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Innovation Management
Formulating an innovation strategy
Part 1 – Innovation strategy as the management of competencies

Strategy: Strategy as what we should do, contrasted with operations which has to do with how should we do it. Strategy has more to do with objectives, goals and high level decisions, where operations have to do more with making sure whatever you have decided here happens. In other words (non academic) strategy is doing the right thing where operation is doing things right. Both are important.
Corporate Strategy: Is the approach that you can take to define the strategy of an organization.

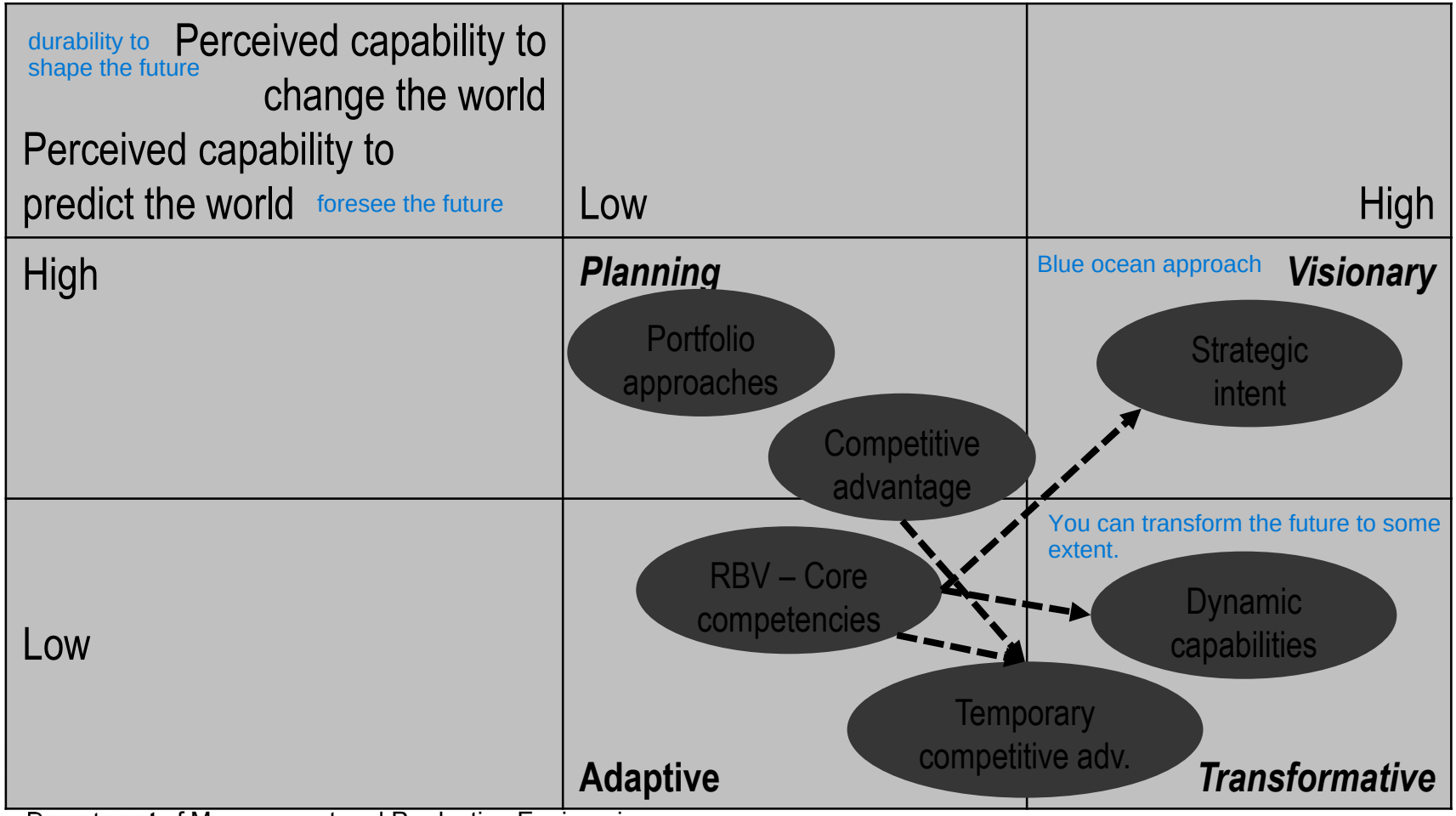
Innovation Strategy: Is the portion of corporate strategy that has to do with innovation. You will have operation, finance, marketing strategy and above all these strategies you will have innovation strategy.

Outline of the presentation

- Innovation and product portfolio management
- Innovation and the theory of “competitive advantage”
- Innovation and “core competencies”
- Sustainability of competitive advantage
- Auditing and benchmarking competencies
- Managing the development of competencies

Innovation and corporate strategy

- Objective: to create a link between differente “schools” of corporate strategy and innovation management → how can you develop an “innovation strategy”?
- Schools of corporate strategy have different approaches with respect to uncertainty



To make these choices it depends who you are. e.g. if you are Elon Musk, you are a visionary.

Portfolio approach: Any company is represented as a set of business units which are being managed at the same time. e.g. Samsung: produces TV, cellphone...they have number of business units, their big strategic decision will be which one they should invest or divest. (keep or throw away) -- manager role. All of these are being managed in central level (board), we call "internal capital market". The purpose is to make diversification, these companies are more stable.

Innovation and product portfolio management

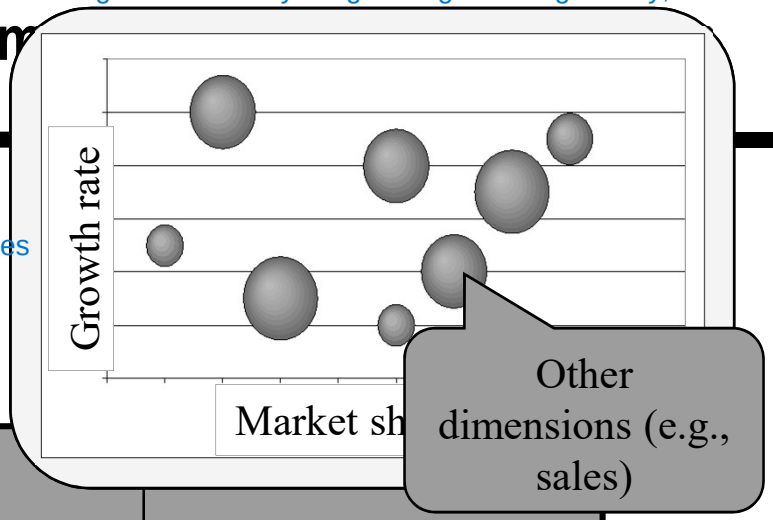
- The firm is represented as
  - A portfolio of heterogeneous products, directed to a variety of markets
  - An “internal capital market” (cash from mature product lines finances the development of embryonic products)
- Strategic competence consists in
  - Managing the product portfolio by entering and exiting markets

… but what’s the purpose of this kind of a firm (think of GE)?

- Financial markets are imperfect
- You can have synergies among businesses that seem non-related (management skills, brand, reputation etc.)
- In a dynamic environment you can have inter-temporal economies of scope which benefit from a large footprint w.r.t. technologies and markets

BCG Matrix: Each business unit is represented on a graph where you have the absorption of cashflow (how much money is being used by the business unit), cash flow generation (how much money is being generated by the business unit). Usually you have metrics for these two variables, and a bubble chart where the size of each business unit is the size of bubble. (how portfolio of each business unit is spread).
?: Business units using a lot of money but don't generate. (for future) Stars: Business units using a lot of money, but also generate money. (Growing and becoming successful). Cash cows: business units not using money anymore (investments happened), but generating a lot of money. Dogs: not generating money, and not using money. (throwing away)

Innovation and product portfolio managem



- BCG Matrix

Boston Consulting group's product portfolio matrix (it is about innovation) -- you should have businesses on all portions of the S-curve.

A balanced portfolio

Cash flow absorption (growth rate) / Cash flow generation (market share / market share of first competitor) — consider the market share	High	Low
High	"Star"	"Question mark"
Low	"Cash cow"	"Dog"

Stars take away money so we should cut from dividends. makes transitions difficult (cost money - cut dividends - unhappy shareholders). Not only it depends who you are but who your shareholders are.

Optimal cash flow

Venture Capitalist. How many ?: ONE each team should focus on a single thing.

Johnson & Johnson - dividends (growing) as cash cows. forms ? -- starts cash cows.

Utility companies (e.g. Iren): Cash cows. they lead to have ?s. they shouldn't be conservative (dividends focused),they should also do something new.

Porter: The focus is either on the company as a whole (specialize), or the business unit of a member of supply company. First of all, company is part of value chain (suppliers, distributers, customers), and also the part of competitive context (given the company and industry you are in, it matters a lot the success you are able to make or not). Strategic competence is the ability to understand which industries are good or bad.(based on profitability). Porter says, some companies are able to structure themselves in such a way that they are more profitable than others. -- They will have competitive advantage: Stability of a company to earn superior profits than the average company in industry (benchmark).

Innovation and "competitive advantage"

- The firm is represented as
  - Part of a value chain
  - Part of a competitive context

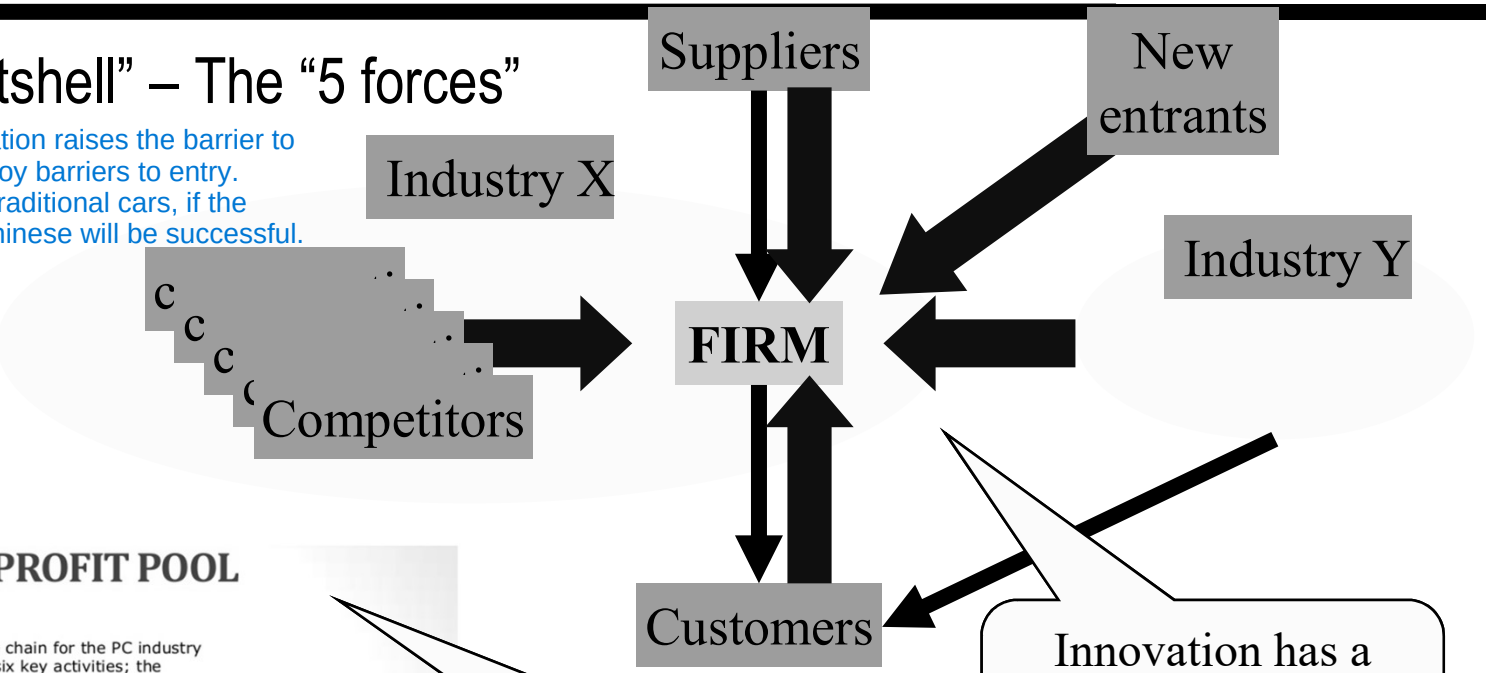
    ("structure → behavior → performance", or *structuralist* paradigm of Industrial Economics)
- Strategic competence consists in
  - Spotting a potentially favorable industry and entering
  - Structuring the firm's operations in order to create value
  - Maneuvering in the environment in order to retain the value created within the firm

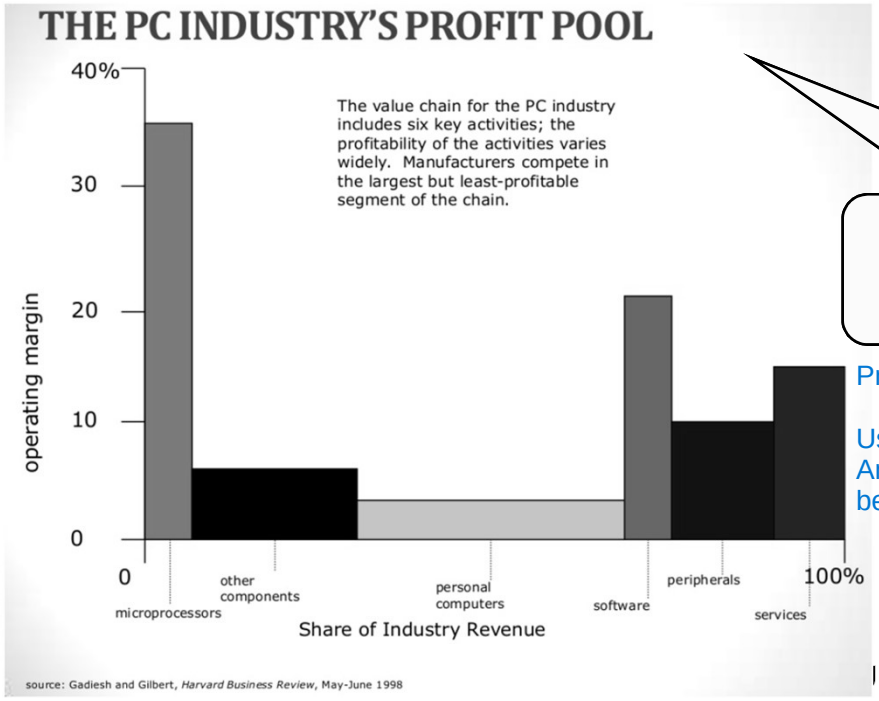
The company would like to have high profits but it is prevented because of the forces are being applied by different people:
1- Competitors: improve their products, lower the prices so you are unable to have superior profits. Also leads to incremental innovations. 2- Suppliers: raise the prices, lower the quality - make you unable to have superior profits. Suppliers might be innovators which leads to improvements. 3- Customers: Asking for more and offering less. Also forces you to innovate as they go to the other companies. 4- New entrants: If make a decent amount of money, new entrants will enter the industry. If the barriers (e.g. cost to sustain) to enter to an industry are so low, they enter easily. 5- Other industries: might enter even though not same product but a substitute. e.g. shared mobility (e.g. bikes, scooters) not direct competition with car sharing but affects. Also innovation has a big role in determining what is compitted against you and what not.
e.g. Trains vs flight on Turin to Rome. In the past they were not competitors as train was so cheap. Now, trains are faster but expensive vs planes became cheaper (business model innovation).

