Creativity, Innovation and Intellectual Property (LCMB7007)

Week – 8

Part 1

Disruptive Innovation

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Disruptive Innovations

Innovation categories

- **sustaining** – better products that can be sold with higher margin to demanding customers; incumbents win

- **disruptive** – commercialization of simpler, more user-friendly products, which are chepaer and targeted to new or less demanding customers; new entrants win

Key elements of disruption

- Customers at each market has limited absorption capacity
- Technological progress usually is faster that the ability of the market to employ it.
- Companies focus on better products to be sold with higher margin to unsatisfied customers.

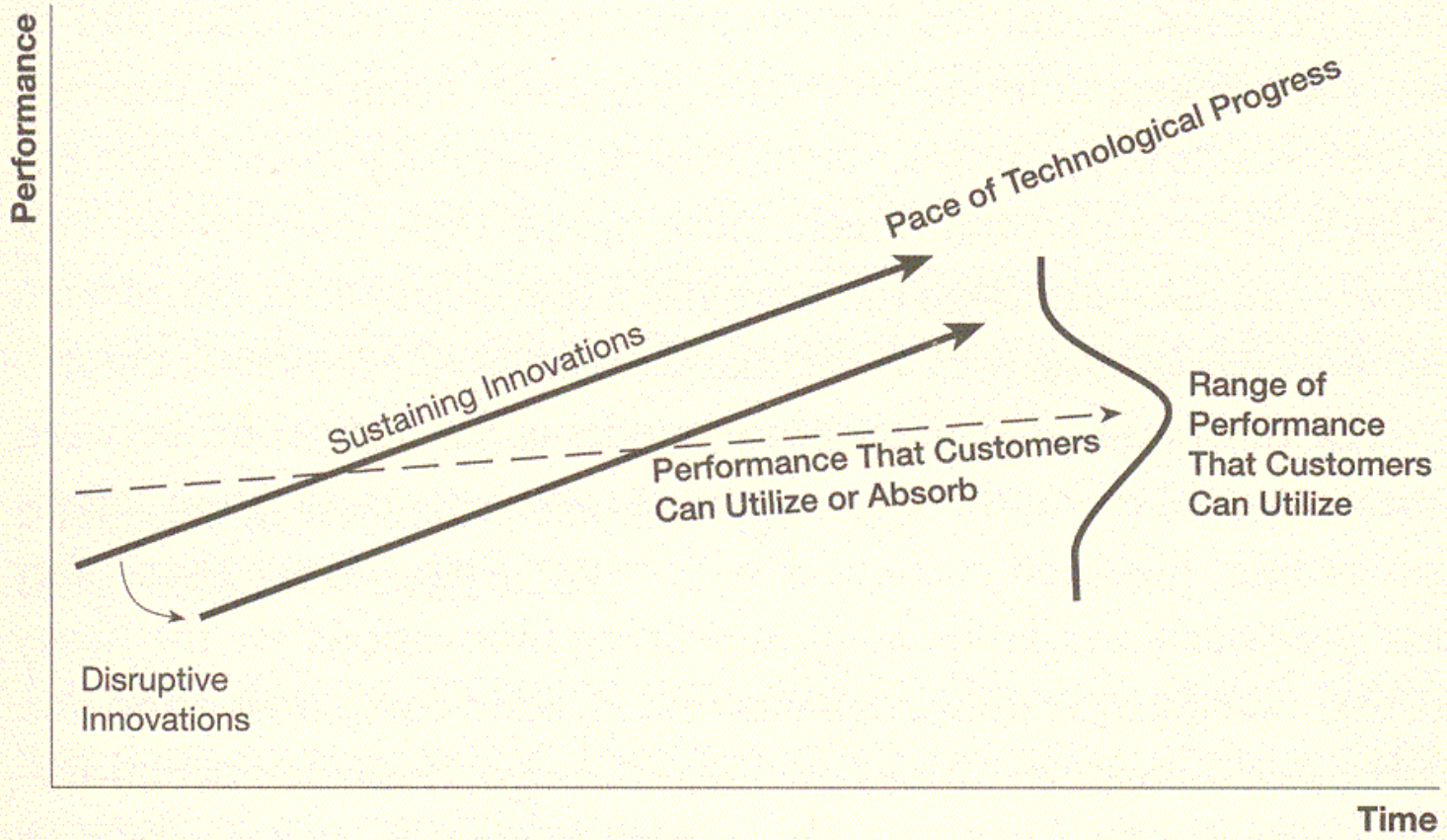
Sustaining Vs Disruptive

- **Sustaining**: focused on demanding customers; both incremental and radical. Incumbents have resources and motivation.

