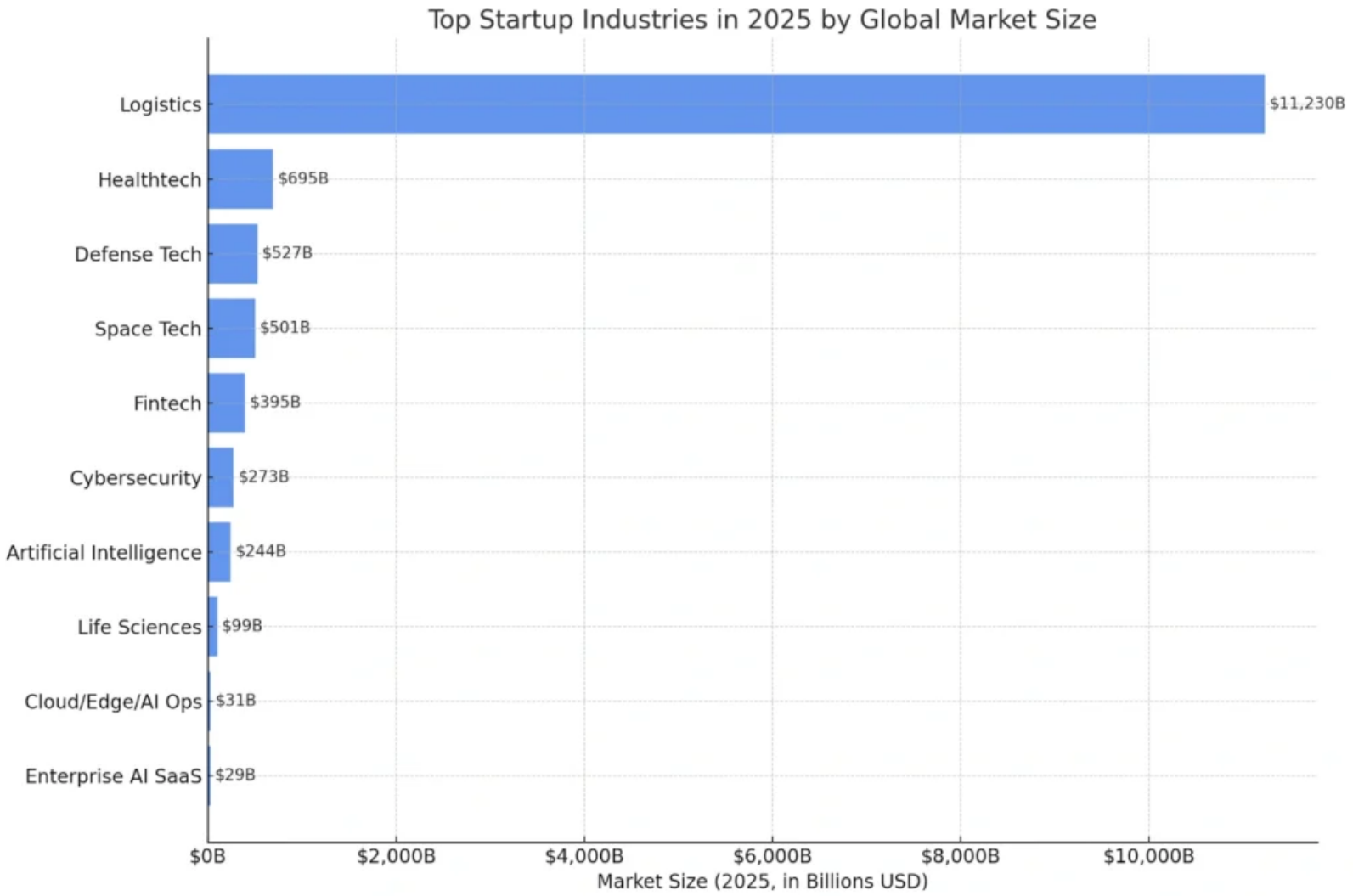
Startup market data



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Startup market data

Top 10 countries by number of Startups

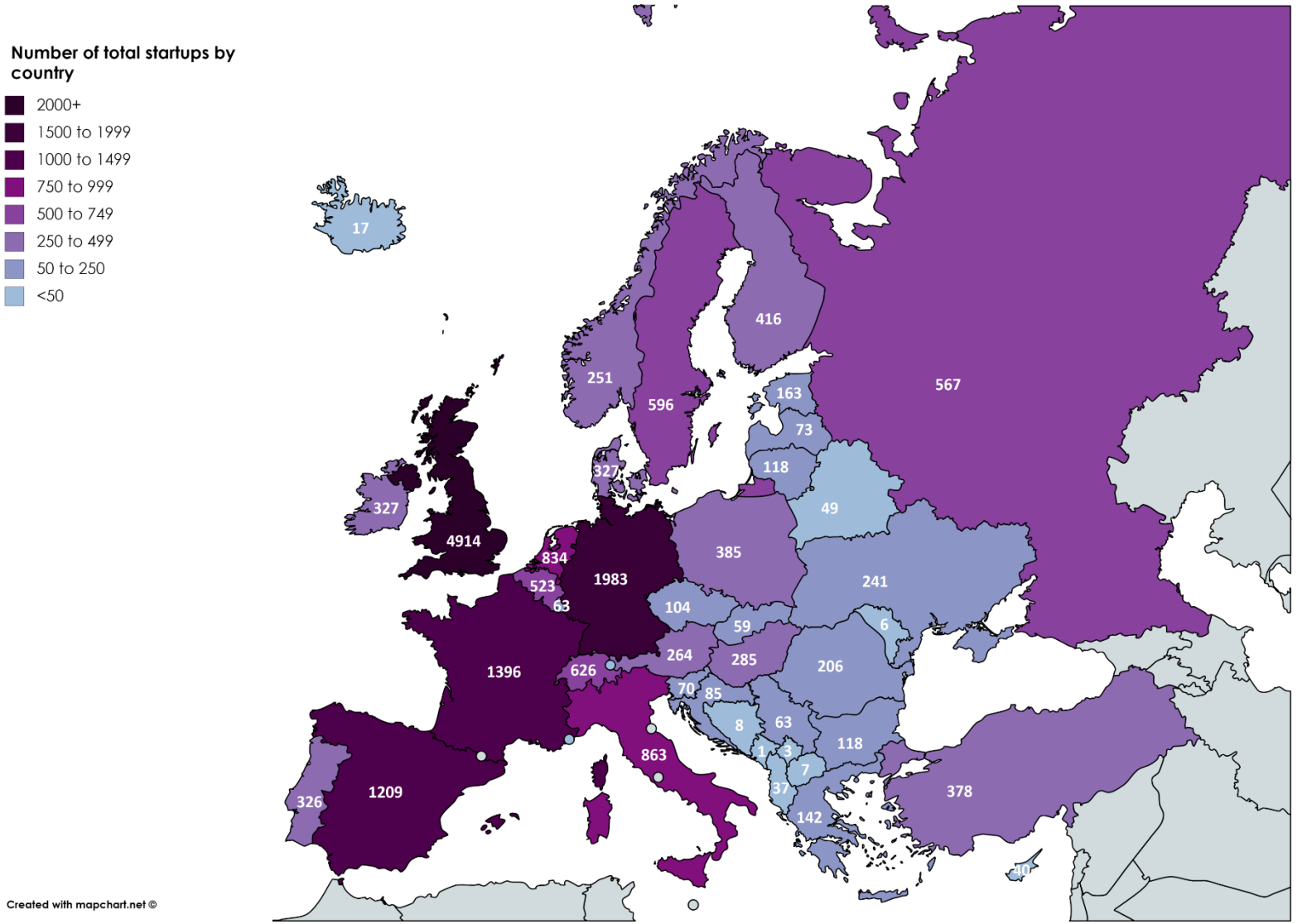
Startup efforts are widely spread around the world, but the USA dominates

1	USA	71,153
2	India	13,125
3	UK	6,220
4	Canada	3,303
5	Indonesia	2,347
6	Germany	2,295
7	Australia	2,262
8	France	1,567
9	Spain	1,407
10	Brazil	1,166

