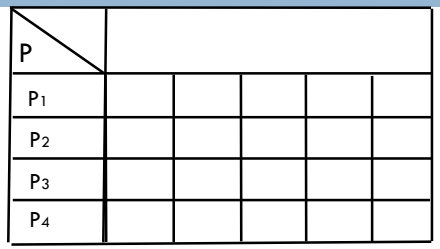
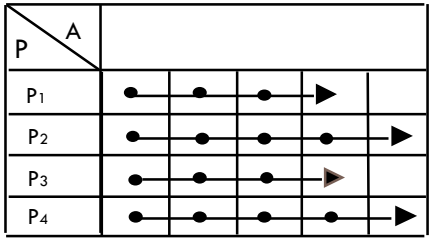
Morphological Tableau

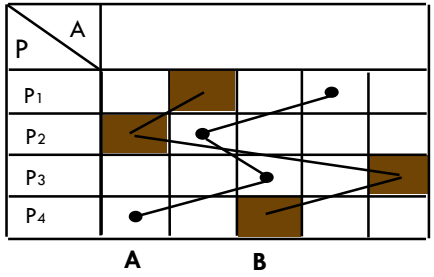
1. Identification of the elements of the problem (parameters) to be listed in the first column



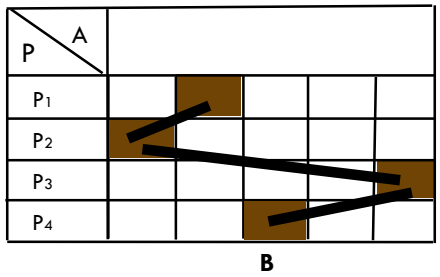
2. Search for partial solutions (options) for each parameter



3. Development of overall solutions by connecting elements through lines; each line representing a possible solution



4. Analysis and pinpointing of the optimum overall solution, e.g. „B“

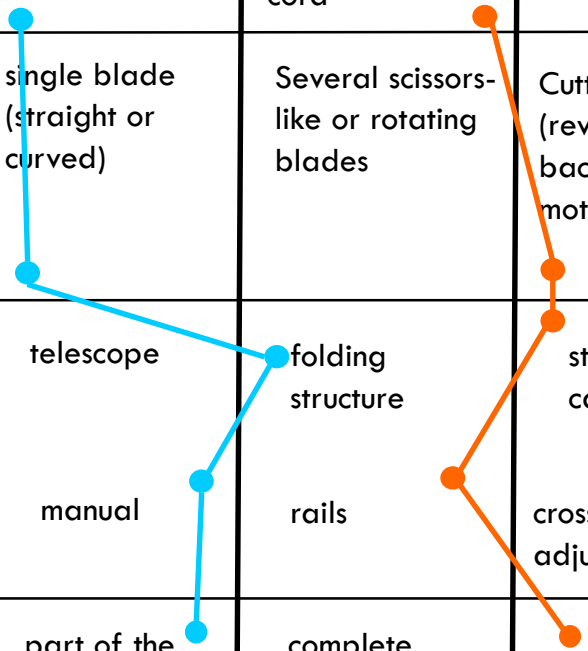


Morphological tableau for a coffee machine

Parameters	**Potential solutions** (values; here limited to three for each problem)		
..boil water	heating coil (built in)	hot plate or open flame (external)	chemical reaction producing hot water
..dispense coffee powder	by hand, with spoon	built-in measuring cup	integrated dispensing
..filter	filtering paper	porous porcelain	electrostatic precipation
..keep warm	heat insulating material	addition of heat	heat retaining hood
..pour coffee	tap	pumping unit	second container, pour out
Solutions (examples)	**K1** boil = chemical reaction dispense = integrated unit filter = ceramic filter keep warm = insulating hood pour = tap		**K2** boil = heating coil dispense = integrated unit filter = filter paper keep warm = heat addition pour = second container

Morphological Tableau for a Hedge Clipper

Parameter	Design alternatives (values)					
Drive	manual	electric powder cord	elektric, battery-driven	combustion engine		
Cutting unit	single blade (straight or curved)	Several scissors-like or rotating blades	Cutting chains (revolving or back-and-forth motion)	one or several saw blades	Cutting or sawing disk	Cutting beam
Carriage unit	telescope	folding structure	stationary carriage	insert (add-a-unit design)		
Guidance of carriage unit	manual	rails	cross-span adjuster	optical guide beam	with distance control	electronic
Range of action of cutting unit (single run)	part of the hedge front (not complete Height)	complete hedge front	top of the hedge	hedge front plus top	Allround clipping	



Morphological Tableau for a Garbage Separation System

Parameters	Solution Options				
Garbage collection	Conveyorbelt	Hopper	Flap	Bunker	Container (stationary)
Determine composition	Optical screening	Chemical analysis	Mechanical analysis		
Transportation	Crane	Chute	Shaking belt	Belt loader	Conveyor belt
Processing	Shear	Grinder	Hammer mill	No processing	
Separation	Magnetic drum	Shaking screen	Air separation	Flotation	Manual separation
Storage	Bunker	Containers	Dump	On trucks	On trains

Combination 1

Combination 3

Combination 2

Morphological Tableau: Fairytales

Parameter	Options					
Main actor	Little girl	Turkish boy	Tennis ball boy	A dwarf	Handicaped child	.....
Friends	Neighbourhood child	Dachshund	Grandpa and grandma	Pumuckl	The little people	.....
The evil	Witch	Magpie	Auntie Margot	Big dog	Caretaker	.....
Embodiment of good	Fairy	Grandma	Pigeon	Gardener	Lady from the castle	.....
Place of the action	Big city	On the beach	Family excursion	Ship	Kinder-garden	.....
Mysterious event	Cake/Coke is growing again	Switch into another world	Gliding over a moonlight ray	Serialized dreams	Reading mind	.....
Danger	Deep fall	Arrested	Noses are growing all over the body	Evil giant cat	Shrill noises	.....
Happy-end	A wish comes true	Parents come home	Big party	The cat is back again	Balloon ride	.....

Fairytale A

Fairytale B

Application of the Morphological Tableau

Application

- In general: Whenever a task, process or function can clearly be divided into independent parts, subfunctions, elements
- Complex problems
- Especially suited for:

* machines
* devices
* organizational tasks (organizing a conference)
* processes (with phases of different functions)

Situation in problem solving: After intensive open idea generation in order to structure the material and to separate between essential and less conceptual ideas (especially in workshops)

Weaknesses

- The solution stays within the established frame-work.
- Breakthrough-ideas can not be expected!
- Difficulty to maintain an overview over attractive solutions.
- Abstractive thinking required.

