ECONOMICS AND MANAGEMENT OF INNOVATION SIMPLE (FOR REAL)

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1 SUMMARY

Disclaimer

The following notes are based on the class material content, as I was following as an <u>attending student</u> (so, some chapters from the book are present here, but not all of them – like would happen for a non-attending student).

I am interested very much in this field, but this course was honestly atrocious and definitely I suggest doing the non-attending exam, given it was very boring on any possible point and was not telling anything remotely interesting by the three people employed (the project gives definitely no added value; not hard, at least in this year, but not interesting at all and useless for the exam apart sponsoring their company) – I don't remember a single lesson, other than the amazing teacher from the Startups in ICT Course held in the following semester which was an invited speaker. He should definitely teach these people how to teach.

It's a problem of the course and teachers though, given other courses of the same field and themes, for example the ones in the Minor, are much more interesting than this one. Given it's a mandatory course that we have to take, still, these are meant to be a miscellanea of notes useful for everybody. Thanks slides for helping to give more context to many sentences and concepts, given said teachers never further explain or develop the concepts present, so recordings are useless and slides basically tell everything, given they leave no added value to a student or a learner.

Keep in mind the discussion questions in slides were never touched usually, the Moodle is so disorganized that you will hate it very soon (use it and you will understand why) and (almost always) the slides on Moodle were never the right ones (that's why you read "revised" versions) – this file of course is based on the revised versions and, as said, only on that material. Some slides were not even touched for some reason, just there as filler, showing the general disinterest in this course even by the teaching staff.

Still, given some chapters would not be complete if not reading the book because the revised versions cut some content, to make you and me get more points, I read the book anyway and tried to only insert useful content.

I try to be objective, but this is a disclaimer in all regards, so that's my advice. In any case, this is a good resource, which also considers the material used to make the project, for which I will dedicate a specific section in file.

Speakers are part of exam material (at least this year, I asked one of the staff inside the teaching team). The order of the chapters follows the same order followed in class, which for this year was this [here](#).

Lastly, consider the chapters for both attending and non-attending:

Attending Students: 1/2/3/4/6/8/9/11/12 + material discussed in class + speakers

Non-Attending: The other chapters + 5/7/10/13

Finally, I hope this is useful. The file does not assume to be correct but tries to be a valuable resource to pass this "mandatory" exam and possibly give new notions to a curious (like me) reader. Feel free to reach me to provide feedback over its content. Also to thank me, doesn't kill me that much.

Written by Gabriel R.

2   COURSE INTRODUCTION

The course will be focused on innovation, ecosystems innovation and different sources/types, firm strategies/competition and case studies. It's all based on the book present [here](#).

Innovation as a concept is the perception of something different given to customers and people, having a competitive advantage over old ideas and marking a difference for customers and their relationships. This is made creating products and services, targeting customers overtime and helping the existing ones.

The City Vision event (present in the course schedule) is important, can give bonus points if one goes to it. It's present on the end of Moodle in the "Events" section. If one manages to be present at least 1.5 h. into the City Vision event, one can get 1 point for the exam (*at least, we were told so*). Remember to sign before entering and signing before going out. Link to the event: https://city-vision.it/evento/city-vision-2023/

Key points about inquiring with startups:

1) Founding team
2) Where did the idea come from
3) Main obstacles
4) Main facilitators

About the exam:

- **FOR ATTENDING STUDENTS**

The final exam consists of two parts.

1. The first part consists of a written test which includes 3 open questions on the content of the textbook. Each question will be evaluated with a maximum of 8 points.

2. The second part includes one group-work ppt presentation of 8-10 slides (evaluated with a maximum of 8 points). The presentation of the teamwork (composed of possibly 5 students, at most 6) is made by companies (in my file, you will find more [here](#) and the next chapter to that but also [here](#).

To form a group, there is a "Build your team" link.

- **FOR NON-ATTENDING STUDENTS**

The final exam consists of a written test which includes 4 open questions on the content of the textbook. Each question will be evaluated with a maximum of 8 points.

FAQ:

- The questions possibly comprehend all book and all class material, including in-depth, speakers and whatever you can think about
- If you see my Q&A, you will see what kind of questions are usually asked anyway

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3   INTRODUCTION (CHAPTER 1)

Innovation stands as a pivotal element in shaping the success of competitive endeavors. Many times, this serves as the differentiating factor that sets industries apart, allowing them to carve a unique niche in the market and make a notable impact across the world.

Technological innovation is now the single most important driver of competitive success in many industries:

- Many firms earn over one-third of sales on products developed within last five years
- Product innovations help firms protect margins by offering new, differentiated features
- Process innovations help make manufacturing more efficient

Information technology advancements have accelerated innovation very much (consider for example the usage of CAD/CAM systems, enabling rapid design and shorter production). Importance of innovation and advances in information technology have led to:

- Shorter product lifecycles (more rapid product obsolescence)
- More rapid new product introductions
- Greater market segmentation
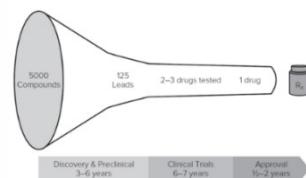
Innovation enables a wider range of goods and services to be delivered to people worldwide, with consequences like:

- More efficient food production, improved medical technologies, better transportation, etc
- Increase in Gross Domestic Product (GDP) by making labor and capital more effective and efficient

However, may result in negative externalities (e.g., pollution, erosion, antibiotic-resistant bacteria).

Successful innovation requires specific strategies and implementation processes, crafting an *innovation funnel*.

This is a pipeline aiming to take an idea from concept to reality by converging to a specific product: very few are able to make it, because many fail to give some return.

For example, The New Product Development Funnel in Pharmaceuticals.

There are different industry dynamics of technological innovation:

- The sources from which innovation arises, including the role of individuals, organizations, government institutions, and networks

- Types of innovations and common industry patterns of technological evolution and diffusion

- The factors that determine whether industries experience pressure to select a dominant design, and what drives which technologies dominate others

- Effects of timing of entry, and how firms can identify (and manage) their entry options

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The book itself gives a fairly useful summary of chapter, which will be included each time here:
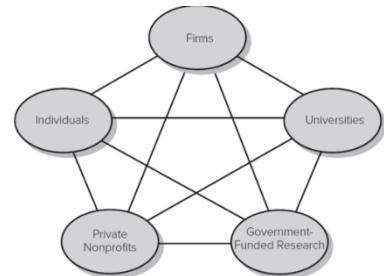
1. Technological innovation is now often the single most important competitive driver in many industries. Many firms receive more than one-third of their sales and profits from products developed within the past five years

2. The increasing importance of innovation has been driven largely by the globalization of markets and the advent of advanced technologies that enable more rapid product design and allow shorter production runs to be economically feasible

3. Technological innovation has a number of important effects on society, including fostering increased GDP, enabling greater communication and mobility, and improving medical treatments

4. Technological innovation may also pose some negative externalities, including pollution, resource depletion, and other unintended consequences of technological change

5. While government plays a significant role in innovation, industry provides the majority of R&D funds that are ultimately applied to technological innovation

6. Successful innovation requires an in-depth understanding of the dynamics of innovation, a well-crafted innovation strategy, and well-developed processes for implementing the innovation strategy

You can find a suggested reading on this chapter here, discussing the role of collaborations of university-industries, recognizing the values of individuals.

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4   SOURCES OF INNOVATION (CHAPTER 2)

Innovation can arise from many different sources and the linkages between them is strong, central and decentralized at the same time. This is briefly summarized by the right figure.

We may see this one as a complex system where any particular innovation may emerge from one or more components of the system or the linkages between them.

One primary engine of innovation is definitely <u>firms</u>:

- Are well suited to innovation
- Have greater resources than individuals and management system to control these resources
- Face strong incentives to develop different products and services

It's interesting to analyze <u>creativity</u> as the ability to produce *useful* and *novel* work.

<u>Individual creativity</u> is a function of:

- *Intellectual abilities* (ability to articulate ideas = primary process thinking/divergent thinking)
- *Knowledge* (understand field, but not wed to paradigms)
- *Personality* (confidence in own capabilities = openness to experience)
- *Motivation* (rely on intrinsic motivation)
- *Environment* (support and rewards for creative ideas)

We might manage to categorize <u>organizational creativity</u> as a function of:

- *creativity of individuals* within the organization
- the *crafting of new social processes* that help shape new forms of interactions and trainings
    - o encouraging creativity in the same processes individuals interact and behave
    - o company's ideas can be accessed via the *intranet*

There are different methods for encouraging/tapping organizational creativity:

- Idea collection systems (e.g., suggestion box; good idea but only a 1st step in employee creativity)
    - o In this Google is a very good example: they use a range of formal/informal mechanisms to encourage employees innovation, like:
        - ▪ 20% Time (spend 20% of working time working on personal projects)
        - ▪ Recognition Awards
        - ▪ Innovation Reviews
- Creativity training programs
- Culture that encourages (but doesn't directly pay for) creativity

Innovation involves the practical application of creative ideas to create new devices or processes, which requires combining creativity with resources and expertise. Take <u>inventors</u>, for instance – they master the fundamental tools and operations of their respective fields.

- They constantly seek new challenges to expand their unified knowledge
- They question established assumptions and engage in a continuous process of ideation, refinement, and experimentation
- This approach results in the development of numerous new devices, though only a selected few are eventually commercialized

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Understanding *how* these factors helped them become breakthrough innovators reveals how anyone can nurture breakthrough innovation potential.

Innovators are often studied to understand how to make the right breakthrough and some key commonalities were found:

- They felt a sense of "separateness" and the tendence to challenge rules
- They had intense faith in their ability to achieve their objectives
- They were keenly idealistic
- They began with modest means and worked very hard for their success
- They were often self-taught

Many other times, innovation can come by users (innovation by users), because they have a deep understanding of their own needs practically and tend to solve their problems themselves, without having manufacturers profiting from their sale.

Also, there is Research and Development by firms (R&D). We can define the following types of research:

- *Basic research* aims at increasing understanding of a topic or field without an immediate commercial application in mind
- *Applied research* aims at increasing understanding of a topic or field to meet a specific need
    - more likely to have commercialization than the basic one

Development refers to activities that apply knowledge to produce useful devices, materials, or processes. In this case, we have two specific approaches:

- Science Push (studied from 1950s/60s) approaches suggest that innovation proceeds *linearly*:
    - Scientific discovery → invention → manufacturing → Marketing
- Demand Pull (studied from 1960s) approaches argued that innovation originates with *unmet customer need*:
    - Customer suggestions → invention → Manufacturing

Most current research argues that innovation is not so simple and may originate from a variety of sources and follow a variety of paths – that's why we analyze firm linkages of different kinds.

Most frequent collaborations are between firm and their customers, suppliers, and local universities, on which the firms have linkages. On the right, the usual percentages.

Collaborates with:	North America (%)	Europe (%)	Japan (%)
Customers	44	38	52
Suppliers	45	45	41
Universities	34	32	34

There are also *complementors* analyzed inside firm linkages:

- these are businesses, products, or services that provide value by enhancing or complementing the offerings of another company (e.g. lightbulbs for lamps, DVD movies for DVD players, etc.)
- they often work in conjunction with a company's products or services to create a more complete and attractive solution for customers (e.g. Kodak and Fuji in both camera and film markets)

Just to mark differences between complementors and suppliers:

- complementors enhance the value of a company's products or services (you don't always need them), often in a cooperative relationship
- suppliers provide the necessary inputs for a company's core operations in a transactional relationship (you need them)

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Innovation can be <u>External</u> or <u>Internal Sourcing</u>, which are complements.

- Firms with in-house R&D also heaviest users of external collaboration networks
- In-house R&D may help firm build *absorptive capacity*
  - o exploit external knowledge, using tools efficiently to "absorb it" and spread it
  - o it enables to better use information obtained externally

<u>Government-funded research</u> goes into two directions: the *universities* and *governments* themselves.

Many <u>universities</u> encourage research that leads to useful innovations:

- Some of them are *patented*, allowing to collect *royalties* from inventions funded with taxpayer dollars (thanks to Bayh-Dole Act of 1980)
  - o This led to rapid increase in establishment of *technology-transfer offices*
- Revenues from university inventions are still very small, but universities also contribute to innovation through publication of research results

<u>Governments</u> invest in research through:

- Their own laboratories
  - o *Science parks* (regional districts to foster collaboration)
  - o *incubators* (institutions designed to nurture the development of new businesses that might otherwise lack access to adequate funding or advice)
    - ▪ different examples from the book on this from USA governments with programs
- Grants for other public or private research organizations
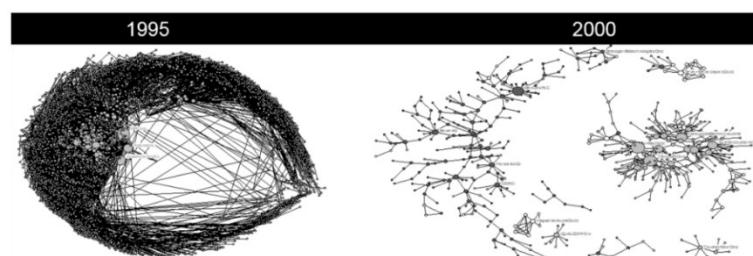
Many <u>private nonprofit organizations</u> do in-house R&D, fund R&D by others, or both (there are a good number of organizations doing this, e.g. SEMATECH, Mayo Foundation).

The R&D Business expenditure is very much the biggest one, while government spend an average/low amount of funds on this (apart from India where it's huge); also, higher education represents a good investment especially in European countries. Such collaborations include (but are not limited to):

- Joint ventures (more companies coming together and creating new things)
- Licensing and second-sourcing agreements (patents/intellectual properties)
- Research associations (collaborative groups or research and expertise)
- Government-sponsored joint research programs (funding in various sectors)
- Value-added networks for technical and scientific exchange (provide platforms for exchange)
- Informal networks (collaborations of individuals across common interests)

Collaborative research is especially important in high-technology sectors where individual firms rarely possess all necessary resources and capabilities. As firms forge collaborative relationships, they weave a larger network that influences the diffusion of information and other resources.

The figure shows pictures of the worldwide technology alliance network in 1995 and in 2000. The mid-1990s saw firms responding rapidly to change via large and dense web of connected firms, while in the next decade a significant decline in alliance activity, resulting in both big and small components.

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In collaborative networks, firms join a larger network:

- This dynamic network, spanning various forms like social and supply chain networks, facilitates the flow of information and resources
- The environment plays a crucial role in enhancing creativity, encouraging idea generation, research, and societal involvement in innovation
- By providing member firms access to a wider range of information (and other resources) than individual firms possess, interfirm networks can enable firms to achieve much more than they could achieve individually

Technology clusters are regional clusters of firms that have in common a connection to a technology, made by a variety of actors coming from different fields, coming together for provision of new knowledge – examples might be Silicon Valley's semiconductor firms or lower Manhattan's multimedia cluster. They may span a region as narrow as a city or as wide as a group of neighboring countries.

We talk about *agglomeration economics* when firms benefit from each other being physically close and this further expands knowledge according to their closeness, willingness and codification. It has some pros:

- Proximity facilitates knowledge exchange, fostering innovation in a streamlined way
- Cluster of firms can attract other firms to area, strengthening cluster and overall capabilities
- Supplier and distributor markets grow to service the cluster and increase business opportunities
- Cluster of firms may make local labor pool more valuable by giving them experience, diversifying and specializing experience and exposing employees to cutting-edge technologies and practices
- Cluster can lead to infrastructure improvements (for example, better roads, utilities, schools, etc.)

There are also some *downsides* related to agglomeration:

- Increased competition
  - High concentration of firms in the cluster intensifies competition
  - Firms may face challenges in standing out or maintaining competitive advantages
- Knowledge leakage
  - Information sharing, while beneficial, can also lead to knowledge leakage
  - Protecting intellectual property becomes a concern in a closely-knit cluster
- Congestion and pollution
  - Growth in business activities may result in increased congestion and pollution
  - Infrastructure and environmental challenges may arise due to cluster expansion

Likelihood of innovation activities being geographically clustered depends on different factors (for each, an example is given):

- The nature of the technology
  - Its underlying knowledge base or the degree to which it can be protected by patents or copyright, the degree to which its communication requires close and frequent interaction
- Industry characteristics
  - Degree of market concentration or stage of the industry lifecycle, transportation costs, availability of supplier and distributor markets
- Cultural context of the technology
  - Population density of labor or customers, infrastructure development, national differences in how technology development is funded or protected

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<u>Technological spillovers</u> are an important concept, and they occur when the benefits of research or innovation conducted by one entity extend to benefit other entities. The likelihood of these ones can be influenced by several factors:

- Strength of protection mechanisms (for example, patents, copyright, trade secrets)
    - o Stronger protections may limit unintended knowledge diffusion
- Nature of underlying knowledge base (for example, tacit, complex)
    - o Tacit knowledge, being less codified, may be more prone to unintentional sharing
- Mobility of the labor pool
    - o A highly mobile labor pool can contribute to the transfer of knowledge across organizations

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Summary of chapter directly from the book:

1. Creativity is the underlying process for innovation. Creativity enables individuals and organizations to generate new and useful ideas. Creativity is considered a function of intellectual abilities, knowledge, thinking styles, personality traits, intrinsic motivation, and environment

2. Innovation sometimes originates with individual inventors. The most prolific inventors tend to be trained in multiple fields, be highly curious, question previously made assumptions, and view all knowledge as unified. The most well-known inventors tend to have both inventive and entrepreneurial traits

3. Innovation can also originate with users who create solutions to their own needs. The rise of the snowboarding industry provides a rich example

4. Firms' research and development is considered a primary driver of innovation. In the United States, firms spend significantly more on R&D than government institutions spend on R&D, and firms consider their in-house R&D their most important source of innovation

5. Firms often collaborate with a number of external organizations (or individuals) in their innovation activities. Firms are most likely to collaborate with customers, suppliers, and universities, though they also may collaborate with competitors, producers of complements, government laboratories, nonprofit organizations, and other research institutions

6. Many universities have a research mission, and in recent years universities have become more active in setting up technology transfer activities to directly commercialize the inventions of faculty. Universities also contribute to innovation through the publication of research findings

7. Government also plays an active role in conducting research and development (in its own laboratories), funding the R&D of other organizations, and creating institutions to foster collaboration networks and to nurture start-ups (e.g., science parks and incubators). In some countries, government-funded research and development exceeds that of industry-funded research

8. Private nonprofit organizations (such as research institutes and nonprofit hospitals) are another source of innovation. These organizations both perform their own R&D and fund R&D conducted by others

9. Probably the most significant source of innovation does not come from individual organizations or people, but from the collaborative networks that leverage resources and capabilities across multiple organizations or individuals. Collaborative networks are particularly important in high-technology sectors

10. Collaboration is often facilitated by geographical proximity, which can lead to regional technology clusters

11. Technology spillovers are positive externality benefits of R&D, such as when the knowledge acquired through R&D spreads to other organizations

You can find a suggested reading of this chapter here.

Written by Gabriel R.

5   SOCIAL INNOVATION

<u>Social innovation (SI)</u> concerns the implementation of a wide range of activities and addressing of *social problems* and *human needs*.

- We have two EU definitions:
  - o "social innovations are *new ideas*, which meet *social needs*, create *social relationships* and form *new collaborations*"
  - o "new ideas that meet *social needs*, creating *social relationships* and form *new collaborations*, creating products, services and models as innovations, to meet unmet needs and encouraging *market* uptake of new solutions, stimulating *employment*"
- There is a strong relationship between *places and innovations*
  - o especially considering societal needs that SIs aim to alleviate are *place-specific*

We categorize innovation and social innovation this way:

- *Innovation* is seen "new combination" of production factors – land, labor, capital, entrepreneurship
- *Social innovation* as new combination of social practices:
  - o for resolving societal challenges
  - o which are adopted and utilized
  - o by the individuals, social groups and organizations
- Both *create value* equally, among the professional practices followed in any context

The concept itself is debated, but scholars agree on:

- emerging of social innovation as a *response to social needs*
- emerging in *separate places*, usually happening in *rural* or *remote* areas, possibly escaping from marginality, given the need of conditions

The term was *politically* charged and associated with *social reform*, leading to development of further social and physical technology – this was also used to describe the remainder of technical innovation.

Let's quote these different policies:

- Obama established The White House Office of Social Innovation and Civic Participation in 2009
- EU launched its Europe 2020 strategy in 2010, identifying SI as a field that should be nurtured in the Innovation Union Flagship Initiative
- In 2013, the Social Investment package was launched to support EU member states in renewing their social protection systems, with programs like Horizon 2020 and CAPS programme

Innovation mainly addresses two types of issues:

- <u>economic</u> ones, like:
  - o products/services
  - o processes
  - o organizational structures
  - o marketing strategies

- <u>social</u> objectives, like:
  - o roles (of individuals, firms, institutions)
  - o relations (in private/professional environments, networks, communities)
  - o norms (formal and informal)
  - o values (customs, manners, ethics)

Written by Gabriel R.

