

Innovation and R&D

Markets for technology

Markets for technology

They arise from the relatively recent trend to subdivide the innovative process in different stages, in the hands of different organizations. The single firm is very rarely in charge of the whole innovative process and there is therefore an increasing need of exchanging technology (hardware, software, patents, etc.) on specific markets.

The birth of markets for technology has been possible thanks to the development of the patenting system. Once intellectual property rights are embedded in a patent, they can be exchanged within a well defined legal protection system.

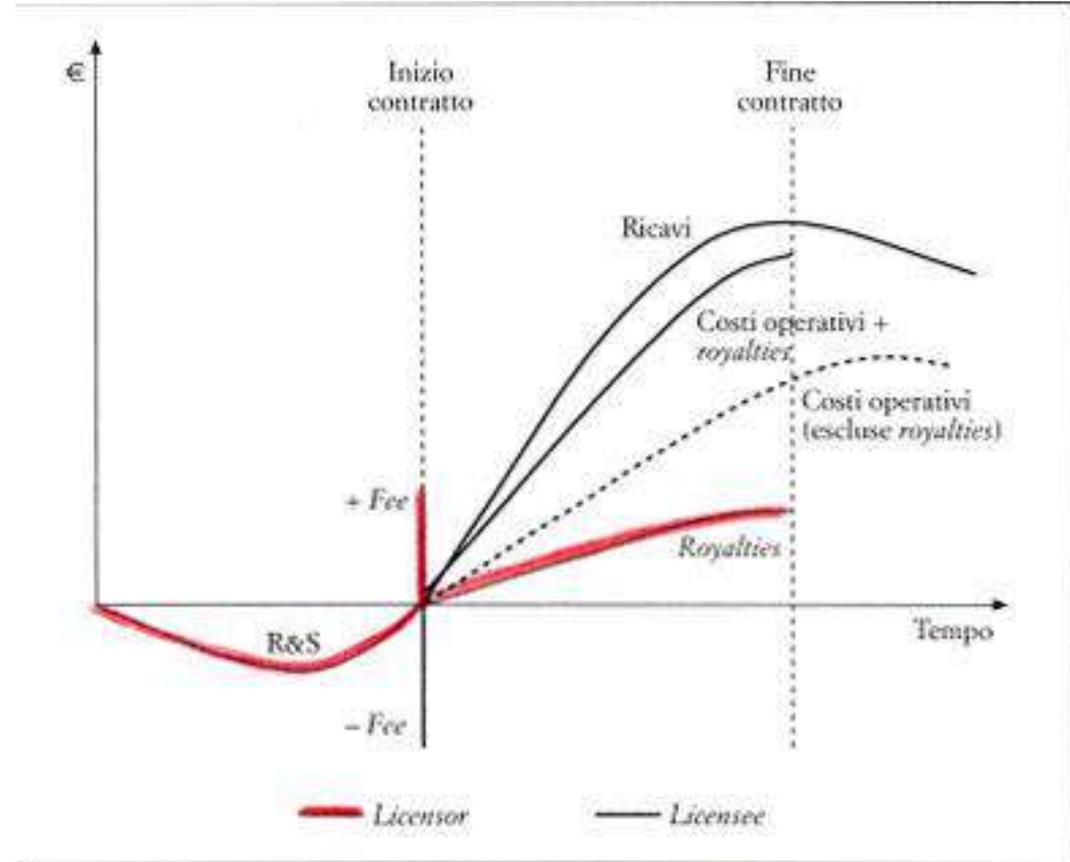
Two main aims reached:

- **Micro level:** to create new opportunities for firms to acquire technologies and increase profits;
 - **Macro level:** to improve the allocation of innovative resources within the economic system (firms that are more efficient in research than in production can concentrate on their core competences).
- 

Markets for technology: operations

1. **Licensing:** the *licensee* is allowed to use the rights related to a specific patent (or set of patents), paying the *licensor* (patent's owner) an initial fee and periodic royalties, fixed or as sale percentage. It can be:

- In: patent purchase
- Out: patent sell
- Cross licensing: mutual patent exchange, esp. for industries with complex and rapidly evolving products.