What Creativity Techniques achieve

- Establishing a clear focus
- Planned, organized process vs. spontaneous intuition
- Uses normal, competent staff vs. only highly creative
- Ensure discipline for cooperative group work
- Provide predictable results within a given time
- Does these things by
  - stimulating the creative process
  - compressing it in the time

VI. Idea Evaluation and Selection

The Situation after Idea Generation

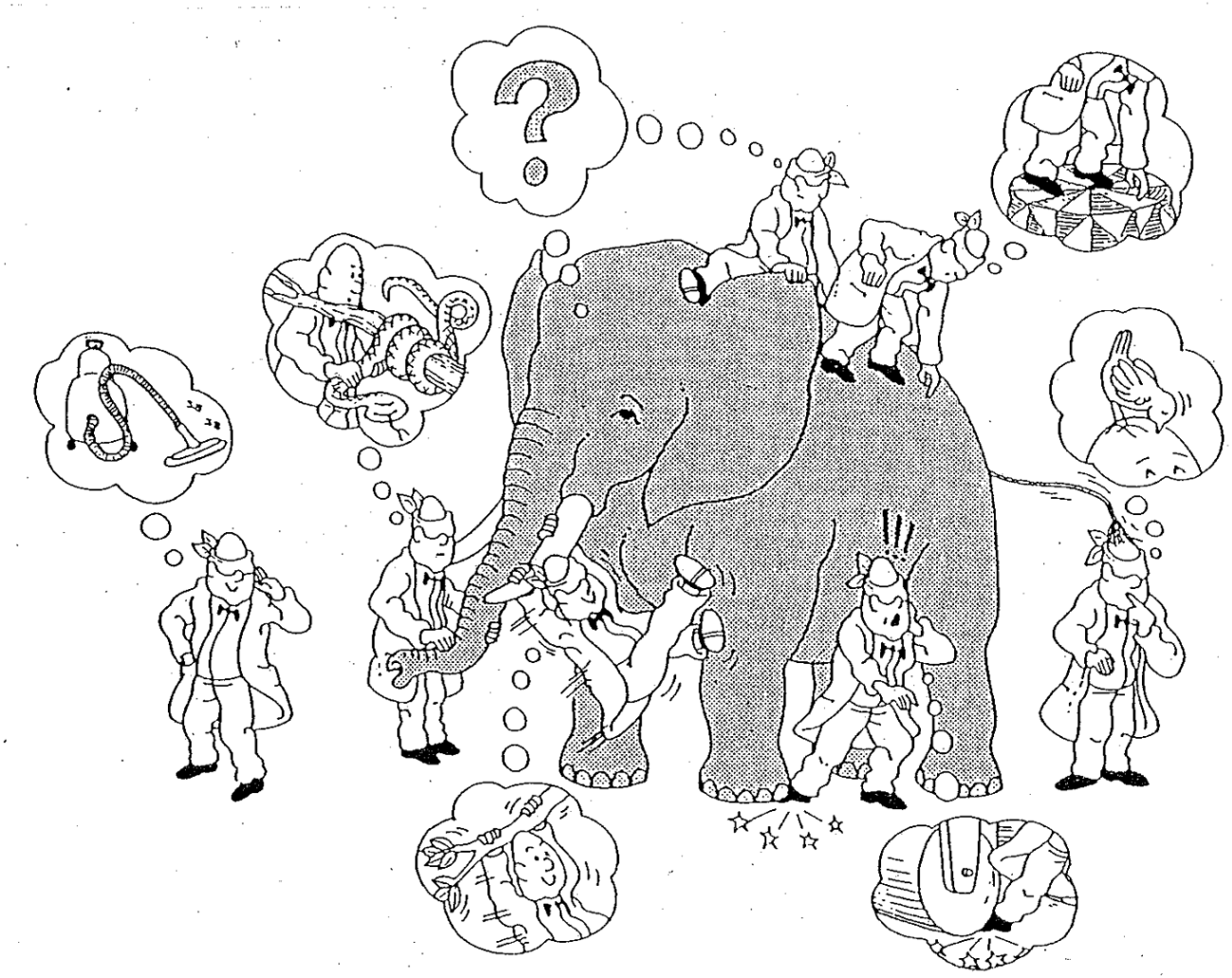
- A big number of ideas are listed, however only a few can be realized.
- Most ideas are only vaguely described.
- The information about the individual ideas is generally low.
- In a rather short period of time a few ideas have to be selected for further investigation and development.

Problems for the (Non-self) Evaluators

- A judgement has to be given on the basis of incomplete information and insufficient knowledge of details.

- Evaluation needs also fantasy and creative thinking on
  - the final product and
  - the social, economic and technical environment of usage of the product.