- **Disruptive**: introduce products and services not as advanced as existing ones, but offering other advantages (simpler, cheaper, more user friendly, ...) and focus on new or less demanding customers.

FIGURE 2-1

The Disruptive Innovation Model



Clayton M. Christensen: The Innovator´s Solution, Harvard Business Press, 2003

Trajectory of the disruptive innovation

Due to technological progress the trajectory of the disruptive innovation after some time crosses the trajectory of demands of more demanding customers and starts to replace:

incumbents who are not principally ready to react adequately, as they are motivated to succeed at „better“ markets, not to defend themselves on „inferior“ ones.

Conditions for success - 1

- Disruption is successful, as it is easier to defeat competition that tries to escape than the competition who fights

- Innovation must be disruptive for all companies in the industry
- Ex. Internet; E-Commerce. E-Business

Conditions for success - 2

- Following the trajectory upwards to market tiers where it is possible to attain higher margins is what good manager is expected to do.

- Each company therefore prepares its own disruption. This is the innovator´s dilemma, but also the start of innovator´s solution.

- The advice to new, growing firms: focus on products and markets ignored or neglected ba incumbents.

Two types of disruption

- **New markets:**

Compete with non-consumption: simpler, more user friendly, can be used by less sophisticated customers (PC, transistor radio, desk copiers).

- **Low-end:**

Focus on lower tiers of main markets (minimills, discount stores, Korean auto-makers); motivate incumbents to leave the market

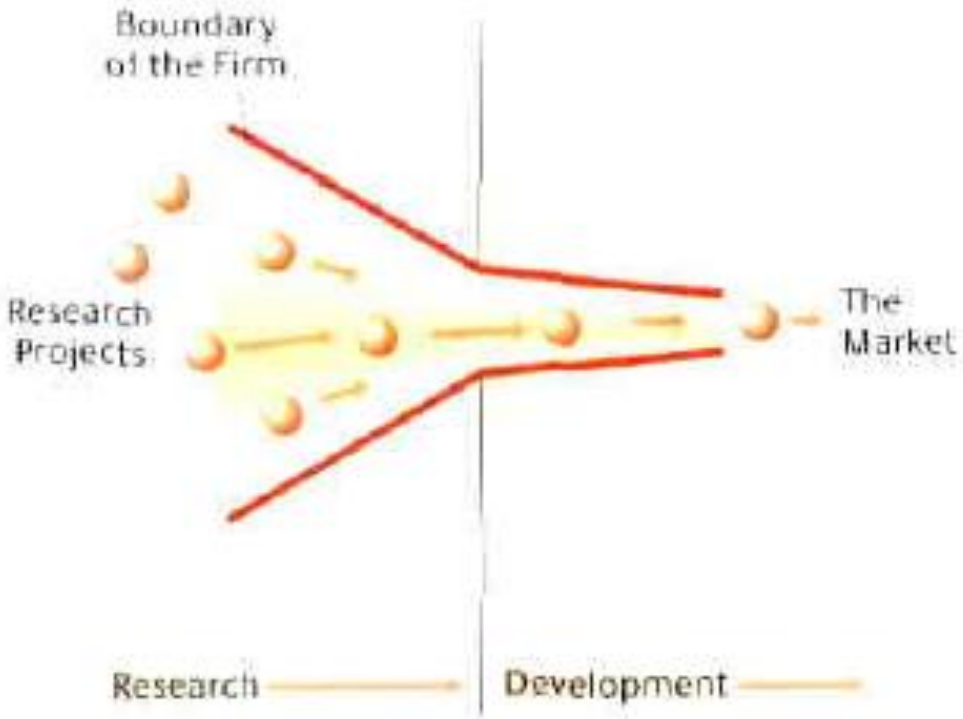
OPEN INNOVATION

- Chesbrough, H., "*Open Innovation*", Harvard Business School Publishing, Boston MA, 2003
- ***Closed innovation*** - requires control
- ***Open innovation***
  - companies use external as well as internal ideas and both external and internal ways to market
  - internal ideas can be taken to the market through external channels to generate additional value