A cross-licensing example

Sony

Excluded from cross-licensing

- Digital Reality Creation (DRC) TV signal processing technology
 - PlayStation technologies
 - TFT LCD panel technologies
 - Organic EL panel technologies
- etc

Samsung

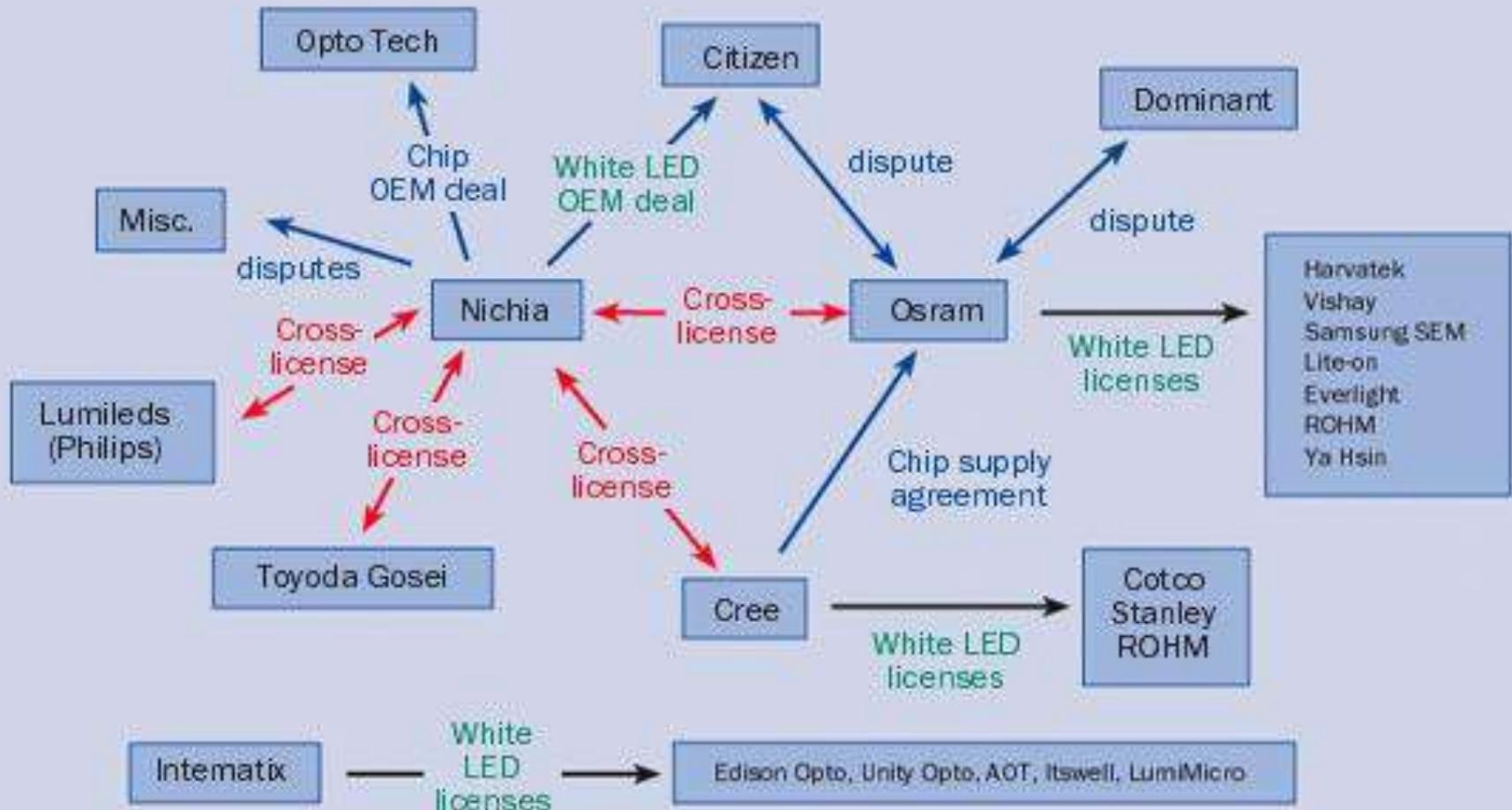
Excluded from cross-licensing

- Digital Natural Image engine (DNle) TV signal processing technology
 - Home network technologies
 - TFT LCD panel technologies
 - Organic EL panel technologies
- etc

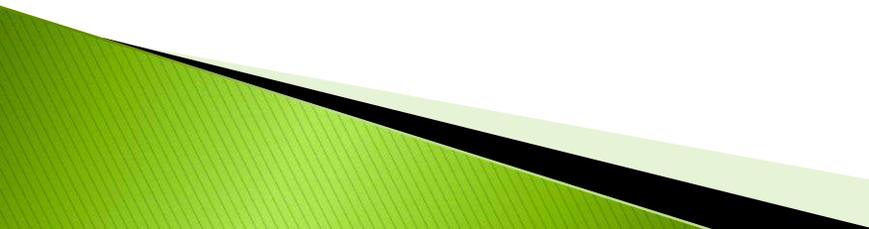
Covered by cross-licensing agreement

- Semiconductor technologies
- Data compression and communications technologies
- Industry standardization technologies
- Formatting technologies