Innovation and "competitive advantage"

- "Porter in a nutshell" – The "5 forces"

4- new entrants force: Incremental innovation raises the barrier to entry where radical innovation often destroy barriers to entry.
e.g. Cars: Chinese are not successful in traditional cars, if the industry shifts to electric cars (radical), Chinese will be successful.





Profit pool: shows in a graphic way where the profitability is concentered and when higher.

Usage of Porter approach: in relatively mature industry, you must understand who is who. Any business unit in transforming industry. Probably not startups and emerging industries because they don't know their suppliers, new entrants...

Competitive advantage not only comes from good management but also about a clear definition of what you want to achieve. Essentially choosing two variable. 1- Low cost producer. (therefore, your competitive advantage comes) Idea: You can earn money in two ways. Either you reduce the price and increase the volume or keep the price and you have a higher margin. 2- Differentiator with respect to competitor. (Your success is due to fact that you do things which are different from all the rest). Idea: Gives you money, if you have product which are different than others, you will able to tap into segments of a market. Pursuing both will put you in the middle of river. e.g. Lamborghini, differentiation industry (focused) strategy. Volkswagen Group: Differentiation (overall), it offers cars all different type.

Innovation and "competitive advantage"

- "Porter in a nutshell" – Competitive advantage comes from "generic strategies" (cost vs. differentiation, industrywide vs. focused)

	Cost leadership (industrywide)	Cost leadership (differentiation)	Differentiation (overall)	Differentiation (focused)
Product	Reduce direct cost Exploit economies of scale in R&D	Design product "just enough" for needs of segment	Enhance differentiating features (at lowest cost possible)	Design product to exactly meet needs of segment
Process	Exploit economies of scale in production Exploit learning economies	Develop low-cost process "fine tuned" to segment needs	Exploit economies of scope and flexibility	Develop "fine tuned" process to meet performance required by segment

Innovation and “competitive advantage”

- “Porter in a nutshell” – Firms can be represented as a value chain… and technological innovation is relevant to each of its phases

Inbound logistics	Operations	Outbound logistics	Marketing & sales	Service
Transportation Material handling Storage ICT	Product technology Materials Machine tool Material handling Packaging Maintenance Testing ICT	Transportation Material handling Storage ICT	Media ICT	Diagnostics ICT

exclusivity of resources and competencies: All other companies are not able to have what I have. it can be based on geography, technology...
Imitability (Imitations of organizational competencies): Maybe they will be able to have same resources but not able to imitate the way you make them work. (sources might be slightly different, or different suppliers, or maybe legally it isn't achievable).
Appropriability: If I am able to appropriate this value being created and not owners of that. e.g. I am making money because of a good supplier, they will ask for more.
Transferability: the ability have to transfer these competencies into other business units or operational entities to scale the business. e.g. I might be successful as small business (having competitive advantage), but I realize in order to make it sustainable I have to make it grow. And maybe moving from one factory to second and third is difficult because of high specificity of competencies I have in my original place.

Sustainability of competitive advantage

- Is technology-based competitive advantage sustainable?
- Answer - It depends on
  - exclusivity (how many other firms in the industry have comparable resources and competencies?)
  - imitability (can routines / organizational competencies be observed and replicated by competitors? Is there any specificity in the set of resources and their complementary relationships? What about IP?)
  - appropriability (who “owns” the competencies and who extracts rents from them?)
  - transferability (can organizational competencies be observed and replicated by the firm in order to grow the business?)
  - maturity (can competencies be grown further? What is the “depreciation rate” of competencies?
  - capability to exploit their value (strategy w.r.t. business model and vertical integration, execution capability)

A popular concept in assessing strategic value of assets (including technology) is VRIO analysis (Value, Rarity, Imitability, Organizational foundations)

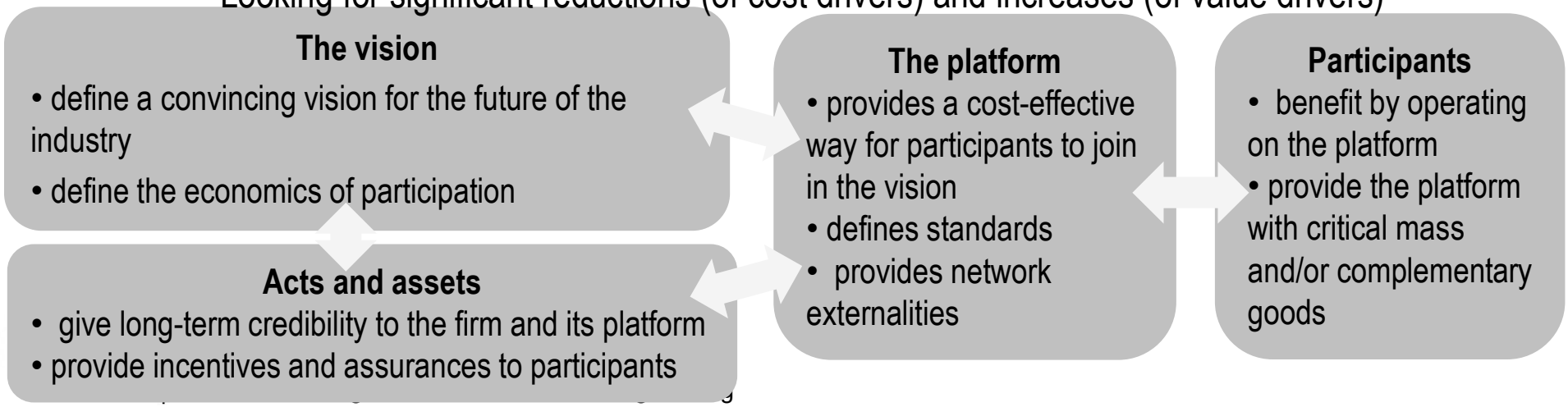
Maturity: You might have a competitive advantage, but maybe it is set to become obsolete. e.g. Cobol (an obsolete language) but still to some years ago some companies had it as their competitive advantage because it was used in some legacy systems, until it became obsolete completely.
Capability to exploit their value: Sometimes you don't have good business model. Then you do VRIO analysis.

Whom are the blue ocean strategy for: 1- Companies that have something completely unique either in their technology or reputation or financial backet or... (huge power). e.g. Elon Musk. 2- Using strength of others. e.g. Airbnb, uber,... tried to leverage on someone else. Airbnb leveraged on other people homes. It is about pursuing both low cost and differentiation, creating incentives for drawing all the participants in the platform and trying to find out how to create value and lower the cost. First, vision about the future of hospitality, then creating a platform to bring actions and assets that being delivered by everybody else together, then create procedures that enable this in very simplest way (e.g. scoring system in Airbnb to build trust).

Innovation and "shaping strategies"

"The best way to predict the future is to invent it." (Alan Kay)

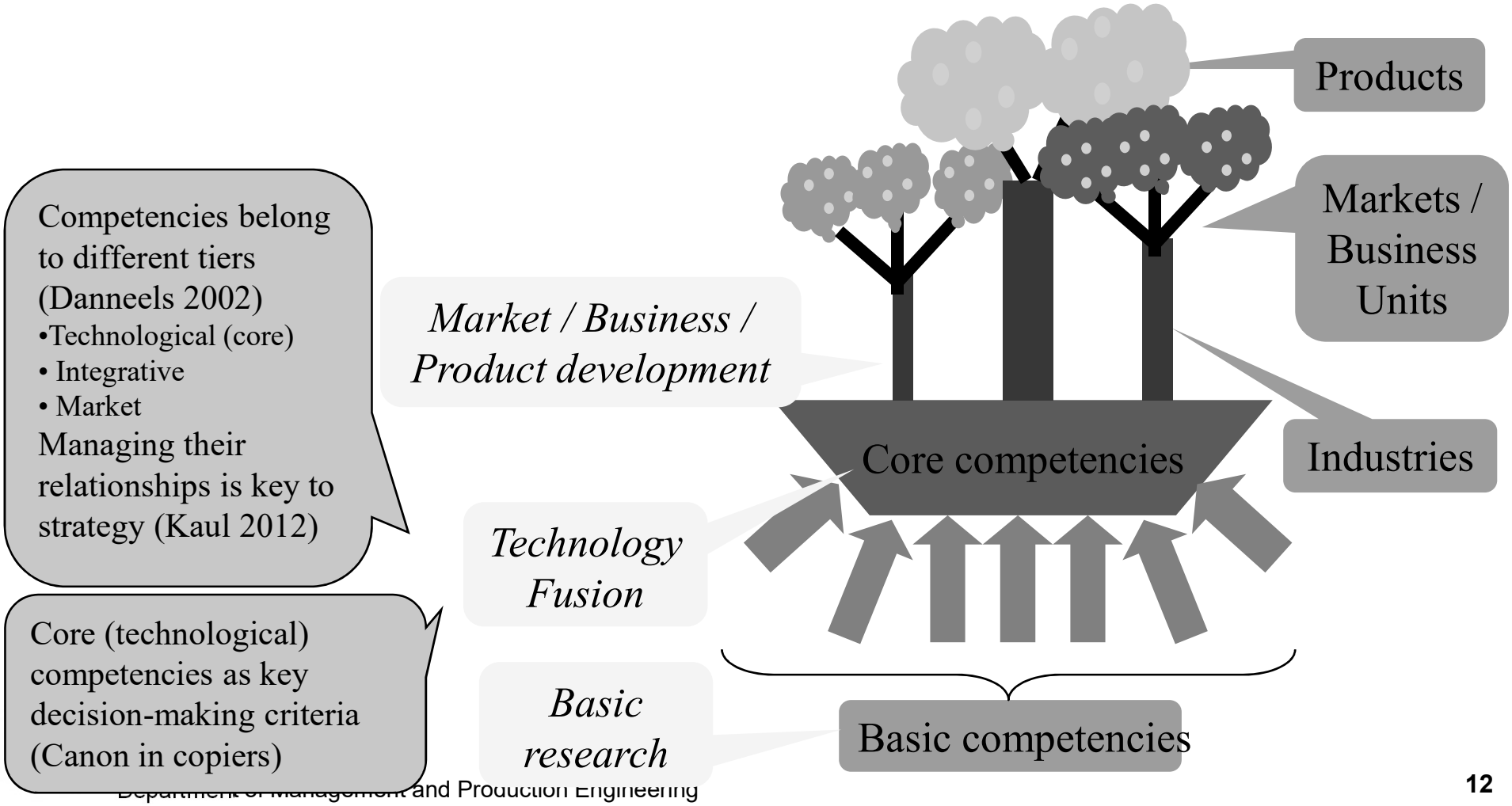
- Shaping strategies are typical of disruptive innovators (Hagel et al. 2008)
  - The firm does not analyze the "as-is" scenario but defines one, based on a vision ("blue-ocean" *reconstructionist* paradigm of Industrial Economics), and then "designs the business" (e.g. Roger Martin)
  - Rewards pertaining to the vision are perceived to be ***very*** high w.r.t. risks
  - The strategy is usually based on
    - Value Innovation, i.e. aligning propositions related to value, profit and people (→ business model innovation)
    - Pursuing both low cost and differentiation
    - Providing incentives for drawing stakeholders on a "platform"
    - Looking for significant reductions (of cost drivers) and increases (of value drivers)



Core competencies: a competence that is core for the company and business model even though it isn't recognized strategically as such . Not only a single technology but could be a combination of technologies. Corning: glass, Honda: engine, Canon: Optical technology and electronics
Technology Fusion: two or more separate core technologies are transformed into a combination or conglomerate of technologies to function in unison or synergistically. e.g. What are the core competencies of Canon: Optical technology combined with electronics, like printers, cameras...
Integrative competencies: companies which have core competencies, the integrative competencies will allow them to step toward building a product. And also market competencies. e.g. Canon with laser printer as core competencies and its mechanical parts as their integrative competencies. Partial forward integration:????