The Commission's actions on SI and the Social Investment Package induce uptake and scaling up of SI solutions, having as main objectives:

1) promoting social innovation as source of *growth and jobs*
2) *sharing information* about SI in Europe
3) supporting *innovative entrepreneurs* and mobilizing *investors* and *public organizations*

The EU commissions actions on SI relate to:

- *Networking* → helping organizations across Europe to connect
- *Competition* → having an yearly competition for supporting new solutions to societal challenges
- *Funding* → support SI through different programs
- *Ecosystems* → improve the conditions for social innovation and social enterprises in Europe, attracting also private investors
- *Impact* → gathering and disseminating evidence about the innovation actions and methodologies
- *Incubation* → supporting structures EU-wide of incubators for innovation
- *Exploring* → looking for new ideas and applications in different fields

There are several approaches on how SI is seen:

- a *pragmatic* approach, as a complex of "innovative activities and services that are motivated by the goal of meeting a *social need* and are predominantly developed and diffused through organizations whose *primary purposes are social*"

- a *systemic* approach, as a *complex process* through which processes or programs are introduced, leading to a *deep change* in daily routines, resource streams, power relations and values within the *system* affected by the innovation

- a *managerial* approach, as a new solution to a social problem, which is more *effective, efficient, sustainable or fairer* compared to existing solutions, generating *value for the society*

- a *territorial* approach, as a process of empowerment and political transformation targeting a bottom-up transformation in terms of *stakeholders* and *distribution* of resources

There are many societal levels according to the Bureau of European Policy (BEPA):

- *micro* level – the *social demand* level: tackling specific problems faced by *specific groups of the ground* that are traditionally not addressed by the market itself, impact vulnerable people

- *meso* level – the *societal challenge* level: tackling challenges affecting people at a larger scale and across whole sectors, often manifesting through complex *social, economic, environmental and cultural* factors that require new forms of *relations*

- *macro* level – the *systemic change* level: enquiring some *fundamental transformation* of the way *society* behaves, in institutions, actors and structures, empowering different sources of well-being (new crafting governance techniques and ideas)

Written by Gabriel R.

SI addresses present and new social needs, crafting multiple *drivers* for innovations.

As such, there can be <u>socio-economic drivers</u>, like:

- new sources of competition
- changes of investor confidence
- changing values of assets
- alterations in demand/supply
- employment/unemployment
- poverty

We can also consider <u>technological advancements</u> like:

- automation
- digitalization
- platforms advent
- access to information
- ethical and privacy-related issues
- balancing home/work mix
- altering value of property rights

There are also <u>cultural drivers</u>, for example:

- changing local traditions
- fundamentalisms vs democracies
- generational or cultural gaps
- altering values and norms
- role of media in opinions, attitudes and behaviors of people

Also consider <u>sustainability-related drivers</u>:

- Environmental awareness (climate change)
- Social pressures
- Population changes: demographic dynamics and migration patterns

and <u>single events</u>:

- Financial and economic crisis
- Natural disasters
- Health emergencies

<u>Societal changes</u> can create problems and new needs, as:

- Societal and economic inequalities
- Economic decline
- Institutional and political distrust
- Digital divide
- New labor structures displacing previous ones
- Generational gap
- Gender (pay) gap

Written by Gabriel R.

A possible *categorization* is born:

1) Objectives
   a. SIs satisfy societal need, including the needs of *particular social groups* (aiming at *social value creation*) – that are usually not met by conventional innovative activity (c.f. "economic innovation"), either as a goal or end-product
   b. SI does not produce conventional innovation outputs such as patents and publications

2) Actors and actor interactions
   a. SIs are created by actors who usually are not involved in "economic innovation"
   b. SIs often involve predominantly *new types of social interactions*, achieving common goals and/or innovations that rely on *trust* rather than mutual-benefit relationships
   c. SIs involve different action and diffusion processes but ultimately brings *social progress*

3) Outputs/Outcomes
   a. Early definitions of SI strongly relate it with the production of social technologies (c.f. innovation employing only "physical technologies") or "intangible innovation"
   b. Some others indicate that social innovation changes the attitudes, behaviours and perceptions of the actors involved
   c. Some others stress the public good that SI creates
   d. SI is often associated with long-term institutional/cultural change

4) Innovativeness
   a. It involves "the implementation of a new or significantly improved product/service/process/marketing method or a new organizational method in business practices, workplace organization or external relations"

There can be some related concepts:

- *Corporate Social Responsibility* (CSR), involving initiatives which *extend beyond* meeting immediate interests of stakeholders of enterprises, offering potential to enhance performance

- Adopting a business approach *social entrepreneurs* focus on bringing improved social outcomes, creating new solutions in education and healthcare

- The underlying driver is creating social value as opposed to personal/shareholder wealth, characterizing the creation of new solutions that benefit communities, promoting diversity

Useful tools to check such research cases in SI:
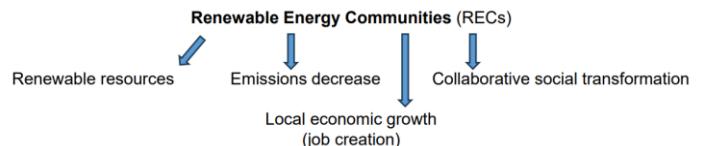
- ISI Web of Knowledge (reference here – requires login)
- ESID (reference here)
  o Source of information on social innovation projects and actors in Europe and beyond
  o Uses machine learning and NLP techniques to collect information about social innovation projects and human annotation to train its machine learning models
  o There is a dataset of thousands of social innovation projects
  o For each, there is a title, a type with scores, a summary, location and topic

Written by Gabriel R.

Some slide examples to SI cases (from slide 35 to 55 – just two listed here, other *seven* present in slides, but given these ones *you get the idea*; we don't like filler content because you can't teach – editor's note):

- Orti Generali – Turin
    - The project has recovered a residual agricultural area previously abandoned and previously used for illegal vegetable gardens. It responded to the resident population's need for land to legally cultivate, also becoming a place for socialization and training on sustainability and agriculture issues for all citizens
- Why a social innovation?
    - Because the project responded to the needs of local farmers, redeveloping the agricultural area and opening it up to the use of the population
    - Because it aims at the work and social inclusion of marginalized people, through training internships and job grants
    - Because after being founded by an association, the project was able to evolve, engaging in dialogue with the public administration and activating an alternative business model in the agricultural sector
    - Because it favors ethical and sustainable cultivation of the land

- D-Hub Atelier di Riuso Creativo – Verona
    - It fights social exclusion through social and work integration (especially of disadvantaged women) and community animation
- Why a social innovation?
    - Because it responds to the needs of the population of the neighborhood, representing a hub of meetings, relationships and unions of diversity
    - Because it aims to introduce previously unemployed disadvantaged women into the world of work and make them independent
    - Because it is an active subject in the governance of public spaces and common goods in the neighbourhood, collaborating with many other formal and informal Third Sector actors, but also with the Municipality (participation in municipal projects)

SI involves the creation also of *Renewable Energy Communities (REC)*; basically, an Energy Community is an association that produces and shares renewable energy, generating and managing cost-effective green energy autonomously, reducing CO_2 emissions and energy waste.

- Targets by the European Union require that at least 75% of total energy comes from *renewable sources* and 16% of electricity generates in *collective projects* (EU, 2018)

- Citizens should be involved in energy consumption, generation, trading and supply for reaching such targets and *energy transition*

Renewable Energy Communities (RECs)

Renewable resources → Emissions decrease → Local economic growth (job creation) → Collaborative social transformation

In RECs contexts, an innovative business model should be elaborated because:

- high levels of technologies
- high presence of ICTs
- new market operators (in comparison with traditional ones)
- centered on an original agent: a *prosumer*
    - person who at the same time is both consumer and producer of goods/services

Written by Gabriel R.

Value should be created for members at *different levels* (collective consumers, firms, third parties, etc.) and in the *renewable energy sector*, attention should be paid to social, environmental and economic *sustainability* (and specific material structures of the electricity system).

All of this creates *innovative and sustainable models*. Just a few key points to note in RECs and Sis context:

- Engaging citizens through collective energy actions can reinforce *positive social norms* and *support the energy transition*

- Community energy can foster citizens' participation and control over decision making in *renewable energy*

- Its SI potential also resides in the ability to *integrate consumers independently of their income and access to capital*, ensuring that the benefits of decentralization are also shared with those that cannot participate

- *Innovative social policy* and revisited regulatory structures are needed to address the potentially regressive effects that could arise when some societal groups might be impaired by an inability to invest in renewables projects

- Ensuring that as many people as possible can participate in community energy can release the *creative forces of social innovation* and *sustainable lifestyles* across different social groups

- The report recommends carrying out an EU-wide exercise assessing the potential of energy communities in *reducing energy poverty*, including lowering the barriers that prevent socially vulnerable groups from participating in distributed generation and communities

Written by Gabriel R.

6 INVITED SPEAKERS: MOBISEC

Because this is not theory related, speakers are something more abstract: I will give just a fairly synthetic synopsis about the whole thin, to make you focus on a few selected points.

Overview:

- Mobisec is a cybersecurity company founded in 2015, focused on mobile security. They have conducted over 10,000 mobile app analyses
- It's founded on the idea cyber-attacks can be everywhere and can bring potential losses at any time with potentially devastating consequences
- It's important to bring the expertise of security to companies and people alike: keeping confidential information, attention on personal/sensitive data, customer behaviors and profiling
- This can be costly for companies, but even more in image and returning costs later, because of data breaches and consequent customers perception
- A significant shift it on its way; different partners include banks, insurances, payment companies, institutional companies, etc

Offerings:

- Mobisec DSA - Analyzes apps in live contexts across functions, data, and components. Fast testing and detailed reporting via AI/ML/automation services configured in DevOps in realtime
- VAPT/WAPT - Assesses vulnerabilities and conducts penetration testing to find weaknesses. Follows best practices
- Monitoring - Continuous monitoring for vulnerabilities in libraries and dependencies. Enables rapid patching
- Hiwave - Manages and secures IoT devices, apps, users and data. Integrates monitoring into enterprise systems
- UEM Assessment - Evaluates and improves enterprise mobile device management programs
- App Scraping - Monitors alternative Android app stores for brand/IP infringement
- Training - Immersive cybersecurity training for developers focused on practical skills

Competitive Advantages:

- 8 years' experience securing advanced mobile apps and IoT systems. Trusted by leading companies.
- Innovative approach delivers superior value. Combines mobile expertise with enterprise-level capabilities
- Testing on real devices, not emulators, enables finding hidden threats. Purpose-built for modern mobile environments, being present in the territory, particularly the Italian one

7 GROUP FORMATION AND WORK STRUCTURE

The formed groups of 5/6 people of Economics must decide a challenge between two themes <u>focusing only on Mobisec</u> (for each, I briefly summarized the slides present on Moodle just to give some ideas, so, some keyword buzz):

- Market Research Challenge
    - <u>This challenge focuses on firms</u>
    - A strategy Is well-developed if it's long-term, given a profound understanding of the environment and its resources; this represents the present vision and the future (R&D), analyzing competitors and predict how the market will change
    - A good strategy gives a competitive advantage over financial, physical and human resources above others, analyzing how the market will trade information and try to go across barriers of innovation and imitation, differentiating enough to give value to the market.
- Some useful material:
    - https://www.wipo.int/edocs/mdocs/aspac/en/wipo_ip_bkk_17/wipo_ip_bkk_17_15.pdf
    - https://www.b2binternational.com/assets/ebooks/mr_guide/practical-guide-to-market-research_full.pdf
    - https://www.cmu.edu/swartz-center-forentrepreneurship/assets/Olympus%20pdfs/Competitive%20Analysis.pdf
    - https://sociology.fas.harvard.edu/files/sociology/files/interview_strategies.pdf
    - https://www.cii.co.uk/media/6158020/a-useful-guide-to-swot-analysis.pdf

- Communication Strategy Challenge
    - <u>This challenge focuses on customers</u>
    - Here we focus on a Lean Marketing approach, which emphasizes efficiency, continuous improvement, and customer-centric strategies, based on Agile development, iteratively improving over experiments and give cross-functional collaboration
    - Focus on individuals and interactions over tools, giving a good abstraction between search and execution to understand how to validate customers and build an effective company plan
    - In this case, the slides are based on social media, but the core is: tell a story to give connections deeply within people, form groups and lead them towards your vision.
    - This is an Agile process so continuously test, seeing how it will be feasible, desirable and viable, prioritizing risks and balancing how will you spend and all the components, learning by evidence or visually from a few key points (learning cards)
    - Determine the traffic/setup the bridge/qualify customers/qualify buyers/identify hyperactive buyers/age and ascend relationships/change the selling environment, by creating multiple funnels, each specific to a context and create an editorial plan

We are given paper material on how to develop a strategy and a few visual cards to develop a strategy effectively (also, we're told not to share the paper material). Some of this paper material is also available on PDF. Specifically:

- Market Research Challenge
    - SWOT Strategy (Strengths – Weakness – Opportunities – Threats)
        - Specifically, double-edged on weaknesses and strengths, so SSWWOT (for a thorough analysis of your business)
    - Scenario canvas

- Communication Strategy Challenge
    - Delivery journey (for delivering the best value to your customers)
        - Describe relationships and channels from start to finish (before/during/after)
    - Proposition journey (for improving your value proposition)
        - Essentially, a vision that start from core and extends to be effective (before/during/after)
    - Affinity (for customer profiling and empathy mapping)
        - Describing personal and psycho-attitudinal features of customers
    - Scenario canvas

The scenario canvas is common because, given the specific company, we want to understand all the factors that contribute to the company vision. In class, we're asked to use it for Mobisec and try to understand the key points.

Written by Gabriel R.

8   Ok, but so how is the project like?

The project consists of making a presentation about a company presenting and:

- in 2023/2024 the chosen company was Mobisec
    - o   one can do the Market Challenge
    - o   or can do the Communication Challenge
- in 2022/2023 (the first year Sedita was the teacher) there was the same thing with slides, not specifically on Market/Communication though, but also the possibility of doing a paper of sort (unluckily not present here, would have been much preferable)

The group consists of 5/6 people which is created via Moodle before the end of October; if, like my case, has a component who does not work at all, just tell the teacher, there's no problem and write the effective components of the group.

What I suggest, given this project is not that hard to do, but like this year had basically no information to rely upon, is to divide immediately the work between people, crafting all the phases. What I did was taking the slides of the company and dividing the work in weeks: one week doing the audience analysis, another week doing the channels part, etc.

This will result in a mock presentation, which has to be ready for the end of December. This one has this structure:

"Attending students are required to upload a group-work ppt presentation of 8-10 slides (evaluated with a maximum of 8 points) and to present it to the class on the 22nd of December 2023.

Suggested structure of the presentation:

- *Team name and list of the group members*
- *Analysis*
- *Results*
- *Critical thoughts*
- *References"*

On the end of January, then, the real presentation will be shown to the company, Mobisec in this case, giving you up to 8 points and the exam itself, which these notes cover completely.

Also, don't worry if you work alone or with two/three people most, it is definitely feasible like in my case – it's literally a fricking PowerPoint you had to do this year.

Note: it was not compulsory this year to prepare a report about what we found inside our research. It seemed like initially, but after was confirmed it was not needed. I'll write this for posterity, so you will know (less doubts – less wasted time).

Written by Gabriel R.

9   TYPES AND SOURCES OF INNOVATION (CHAPTER 3)

Innovations can be categorized based on *several dimensions*:

- This categorization helps clarify the opportunities different innovations offer different opportunities (and pose different demands and challenges) to various stakeholders, including producers, users, and regulators
- Additionally, the path that a technology follows over time, known as its *technology trajectory*
  - o This is often used to represent the technology's rate of performance improvement or its rate of adoption
  - o Many consistent patterns have been observed in technology trajectories, helping us understand how technologies improve and are diffused

Let's delve into the different types of innovations:

- Product innovations are embodied in the *outputs* of an organization – its goods or services
  - o E.g., Elon Musk's use of automation for most of the production process for the Model 3

- Process innovations, which are in the *way an organization conducts its business*, such as in techniques of producing or marketing goods or services
  - o It encompasses the development of new products or the enhancement of existing ones, occurring in tandem with the previous ones
  - o Product innovations can enable process innovations and vice versa
    - ▪ A product innovation for one might be a process innovation for one another
    - ▪ E.g., UPS creates a new distribution service (*product innovation*) that enables its customers to distribute their goods more widely or more easily (*process innovation*)

Innovation can be distinguished according to the *impact* they have:

- Incremental innovations involve small, gradual improvements to existing products or processes
  - o These may involve only a minor change from (or adjustment to) existing practices
  - o E.g. new service plan/change screen to a phone to make it crack-resistant

- Radical innovations are groundbreaking and disruptive, often creating entirely new markets or industries: definitely, very different from prior solutions
  - o The radicalness of an innovation *is the degree to which it is new and different* from previously existing products and processes
    - ▪ This is relative; it may change over time or with respect to different observers
    - ▪ E.g., digital photography a more radical innovation for Kodak than for Sony
  - o Radicalness is also measured in risk and is relative to the observer

We can compare radical and incremental innovation via the following table, representing the differences:

Incremental innovation	Radical innovation
continuous (linear improvement of value acquired by the customer)	discontinuous (with or without predecessor; essential, nonlinear improvement obtained by the customer)
based on old technology	based on new technologies
dominant design unchanged	leads to a new dominant design
does not lead to a paradigm shift	can lead to a paradigm shift
implies a low level of uncertainty	implies a high level of uncertainty
improvement of existing characteristics	introduces a whole new set of performance features
existing organization and qualifications are sufficient	requires education, new organization and skills
the result of a rational response or necessity	result of chance or R & D policy, not necessity
driven by market pull (important in the advanced stage of technology)	driven by technology (important in the early stage of technology)

Written by Gabriel R.

Also, according to the impact on the internal organization:

- <u>Competence-Enhancing innovations</u>
    - o Those build upon a firm's existing knowledge base and capabilities
    - o They leverage and extend the skills, expertise, and technologies that a company already possesses, resulting in a natural progression made via incremental advancements
    - o Example of such are the Intel's transition from Pentium III to Pentium 4 processors or the 3D printing industry; improvements in materials and technology have made these radical shifts possible while building on existing knowledge base

- <u>Competence-Destroying innovations</u>
    - o These render a firm's existing competencies and knowledge obsolete
    - o They introduce radical changes, often requiring a firm to adopt entirely new skill sets and technologies, disrupting the status quo
    - o An example is the introduction of electronic calculators, which made the expertise in manufacturing slide rules, held by companies like Keuffel and Esser, obsolete. Electronic calculators represented a completely different technology and skill set

But also, innovation on the products themselves and their categorization:

- <u>Component innovations</u> (or *modular* innovations)
    - o These entails *changes to one or more components* of a product system without significantly affecting the overall design
    - o An example of a component innovation is adding gel-filled material to a bicycle seat to improve comfort
        - ▪ This change affects a specific component (the seat) without fundamentally altering the overall bicycle design

- <u>Architectural innovations</u>
    - o These entails changing *the overall design of the system*, or the way components interact
    - o An example of an architectural innovation is the transition from the high-wheel bicycle, with a large front wheel and a small rear wheel, to the safety bicycle, which had equal-sized wheels and a fundamentally different frame design
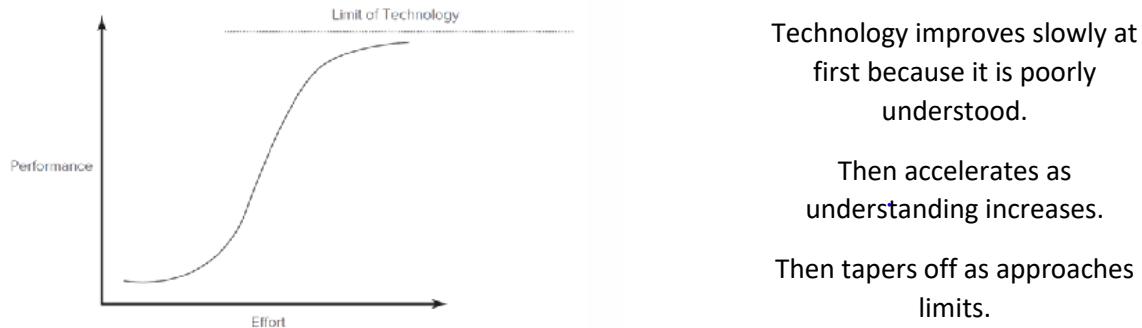
When a technology's performance is plotted against the amount of effort and money invested in the technology, it typically shows slow initial improvement, then accelerated improvement, then diminishing improve.

- Often a technology's evolution is plotted with performance (e.g., speed, capacity, or power) against time, but this must be approached with care
- If the effort invested is not constant over time, the resulting plot can obscure the true relationship
- If effort is relatively constant over time, plotting performance against time will result in the same characteristic curve as plotting performance against effort
- However, if the amount of effort invested in a technology decreases or increases over time, the resulting curve could appear to flatten much more quickly, or not flatten at all

We would need a tool able to describe:

- the *rate of technology's performance improvements*, given many times technologies emerge and may have difficulties in attracting other researchers or participate in their development
- the *market penetration*, which greatly varies according to the situation

Written by Gabriel R.

This tool is made by <u>S-curves</u>, also known as sigmoid curves or S-shaped curves, graphical representations of the growth or adoption of a specific phenomenon over time or during their lifecycle. Both the rate of a technology's improvement, and its rate of diffusion to the market typically follow an s-shaped curve.

Technology improves slowly at first because it is poorly understood.

Then accelerates as understanding increases.