A cross-licensing example: the LED sector



Markets for technology: operations

- 2. Collaboration among firms and patent pooling.** Firms collaborating for the joint development of a new product, for which a joint patent is filed. The patent is then management by an autonomous third party that collect the royalties and distribute them among partners in compliance with the agreement.
 - 3. Technology transfer from public research institutions to firms.** For example research mobility, spin-offs, informal and personal relations, employee training programmes, etc.
 - 4. Free licensing:** this is done to facilitate the diffusion of a standard or to signal that the firm does not have a monopolistic intention.
 - 5. Technology brokering.** Firms specialised in design and innovation developing new product for firms operating in different sectors, by recombining originally existing technologies (ex. IDEO).
- 

Markets for technology: limits

1. **Lack of transparency:** it is difficult to find the best partners for knowledge exchange.
2. **Uncertainty on legal rights:** sometimes the patent boundaries are not clear and it is not always easy for the court to judge.
3. ***Disclosure* of the characteristics of the object:** in some cases the exchange of technologies is hindered by the fear of imitation processes.
4. **Incomplete exchange object:** sometimes to acquire a patent might not be sufficient to exploit it fully, because non patented tacit knowledge is required (embedded in the owner and that the owner could have the interest to hide).
5. **Difficult integration of the new technology** within the acquiring firm (for example for insufficient knowledge or due to the “*not invented here*” syndrome).
6. **Difficult economic evaluation of the exchanged competences,** due to their intangible nature and to the uncertain economic result. Sometimes the purchaser might overestimate the value of a patent.
7. **Financial constraints,** due to difficulties in finding funders available to invest their money in highly risky innovative ventures.

Innovation and R&D

R&D collaboration

Why to collaborate with others in innovation?

1. Reduction of spillover effects
 2. Existence of markets for technology
 3. Evolution of the scientific and technological progress
 4. Economies of scale/scope
 5. Risk management
 6. Widening of the internal resources and competences base (access to complementary assets)
- 

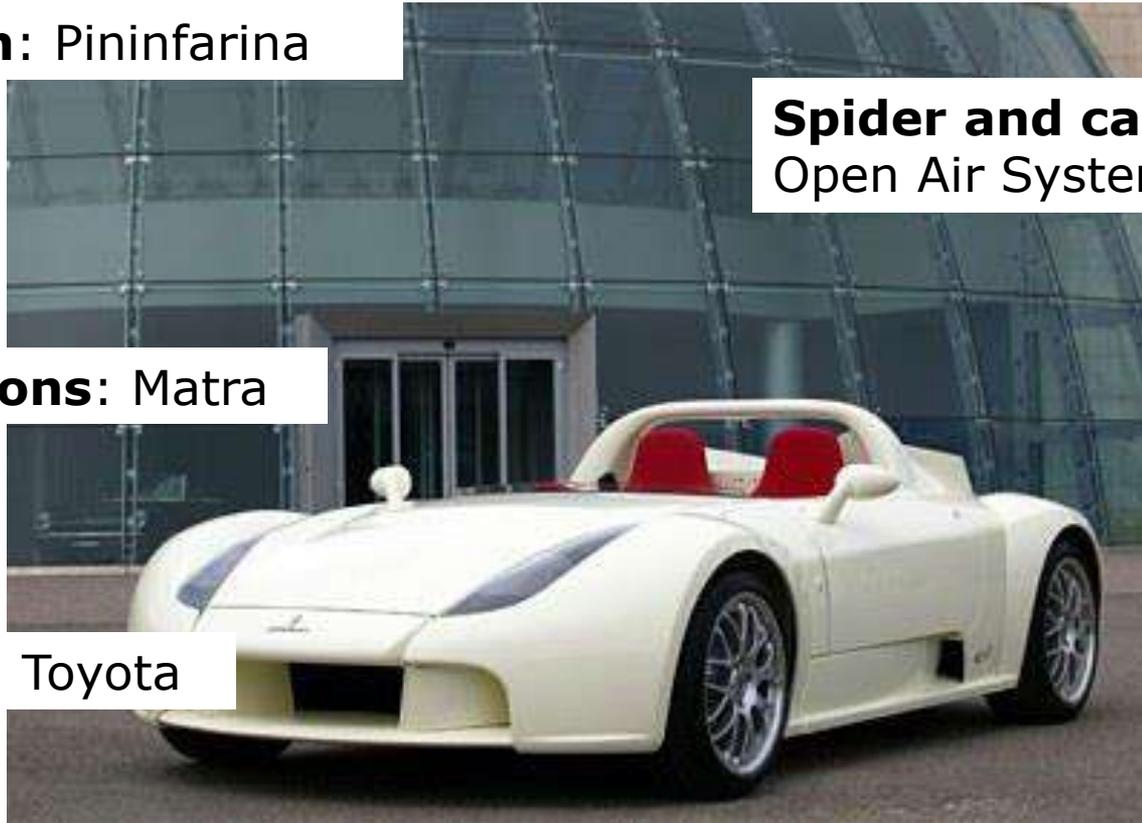
Enjoy, the first Pininfarina automobile

Design: Pininfarina

Spider and cabrio top:
Open Air System

Suspensions: Matra

Engine: Toyota



Enjoy, the first Pininfarina automobile



Ducati: the relevance of suppliers

The Desmosedici RR



Dashboard: Digitek 

handlebar: 
Dondi


Chains: Regina


Radiator: MB
Motorsport

Muffler:
Termignoni
e LeoVince


Brakes:
Brembo 

Pinions: Carat 


Wheel rim:
Marchesini

Clutch discs:
Adler 

Cooperation agreements for innovation: objectives

Cooperation agreements can have mainly two main aims: :