Innovation and "core competencies"

- Prahalad and Hamel (the core competence of the corporation)… NEC vs. GTE, Canon, Honda, 3M, Corning



According to evolutionary theory of the firm, a firm is based on resources and routines. good managers able to find resources which are great compared to the cost and synergistic with one another, and working together establishing processes (explicit part) and routines (implicit part) which is day to day work. e.g. knowledge of the individuals that are tied up with routines and processes in a company. (competence)

Resource based theory: is strategic management version of the evolutionary theory of the firm.
Capability: it is the competence that has been used to develop a strategy. Dynamic capability: are the capabilities that a company has and built to change other capabilities. e.g. a company (following core competencies) is going to find best PhDs to hire and integrates them in order to build R&D capabilities. (a capability that modifies other capabilities) so ability of a manger to look forward and modify resources and teams in such a way that they manage challenges of future. We call this, a process in three steps: Sensing - Seizing - Transforming: You sense what are the opportunities and challenges of future, then you do something about it, then making sure the whole thing works.

Innovation and "core competencies"

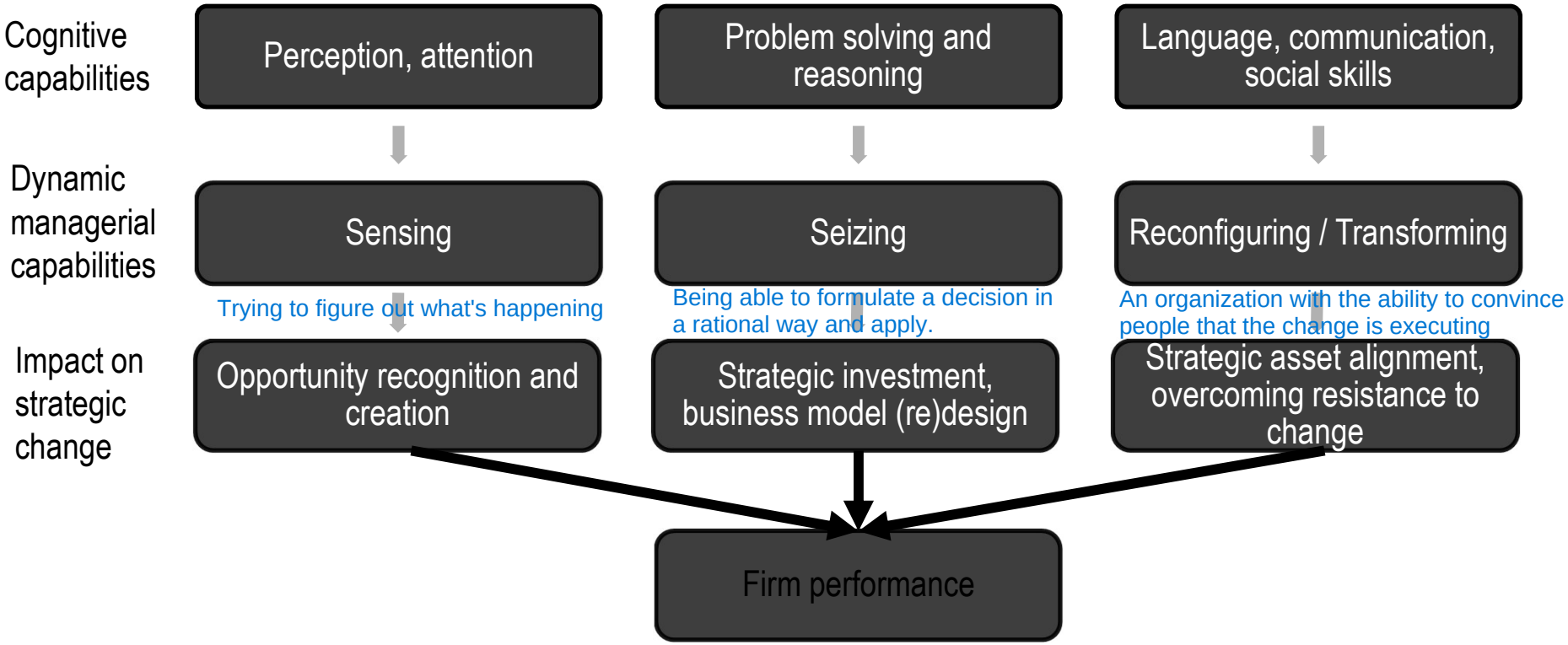
- The *resource based* theory looks inside the firm
  - The focus is on differences between firms, which is the source of competitive advantage (*why are firms different*?)
- The firm is represented as a set of
  - complementary resources (role of *stickiness* of resources and of luck)
  - competencies (routines that involve resources), a few of which are acknowledged to be "core"
- Strategic competence consists in
  - Ensuring the growth of the firms' resources and competencies
  - Using them in order to develop products and markets
- *Capability* = "*competence that has been strategically understood*"
- "Dynamic capabilities" = capability to purposefully and dynamically integrate, develop and re-configure internal and external resources and competencies

Some routines are aimed at effectiveness / efficiency, other ones at ensuring adaptability

Sensing	Seizing	Managing threats / transforming
Sensing and framing opportunities	Structuring the business model and the organization	Continuous realignment of tangible and intangible assets

Innovation and «core competencies»

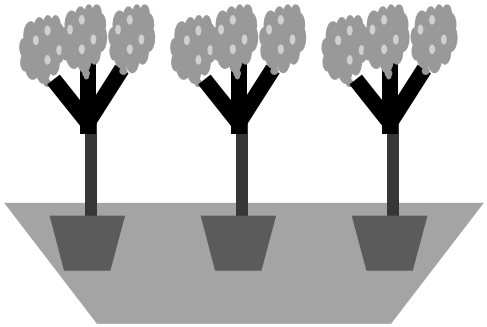
- There is an obvious connection between strategic change and top management
- A connection can be drawn between dynamic capabilities at firm level, managerial level, and managers' cognitive capabilities (Helfat and Peteraf 2015)



The core competencies are usually technological but in some cases it's different. e.g. IBM, markets as their core competency as serving different markets from type writing machines to AI.

Innovation and “core competencies”

- “Core competencies” as strategy-guiding principles can also be defined more broadly (e.g., “capability to serve a market”, or a specific process)

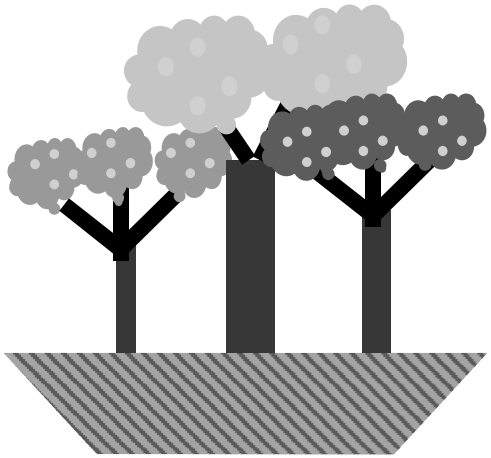


Product portfolio-managed

•Many technologies, many markets

•Synergies in cash, some infrastructure and “management culture”

• e.g. GE, United Technologies Corp.

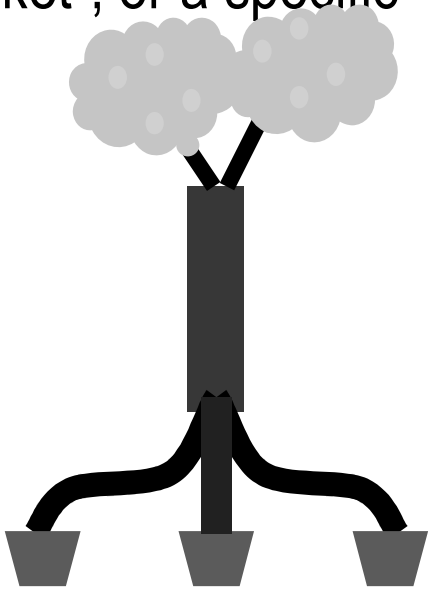


(Technological) core competence-led

• Core technologies, many markets

• Synergies in technologies

• e.g. Corning, Canon,



(Market) core competence-led

• Many technologies, core markets

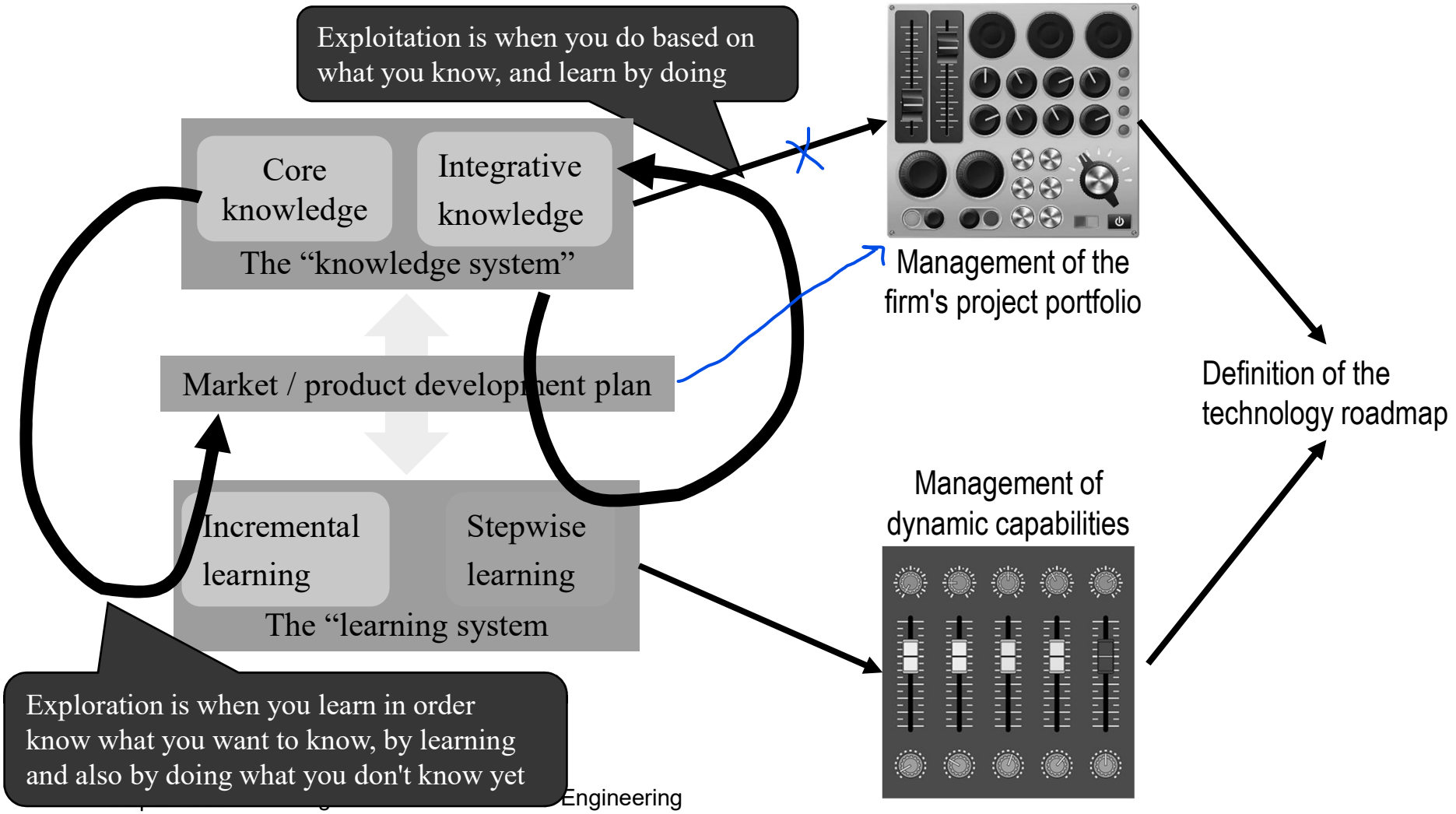
• Synergies in markets

• e.g. IBM

Strategy of exploitation: By using you learn something, by learning you are able to do something more.(usually small steps) Based on what the company knows (core knowledge & integrative knowledge) it does things, and by doing things you learn (changing your knowledge base) making a step forward. e.g. Corning originally making glass, then based on that they started making light bulbs, and based on light bulbs they learned to make particular type of glass which was useful to develop many other things. Strategy of exploration: this is what I know now, this is what I mean to learn because I realized that I don't know enough, and the way to learn to do something about it. e.g. traditional car maker: how much should I invest in new technologies of electric cars. Now what are the levers on which you can actually move? 1- The portfolios of activities you run. 2- The learning strategies you create. Why? If you're following an exploitation strategy (based on what you know), you decide what products and services to build, and then you have to capitalize and build learning different things to able to achieve. If you are following an exploration strategy, you have to decide what you want to learn, then you have to decide how to exploit what you have decided to learn. (You have to do both).

Innovation and core competencies

- Dynamic capabilities following the model by Helfat and Raubitsheck (2000) – the firm is an entity where "knowing", "learning" and "doing" coevolve, more or less strategically



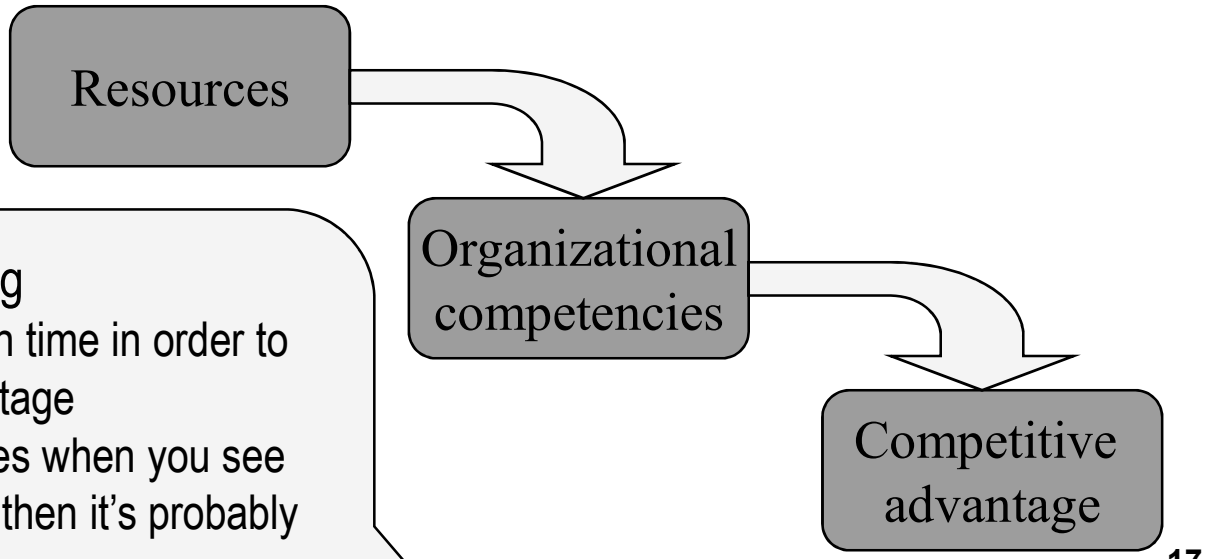
Engineering

Innovation Strategy: Management of competencies and management of product and service development finance. The key question: A company knows what it knows and has to decide what do I need to learn in the next 3 years.

