

Innovazione e Sviluppo del Prodotto

Technology intelligence

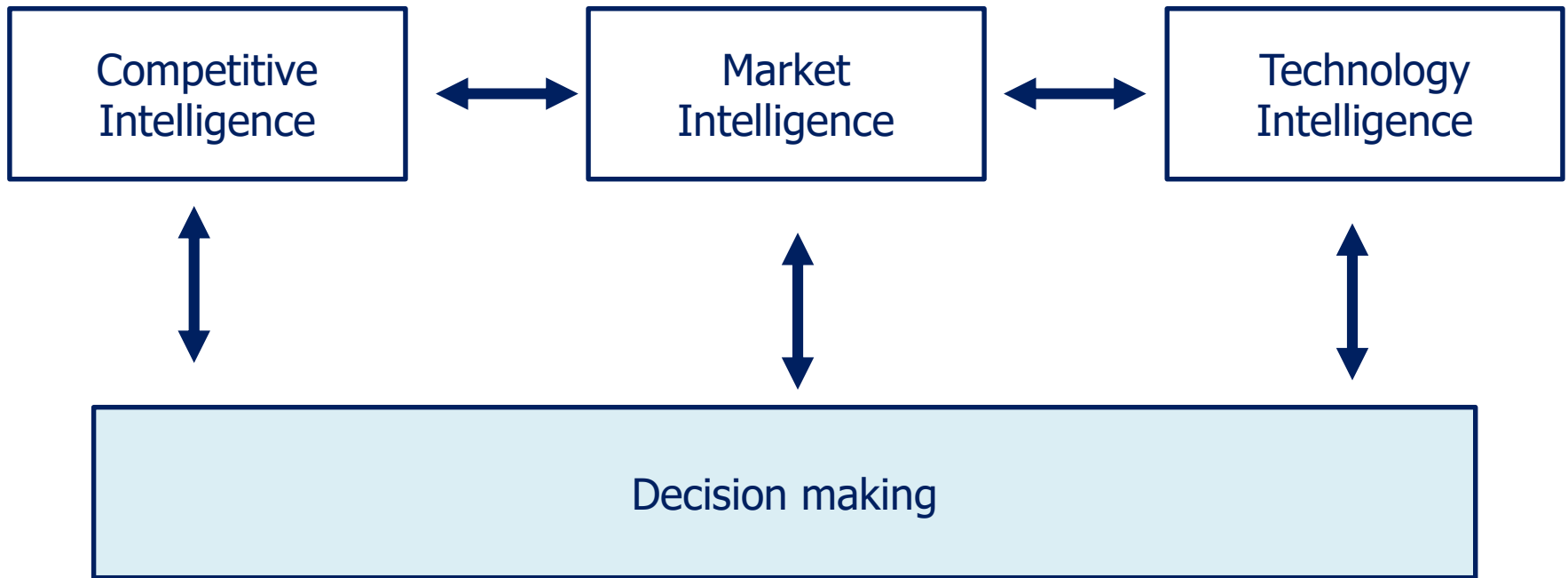
Agenda of today

Sources of information → dott.ssa Ballestra from Liuc library

Technology Intelligence

- What technology intelligence is
- Why to use technology intelligence
- How to use technology intelligence

Technology intelligence tools



What is technology intelligence?

Some definitions...

«*Business & Technology Intelligence are **tasks** that support **decision-making of technological and general management concerns** by **taking advantage** of a timely preparation of relevant information on facts and trends (opportunities and threats) of the organization's environment by means of collection, analysis and dissemination.*»

(Lichtenthaler and Savioz, 2002)