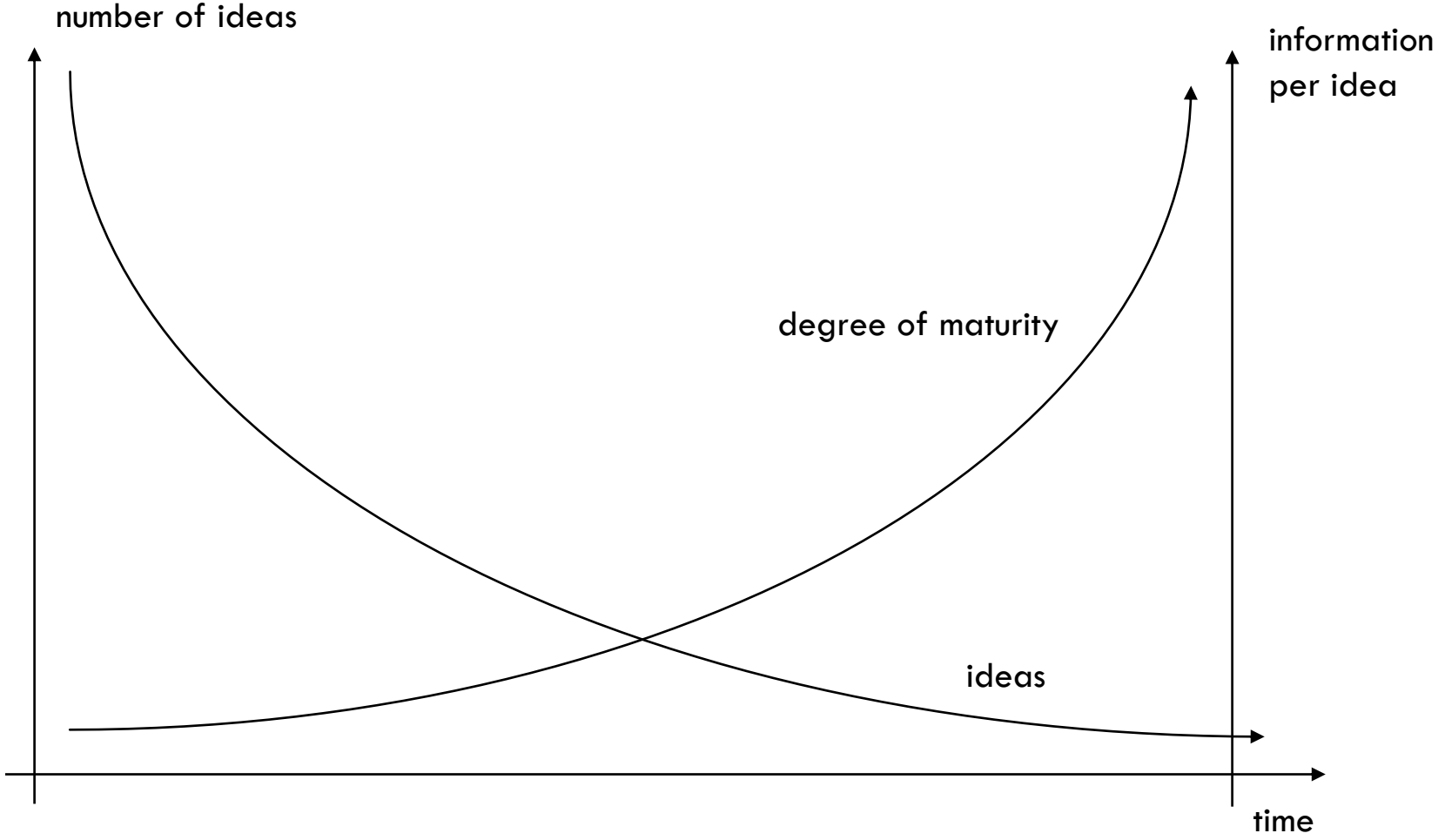
Wrong Interpretation Because of Limited Insight



Widespread Failures in Screening

- Screening: the investigation of a great number of something (for instance, people) looking for those with a particular problem or feature.
- Strategic aspects are forgotten (e.g. areas excluded by company policy); management brings in these aspects late in the process killing many ideas.
- Criteria are distributed to knowledgable persons; all work parallel.
- Screening is done by committees; from session to session ideas are rejected without additional information collection in the meantime.
- The most important criteria are applied first (market data; Return On Investment); they require high effort and can nevertheless not be applied satisfactorily.
- No decision rules are laid down beforehand.
- One is anxious to reject ideas that in fact might be valuable. (The aim of the screening process is to select a short list of ideas that have a potential; the objective is not to verify that all rejected ideas are bad.)

Information Status during the Screening Process



Idea Selection in Steps

Example: From 100 ideas 1 has to be identified as the best. Budget: $100 000

A: Selection in one step

For each idea $1 000 are spent to collect information. On the basis of this information, the selection is made.

B: Selection in several steps

Step	reduction of ideas		costs/idea	costs/step	accumulated costs
1	100	30	100 -	10 000 -	10 000 -
2	30	10	500 -	15 000 -	25 000 -
3	10	5	2 000 -	20 000 -	45 000 -
4	5	3	5 000 -	25 000 -	70 000 -
5	3	1	10 000 -	30 000 -	100 000 -
			17 600 -		

For the final 3 ideas $17 600 were spent for information collection.

- How about the cost of time?

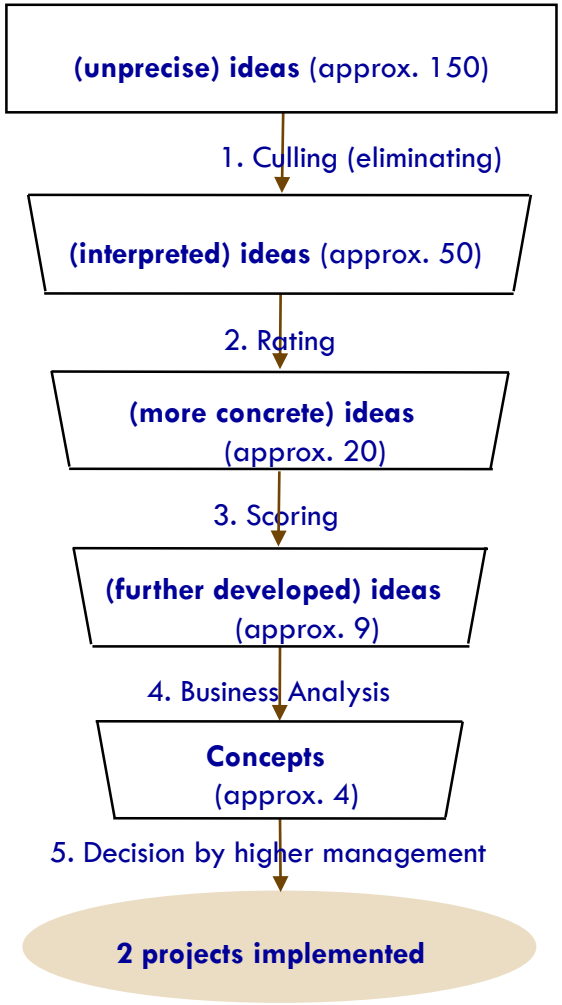
Principles of Cost Efficient Idea Screening

- The selection should be made in steps; 3 - 4 steps have proved to be practical.
- On the basis of an evaluation, ideas are eliminated in each step, allowing to concentrate on the remaining ideas in the following steps.
- The evaluation is made on the basis of certain criteria.
- The criteria can be applied one after the other.
- Criteria requiring lowest effort on information should be applied first; then one should go on with criteria requiring higher efforts.
- From step to step additional and more profound information for evaluating the criteria are needed.
- Rules for decisions must be established prior to idea elimination.

