a.a. 2018 / 2019

FACOLTA' DI INGEGNERIA

INDUSTRIAL DESIGN (NEW PRODUCT DEVELOPMENT)

Docente: I. Tagliavini

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MODULE 1 STRATEGIC MARKETING & CONCEPT DESIGN

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INTRO – PRODUCT DEVELOPMENT PROCESS

IDEA

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Product Life

Identifying and exploring ideas to solve a problem or address a need

CONCEPT

Conceptualizing the idea into a product with key features based on current and future market needs

PEVELOPMENT

velopment of product into a m which supports fitable production id marketing of he product

LAUNCH

Launching the new or improved product to the market

POST-LAUNCH

Providing support and service regarding the product

Continuous marketing, sales and delivery

INTRO

INDUSTRIAL DESIGN

OBJECTIVES:

Understand how to conceive successful innovation in the digital era:

Know your Customers.

MODULE 1 OVERVIEW

D Episode 1: "The market, the unknown"

- Innovation in the digital era
- Market Analysis & understanding
- Customer needs Analysis
- Case Studies
- Experimenting

Episode 2: "Design Thinking"

- Design Thinking concept and evolution
- Design Thinking process & tools
- Brainstorming concept & rules
- Case Studies
- Experimenting

□ Episode 3: "Hyperconnected Society"

- IoT Impact on Business
- How NPD has changes in the digital era
- Big data and....small data
- Case Studies
- DeLonghi Presentation

D Episode 4: "Proof of Concept"

- Agile & Lean methodologies
- The importance of Prototyping
- Brainstorming Exercise: break-out groups & report out
- Q&A session
- Tutoring dates

INNOVATION IN THE DIGITAL AGE

10 TRENDS SHAPING INNOVATION IN THE DIGITAL AGE



Fonte: «10 trends shaping in the digital age innovation", European Strategy Center

- One of the defining characteristics of the digital age is the tremendous speed with which innovation is advancing.
- In the post-war industrial age, innovation typically took place in incremental steps: Dedicated research teams, typically in longestablished companies, would develop new products and service. The innovation itself often consisted of an improvement or enhancement to an existing product or service.
 - Today, while incremental innovation is still valid, **disruptive innovation** a phenomenon first described in the 1990s – has become the new norm of success. New players are entering existing markets more easily and gaining rapid dominance.

Fonte: «10 trends shaping in the digital age innovation", European Strategy Center

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Tech firms are the new powerhouses

Market valuation in billion US dollars



Source: Bloomberg, ycharts

- Traditional levers of innovation, such as patents, number of researchers or R&D spending, continue to be important but have been complimented by other drivers.
- Often referred to as Knowledge-Based Capital, intangible assets have become the key ingredients of modern-day corporate success (Design, software, Data etc)
- Data, in particular, is emerging as the key resource for and enabler of – innovation because it is necessary for the customisation of products and services that is increasingly expected by users.
- Data is also the main resource for **Artificial Intelligence** (AI), which is arguably the next innovation frontier, as machines will increasingly match or even exceed human intelligence

- In the digital economy, companies that are able to capture the highest number of users set the de facto 'standard' for their sector ("network effect").
- Today's most innovative companies are no longer necessarily the largest ones. This 'scale without mass' is a genuinely new phenomenon that has proven highly disruptive to incumbent firms, as well as labour markets.
- it is not surprising that many of today's most successful businesses were more concerned with gaining users rather than developing commercially viable business models in the early years of their existence.

- innovation in the digital era is reliant on top digital infrastructure: high-speed broadband, 5G, super-computational power, large-scale cloud computing facilities, among others.
- As digital technologies increasingly converge with physical ones, it is no longer just about connecting businesses and people, but also about connecting devices (IoT), enabling them to exchange data.
 - In a world where data is the key resource, **ubiquitous connectivity** has become a precondition for economic growth and innovation.