Plan your resources on time: Starts from sensing. The other point to realize not only you have to plan to acquire resources but also make sure that these new things become part of the top management approach.

Auditing and benchmarking competencies

- Based on the previous, it is possible to audit, benchmark and plan the growth of
  - Resources (Valuable, Rare, Inimitable, Organizationally well-founded)
  - Competencies

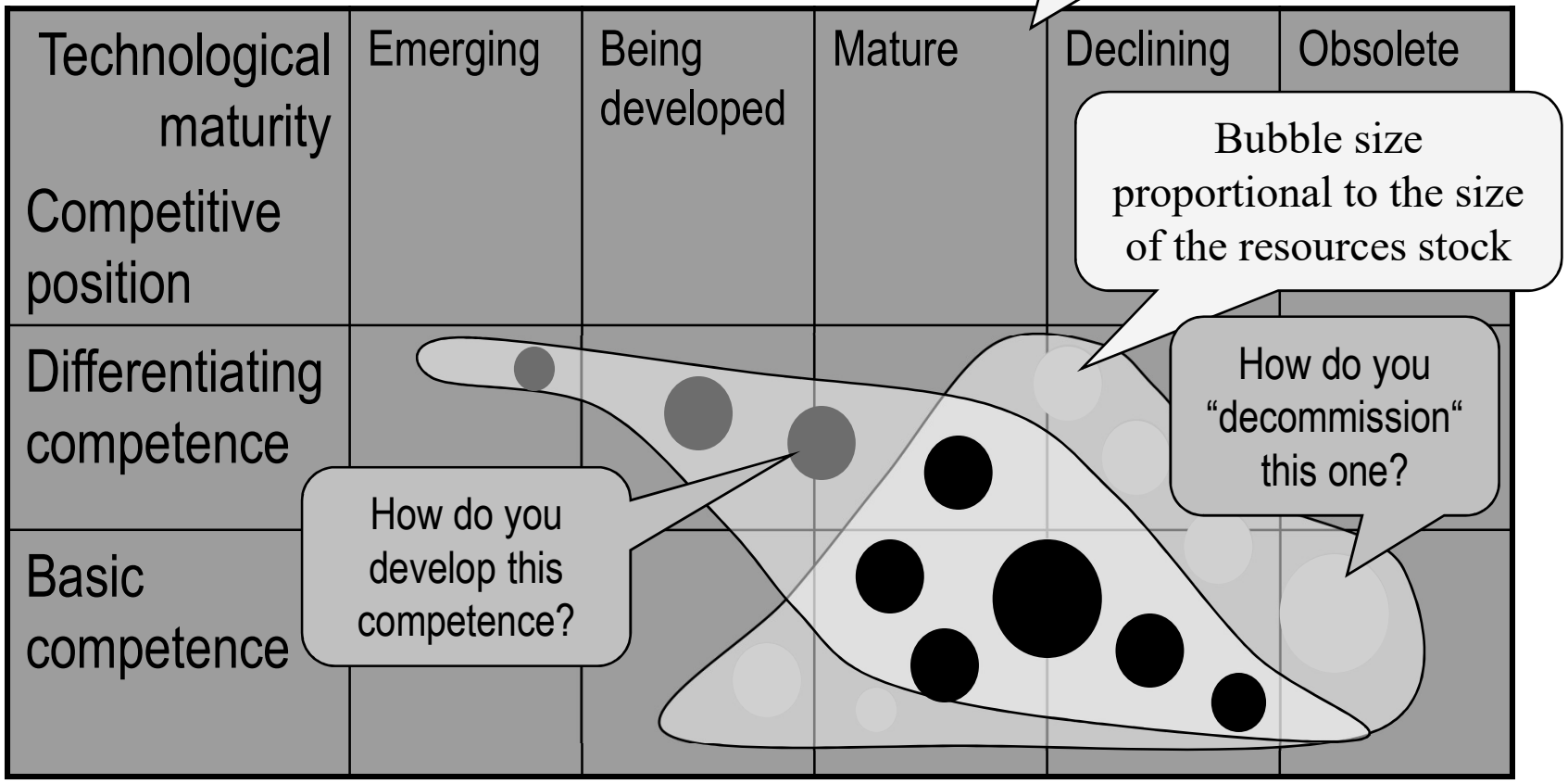


The process is generally quite long
→You have to plan your resources on time in order to have an impact on competitive advantage
→ if you start changing your resources when you see problems in competitive advantage... then it's probably too late!
→ get "new resources" on the top team too, looking at future needs, not only current capabilities and merit

How to make a assessments of competencies? (Like BCG chart) You make bubble chart of competencies. You locate the bubble considering the maturity (emerging, mature, obsolete...) and competitive position. Bubble size: the size of the competencies pool you have. e.g. IT company, competencies: e.g. algorithms. Since these competencies are attached to the people, the size of the bubble could be the number of people you got. e.g. I have 4 python developers. (python is mature now, GPT is being developed, Cobol is obsolete). Decommission: ???

Auditing and benchmarking competencies

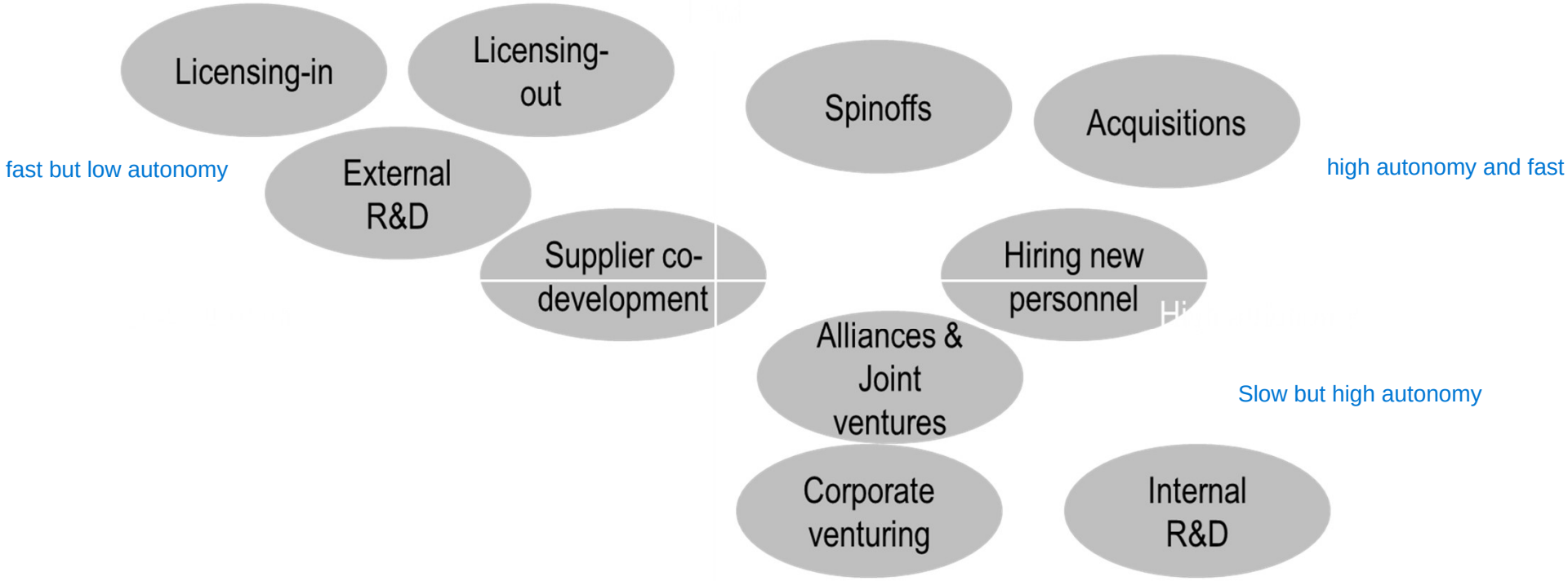
- Maturity vs. competitive position map



How to develop new competencies? a lot of ways. How can I decide what is best for me? It depends who you are. speed vs autonomy (ability to appropriate): low or high autonomy means whether you are able to appropriate the rest or you are giving off the possibility of appropriability. e.g. Acquisitions (dynamic capability): you have high appropriability and it is relatively fast. Internal R&D: it is a bit slow. Licensing out: fast but low autonomy.

Managing the development of competencies

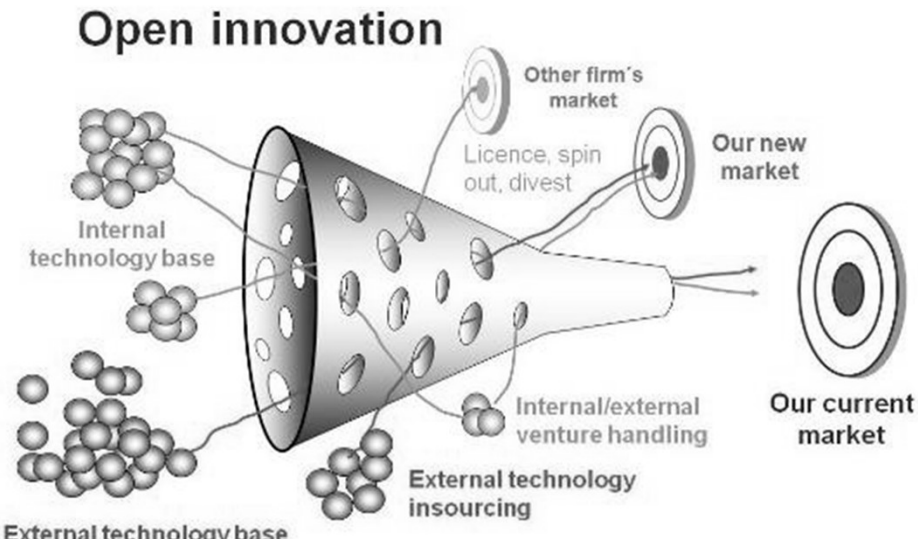
- Underlying theory has been covered when talking about organizational learning
- There is a variety of means (the main tradeoffs are "speed vs. appropriability" and internal vs. external level of understanding)
- Watch out for appropriateness of choice vs. execution capability



Open innovation: Innovation is not being built within the company anymore but being taken from the outside. e.g. By partnering, hiring, licensing...
P&G: External technology based

Managing the development of competencies

- Currently, “open innovation” is an umbrella term that covers many of these approaches
  - Strategically capturing ideas and competencies from outside the firm
  - “Letting go” of non-core ideas, competencies and projects to others
  - Recombining all of the above to generate new business models



Absorptive capability: Building new knowledge creates knowledge that makes you more aware and you are able to tap external knowledge.
Absorptive capacity: is a firm's ability to identify, assimilate, transform, and apply valuable external knowledge.
Alternative model: if a company is flexible and able to change their process and routines (learning), it will probably learn from R&D. (Higher organizational IQ).
Emerging interpretation: It depends with huge capital differences.
The companies with high debt, they should avoid internal R&D (because R&D takes years) and in contrast companies with low debt should invest in R&D.

Managing the development of competencies

- Internal R&D (used to be the mainstream approach)
  - Ambiguity of causal linkage with performance
    - Traditional model: "*if you invest in R&D you gain directly and because you increase your absorptive capacity in order to learn from competitors*" normal way
    - Alternative model (Knott 2008): "*Smarter firms (organizational IQ?) gain more from R&D and righfully make more investment. 'Dumber' companies don't gain much and do not (and should not!) invest in it*"
    - Cynical interpretation: "*successful companies have money to throw at R&D, and occasionally get something out of it*" which is not always true.
    - Emerging interpretation (Greve 2003): «*amount and type (exploration vs. exploitation) of R&D effort is determined by the mismatch between actual (or forecasted) and desired performance, moderated by national culture, type of ownership, etc.*»
  - Tends to be rewarding for firms with low financial leverage and high cash flow
    - Intangible assets produced are difficult to use as collateral
    - R&D requires stable cash flows (difficult if firm is highly leveraged, especially with fluctuating demand)
  - In SMEs R&D frequency matters more than intensity (R&D budget/sales), and is usually higher if internal knowledge assets are stronger than in the firm's external network (Cuervo and Un, 2010)
  - Requires strong commitment by CEOs (and seems to suffer if CEOs are external and lack firm-specific technical knowledge Cummings and Knott 2018) Requires strong leaderships

Managing the development of competencies

- Internal R&D
  - Takes time Developing competencies through Internal R&D takes time. You might lose your competitive advantage
  - Constrained by path dependency → can require an initial stimulus (event and resources)
  - Allows greater degree of appropriability
  - Allows attraction of talent… but requires incentives and resource retention strategies… though not to the point of dissipating profits (ar R&D people overpaid? How can you measure performance? How strong are non-compete contracts?) For researchers not only money but also how much they learn is important. Also motivation
  - Must be adequately placed in the organization
    - Within Business Units (decentralized)
    - In specific organizational units (centralized)
    - Spinoffs or intrapreneurship schemes (corporate venturing)

(Sauermann and Cohen 2010) R&D employees look for intellectual challenges, independence and salary. Results are correlated to *quality*, not *quantity* of effort

(Ganco 2013) Depending on complexity of knowledge, resources may leave the firm
- for another firm vs. start their own
- do it alone vs. with a group

(Wang et al., 2009) Firms tend to develop firm-specific know-how (higher sustainability of competitive advantage + lower market value of human resources) but employees are unwilling to spend effort in this direction

(Yanadori and Cui 2013) Strong individual compensation leading to pay dispersion can backfire (in case of firms with low growth prospects / financial slack)

(Conti 2014) Non-compete contracts allow firms to promote riskier R&D projects

(Kehoe and Tzabbar 2015) «Star researchers» cast both positive and negative influences on colleagues

(Gambeta et al., 2019), strong firm-employee ties push towards exploitation and away from exploration

Centralize pros: Strategy and financing is decided by the board, being close to scientific community. e.g. Palo Alto next to Stanford university. Centralized should have a central location.
Decentralized cons: You will lose good people as there is no well-defined career for them.
R&D is a great way to develop competencies, but you have to be able to finance it, manage (organizationally & geographically) it.