Then tapers off as approaches limits.
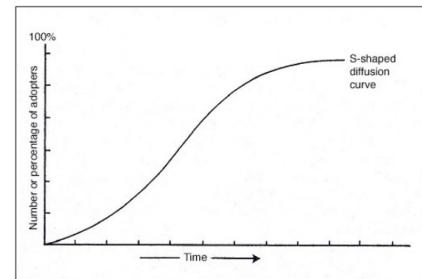
Technologies do not always get to reach their limits and they may be displaced by new, *discontinuous technology*.

- A <u>technological discontinuity</u> is a technology that fulfills a similar market need but is based on an entirely new knowledge base representing a shift in technology, often resulting in a new or greatly improved product
    - o E.g., switching from carbon copying to photocopying, vinyl records to compact discs
- Technological discontinuity may initially have lower performance than incumbent technology
    - o E.g., first automobiles were much slower than horse-drawn carriages

Firms may be reluctant to adopt new technology because performance improvement is initially slow and costly, and they may have significant investment in incumbent technology.

S-curves represent technology diffusion (spread of a technology through a population) fairly well, as shown by right figure:

- Adoption has a slow learning curve, given the technology is unfamiliar

- There is an accepting phase, in which the curve accelerates as technology becomes better understood

- Eventually market is saturated and rate of new adoptions declines

A famous example of a technology following this kind of plot is definitely microprocessors with Moore's Law, considering processors will have to improve their performance over time doubling in terms of resources and research.

Technology diffusion tends to *take far longer than information diffusion*:

- Technology may require acquiring complex knowledge or experience
- Technology may require complementary resources to make it valuable
   - o for example, cameras not valuable without film
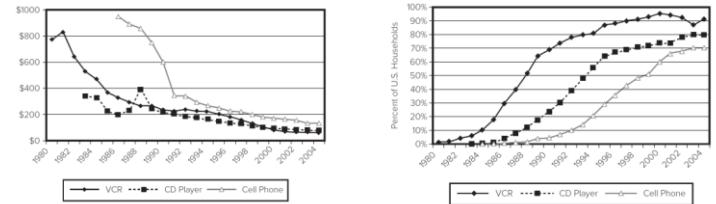
Managers can use data on investment and performance of their own technologies or data on overall industry investment and technology performance to map s-curve.

Written by Gabriel R.

While mapping the technology's s-curve is useful for gaining a deeper understanding of its rate of improvement or limits, its use as a prescriptive tool is limited.

- True limits of technology may be unknown (especially, in advance)
- Shape of s-curves can be influenced by changes in the market, component technologies, or complementary technologies (or even by firm activities themselves)
- Firms that follow s-curve model too closely could end up switching technologies too soon or too late (shape not set in stone)
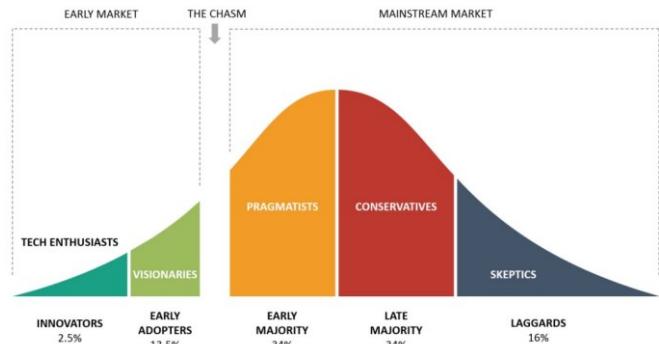
S-curves of diffusion are in part a function of s-curves in technology improvement.

The learning curve leads to price drops, which accelerate diffusion, as shown here.

You can see here the *technology adoption life cycle plot* here.
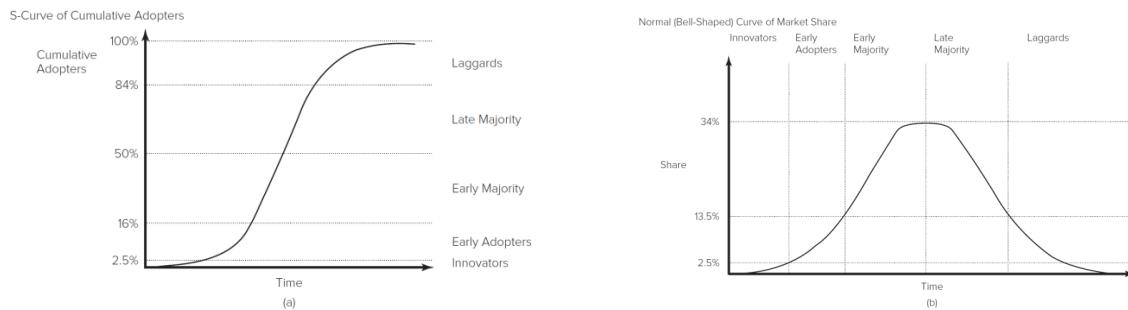
In this, different categorizations are made, describing all market phases, the mainstream and the uncertain phase from "new" to "comfort" zone of the market.

In this, we categorize the following:

- *Innovators* are the first individuals to adopt an innovation
    - They are adventurous, comfortable with a high degree of complexity and uncertainty, and typically have access to substantial financial resources

- *Early Adopters* are the next to adopt the innovation
    - They are well integrated into their social system and have great potential for opinion leadership
    - Other potential adopters look to early adopters for information and advice, thus early adopters make excellent "missionaries" for new products or processes

- *Early Majority* adopt innovations slightly before the average member of a social system
    - They are typically not opinion leaders, but they interact frequently with their peers

- *Late Majority* approach innovation with a skeptical air
    - They may not adopt the innovation until they feel pressure from their peers
    - They may have scarce resources

- *Laggards* are the last ones
    - They base their decisions primarily on past experience and possess almost no opinion leadership
    - They are highly skeptical of innovations and innovators and must feel certain that a new innovation will not fail prior to adopting it

Written by Gabriel R.

Below, some s-curves detailing diffusion of innovator categories:

Technologies often improve faster than customer requirements demand, and this enables low-end technologies to eventually meet the needs of the mass market

- An example on this concept related to Microsoft here, in which we analyze how the power of other mobile OS's defeated Windows Phone, while on desktop, still today, there is almost complete dominance by Windows (in the consumer market)

The emergence of a new technological discontinuity can overturn the existing competitive structure of an industry, creating new leaders and new losers. This process was defined as *creative destruction*.
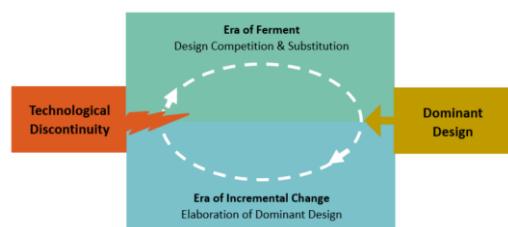
- Several studies have tried to identify and characterize the stages of the technology cycle in order to better understand why some technologies succeed and others fail
- A study emerged, defining the technology as *cyclical*
    - o each new s-curve ushers in an initial period of turbulence, followed by rapid improvement, then diminishing returns
    - o ultimately is displaced by a new technological discontinuity

The technology cycle can be characterized into two phases:

- the *fluid phase*
    - o when there is considerable uncertainty about the technology and its market
    - o firms experiment with different product designs in this phase and compete with each other
- after a while, firms arrive at a consensus and the *specific phase* begins
    - o it happens when the dominant design has firmly established itself
    - o when firms focus on incremental improvements to the design and manufacturing efficiency

Technological change proceeds *cyclically*:

- each discontinuity inaugurates a period of *turbulence* and uncertainty (*era of ferment*)
- this happens until a dominant design is selected, ushering in an era of *incremental change*

Some observations:

- A dominant design always rose to command the majority of market share unless the next discontinuity arrived too early
- The dominant design was never in the same form as the original discontinuity but was also not on the leading edge of technology
    - o It bundled the features that would meet the needs of the majority of the market

Written by Gabriel R.

A summary of the whole chapter directly from the book:

- Different dimensions have been used to distinguish types of innovation. Some of the most widely used dimensions include product versus process innovation, radical versus incremental innovation, competence-enhancing versus competence-destroying innovation, and architectural versus component innovation

- A graph of technology performance over cumulative effort invested often exhibits an s-shape curve. This suggests that performance improvement in a new technology is initially difficult and costly, but, as the fundamental principles of the technology are worked out, it then begins to accelerate as the technology becomes better understood, and finally diminishing returns set in as the technology approaches its inherent limits

- A graph of a technology's market adoption over time also typically exhibits an s-shape curve. Initially the technology may seem uncertain and there may be great costs or risks for potential adopters. Gradually, the technology becomes more certain (and its costs may be driven down), enabling the technology to be adopted by larger market segments. Eventually the technology's diffusion slows as it reaches market saturation or is displaced by a newer technology

- The rate at which a technology improves over time is often faster than the rate at which customer requirements increase over time. This means technologies that initially met the demands of the mass market may eventually exceed the needs of the market. Furthermore, technologies that initially served only low-end customers (segment zero) may eventually meet the needs of the mass market and capture the market share that originally went to the higher-performing technology

- Technological change often follows a cyclical pattern. First, a technological discontinuity causes a period of turbulence and uncertainty, and producers and consumers explore the different possibilities enabled by the new technology. As producers and customers begin to converge on a consensus of the desired technological configuration, a dominant design emerges. The dominant design provides a stable benchmark for the industry, enabling producers to turn their attention to increasing production efficiency and incremental product improvements. This cycle begins again with the next technological discontinuity

- The first design based on the initial technological discontinuity rarely becomes the dominant design. There is usually a period in which firms produce a variety of competing designs of the technology before one design emerges as dominant

- The dominant design rarely embodies the most advanced technological features available at the time of its emergence. It is instead the bundle of features that best meets the requirements of the majority of producers and customers

Written by Gabriel R.

# 10 STANDARDS BATTLES, MODULARITY AND PLATFORM COMPETITION (CHAPTER 4)
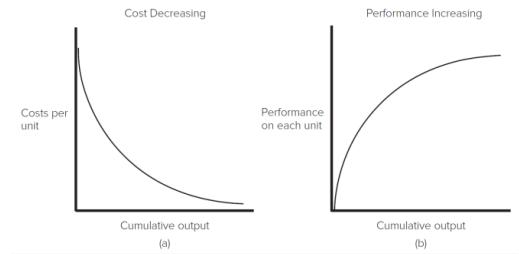
The previous chapter talked about technological innovation patterns; in particular, we say in many a single or a few <u>dominant designs</u> emerge, many times with pressure given by the market.

- This is because having a dominant design can lead to a more efficient and coherent marketplace, making it easier for consumers to adopt and interact with products or technologies
- The process of selecting a dominant design is influenced by *multiple dimensions*
    - they are complex and include technological, economic, and strategic factors
- Firm strategies play a vital role in shaping which technologies rise to dominance. Companies can actively influence several of these dimensions, increasing the likelihood of their own technologies becoming dominant

Hence, *dominant designs are selected* for a few reasons:

1. *Increasing Returns to Adoption*

   - Technologies become *more valuable* as they are *adopted*
   - Two primary sources are *learning effects* and *network externalities*
   - The *learning curve* here on the right shows the impact of learning effects
     - as a technology is used, producers learn to make it more efficient and effective

2. *Prior Learning and Absorptive Capacity*
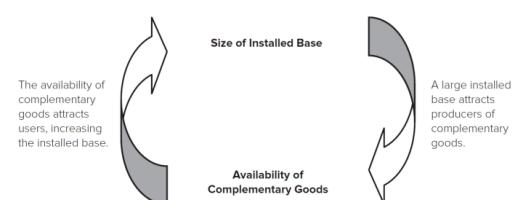
   - *A firm's prior experience* influences its ability to recognize and utilize new information
   - Absorptive capacity, as we saw already, is the ability of an organization to recognize, assimilate and utilize new knowledge
   - The *knowledge base* helps firms use and improve the technology (built via its usage)
     - Suggests that technologies adopted earlier than others are likely to become better developed, making it difficult for other technologies to catch up

3. *Network Externalities* (also called *positive consumption externalities*)

   - In markets with network externalities, the *benefit* from using a good *increases* with the *number of other users of the same good*
   - They are common in industries that are physically networked
     - For example, railroads, telecommunications
   - They also arise when compatibility or complementary goods are important
     - For example, many people choose to use Windows in order to maximize the files and software applications compatibility

A technology with a large installed base attracts developers of complementary goods; a technology with a wide range of complementary goods attracts users, increasing the installed base.

This ensues a *self-reinforcing cycle*.

Written by Gabriel R.

Continuing with points on why dominant designs are selected:

4. *Government Regulation*

- In some cases, government organizations may intervene in industries where a single dominant design is beneficial for consumer welfare, imposing *standards*
    - E.g., the NTSC color standard in U.S. television broadcasting
    - E.g., the GSM standard for mobile communications in the European Union
- The goal is to ensure compatibility and a smooth user experience

5. *The Result: Winner-Take-All Markets*

- In these markets, single standards prevail, creating a *natural monopoly* where others may be locked out
- Increasing returns to adoption create *path dependency* in technology trajectories
- The events leading up to the outcome significantly impact the final result
- Dominant designs have a far-reaching on future technological developments in the same area, for future technological inquiries
- Winner-take-all markets have unique competitive dynamics
    - *Technologically superior* products do not always win
    - Firms must adopt different strategies for success in these markets compared to those with less pressure for a single dominant design

In increasing returns industries, a technology's value is influenced by:

- its *standalone value*
    - the things it can do or the sources of appeal that are not due to its installed base or available complements
    - it includes factors like the functions enabled, aesthetic qualities, and ease of use

- its *network externality value*
    - standalone benefits/costs + size of installed base/availability of complements
    - it assesses *multiple dimensions of value*
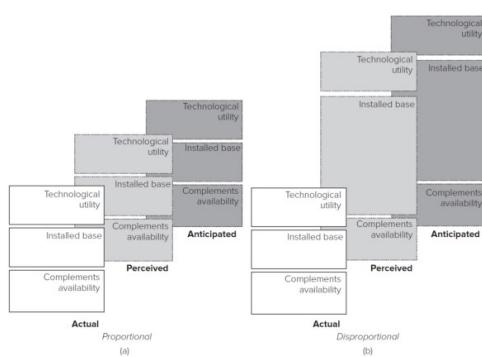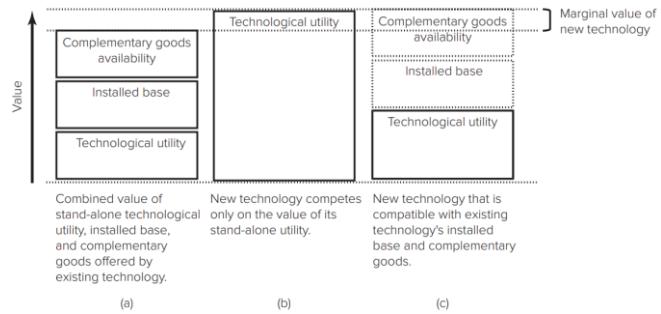
A "Buyer Utility Map" to identify elements of a technology's standalone value, considering different aspects presented above. The following set of figures is an example of it:

	Purchase	Delivery	Use	Supplements	Maintenance	Disposal
Customer productivity	Price of Prius slightly higher than comparable nonhybrid models		Offers speed and power comparable to nonhybrid models	Can stop less often for gas, saving money and time	NA	NA
Simplicity	Buyer may feel less able to assess value of vehicle	NA	Operates like a regular combustion engine vehicle	Refuels like a regular combustion engine vehicle	NA	Hybrids have larger batteries that would have to be recycled and disposed of at end of life

	Purchase	Delivery	Use	Supplements	Maintenance	Disposal
Convenience	NA	Will be sold through traditional dealer channels	Does not have to be plugged into electrical outlet	Can purchase fuel at regular gas stations	Maintenance is similar to regular combustion engine vehicle	NA
Risk	NA	NA	Buyer might face a higher risk of product failure because it embodies a new technology	NA	Buyer might have difficulty finding replacement parts because of new technology	Prius might be more difficult to resell or have lower resell value

|	Purchase	Delivery	Use	Supplements	Maintenance	Disposal
Fun and image	NA	Connotes image of environmental responsibility	NA	NA	NA	NA
Environmental friendliness	Buyers feel they are helping support the development of more environmentally friendly cars	NA	Emits lower levels of pollutants	Requires less use of fossil fuels	NA	NA

Written by Gabriel R.

Network externality value is determined by:

- the *size* of a technology's installed base
- the *availability* of complementary goods

A new technology that has significantly more standalone functionality than the incumbent technology may offer less overall value because it has a smaller installed base or poor availability of complementary goods (e.g. NeXT Computers vs. Windows-based PCs – the first were extremely technologically advanced, the latter had the highest installed base value and complementary good value).
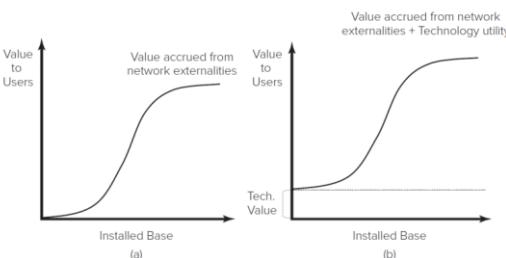
To compete with an existing dominant technology, new technology must offer *dramatic improvement* or *compatibility with the existing installed base and complements*.
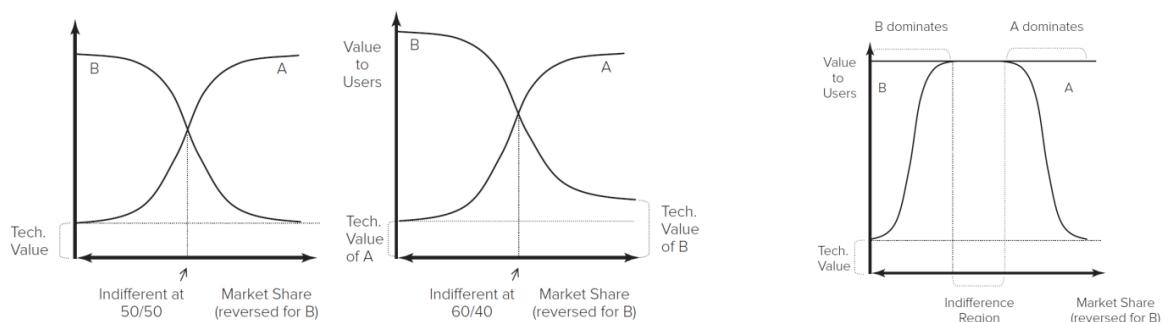
Subjective information, including perceptions and expectations, can be as crucial as objective data.

The value attributed to each dimension may not always align with actual numbers, being disproportional in how both customers and technologies react in the market.

We can graph the value a technology offers in both standalone value and network externality value. The value of a technology increases following an s-curve.

We can compare the graphs of two competing technologies and identify cumulative market share levels (*installed base*) that determine which technology yields more value. When two technologies compete for dominance, customers will compare the overall value yielded (or expected) from each technology, both from market perception and market share.

Written by Gabriel R.
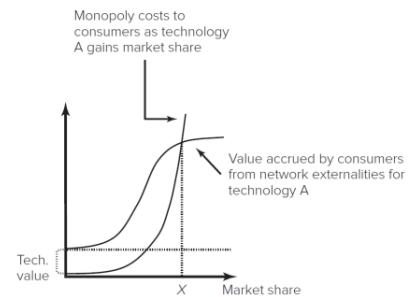
So, are winner-take-all markets good for consumers?

- Economics typically promotes competition for the benefits it offers to consumers
- However, in cases where network externalities come into play, consumers may find more value when one technology dominates

Should the government intervene when network externalities result in a natural monopoly?

- *Network externality benefits* to consumers increase *as* the cumulative *market share of a technology grows*

- There's also a *rising potential for monopoly costs to customers*, such as price gouging and restricted product variety with cumulative market share

- Curve shapes are different: network externality benefits tend to grow logistically, while potential monopoly costs grow exponentially

- When monopoly costs outweigh network externality benefits, government interventions may be justified. The optimal market share occurs where these lines intersect

In some markets, modularity is used to create a *platform ecosystem* where multiple firms contribute to a product system.