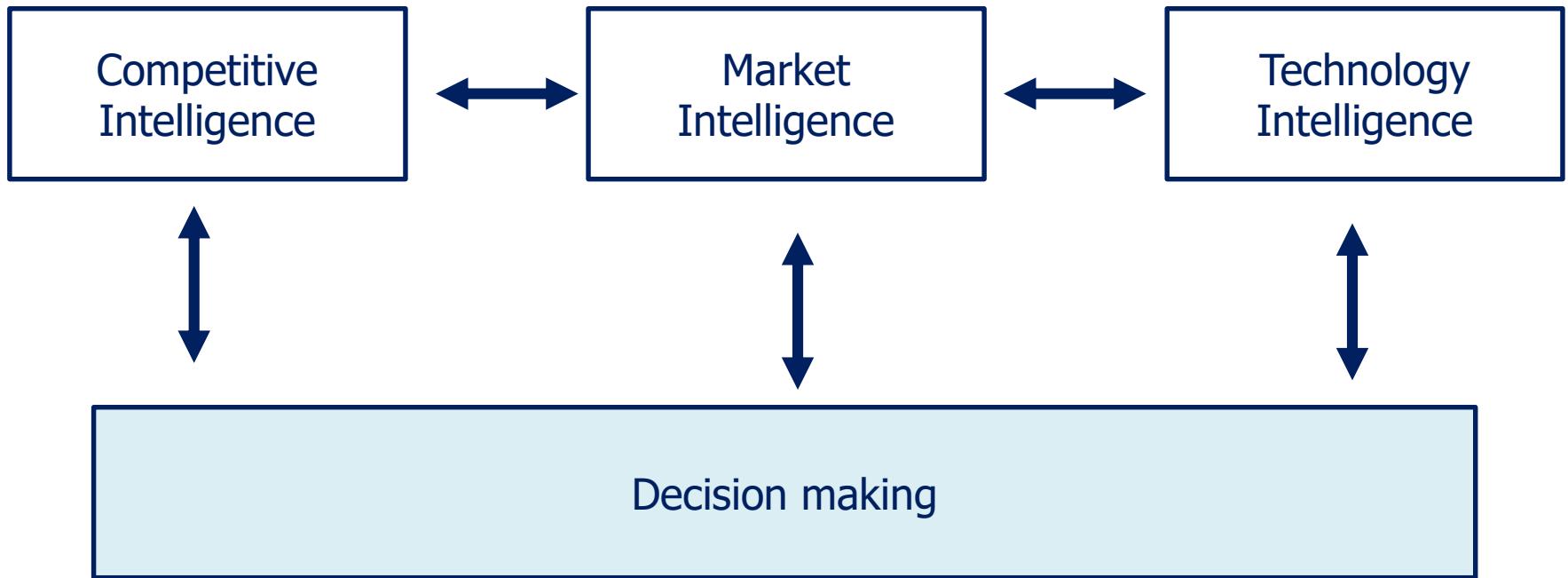
«*Collection and delivery of **information** about new technologies to **support decision making process** within an organization. An effective TI system will **warn** your company about technology **threats** and identify **opportunities**, in time for your (company) to act on the information.*»

Cambridge book of technology intelligence

Technology intelligence

«*The capture and delivery of **technological information** as part of the **process** whereby an organisation develops an **awareness of technological threats and opportunities.*** » (Kerr et al., 2006).

Why technology intelligence? And why business should do TI?



Several reasons...

- Changes in technology can have a significant impact on business
- Industry that did not anticipate the impact of ... Struggled to maintain the position in the market
- Identify technologies that have the potential to revolutionise an industry, early enough to allow your company to take on board a new opportunity or to react to a threat

In a nutshell...

What are the gaps between intelligence needs and intelligence provision?

How do firms do TI?

Technology intelligence process

The technology intelligence process should comprise the following steps:



Determination of
the information
needs

Information
search

Information filter
and analysis

Information
communication

Why clarify the information need

“little internal acceptance”

“some wanted information is not received and some information received is not wanted”

Determination of information needs

- Which kind of decision should be supported?
 - Identification of opportunities
 - Emerging technologies
 - Exploitation of possessed proprietary technologies
 - Exploitation of existing available technologies not yet used in the business
 - Description of possible partners
 - Threat avoidance
 - Avoiding to invest in a technology too early or too much /too late or too poorly
 - Prioritizing R&D projects / supporting R&D project selection
- All technology strategy decisions should be supported by the TI process

What matters?