Principles for Screening

- Criteria can be applied sequentially (one after the other).
- The sequence of the criteria is determining costs.
- Best cost effectiveness is achieved when the criteria are applied in the order of cost per idea.
- It is sufficient to rank the criteria according to a relative judgement.
- For practical purposes a screening procedure in four steps has proved effective:
  - Culling
  - Rating
  - Scoring
  - Business analysis
- The percentage of rejected ideas should be high in the first steps (>60%) and then be reduced (<50%).

Why Idea Selection in Steps?



Types of Criteria

- There exist criteria with different characters. This has to be considered when applying them.

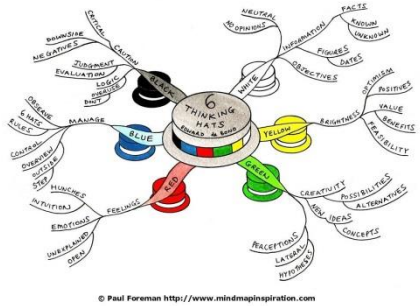
- **Categorical criteria:** Sorting into different categories, i.e.: Yes, no, incomplete, more information needed, don't know
- **Gradual criteria:** Judgements about fulfilment on a score scale
- **Integral criteria:** Calculation of economic metrics on the common basis of money (i.e.: Return On Investment, Return on Attention, Net Present Value, break even)

Idea Evaluation and Selection in four Steps

- **Step 1: Sorting and Screening (Culling, Rating)**
  - Structuring, summarizing, references
  - Elimination based on “must” and “should” criteria (negative elimination)
- **Step 2: Pre-selection (Scoring)**
  - Scoring models
  - Ranking according to overall scores
  - Best ideas are followed on (positive selection)
- **Step 3: Analyses**
  - Risk analysis
  - Success factor analysis
  - Analysis of costs
  - Concept and detail improvements
- **Step 4: Business Analysis and Presentation for Decision**
  - Rentability calculations
  - Portfolio analysis
  - Business Plan

Classification of Evaluation Techniques

Rentability calculations	Rough estimates	return on attention, return on investment, return on skills	Pay-back period Internal interest rate Net Present Value
Analytical evaluation	Yes/No-Check	Checklists Profiles	Scoring models Success factor analysis Portfolio analysis
Dialectical evaluation	Pro/contra-catalogue	Advocate procedure	
Holistic evaluation	Sticking dots	Pairwise comparison Six-Hats-method	



simple methods → sophisticated methods

Scoring Model

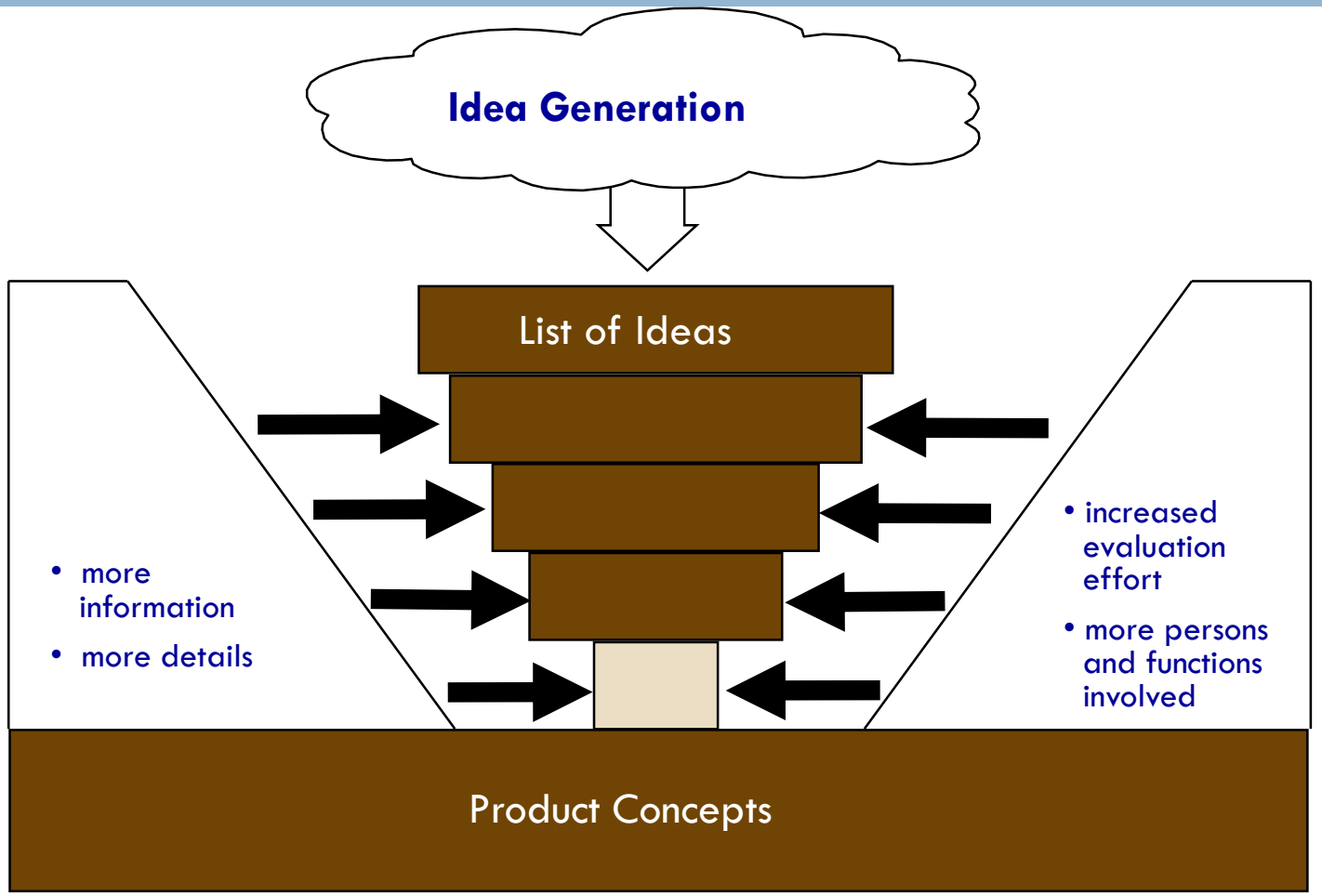
Criteria	Weight factors	Suggestion A		Suggestion B		Suggestion C	
		Score	Value	Score	Value	Score	Value
Market volume	1,0	3	3,0	5	5,0	2	2,0
Intensity of competition	0,85	4	3,4	1	0,85	4	3,4
Market growth	0,7	2	1,4	2	1,4	3	2,1
Investment volume	0,65	1	0,65	3	1,95	4	2,6
Synergetic use of existing know-how	0,5	3	1,5	4	2,0	2	1,0
Time for development and setup	0,4	3	1,2	1	0,4	5	2,0
Recognition on the part of the consumer	0,3	3	0,9	3	0,9	3	0,9
Scale of scores: 1,2,3,4,5	Overall value	$\Sigma =$	12,05	$\Sigma =$	12,5	$\Sigma =$	14,0

C provides the relative best suggestion. If the bound is set at 13 only suggestion C is followed up.