- *Modular systems* are those that can be *separated and recombined* to alter their configuration, scale, or functions

- *Standardized interfaces* ensure *compatibility* between components

  a. In some product systems, modularity enables components from different producers to be recombined
     i. for example, smartphones with different apps
  b. In others only components from a single firm are recombined
     i. for example, Ikea shelving systems

Modularity is more valuable when there are:
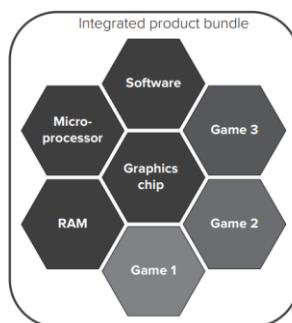
1. *diverse* technological *options* that *can be recombined*
2. when *customers* have *heterogeneous preferences*

In platform competition, it's important to encompass *modularity* as a mean to *both increase market* and *customers' trust*. We distinguish different means:

A. Traditional integrated product bundle:
- Provider tries to meet buyers needs itself
- No customization, no external compatibility
Example: Nokia E90 Communicator
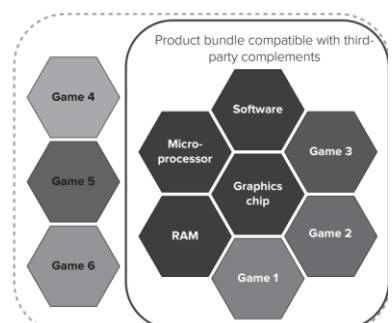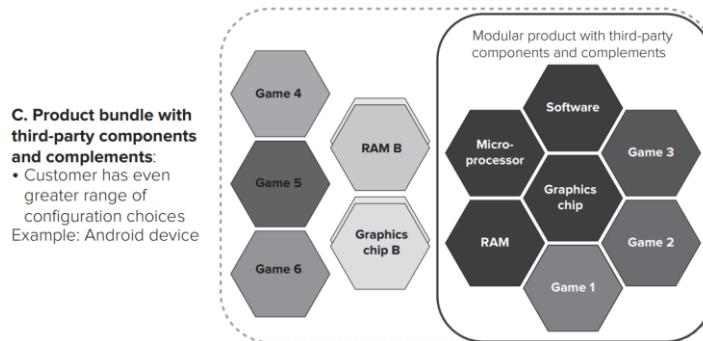
B. Product bundle with third-party complements:
- Compatibility with third-party choices expands options for customers
Example: Apple iPhone

Written by Gabriel R.
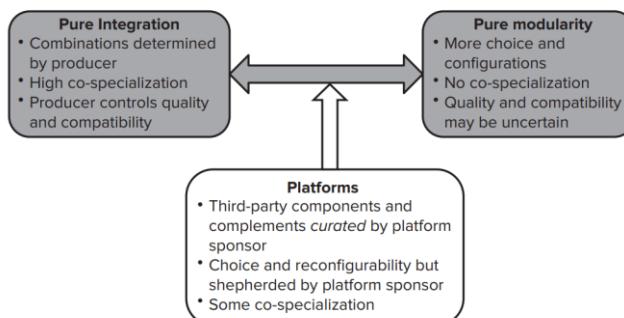
The majority of products are modular at some level, given they are always composed by other means.

-   Tightly integrated (i.e., nonmodular) product systems and modular systems have different kinds of advantages.
    a. A tightly integrated product system might have components that are customized to work together, which may enable a level of performance that more standardized components cannot achieve.
    b. The producer of a tightly integrated system also has more control over the end product, which can enable them to better monitor quality and reliability

-   Modular products, on the other hand, often offer more choices over function, design, scale, and other features, enabling the customer to choose a product system that more closely suits their needs and preferences.
    a. Second, because components are reused in different combinations, this can achieve product variety while still allowing scale economies in manufacturing the individual components. This is known as *economies of substitution*
    b. Modularity becomes increasingly valuable in a product system when there are (a) diverse technological options available to be recombined, and (b) heterogeneous customer preferences

In a *platform ecosystem*, a core part of a product (e.g., a video game console) mediates the relationship between various components or complements (e.g., video games, peripherals) and end-users (components are mutually dependent entities mediated by a stable core).

-   *Platform's* boundaries can be well-defined with stable members or flexible and ever-changing
-   *The* success of all ecosystem members depends partly on the success of others
-   *Members* often invest in co-specialization or exclusivity agreements within the ecosystem

Platform ecosystems aim to balance pure modularity and pure integration, according to the following (taken by the book, cause the table in slides was horrible):

Written by Gabriel R.

Summary of the whole chapter:

- Many technologies demonstrate increasing returns to adoption, meaning that the more they are adopted, the more valuable they become

- One primary source of increasing returns is learning-curve effects. The more a technology is produced and used, the better understood and developed it becomes, leading to improved performance and reduced costs

- Another key factor creating increasing returns is network externality effects. Network externality effects arise when the value of a good to a user increases with the size of the installed base. This can be due to a number of reasons, such as need for compatibility or the availability of complementary goods

- In some industries, the consumer welfare benefits of having a single standard have prompted government regulation, such as the European Union's mandate to use the GSM cellular phone standard.

- Increasing returns can lead to winner-take-all markets where one or a few companies capture nearly all the market share

- The value of a technology to buyers is multidimensional. The stand-alone value of a technology can include many factors (productivity, simplicity, etc.) and the technology's cost. In increasing returns industries, the value will also be significantly affected by the technology's installed base and availability of complementary goods

- Customers weigh a combination of objective and subjective information. Thus, a customer's perceptions and expectations of a technology can be as important as (or more important than) the actual value offered by the technology

- Firms can try to manage customers' perceptions and expectations through advertising and public announcements of preorders, distribution agreements, and so on

- The combination of network externality returns to market share and technological utility will influence at what level of market share one technology will dominate another. For some industries, the full network externality benefits are attained at a minority market share level; in these industries, multiple designs are likely to coexist

Written by Gabriel R.

11 DEFINING THE ORGANIZATION'S STRATEGIC DIRECTION (CHAPTER 6)

A *coherent technological innovation* strategy is a critical component of a firm's success, as it not only builds on the firm's existing strengths (current position) but also guides its future development (strategic direction). This strategy is essential for staying competitive and relevant in a rapidly evolving landscape.

To formulate a successful technological innovation strategy, several key steps are involved:
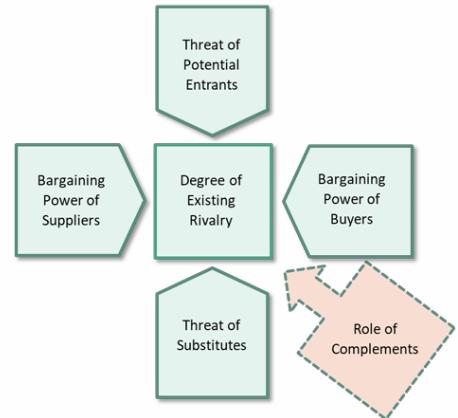
- Appraising the firm's environment
- Appraising the firm's strengths, weaknesses, competitive advantages, and core competencies
- Articulating an ambitious strategic intent

External analysis is a crucial step in formulating a technological innovation strategy and assessing the firm's current position. It involves assessing the external factors and forces that can impact a firm's innovation initiatives and its competitive position.
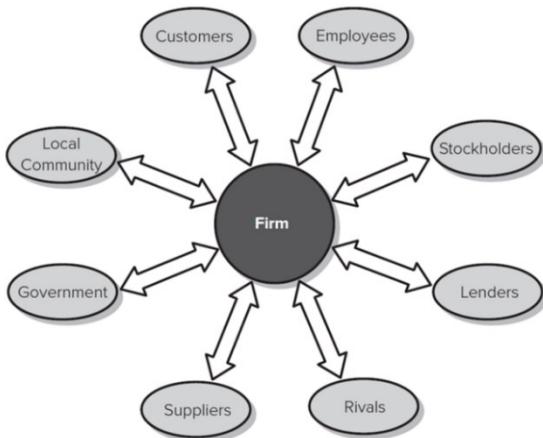
To *assess the firm's current position*, some common methods for external analysis are Porter's Five-Force Model and Stakeholder Analysis.

Let's analyze first the Porter Model, which considers five forces to understand an industry's degree of attractiveness and a firm's opportunities and threats. See figure and following points for more.

- Degree of existing rivalry
  a. This force examines *the likelihood of new competitors* entering the market
  b. Determined by number of firms, relative size, degree of differentiation between firms, demand conditions, *exit barriers*, cost conditions, demand growth (maturity/share/prices)

- Threat of substitutes
  a. Substitutes are products or services that are not considered competitors, but fulfill a strategically equivalent role for the customer
  b. This analyzes the possibility of customers switching to alternative products and services
  c. Determined by number of potential substitutes, closeness in function and relative price

- Threat of potential entrants
  a. Determined by attractiveness of industry, height of *entry barriers* for new firms

- Bargaining power of suppliers
  a. The *degree to which the firm relies on one or a few suppliers* will influence its ability to negotiate good terms
  b. Determined by number of suppliers and their differentiation, firm's inputs and outputs obtained from a particular supplier, switching costs, and potential for vertical integration

- Bargaining power of buyers
  a. The *degree to which the firm relies on one or a few buyers* will influence its ability to negotiate good terms
  b. Determined by number of buyers and their differentiation, firm's inputs and outputs obtained from a particular buyer, switching costs, and potential for vertical integration
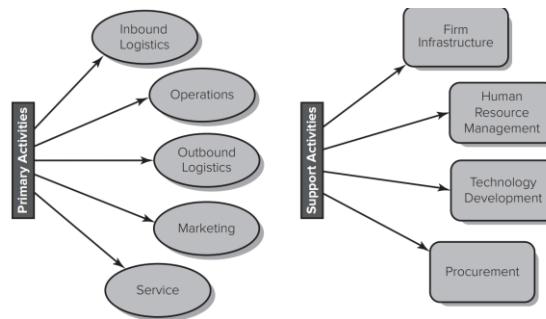
- Recently Porter has acknowledged the role of *complements* (products that enhance the usefulness or desirability of a good), as one must consider:
    a. how important complements are in the industry
    b. whether complements are differentially available for the products of various rivals
        i. impacting the attractiveness of their goods
    c. who captures the value offered by the complements

The other method to consider is the <u>stakeholder analysis</u>, which are individuals, groups, or entities that have an interest or are affected by the organization's activities, performance, or outcomes (so called "stakes" of the firm).

Each stakeholder has interests and different needs, each in their own field and each wants an improvement in the value of their offerings, whatever they may be.

Each one contributes resources, through goods, services expertise, work and awareness giving competition, pricing, transparency and good management.

Now, we consider <u>internal analysis</u>, which tries to:

- identify the firm's strengths and weaknesses
- it's helpful to consider each element of the *value chain*, with an efficient use of resources and processes

Internal analysis revolves around SWOT (Strengths – Weaknesses – Opportunities – Threats) processes, which bring and considers the <u>competitive advantage</u> of the firm: the *unique attributes*, resources, or capabilities that enable an organization *to outperform its competitors* in a specific market or industry.

- This advantage can manifest in various ways, such as offering better products or services, lower prices, superior customer service, or faster delivery, among others.
- The ability to sustain and defend this advantage over time is essential, as it allows a company to maintain profitability and market leadership

In assessing the firm's position, we want to assess which strengths have potential to be sustainable competitive advantage, like the ones here.

- Rare.
- Valuable. ⎫ Competitive   ⎫ *Sustainable*
- Durable.   ⎬ Advantage   ⎬ *Competitive*
- Inimitable. ⎭   ⎭ *Advantage*

Resources are difficult (or impossible) to imitate because they are:
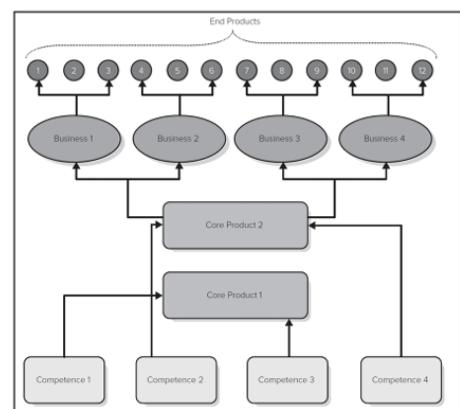
- Tacit (they cannot be readily codified in written form)
- Path dependent (they are dependent on a particular historical sequence of events)
- Socially complex (they arise through the complex interaction of multiple people)
- Causally ambiguous (it is unclear how the resource gives rise to value)

Written by Gabriel R.

In the context of identifying core competencies and capabilities, *serendipity* plays a noteworthy role.

- Serendipity is the concept of making fortunate and unexpected discoveries or connections while searching for something entirely different
- When it comes to identifying core competencies and capabilities, serendipity can lead to uncovering valuable strengths that a company may not have actively sought

We define <u>core competencies</u> as *a set of integrated and harmonized abilities* that *distinguish a firm* in the marketplace (the way we deploy the resources), arising from the firm's ability to combine, harmonize the abilities in which the firm excels into building blocks of expertise. Some key points to make here:

- Several core competencies may underlie a business unit. This means that different units within a company may rely on the same set of core competencies

- Core competencies should possess certain key characteristics:

    - *Significant Competitive Differentiation*: They should provide a substantial advantage over competitors in the market

    - *Cross-Business Applicability*: They should be applicable to a range of businesses within the organization

    - *Difficulty of Imitation*: Competitors should find it challenging to replicate these competencies (hard for competitors to imitate)
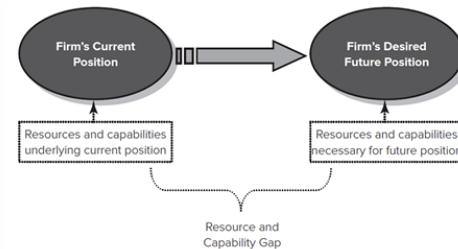
When firms excel at a particular activity or set of competencies, they can become over committed and inflexible (so-called *risk of core rigidities*).

- This can lead to a situation where the firm is overly reliant on its current strengths, making it challenging to adapt to changing market conditions
- With a well-developed knowledge, firms might be less flexible to change trajectory

However, *dynamic capabilities* provide a solution to this problem.

- They are a distinct category of competencies that enable a firm to respond quickly and effectively to change.
- For example, firm may develop a set of abilities that enable it to rapidly deploy new product development teams for a new opportunity
    - firm may develop competency in working with alliance partners to gain resources quickly

<u>Strategic intents</u> represent long-term goals that are not only *ambitious* but also designed to stretch and leverage a firm's core competencies, *drawing from all levels* of the organization.

Each tries to go beyond incremental improvements and envisions a significantly higher level of achievement. Typically, strategic intent looks 10 to 20 years into the future, setting clear milestones.

Written by Gabriel R.

At the end of this lesson, we analyze an extract in paper from the book about Tesla. I will briefly summarize the whole content (which you can find at the beginning of the 6th chapter).

In 2021, Tesla achieved remarkable success, evolving from a luxury electric car startup to a global powerhouse in the automotive and energy sectors. A few selected key points:

- Founded in 2003 by Martin Eberhard and later joined by Elon Musk, who provided funding.

- Tesla's first product was the Roadster, an all-electric sports car based on the Lotus Elise, known for its impressive performance and range.

- The Model S, introduced in 2012, marked Tesla's transition to a major automaker. It was a high-performance all-electric sedan with a range of up to 300 miles.

- Model X, unveiled in 2015, was an all-electric SUV with distinctive features, including gull-wing doors and impressive acceleration.

- Model 3, announced in 2016, aimed to make electric cars more accessible, with a base price of $35,000 and a substantial range. It garnered huge reservations.

- Tesla faced challenges in scaling production, leading to criticism and financial stress, but eventually achieved its production targets.

- Beyond cars, Tesla invested in charging infrastructure and acquired SolarCity to expand into solar energy and roof products.

- Gigafactories in the US, China, and Europe were established to mass-produce batteries and vehicles.

- Tesla's rapid expansion and diverse projects raised questions about the company's ability to manage its ambitious goals.

Written by Gabriel R.

Summary of the whole chapter:

- The first step in establishing a coherent strategy for the firm is assessing the external environment. Two commonly used models of external analysis are Porter's five-force model and stakeholder analysis

- Porter's five-force model entails assessing the degree of existing rivalry, threat of potential entrants, bargaining power of suppliers, bargaining power of customers, and threat posed by substitutes. Recently Porter added a sixth force, the role of complements

- Stakeholder analysis involves identifying any entity with an interest in the firm, what it wants from the company, and what claims it can make on the company

- To analyze the internal environment, firms often begin by identifying strengths and weaknesses in each activity of the value chain. The firm can then identify which strengths have the potential to be a source of sustainable competitive advantage

- Next the firm identifies its core competencies. Core competencies are integrated combinations of abilities that distinguish the firm in the marketplace. Several core competencies may underlie each business unit, and several business units may draw upon the same core competency

- Sometimes core competencies can become core rigidities that limit the firm's ability to respond to a changing environment

- Dynamic capabilities are competencies that enable a firm to quickly reconfigure the firm's organizational structure or routines in response to change in the firm's environment or opportunities

- A firm's strategic intent is the articulation of an ambitious long-term (10 to 20 years out) goal or set of goals. The firm's strategic intent should build upon and stretch its existing core competencies

- Once the firm articulates its strategic intent, managers should identify the resources and capabilities that the firm must develop or acquire to achieve its strategic intent

- The balanced scorecard is a measurement system that encourages the firm to consider its goals from multiple perspectives (financial, customer, business process, and innovation and learning), and establish measures that correspond to each of those perspectives

Written by Gabriel R.

12 COLLABORATION STRATEGIES (CHAPTER 8)

Firms are frequently confronted with the decision of whether to pursue *innovation* activities:

- *independently* (alone)

- *in collaboration* with other entities

Collaboration offers the potential to help firms achieve innovation goals more effectively, quickly, and with reduced costs and risks. Infact:

- t's essential to recognize that collaboration also brings challenges, including sharing control, sharing rewards, and the potential for partner misconduct

- The decision to collaborate or go solo depends on a careful consideration of the pros and cons

- Additionally, various forms of collaborations exist, each with its advantages and disadvantages

In the realm of innovation management, <u>collaboration strategies</u> are pivotal.

- Companies often find themselves at the crossroads of deciding whether to pursue innovation initiatives independently or collaborate with external partners

  - This decision carries significant implications, both in resources and people

- Collaboration enables firms to *gather diverse expertise* and *resources*, this way creating a *more cost-effective and faster innovation*

  - Synergistic efforts with external partners can lead to breakthrough innovations

A firm can <u>choose to go solo</u> for a few reasons:

1. *Availability of Capabilities*

   - Firms need to assess whether they possess in-house the required expertise, resources, and skills to execute the innovation project independently (without considering partners)

   - If the firm has the necessary capabilities, it may opt for solo development to maintain full control over the process

2. *Protecting Proprietary Technologies*

   - If a firm possesses valuable, proprietary technologies that provide a competitive advantage, going solo may be preferred

   - This approach allows the firm to retain exclusive control of the technology and safeguard its intellectual property from potential competitors or collaborators

3. *Controlling Technology Development and Use*

   - The level of control a firm wishes to maintain over the technology's development and applications plays a critical role, ensuring autonomy and protection

   - Some firms prioritize the ability to direct the entire development process and dictate how the technology is utilized, preferring control over said processes than immediate *alliances*

Written by Gabriel R.

4. Building and Renewing Capabilities

- In cases where the innovation project is central to renewing or developing the firm's core capabilities, going solo may be the preferred choice

- This is particularly relevant when the project is strategically important for the firm's long-term competitiveness and growth. Solo development allows the firm to focus on building and strengthening its internal capabilities

There are numerous *types of collaborative arrangements*, each with its own advantages or costs.

1) <u>Strategic alliances</u> are *formal* or *informal* agreements between two or more organizations (or other entities) to cooperate in some way

   - These alliances can take on various forms and serve different purposes in the context of innovation and business development

   - They can be characterized by their emphasis on *combining complementary capabilities* (*capability complementation*) or *transferring capabilities* (*capability transfer*)

Complementary capability alliances are formed when organizations bring together their unique strengths, expertise, or resources to create constructive interaction

	Individual Alliance	Network of Alliances
Capability Complementation	A GE-SNECMA alliance	B Corning Glass alliances
Capability Transfer	C Thomson-JVC alliance	D Aspla

- This constructive collaboration often leads to joint innovation and market opportunities, but also to access resources quickly

  - A firm's alliance strategy can also vary in terms of scale and scope. Some firms may prefer *individual alliances* with specific partners, while others may opt for a *network of alliances*

  - The choice between individual or network alliances depends on the firm's objectives: as a matter of fact, we can have possible overlapping capabilities and waste of time/energy/costs

- While fast, flexible and reversible, partners may not be aligned and may exploit each other

2) <u>Joint Ventures</u> are a specific type of strategic alliance that involves significant *equity investment*. In a joint venture, two or more organizations come together to establish a *new, separate legal entity*.

   - This entity operates independently and is often formed for a specific project, venture, or business opportunity. Joint ventures allow the partnering organizations to share not only resources and expertise but also the risks and rewards associated with the venture

   - It's a common approach when two firms seek to combine their strengths to pursue a common goal

   - While there is the share of costs, risks and alignment of incentives, there is the risk of shared control and profits and also risk of exposure of proprietary knowledge

Written by Gabriel R.

3) <u>Licensing</u> is a contractual arrangement that grants one organization (or individual) the *rights to use another's intellectual property*, such as patents, trademarks, or copyrights. In exchange for these rights, the licensee typically pays royalties or licensing fees

  - Licensing is a strategic approach for organizations to leverage external technology or intellectual assets without the need to develop them in-house

  - It can be a mutually beneficial arrangement, with the licensor generating revenue from their intellectual property and the licensee gaining access to valuable technology or content

  - While it's a fast and inexpensive way to leverage intellectual property and fast enter in the market even without the required resources, firms may give up some control in how a technology is developed and used

4) <u>Outsourcing</u> involves an organization (or individual) *procuring services, products, or processes from an external provider* instead of producing them in-house. (e.g., *contract manufacturing*)

  - It's a strategic decision to focus on the core competencies of the organization while delegating non-core activities to specialized service providers

  - This is often chosen for its cost savings, efficiency, and access to specialized expertise

  - While firms can pool scale across many leading to higher quality and lower price, this may create competing products, forfeiting important learning opportunities

5) <u>Collective Research Organizations (CRO)</u>, which are organizations formed to facilitate collaboration among a group of firms (many forms, including trade associations, university-based centers, or private research corporations – infact, are formed through government or industry associations)

  - Their primary purpose is to foster research and development activities, pooling resources and expertise from multiple companies.