- Production of **tangible outputs**: partners share resources in order to reach together a more efficient dimension;
 - **Learning objectives**: focus is on tacit competences. The main aim is to acquire competences from the partner/rival in order to face radical technological changes and to include in products different technologies.
- 

Cooperation agreements for innovation: the choice of partners

Selection of partners is crucial for the agreement success, which depends from a wide variety of factors: resource compatibility, dimension and market power of partners, coherence between objectives, values and firm culture.

In particular, the partner is suitable if it owns **complementary** resources and it is characterised by **strategic compatibility** (for example, a differentiation leader cannot successfully cooperate with a cost leader).

BEFORE signing the agreement it is necessary to define the distribution of investments and incentives and also the nature of shared resources (decisions on **staffing** and on the **localisation** of the new R&D unit).

Possible problems in collaborations for innovation

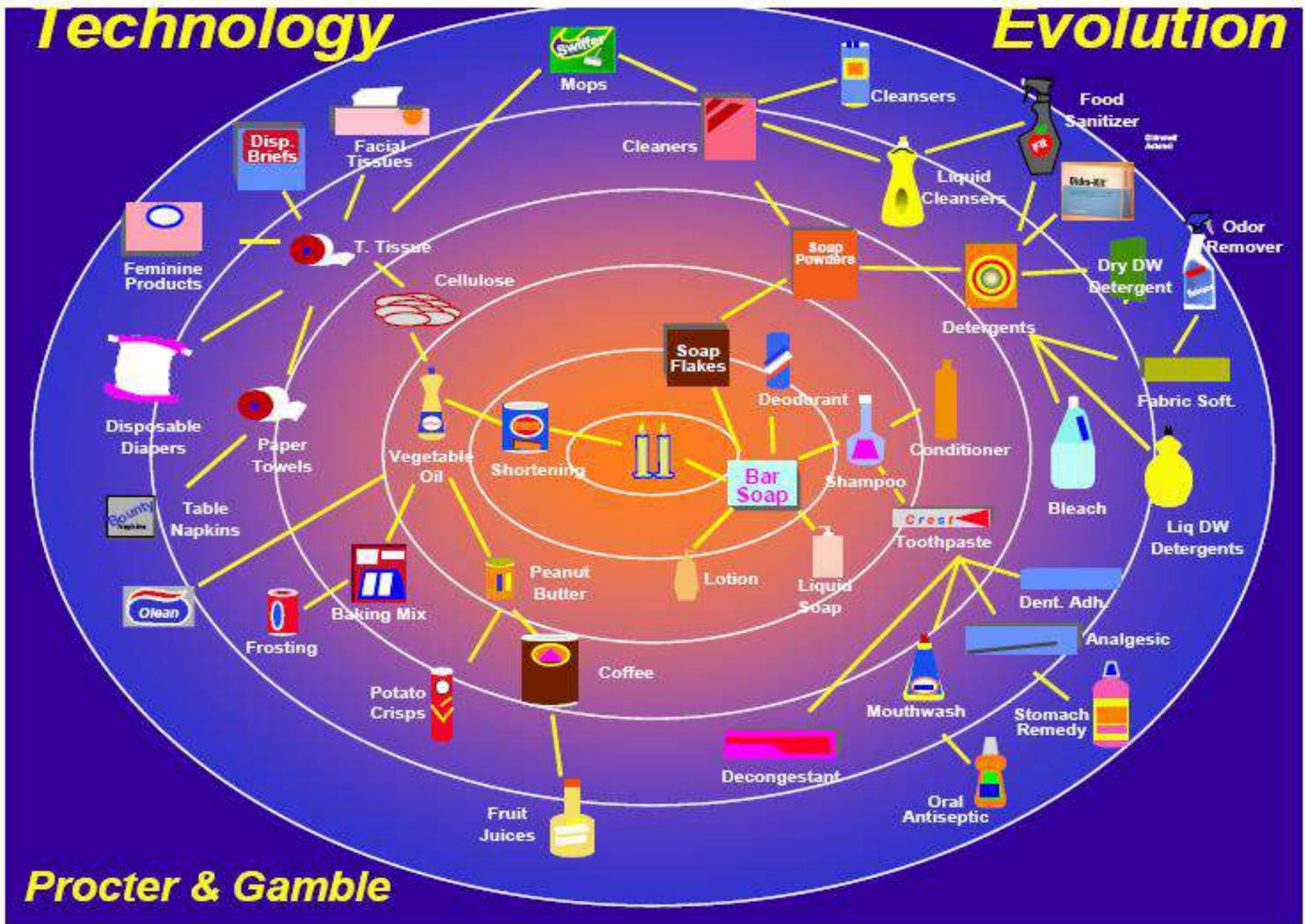
- ▶ Different objectives or coordination difficulties;
 - ▶ Difficulties in integrating the new R&D unit within the partners' structures;
 - ▶ Communication problems;
 - ▶ Insufficient *absorptive capacity* by one or more partners, i.e. capacity to correctly interpret and absorb information coming from outside;
 - ▶ Different contract power;
 - ▶ Opportunistic behaviours;
 - ▶ “not invented here” syndrome: a firm's internal R&D group refuses to apply and use innovation coming from other actors (often competitors).
- 