Ranking by Pairwise Comparison

↓ Ideas →		1	2	3	4	5	6	Number of pre-ferences	Rank
1			1	1	0	1	1	4	II
2		0		1	0	0	1	2	IV
3		0	0		0	0	1	1	V
4		1	1	1		1	1	5	I
5		0	1	1	0		1	3	III
6		0	0	0	0	0		0	VI

From Ideas to Product Concepts



Evaluation of Ideas

- The **in-depth evaluation** of ideas is to be based on criteria.
- A great variety of methods is available for evaluation: profiling technique, distribution of points, catalogue of pros and cons, advocating technique, cost benefit analysis, economic assessment
- From stage to stage
  - the number of ideas to be further processed is reduced,
  - the information about the more promising ideas increases,
  - more sophisticated evaluation methods are used,
  - the number of involved people increases,
  - the ideas are gradually concretized and elaborated (development of ideas into concepts).

VII. Creativity / Innovation Workshops

The Phases of a Workshop

Prephase

- Planning
- Preparation

Execution

- Warming-up
- Introduction (background, objectives)
- Overview, agenda
- Working on main task (e.g. idea generation)
- Planning the next steps
- Closing (summary, feedback, outlook)

Follow-up

- Minutes
- Implementation of planned tasks

Roles within the Workshop Group

- moderator(s)
- assistant and writer
- problem owner(s)
- expert(s)

The Ideal Moderator

- **Preparation:**
  - Selection of participants (as agreed with the problem owner)
  - Invitation
  - Organisation (rooms, equipment)
  - Designing the agenda
- **Moderation of session:**
  - Ice-breaking (short exercise or game)
  - Introduction of participants
  - Presentation of the problem by the problem owner
  - Explaining the rules
  - Keeping records on a flipchart (shortening the statements without loosing the specifics)

The Ideal Moderator

- Observe the group (tensions, conflicts, desires, frustration, etc.)
- Stop lengthy discussions and lead back to the main path
- Re-stimulate idea flow when slowing down
- Finish a single step and introduce to the next step
- Stay within the planned time schedule
- Ensure breaks
- Handle conflicts

- **Follow-up:**
  - Make sure that minutes are made and are distributed
  - Observe follow-on activities