- What kind of information
- Company context, industry and product specificities
- Future and strategy
- Who the decision makers are
- What information they want
- How to receive



Topic: _____

Team: _____

Date: _____

Information Needs: Managerial / Commercial

Application Areas

Technology	Application	Application	Application
Technology	Application	Application	Application

Information Needs: Technical / Scientific

Critical Questions

Question

Question

Question

Question

Question

Question

Question

External (e.g. Competitors / Regulators)

Internal (e.g. Partners / Suppliers)

Your Industry

Who to Watch

Other Industries

External (e.g. Competitors / Regulators)

Internal (e.g. Partners / Suppliers)

Your Industry

Who to Talk to

Other Industries

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 Dr Clive Kerr, University of Cambridge, 26 Jul 13
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 IEM

Fig. 1. Technology intelligence 'information needs' template.

Topic: _____

Team: _____

Date: _____

Step 2b
Elicit the information needs
from a managerial/commercial
perspective

Information Needs: Managerial / Commercial

Application Areas

Technology

Application

Innovation

Step 1a

Step 1b
Map potential
application areas

Information Needs: Technical / Scientific

Step 2a
Elicit the information needs
from a technical/scientific
perspective

Step 3
Set the search
queries

Critical
Questions

Question

Question

Question

Question

Question

Question

External (e.g. Competitors / Regulators)

Internal (e.g. Partners / Suppliers)

Step 4a
Identify local sources
that should be watched

Your Industry

Who to Watch

Other Industries

Step 4b
Identify distant sources
that should be watched

External (e.g. Competitors / Regulators)

Internal (e.g. Partners / Suppliers)

Step 5a
Identify local sources
that should be engaged

Your Industry

Who to Talk to

Other Industries

Step 5b
Identify distant sources
that should be engaged

Fig. 3. Steps for completing the template.

Topic: _____ Team: _____ Date: _____

Information Needs: Managerial / Commercial

Commercial
Route to market
New
Company
Feasibility
Fast track
Economic
Regulation
Market
Value / Size
Academy
Environment
Low cost
Business
Trends
New
Regulatory
Impact

Critical Questions

Market
Growth?

Technology
Fast to
Commercially?

Technical
Complexity?

Production
Scale?

External (e.g. Competitors / Regulators)

Oil
Mega
NOC
Intensive /
Process
Technical
Complexity

Internal (e.g. Partners / Suppliers)

Commercial
Supply /
Shared
Process
Industry
Confidential
References
Gas
Trends

External (e.g. Competitors / Regulators)

Support
Analysis/
Contract
Commercial
Licenses
Regulators

Internal (e.g. Partners / Suppliers)

Advanced
Partners
Fuel
Substrates
EPC
Company
Procurement
Lockdown
Site
Visitors

Application Areas

Technology

Liquid
Fuels
Energy
(other forms)
Chemicals/
Products

Gas
Liquids
Other

Who to Watch

Other Industries

Conventional
Chemical
Industries
Bio
Tech
Other
Energy
Supply
Networks
Energy
Storage

Who to Talk to

Other Industries

Special
Partners
University's
Research
Networks
Partners
Bio
Tech
Laboratory
Groups

Information Needs: Technical / Scientific

Market
Scientific
Unknown
Challenges
Process
Complexity
Research
Institutions
Commercial
Feasibility
Competing/
Advantage
Technology

Who to Watch

Other Industries

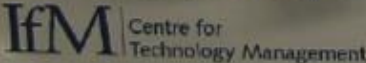
Conventional
Chemical
Industries
Bio
Tech
Other
Energy
Supply
Networks
Energy
Storage


