Patents: mapping, outlook and design around

@ PhD *plus*

Pisa, March 2015

A common view about patents

A common view about patents

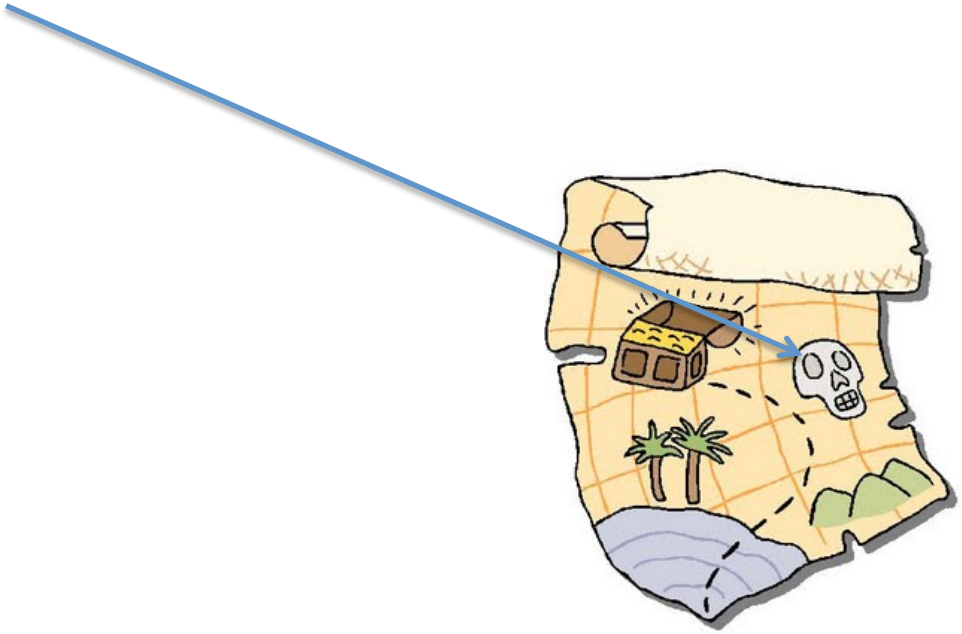
A wider view about patents

A wider view about patents

With a good map you can…

With a good map you can…

Spot obstacles…



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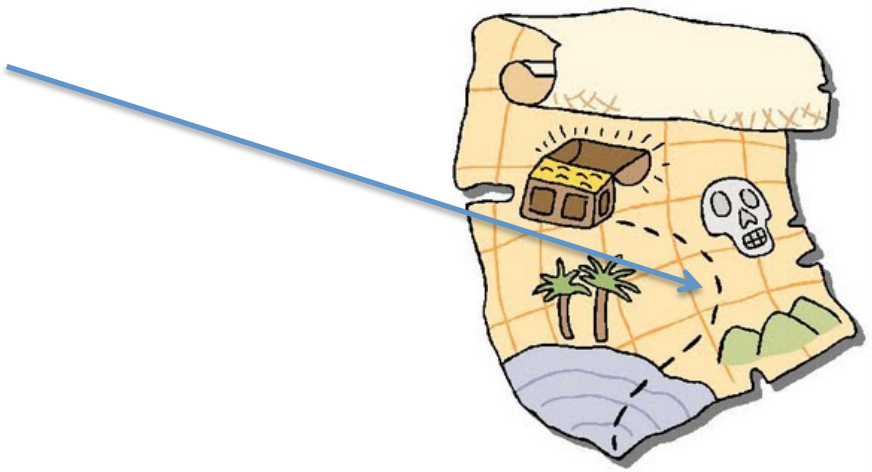
Explore new territories



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(i.e. guide R&D)

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Detect technical trends
Track competitors, partners, clients

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With a good map you can…

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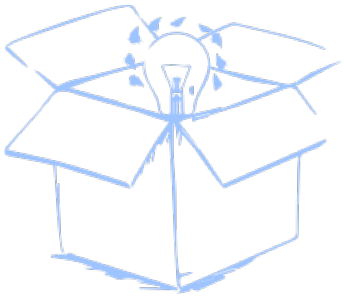
Explore new territories
(i.e. guide R&D)

Detect technical trends
Track competitors, partners, clients
(i.e. competitive intelligence)

Find hidden treasures
(i.e. M&A, investments, license, new markets…)

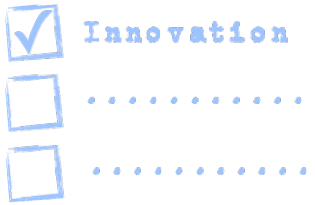
Innovation is what sets companies apart



Innovation is

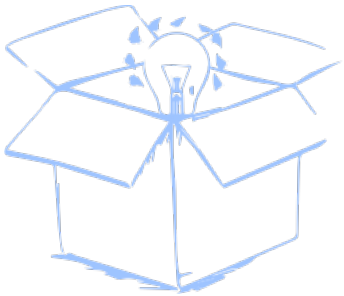
competitiveness

trendiness



a top priority

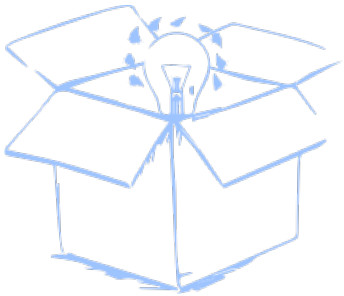
Innovation is not a linear process



Idea

Market

Innovation is not a linear process



Idea

Technical issues

Economical issues

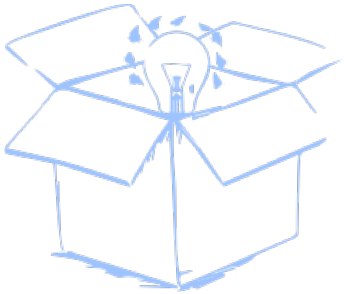
Legal issues

Logistic issues

...

Market

Innovation can be done with smart approach to IP



patents

↓

strategy

↓

product

↑

- Verify patentability
- File patents to guarantee market exclusivity and attract investments
- Detect emerging technologies and trends
- Be aware of competitors' strategies
- Acquire IP
- Smart product design

Streamline the innovation process

patents

research

mapping

strategy

protection
valorization

technology
foresight

product

design
around

conceptual
design

IP and R&D

80% of information contained in patents is not available elsewhere

Only a part of the world corpus of 70M patents is still active.

- Avoid reinventing the wheel (e.g. license and invest R&D elsewhere)
- Keep updated on state of the art
- Use as an indicator of the degree of development
- Find ideas, inspiration or complementary technologies
- Inventive principles (see TRIZ)
- Import solutions from different field (crossover)
- Discover new clients and new application areas for your invention

IP and business

- Protect your market share
- Increase your market share, via direct patenting, buying, license, or M&A
- Pioneer patent versus fence patents around it
- Mislead competitors
- Block an area / a solution, keeping off everyone else
- Aggressive threats, mining, trolling, etc.
- Foster licence / cross-licence and partnerships
- Attract investments or increase evaluation leveraging IP