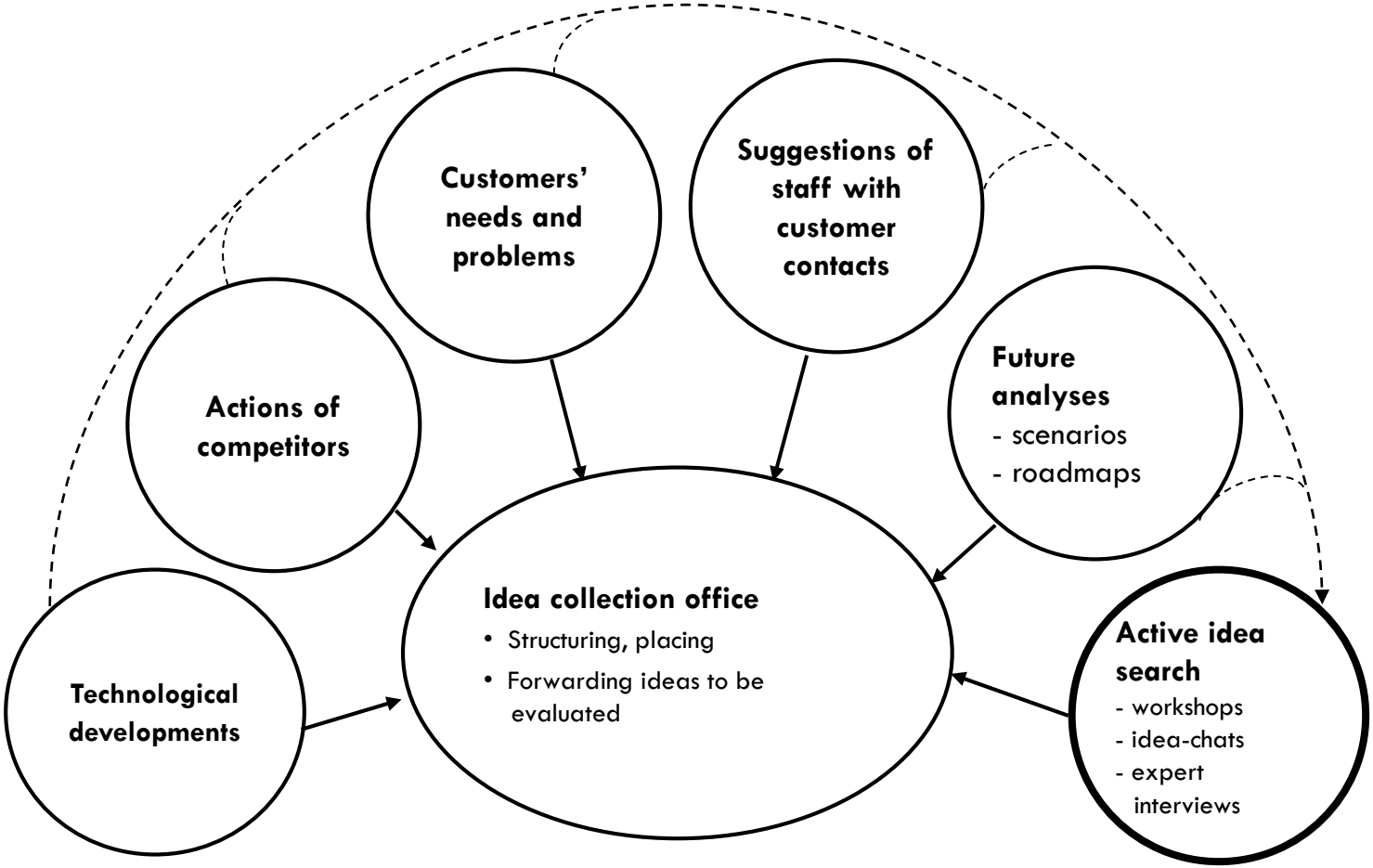
Workshop Rules

- Do not block! Listen to others, relate to others.
- Concentrate work, no side-talks!
- Humour is welcomed; share jokes with all.
- Short and precise statements.
- Stay with the agenda points; don´t jump!
- Be open; unusual, brave ideas are welcome.
- Be tolerant, nobody is perfect.
- If you don´t feel well or have any wishes please pronounce it.
- The moderator´s role is to lead through the process, to achieve the aims of the session. Therefore he may shorten discussions, change procedure or take other actions.

VIII. Idea Management

Central Idea Collection and Structuring

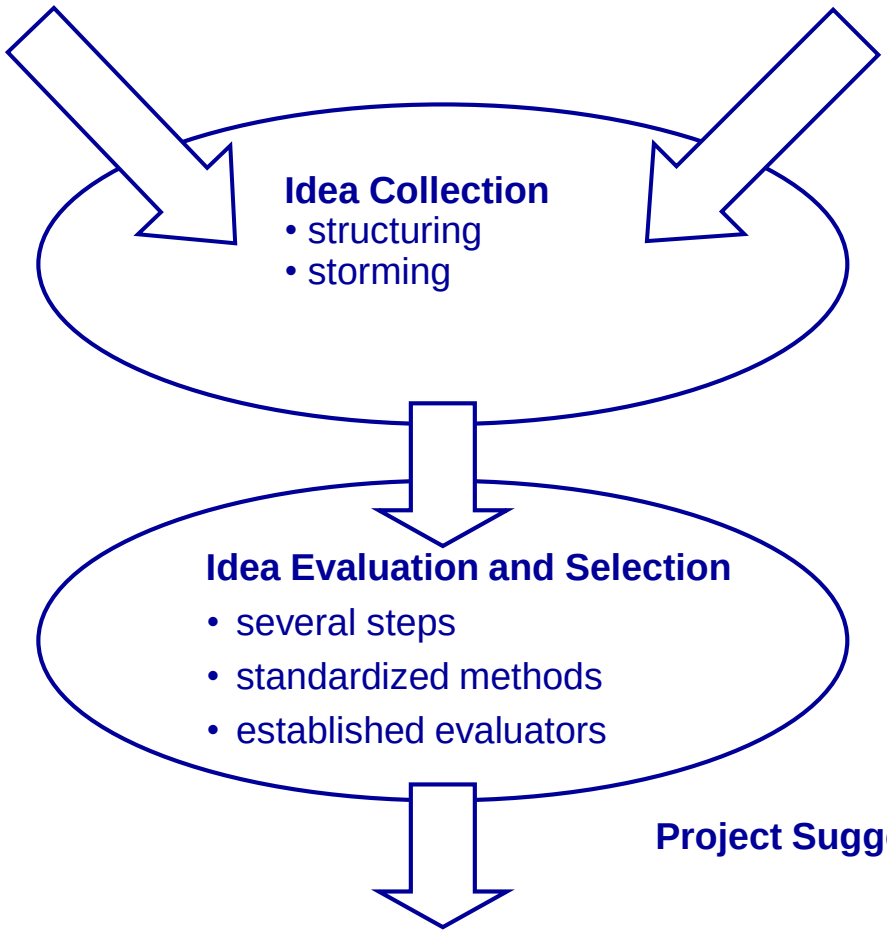
All idea sources should be used!