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- If the industrial age was marked by standardisation, the digital era is about **customisation**. The consumer and user is ever more central to innovation, by virtue of being more active and responsive, leading the way towards more tailor-made, personalised, on-demand products and services.
- Possibly one of the largest drivers of mass customisation is 3D printing – enabling the production of personalised products at near mass production prices and speeds.

 Once considered primarily as a low-cost producer and copymaker, China is now often leading the innovation wave

 Not only is China the global leader in the construction of commercial drones with Da-Jiang Innovations, it now also boasts the world's most valuable Al startup

China is investing in R&D at a rate that eclipses both the EU and US

R&D spending in billions of dollars (current, in purchasing power parity terms)



Source: Veugelers, R., The challenge of China's rise as science and technology powerhouse, Bruegel, Policy Contribution, Issue no 19, July 2017 http://bruegel.org/wp-content/uploads/2017/07/PC-19-2017.pdf

FACTORS INCREASING COMPETITION

- Customers have access to unprecedented levels of choice to satisfy their needs.
- Niche markets, have become viable thanks to the possibility of **aggregating demand at the global level**.



FACTORS DECREASING COMPETITION

- Established online platforms are actually subject to very low competitive pressures from new entrants, due to strong network effects
- The pressure to innovate comes from the users themselves, rather than from other players, to maintain customer satisfaction and discourage users from switching to other services.



- Many big players (e.g. Google as a search engine, Amazon as an online book ordering platform), are continuously moving into new areas – increasingly also into the physical world (smartphones, Alexa home products, autonomous vehicles etc)
- Start-ups are being seen as a means of completing service offerings with exciting new features. This explains why the big digital players have been racing to snap up promising new start-ups.
- This type of platform consolidation is today ranked as a **top barrier to innovation by startups** themselves.

THE NATURE OF COMPETITION IS CHANGING

The race to acquire top Artificial Intelligence start-ups is heating up

Dates of acquisition (only includes first exits of companies)



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8. TRIAL & ERROR IS THE PATH TO PERFECTION

- Start-ups are increasingly 'trial and erroring' their way to market penetration, making new releases on a regular basis. By walking before they can crawl, they may risk getting it wrong but they gain access to honest customer feedback
- In fact, 'beta' launching of products and services is increasingly common among many of today's corporate giants. Most of Google's products are today launched in beta with bugs fixed and improvements made based on user data analytics.
- The ability to innovate quickly and cheaply, continuously refining, correcting or modifying products or even business models, and the acceptance of failure are a key element of Innovation

YouTube was launched as a video dating site, without much success. Then users started uploading funny videos, taking the project into a completely new direction.

Twitter began as a podcasting platform. However, with fierce competition from iTunes, the team started working on a side project that evolved into Twitter, one of the largest social media platforms.

PayPal started as a cryptography company designed for exchanging money over Palm Pilots. Without much success, it pivoted to the market of enabling people to make secure on-line payments.

Nokia was founded in 1865 as a pulp mill company and has reinvented itself more than once. After leading the mobile phone revolution in the 1990s, it rapidly fell into irrelevance with the rise of the smart phone. When its mobile phone business was acquired by Microsoft,

Nokia managed to reinvent itself once again as a successful player in the telecommunication infrastructure and Internet of Things market.

9. THE DEMOCRATIZATION OF INNOVATION

- For a long time, innovation was confined to labs or sometimes garages. Today, it happens everywhere. Unprecedented access to knowledge via the Internet, coupled with ever cheaper and more accessible technology, makes anyone a potential innovator.
- **Open innovation** is happening everywhere. Large companies are opening up their ideas to competition, targeting start-ups and individuals with a view to bring in fresh inspiration. New **co-creation models** and fast-paced innovation communities are rapidly growing (Incubators, Accelerators, Co-working spaces etc)
- The 'democratisation of innovation' also means that the biggest gamechangers no longer necessarily come from peer-to peer competition, but often from 'outsiders'. In the digital era, taxi drivers and hotel owners compete with ordinary citizens.....