Who to Talk to

Other Industries

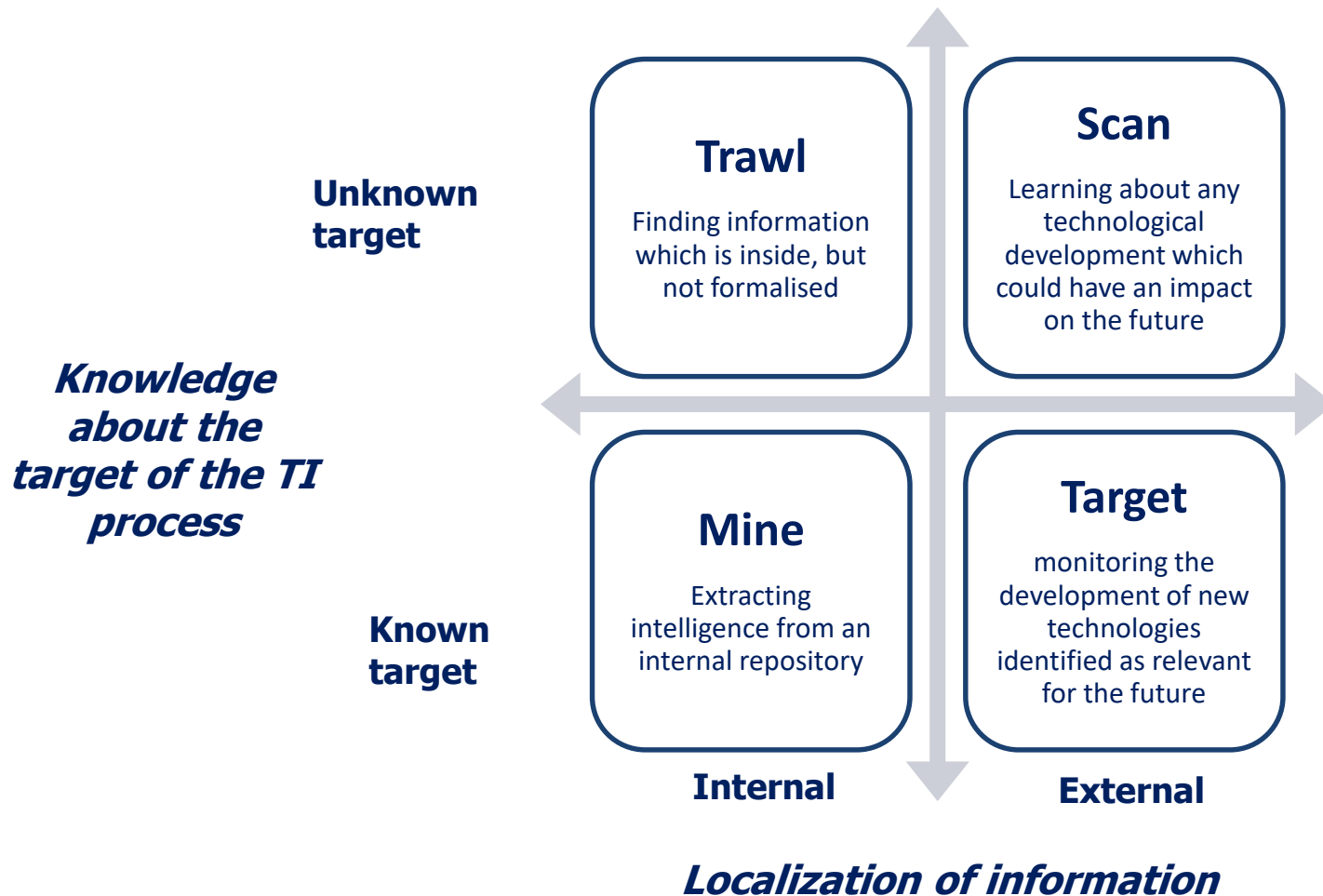
Special
Partners
University's
Research
Networks
Partners
Bio
Tech
Laboratory
Groups