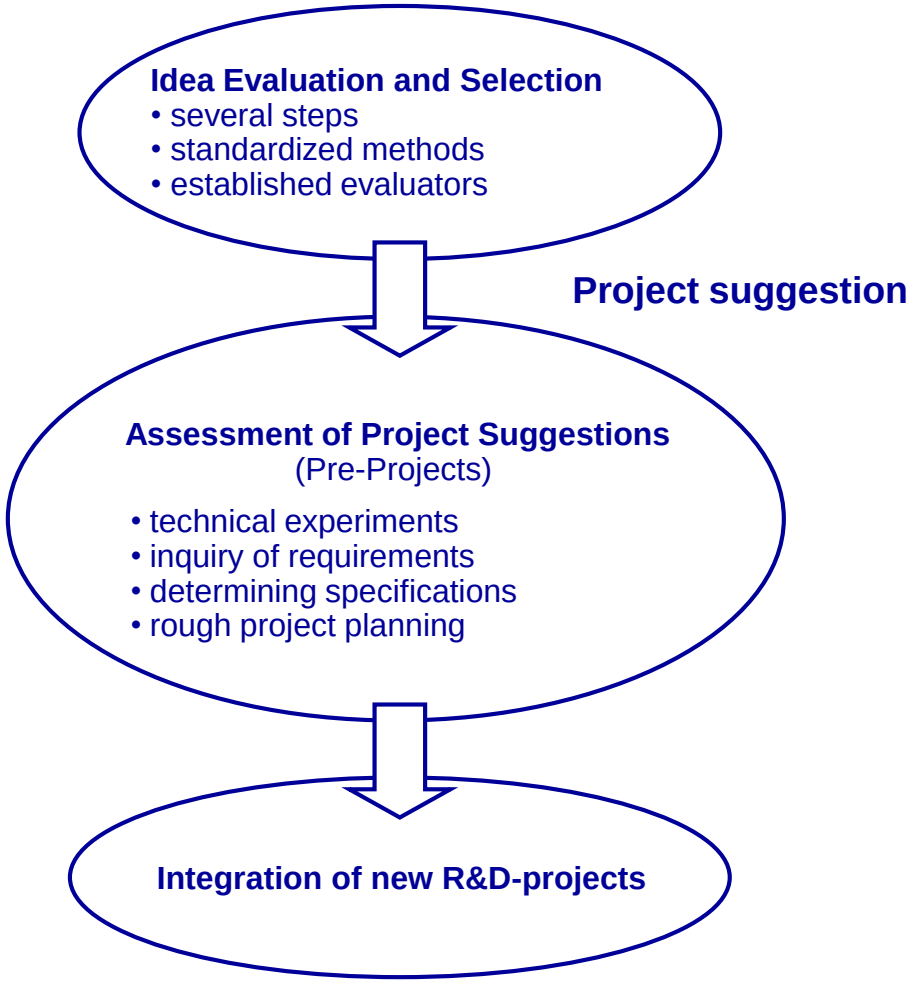
Management of Idea Flow

Diverse Sources
- customers
- competition
- staff
- analyses

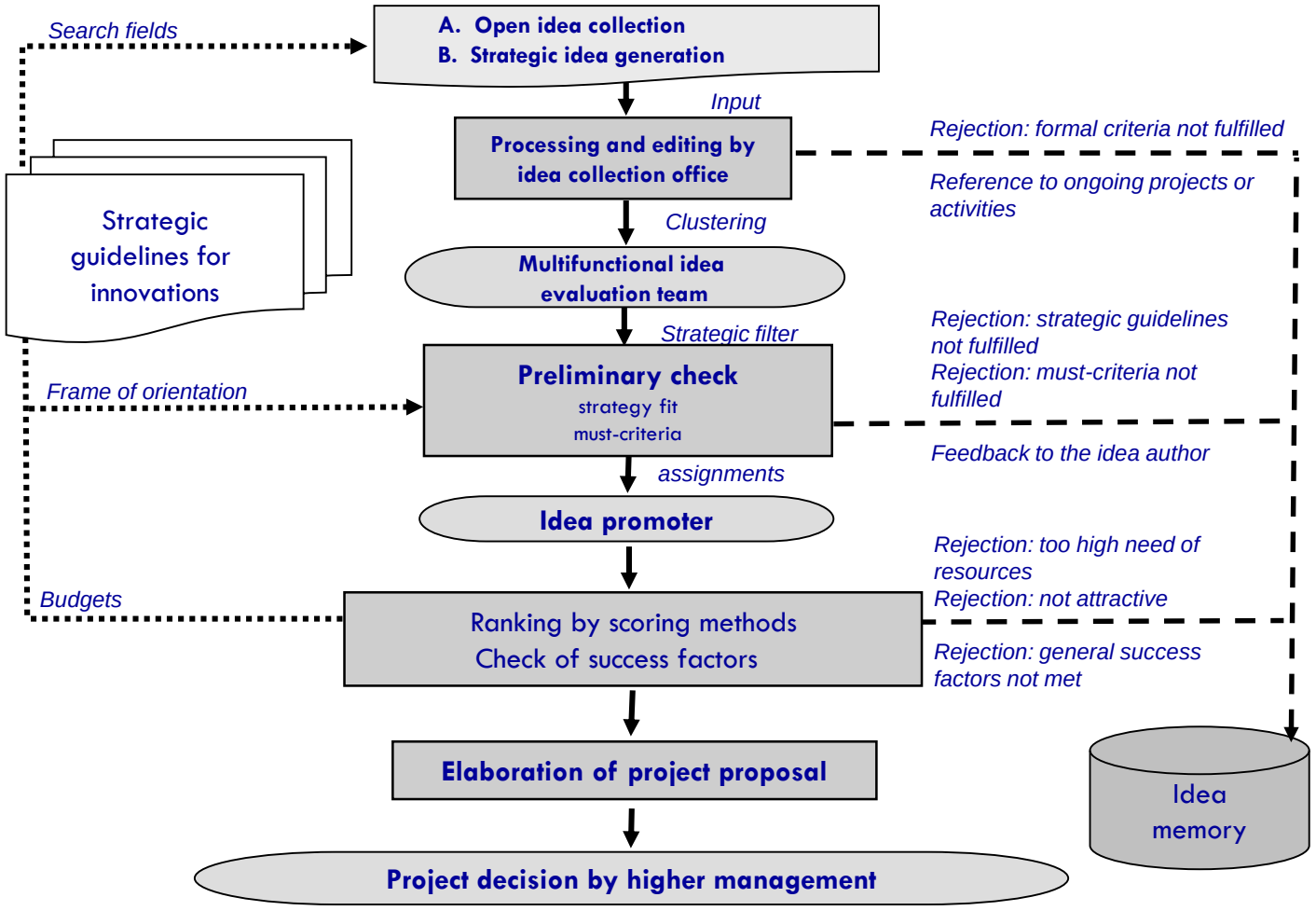
Systematic Idea Generation
- Idea generation sessions
- Creativity workshops