number of startups

Source: startupranking.com

firstsiteguide.com



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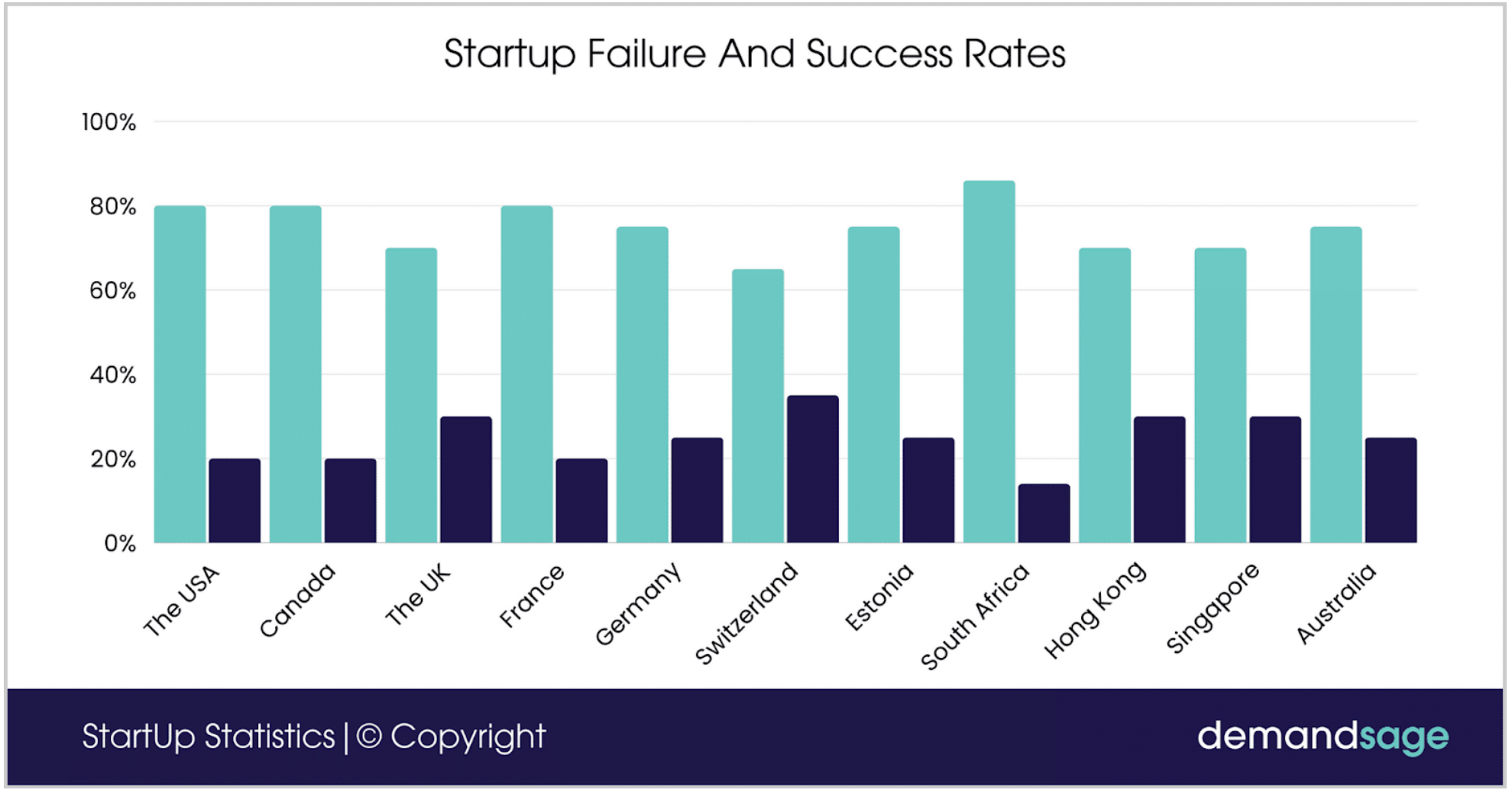