  - By joining collective research organizations, firms can share the costs of research, access a broader knowledge base, and collaborate on pre-competitive research projects

  - These organizations are particularly valuable in industries where research and innovation require significant investments

In order to *choose a mode for collaboration*, firms should match the *trade-offs of a collaboration* mode to their needs, as also shown here:

	Speed	Cost	Control	Leverages Existing Competencies	Develops New Competencies	Accesses Other Firms' Competencies
Solo Internal Development	Low	High	High	Yes	Yes	No
Strategic Alliances	Varies	Varies	Low	Yes	Yes	Sometimes
Joint Ventures	Low	Shared	Shared	Yes	Yes	Yes
Licensing In	High	Medium	Low	Sometimes	Sometimes	Sometimes
Licensing Out	High	Low	Medium	Yes	No	Sometimes
Outsourcing	Medium	Medium	Medium	Sometimes	No	Yes
Collective Research Organizations	Low	Varies	Varies	Yes	Yes	Yes

Written by Gabriel R.

There are many *advantages* in collaborating:

1. *Acquiring Capabilities and Resources Quickly*
    - To gain rapid access to complementary/useful capabilities from partners
    - It is not unusual for a company to lack some of the complementary assets required
    - Given time, the company can develop such complementary assets internally

2. *Increasing Flexibility*
    - To reduce its asset commitment and enhance flexibility
    - This can be particularly important in markets characterized by rapid technological change

3. *Learning from Partners*
    - Transfer of knowledge from partners and creation of new knowledge that individual firms could not have created alone
    - By pooling their technological resources and capabilities, firms may be able to expand their knowledge bases and do so more quickly

4. *Resource and Risk Pooling*
    - Sharing costs and risks of a project
    - This can be important when a project is very expensive or its outcome highly uncertain

5. *Building a Coalition around a Shared Standard*
    - Development of a project with a collaboration that facilitates the creation of a shared standard (e.g., CHAdeMO standard in charging electric vehicles)

Collaboration *starts with choosing and monitoring partners well*, considering a number of factors:

1. *Resource Fit*
    - Assess how well the potential partners fit the resource needs of the project
    - Ensure if they are complementary, supplementary and what value they bring

2. *Strategic Fit*
    - Examine whether the potential partner has compatible objectives and working styles
    - Make combined efforts towards commons strategic goals

3. *Impact on Opportunities and Threats*
    - Understand how collaboration will impact the firm, customers, partners
    - Impact on new possible entrants, rivals, complementary goods and substitutes

4. *Impact on Internal Strengths and Weaknesses*
    - Assess whether collaboration would enhance the firm's strengths, understanding risks
    - See how partners would contribute, enhancing the firm capabilities, strengths, weaknesses
    - Understand the impact of possible competitive advantage with or without collaborating

5. *Impact on Strategic Direction*
    - Determine whether the collaboration aligns with the firm's strategic intent
    - Understand if collaboration is likely to help firm close any resource or technology gaps
    - Ensure it does not divert from the goals and considering objectives evolution overtime

Written by Gabriel R.

Successful collaborations require clear yet flexible monitoring and governance mechanisms in *choosing and monitoring partners*.

- Many collaborations utilize legally binding *contractual arrangements*

  - These contracts serve as the foundation for the partnership and detail the rights and obligations of each party involved

  - They provide a legal framework to address disputes, violations, and remedies for issues

- <u>Alliance contracts</u> play a crucial role in ensuring that partners are fully aware of their rights and obligations within the collaboration, preventing misunderstandings and conflicts.

- They often include the following key elements:

  - What each partner is *obligated to contribute*
    - Clearly outline the resources, expertise, and responsibilities that each partner is expected to provide to the collaboration

  - How much *control* each partner has in the arrangement
    - Define the decision-making processes, responsibilities, and authority of each partner within the collaboration

  - When and how proceeds of the collaboration will be *distributed*
    - Specify how any benefits or profits resulting from the collaboration will be shared among the partners

  - *Review* and *reporting* requirements
    - Establish mechanisms for regular progress reporting and review to ensure that the collaboration stays on track and aligns with its objectives

  - *Provisions for terminating* the relationship
    - In the event that the collaboration faces irreconcilable issues or has fulfilled its purpose, contracts should include provisions for the partnership termination

In some collaborative arrangements, partners opt for shared <u>equity ownership</u>. This means that each partner contributes capital and, in return, owns a share of equity in the alliance or joint venture. Consider:

- Shared equity ownership aligns the incentives of the partners. When each party has a stake in the equity, they are more motivated to work collaboratively to ensure success

- It provides partners with a sense of ownership in the venture. This can foster a stronger commitment to the project, as each partner feels a direct stake in its outcomes.

Written by Gabriel R.

Some collaborative arrangements may rely instead on <u>relational governance</u>, self-enforcing governance based on the goodwill, trust, and reputation of partners involved. Some key points:
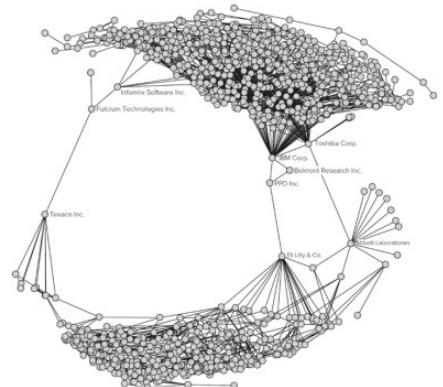
- *Built Over Time*
    - Trust and goodwill are built over time through the collaborative history
    - Interactions between partners, contributing to development of trust

- *Facilitating Extensive Cooperation*
    - Relational governance can foster more extensive cooperation, sharing of knowledge, and mutual learning among partners

A firm's position within a collaborative network *can significantly impact* its access to information, resources, and *its ability to influence desired outcomes*. Firms in central positions typically have quicker access to more information, while those in key brokerage roles benefit from exposure to diverse information and control over information flow between groups.

Two key aspects that define a firm's position are:

1. *Centrality*

    - It refers to a firm's location or prominence within the network, making it well-connected to other network members, creating a significant impact for others

    - It provides advantages such as:

        - Access to a wide range of information and knowledge from various network connections

        - Increased visibility and recognition within the network, making the firm a focal point for interactions

        - Enhanced ability to influence network activities and outcomes

2. *Opportunities for Brokerage*

    - These arise when a firm serves as a bridge or intermediary between different segments or groups within the network

    - These firms can act as intermediaries, facilitating the exchange of information, resources, or collaboration between otherwise disconnected entities

    - Brokerage provides several benefits:

        - It allows the firm to control or mediate interactions between different parts of the network, giving it a position of influence

        - Firms with opportunities for brokerage often have a unique vantage point, as they have insights into and can capitalize on information flow between different network segments

        - They may enjoy increased negotiation power and the ability to leverage their position to create value for themselves and other network members

Written by Gabriel R.

Summary of chapter directly from the book:

1. A number of factors will influence whether a firm chooses to collaborate on an innovation. Some of the most important include whether the firm (or a potential partner) has the required capabilities or other resources, the degree to which collaboration would make proprietary technologies vulnerable to expropriation by a potential competitor, the importance the firm places on controlling the development process and any innovation produced, and its role

2. Firms may choose to avoid collaboration when they already possess the necessary capabilities and other resources in-house, they are worried about protecting proprietary technologies and controlling the development process, or they prefer to build capabilities in-house rather than access a partner firm's capabilities

3. Some of the advantages of collaboration include sharing costs and risks of development, combining complementary skills and resources, enabling the transfer of knowledge between firms and the joint creation of new knowledge, and facilitating the creation of shared standards

4. The term strategic alliances refers to a broad class of collaboration activities that may range from highly structured (e.g., joint ventures) to informal. Strategic alliances can enable simple pooling of complementary resources for a particular project, or they may enable the transfer of capabilities between partners. The transfer of capabilities often requires extensive coordination and cooperation

5. A joint venture is a partnership between firms that entails a significant equity investment and often results in the creation of a new separate entity. Joint ventures are usually designed to enable partners to share the costs and risks of a project

6. Licensing involves the selling of rights to use a particular technology (or other resource) from a licensor to a licensee. Licensing is a fast way of accessing (for the licensee) or leveraging (for the licensor) a technology but offers little opportunity for the development of new capabilities

7. Outsourcing enables a firm to rapidly access another firm's expertise, scale, or other advantages. Firms might outsource particular activities so that they can avoid the fixed asset commitment of performing those activities in-house. Outsourcing can give a firm more flexibility and enable it to focus on its core competencies. Overreliance on outsourcing, however, can make the firm hollow

8. Groups of organizations may form collective research organizations to jointly work on advanced research projects that are particularly large or risky

9. Each form of collaboration mode poses a separate set of trade-offs in terms of speed, cost, control, potential for leveraging existing competencies, potential for developing new competencies, or potential for accessing another firm's competencies. An organization should evaluate these trade-offs in formulating a collaboration strategy

10. Successful collaboration requires choosing partners that have both a resource fit and a strategic fit

11. Successful collaboration also requires developing clear and flexible monitoring and governance mechanisms to ensure that partners understand their rights and obligations and have methods of evaluating and enforcing each partner's adherence to these rights and obligations

Written by Gabriel R.

13 INVITED SPEAKERS: PARADIGMA

Overview

- Paradigma is an open innovation ecosystem connecting startups, technologies, and business ideas with capital, corporations, and markets to drive impactful innovation, while collaborating with different authorities and municipalities
- It is based on an active incubation, accelerate the development of corporate and accelerating the acquisition of capitals and debts/grants, combining cost-effective R&D with minimization of risks, engagement of customers and co-creation of ideas and people

Reasoning:

- Paradigma can quote different examples of green and sustainable processes
- Since Kyoto, different carbon offsets projects were born to give a positive impact over the environment hence reducing carbon emissions and validating projects and processes
- On this there are different markets, including low carbon fuel standard credits, green bonds, energy attribution certificates, biodiversity credits, and the voluntary carbon market
- AI might help following the Paris Protocol in reshaping the future in implementing smart cities

Case studies:

- EXPOfin: Green Energy Solutions. Efficiency, Production and Storage
- NExT (Network Exchange Transport): Efficiency benchmark on Smart Mobility
- Logbot: Certified global IoT real-time data monitoring system
- NICOLE: Demand-side fintech solutions

Offerings:

- Impact Builder - AI-powered platform to guide sustainability strategies and solutions for smart cities, monitoring impact in real-time
- Companies - Paradigma supports an ecosystem of companies offering solutions for energy efficiency, renewable energy, IoT monitoring, green materials, and more
- Financing - They provide access to various sources of capital including crowdfunding, grants, corporate venturing, and institutions
- Acceleration - Startups and projects can get support through incubation and acceleration programs.
- Transformation – Towards an interoperable and modular market

Approach:

- Focus on environmental, social impact alongside economic sustainability
- Leverage latest technologies like AI, IoT, and blockchain to create innovative solutions
- Modular, interoperable platforms and data systems
- Localized solutions capable of scaling globally
- Real-time impact monitoring and measurement

Key Message:

- Individuals and companies can make a real difference through open, collaborative innovation focused on positive environmental and social impacts, while being open to change

Written by Gabriel R.

14 THE TECHNOLOGICAL ACQUISITION PARADOX IN THE BEAUTY INDUSTRY: THE CASE OF L'ORÉAL

(Essentially, we do this case study because our teacher wrote a paper about this here; in particular, there is definitely discussed in depth the exchange of knowledge between close firms)

We conceptualize open innovation as a meticulously orchestrated process that facilitates the purposeful exchange of knowledge across organizational borders, actively encouraging collaborative endeavors.

Beauty is a major global industry, with leading companies like *L'Oréal* (the biggest player inside beauty industry) that have significant revenues and market share. Our examination encompasses a thorough analysis , understanding companies over the umbrella and the M&A tactics (Mergers and Acquisitions).

In this context, two primary approaches exist (each type of innovation is useful in different context):

1. *Inbound*

This involves the *inflow* of external knowledge and ideas into an organization's innovation processes.

- This approach recognizes that valuable insights and technologies may exist beyond the organization's boundaries.
- In the case of L'Oréal, this could mean actively seeking external contributions, such as collaborations with research institutions, startups, or other entities, to enhance their product development or technological capabilities.

2. *Outbound*

It focuses on the *external* utilization of an organization's intellectual property and assets.

- This involves licensing, selling, or otherwise leveraging the organization's innovations to external partners.
- In the context of L'Oréal, outbound open innovation might entail strategic partnerships, licensing agreements, or spin-offs, where the company shares or sells its innovations to other entities, fostering a broader impact in the beauty industry.

In a strategic move that transcends conventional industry boundaries, L'Oréal and Nestlé have embarked on a joint venture, echoing the principles of the *Blue Ocean Strategy*.

This approach, pioneered by W. Chan Kim and Renée Mauborgne, challenges companies to break free from competitive red oceans and explore untapped, blue ocean market spaces.

L'Oreal has engaged in joint ventures and Mergers & Acquisitions (M&A) as part of its growth strategy, such as its partnership with Nestlé for the Inneov brand that combines L'Oreal's dermatology expertise with Nestlé's nutrition knowledge.

In this collaboration, the constructive collaboration between L'Oréal's expertise in cosmetics and beauty and Nestlé's stronghold in nutrition and wellness becomes a pivotal point of innovation.

Written by Gabriel R.

There may be innovative product synergies:

- The essence lies in creating products that transcend traditional categorizations. Imagine cosmetic formulations enriched with nutritional elements, catering not just to aesthetic preferences but also aligning with the growing trend of holistic well-being. This innovative fusion positions the venture in a space that is yet to be fully explored — *a blue ocean* of beauty and wellness

- This strategic alliance isn't solely about market expansion; it's a journey into uncharted territories. The global presence of L'Oréal and Nestlé provides a canvas for the joint venture to paint a narrative of cultural diversity, addressing consumer needs in different corners of the world

- Beyond the tangible products, this collaboration reinforces the brands involved. It communicates a commitment to adaptability, innovation, and a forward-thinking approach

M&A activity surged in the 1990s but declined due to the dot-com bubble recession in the early 2000s. This can be viewed through the lens of open innovation, potentially enabling access to new knowledge and innovation output.

The brand reinforces globally and gains consumer trust:

- The long-term vision goes beyond immediate market gains
  - By embracing the [*Blue Ocean Strategy*](), L'Oréal and Nestlé position themselves for sustained relevance and growth
  - The dynamic nature of uncontested markets allows for continuous evolution, preventing the risk of becoming commoditized in crowded spaces

- In essence, this joint venture isn't just a business collaboration; it's a strategic navigation into unexplored waters. Value creation doesn't always reside in traditional market segments
  - The Blue Ocean Strategy becomes the guiding philosophy, encouraging these industry giants to redefine the beauty and wellness landscape
  - this creates a narrative that goes beyond the expected

In the context of L'Oréal, M&A play a significant role in shaping the company's strategic landscape and market presence. Here are some key relationships between M&A activities and L'Oréal:

1. Market Expansion

- M&A activities allow L'Oréal to expand its market presence globally.
  - Acquiring or merging with companies in different regions enhances the brand's reach and penetration into diverse consumer markets.
  - This varies between 1500 and 4500 transactions on average since 1985 up to now

2. Portfolio Diversification

- Through acquisitions, L'Oréal can diversify its product portfolio.
  - This diversification may involve entering new beauty and cosmetic segments or acquiring brands with different target demographics, allowing the company to cater to a broader consumer base

Written by Gabriel R.

3. Innovation and Technology Integration

- Acquiring innovative companies or startups provides L'Oréal with access to innovative technologies and beauty solutions.
  - This helps in staying ahead of industry trends and maintaining a competitive edge in terms of product innovation

4. Brand Strengthening and Operational Synergies

- M&A activities can be strategic for strengthening L'Oréal's brand portfolio
  - Acquiring well-established and reputable brands enhances the overall image of the company and can contribute to brand loyalty and trust among consumers
- Merging with or acquiring companies in the same industry can lead to operational synergies.
  - Shared resources, streamlined processes, and improved efficiency may result from combining forces with complementary businesses

5. Strategic Alliances and Partnerships
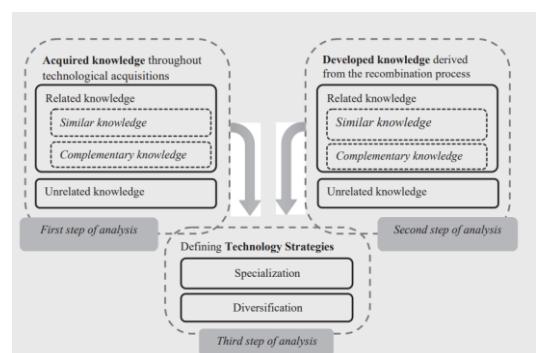
- L'Oréal may engage in strategic alliances or partnerships through M&A activities
  - This can involve collaborating with companies that bring unique expertise, distribution channels, or market insights, fostering mutually beneficial relationships
- Acquiring companies with a strong presence in specific geographic regions helps L'Oréal in navigating local market dynamics effectively

Before exploiting innovation, you need to create it too, acquiring companies which already have this knowledge. We ask ourselves two questions:

- From an open innovation perspective, do you expect M&As to positively impact innovative output?
  - M&As can bring together diverse talent, technologies, and R&D capabilities, while also combining access to new markets and customer segments to simulate new thinking. There may be cultural differences and process integration which might get difficult and time-consuming, but overall this can always be positive
  - In L'Oréal case, this may strengthen the company overall position, aligning with new capabilities and standards, personalizing experiences each time

- In what direction will post-M&A technology efforts move? (e.g., same technological trajectory, exploration of new technological spaces...)
  - Companies aim to leverage new synergies, which can actually enhance entities and existing product lines, providing new opportunities in different spaces of knowledge, often acquiring expertise in new directions. This can lead to portfolio expansion, enhancing competitiveness and new capabilities
  - This smooth transition can be beneficial overall, managing new perception by other firms and communicating new values over innovation

The following study investigates L'Oréal's technological acquisitions in the beauty industry, aiming to understand their impact on the company's technological trajectory.

These are seen as enriching inside the L'Oréal portfolio, acquiring knowledge both complementarily and technologically, both in patent acquisition, strategic decision-making and balance between novelty and similarities.

Written by Gabriel R.

The analysis revealed L'Oréal mainly used the external knowledge it acquired from technological acquisition to intensify the specialization of its knowledge base. There are some lessons to be learned here:

1) Technological acquisitions enable companies to increase their technological specialization through a recombination process that exploits similar knowledge from the target
   o L'Oreal primarily used technological acquisitions to expand similar knowledge and reinforce its existing competencies and strengths (specialization strategy)

2) Even if technological acquisitions enable companies to adopt a technological diversification trajectory through a recombination process that exploits complementary or unrelated knowledge
   o the acquirer tends to use the acquired knowledge for reinforcing its specialization

3) Radical innovations can derive from the close knowledge recombination
   o paradox and not necessarily coming from the exploration of distant knowledge

To conclude, it's useful to constantly recombine and diversify specialization, allowing a different degree of diversification each time thanks to acquisition of both developed and acquired knowledge.

Written by Gabriel R.

15 PROTECTING INNOVATION (CHAPTER 9)

Firms must decide *whether* and *how* to protect their technological innovations.

- Protecting innovation helps a firm retain control over it and appropriate the rents from it
- However, sometimes *not* protecting a technology is to the firm's advantage
  - it may encourage others to support the technology and increase its likelihood of becoming dominant

Appropriability is important: it represents the *degree* to which a *firm can capture economic gains*, or rents, *from its innovative endeavors*. This is determined by how easily competitors can replicate the innovation.

- Some innovation are inherently difficult to copy, because of their nature or how socially complex they may be
- Firms may also attempt to protect innovations via different measures
- Patents, trademarks and copyrights each protect different things
  - Overtime, trademarks statistically were issued much more than patents

There may exist some protective measures over innovation:

1) Patents**:** The governments provide *exclusive rights for a specified duration*, preventing others from making, using, or selling the patented invention
   - They are particularly effective for protecting
     1. *useful* (must produce a desirable result, improve or solve problems)
     2. *novel* (must be already patented or described in public literature)
     3. *not obvious* ones (person with skills would not achieve the same with same effort)

   - There are different types of patents, for example:
     1. *Utility patents* protect new and useful processes, machines, manufactured items or combination of materials
     2. *Design patents* protect original and ornamental designs for manufactured items
     3. *Plant patents* protect distinct new varieties of plants
   - In 1998, many software algorithms became eligible for patent protection

There may be *patent laws*, thanks to which countries have their own laws regarding patent protection. Some treaties seek to harmonize these laws. Here, we give some selected examples.

- *Paris Convention for the Protection of Industrial Property (March 2021)*

  - A citizen of any member country may patent an invention in any of the member countries and enjoy the same benefits of patent protection as if the inventor were a citizen of those countries

  - Provides right of "priority" – once inventor has applied for protection in one member country, they can (within certain time period) apply for protection in others and be treated as if they had applied on same date as first application

Written by Gabriel R.