IP and strategy

- Strategic comparison against competitors
- Identify potential partners and opportunities

insight

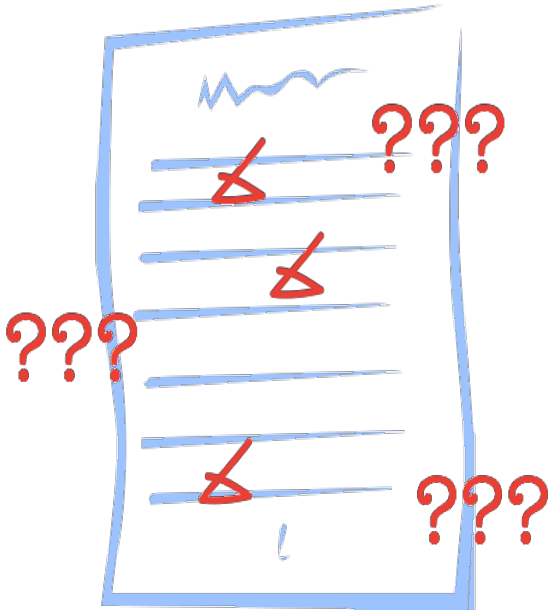
- Characterize recent technologies and their advantages and disadvantages
- Detect characteristic development patterns
- Identify technology trends

foresight

IP and start-up

- Patents are very important for reputation / promotion
- Patents are sometimes the only parameter to value startups
- Patents attract investments
- The broader the technical areas covered by the portfolio, the better
- Proliferation of patents is a danger, though

Patent research can be a tricky task…



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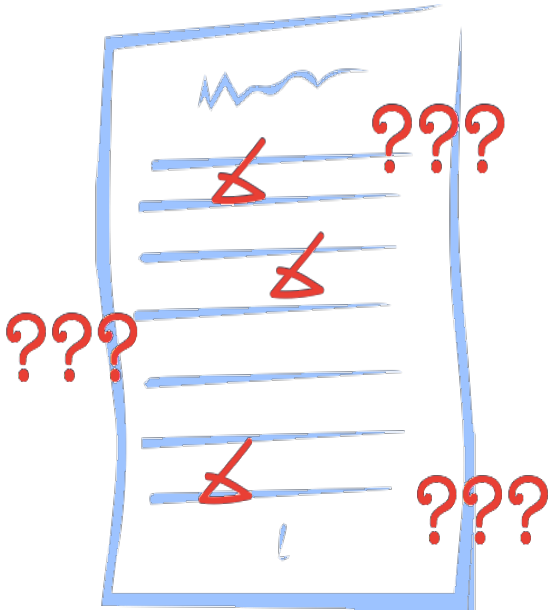

Content-related issues

- Great number of potentially relevant patents
- Signal to noise, not just recall vs precision
- Granularity, from single patent to whole field
- Methodology to select, compare, organize IP
- Presence of technical variants
- Partial overlap of content

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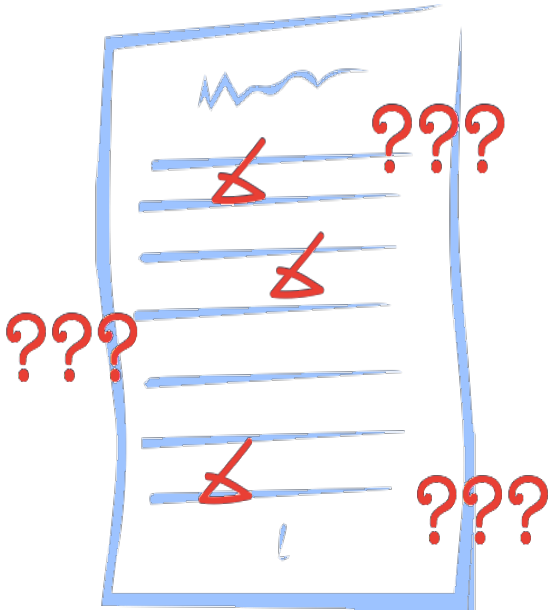


Data-related issues

- Natural language: alternate spellings, synonyms, technical slang, polysemy
- Obscure or ambiguous language, often intentional
- Incompleteness, omissions: non-standard classes, “hidden” assignees, …
- Plain mistakes by inventors, lawyers, or examiners

How to search for patents

Espacenet, Google patents, of course.

Espacenet has an excellent guide not just on grammar but on tricks to construct good searches

- Understand the field (not obvious), both for lexicon and for industry needs, and then segment your query
- Understand functioning (not obvious), and functionalize your query (many engines offer proximity search)
- When using boolean operators, divide your query into sub queries

How to search for patents

Always check your engine for:

- Stemming/lemmatization: circle / circles, circle / circular, etc
- Special characters: () - & …

Look for synonyms to increase recall but pay attention not to enlarge too much, and avoid losing precision using various tricks.

Beware of generic words: can (type of combustor) is also

- to be able to (modal auxiliary)
- can bus
- cylindrical container
- preserve food

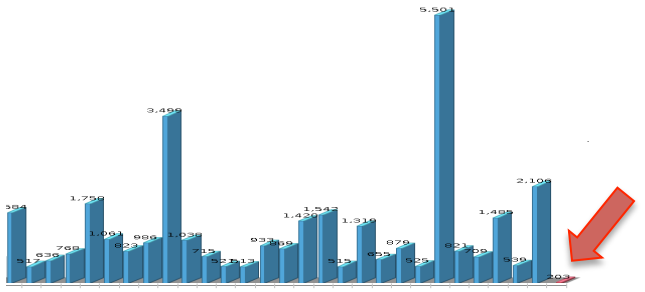
How to search for patents

Make clever use of the structure of patents
(title, abstract, claims, description, drawings)

Make clever use of metadata

Beware of metadata though:

- IPC - now CPC - not suitable for transverse technologies
- Companies cheat (e.g. windscreen)
- Alternative spellings (GE, Gen. Electric, General Electric)
- Inventors as assignee hiding big company
- One may not be aware of newcomers
- …



A case study

The initial condition

- Medium sized global company
- Company had already invested **2 million Euro** in the R&D of two innovative devices
- Products were already at the **prototype** stage when the analysis was performed

Goals

- File as many patents as possible, to guarantee **market exclusivity** and **attract investments**
- Awareness of **all competitors** movements; big players are known but small start-ups are not
- Need for a **Freedom to Operate** in the US market or **patentability** of inventions

Infringement & patentability

Between the 2 devices, a total of **14 inventive ideas** has been identified as potential innovations to be protected

For each of the 14 ideas, the patent db has been scanned to look for similar solutions

Analysis of the most relevant documents. As a result:

- **4** ideas were truly new and could be **patented** straight away
- **6** ideas had already been presented in expired patents. Safe to use but **not patentable**
- **3** ideas were in infringement of valid patents, but it was possible a **design around**
- **1** idea was very similar to a recent patent, but enough prior art to guarantee **FtO**

Design around and redesign

- 3 solutions needed a design around of existing patents
- Mapping the IP scenario allowed to spot **gaps** that could be exploited as well as uncharted technical areas.
- Hints and useful technologies to be imported from different fields were also looked for.
- Taking advantage of the previous analyses,

  6 additional innovative **solutions** were designed
- As a result, the final devices were not just legally safer, the redesign **improved** their functionality even more.

Outcome

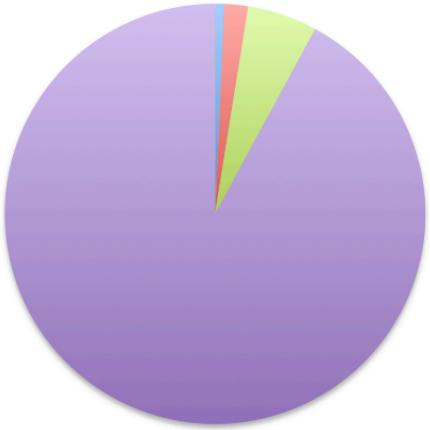
- Combining initial solutions and redesigned ones, the company could file **7 patents**
- A full **Freedom to Operate** in the US market has been provided for the two devices
- The company attracted further **investors** for its project
- The two devices are now ready for launch in the **market** and a third variant is on the way
- A pool of design solutions and a full **mapping** of the field available for future reference

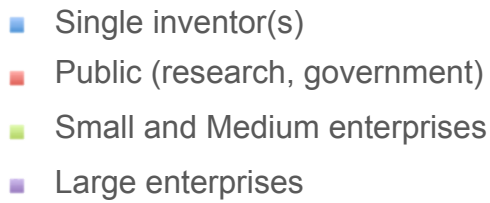
Tools to support design (and redesign)

Is it possible to make the process systematic?