European Venture Capital has grown 3x over the last 5 years but remains minute in global comparison



Source: PwC, CB Insights MoneyTree, Report Q4 2017

"According to Harvard Business School professor Clayton Christensen, each year more than 30,000 new consumer products are launched and **80 percent** of them fail."

Source: Harward Business Review

"A study by the Product Development and Management Association (PDMA) found failure rates varied among industries, ranging from **35** percent for healthcare to **49** percent for consumer goods."

Source: Product Development and Management Association

INNOVATION CHALLENGE

T.A. EDISON: ONE OF THE MOST SUCCESSFUL AMERICAN INVENTORS (LIGHT BULB, MOVIE FILM ETC) UNDERSTOOD BEFORE OTHERS THAT:

"THE REAL CHALLENGE IS NOT THE INVENTION ITSELF, BUT TO ACHIEVE ITS TECHNICAL AND COMMERCIAL ACCOMPLISHMENT»

- EXAMPLES: J.M.SPENGLER INVETED THE VACUUM CLEANER, W.H. HOOVER MANAGED TO SELL IT.
 - E. HOWE, IN 1846, BUILT THE FIRST SEWING MACHINE;
 I. SINGER COMMERCIALIZED IT.

Fonte: Mrdcompany

Nespresso

- 1976: Nespresso system patent filed.
- 1982: Focus on restaurant and office market.
- 1986: Separate Nespresso SA company formed.
- 1988: New CEO overhauls marketing strategy.
- 1991: Nespresso launched internationally.
- 1997: First advertising campaigns started.
- 1998: Focus on ecommerce with web site redesign.
- 2006: George Clooney retained as spokesperson.
- 2008: Sales 2000-8 average 35% yearly and attain \$1.9 billion.
- 2012: Extend market with cheaper coffeemakers. {17}
- 2013. 30% of the world's 2,400 Michelin-starred restaurants use Nespresso. {18}.

1. Focus was shifted from offices to affluent households.

2. Coffee was sold by direct mail as 'pods', capsules that could be inserted into the coffee machines with a minimum of fuss and coffee wastage.

THE KEY POINT IS NOT "TO INNOVATE OR NOT", BUT "HOW TO SUCCESSFULLY INNOVATE"

SO WHAT DOES IT MEAN TO SUCCESSFULLY INNOVATE? HOW TO INCREASE THE LIKELYHOOD TO ACHIEVE A SUCCESSFUL INNOVATION?

INNOVARE CON SUCCESSO

INDUSTRIAL DESIGN



- What is the customer pain? Is there currently a problem/unmet market need? Tell a short story about how your innovation is unique in alleviating this pain or fulfilling customers' needs.
- □ Who are the **targeted users and/or customers** and why will they want to buy your product/service (unique selling point)?
- What is the market in terms of type (e.g. niche/high volume, new/mature, growth rate), size (e.g. volume, value, geographical scope) and growth? What is your envisaged market share?
- Who are your main direct and indirect competitors? (Competitors, substitutes and alternatives). What is the market's state-of-the-art? How would your innovation compare with available solutions, practices or products?
- Describe your value chain (suppliers and customers). Identify which of these or other stakeholders should be involved to ensure successful commercial exploitation.

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Market and customer understanding are mandatory elements to achieve successful Innovation

Fonte: Pitch deck template, H2020

MARKET UNDERSTANDING & ANALYSIS

TRENDS ANALYSIS

Analyse emerging technologies, consumer Trends and socio-political changes potentially influencing the reference market

TARGET MARKET/MARKET SIZING

Sizing the reference market and its segments, identifying growth trends and market shares

COMPETITIVE ANALYSIS

Analysing competitor's offer, price positioning and streights/weaknesses. Identify reference products and their key features.

VALUE CHAIN ANALYSIS

Understand who are the players involved and the value creation process, both for the company and for the overall market.