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Search modes



Information search

- Formal sources: journals, books, reports, studies, databases
- Informal sources: conferences, meetings, collaborations and alliances; expert circles

- Internal sources: employees from R&D, marketing, manufacturing, TI specialists
- External sources: external TI specialists, info broker



Information users:

- Internal researchers, engineers, decision makers, IT specialists

- External brokers, TI specialists

Source advantages and disadvantages

- Formal sources:
 - Advantages: Easy access, low priced, analyzed, structured, impersonal
 - Disadvantages: Late, widespread (non exclusive), analyzed, information overload
- Informal sources:
 - Advantages: Early (maybe), exclusive, non analyzed
 - Disadvantages: Expensive, non analyzed, doubtful, fuzzy, incomplete, personal, previous knowledge require

And other sources

- Publications
- Patents
- VC funds
- Start-up fairs
- Contacts to universities
- Consultants, extl. experts
- Scientific conferences
- Product fairs
- Commercial conferences
- Cooperations
- Suppliers
- Lead users
- Information brokers
- Stock market information
- Governmental programs
- Standards committee
- National research committee
- Financing PhD studies
- Sabbaticals
- Employ Post Docs
- Personal networks
- Journals, newspapers
- Databases
- WW

Factors influencing the choices

- Degree of formality (formal vs. informal, primary vs. secondary)
- Type of Sender (competitor, university, supplier, customer, ...) and its openness
- Stage of innovation (research vs. development, early vs. mature technologies)
- Industry specific technology development
- Directedness of information search (scanning vs. monitoring)
- Strategic importance of information need

Information filter and analysis

- Information collected should be:
 - Filtered
 - Integrated
 - Assessed
- In coherence with the information needs

Information filter and analysis

Methods for elaborating information can be distinguished according to:

- The (prevailing) nature of data
 - Quantitative methods
 - Qualitative methods
- The (prevailing) use
 - Explorative
 - Normative
- The time horizon
- The (prevailing) focus:
 - Internal
 - External

Communication

- Face-to-face dialog, meeting
- Video communication
- Phone / conference call
- Documents

- Mix of oral and document communication

Some tips

- “To ensure accuracy and completeness, always use more than one source of information.” (*Coburn, 1999*)
- Large numbers of information sources do exist. The challenge is to choose the appropriate source for an information acquisition task.
- The relevance of information sources for a certain information acquisition task differs depending on the degree of formality, the type of sender... and the strategic importance of information need

In a nutshell...

How well does the company utilise available sources to satisfy its intelligence needs?