- Of course, good mapping to detect white spaces, crossover etc..
- “Creativity as an exact science”:
  G. Altshuller and his 40 inventive principles
- Formalization of problems to find solutions by analogy.
- Functional analysis.
- Euristics (*eu* = good + *risko* = to find).
- ….

Understanding the market





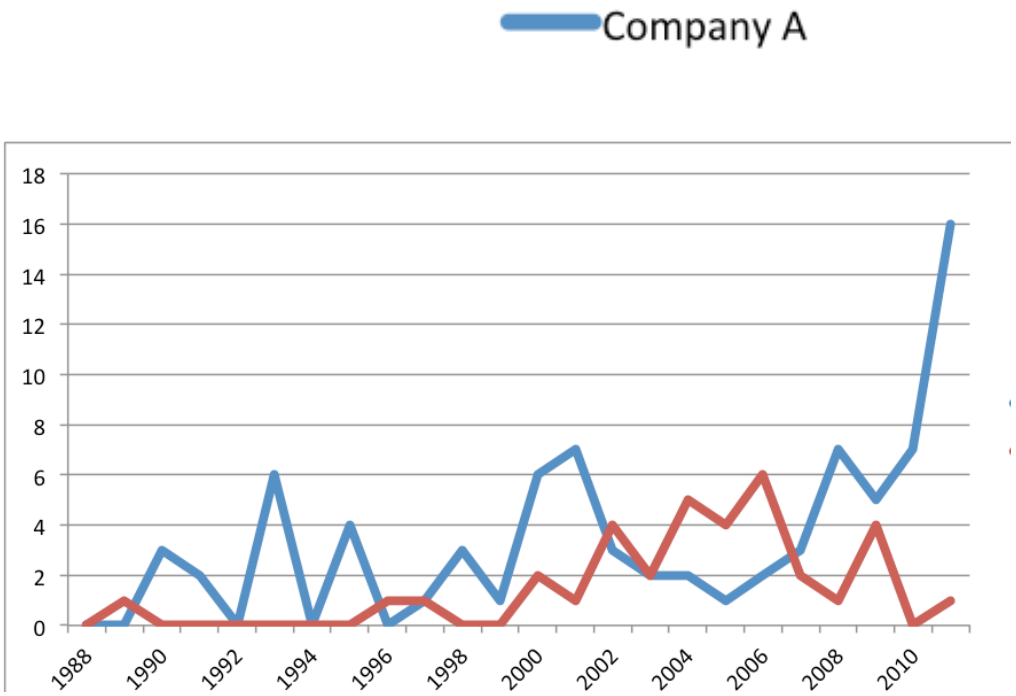
BIOINFORMATICS

Of course big players are present, but 3/4 of the patents in the field come from specialized companies, research centres, start-ups