Managing the development of competencies

- Research activities can be
  - Centralized
  - Decentralized each unit has its own R&D

- Use of Intranets
- Market mechanisms… R&D funding coming from SBUs + "results showcases" (HP)
- Having both centralized and decentralized R&D (GE)
- Matrix organization … program managers (with SBU experience) control funds and technology leaders (scientists) manage people & projects (GE)

Form	Pros	Cons
Centralized	Financing is decided by top management Long-term perspective Closeness to the scientific community Well-defined career management Economies of scale, no duplication of effort	"Ivory tower"syndrome (Xerox PARC, www.parc.com)… needs mechanisms to coordinate with BUs (e.g. HP Labs) A single geographical location can limit the potential resources
Decentralized	Closeness to market and development activities R&D can be internazionalized to acces knowledge residing abroad (asset-seeking FDI)	Financing may be less stable Short-term perspective Separation from the scientific community Undefined careers Duplication of effort

The situation in which top management becomes so disconnected and out of touch with the experiences and problems of those at the bottom of the organizational hierarchy, who actually get the work done, is what is called "the Ivory Tower Syndrome".

Acquisition: When the acquirer company acquire a target company. We do acquisition because of the competencies (resources & routines) they have. Two ways to do it: 1- Buying the shares of the target company (not learning). 2- Integration (learning): Disassembling parts of it to reassemble them within your own organization, this is how you create value. (This approach is relatively quick)
Transaction cost: it's the cost that you have to spend not when you buy something but because of the process of buying. 1- Scouting: which company should I buy? 2- Due diligence: Inspecting the company you want to buy. e.g. their Accountancy system, legal aspects, people... 3- Negotiation. 4- Integration.

Managing the development of competencies

- Acquisition
  - Delivers results quickly, especially for firms that are innovation-oriented but underperform (Zhao 2009) and ensures a high degree of appropriability
  - Creates value when acquiring
    - Knowledge assets, either similar (→ incremental innovation) or complementary (→ discontinuous innovation) (Makri et al. 2010)
    - For technology-intensive firms, IP portfolios granting monopolistic rights or freedom to operate (Grimpe and Hussinger, 2014)
  - High transactions costs → scouting, due diligence (especially for IPR), negotiation, integration

First problem

  - Integration is especially related to
    - organizational routines (role of product architecture)
    - resource retention keeping people
    - dealing with organizational inertia (on both sides) and path dependency with respect to prior exploitation / exploration orientations

Second problem

Organizational Inertia: Neither the company you acquired nor your company will be so willing to adapt their ways of doing. Routines are difficult to change. Making the acquisition long, costly, and has number of potential pitfalls.

Cisco

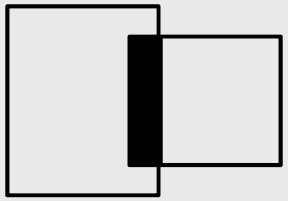
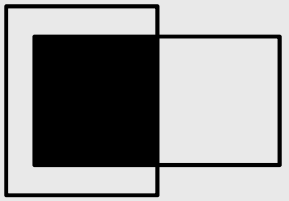
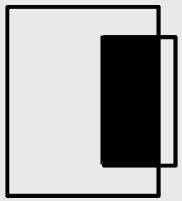
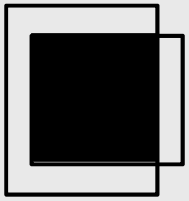
- Strategy based on product line breadth and standardization → modularity and decentralization
- Fast acquisition process based on
  - Screening of candidate companies
  - Due diligence
  - Negotiation
- Integration process based on
  - Employee retention (HR processes, benefits, CEOs as VPs)
  - Standardized operations (NPD, MRP, Quality, Suppliers)
  - Speed (product immediately on price list, everything else done within 90 days)

Intel

- Budget for technology-related acquisitions is 2x R&D
- Manages a Corporate VC fund

Managing the development of competencies

- Acquisitions are subject to an 'integration paradox'
  - integrating knowledge disrupts the acquired firm and reduces its autonomy → its innovation capabilities
  - successful integration depends on the degree of overlap between target and acquirer's knowledge. This influences the acquirer's absorptive capacity, diversity of knowledge, and potential for conflict (Sears and Hoetker, 2014)
  - There is no 'ideal' combination. Empirical evidence shows diversity might matter more than absorptive capacity

Acquirer overlap Target overlap	Low (target knows little of what acquirer knows)	High (target knows much of what acquirer knows)
Low (acquirer knows little of what target knows)	• Low absorptive capacity • High diversity • Low conflict 	• Low absorptive capacity • High diversity • High conflict 
High (acquirer knows much of what target knows)	• High absorptive capacity • Low diversity • Low conflict 	• High absorptive capacity • Low diversity • High conflict 

Winner's curse: means you are the one who is willing to pay the most, and you ended up paying more than anybody else would have paid.

Managing the development of competencies

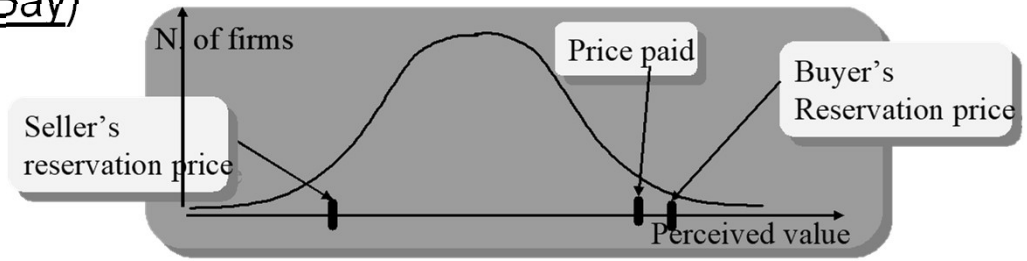
Third

- Acquisitions are subject to the 'winner's curse'
  - Acquirers evaluate targets assuming

    Value post integration > *Acquisition price* + *Integration cost*
  - Overpayment can arise if the acquisition price is subject to a *de facto* auction (e.g. Skype's 3.1 B$ acquisition by eBay)

    Causes the winner's curse

    Why?



  - For unique targets, overpayment allows to keep the target out of competitors' hands
  - Value post integration is associated to (Ransbotham and Mitra 2010)
    - Intrinsic value of operations (acquirer-independent, grows with age of target in case of startups)
    - Unexplored growth options (acquirer-specific, and decreases with age of target)
  - Overpayment risks seem to be lower when acquiring a divested asset and not a standalone firm (Laamanen et al., 2014)

How to evaluate Skype? eBay wanted to integrate skype to them so their value would increase. eBay bought Skype for 2.6 billion dollars (actual worth: 200 m) in an auction among google, yahoo...when you are in a position of target company, you have to have informal discussions (pre-contract engagement) with other companies in order to drag to auction. On the other hand, if you are the acquirer, you might find startups which not everybody is aware of it (not mature yet) to acquire with exclusive rights.

The evolution of Skype and its acqu

Price paid + integration cost < NPV(cost synergies + additional profits)

2002
Skype founded and raises 20 M$

2004
- Skype reaches 7M$ sales
- Plans for 2005 and 2006 are 60M$ and 200 M$ revenue
- Long-term margins at 25%

Could be valued up to 200M$ as an independent business

2005
Skype acquired by eBay for 2.6 B$ (+ earn-out)

Winner's curse

2007
eBay writes off investment by 1.4 B$

2008
Skype reaches 550 M$ revenues (+44%) at 23% margin

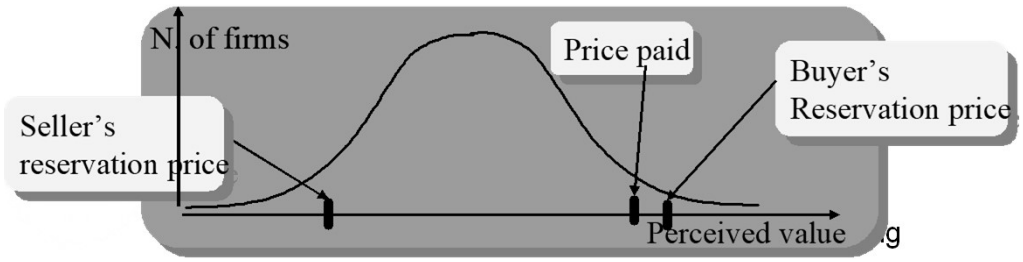
2009
Skype & eBay sued by Jotllid (Skype founders' "IP vault") for copyright infringement on Skype's core code

due diligence problems

2009
IPO derailed and eBay privately sells 65% stake at implied valuation of 2.75 B$

2011
Microsoft buys Skype for 8.5 B$ (32 x EBITDA, 68$/active user, 1k$/paying user)

Microsoft bought it to integrate it to Office (themes)



Corporate venturing: When company behaves like venture capital investor. It is a strange mixture of internal R&D, acquisitions, and joint ventures. The idea: to make a limited investment in a small startup (growing) because you think the startup will grow. e.g. if Bosch invests in a small AI startup, the startup grows and eventually becomes Bosch's industrial partner. Bosch will set up a corporate venture capital fund (Separate legal entity: Bosch ventures) with people who come from venture capital industry and these people will go to startups. By this you can avoid problems like not Bosch people being involved with the startup or adverse selection. Problems: Creating Bosch Venture: will you be able to attract professionals? will you be able to enter deals with real large venture capitalist companies?

Managing the development of competencies

- Corporate venturing It is something for big guys
  - The company behaves as a venture capital investor and takes up stakes in startup firms (spinoffs or not) → "hybrid" between internal R&D, acquisitions, and joint ventures
  - It is complement (not a substitute) to internal R&D, but who comes first?
  - Corporate venturing can have a number of purposes
    - Innovation venturing (financing firms that develop technology that is/might become core)
    - Ecosystem venturing (financing firms that develop complementary technology/products)
    - Harvest venturing (makes excess internal resources look for revenue in the market)
    - Private equity venturing (purely financial diversification)
  - Frequently found if (Dushnitsky and Lenox 2005)
    - IP protection is weak
    - significant technological change and uncertainty
    - complementary assets (e.g. distribution) are important
    - the venturing firm has high absorptive capacity w.r.t. the target and high cash flow

    … but under these conditions the target might not accept, in fear of imitation or rent extraction (CVC paradox, Dushnitsky and Shaver 2009) → complementary role of VCs and CVCs

Medium size companies: putting money as limited partner into normal venture capital fund. (Innovation venturing)
Ecosystem venturing: making investments not in technologies that are core to me, but complementary to me. e.g. Intl funding game developers, their strategic interest is that game makers create games that require more powerful CPUs.
Harvest venturing: basically used to spinoff units which are not considered core.

Hiring experts vs Acquisition: 1- longer process (one for each person). 2- the auction mechanism only exists at the beginning as there are less experts.
3- Integration: Is the person compatible to my company routines?

Managing the development of competencies

- Hiring experts
  - "hybrid" between internal R&D and acquisition
  - allows a significant but progressive learning process (for older organizations, this occurs if new hires are experienced - Jain, 2016)
  - high transaction costs (personnel selection and integration)
  - the integration problem is different than with acquisition
    - individuals are generally easier to adapt,
    - you get many integration problems (one for each person)
    - individuals may easily be "gobbled up" by the organization
  - you must wait for results until integration is ended
  - lesser risk of incurring in the "winner's curse" (the job market is usually liquid), save for emerging technologies
  - individual competencies can be "institutionally specific" (→ a candidate who did well in his former position might underperform with you… e.g. academic researchers, Toole and Czarnitzki 2009)

Strategic Alliance: Any type of agreement between two companies. according to innovation management, two companies have no shared holding agreement either between themselves or to new legal entity. Creating Value by partnering with another company? Two ways: 1- We have complementary competencies. e.g. I do hardware, you do the software. 2- Joining forces with competitors to achieve economies of scale. e.g. Doing a costly project together. Might lead to define standards (standards by agreement). Usually these things are done for exploitation purposes, not exploration. Problems as follow:
1- Contracts are difficult to enforce. This open the door for opportunistic behavior, which means you don't act according to what it's said in contract. (free-riding).This usually happens at lower level management of company.

Managing the development of competencies

2- IP leakage: Sharing too much knowledge.