Chesbrough H.W.: The Era of Open Innovation, MIT Sloan Management Review, Spring 203, p. 35 - 41

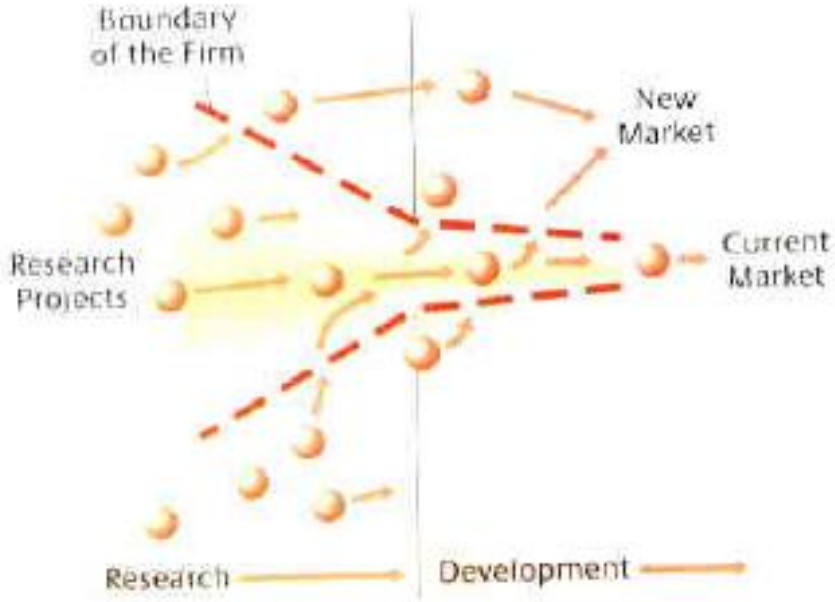
The Closed Innovation Model

In closed innovation, a company generates, develops and commercializes its own ideas. This philosophy of self-reliance dominated the R&D operations of many leading industrial corporations for most of the 20th century.



The Open Innovation Model

In the new model of open innovation, a company commercializes both its own ideas as well as innovations from other firms and seeks ways to bring its in-house ideas to market by deploying pathways outside its current businesses. Note that the boundary between the company and its surrounding environment is porous (represented by a dashed line), enabling innovations to move more easily between the two.



Closed innovation	Open innovation
All the best people are working for us	Not all the best people are working for us . We must work with clever people within and outside our company.
R&D creates profit only when we invent, develop and market everything ourselves.	External R&D can create remarkable value; to employ it, we need absorption capacity, often as internal R&D.
If we develop the product ourselves, we will be the first on the market.	R&D can create profit even if we do not initialize and perform it ourselves.
Winner is who gets the innovation to the market first.	To develop better business model is more important than to be the first in the market.
We will win if we develop most of the ideas (an the best of them).	We will win if we make best use of internal and external ideas.
We must have our intellectual property under control so that our competitors can make advantage of it.	We must be able to profit from others using our intellectual property and we must license the intellectual property if it supports our business model.

Closed innovation	Open innovation
Examples: nuclear industry, mainframe computers	Examples : PC, movies
Mostly internal ideas	Many external ideas
Low workforce mobility	High workforce mobility
Low role of the venture capital	Active venture capital
Few new businesses, weak ones	Many new businesses
Universities are not important as the sources of ideas	Universities are not important as the sources of ideas and people

Business model

- Formulate ***value proposition***, i.e. the value delivered to the customer by the product based on specific technology.