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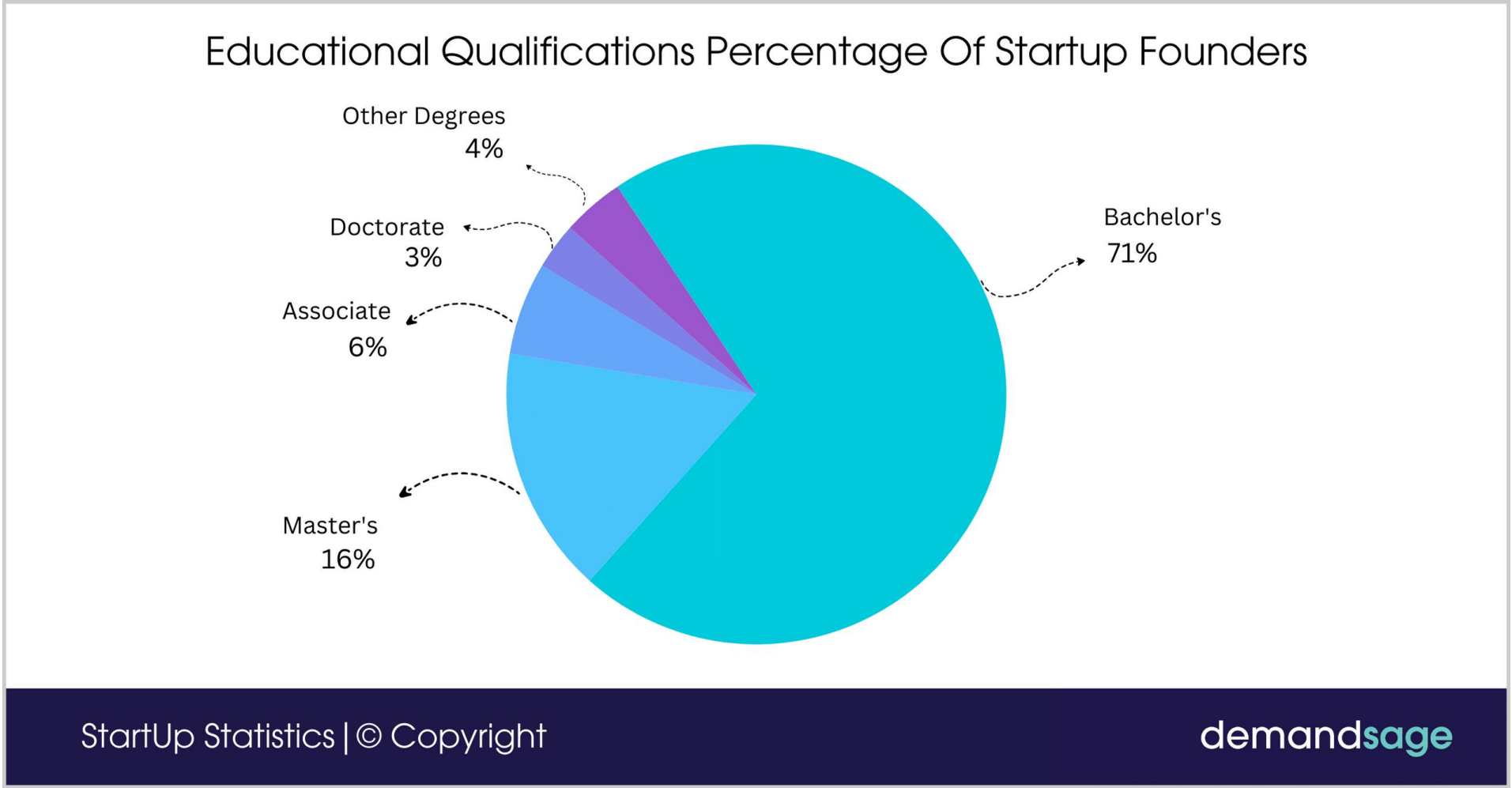
Startup market data