- *Patent Cooperation Treaty (PCT) - 1970*

  - Inventor can apply for patent in a single PCT (Patent Cooperation Treaty) receiving office and reserve right to apply in more than 100 countries for up to 2 and a half years

  - Establishes date of application in all member countries simultaneously, making results of patent process more uniform

The top patent applications countries are China, USA, Japan (those three are the star countries), then we have Korea, Europe (particularly Germany), India, etc.

Here you can find what gets patented internationally in the technology field:

Annex 4: International applications by field of technology (PCT System)

	Technical Field	2019	2020	2021	Share (%)	Growth (%)
I	**Electrical engineering**					
1	Electrical machinery, apparatus, energy	17,194	17,367	18,224	6.9	4.9
2	Audio-visual technology	8,900	11,534	10,837	4.1	-6.0
3	Telecommunications	5,861	6,445	6,371	2.4	-1.1
4	Digital communication	19,050	22,078	23,603	9.0	6.9
5	Basic communication processes	1,554	1,610	1,647	0.6	2.3
6	Computer technology	21,496	24,343	26,092	9.9	7.2
7	IT methods for management	5,747	5,891	5,298	2.0	-10.1
8	Semiconductors	8,048	8,862	8,346	3.2	-5.8
II	**Instruments**					
9	Optics	8,018	8,371	7,919	3.0	-5.4
10	Measurement	11,451	12,704	12,152	4.6	-4.3
11	Analysis of biological materials	1,917	2,062	2,149	0.8	4.2
12	Control	5,363	5,457	5,182	2.0	-5.0
13	Medical technology	16,916	17,500	18,552	7.1	6.0
III	**Chemistry**					
14	Organic fine chemistry	5,888	6,351	6,150	2.3	-3.2
15	Biotechnology	7,404	7,985	8,745	3.3	9.5
16	Pharmaceuticals	9,785	10,767	12,147	4.6	12.8
17	Macromolecular chemistry, polymers	4,425	4,656	4,478	1.7	-3.8
18	Food chemistry	2,214	2,384	2,467	0.9	3.5
19	Basic materials chemistry	5,589	5,712	5,482	2.1	-4.0
20	Materials, metallurgy	4,417	4,685	4,313	1.6	-7.9
21	Surface technology, coating	3,852	4,014	3,834	1.5	-4.5
22	Micro-structural and nano-technology	390	456	439	0.2	-3.7
23	Chemical engineering	5,074	5,285	5,225	2.0	-1.1
24	Environmental technology	2,705	3,020	2,769	1.1	-8.3
IV	**Mechanical engineering**					
25	Handling	5,954	6,413	6,256	2.4	-2.4
26	Machine tools	4,300	4,315	4,307	1.6	-0.2
27	Engines, pumps, turbines	5,366	5,123	4,441	1.7	-13.3
28	Textile and paper machines	2,769	2,952	2,622	1.0	-11.2
29	Other special machines	7,236	7,483	7,232	2.7	-3.4
30	Thermal processes and apparatus	4,085	4,306	3,926	1.5	-8.8
31	Mechanical elements	5,952	5,847	5,160	2.0	-11.7
32	Transport	11,227	11,290	10,110	3.8	-10.5
V	**Other fields**					
33	Furniture, games	4,625	4,718	4,491	1.7	-4.8
34	Other consumer goods	5,445	6,044	5,840	2.2	-3.4
35	Civil engineering	6,387	6,502	6,317	2.4	-2.8

Note: For confidentiality reasons, data are based on published applications and on the publication date.

Computer technology (9.9% of total) accounted for the largest share of published PCT applications, followed by digital communication (9%), medical technology (7.1%), electrical machinery (6.9%), and measurement (4.6%)

Six of the top 10 technology fields recorded growth in 2021, with pharmaceuticals (+12.8%) reporting the fastest rate of growth, followed by biotechnology (+9.5%), computer technology (7.2%) and digital communication (+6.9%).

Pandemic effect!

Here you can find the top PCT applicants in the field instead:

2021 overall position in PCT ranking	Position changed in overall PCT ranking	Applicant's Name	Origin	2020	2021
1	0	HUAWEI TECHNOLOGIES CO., LTD.	China	5,464	6,952
2	3	QUALCOMM INCORPORATED	U.S.	2,173	3,931
3	-1	SAMSUNG ELECTRONICS CO., LTD.	Republic of Korea	3,093	3,041
4	0	LG ELECTRONICS INC.	Republic of Korea	2,759	2,885
5	-2	MITSUBISHI ELECTRIC CORPORATION	Japan	2,810	2,673
6	2	GUANG DONG OPPO MOBILE TELECOMMUNICATIONS CORP., LTD	China	1,801	2,208
7	0	BOE TECHNOLOGY GROUP CO.,LTD	China	1,892	1,980
8	-2	TELEFONAKTIEBOLAGET LM ERICSSON (PUBL)	Sweden	1,989	1,877
9	0	SONY GROUP CORPORATION	Japan	1,793	1,789
10	0	PANASONIC INTELLECTUAL PROPERTY MANAGEMENT CO., LTD.	Japan	1,611	1,741

A patent process is actually composed of many steps, which can be summarized by the following figure:

Written by Gabriel R.

There are different *patent strategies*: motivations behind seeking patents are diverse and extend beyond the simple desire to make and *sell the invention* directly.

- However, inventors and firms may monetize patents in a range of different ways, including *licensing* the technology to others, or *selling the patent rights* to another firm to better use them
- Sometimes firms seek patents just to *limit the options of competitors*

Sometimes firms seek patents just to earn revenues through aggressive patent lawsuits. These actions are sometimes referred to as "*patent trolling*".

- This refers to the practice of acquiring and holding patents with the primary purpose of using them aggressively to sue or threaten legal action against other companies
- Apple claims to be the first target for patent trolls, having faced nearly 100 lawsuits in 2011-2014

Dense webs of *patent thickets* can make it hard for firms to compete, and stifle innovation.

- Firms sometimes buy bundles of patents just to create a "war chest" to defend themselves from lawsuits by offering a credible threat of retaliation

- For example, in 2011, the bankrupt Nortel auctioned off its massive patent portfolio. A consortium called Rockstar Bidco that included Microsoft, Apple, RIM, Sony, and Ericsson, won the auction for $4.5 billion, beating out Google which bid $4.4 billion
  - Google subsequently bought 1,030 IBM patents that covered a range of technologies
  - These patents were not necessary for Google's business directly
    - they provided a retaliation threat to others that might attack through patent suits

2) <u>trademarks/service marks</u>: words, phrases, symbols, designs or other indicators used to distinguish the source of goods from one party from goods of another (e.g., Nike "swoosh" symbol)
   - Rights to trademark are established in legitimate use of mark; do not require registration
   - However, marks must be registered before suit can be brought overuse of the mark
   - Registration can also be used to establish international rights over trademark

Two treaties simplify registration of trademarks in multiple countries:

- *Madrid Agreement Concerning the International Registration of Marks*
  - This is an international treaty that allows trademark owners to register their marks in multiple countries using a single application filed with the International Bureau of the World Intellectual Property Organization (WIPO)
  - It simplifies the process for obtaining and managing international trademark protection

- *Madrid Protocol*
  - This is a later treaty that extends the principles of the Madrid Agreement
  - It provides a centralized and streamlined system for trademark owners to secure and manage protection in multiple countries
  - It offers a cost-effective and efficient way for businesses to expand their international trademark portfolios

- Countries that adhere to either or both are in Madrid Union

Written by Gabriel R.

Here you can see a list of top applications according to the Madrid Union for trademarks:

2021 Ranking	Position Changed	Applicant's Name	Origin	2020	2021
1	4	L'OREAL	France	116	171
2	2	ADP GAUSELMANN GMBH	Germany	123	120
3	8	GLAXO GROUP LIMITED	U.K.	64	110
4	-2	HUAWEI TECHNOLOGIES CO., LTD.	China	197	98
5	-4	NOVARTIS AG	Switzerland	233	94
6	1	EURO GAMES TECHNOLOGY LTD.	Bulgaria	84	93
7	1	APPLE INC.	U.S.	80	92
8	6	HENKEL AG & CO KGAA	Germany	60	90
9	-6	SHISEIDO COMPANY, LTD	Japan	133	89
10	-1	SYNGENTA CROP PROTECTION AG	Switzerland	78	85

3) <u>copyright</u>, usually granted to works of authorship, may it be original, artistic or literary. It prohibits others from:
- Reproducing the work in copies or phonorecords
- Preparing derivative works based on the work
- Distributing copies or phonorecords for sale, rental, or lease
- Performing/displaying the work publicly

Copyright lasts for author's life plus 70 years after 1978 laws and inventions (before, it lasted only 28 years). Other things to note on this:
- Work that is not fixed in tangible form is not eligible
- "Doctrine of fair use" stipulates that others can typically use copyrighted material for purposes such as criticism, new reporting, teaching research, etc. (happens in the USA)

Copyright protection and laws on that vary from country to country:

- However, the *Berne Union for the Protection of Literary and Artistic Property* (*Berne Convention*) specifies a minimum level of copyright protection for member countries
  - It ensures automatic protection upon creation, eliminates differential treatment based on citizenship, recognizes the right of attribution and integrity, sets a minimum duration for protection, and allows some flexibility for exceptions and limitations
  - It eliminates differential rights to citizens versus foreign nationals

Here you can find a useful summing-up:

	Trademark	Patent	Copyright
What's legally protected?	A **word, phrase, design**, or a combination that identifies your goods or services, distinguishes them from the goods or services of others, and indicates the source of your goods or services.	Technical **inventions**, such as chemical compositions like pharmaceutical drugs, mechanical processes like complex machinery, or machine designs that are new, unique, and usable in some type of industry.	Artistic, literary, or intellectually **created works,** such as novels, music, movies, software code, photographs, and paintings that are original and exist in a tangible medium, such as paper, canvas, film, or digital format.
What's an example?	Coca-Cola® for soft drinks	A new type of hybrid engine	Song lyrics to "Let It Go" from "Frozen"
What are the benefits of federal protection?	Protects the trademark from being registered by others without permission and helps you prevent others from using a trademark that is similar to yours with related goods or services.	Safeguards inventions and processes from other parties copying, making, using, or selling the invention without the inventor's consent.	Protects your exclusive right to reproduce, distribute, and perform or display the created work, and prevents other people from copying or exploiting the creation without the copyright holder's permission.

4) <u>trade secret</u>, which is an information that belongs to a business that is generally unknown to others, given it's held as private. They do not need to meet patent laws requirements and:
- Firm can protect proprietary product or process as trade secret *without disclosing* detailed information that would be required in patent
- The trade secrets enable broad classes of assets and activities to be protectable
- Famous secret formulas are Coca-Cola, KFC Recipe, WD-40, Big Mac Special Sauce, etc.

Written by Gabriel R.

To qualify a trade secret under the Uniform Trade Secret Act (USA):

- Information must not be generally known or ascertainable and the holder has secrecy measures
- Information must offer a distinctive advantage to the firm that is contingent upon its secrecy

In particular, the act states that no individual or group can copy, use, or otherwise benefit from a trade secret without the owner's authorization if they meet any of the following conditions:

- They are bound by a duty of confidentiality (e.g., employees, lawyers)
- They have signed a nondisclosure agreement
- They acquire the secret through improper means such as theft or bribery
- They acquire the information from someone who did not have the right to disclose it
- They learn about the secret by mistake but have reason to know that the information was a protected trade secret
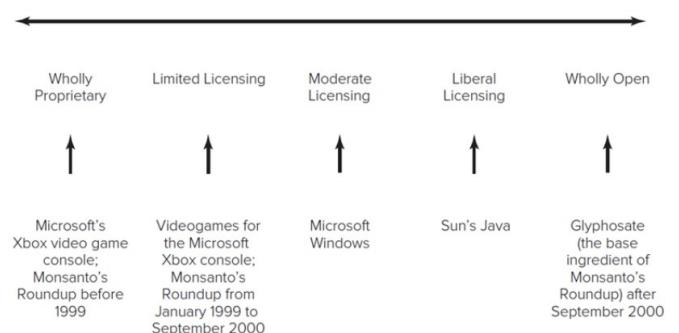
We take as reference the World Intellectual Property Organization (WIPO) site, which is used as a main reference to find trademarks. Its database encompasses patents, trademarks, copyrights and statistics.

In some industries, legal protection mechanisms are more effective than others.
- E.g., in pharmaceutical, patents are powerful; in electronics they might be easily invented around
- It is notoriously difficult to protect manufacturing processes and techniques
    - Trade secrets may be relied upon, but their effectiveness depends on technology and industry context
- In some situations, *diffusing a technology* may be *more valuable than protecting it*
- However, once control is relinquished it is difficult to reclaim
    - This happened for example in 1980 with Compaq which cloned many IBM PCs legally via reverse-engineering, this way selling a lot of products

Here we see how protection mechanisms are used effectively (figure on the side furtherly specifies more):
- *Wholly proprietary systems* may be legally produced or augmented only by their developers (protected by patents)

- *Wholly open systems* may be freely accessed, augmented and distributed by anyone, usually not protected by patents or secrecy

Wholly Proprietary	Limited Licensing	Moderate Licensing	Liberal Licensing	Wholly Open
Microsoft's Xbox video game console; Monsanto's Roundup before 1999	Videogames for the Microsoft Xbox console; Monsanto's Roundup from January 1999 to September 2000	Microsoft Windows	Sun's Java	Glyphosate (the base ingredient of Monsanto's Roundup) after September 2000

Protection has a few advantages:
- Proprietary systems offer greater rent appropriability
- Rents can be used to invest in further development, promotion, and distribution
- Give the firm control over the evolution of the technology and complements (*architectural control*)
- E.g., Microsoft's Windows with its rise to dominance inside the PC system

Also, diffusion has a few advantages:
- May accrue more rapid adoptions if produced and promoted by multiple firms
- Customer and complementary goods providers may perceive the technology as better or its future as more certain when multiple companies back it (better quality perception)
- Other firms (though external development poses its own risks) might improve technology through collective efforts

Written by Gabriel R.

Summary of the chapter:

1. The degree to which a firm can capture the rents from its innovation efforts is largely determined by the degree to which competitors can quickly and easily imitate the innovation. Some innovations are inherently difficult to copy; others are difficult to copy because of the mechanisms the firm uses to protect its innovation

2. The three primary legal mechanisms used to protect innovation in most countries are patents, trademarks, and copyrights. Each mechanism is designed to protect a different type of work or good

3. International treaties have helped to harmonize patent, trademark, and copyright laws around the world. Most countries now have patent, trademark, and copyright laws of some form, and in some instances protection can be applied for in multiple countries simultaneously

4. Trade secrets provide another mechanism of protecting innovation. Firms that protect their intellectual property as a trade secret often have legal recourse if another party wrongfully takes and uses such property

5. Legal mechanisms for protecting innovation are more effective in some industries than others; in some industries, inventing around a patent or copyright is relatively easy. Similarly, in some industries it is nearly impossible to protect an innovation by using trade secrets because commercializing the innovation reveals its underlying technologies

6. Sometimes the choice between protecting versus diffusing a technology is not obvious. Both strategies offer potential advantages. Many firms use neither a wholly open nor wholly proprietary strategy, but rather a partially open strategy

7. Protecting an innovation helps ensure that the firm earns the lion's share of the returns from the innovation. These returns can then be reinvested in further developing the technology, promoting the technology, and producing complementary goods

8. Protecting an innovation also preserves the firm's architectural control, enabling it to direct the technology's development, determine its compatibility with other goods, and prevent multiple incompatible versions of the technology from being produced by other firms

9. Diffusing a technological innovation can encourage multiple firms to produce, distribute, and promote the technology, possibly accelerating its development and diffusion. Diffusion can be particularly useful in industries that accrue increasing returns to adoption. It is also useful when the firm has inadequate resources to be the sole developer, producer, distributor, and marketer of a good

Written by Gabriel R.

16 CROWDSOURCING AS A SOURCE AND FORM OF INNOVATION

<u>Crowdsourcing</u> means *involving a large, decentralized group of dispersed participants contributing or producing goods or services*, contributing actively to innovation.

- This approach leverages the collective intelligence, skills, and resources of a diverse and often decentralized crowd to solve problems, generate ideas, or complete tasks
- The firm outsources to an undefined crowd activities, with active participation required
- It allows for large-scale and on-demand invocation of human input for data-gathering and analysis
- It is different from outsourcing → organizations rent functions from a specific company

Quoting slides, we have three different definitions coming from slides:

- "it represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined and large network of people in the form of an open call"
- "to answer the most vexing innovation and research questions, crowds are the partner of choice"
- "it constitutes an innovative pattern for enhancing collaborative works based on challenges open to professionals and amateurs willing to contribute to a specific task launched through a web platform"

Crowdsourcing means giving "power to the crowd" – People have the power, like the Patti Smith song.

- It provides the opportunity *to tap into the diverse perspectives*, collective intelligence, and creativity of a large, decentralized group of contributors
  - This approach can *accelerate innovation*
- Tasks and workloads can be *distributed* across *a crowd to improve efficiency*
  - With many minds contributing, the quality of outputs can exceed traditional approaches
- Participation in crowdsourcing is *inclusive*
- New professional networks form as participants *connect across disciplines*
- This model uncovers *new diversity of views*, possibly leading to smarter solutions and directions

A practical example of crowdsourcing from the slides:

- PepsiCo has solicited input from customers on new potato chip flavors for their "Lay's" brand
- Their first 'Do Us a Flavor' campaign was launched in 2012 in response to the brand's declining market share amongst millennials
- Over 14 million submissions were received, and 'Cheesy Garlic Bread' was chosen as the winner
- The new flavor contributed to an 8% increase in sales in the three months following its launch

Some other examples are:
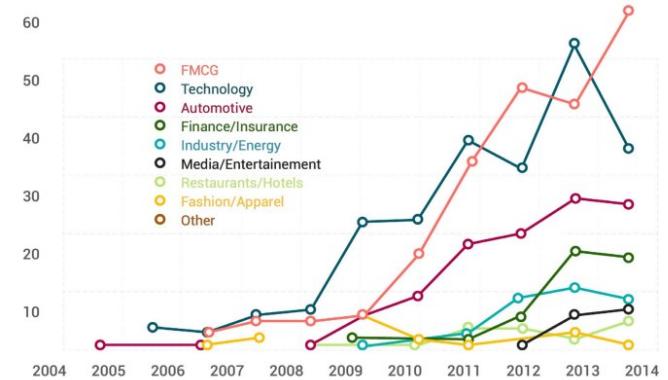
- Wikipedia → allowing basically anyone to collaborate on articles, create them and stuff
- Waze/Google Maps → allowing people contributions to improve map accuracy and details
- Kickstarter → allowing crowdfunding, which means random crowds of people sustaining a project
- Amazon Mechanical Turk → platform where businesses can post tasks and receive compensation
- Dell IdeaStorm → online platform for customers to submit, discuss and vote on ideas related to Dell products and services
- InnoCentive → platform to connect analytical people worldwide
- Piggybee → crowdsourced shipping and travel platform connecting individuals to share shipping space for items and travel experiences and make them connect

Written by Gabriel R.

For crowdsourcing we need many things:

- The *crowd*
  - This refers to the collective group of individuals who voluntarily participate in the crowdsourcing initiative
  - This group can be diverse, comprising people with various skills, knowledge, and perspectives

- The *crowdsourcer*
  - This is the entity or organization that initiates and manages the crowdsourcing effort
  - This defines the problem or task to be addressed, establishes goals, and sets the parameters for participation

- The *crowdsourced task*
  - This is the specific problem, challenge, or project that the crowdsourcer seeks assistance
  - This could range from solving complex problems, generating creative ideas, conducting research, to completing tasks that require human intelligence

- The *crowdsourcing platform*
  - This is the digital or physical space where the interaction between the crowd and the crowdsourcer takes place
  - Online platforms, such as websites or applications, are common for digital crowdsourcing
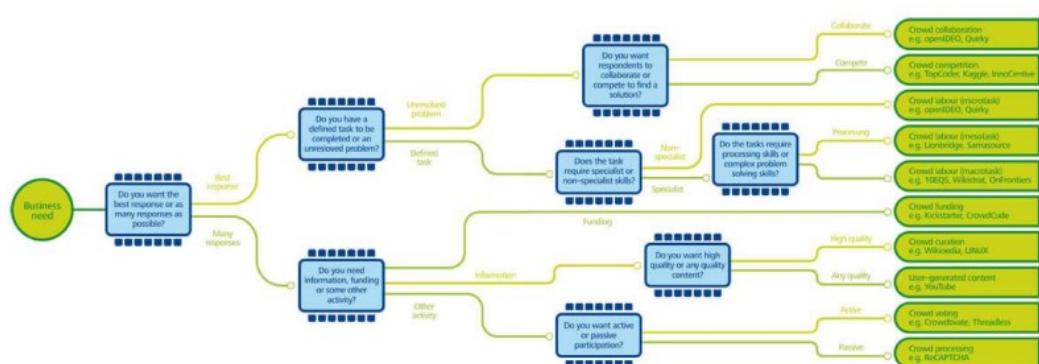
Which two of these depend on crowdsourcing the most?