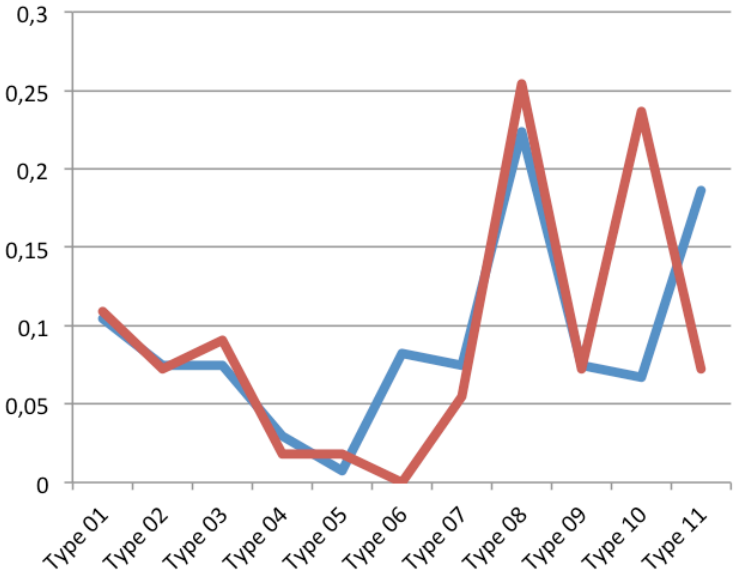
GAS TURBINES COMPONENT

Large companies dominate. Among them GE detains almost half of the patents

Understanding the market

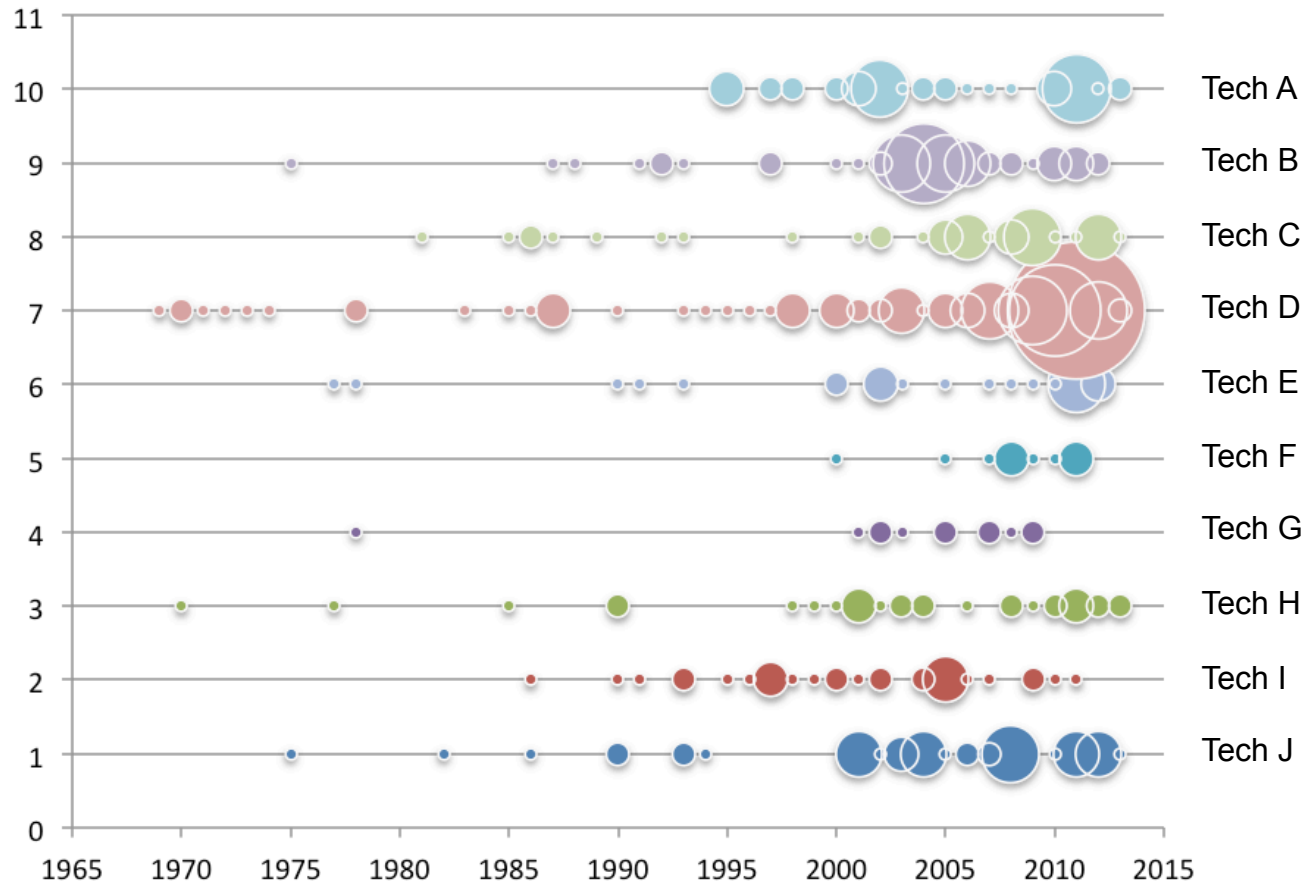


Filing activity over years



Filing activity over sectors

Comparative evolution of similar technologies

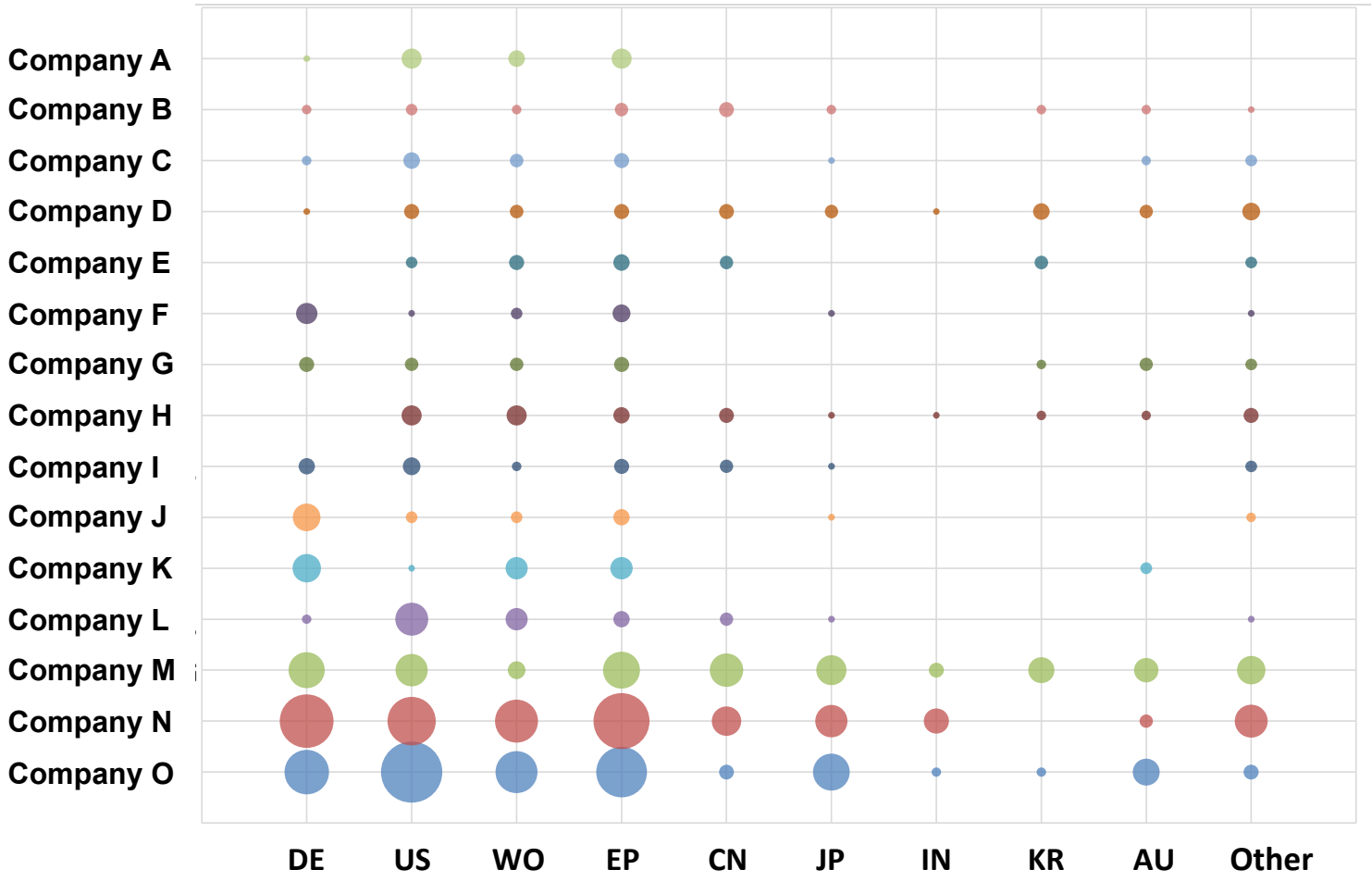


Activity by year in each technical area (can be done for individual assignee)

Understanding the market

Where is the action taking place? Geographical distribution of assignees.