- Identify ***market segment***, ie. users to whom the technology brings value and performs the job to be done.

- Define structure of the ***value chain***, required for the product creation and distribution.

- Value creation is necessary, however not sufficient condition of profitability; value creation is conditioned by:
  - balance of forces among our business, suppliers and competitors
  - presence of complementary assets (e.g. in production, distribution, etc.) necessary for supporting the company position in the value chain.

Business model– cont´d

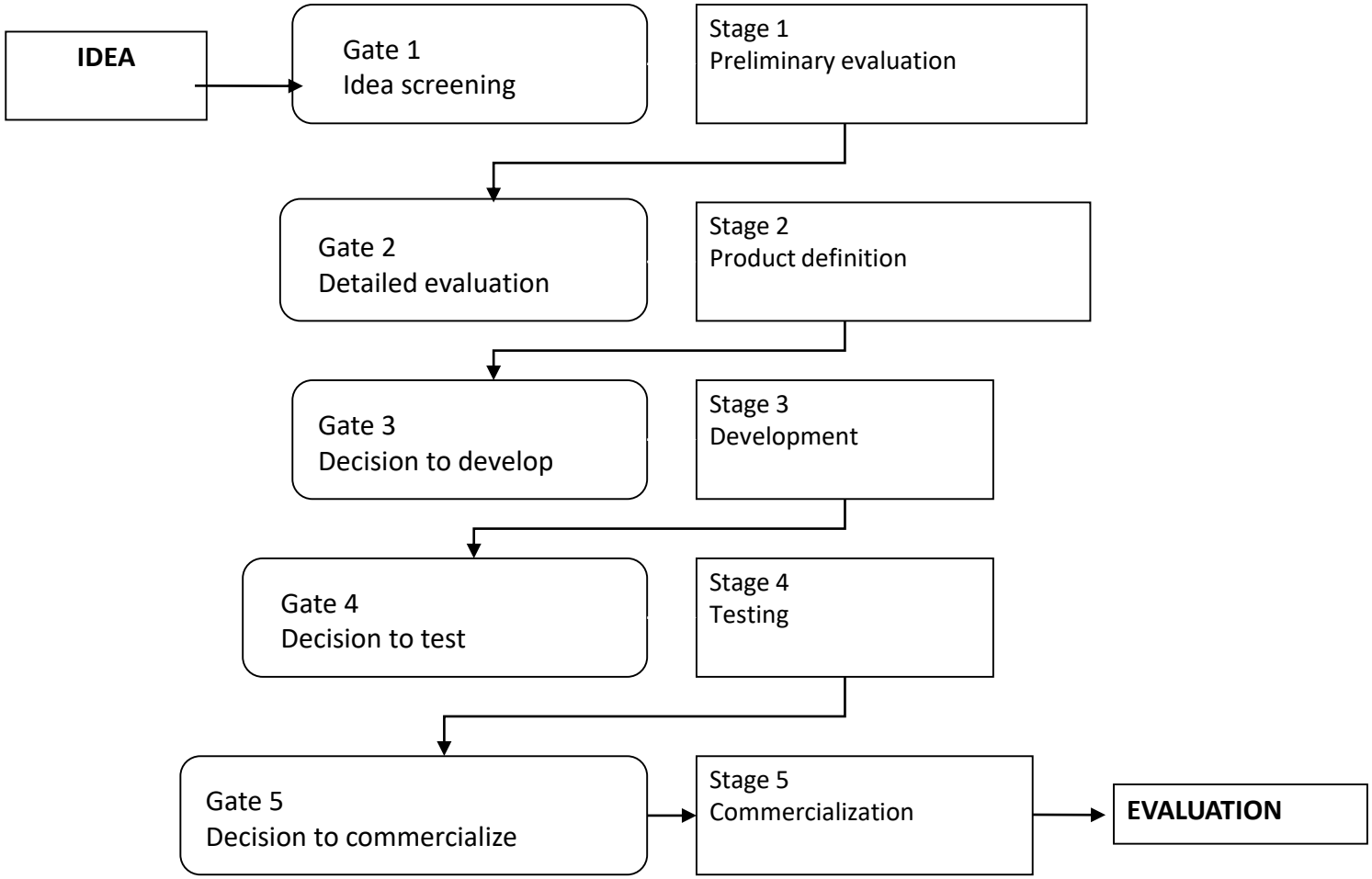
- Specify the mechanism of profit creation and evaluate product ***cost structure*** and ***target margin***

- Describe the company position in the ***value network*** that connects suppliers and customers, including identification of potential alternative producers and competitors.