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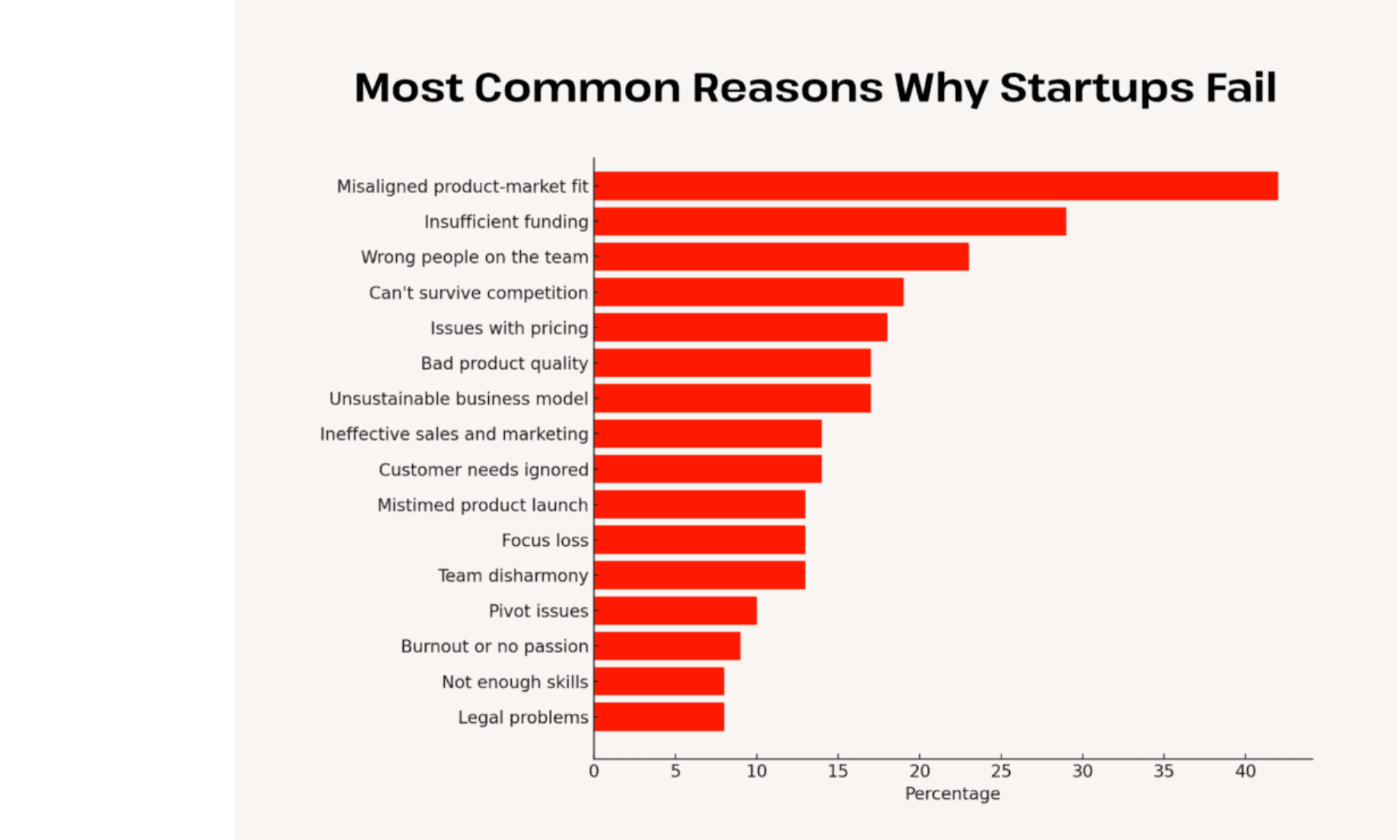

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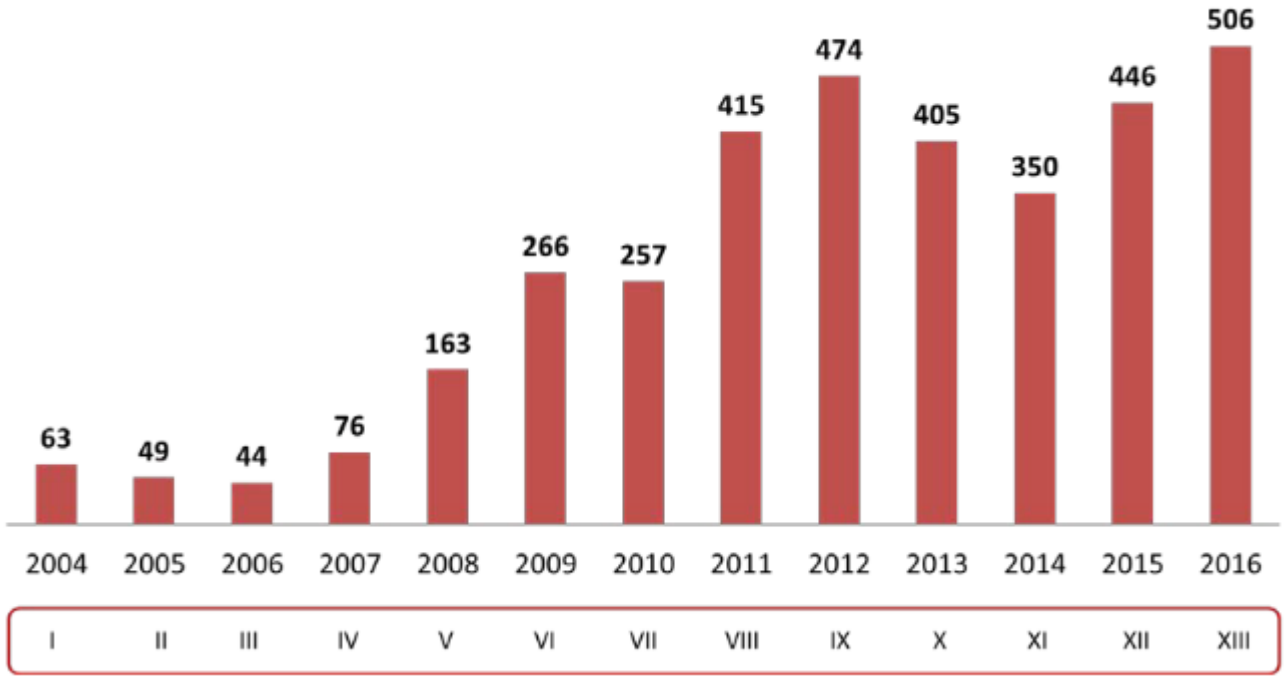
Startups – UPM case