- Strategic alliances (non-equity agreements)

Expensive

  - Can create value when participating firms
    - have complementary competencies
    - are competitors (can lead to economies of scale, standard-setting, etc.)… but some degree of complementarity is always present (firms are different!)
    - jointly pursue asset exploitation (not exploration) (Hoang and Rothaermel 2010)

because not so likable to happen. We might not have anything to contribute

  - Firms are bound by contractual (not institutional) links
    - Tradeoff between transaction costs associated to contracting and ability to solve ambiguity → 'relational governance' mechanisms when sharing knowledge-based assets (Hoetker and Mellewigt 2009), or board-like "steering committees" (Devarakonda and Reuer, 2018)
    - Risks of free-riding at corporate and individual level → need to provide adequate incentives and clarify organizational status
    - Risks associated to IP leakage, which requires well-written contracts
      - more likely if focal company has a lot of IP to lose, and partners have significant absorptive capacity (Giarratana and Mariani, 2014)
      - a key decision variable is the degree of partner interaction (Contractor, 2011)

Free-riding: means you take a free ride in the car of your friend without thinking about compensation.

Joint-Ventures: Creating an new legal entity co-hold by two companies that is made for the purpose of carrying out the process. Issue 1: If a large company making a spinoff joint-venture (50/50) with a smaller company, the bigger company's "50" would be bigger. Issue 2: People at the joint-venture are taking away (lose connections) from their original company. Cost (another issue): establishing a new joint-venture company is costly. e.g. office, managers, board of directors... The joint-venture is fine for relatively large projects.

Managing the development of competencies

Cheaper

- Joint-ventures (equity agreements)
  - Can create value thanks to size and/or complementarity
  - With respect to alliances,
    - Firms are bound by institutional links
    - Lower degree of ambiguity, since incentives are better aligned (though “small” JVs risk not being able to provide sufficiently powerful incentives to avoid opportunistic behavior)
    - higher costs (at setup and for managing the structure)
    - the JV is separated from parent organizations (may be an advantage or a risk)

Co-development: Exclusivity issues (technically specific to the customer).
Post contractual hold-up: A hold-up occurs when one transactor takes advantage of another's lack of comparably valued alternatives to insist on more favorable terms of trade.
Principal-agent problem: When a principle pays an agent to do the job, but is not in the position to check. opens the door for opportunistic behavior.

Managing the development of competencies

- Co-development (financing component suppliers' R&D activities)
  - Provides an incentive to perform R&D on customer-specific projects by reducing the risk of post-contractual hold-up
  - Results may be hard to monitor, and a principal-agent problem arises
  - Contingency-based contracts may be useful (e.g., gain-sharing)
  - New competencies do not belong to the firm
    - the supplier gains higher bargaining power and reputation
    - competencies may be spilled over to competitors' projects
    - risks can be reduced by leveraging specificity or using intellectual property clauses in contracts

"XYZ told me that if I want to be a supplier of his, I must invest 100,000 € for an R&D project whose results I can't use otherwise. I bet that after the project is ended XYZ will change the terms and force me to cut down on price. Better avoid this!"

Risk of lowering transaction price and Post contractual hold-up problems

"XYZ has granted me 100,000 € for the R&D project. They aren't able to monitor what I'll do with the sum. I'll spend half of it, or maybe use it to change the scope of the project so that I can use results elsewhere"

Principal-agent problem

Sometimes this can lead a supplier to take the risk of doing customer-specific R&D without financing

Sharing IP with suppliers (but retaining exclusive industry-specific rights) can become a powerful incentive (Carson and John 2013)

Co-development: is paying the supplier to do R&D work which is specific to you.

Managing the development of competencies

- Co-development can entail different arrangements (Bhaskaran and Krishnan 2009)
  - Revenue sharing → the supplier makes the R&D investment and shares the revenue
    Risk of Post contractual hold-up
  - Investment sharing → the customer pays the supplier to do the R&D work
  - Innovation sharing → the customer pays the supplier but also shares R&D work
    to avoid Post contractual hold-up and principle-agent problem. (jointly)

Require alignment of incentives and knowledge sharing → better to share money and/or effort

Sharing effort helps overcome technical difficulties

Funding suppliers supports them in the face of timing uncertainty

Major source of uncertainty / Innovation type	Uncertainty in translating R&D to a product	Both types of uncertainty	Uncertainty in timing
New to the world	Innovation sharing	Innovation sharing or investment sharing	Investment sharing
Incremental	Revenue sharing	Revenue sharing or investment sharing	Investment sharing

Incremental projects, with quality mainly dependent on supplier

Outsourcing R&D: Pay money and get the work done. Problems: Transaction Costs: How would you find people to build the required competency? 1- In university, technology transfer offices (like marketing & sales department of university). 2- To use websites, e.g. Innocentive (specialized in the field of pharmaceutical and chemistry), it is easier to do their challenges. It is harder to do in the field of mechanical engineering. 3- Setup Scouting units: a company might setup the scouting unit whose job is to go around the world and look for technical solutions. e.g. looking at websites, trade fares, trip to silicon valley... because you want to make sure that any competence which might be interested for your company found. (costly)

Managing the development of competencies

- Outsourcing R&D to third-party organizations and scouting for solutions
  - Main candidates are
    - Competitors' R&D units
    - Consultants
    - Smaller firms close to solutions
    - Not-for-profit research centers
    - Universities
  - Transaction costs can be high and require a specific organization
    - Academic Technology Transfer Offices
    - "Markets for ideas" and "crowdsourcing" (e.g. Innocentive, Ninesigma, etc.), working as "innovation contests" (→ tradeoff btw. competition and underinvestment due to uncertainty in outcome)
    - Scouting units (Monteiro and Birkinshaw 2017) working on technology push and demand pull, and operating "translation", "matchmaking" and "transformatoin" processes

With many participants (Boudreau et al. 2011) individuals' incentives are low, but there is a greater likelihood to find a "great" (i.e. extreme) idea. If problem uncertainty is

- low, solutions will be similar → contests work well if participants don't have to invest much and can apply prior knowledge or results (else, the number of participants should be reduced)
- high, solutions will tend to spread → many participants will not reduce individuals' incentives as much, and the "extreme value" effect is greater

Appropriability problem: I am paying you to solve the problem, and I want to make sure that the competencies you developed are going back to me so I make money out of it. The problem is bigger when dealing with "for profit" firms, but it is easier with non-profits like universities. The main issue with non-profits is with IPRs (Intellectual property rights), the solution is to sign a contract with the professor that since I am paying the IPRs are going to be covered by me and publishing the result is subject to my sign it off. Only publishing the things that don't fully allow the complete replication of the whole thing. (Problem: enforcement of the contract is weak)
Risks of publishing: 1- The paper goes around the web. 2- Competitor companies (at the workshop) seize things. 3- patent in the name of professor.
Mostly the companies hire the professors and researchers to avoid such problems.

Managing the development of competencies

- Outsourcing R&D to third-party organizations and scouting for solutions
  - Appropriability of competencies is a key point
    - A large firm will engage in Open Innovation in order to appropriate competencies to some degree
    - A «for profit» firm will partner with a large firm because of its value creation capability, but will be wary of value appropriation → risk of adverse selection (Diestre and Rajagopalan 2012)
    - Non-profit innovators may not feel this problem, but tacit competencies may be difficult to transfer
    - Contractual design must deal with incentives and IPRs
    - Managing and moving people around can help (e.g. hiring researchers, secondment of own personnel, etc.)

Managing the development of competencies

- Outsourcing R&D to third-party organizations / scouting for results
  - You can envisage four collaboration modes (Pisano and Verganti 2008)
  - Designing incentives is key
  - These models sometimes can sometimes become services to third party firms

Governance **Participation**	**Hierarchical** Greater control on innovation... provided you have the right strategy	**Flat** Sharing the responsibility on innovation ... hopefully retaining profits
Open Reach into unknown domains... but you have to screen solutions	**"Innovation Mall"** Anyone can participate but the company decides the winners (e.g. Innocentive)	**"Innovation community"** Anyone can propose solutions and the community decides on the winners (e.g. Open Source communities)
Closed Solutions from the best experts... but you have to know them	**"Elite Circle"** The company invites participants and determines the winners (e.g. Alessi)	**"Consortium"** A private group looks for solutions and chooses the best ones (e.g. IBM partnerships for semiconductors)

Managing the development of competencies

- Acquisition of licences
  - Apparently it looks like giving up the development of competencies
  - It often is a first step to develop them later on (e.g., emerging countries)
  - Many patents are “up for grabs”
    - non-core inventions made by large companies,
    - university patents,
    - inventions by small companies that don’t have the clout to compete in the product market
  - Grant-back clauses (the licensee must transfer rights on improvements back to the licensor) can be highly limiting

Managing the development of competencies

- Becoming a supplier (Alcacer and Oxley 2015)
  - Similar to acquiring a license
  - Can be highly beneficial, especially if
    - partnering with a technological leader
    - engaging in product development and not only manufacturing
  - Competencies are usually related to the technology (very rarely to the market)

Two risks attached to “Off the shelf”: 1- Suppose there is a single company that becomes the sole supplier of fraud detection mechanisms (monopoly). There will be very little incentive for innovation. - The industry gets stuck and the only way to get out of it is to start developing your own competencies. e.g. Swiss watches. How do you differentiate? The med level watch makers are going to make their own to differentiate from monopolist. 2- Inability to specify and buy things and verify: e.g. analogue to digital, for example you need experts for buying.

Managing the development of competencies

- Total outsourcing (design and production)
  - It is equivalent to “giving up” the idea of developing competencies
  - “Off the shelf” components
    - often are less than “leading edge”
    - do not differentiate the firm against competitors
  - Outsourcing requires caution
    - You risk losing the capability to specify, buy and verify
    - Suppliers may have little incentive to pursue innovation further

Final Remark: Each of these things (Internal R&D, acquisitions, Hiring people...) has pros and cons, details which might or might not work. it is complicated, not easy. Is it a mater of scale, size? YES, for example R&D requires a large stable company. Acquisitions means you have to be a big guy. Corporate venturing, you have to be there. Joint-venturing and strategic alliances, you have to big.
Message: In the world of innovation today, it is the world for big guys (Only they are able), or small guys work along side the big guys (e.g. joint-venture).
Losers: Small guys trying to act independently, or small players think they are smart.

Prof. Marco Cantamessa

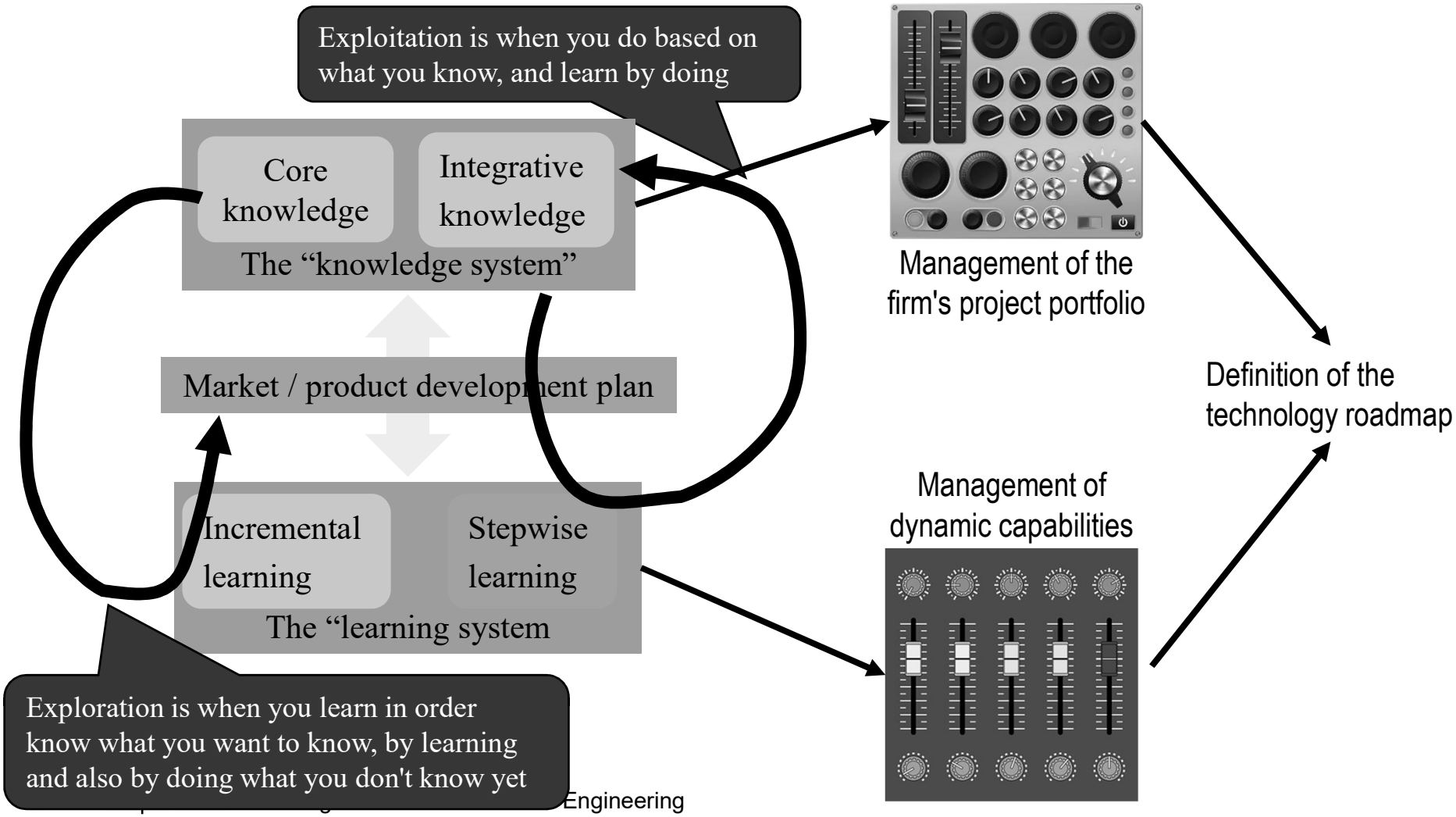
Innovation Management
Formulating an innovation strategy
Part 2 – Innovation strategy as project portfolio management

another perspective

You cannot look at strategy without looking at set or portfolio of projects that drive the strategy or come out as a result of the strategy itself. We call this project portfolio management (PPM). We can boil it down into three things: 1- Creating categories for projects. 2- Establishing processes (Stage-Gate). 3- Making the decisions which project to peruse based on criteria (Financial...)