- Formulate ***competitive strategy*** enabling to the innovative company to gain and keep competitive advantage.

EVALUATION OF THE NEW PRODUCT DEVELOPMENT AND R&D PROJECTS

Stage-gate process



Project feasibility

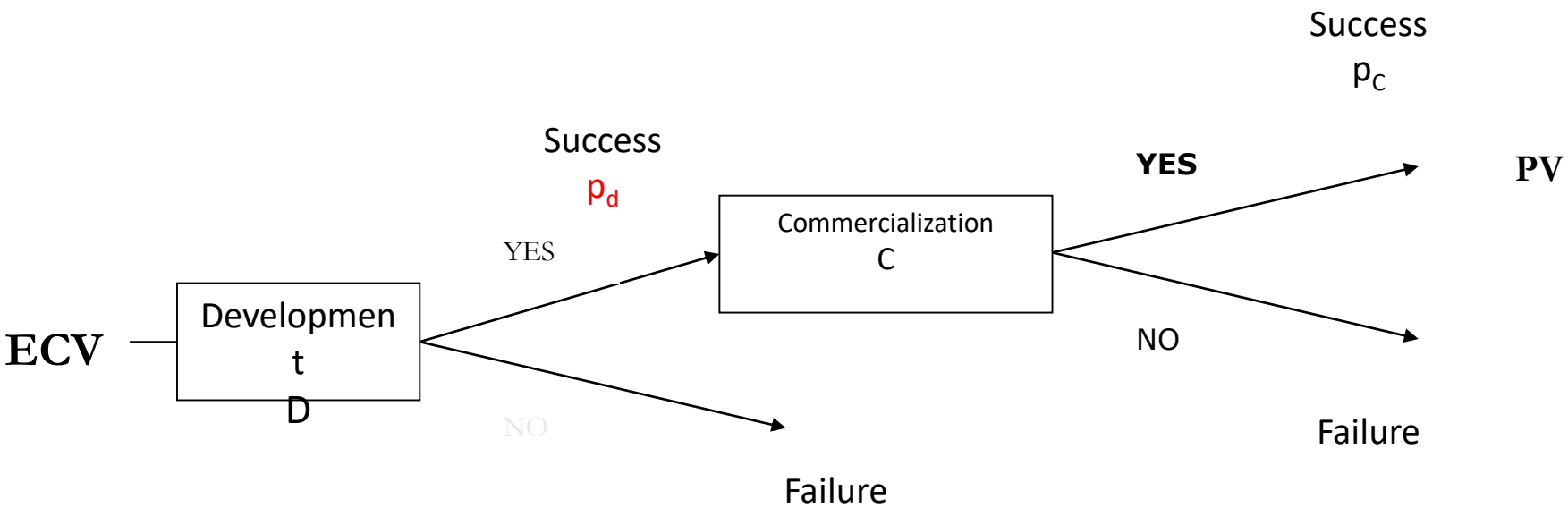
- The stage-gate model divides the innovation process into five stages with gates, in which evaluators decide if to continue or kill the project.
- Each phase has its cost, duration and probability of success. Usually only the last stage generate profits.
- To justify the project development cost, we should prove at the very beginning its feasibility. Traditionally we have to show that the project net present value is greater than zero, i.e. that the whole project, taking into account the time value of the money, will generate net profit.