An example of collaboration for innovation: Procter & Gamble (P&G)

Procter & Gamble is a multinational company operating in many different sectors, for which innovation is synonymous of market survival.



P&G: the birth of the innovative idea



Collaboration to innovate: the P&G case

In 2000 **P&G** starts a new R&D strategy , named “Connect and develop”, with this aim: in 5 years, 50% of new products from internal R&D and the remaining **50% from open innovation**.

Four main reasons:

1. **Growth.** The yearly growth target is 4 billion \$ of sales. Internal R&D alone would not have been able to keep the pace with this target.
2. **Time to market.** The external experience accelerates the product development.
3. **Costs.** External R&D is formed by million of persons, and produces at much lower costs.
4. **Cross-innovation.** Accessing the world market allows to have access to very different markets, with unusual but transferrable solutions.

All objectives are reached and surpassed in 2006.

Collaboration to innovate: the P&G case

To contact potential external collaborators for innovation, P&G uses a specific website



Partnering for

Mutual Value

It's a fact: collaboration accelerates innovation. In an increasingly connected world, the biggest business wins come from working together. When we partner externally, inspiration and innovation—and mutual value creation—are at our fingertips.



Innovating, Together

P&G's Connect + Develop program helps initiate partnerships to meet today's needs across the P&G business: for products, technology, in-store, ecommerce and the supply chain. Whether you are an individual inventor, a small business, or a Fortune 500 company, Connect + Develop is designed to help innovators and patent-holders connect with P&G.

[LEARN MORE >](#)

Collaboration to innovate: the P&G case

What is Connect + Develop?

Open Innovation at P&G

To put it simply, P&G aims to partner with the world's most innovative minds— from individual inventors and small businesses, to Fortune 500 companies— to deliver on the company's most challenging opportunities.

Connect + Develop helps P&G engage with innovators and patent-holders to meet needs across the P&G business: for products, technology, in-store, ecommerce and the supply chain.

How Does it Work?

P&G partners with external resources to drive discontinuous, sustainable innovation and productivity.

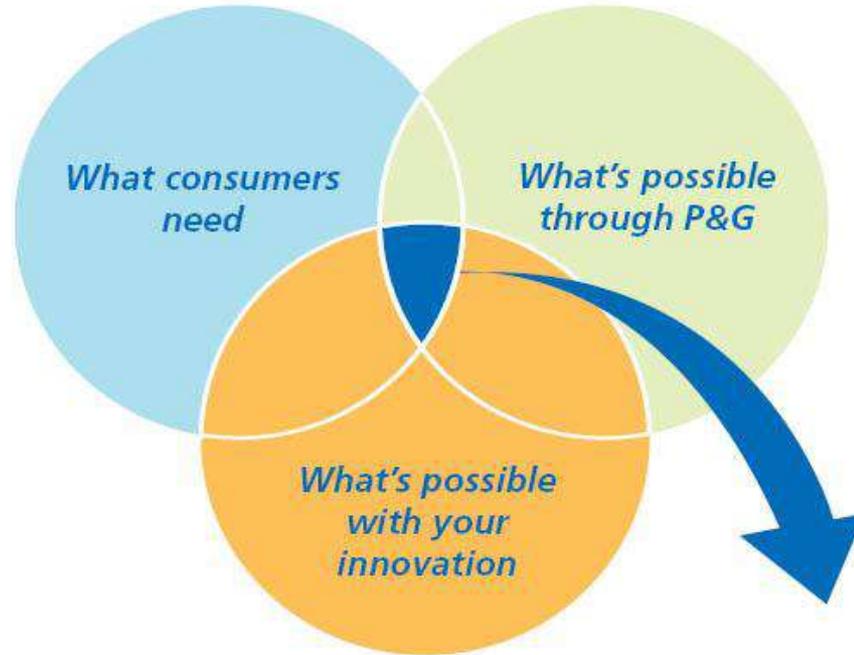
Within P&G, we have a global team dedicated to empowering Connect + Develop, searching for innovations, working with prospective partners and shepherding breakthrough innovations through the company and into market.