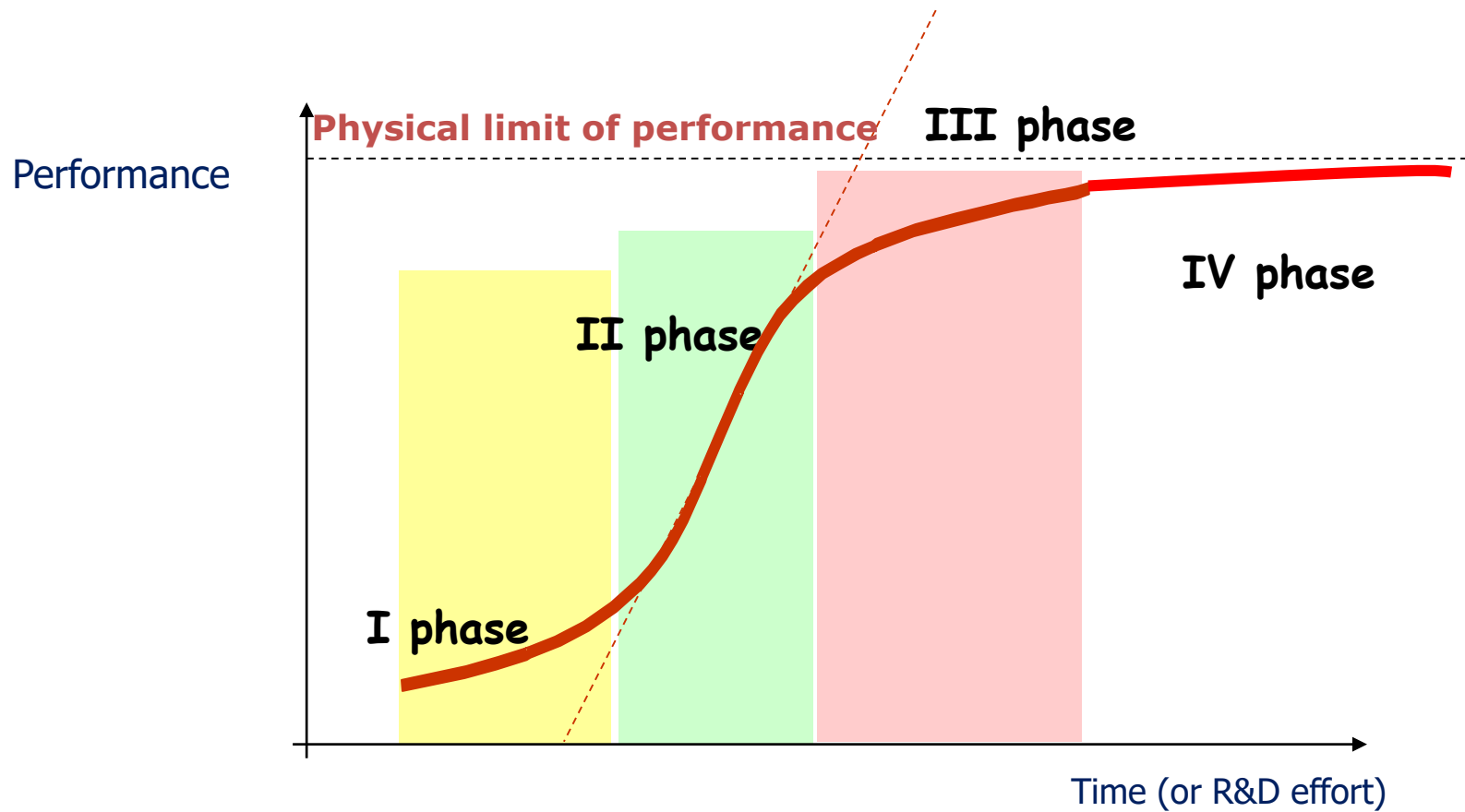
Technology Intelligence Methods

- S-curve
- Patent analysis
- Publication analysis
- Scenario analysis
- Roadmapping
- Relevance trees
- Delphi method
- Brainstorming
- Lead users analysis
- Quality function deployment
- Skill – application matrix
- Technical innovation audit
- Benchmarking
-

Technology intelligence – Methods

- The choice of the intelligence method should take into consideration:
 - Information needs and the type of use expected for results
 - Time, resources, competences available
 - Familiarity with the methods
 - Time horizon
 - Uncertainty
 - Strategic relevance of the TI process

S-curve



S-curve

- The evolution of performance for a specific technology can be described with a S-curve (or substitution curve)
- Technology progress is not a casual process: the analysis of the historic evolution of performance parameters (technical, functional or economic parameters) has demonstrated that these evolve with a regular path:
 1. Embrionic phase, with a very low improvement of performance
 2. Growth phase, with a very rapid increase of performance
 3. Maturity, again with a low increase of performance
 4. Obsolescence, when the performance is asymptotically near to its limit

S-curve

$$y = \frac{L}{1 + ae^{-bt}}$$

- L = superior limit of performance y
- b defines the slope
- a defines the inflection point
- Parameters a and b are valuated on the basis of historical data

- Assumptions:
 - L is known
 - The form of the function is correct
 - Historical data allow to valuate a and b with statistical significance