Understanding the market



Where is the action taking place - take 2: extensions to various jurisdictions

Understanding the market

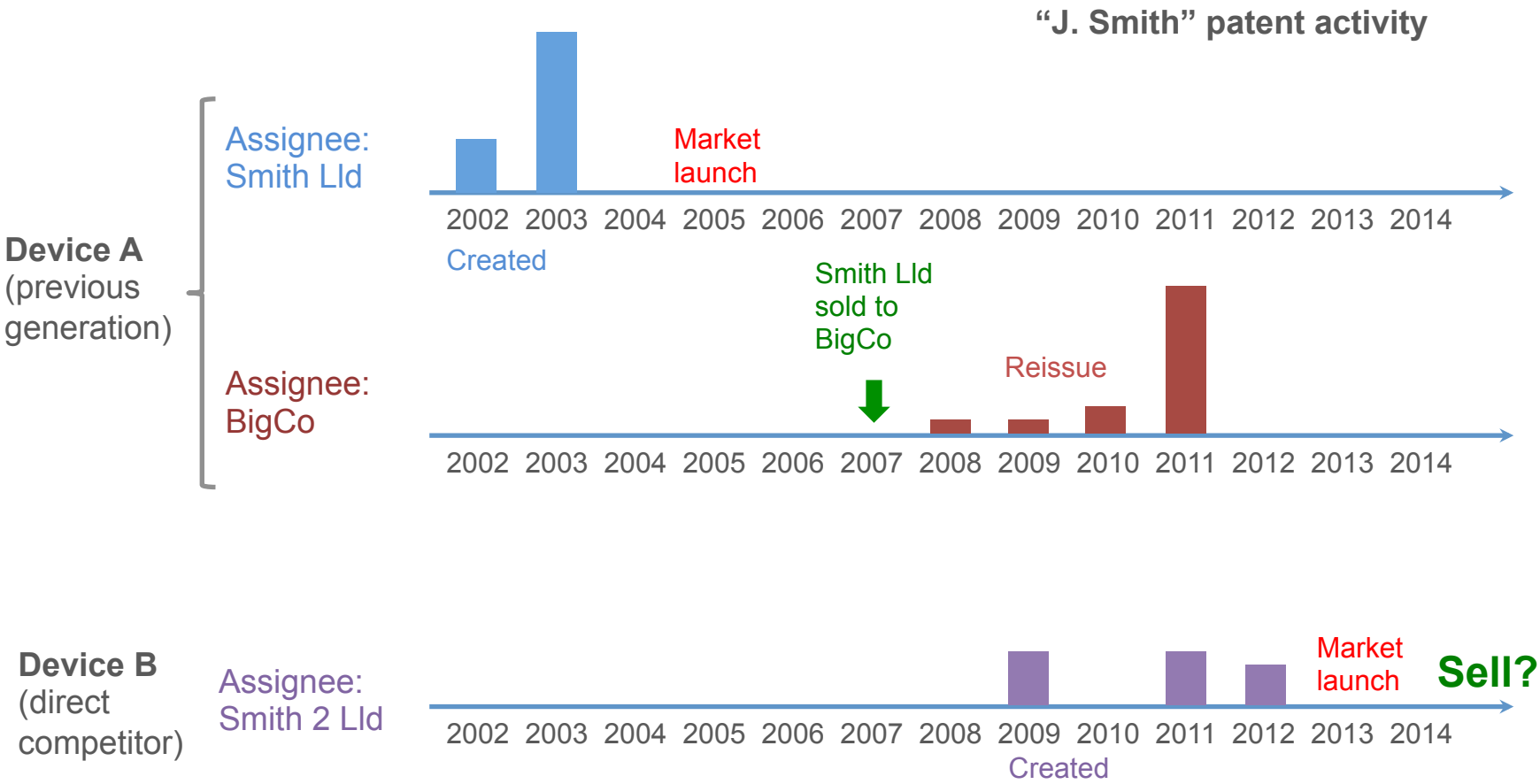
In the case study,

one of the client's planned solutions was infringing a patent by "J.Smith".

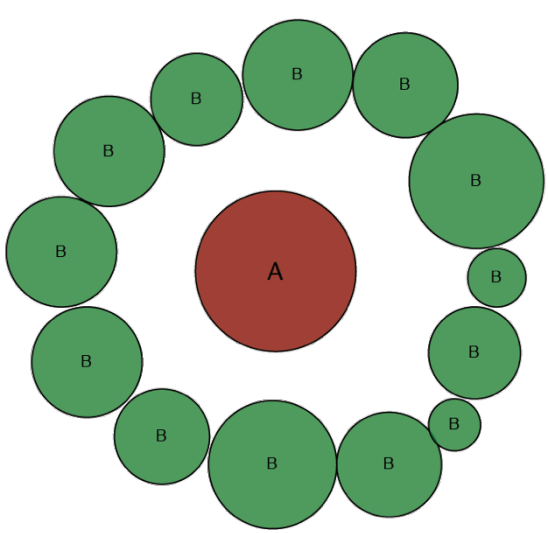
Such patent is owned by an independent, small start up.

Is it a danger or an opportunity?

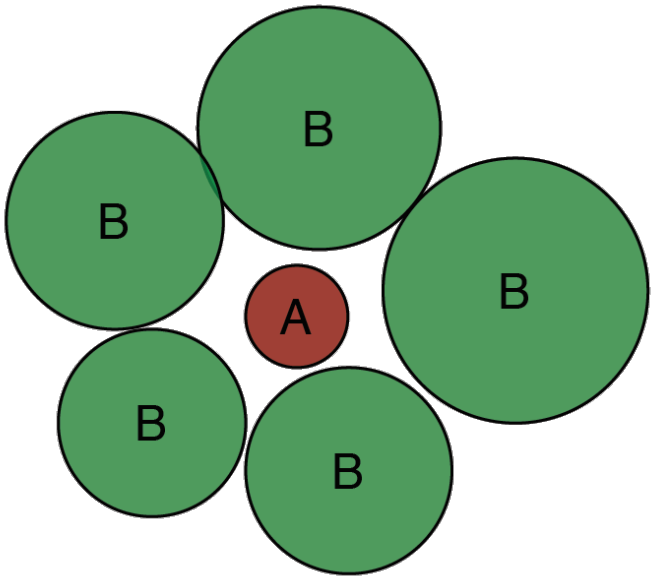
Understanding the market



Positioning a patent



Strong patent



Weak patent

Positioning a patent

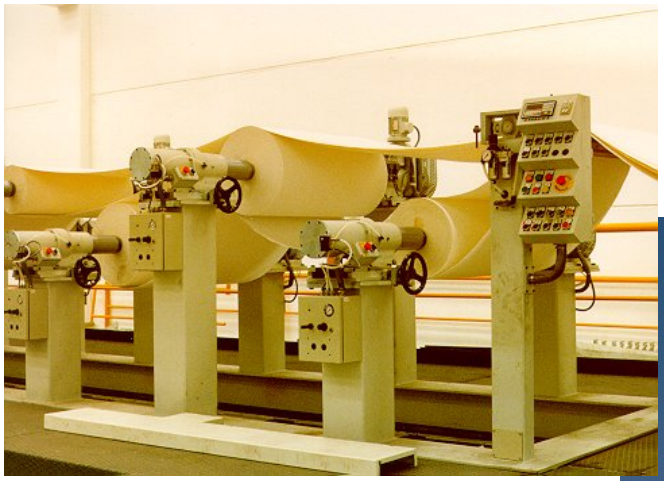
Internal factors

- Age of the patent
- Extension (EP, US, WO, …)
- Status (A1, B1, …)
- Quality of writing
- Quality of coverage
- Part of a strategy

External factors

- Trend of the field / IPC class
- Hype (e.g. Gartner)
- Number and type of other players
- Number of citations received
- Potential infringements

Crossover



Crossover and new market

APPLICATION/CLASSES

MICRO-ORGANISMS OR ENZYMES COMPOSITIONS PROPAGATING, PRESERVING, OR MAINTAINING MICRO-ORGANISMS MUTATION OR GENETIC ENGINEERING CULTURE MEDIA

MEASURING OR TESTING PROCESSES INVOLVING ENZYMES OR MICRO-ORGANISMS (immunoassay G01N 33/53) COMPOSITIONS OR TEST PAPERS THEREFOR PROCESSES OF PREPARING SUCH COMPOSITIONS CONDITION-RESPONSIVE CONTROL IN MICROBIOLOGICAL OR ENZYMOLOGICAL PROCESSES

PREPARATIONS FOR MEDICAL, DENTAL, OR TOILET PURPOSES

SUGARS DERIVATIVES THEREOF NUCLEOSIDES NUCLEOTIDES NUCLEIC ACIDS

PEPTIDES

INVESTIGATING OR ANALYSING MATERIALS BY DETERMINING THEIR CHEMICAL OR PHYSICAL PROPERTIES

ELECTRIC DIGITAL DATA PROCESSING

FERMENTATION OR ENZYME-USING PROCESSES TO SYNTHESISE A DESIRED CHEMICAL COMPOUND OR COMPOSITION OR TO SEPARATE OPTICAL ISOMERS FROM A RACEMIC MIXTURE

SPECIFIC THERAPEUTIC ACTIVITY OF CHEMICAL COMPOUNDS OR MEDICINAL PREPARATIONS

NEW PLANTS OR PROCESSES FOR OBTAINING THEM PLANT REPRODUCTION BY TISSUE CULTURE TECHNIQUES

COMBINATORIAL CHEMISTRY LIBRARIES, e.g. CHEMICAL LIBRARIES, IN SILICO LIBRARIES

APPARATUS FOR ENZYMOLOGY OR MICROBIOLOGY

ANALOGUE COMPUTERS

PRESERVATION OF BODIES OF HUMANS OR ANIMALS OR PLANTS OR PARTS THEREOF BIOCIDES, e.g. AS DISINFECTANTS, AS PESTICIDES OR AS HERBICIDES PEST REPELLANTS OR ATTRACTANTS PLANT GROWTH REGULATORS

ANIMAL HUSBANDRY CARE OF BIRDS, FISHES, INSECTS FISHING REARING OR BREEDING ANIMALS, NOT OTHERWISE PROVIDED FOR NEW BREEDS OF ANIMALS