If you have an innovation that can improve the lives of our customers, you could be our next Connect + Develop partner.



Collaboration to innovate: the P&G case

Considering the wide range of use of its products, in order to keep a high innovative level, it is necessary to continuously collaborate with other firms and other actors.



Connect + Develop allows us to quickly create and introduce new innovations by incorporating the capabilities of external resources.

Ex. Pringles prints

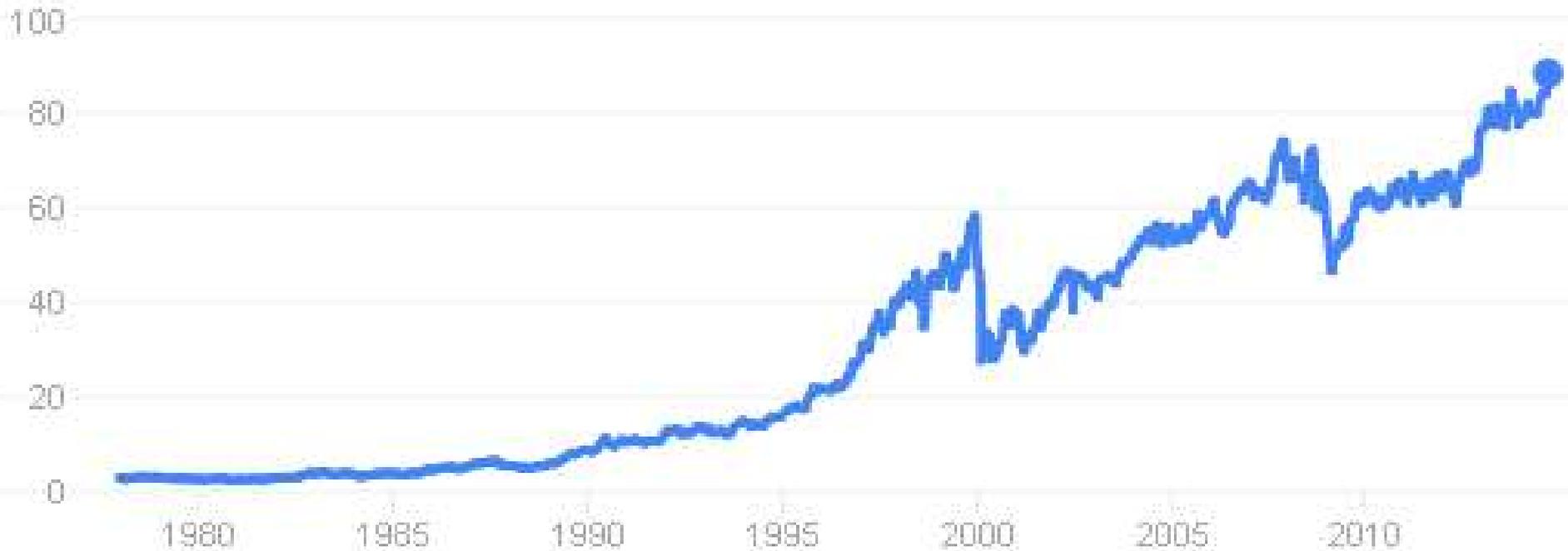


Results

Today, more than 35% of new products on the market are at least partially the result of external innovation, against 15% in 2000.

45% of initiatives currently included in the product portfolio have key elements discovered externally.

These results reached with a decrease in the internal R&D expenditure and with a trademark portfolio valued 22 billion dollars.



Innovation and R&D

Pioneers and followers

Innovation and firm's positioning

The choice of the timing of entry of an innovation of the market is strategic and it affects the competitive dynamics of the sector.

There are three categories:

- FIRST MOVERS or PIONEERS
- EARLY FOLLOWERS
- LATE ENTRANTS



The pioneer's advantages

1. **Brand loyalty;**
 2. **Technological leadership:** consumers might identify the pioneer's product as standard;
 3. **Patents:** the pioneer can patent its innovation (not in all sectors and for all innovations);
 4. **Switching costs:** to be paid by consumers who want to leave the existing product for another (even for higher quality ones);
 5. **Externalities:** if the pioneer is able to create a wide network of customers it could be very difficult for followers to enter the market;
 6. **Experience effects and scale economies;**
 7. **Exclusive access to scarce resources and control of the distribution channels;**
 8. **Capacity to absorb initial losses and to implement aggressive strategies.**
- 