Examples

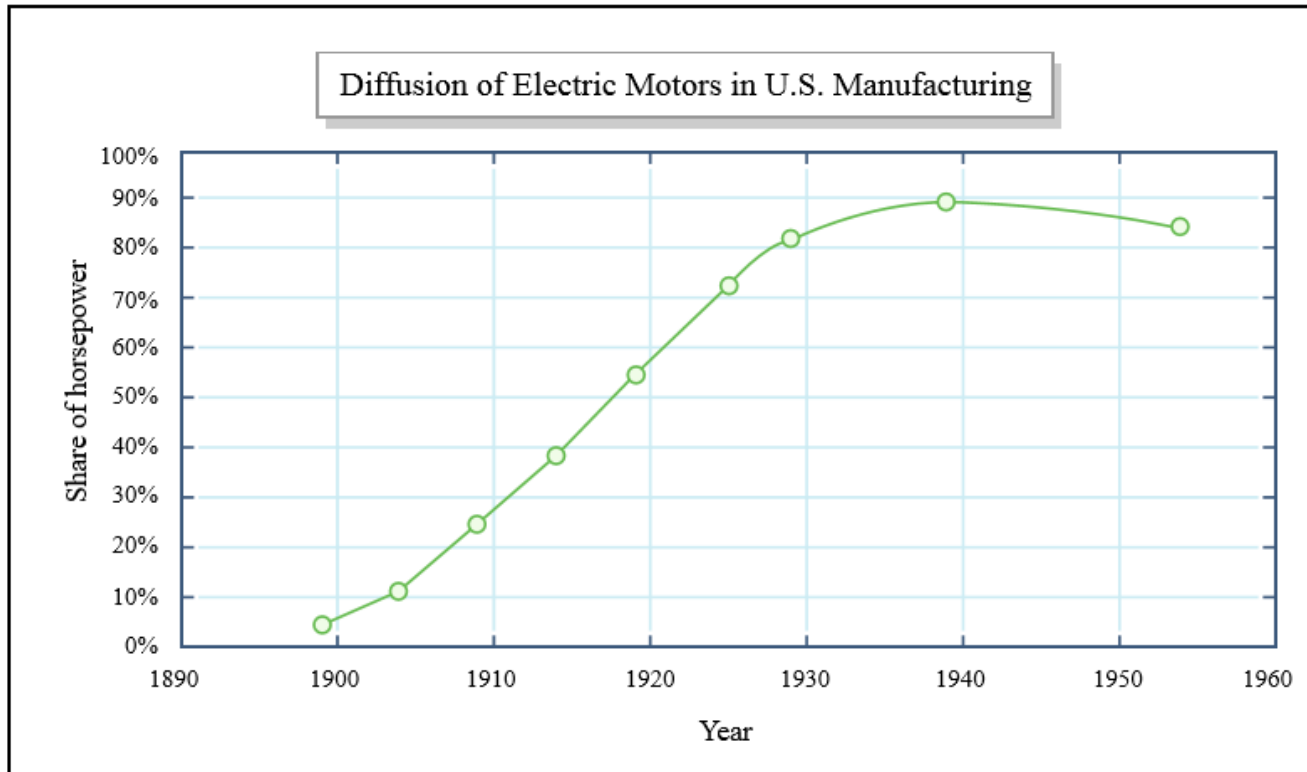
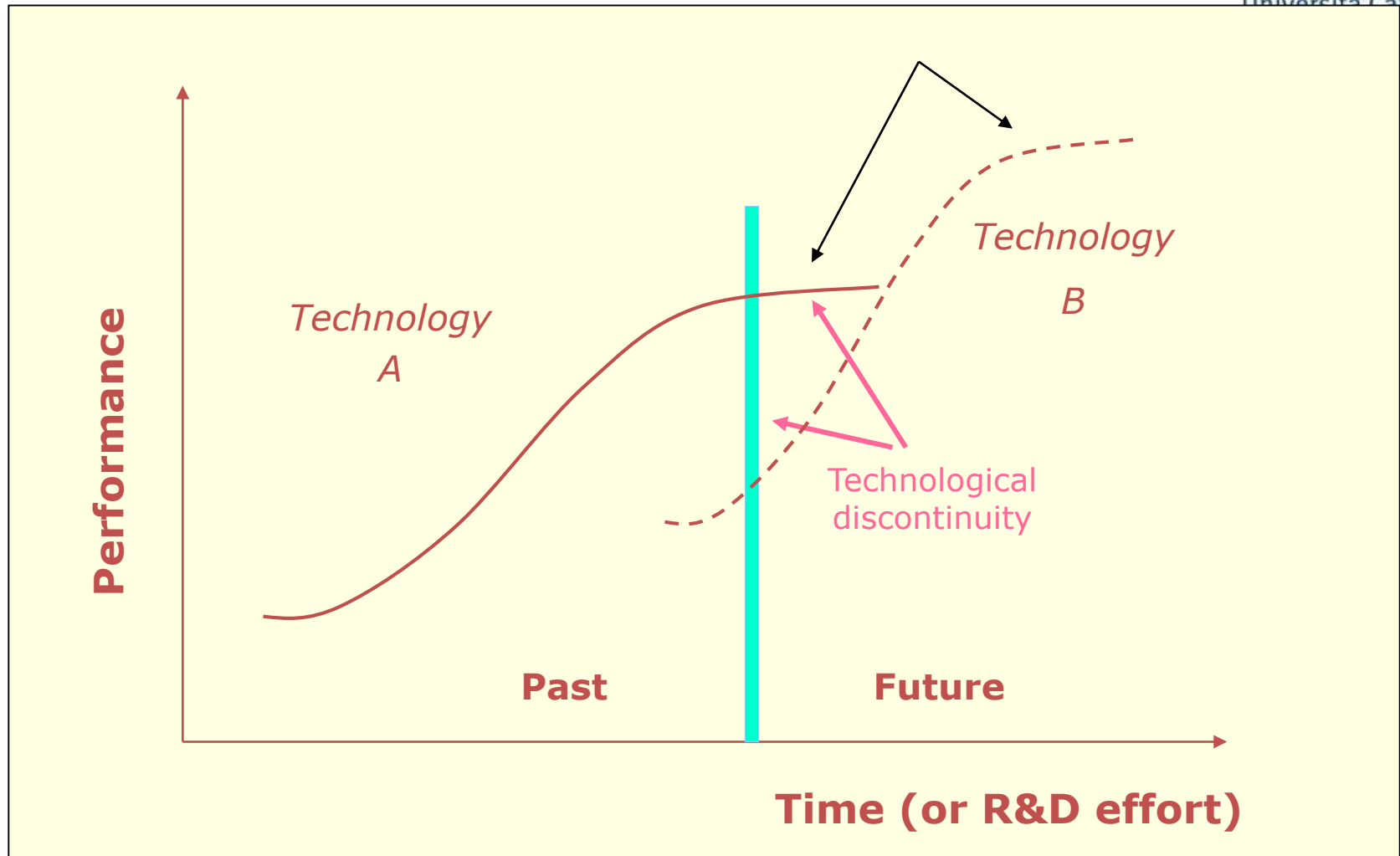


Image by MIT OpenCourseWare.

Hall, 2004

Substitution curves



S-curves, technological substitution and positioning

- Continuous investments in a mature technology allow for an incremental, limited improvement in performance with increasing marginal costs
- If a new technology, at a definite point in time, is characterised by higher performance with respect to the old one, firms are triggered to «jump» to the new one before the old has achieved its higher level of performance
- Companies that do not identify their position and /or do not recognize the level of maturity of a technology may fall into increasing investments with decreasing returns in terms of performance

S-curves: limits

- Time is a significant variable only if associated with continuous R&D effort
- It is difficult to estimate L , a and b
- Unexpected changes in the customer or competitors' behavior may lead to a different evolutionary path with respect to what estimated