Innovation and core competencies

- Dynamic capabilities following the model by Helfat and Raubitsheck (2000) – the firm is an entity where "knowing", "learning" and "doing" coevolve, more or less strategically



Outline

- A foreword on the importance of project portfolio management
- Taxonomies for projects (static)
- The innovation funnel (dynamic)
- Tools and methods for project portfolio management

Project Management (as a discipline): Basically sees the individual project and you call this project management, it sees connected projects called programs (program management) and the in the top level there is project portfolio management which is not the decision of how to carry out projects and programs but which projects and programs will be carried out. (choosing project).
These should be done in a formal way (formal procedural approach). 1- You have to make projects at the same time (Project glut). If you have two main project, eventually you will have overused resources. e.g. employees overused (too much work for too many people)
Failed projects never die: If you have 100% success rate your in projects, it is not good. There has to be some sort of failure wave which has to be controlled, managed.

A foreword

Objectives Overload: e.g. if you are trying to customize the product for different companies. You have make to order in making these decisions. How? 1- You to classify their projects 2- You have to setup a process. 3- you have to have a decision making criteria. (Classify, process, decide)
Classify: means projects are not the same. Developing a new product is different from customizing an existing product for customer. And the decision is all up to you.

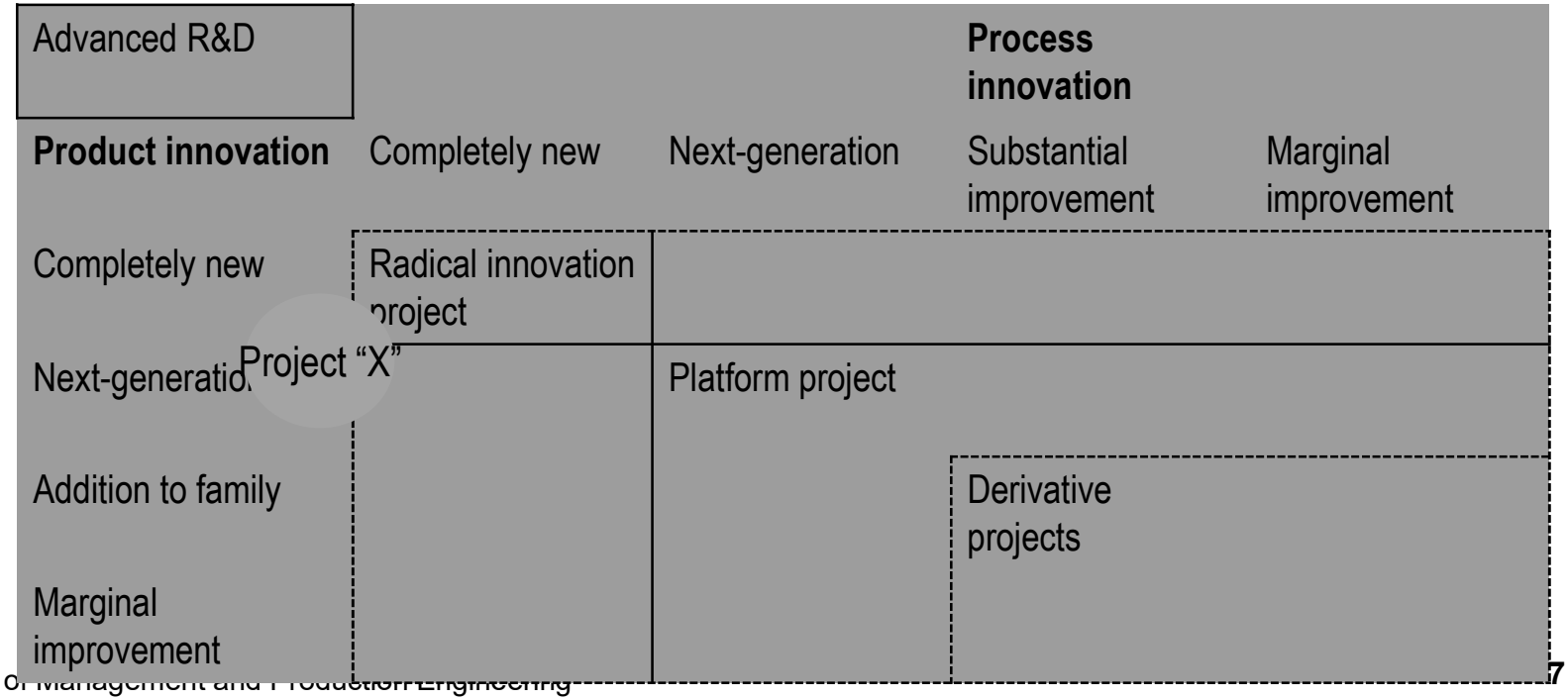
They are not comparable. (developing new product vs customizing an existing product).

- The role of top management in project portfolio management (PPM)
- The strategic need to formalize PPM
  - PPM as a tool for defining / implementing innovation strategy
  - “Project glut” and over-used resources
    - No project is assigned enough resources
    - Projects fight to get hold of resources (on “political” basis)
    - Project lead time increases without bounds
  - Failed projects never die
  - Projects get overloaded with objectives
  - Decision making is subjected to cognitive biases and political influence

Create baskets: among the baskets, one basket which is often very important, it will become the platform development. Usually it is wise to separate projects where develop products from research projects (advanced) by using platform development. e.g. Volkswagen AG: if look at their cars, you'll realize they share platforms. For instance they have a platform for compact cars which is the same basic setup components that is used to do the Audi A3, Volkswagen golf,...the core components are common among these cars.

Taxonomies for projects

- Wheelwright and Clark – map and categorize your projects
  - Projects at different levels are fundamentally different (scope, decision-making process, deciding authority, etc.)
  - Projects must be compared like-for-like



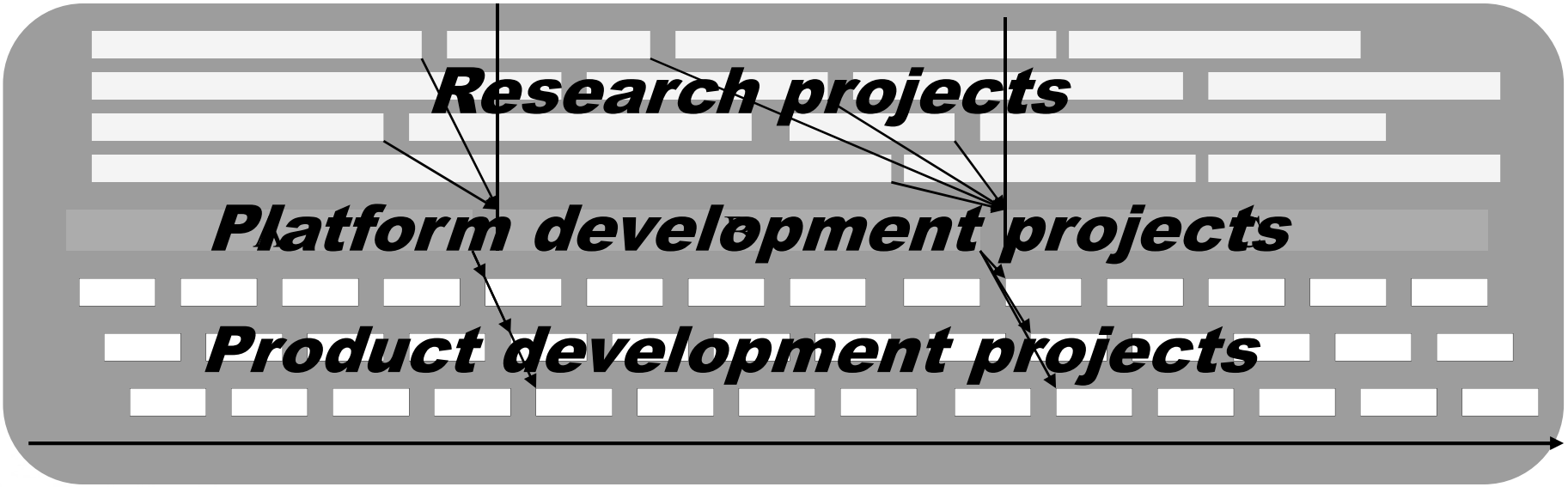
Developing a new platform costs billion dollars, but projects based on an existing platforms roughly costs between 100-200 million dollars. By doing this you achieve huge economies of scale (a fixed cost you can spread over a large volume. a fixed cost can be R&D). Why? if you develop a billion dollar project and then you spread your billion dollars over all these different models, you could probably have a billions dollar over two million cars (500). You have advantages with respect the money (economies of scale), in terms of flexibility (you can launch products and see whether they work), you can also have advantage of creating products that priced differently (e.g. Audi is more expansive than Volkswagen and Skoda even though the cost is the same). How to do? you have to integrate everything that is costly in the platform and to differentiate in the projects anything that is not so expensive but is flashy. (Marketing perspective)

Taxonomies for projects

Why platform development is important (innovation perspective): This allows the people who run these projects to focus on the things that matter. What you need to do to develop a single technology that works alone, make it work and do it by discipline. You only focus in integration in platform development.

- Platform projects can decouple projects having different
  - innovative content
  - features and objectives

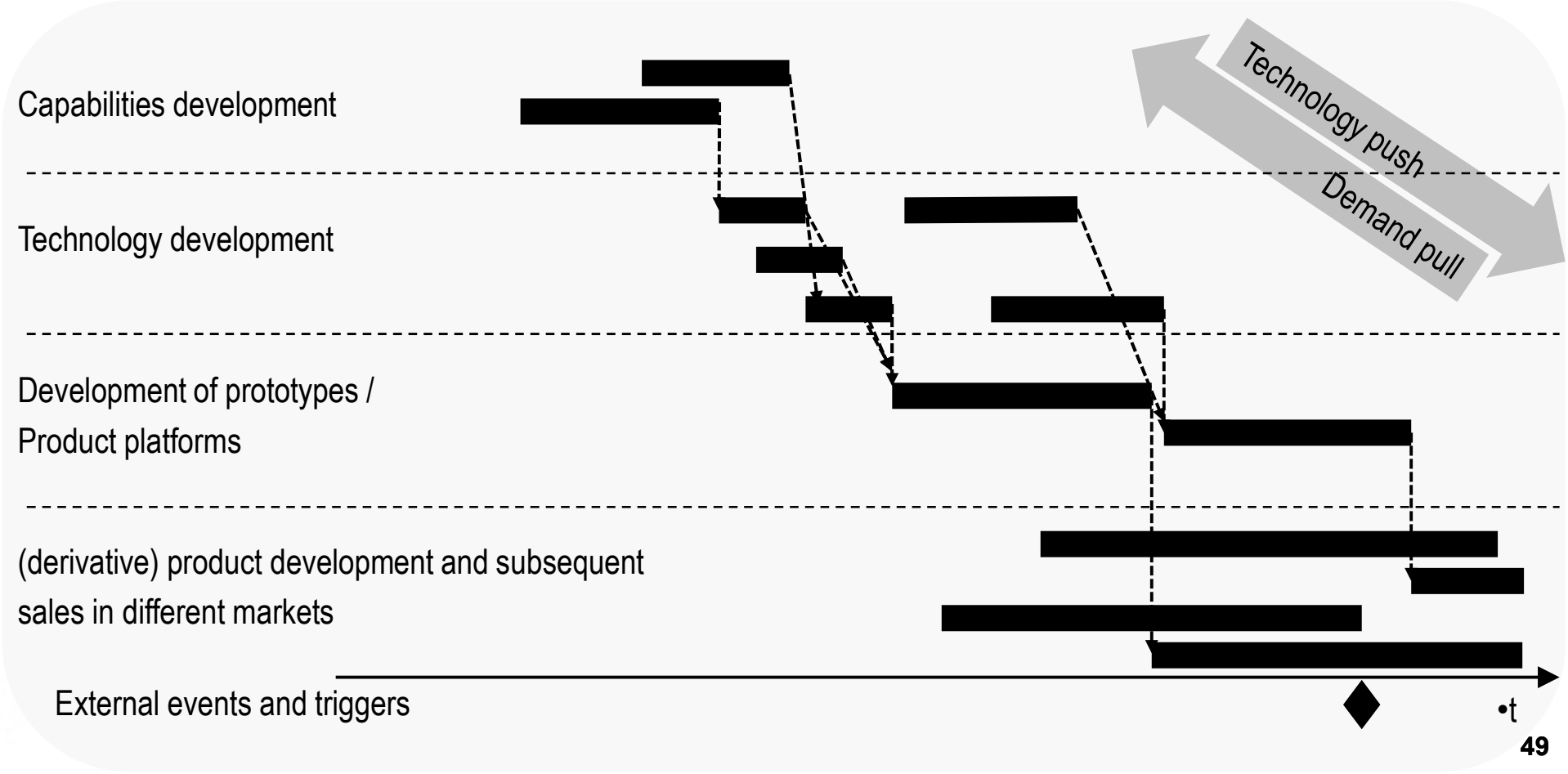
Platform development message: if you take it from high level marketing perspective, it is mostly about reducing the costs. But if you take it from perspective of innovation and managing projects, it is about sorting things out, making sure when you do something, you do that thing not all the rest.



Technology roadmap: a notations of project portfolio of a company that basically says where are you going (high level). Why important: because if you don't have a clear picture where you are going over the next "5 years", you will not a have vision.
The process: Each individual project goes from initial idea all the way to success or failure.