The follower's advantage

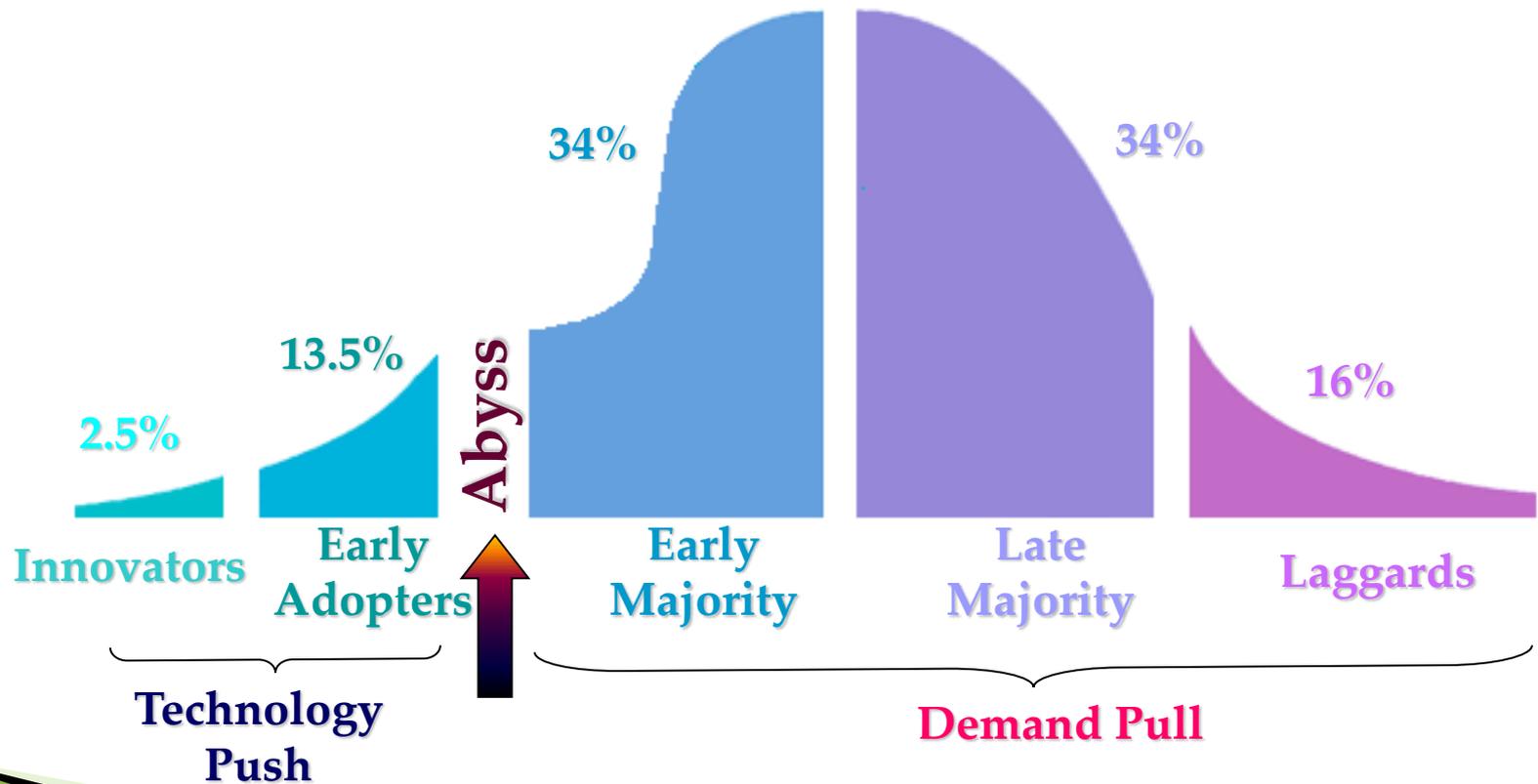
- a. Lower R&D costs
 - b. Necessity of “enabling” technologies;
 - c. Reduction in the innovation launch timing;
 - d. Learning effects:
 - 1. As regards production and marketing the follower learns from the pioneer's mistakes;
 - 2. The follower can exploit the learning efforts of clients;
 - e. Possibility to develop a second generation technology which is better than the one launched by the pioneer;
 - f. Possibility to exploit already developed technologies and complementary products;
 - g. Possibility to operate on a less uncertain market.
- 