- Fashion/apparel
- Healthcare
- <u>FMCG (Fast Moving Consumer Goods)</u>
- Finance/insurance
- Automotive
- Media/entertainment
- <u>Technology</u>
- Industry/energy
- Restaurant/hotel

In this context, crowdsourcing contests can be of different type: the main ones are video contest (45%), followed by idea contests (23%), then design (10%) and other contest in general (11%).

Crowdsourcing means "choosing the right crowd for the right problem", considering all of these factors:

Written by Gabriel R.

More and more companies and public sector organizations are now *ditching traditional innovation processes* and are, instead, working with *enterprise-scale platforms to reach broader crowds* capable of generating answers and executing tasks faster and more cost-effectively than their own employees.

Crowdsourcing model	Good for	Not so good for	Examples
Crowd collaboration	• Tasks requiring the aggregate 'wisdom of the crowd' • Generating outside ideas	• Promoting individual capabilities or expertise • Predetermined outcomes	• 99Designs • X Prize • Quirky
Crowd competition	• Creating actionable solutions • Developing prototypes • Building a sense of community • Generating outside ideas • 'Gamification'	• Predetermined outcomes	• TopCoder • Kaggle • InnoCentive • Applause
Crowd labour (microtasks)	• Well-defined, everyday tasks for individuals that require general skills only • On-site manual work, such as store restocking, furniture assembly and cleaning • Large crowds • When you don't want to hire permanent employees or contractors • Real-time market intelligence or data gathering	• Poorly defined, unstructured or non-routine activities • Tasks requiring subjective judgement • Tasks requiring specialist or higher-level cognitive skills	• TaskRabbit • Amazon's Mechanical Turk • Streetbees • Gigwalk • Samasource
Crowd labour (mesotasks)	• Well-defined tasks that require specialist but time-consuming activities, such as data entry • When you don't want to hire permanent employees or contractors	• Poorly defined, unstructured or non-routine activities • Tasks requiring subjective judgement or specialist skills	• Lionbridge • CrowdFlower
Crowd labour (macrotasks)	• Poorly defined or unstructured tasks or problems, such as strategy development, research or consulting • Tasks requiring subjective judgement or specialist skills • When you don't want to hire permanent employees or contractors	• Routine tasks and activities	• 10EQS • Wikistrat • OnFrontiers • Applause
Crowdfunding	• Fundraising • Start-ups • High transparency	• Financing ongoing operations • Loosely structured initiatives • High short-term expectations	• Kickstarter • CrowdCube
Crowd curation	• Building and sharing knowledge	• Solving defined problems	• Wikipedia • TripAdvisor
User-generated content	• Building large content repositories	• Ensuring the best possible quality of content	• YouTube • iStockphoto

Here is presented the context of *Eyeka*, which is a global creative platform that connects businesses with a community of creative individuals (founded in 2006, has clients like Unilever, Coca-Cola, Procter&Gamble, Nestlé) – this is briefly considered as a case study.

- It operates as a crowdsourcing platform where brands and organizations can launch contests to obtain innovative solutions, ideas, and content from a diverse group of contributors
- It's a way to pose new challenges as questions to do something better – this way, open innovation is about asking to do more with less, to do things better and faster with different insights

Basically, Eyeka offers different contests, where brands or organizations launch projects seeking creative solutions. There was a group activity on this website involved, based on choosing a contest from the present ones and then underlining advantages and disadvantages. Sadly, this site is broken on login and so was for everybody, so no useful note can be written on that (Oh no! Anyways…).

Written by Gabriel R.

17 INNOVATION NETWORKS

<u>Innovation networks</u> have become a persistent organizational phenomenon in industrial innovation processes. However, in economics they were considered in the first place only as a temporary hybrid phenomenon between markets and a hierarchical organization within a single firm.

When firms *interact*, they *exchange knowledge* and, possibly, *innovation*. It happens to firms:

- even though they can be competitors: *cooperation-competition*
- even though they operate with *uncertainty*: they do not know effects of interactions or where to find knowledge
- *trust* plays a critical role: mutual interests, reciprocity, common norms and values

There are various kinds of networks and involved issues (expanded a bit to give you some context):

- *Inter-firm networks* involve collaborations and connections between different companies
    - These networks can range from simple partnerships to complex supply chain relationships
- *Strategic networks* are formed to achieve specific strategic objectives
    - These networks often involve a mix of companies, research institutions, and government entities, sharing common objectives and being adaptable to changes
- *Clusters of innovation* refer to geographic concentrations of interconnected companies
   - They are specialized suppliers, service providers, associated institutions in a particular field
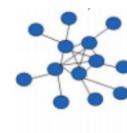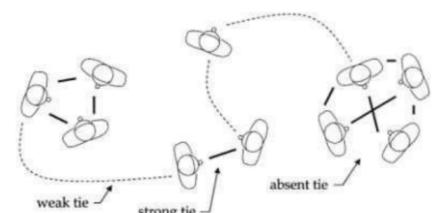
We discuss here the role of *networks* in *innovation* which are related to innovation in *sectors* and *places* (for example, pharmaceutical, biotech, high-tech, high-complexity, etc.). There are social dynamics and economic systems which revolve around:

- relevance of personal networks
- relevance of network within a firm's boundary (intra-firm)
- relevance of inter-firm networks (inter-firm)

Networks involve relationships, ties and bonds: there are stronger relationships (between friends/direct colleagues – *strong ties*, useful for team-work) and weaker ones (acquaintances/distant colleagues – *weak ties*, typically bridges and work for innovation – *strength of weak ties*).

We discuss about centrality/social innovation/friendship/future ties in establishment of existing ties.

When firms engage in networks, they form connections that can be akin to a Core-Periphery (C/P) structure. This structure is characterized by a densely connected core where strong ties facilitate efficient communication and collaboration, and a periphery where weaker ties act as bridges for potential innovation.

There is a specific type of innovation network, which are <u>organizational networks</u>, which bring together numerous different organizations to work together and collaborate around a common purpose.

- Their key focus is on bringing together different organizations to collaborate for common goals
- Many factors contribute to their foundations:
    - *homophily* (associate with similar others)
    - *heterophily* (associate with different others)
    - closure (all connected)
    - brokerage (intermediate nodes), etc.

Written by Gabriel R.

In network, it's important both the *power of individuals* and the *distance* between them:
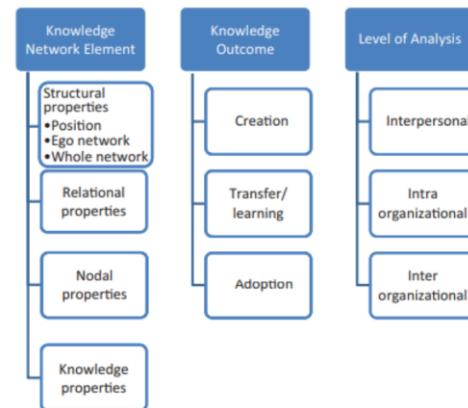
- Ties formation and inertia between partners of behavior, leading to various levels of assortativity and clustering, trying to exploit resources and opportunities alike
- The effectiveness of such networks often hinges on the number and quality of connections between these organizations
- Consider networks are irregular and decentralized, so there is no conformation to a specific model or structure - Neither market nor hierarchy (Powell, 1990)

Here we compare the economic organizations, considering in networks we have a more flexible structure:

Key Features	Market	Hierarchy	Network
Normative Basis	Contract – property Rights	Employment Relationship	Complementary Strengths
Means of Communication	Prices	Routines	Relational
Methods of Conflict Resolution	Haggling – resort to courts for enforcement	Administrative fiat - Supervision	Norm of reciprocity – Reputational concerns
Degree of Flexibility	High	Low	Medium
Amount of Commitment Among the Parties	Low	Medium to High	Medium to High
Tone or Climate	Precision and/or Suspicion	Formal, bureaucratic	Open-ended, mutual benefits
Actor Preferences or Choices	Independent	Dependent	Interdependent

We then discuss, knowledge networks are collections of individuals and teams who come together across organizational, spatial and disciplinary boundaries to invent and share a body of knowledge.

- The focus of such networks is usually on developing, distributing and applying knowledge
- It's important to organize those according to a series of properties (also shown here on figure)
- Social relationships and networks will constitute new bonds and relationships

There is a *methodology/societal perspective* studying all of this, which is SNA (Social Network Analysis):

- This is the study of *relations* among a set of agents and networks are representations of systems in which the elements (or *nodes*) are connected *by ties*
- This delves deeper into *networks of relations* and looks for explanations for *social/organizational behaviour* in the *structure* and *dynamics* of these networks rather than the individuals alone
- This allows to form a *network society*

Relations matter:
- in the context of investigating ideas and material *flows* through relationships
    - investigating *co-participation* in specific settings
    - understanding how an agent is *embedded* in a web of relationships with other agents
- everything is linked to some extent, we have only to understand how

SNA is widely employed in social science (social issues) and network analysis/graph theory because of these reasons, given the nature of its analysis.

Written by Gabriel R.

Notable examples:

- Konigsberg bridges
- six degrees of separation (degrees of Bacon)
- small world experiment

There are three main categories of network drivers:

- Nodes characteristics
    - firms' size, experience and typology of specialization
- Dyadic mechanisms
    - similarities vs differences
- Network structures
    - whole-network structures (connectivity and density)
    - ego-network structures (for example, centrality and constraints)

Some practical applications:

- Police forces and the army use SNA to identify criminal networks building on traces of communications they have.
    - In this way law enforcement agencies can also individuate key actors, new entrants, etc.
- Social Networks use SNA to indicate potential friends starting from friend-to-friend linkages
- Electricity and telephone operators use SNA to optimize structures and capacity of their systems
- Companies use SNA to improve communication flows in their organization, with partners or customers

18 INVITED SPEAKERS: M31

Overview:

- M31 is a technology company founded by Fabio D'Alessi composed of 40 people each solving different problems, looking out for problems and understanding how to solve them
- It aims to transfer technology from universities to society through entrepreneurship and startups, contributing to social innovation (transferring knowledge and contributing to social growth), possibly transferring technology to society
- This can be driven by huge innovation given by MIT; giving faith to young people contributes also to success, while carefully specializing students even more (30000 companies for 2 trillion dollars)

Case studies:

- UQIDO = Avoid people waiting and create an app to avoid queues
- centervue = Foreseeing retina diseases via intelligent machines
- d-eye = Technology to see the retina in the palm of an hand
- d-heart = ECG portable device attached to a smartphone
- Dainese = Motorcycle protections and leaders in the market with airbags
- VideoTec = Intelligent surveillance platform allowing IP controlled camera
- Manfrotto = Bringing specialized photography products and the palm of a mobile/tablet

Offerings:

- Technologies - M31 develops solutions in areas like hardware, software, AI, robotics, IoT, and mobile
- Startups - M31 incubates and accelerates startups to bring ideas to market
- Partnerships - M31 partners with universities, corporations, and institutions
- Commercialization - M31 helps take innovations to market by identifying problems and developing solutions

Approach:

- Leverage latest technologies to create innovative solutions.
- Focus on identifying real-world problems that technology can help solve.
- Rapid prototyping and iteration to develop working solutions.
- Building an ecosystem of partnerships to drive innovation.

Key Message:

- Universities and entrepreneurs can work together to transfer technology to society in a way that solves real problems and makes a positive economic impact.

Written by Gabriel R.

19 TEAM COMPOSITION OF INNOVATION PROJECTS (CHAPTERS 11/12)

19.1 CHAPTER 11 - MANAGING THE NEW PRODUCT DEVELOPMENT PROCESS

Case study: the example of Cisco Systems, which has long used a "waterfall" model to develop its software and its teams moved through stages of the development process sequentially, waiting for multiple months for an output; drawbacks, not flexible/versatile to changes, hence the shift to Agile methods in 2014

- Here, a product is broken up into smaller and quick parts, to intervene quickly.
- This involves listening to user stories and coordinate success towards small periods of time (sprints), privileging working demos/products adaptable overtime (modular) which can be shown to client.
- Despite the intense attention paid to innovation, failure rates are still extremely high. More than 95% of new product development projects fail to earn an economic return.

The NPD Process has different objectives:

- *Maximize fit with customer requirements*
  - products need to have greater quality or more attracting pricing than competing products
  - many projects fail to achieve this because of a lack of clarity on which features customers value the most and may over/under estimate/spend in resources

- *Minimizing development cycle time*
  - a product can fail if the firm takes too long to bring it to the market
  - bringing a product early creates brand loyalty, capture scarce assets and allow more time to build complementary goods
  - reduces costs in development of products about this can lead to rushed products

- *Controlling development costs*
  - the costs have to be not only effective but also efficient
  - have sustained costs of developing with the market expectations

There are different ways of development:

- A <u>sequential process</u> has no early warning system to indicate that planned features are not manufacturable
  - The cycle time can lengthen as the project iterates back and forth between the product design and process design strategies

- To shorten there are <u>partly parallel development processes</u>
  - The product design is initiated before the concept development is complete and the process design is began long before product design is finalized
  - The last one can, in some situations, substantially increase the risks or costs of the development process
    - One type of this is *concurrent engineering*, involves not only conducting the typical product development stages simultaneously but also considers downstream stages of a product's lifecycle such as maintenance and disposal

<u>Project champions</u> are typically senior executives who use their influence and authority to support and advance specific NPD projects within the organization. Many US/Japanese/European firms use seniors to champion their NPD projects.

There are different *benefits* for championing:

- *Power and Advocacy* **-** Senior executives have the power to advocate for the NPD project, ensuring that it receives the attention and resources it needs for successful execution

- *Resource Access* **-** They can facilitate access to necessary resources, including financial, human, and technological resources

- *Communication* **-** Senior executives, by virtue of their position, can effectively communicate with various departments and areas within the firm, fostering collaboration and alignment

There are also correlated *risks for championing*:

- *Bias and Judgment* **-** The role of a champion may lead to biased judgment about the project's viability or potential success

- *Escalating Commitment* **-** Champions may become overly committed to the project, even in the face of evidence suggesting that it may not be as successful as initially thought

- *Resistance to Challenge* **-** Others within the organization may be hesitant to challenge or question the decisions of a senior executive acting as a champion

To mitigate the risks associated with championing, it may be beneficial for the organization to develop "anti-champions" or individuals who actively express dissenting opinions. This can help in avoiding groupthink and ensuring a more thorough evaluation of the project's merits.

There are many *myths* about product champions:

1. Projects with champions are more likely to be successful in the market
   o Many factors determining market success are typically beyond champion's control

2. Champions get involved because they are excited about project rather than from self-interest
   o Results suggest that champions more likely to support projects that benefit their own departments

3. Champions are more likely to be involved with radical innovation projects
   o Equally likely to be involved with incremental projects

4. Champions are more likely to be from high (low) levels in firm
   o Either is equally likely

5. Champions are more likely to be from marketing
   o 15% from R&D, 14% from marketing, rest were from other functions or were users

It's important to *involve* customers:

- Customers are often best able to identify the maximum performance capabilities and minimum service requirements of a new product, given their real-world experiences provide value
- They may be actively involved in NPD teams, contributing their firsthand knowledge to the development process

Written by Gabriel R.

Not only we involve customers, but also we *involve suppliers*:

- Involving suppliers on NPD team or consulting as an alliance partner can improve product design and development efficiency
- Suppliers can suggest alternative inputs that reduce cost or improve functionality

Consider also:

- Firms may employ <u>beta testing</u> strategies, allowing customers to provide input early in the development process by testing prototypes or pre-releases via iterative feedback loops

- In <u>Agile development</u> methodologies, individual features or functionalities are developed into *Minimum Viable Product*s (MVPs), then presented to customers for feedback.
    - Some studies suggest that involving *lead users* can be more valuable than seeking feedback from a random sample of customers
    - <u>Lead users</u> are customers who face the same general needs as the broader market but experience these needs earlier
        - They are early adopters who can benefit disproportionately from innovative solutions. Leveraging their insights can provide a competitive advantage

A way to involve customers is <u>crowdsourcing</u> (described already [here](#)) can be a way to open up innovation tasks where people voluntarily contribute their ideas or efforts. Crowdsourcing challenges typically go through a four-step process:
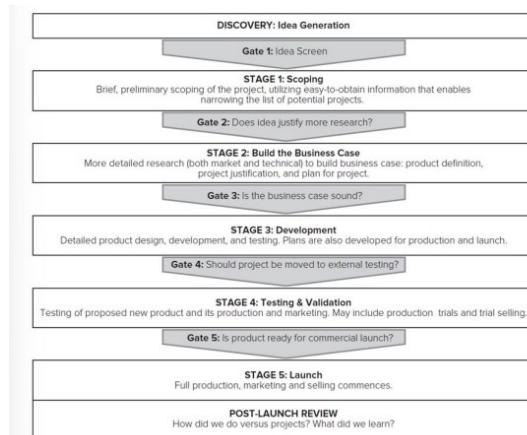
- *Need Translation*
    - A clear, concise and compelling need statement is articulated (e.g., *Request for Proposal*)
- *Connecting*
    - The innovation challenge is broadcasted to the network of potential solution providers
- *Evaluation/Selection*
    - Proposals reviewed in depth, and the most interesting are selected
- *Acquisition*
    - The firm engaged with the solution provider and negotiated an agreement to exchange knowledge, intellectual property, and compensation, adapting the solution to the needs

There are different tools to improve NPD processes:

1) *Stage-Gate Processes* serves as a structured framework for the NPD journey, introducing distinct stages or gates where critical decisions are made.
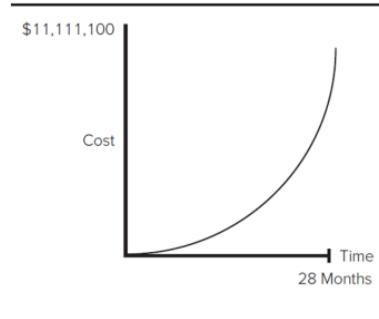
At each gate, project viability is rigorously assessed, enabling teams to scrutinize key aspects and decide whether to proceed, revise, or terminate the project.

This approach acts as a strategic filter, utilizing tough go/kill decision points, thereby optimizing resources and increasing the likelihood of successful new product launches (good example of this [here](#)).

Written by Gabriel R.

The time and cost of projects escalates with each stage, thus stage-gate processes only permit a project to *proceed if all assessments indicate success*. This is shown by the below figures:

Stage	Time	Cost
0. "Here's an idea!"	-	-
1. Formulate-describe and sketch	1 week	$100
2. Conduct preliminary investigations	2 weeks	$1,000
3. Design and define specifications	1 month	$10,000
4A. Develop prototype and test	-	-
4B. Market research	-	-
4C. Strategic fit evaluation and NPV risk analysis	2 months	$ 100,000
5A. Scale up, build pilot plant	-	-
5B. Market test	8 months	$ 1 million
6A. Build plant	-	-
6B. Promote, launch, market	16 months	$ 10 million

Others include:

2) *Quality Function Deployment (QFD)*, which is a structured process originating from Japan that enhances communication and coordination among teams by mapping customer requirements against product attributes using a "house of quality" matrix
   - Steps include identifying customer requirements, weighting them, identifying engineering attributes, establishing correlations, evaluating competition, and determining target values
   - It improves product/customer fit and reduces development cycle time by fostering collaboration and highlighting design trade-offs

3) *Design for Manufacturing (DFM)*, which involves structuring the NPD process by articulating design rules to ensure that product designs are easy to manufacture
   - The purpose of DFM is to reduce costs and boost product quality by simplifying assembly processes and increasing labor productivity, shortening development time

4) *Failure Modes and Effects Analysis (FMEA)* identifies potential failures in a system, prioritizes them based on severity, likelihood, and detectability, and develops plans to prevent them

5) *Computer-Aided Design (CAD), Engineering (CAE) and Manufacturing (CAM)* enable virtual testing and adjustment of product designs, reducing cycle time and costs

There are also tools for measuring new product development performance, which should have as goals:

- Identify which projects met their goals and why
- Benchmark the organization's performance compared to that of competitors or to the organization's own prior performance
- Improve resource allocation and employee compensation
- Refine future innovation strategies

As such, we can characterize:

- *NPD metrics*, a number of methods to gauge the effectiveness and efficiency of the development process using measures able to capture different dimensions
  - Average cycle time to market
  - Percentage of projects completed/undertaken/inside budget
- *Overall Innovation Performance*
  - Firm's return to innovation, goals achieved, ratio in successful projects

Written by Gabriel R.

Summary of the whole chapter:

1. Successful new product development requires achieving three simultaneous objectives: maximizing fit with customer requirements, minimizing time to market, and controlling development costs.

2. Many firms have adopted parallel development processes to shorten the development cycle time and to increase coordination among functions such as R&D, marketing, and manufacturing.

3. Many firms have also begun using project champions to help ensure a project's momentum and improve its access to key resources. Use of champions also has its risks, however, including escalating commitment and unwillingness of others in the organization to challenge the project.

4. Involving customers in the development process can help a firm ensure that its new products match customer expectations. In particular, research indicates that involving lead users can help the firm understand what needs are most important to customers, helping the firm to identify its development priorities. Involving lead users in the development process can also be faster and cheaper than involving a random sample of customers in the development process.

5. Many firms use beta testing to get customer feedback, exploit external development of the product, and signal the market about the firm's upcoming products.

6. Firms can also involve suppliers in the development process, helping to minimize the input cost of a new product design and improving the likelihood that inputs are of appropriate quality and arrive on time.