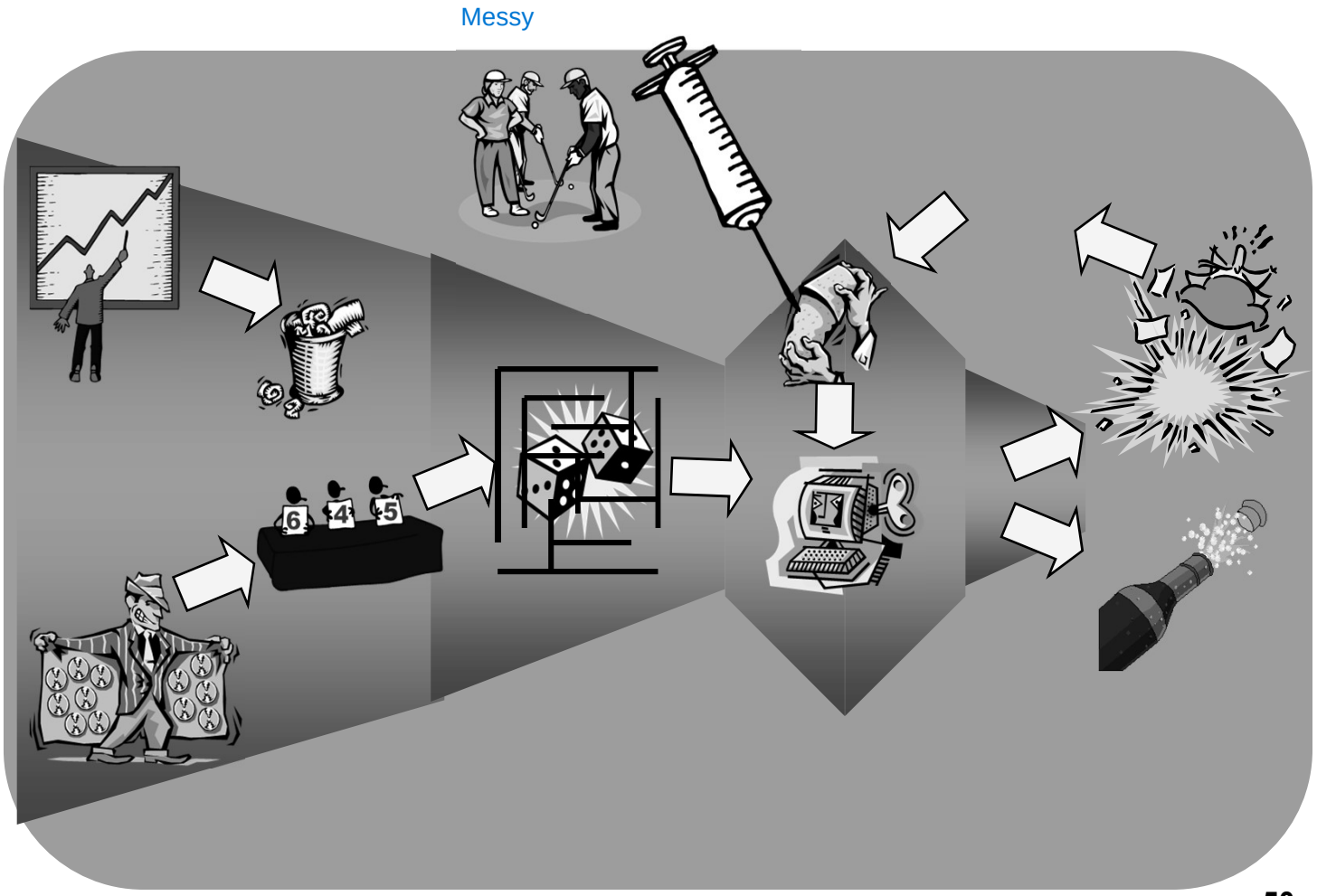
Taxonomies for projects

- Technology roadmapping can help create a coherent picture of the portfolio you are talking about



The innovation funnel

- What's the process like in your company?

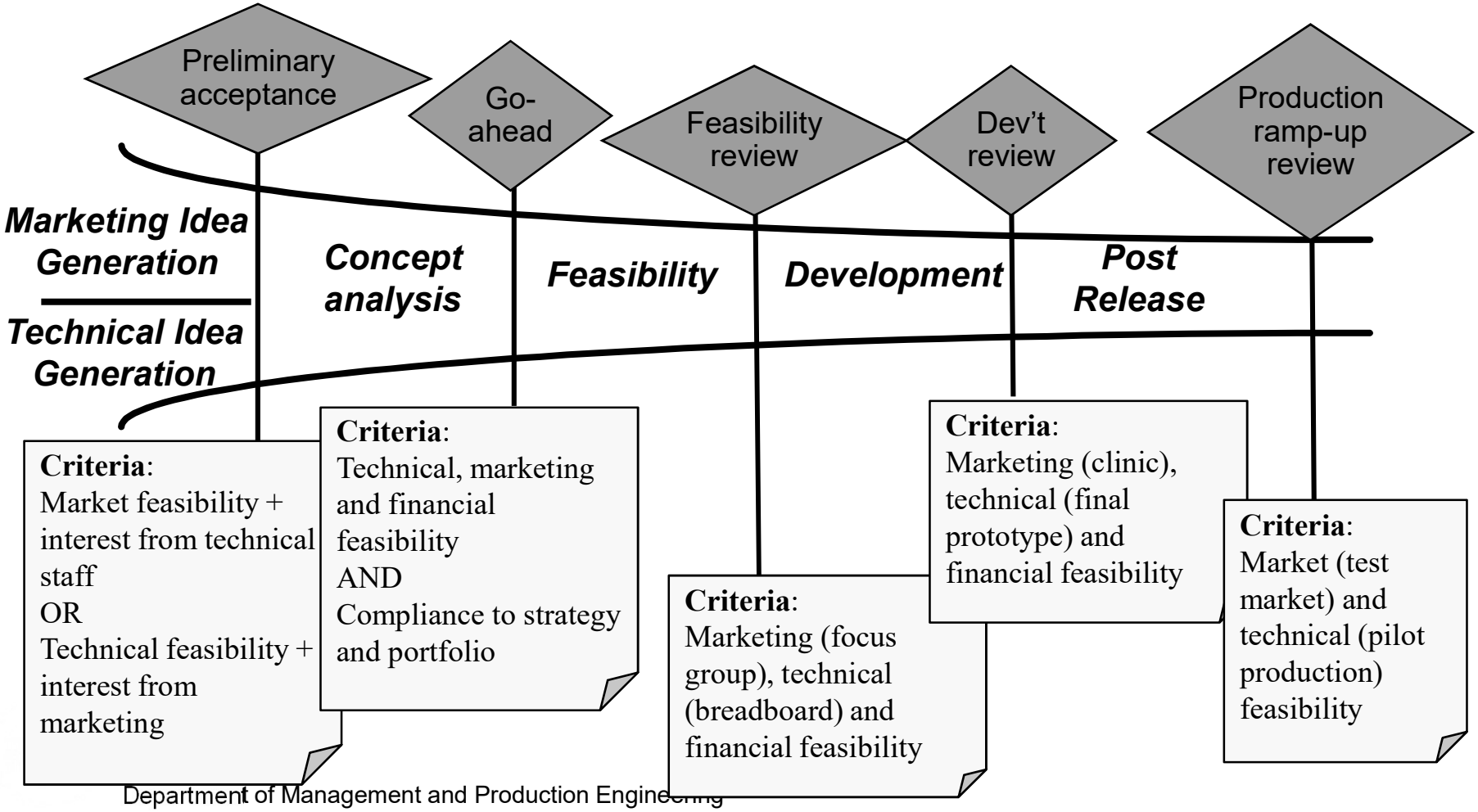


Stage-Gate: The projects are not guaranteed to be successful from day one unless they are very low risk. e.g. Startups are funded by venture capitalist by some amount, when they reach another gate (area of review), they get more money. Also similar with projects the money is allocated in steps (because of uncertainty). For example pharmaceutical companies: Phase 1: drug working - lab analysis. 2- Animal testing. 3- Pre clinical trial: testing on healthy people 3- clinical trial phase one. 4- clinical trail phase two If you look at the number of projects inside a pharmaceutical company, in order to have one successful drug coming out of clinical trial phase 2, you need about 10000 attempts. How to make money: Big margins, failures are concentrated in early phases and less in later phases, and costs are so less in early phases which are being done in lab.

The innovation funnel

Message: This is the proper approach to follow. Set number of gates and stages, decide what criteria had each gate, what is the project for the next stage, and do it by knowing not only what are the stages but also what is the cost per stage.

- Stage-Gate® processes… based on the principle that costs grow and uncertainty decreases with time



Point: Create phases and stages, understand the cost dynamics and decide strict behaves must be at each step. (more details in the book)

Funnel: A lot of projects in, just a few projects out, playing around with the s-curve of costs during project. As long as the costs are low you can keep many projects alive, as soon as the projects start to escalate, then you should start becoming more strict in deciding which project to pursue and which not.

The innovation funnel

- Stage-Gate® processes are widely used and often misused (Schmidt et al. 2009)
  - Many projects in and few ones out … funnels are not pipes
    - Entrance must be easy (stimulate idea generation!)
    - Go/no-go decisions must be for real
    - Clear distinction between early phases (discovery and incubation, aimed at exploring and scrapping bad ideas) and later ones (acceleration, aimed at ensuring business success)… e.g. Eli Lilly's Chorus organizational unit
    - The process may be different for radical and incremental innovations
    - Firm-level performance is positively correlated with broad exploration strategies in the early phases, **if** matched with selectiveness in the subsequent ones (Klingebiel and Rammer 2014)
  - Rejection rates must be initially low, and go up when costs are about to escalate (even more for radical and new-to-the-firm innovations)
  - Completeness of information required should follow the same pattern (if you try getting more than what you budget, you will kill lots of good projects)

The innovation funnel

- Other tips and tricks...
  - Set a reasonable number of gates (3-4, maybe 5 for radical innovations)
  - Use a good review team
    - ≈5 people, or more for late-stage reviews and innovative projects
    - peers at the beginning and senior management towards the end?
  - Capitalize on failed projects ("lessons learned" and salvage assets)
  - Regularly assess review proficiency and try to improve it

This choice has pros and cons!

Evaluation of projects: 1- Financial: Contribution margin (very important to the company): the revenues - the variable cost (not fixed costs). e.g. a restaurant: contribution margin = price of pizza - the variable cost of each pizza (ingredients, daily wages of short-term employees), as long as I have positive contribution margin, at the end of each day, I set aside some money for fixed costs. Better to have a positive contribution margin even not a profitable. NPV if >0 -- good (details in the book)
Payback time: as a company I want to make sure that projects are pay back after PBT(after how many years I want my projects pay back?).
NPV vs PBT: PBT does not discount, killing visibility beyond PBT. (because of these two reasons payback time should not be used)

Tools and methods for PPM

Risk free interest rate: is the interest rate of something that has no risks attached to it. e.g. bonds with AAA rating (German 10 year bonds).
Risk premium: what is the additional amount of risk that I have to add because my project is not a German bond. What is the risk premium at which you should evaluate your project? Questions: 1- Is this a risk premium associated to the firm or projects? if it was a risk of the firm, we would have used Weighted average cost of capital (WACC), is the cost of capital venues by a company which is the weighted average of the different payments made to the different finance and entities. e.g. dividends to shareholders, mortgages, bonds, you sum them all and calculate weighted average and outcomes sum of risks. Why banks ask for this? they want to know how risky are the staff I do. Companies should work on project specific risk.

- Financial methods (es. NPV, IRR, payback time, productivity indicators), deterministic vs. stochastic (e.g., decision trees, Monte Carlo simulation)
- Optimization methods
- Multicriteria methods (from basic scoring or ranking methods to “sound” approaches such as AHP and Electre)
- Visual methods (e.g., bubble diagrams)

It's better to have a project that has the same value of another one but uses less resources than to have something that uses a lot of value and uses a lot of resources, not only general resources but also resources at a given time.

Relevant costs (not significant): It is something that has to do with managerial decision making. Is something change in costs when doing the project? that's relevant cost.
Multicriteria methods: Projects are not only characterized by value and resources (which are easy to quantify) but characterized by impact on public opinion, opportunity to create new options for the future, coherence with my strategy, coherence with my existing competencies, risk (negative side). All should be qualitative. They are the methods that you can take into account actors that don't only have to do with money. e.g. Scoring methods: You put weights on criteria, you score projects based on criteria, then you do weighted sum.
Visual methods: Pie charts to see categories. Bubble charts: to map your project portfolio over different dimensions.

Summary (Project evaluation): First of all we make a forecast the financial flows which will be project cost at the beginning (going down), contribution margin for launching a project or service (positive), then the proper way to evaluation is MPV which means you discount cashflows (money in the future worth less than money today).The benefits (future) are discounted while the costs (now) are not discounted. Another way which is payback time (which is wrong), instead of rooting all the way to the foreseeable future, I decide for a closer time horizon and decide the project is fine if I will be given money back in a short time. Payback time is wrong because first of all, it doesn't discount, but most of all, because it has a inherent bias toward the incremental innovation. Why used: 1- Simple. 2- Rates are low: up to three years ago companies said, since the rates (interest rates) are so low, discount doesn't make any difference. 3- There might be a case which the payback time concise or is very close to the final horizon. e.g. Useful commercial life of an iPhone: 1 year. but one year to design, second year to pay back, third year they make profit. If you have a product or service that has a close expire date, payback time might make sense (fast moving industries). 4- Payback time allows you to deal with future opportunities in a better way (get your money back if things go wrong and then you will be able to do something better. example of buying house in a new city). However, if you have a very clear view of the future, payback time is wrong. e.g. if you know the financial or labor market is close to perfect, payback time is wrong. In sum, NPV is better.