DATA PROCESSING SYSTEMS OR METHODS, SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL, FINANCIAL, MANAGERIAL, SUPERVISORY OR FORECASTING PURPOSES SYSTEMS OR METHODS SPECIALLY ADAPTED FOR ADMINISTRATIVE, COMMERCIAL, FINANCIAL, MANAGERIAL, SUPERVISORY OR FORECASTING PURPOSES, NOT OTHERWISE PROVIDED FOR

HETEROCYCLIC COMPOUNDS (macromolecular compounds C08)

RECOGNITION OF DATA PRESENTATION OF DATA RECORD CARRIERS HANDLING RECORD CARRIERS

COMPUTER SYSTEMS BASED ON SPECIFIC COMPUTATIONAL MODELS

DIAGNOSIS SURGERY IDENTIFICATION (analysing biological material G01N, e.g. G01N 33/48)

ACYCLIC OR CARBOCYCLIC COMPOUNDS

BIOCIDAL, PEST REPELLANT, PEST ATTRACTANT OR PLANT GROWTH REGULATORY ACTIVITY OF CHEMICAL COMPOUNDS OR PREPARATIONS

FOODS, FOODSTUFFS, OR NON-ALCOHOLIC BEVERAGES, NOT COVERED BY SUBCLASSES A21D OR A23B-A23J THEIR PREPARATION OR TREATMENT, e.g. COOKING, MODIFICATION OF NUTRITIVE QUALITIES, PHYSICAL TREATMENT PRESERVATION OF FOODS OR FOODSTUFFS, IN GENERAL

Pharmaceutical, agriculture, food processing, ….

Crossover and new market

Company expanding to a new field, still in the R&D stage, interested in scouting business opportunities

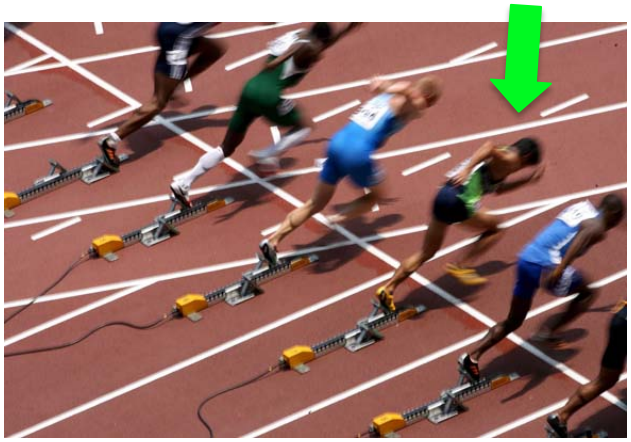
Who will win?

Crossover and new market

Company expanding to a new field, still in the R&D stage, interested in scouting business opportunities

The client asked for…

- Smart classification of existing technologies
- Individuation of technical issues (even unexpected ones)
- Analysis of assignee, coverage, etc.
- **Ranking of significance** (according to chosen criteria)



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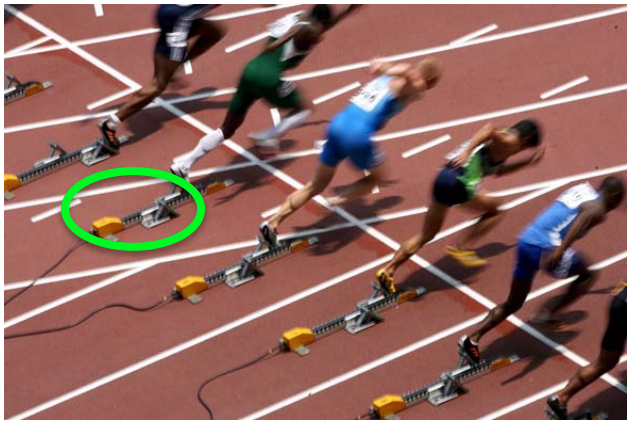


and it actually turned out that…

- Facilitate crossover
- Detect **complementary/supporting** technologies
- Detect **cross-product subsystems**

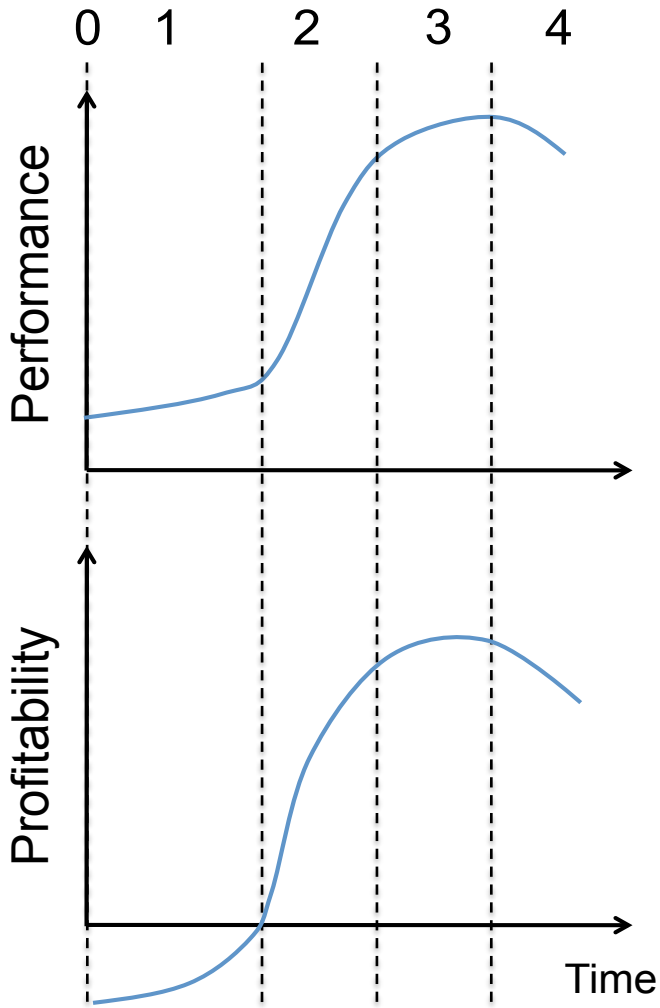
Evolution trends & foresight

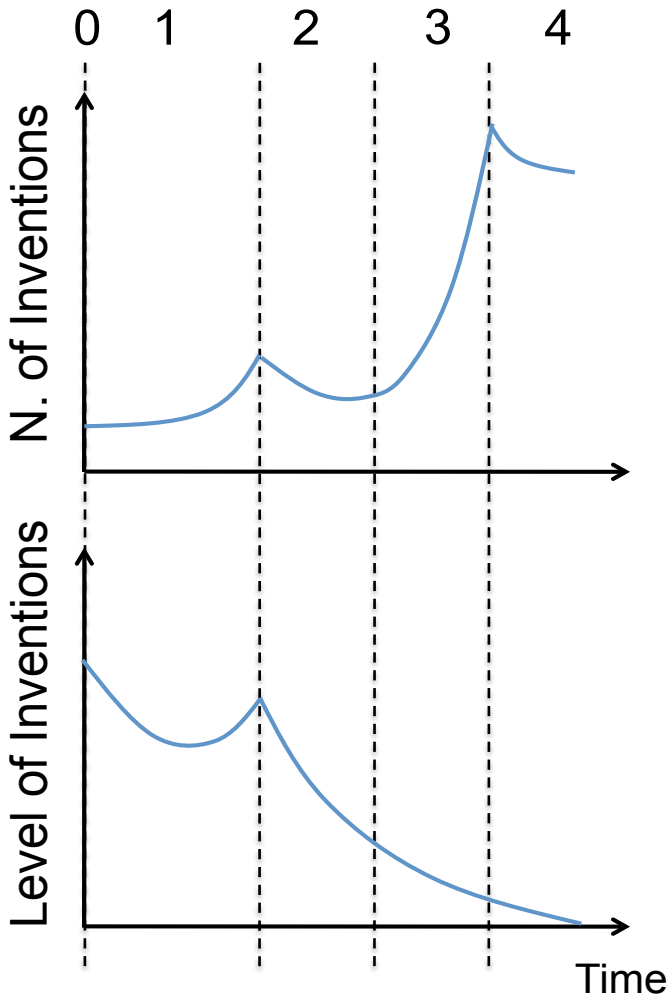
IDEALITY = ∑ Useful functions /∑ Not useful functions

IDEALITY = ∑ Benefit / (∑ Cost + ∑ Harmful side eff.)