7. Stage-gate processes offer a blueprint for guiding firms through the new product development process, providing a series of go/kill gates where the firm must decide if the project should be continued and how its activities should be prioritized.

8. Quality function deployment can be used to improve the development team's understanding of the relationship between customer requirements and engineering attributes. It can also be a tool for improving communication between the various functions involved in the development process.

9. Failure Modes and Effects Analysis can be used to help firms prioritize their development efforts in order to reduce the likelihood of failures that will have the greatest impact on the quality, reliability, and safety of a product or process.

10. Design for manufacturing and CAD/CAM are additional tools development teams can use to reduce cycle time, improve product quality, and control development costs.

11. Firms should use a variety of measures of their new product development effectiveness and overall innovation performance to identify opportunities for improving the new product development process and improving the allocation of resources.

Written by Gabriel R.

19.2 CHAPTER 12 - MANAGING NEW PRODUCT DEVELOPMENT TEAMS

Many organizations now use cross-functional teams to lead and manage the NPD process. There is considerable variation in how these teams are formed and managed. The chapter will look at size, composition, structure, administration, and leadership of teams.

In constructing such teams, we consider some factors:

- Team Size
  - o May range from a few members to hundreds
  - o Bigger is not always better; large teams create more administrative costs and communication problems
  - o Large teams have higher potential for *social loafing*
  - o This term means individuals tend to exert less effort when they are working in group than when they are working alone

- Team Composition
  - o Including members from multiple functions of firm ensures greater coordination
  - o Firms around the world rely heavily on cross-functional teams for their new product development efforts

Diversity in functional backgrounds increases breadth of knowledge base of team. Other types of diversity (for example, organizational tenure, cultural, gender, age, etc.) can be beneficial as well, given:

- It provides broader base of contacts within and beyond firm
- It ensures multiple perspectives are considered

However, diversity can also raise coordination costs, creating <u>cross-functional teams</u>:

- Individuals prefer to interact with those they perceive as similar (<u>homophily</u>)
- May be more difficult to reach shared understanding
- May be lower group cohesion

Extended contact can overcome some of these challenges, given collaboration develops a better understanding, fostering improved communication and group cohesion.

Dozens of laboratory studies have shown that *brainstorming* groups produced fewer ideas and ideas of less novelty than the sum of the ideas created by the same number of individuals working alone. There are three main reasons:

- *Fear of Judgement* – people self-censor many of their most creative ideas for fear of being judged
- *Production Blocking* – when one person is talking, others are blocked from ideating
- *Feasibility Trumps Originality* – groups tend to weight "feasible" more highly than "original"

This indicates that people should brainstorm alone first and elaborate their ideas before moving into team development.

Written by Gabriel R.
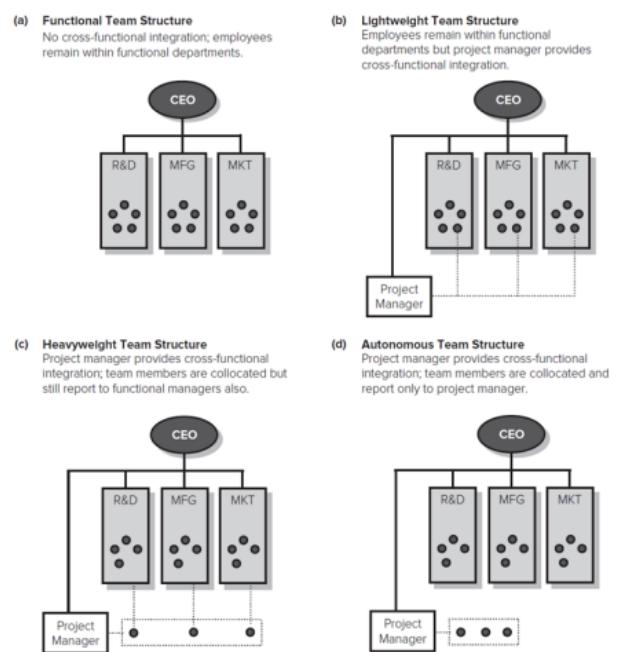
One well-known typology of team structure classifies teams into four types (see also right figure for summary):

- Functional (Separate teams with specific functions)
    - Members report to functional manager
    - Specialized in performing specific functions or tasks which member possess expertise
    - Work is coordinated vertically within the functional hierarchy and no project manager
    - It is temporary and here members may spend less than 10% of their time on project
    - Little opportunity for cross-functional integration
    - Likely to be appropriate for derivative projects

- Lightweight (Agile/Cross-functional, flexible and responsive to change)
    - Members still report to functional manager
    - Emphasis on adaptability and quick response to changes, combining diverse skills
    - Temporary, and member may spend less than 25% of their time on project
    - Typically have a project manager (typically junior or middle)
    - Likely to be appropriate for derivative projects

- Heavyweight (Larger, more structured teams used in complex/long-term projects)
    - Members are *collocated* with project manager
    - Clear hierarchy with designated roles and responsibilities, typically assigned to complex and large-scale projects
    - Manager is typically senior and has significant authority to command resources and evaluate members
    - Often still temporary, but core team members often dedicated full-time to project
    - Likely to be appropriate for platform projects

- Autonomous (Fully independent, faster decision-making, more responsibilities)
    - Members collocated and dedicated full-time (and often permanently) to team
    - Project manager is typically very senior manager
    - High degree of independence and self-governance, with teams responsible for the entire process, from ideation to implementation
    - Project manager is given full control over resources contributed from functional departments and has exclusive authority over evaluation and reward of members
    - Autonomous teams may have their own policies, procedures and reward systems that may be different from rest of firm
    - Likely to be appropriate for breakthrough and major platform projects
    - Can be difficult to fold back into the organization

Written by Gabriel R.

In guiding teams, <u>team leadership</u> is important, given a *team leader* is responsible for directing team's activities, maintaining alignment with project goals, and communicating with senior management. Team leaders impact team performance directly and different team types need different leader types:

- Lightweight teams need junior or middle manager
- Heavyweight and autonomous teams need senior manager with high status, who are good at conflict resolution, and capable of influencing engineering, manufacturing, and marketing function

It's also important to give a good <u>team administration</u>; many organizations now have heavyweight and autonomous teams develop a project charter and contract book.

A *project charter* is a formal document that marks the beginning of a project. It outlines the project's key objectives, scope, stakeholders, and overall direction and may also describe:

- Who is on team
- Length of time members will be on team
- Percentage of time members spend on team
- Team budget
- Reporting timeline
- Key success criteria
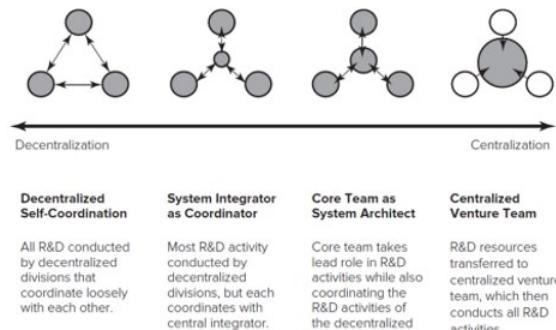
Also, a *contract book* refers to a comprehensive document that outlines the detailed plan for achieving the goals set forth in the team charter. Specifically:

- It serves as a contractual agreement or a formalized roadmap that team members follow
- It defines in detail the basic plan to achieve goals laid out in charter. It provides a tool for monitoring and evaluating the team's performance
- It typically provides:
    - Estimates of resources required
    - Development time schedule
    - Results that will be achieved
- Team members sign contract books
    - this helps to establish commitment and sense of ownership over project being done

In <u>virtual teams</u>, members may be a great distance from each other, but are still able to collaborate intensely via videoconferencing, email, and internet chat programs.

- Enables people with specific skills to be combined without disruption to their personal lives
- However, may be losses of communication due to lack of proximity and direct, frequent contact
- Requires members who are comfortable with technology, have strong people skills and work ethic, and can work independently

A number of technology-intensive multinational were studied, and four patterns of virtual international R&D teams were identified, as shown by this figure.

Decentralized			Centralization
Decentralized Self-Coordination	**System Integrator as Coordinator**	**Core Team as System Architect**	**Centralized Venture Team**
All R&D conducted by decentralized divisions that coordinate loosely with each other.	Most R&D activity conducted by decentralized divisions, but each coordinates with central integrator.	Core team takes lead role in R&D activities while also coordinating the R&D activities of the decentralized	R&D resources transferred to centralized venture team, which then conducts all R&D activities.

Written by Gabriel R.

Summary of the whole chapter:

- Bringing multiple people together into a team enables multiple bases of expertise to be collectively directed toward problem solving; thus, teams are powerful mechanisms for problem solving. However, if teams become too big, administrative costs and communication problems can become significant

- Diversity of team members ensures that the team can draw on different perspectives and bases of expertise. In particular, functional diversity is often sought in new product development teams. Cross-functional teams enable design, manufacturing, and marketing objectives to be integrated in the new product development process

- Diversity of team members ensures that the individuals in the team not only possess different knowledge or viewpoints, but also have various sources of extra-team resources upon which to draw through boundary-spanning activities

- Diversity can also make it more difficult for teams to develop a mutual understanding of the new product development project and can result in lower group cohesion. Teams may need long-term contact and incentives for cooperation to overcome these challenges

- The way in which a team is structured (collocation, permanence, supervisory relationships, etc.) significantly influences how team members interact and the likely outcomes of a development project. Distinct types of teams are appropriate for different types of development projects

- Attributes of the team leader (seniority, authority, multilingual skills) must match the team type for teams to be most effective

- Many firms have teams develop and sign a project charter and contract book to ensure that all team members have a mutual understanding of the project's goals and possess a sense of ownership and commitment to the project's success

- When a company wishes to form a team with individuals who have unique skills but live great distances from each other, it might opt to form a virtual team. Virtual teams use information technologies to achieve communication and coordination. Virtual teams face a distinct set of challenges in promoting participation, cooperation, and trust. As a result, they require special consideration of the selection of team members and the team administration processes

Written by Gabriel R.

20 INVITED SPEAKERS: UQIDO

Overview:

- UQIDO is a design and innovation consultancy founded in 2010 in Padua based on experience economy (delivering memorable experiences via goods and services)
- They help companies define long-term product and business strategies, considering complaints, and unpredictability of market and speaking directly to companies human-centered design.
- They started offering products which could simply solve problems
    - Case studies: the ULSS queue app or the automatic image analysis system
- Overtime, understanding the market, the company expanded, bringing in new people and fostering a culture of positiveness and innovation, with careful revision of project management

Offerings:

- Product definition = Business strategy consultancy understanding long-term goals and defining critical actions to take, according to stakeholders ambitions
- Product design = Human-centered, based on continuous interactions with end users
- Product development = Coding ensuring safe software

Products of note:

- IoT for smart waste = a tool allowing citizens to see fil-levels in bins
- Smart fridges = automatic handling of food resources and alike
- Fitness AI Apps

Key Message:

- Innovation is about making ideas happen through strategic design, user-centricity, and agile development and delivery
- It takes time, courage and organization, all coming from a safe manager view, which drives his team naturally towards success, while considering vulnerabilities and strength points

Written by Gabriel R.

21 INVITED SPEAKERS: GANZAROLI

Overview:

- Scaling up is the increase in the size of a subject accompanied with a proportional increase in the performance, being intentionally planned, efficient in cost and enhancing in capabilities
- Growth is focused on metrics, can be short-term, is linear and focuses on quantitative aspects
- Scale up is focused on capabilities, it is long-term and focuses on capability and efficiency
- Scaling up can take multiple forms
    - Financial = Acquiring resources for expansion without diluting ownership or taking disproportional debt, seeks financial leveraging and strategic investments
    - Horizontal = Expanding products or services to new customers or markets, seeking geographical expansion and new market segments
    - Functional = Enhancing or adding new functions or operations to the business
    - Vertical = Deepening the offerings to existing customers

Challenges:

- Scaling can strain resources and dilute focus, so a company has to maintain identity and values while the company grows, ensuring smooth operations while scaling
- There are multiples stages (lifecycle)
    - Introduction = Low sales/High costs/No-little profits
        - This lays the groundwork, setting up scalable processes and business models, while positioning strategically identifying niches and markets
    - Growth = Increasing sales/Reduced costs/Some profits
        - Scaling is active and adjustments might be made with teams and productions themselves, managing resources effectively and entering new markets
    - Maturity = Consistent sales/Reduced costs/Increasing profits
        - Diversification of offerings while driving innovation via investing in research and development
    - Decline = Reducing sales/Constant costs/Reducing profits
        - Market demand shrinks and companies might scale down their operations
    - Extension = Re-scaling of resources and re-evaluation of strategies
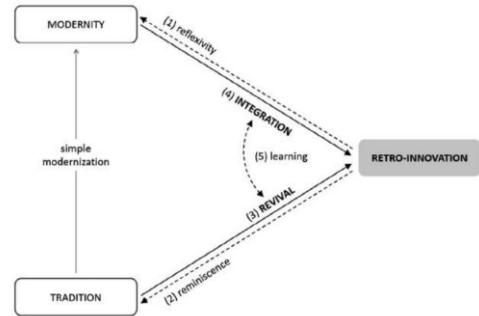
Multiple factors to consider:

- Financial = Capital/profits/Debts/Tax compliance
- Operational = Management of supply chains/inventory/coordination
- Quality = Resources/Pressures/Complexity/Customer needs
- Talent = Development of skill/Positive work culture/Diversity and inclusion
- Infrastructure & Systems = Capacity planning/Reliability/Security/Cost
- Adapting to Market Conditions = Risk/Regulation/Competition/Technology
- Company culture = Communication/Alignment/Transparency/Empowerment
- Market fit = Segments/Customer needs
- Regulatory compliances = Risks/Standards
- Leadership = Team-building/Leaders
- Communication = Time/Visibility

Written by Gabriel R.

22 RETROVATION/RETRO-INNOVATION

Retrovation or retro-innovation is a concept that refers to the reintroduction or revival of older methods, technologies, designs, or practices in contemporary contexts.

- It involves looking back to the *past* for inspiration while bringing elements from previous eras into the present, combining *historical qualities* with original *advancements* and *innovation*
- It can be about *balancing* the revival of largely forgotten past practices, products, ideas and/or technologies with the need for progress and novelty

Here are a few examples of retrovation:

- Leica Cameras, which as brand is associated with classic design and traditional craftsmanship and has incorporated modern technology into its cameras
- Vinyl record player + Bluetooth Speaker, combining a vintage playback method with modern wireless connectivity, this way blending the charm of vinyl records with modern convenience
- The Pokémon Go app, given the Pokémon 1990s nostalgia with AR-based gaming

Retrovation can refer to a *product, service or a production* method that is based on *forgotten resources* and *broken chains* or *lost trails*. It then means an *innovative translation* of the object from the past in such a way that it will be appropriate in a *new use*. There are two kinds of retrovations:

1. we may connect an object of the past to a *new purpose* and thus, create a retrovation
2. we would be able to revive or resurrect an artefact or a practice in the *new context* in such a way that it maintains its connection to the original purpose of the artefact

Let's define some key aspects:

- *Inspiration from the Past*
  - Retrovation involves drawing *inspiration* from historical periods, styles, or techniques
  - It may be driven by a desire to *re-capture* a particular aesthetic, functionality, or cultural aspect that was prevalent in the past

- *Modern Adaptations*
  - The reintroduced elements should be not merely replicas of the past but are *adapted* to meet *current standards*, *preferences*, or *technological requirements*
  - This fusion of the old and the new results in a *hybrid approach* that combines nostalgia with contemporary advancements

- *Nostalgia and Authenticity*
  - Nostalgia often plays a significant role in retrovation
  - People may be drawn to the familiarity and sentimentality associated with *older* things
  - The quest for authenticity and a connection to a *perceived* simpler or genuine past is a driving force

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- *Sustainability and Craftsmanship*
  - In certain cases, retrovation aligns with sustainability goals
  - Embracing older, often more manual or artisanal methods may be seen as a response to concerns about mass production, environmental impact, and a desire for more *sustainable* and *ethical* practices

- *Cultural and Lifestyle Choices*
  - Retrovation extends beyond specific industries and can influence various aspects of culture and lifestyle
  - Whether in fashion, design, entertainment, or agriculture, individuals may choose retrovation as a way to express their *identity, values*, or a particular *lifestyle*

- *Consumer Preferences*
  - Consumer preferences often drive retrovation
  - The popularity of *vintage* or *retro-styled* products indicates a demand for alternatives to the rapid pace of technological change, evoking a sense of timelessness

Let's give a few concrete examples of it (like with SI, in the slides 7 examples were present, but I think again that with 2 of them *you get the idea*, we don't like filler content because you can't teach – editor's note):

1. *Tech Gadgets*
   - Mechanical Keyboards
     - Mechanical keyboards, reminiscent of older typewriters, have seen a resurgence in popularity due to their tactile feedback and durability. They combine a classic typing experience with modern technology and be more efficient
   - Analog Watches
     - Despite the prevalence of smartwatches, analog watches have maintained their appeal. Some watch enthusiasts appreciate the craftsmanship, design, and simplicity of traditional timepieces
   - Mechanical Typewriters
     - While digital word processing is standard, some writers and enthusiasts use mechanical typewriters for a tactile and distraction-free writing experience.

2. *Architecture and Design*
   - Mid-Century Modern Architecture
     - The mid-century modern architectural style from the mid-20th century has experienced a revival in recent years. Characterized by clean lines, open spaces, and a focus on functionality, this style is embraced for its timeless appeal.
   - Retro-Inspired Home Décor
     - Home decor trends often include retro-inspired elements, such as furniture, wallpapers, and color schemes reminiscent of specific decades like the 1950s or 1970s

Retro-innovation should not be interpreted as a simple re-use of something from the past, but as a proper *innovation* inspired from the past: key process of adaption to meet current standards, preferences, or technological requirements.

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The *distinction* lies in the degree of creativity, adaptation, and integration of historical elements into contemporary contexts. We characterize:

- *Re-use of something from the past*
  - This involves the direct application or re-implementation of a past concept, object, or practice without significant modification or adaptation
  - The focus is on replicating or reintroducing the original elements with minimal changes, emphasizing authenticity and evoking nostalgia or connections to the past
  - Examples could include the reissuing of classic books, the re-release of vintage video games, or the straightforward reproduction of historical fashion designs

- *Proper innovation inspired from the past*
  - This involves a more *creative* and *transformative* approach, where elements from the past serve as inspiration for the development of something *new* and *adapted* to contemporary needs
  - The emphasis is on combining *historical* aesthetics, principles, or concepts with *modern* technology, functionality, or design, resulting in *innovative products/concepts*
  - Examples could include the integration of vintage design elements into modern technology, the adaptation of traditional craftsmanship techniques using contemporary materials

There are also various effects to consider:

- Sustainability opportunities mainly when taking inspiration from the *environmentally friendly* and *pro-societal* sustainable practices of the *past*
- Prioritizing an *efficient* and *responsible* use of resources, reduce waste, adapt to contemporary needs, foster place-based solutions, enhance resilience, and support the adoption of circular economy principles
- Encouraging the *exploration* and *integration* of ideas, knowledge, and practices from diverse fields and disciplines
- Its *interdisciplinary* nature can strengthen collaborative strategies by fostering cross-pollination of ideas, bridging expertise gaps, promoting innovative synthesis, enhancing problem-solving capabilities, and increasing adaptability

We discuss about some case studies:

- Artisanry as a way to transform waste into novel resources, valuing a unique and ancient tradition
- Food and wine production inspired from ancient times (e.g., romans, middle-age) with adoption of modern technologies
  - For example, retrovation from ancient wine production techniques with modern technologies.
- Windcatchers or wind towers originated in ancient Persia and used to create cross ventilation and passive cooling in buildings.
  - Today they can be used for mitigation of climate change as they can reduce the buildings energy consumption and carbon footprint and for adaptation to climate change because they facilitate cooling in a warmer climate.
- A case of an italian startup called DMAT presenting a revolutionary and sustainable concrete recipe inspired from Ancient Rome, responding to the challenge of decarbonizing the production processes and guaranteeing a new way of building without increasing production costs

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23 MOCK PRESENTATION AND FINAL PRESENTATION

Basically, one month before the final presentation, there is the mock presentation.

- This consists in creating a set of slides with requirements present here
- You can deliver the slides even on the same day morning
- This is done only at the presence of the professors
- Also, for this one only, people can participate on Zoom if they cannot be present
- They will let you present in exactly 12 minutes, so come prepared
- The good track is let anyone talk a reserved slot
- At the end, each will comment your slides and work/layout/content
- They will write a comprehensive feedback on Moodle anyways

For the final presentation:

- This is also done with the company itself (this case Mobisec)
- The company not necessarily has to be in presence, but the students have to
- Basically, everyone has their slot and talk inside the 12 minutes
- After audience feedback, the company will tell you their thoughts
- You will receive no evaluation on the same day of presentation, still
- Actually, it will come in the form of a PDF file uploaded on Moodle on the number of points (out of 8) your group will get. In the case of mine, after a bit more than a week the points arrived (there were no feedback or textual comments of sort, just the points – empty as the course sadly was)

Consider for your possible reference:

- I did the mock presentation on 22nd December
- I did the final presentation on 18th January

Written by Gabriel R.