CUSTOMER NEEDS & INSIGHTS

Identify and segment target users and deeply understand their needs

- 1. Understanding trends within the industry
 - competitor activities with regard to present and future products
 - technology development
- 2. Understanding trends outside the industry
 - emerging technologies that might affect the industry in the future macro issues such as political, environmental and legal issues that might affect the industry
- 3. Understanding the customer trends that might be related or affecting the industry



- □ MARKET SIZE: is the **total amount** of products sold (or related sales revenues) in a given industry during a specific period of time
- MARKET SHARE: The market share of a company or product is the percentage of sales or of revenue in the market that go to that company or product. Market share tends to vary based on the exact definition of the market in question.
- MARKET GROWTH: Market growth is the increase or decrease in the size of a market for a product or service over time. It identifies a trend, and c

Market Sizing Model

TAM Total Addressable Market	• How big is the universe?
SAM Serviceable Addressable Market	 How many can you reach through your sales channel?
SOM Serviceable Obtainable Market	• How many of those are likely buyers?

When you already have a product portfolio, Factors that affect your ability to address a market are easier to be determined:

- Existing market share
- Relative brand strength
- Cost structure/model
- Distribution channels
- Customer loyalty
- Product/technology differentiation
- • • •

When you are launching an Innovative product, or you are a startup, understanding what can make a difference in a market is a critical success factor in itself !



Apple Jumps to Top of the Global Wearables Market

Top 5 wearable device companies based on worldwide unit shipments in 2017



Competition can be assessed in two main regards.

1. Extent and nature of the existing competition.

Factors that can fuel intensity of competition include:

- The presence of several players with similar shares, struggling for leadership
- Willingness of customers to switch products/suppliers.
- Standardisation and commoditisation of products.
- Ready availability of products through multiple channels.
- 2. Secondly, consideration must be given to the likelihood of new competitors entering the market. Barriers to entry can include a high marketing costs or investment in new production capacity, patents, or high switching costs for customers

Wearable devices segmentation by Application



Wearable devices segmentation by Application

Applications	Product Categories	
Healthcare & Medical	Blood Pressure Monitors Continuous Glucose Monitoring Defibrillators Drug Delivery Products ECG Monitors Hearing Aids	Insulin Pumps Smart Glasses Patches PERS Pulse Oximetry
Fitness & Wellness	Activity Monitors Emotional Measurement Fitness & Heart Rate Monitors Foot Pods & Pedometers Heads-up Displays	Sleep Sensors Smart Glasses Smart Clothing Smart Watches Other, Audio Earbuds
Infotainment	Bluetooth Headsets Head-up Displays Imaging Products	Smart Glasses Smart Watches
Industrial	Hand-wom Terminals Heads-up Displays Exoskeleton	Smart Clothing Smart Glasses
Military	Hand-wom Terminals Heads-up Displays Smart Clothing	Exoskeleton

Fonte: IHS, 2015

COMPETITIVE ANALYSIS



Fonte: IHS, 2015

Channels of distribution can be sorted into two main categories:

DIRECT

Is one where a company sells directly to the end consumer. For instance, through an e-commerce website or at their own retail store or through door-to-door sales is employing a direct channel of distribution. Products go directly to the buyer with no intermediaries.

Benefits of this approach:

More profit goes directly to the company from the consumer.

The drawbacks:

Companies using direct channels of distribution must heavily invest in sales teams and consumer marketing infrastructure, rather than relying on partners. It's also much more difficult to achieve a wide reach geographically or across various market segments without the help of intermediaries.

INDIRECT

Is one where companies work with one or more distribution partners or intermediaries to bring products and services to customers.

Wholesalers:

Sell products in bulk but at lower prices, typically to retailers.

Distributors:

Extend the reach of, and handle the logistics for, products going to wholesalers and retailers.

Retailers:

Sell products directly to consumers in smaller quantities. (Distribution chains, small retailers, department stores etc)

Benefits of this approach:

Achieve a wide reach geographically or across various market segments without investing on huge infrastructure

The drawbacks:

Sharing of the profits with intermediaries

Cooking Machines - Competitors

2. Door to Door Sales **1. SDA companies** companies Guy Demarle[.] Moulinex **KENWOOD** VORWERK Bellini taurus Cozinhar agora é yammi magimix PHILIPS omovir **KitchenAid** IMETEC Manufacturers of domestic appliances that Vorwerk is a company specialized in door have a wide range of products in the food to door business model. processing segment. Thermomix division is the market leader Selling typically through distribution chains and is on the market for 30 years. (such as Expert, Euronics, etc). Taurus and Kenwood selling also through kitchen specialized retailers.