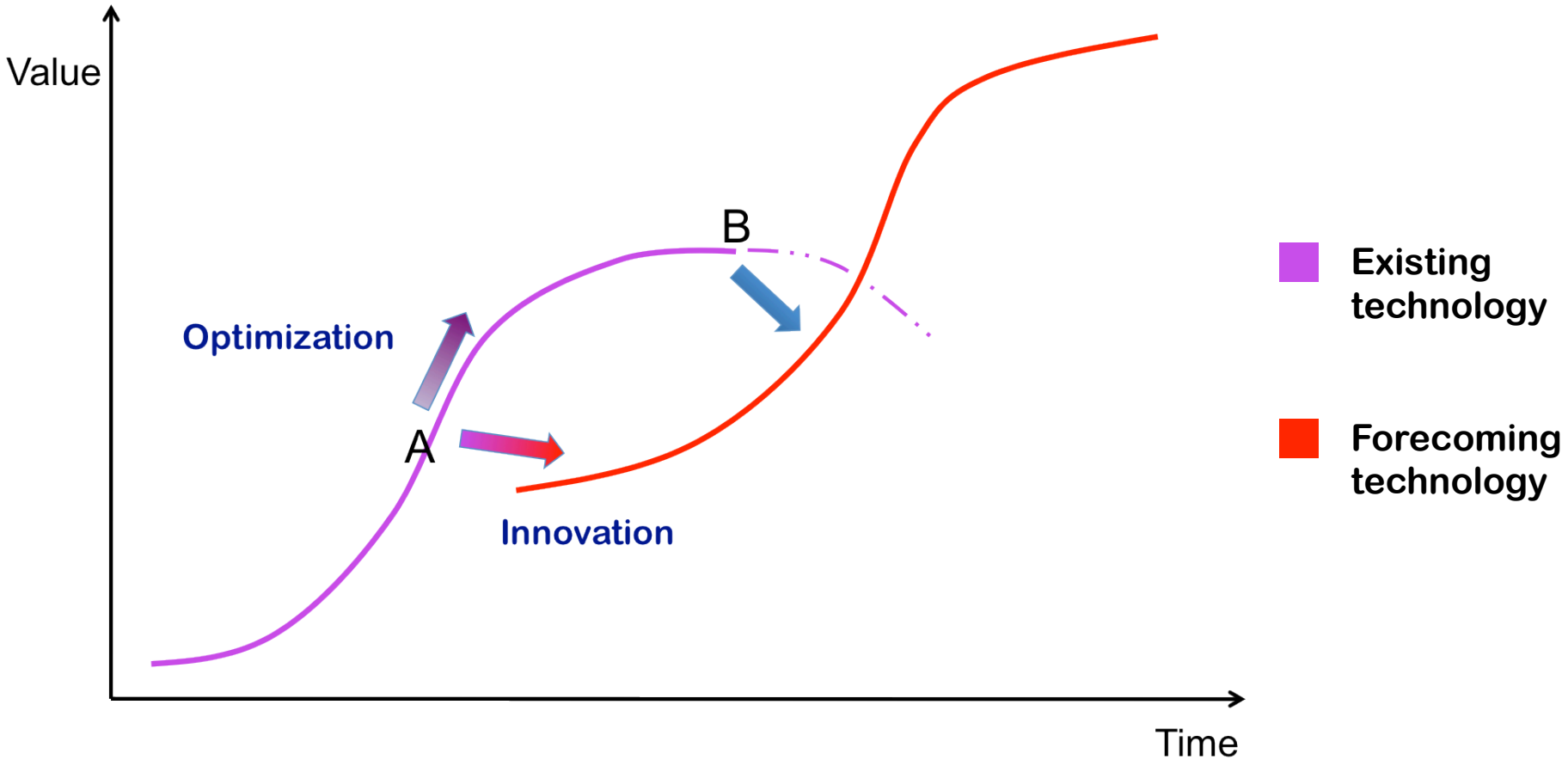
Technological systems tend to evolve in the direction of increasing ideality