Project Expected Commercial Value (ECV)

- Takes into consideration all three important characteristics of each phase – its:

1) cost,
2) duration and
3) probability of success

- The project is modeled by the probability tree.
- The stage duration, together with the discount rate, is reflected in the net present value calculation.
- Illustration: project with only two stages – development and commercialization



ECV = project expected commercial value
p_d = probability of successful development
p_c = probability of successful commercialization
D = development costs
C = commercialization costs
PV = net present value of expected project earnings

$ECV = [(PV * p_c – C) * p_d] – D$

according to [Cooper 2001]

Example

- The first stage (1 year): laboratory tests; success probability 50%.
- The second stage (2 years): field tests; success probability 75%.
- If tests are successful, the necessary investment into the technology is $5M, expected earnings $8M ⇨ project net present value $3M.
- Financial data are discounted, assuming the weighted capital costs WACC = 12%, risk-free discount rate 5%.
- Development costs and specific project risk are high ⇨resulting ECV negative (-$109 000)
- according to this criterion, project should be rejected.

Real options

- The concept of real options is closely related to financial options that found their place in financial markets in recent decades. Real options relate to company opportunities and emphasize the basic idea that risk can bring the competitive advantage and as such it should be rewarded.

- The application of the real options theory is briefly described in [Boer 2003], the related website contains further information and references to more detailed resources. Here we will give only a brief account of basic concepts and terminology.

Two kinds of risks

1) Specific risk
2) Market risk

Specific risk

- Specific for the partial situation
- At lest partly under your control (e.g. risk of a fire or risk of project failure)
- Can be diversified - we can use insurance to share fire risk and maintain the diversified project portfolio to protect against the risk of project failure
- Therefore the market does not pay any premium for specific risks
- Specific risk can be often characterized by its probability.
- Better management of specific risk can help us to achieve the competitive advantage.

Market risk

- Is not under your control
- Cannot be diversified. The pharmaceutical company, as a part of health care sector, can do little to diversify the market risk.
- Traditionally, market risk increases the capital expenses and therefore decreases the project value.
- However, the situation is different with options: here the higher market risk, expressed as volatility, increases the option value, which can be quantified using the Black-Scholes algorithm, well known from financial options.

Volatility

- Quantifies the rate of change of market value of the ***underlying asset,*** i.e. the asset to its ownership we are entitled by buying the option (technology, database of customers …).
- Is usually specific for the industry and can be estimated on the basis of information available from e.g. stock market, industry statistics, etc.
- The higher the volatility, the more advantageous is to hold the respective option.
- The higher volatility means the higher potential of both the increase and decrease of the related asset price. As the option holder we can fully exploit the increase, while in the case of decrease we do not realize the option and the maximum loss is limited by the option cost.

Application

- Boer [Boer 2003] applies the real option model (OPT) with volatility equal to 50% to the example from Fig. 3
- He shows that using this method the project value is $0,171M, i.e. it is positive and the project is ***feasible***.
- The difference in project value assessed by ECV and OPT models is $0,279M, what is enough to justify the project. The difference is caused by market volatility.
- Boer also proves that in case of the zero market risk, i.e. the zero volatility, both methods give the same result.
- The method of real options brings the most significant effect to **projects with high level of risk having slightly negative net present value** determined by ECV or other models based on the discounted cash flow.

Conclusion

- Illustration of the often neglected side of the new product development and R&D projects.
- The researchers, engineers, designers must work together with investors to determine before the project launch and in the gates how efficiently the capital invested into the effort is used.
- It is not an easy task; however, we hope that we succeeded to persuade the auditorium that this important task cannot be avoided.

References

- [Boer 2003] BOER F.P. *Risk-adjusted Valuation of R&D Projects*, online, http://www.tigerscientific.com
- [Cooper 2001] COOPER R.G., EDGET S.J., KLEINSCHMIDT E.J. *Portfolio Management for New Products*, Basic Books, 2001, ISBN 0-7382-0514-1
- [Cooper 2005] COOPER R.G. *Product Leadership*, Basic Books, 2005, ISBN 0-465-01433-X
- [Vacek 2006] Vacek J. "Structuring the new product development processes", in *AEDS 2006 Proceedings*, pp. xx, University of West Bohemia, Pilsen, 2006, ISBN