DISTRIBUTION CHANNELS





How Do You Choose a Distribution Channel for Your Business or Product?

Look at the product itself.

Does it need to reach the customer quickly? Does it need to be bundled with other products in order to be useful or attractive?

Consider target consumer and sales goals.

Are you trying to target a very specific, international population of enthusiasts, such as Bio-cosmetics?

Are you trying to achieve the widest possible audience for your product? Are you trying to sell a wearable medical device for diabetes patients?

Beware of channel conflict if you choose to use multiple distribution channels for the same product. This can be avoided if you strategize about the customer groups you are likely to reach through different distribution channels, focusing on market segmentation.

INDUSTRIAL DESIGN

CASE STUDY

A value chain is a **set of activities** that a firm operating in a specific industry performs in order to deliver a valuable product or service for the market.

The idea of the value chain is based on the process view of organizations, the idea of seeing a manufacturing (or service) organization **as a system**, **made up of subsystems** each with inputs, transformation processes and outputs.

How value chain activities are carried out **determines costs and affects profits**, and therefore the ability of the company to create a **competitive advantage**



Source: Kiira Motors Corporation



Fonte: Accenture

Porter's Value Chain Model



Support Activities

nike ing.

- World largest seller of apparel, footwear, sportswear, and sports equipment supplier
- 2018 global revenue is \$36.4 billion
 - Sponsors many high-profile athletes and sports teams around the world

JUST DO IT.

VALUE CHAIN ANALYSIS – NIKE CASE



Procurement: global procurement team, focus on quality of raw materials, attention to sustainability and environment

Technology: leading edge in technology development and innovation

Human Resources: Nike was recognized for its great HR management and featured as one of the best employers and as one of America's Best Employers for Diversity on Fortune's list. High ethical skills

Firm infrastructure: Nike is a global firm and as such has a large and global infrastructure composed of its offices, retail stores and distribution and logistics centers. This large infrastructure also helps it manage its global presence

De Longhi

- Leading manufacturer of small domestic appliances
- 5 production facilities (3 in China, 1 in Italy, 1 in Romania)
- Contract manufacturing 40%
- "Local for Global" approach
- 5 R&D centers (1 in China, 2 in Italy, 1 in UK, 1 in Germany)
- 32 commercial subsidiaries all over the world

• Esercitazione

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CUSTOMER NEEDS ANALYSIS

CUSTOMER NEEDS



- DEVELOP A PRODUCT/SERVICE THAT IS FOCUSED ON CUSTOMER NEEDS
- IDENTIFY LATENT AND EXPLICIT NEEDS
- DIFFERENTIATE FROM COMPETITORS AND CREATE A COMPETITIVE ADVANTAGE
- CREATE A «UNIQUE SELLING PROPOSITION»

Fonte: Product Design Devel., Ulrich/Eppinger

Market

Actual and potential buyers of a product or service

Market segmentation

The process of dividing the market into subgroups of similar customers

Market segment

Subgroup of people that share similarities which can be used for more efficient seller/buyer relationships

Target market

Subgroup of people that presents the greatest opportunity for targeting



Product need Segmentation





Qualitative research

Qualitative research is empathic, empirical, explorative, direct, physical research. It aims to understand the reasons, the motivations, the opinions, the tendencies that hide behind the numerical data of quantitative research.

Quantitative research

As the word itself says, quantitative research is used to quantify, to elaborate numerical data that can then be easily transformed into statistics, and aims to measures the behaviour, opinions, attitudes of a very large sample of respondents.