The 4 stages of tech evolution

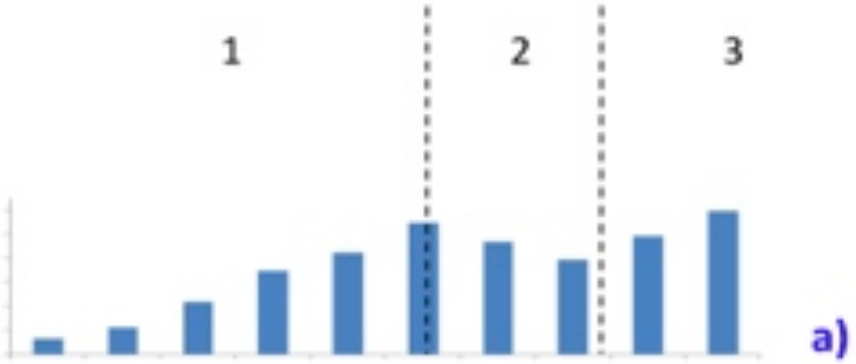




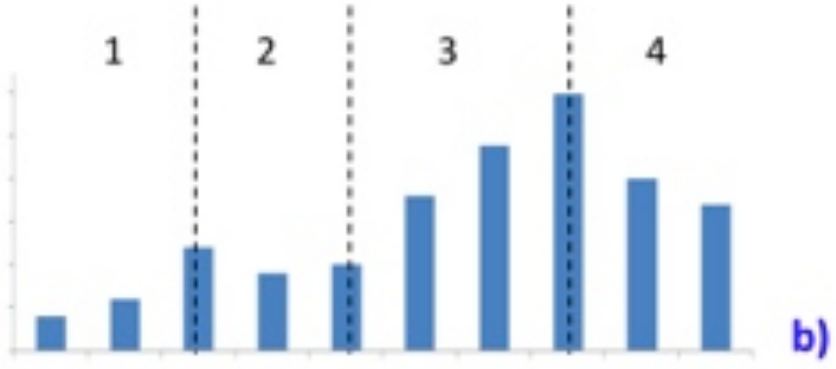
Two kinds of innovation



Comparison of technologies



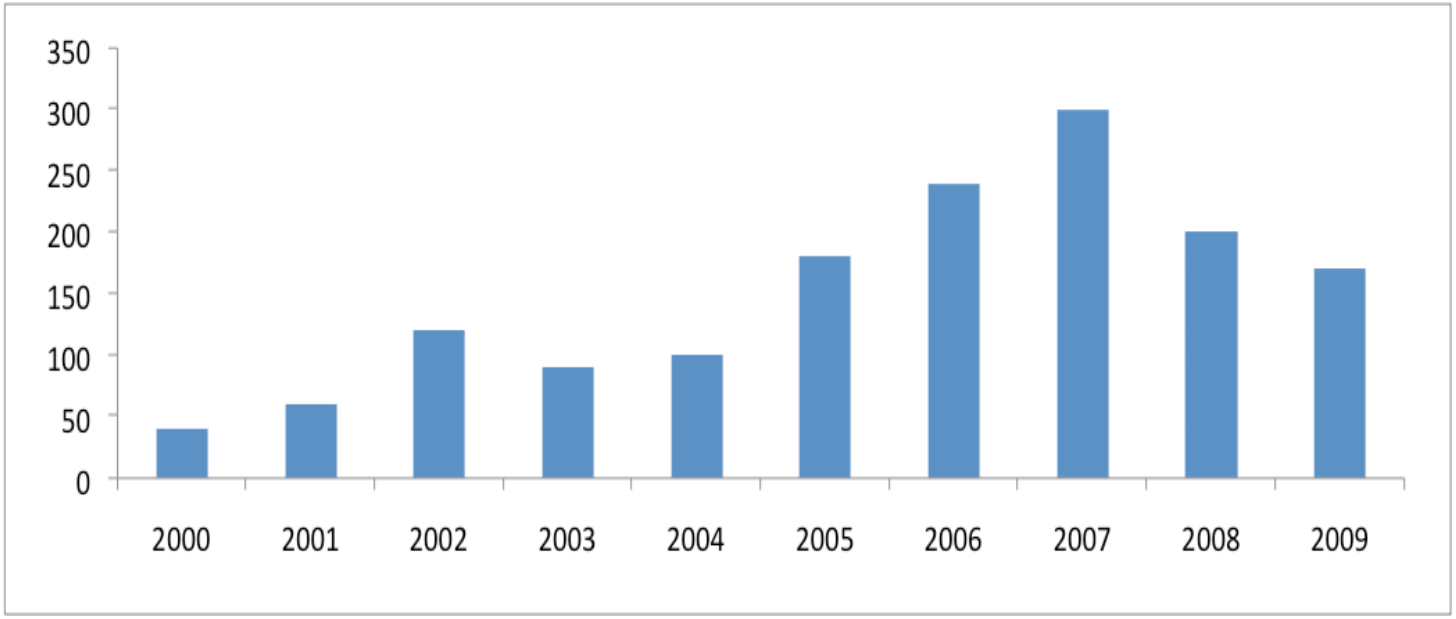
Investing still makes sense



Investing is pointless

A real case

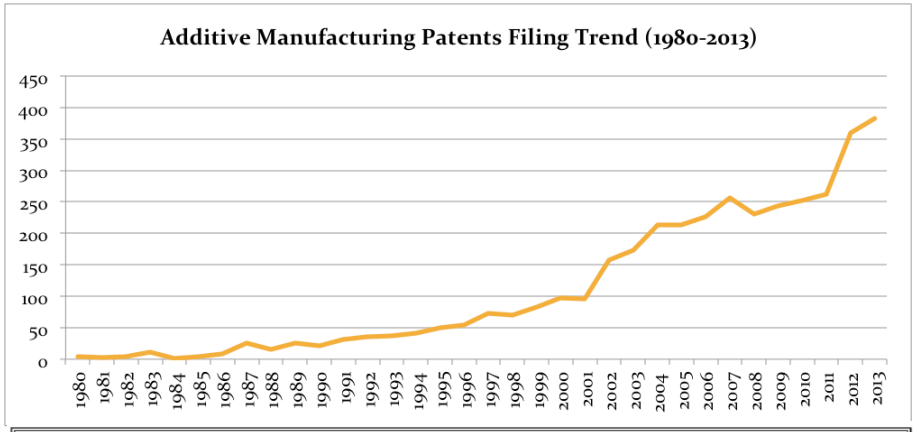
Device for cancer treatment. Great hype, but…

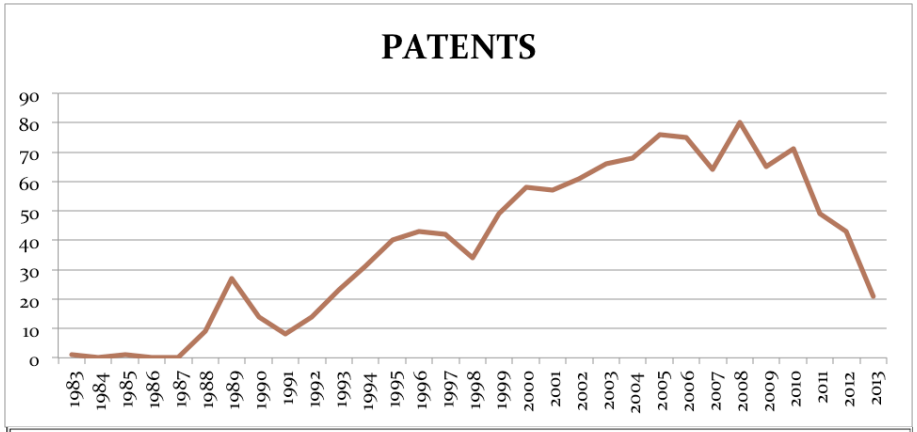


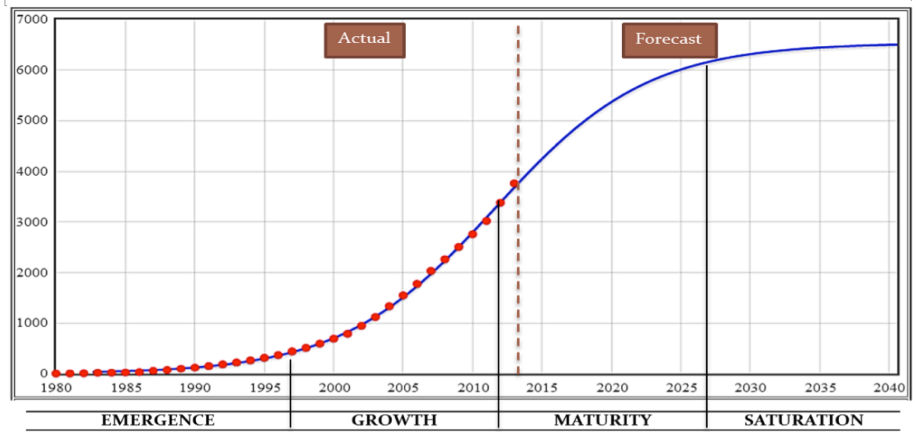
… no new developments, too many side effects

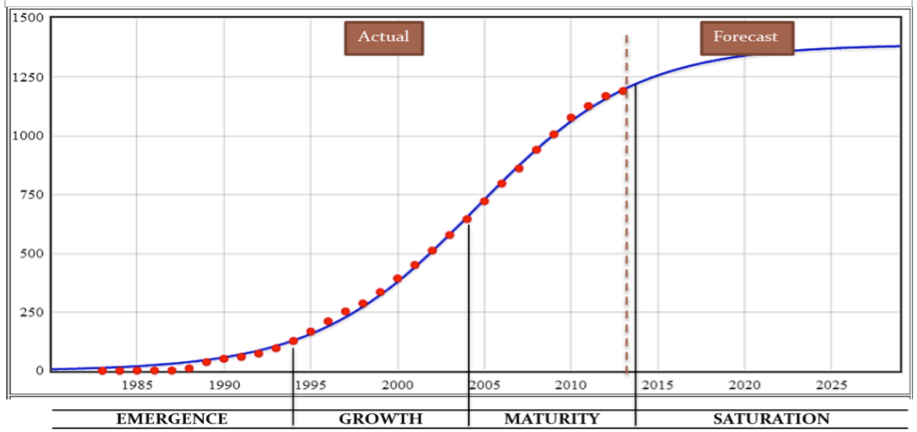
Comparative evolution of similar technologies

Additive manufacturing vs Stereolitography









By degree of maturity

Questions ?