- Evolution of the number of ideas submitted to the UPM Business Creation Competition, ActúaUPM (2004-2016)



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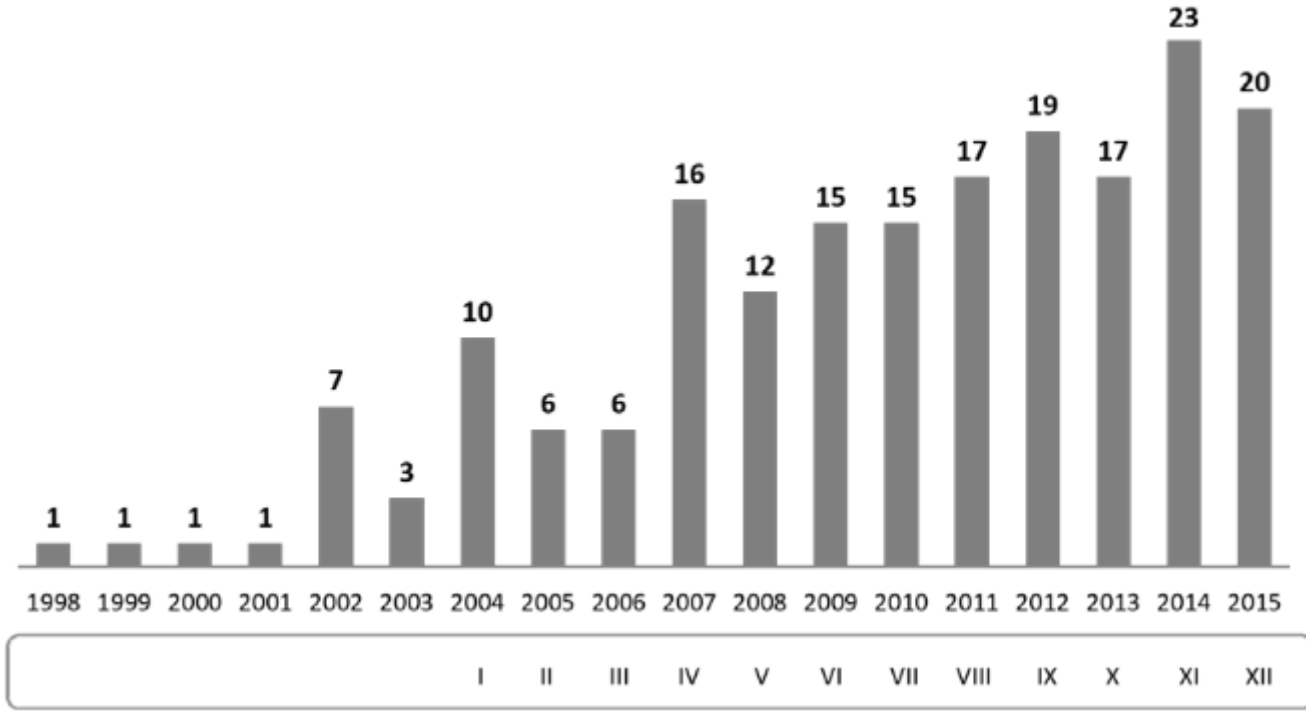
Startups – UPM case

- Evolution of the number of companies created under the Business Creation Program, ActúaUPM (1998-2015)



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The Best way to predict the future is to invent it

Alan Kay, 1971

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