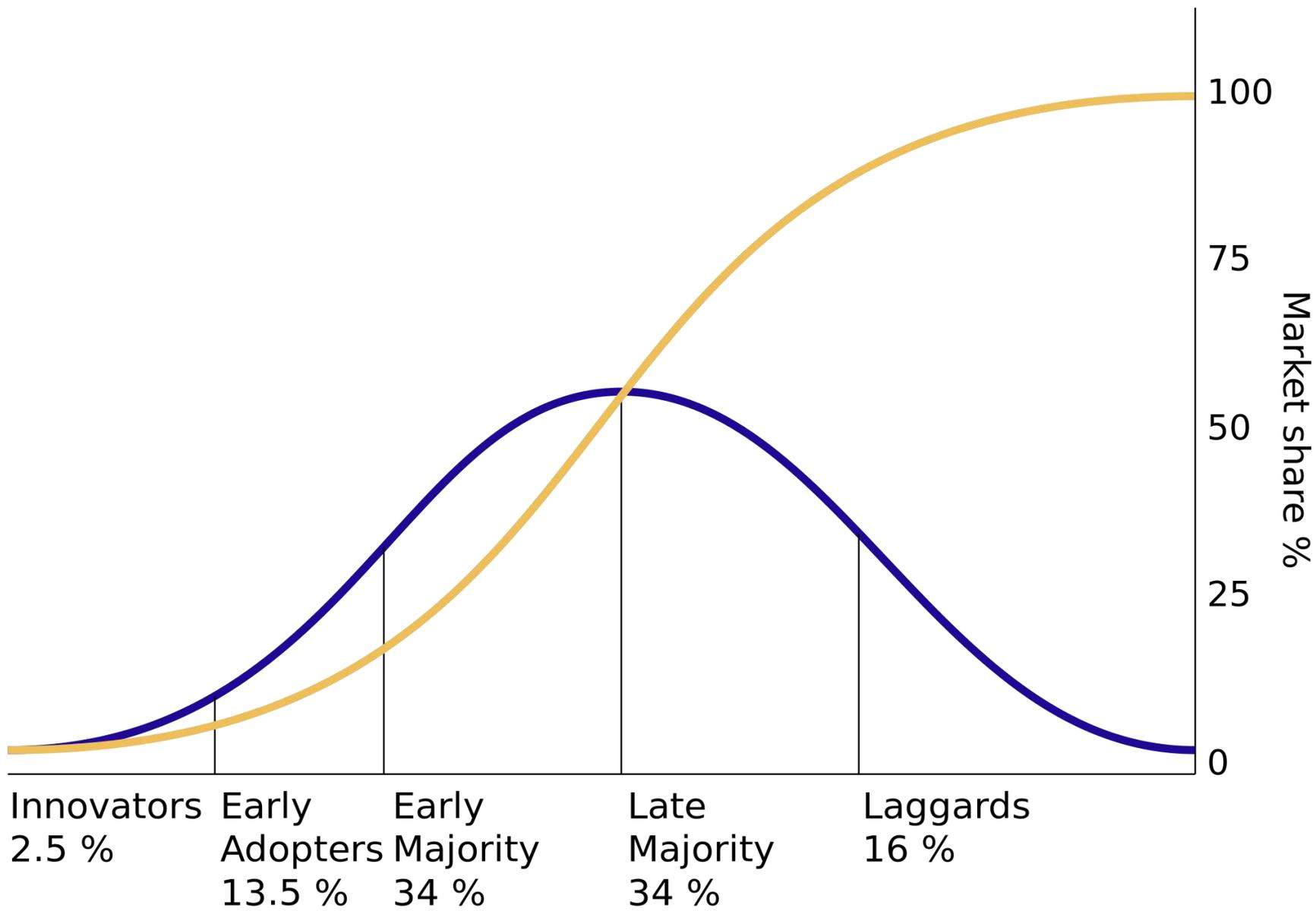
Pioneer or follower: who wins?

Product	Pioneer	Main follower	Winner
Instant cameras	 Polaroid	 Kodak	Pioneer
Video recorders	 SONY	 Matsushita®	Follower
Video cameras 8 mm.	 Kodak	 SONY	Follower
Diapers	 Johnson & Johnson	 Pampers.	Follower
Videogame console	 MAGNAVOX®	 AT&T	Follower
Microprocessors	 intel	 AMD	Pioneer
PC	 Olivetti	  IBM	Follower
Internet browser	 MOSAIC	 Netscape  Internet Explorer	Follower

The innovation diffusion

The choice of being pioneer or follower is related to the innovation diffusion, which usually follows this scheme:





The innovation diffusion

Diffusion is faster in case of:

- 1) **Simple product;**
 - 2) **High compatibility with existing products;**
 - 3) **High relative advantage;**
 - 4) **Efficient communication:**
 - 1) **Observability;**
 - 2) **“tryability”.**
- 

Velocity of diffusion: some examples

	Launch year	Penetration rate 15 years after launch
Washing machines	1908	23
Freezers	1911	3
Air conditioners	1932	1
Microwave oven	1957	1
Vacuum cleaner	1908	33
Blender	1946	9
Radio	1920	72
B&W TV	1939	63
Colour TV	1954	38
ATM	1970	60

Summary

- ▶ Market for technologies
- ▶ R&D collaboration
- ▶ Pioneers and followers
- ▶ Innovation diffusion

Reading list

- Chapter 17: 17.4, 17.5 (excl. 17,6) Lipczynski et al., 2013