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Attributes	Qualitative Research Methods	Quantitative Research Methods
Analytical objectives	This research method focuses on to describe individual experiences and beliefs.	Quantitative research method focuses on describing the characteristics of a population.
Types of questions asked	Open ended questions	Closed ended questions
Data collection Instrument	Use semi-structured methods such as in-depth interviews, focus groups, and participant observation	Use highly structured methods such as structured observation using questionnaires and surveys
Form of data produced	Descriptive data	Numerical data
Degree of flexibility	Participant responses affect how and which questions researchers ask next	Participant responses do not influence or determine how and which questions researchers ask next

INTERVIEWS:

ONE-TO-ONE INTERVIEWS ARE THE MOST COMMONLY USED QUALITATIVE RESEARCH METHOD. QUESTIONS TO BE ASKED AND ISSUES TO BE ADDRESSED ARE FLUID AND TAKE SHAPE AS THE INTERVIEW UNFOLDS. USUALLY LAST BETWEEN 30 TO 90 MINUTES, AND SHOULD TARGET NOT ONLY THE END-USER BUT ALSO PRODUCT/SERVICE INFLUENCERS

FOCUS GROUP:

UP: IN A FOCUS GROUP DISCUSSION, AN INTERVIEWER TALKS TO A GROUP OF PEOPLE ABOUT THEIR PERCEPTIONS, OPINIONS, BELIEFS AND ATTITUDES TOWARDS AN IDEA, CONCEPT, SERVICE, PRODUCT, ETC. THE PARTICIPANTS ARE USUALLY A GROUP OF PEOPLE WHO ARE SIMILAR IN SOME WAY. A TYPICAL FOCUS GROUP HAS ANYWHERE BETWEEN 6 TO 12 PARTICIPANTS.



OBSERVATION IS A QUALITATIVE RESEARCH METHOD WHERE RESEARCHERS GATHER DATA BY OBSERVING PEOPLE'S BEHAVIOUR OR EVENTS IN THEIR NATURAL SETTING.

Fonte: Product Design Devel., Ulrich/Eppinger



2. SAMPLE DEFINITION



3. QUESTIONNAIRE ELABORATION



5. RESULTS SYNTHESIS AND INTERPRETATION

Fonte: Mrdcompany

REASEARCH PLAN DEFINITION

KEY BUSINESS GOAL:

- Explore Brand identity?
- Introduce a new product concept?
- Explore user behaviour in a certain task/activity?

TARGET MARKET

Consumer/Market segments

KEY ASPECTS TO BE EXPLORED

- According to key business goals, list the aspects to be explored and deepened, making sure they flow in a
- explored and deepened, making sure they now i
- structured way and are not too many

INFLUENCERS:

- Consider all the other players influencing the product/service
- buying process:
- Shop Assistant
- Installer
- Designer

.....

SOME KEY RULES FOR QUESTIONNAIRE DEFINITION:

1. RESEARCH OBJECTIVES MUST BE CLEAR

2. STRUCTURE THE QUESTIONNAIRE WITH A LOGICAL FLOW WITH DEFINED STEPS AND PHASES



3. USE OPEN QUESTIONS

4. BEGIN WITH A WARM UP PHASE

1. INTERVIEWEES RECRUITING ACCORDING TO DEFINED SAMPLE

2. INTERVIEWS TIMETABLE ORGANIZATION AND LOCATION SET-UP

3. 1 INTERVIEWER AND 1 ASSISTANT (NEVER MORE THAN 2 PEOPLE)

IT IS CRITICAL TO USE EXPERT INTERVIEWERS, CAPABLE TO PUT AT EASE THE INTERVIEWEES AND TO GRASP AND FOLLOW UP THE MOST INTERESTING ASPECTS

RESULTS SYNTHESIS AND INTERPRETATION IS A KEY STEP AND CONSIST OF:

INDUSTRIAL DESIGN

1. ELABORATE COLLECTED DATA, IDENTIFYING NEEDS



2. DETERMINE A LEVEL OF PRIORITY OF IDENTIFIED NEEDS



Fonte: Product Design Devel., Ulrich/Eppinger

CASE STUDIES