Management of Idea Flow



General Idea Flow Model



Case Study: Wella
Situation at Wella in the early 90s

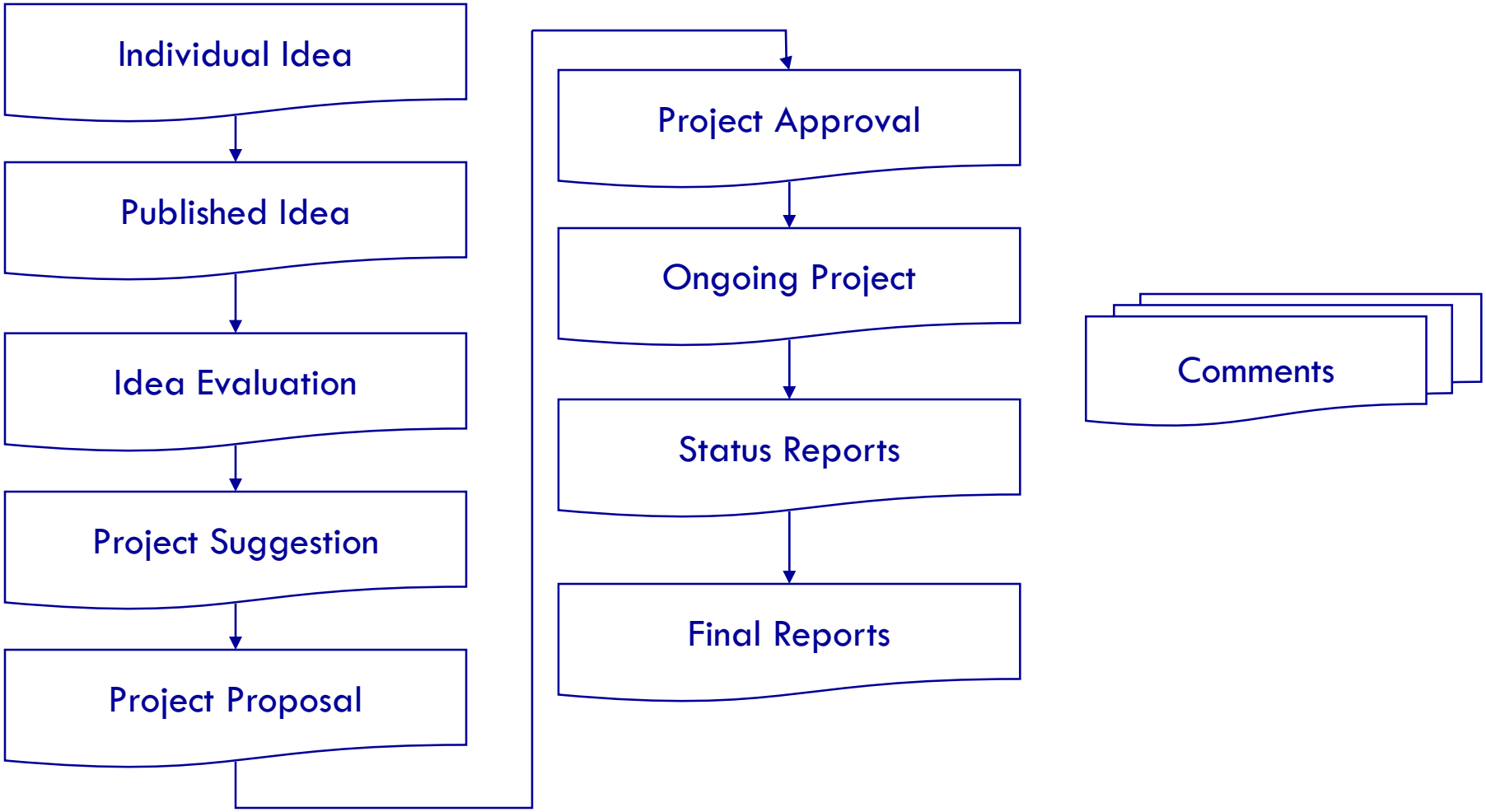
- High innovation challenge
- Project management in R&D implemented, low Electronic Data Processing support
- Requirements: Installation of a permanent and obligatory workflow from idea generation to new product/brand market launch
- Checking and evaluation of existing elements suitable for an ongoing innovation process
- Organization design of an innovation process
- Implementation of the developed idea pipeline on Lotus-Notes

Wella Idea/Project Data Base

Some background information:

• Start with redesign of innovation process:	1994
• Development of the data base:	1995/1996
• Application of data base:	1997
• Ideas treated:	approx. 3500
• Projects started:	approx. 700
• Staff with access to the data base:	approx. 550
• Basic software system:	Lotus notes
• Administrative effort:	50% of a junior professional

Work-flow within the Wella Idea/Project Data Base



Positive Effects of the Idea Data/Projects-Base of Wella

- The staff has fully accepted the Wella Idea Processing-system.
- Motivation of staff raised.
- Number and quality of ideas increased.
- Selection of ideas and projects is done systematically and is therefore transparent to all staff.
- Actual status of projects and other data can be searched.
- Know-how is documented in the system.
- Time saving through automatic workflow.
- Improved communication across functions and departments on ideas and project proposals.
- Central controlling is possible.

Prerequisites for a Successful Idea Management System

- The procedure of the system is obligatory
- Wide tunnel opening
- Different treatment of different types of ideas
- Methods and decision rules are laid down
- Narrow tunnel neck
- All steps are transparent and understandable
- Strategy fit is most important criterium
- Competent evaluators
- Promoters introduce and stabilize the system

Source: 12 cases in North America and Germany

IX. Pre-Project Stage

Pre-Projects

- Objectives:
  - Reducing information deficits and uncertainties
  - improved basis for decision
  - Getting ready for project work
- Projects on proof
- Gathering detailed information on technologies, markets, customers, sales channel, etc.
- Technical pre-tests
- Marketing strategy
- Determining the specifications
- Feasibility study
- Risk analyses

Pre-Projects

- Business plan (rough time schedule)
- Suggestion for project team
- Decision by top management after presentation
- Setting-up innovation project (project management)
- Organizational forms:
  - none (often)
  - part of standardized process with a preliminary project leader
  - length: 2 - 6 months

Summing-up: The Stages of the Concept Finding Phase

1. Strategic Orientation

- Guidelines, focus areas
- Innovation fields
- Communicated to marketing and R&D staff involved in innovation search.

2. Idea Generation

- Central office collecting ideas
- Passive idea collection: any source
- Active idea generation:
  - workshops
  - consumer groups
  - expert interviews
  - future studies
- Classification and distribution of ideas

Summing-up: The Stages of the Concept Finding Phase

3. Idea Selection and Further-Development

- Evaluation and selection process in several steps (4)
- Different methods and evaluators per step
- Prescribed criteria, weights and priorities derived from strategies, goals and restrictions
- Stepwise deepening and further-development

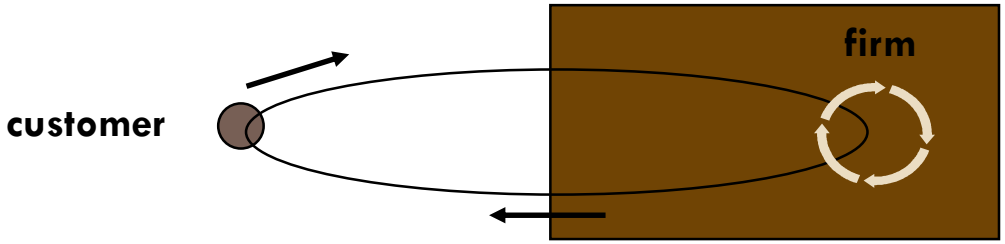
4. Pre-projects

- One „investigator“ for each proposal under consideration
- Reducing uncertainty by information collection; clarifying specific questions
- Project design and rough planning
- Presentation of project proposal to higher management
- Project decision

X. Standardized Innovation Process

Business Processes

Business processes begin and end at the customer.



Main business processes:

- Marketing process
- Product innovation process
- Tender process
- Order processing process

Standardized Processes in R&D

In a company similar products are permanently developed. Very similar activities and chains of actions take place.

Therefore many companies have layed down standard processes for product development and innovation.

They fulfill the following purposes:

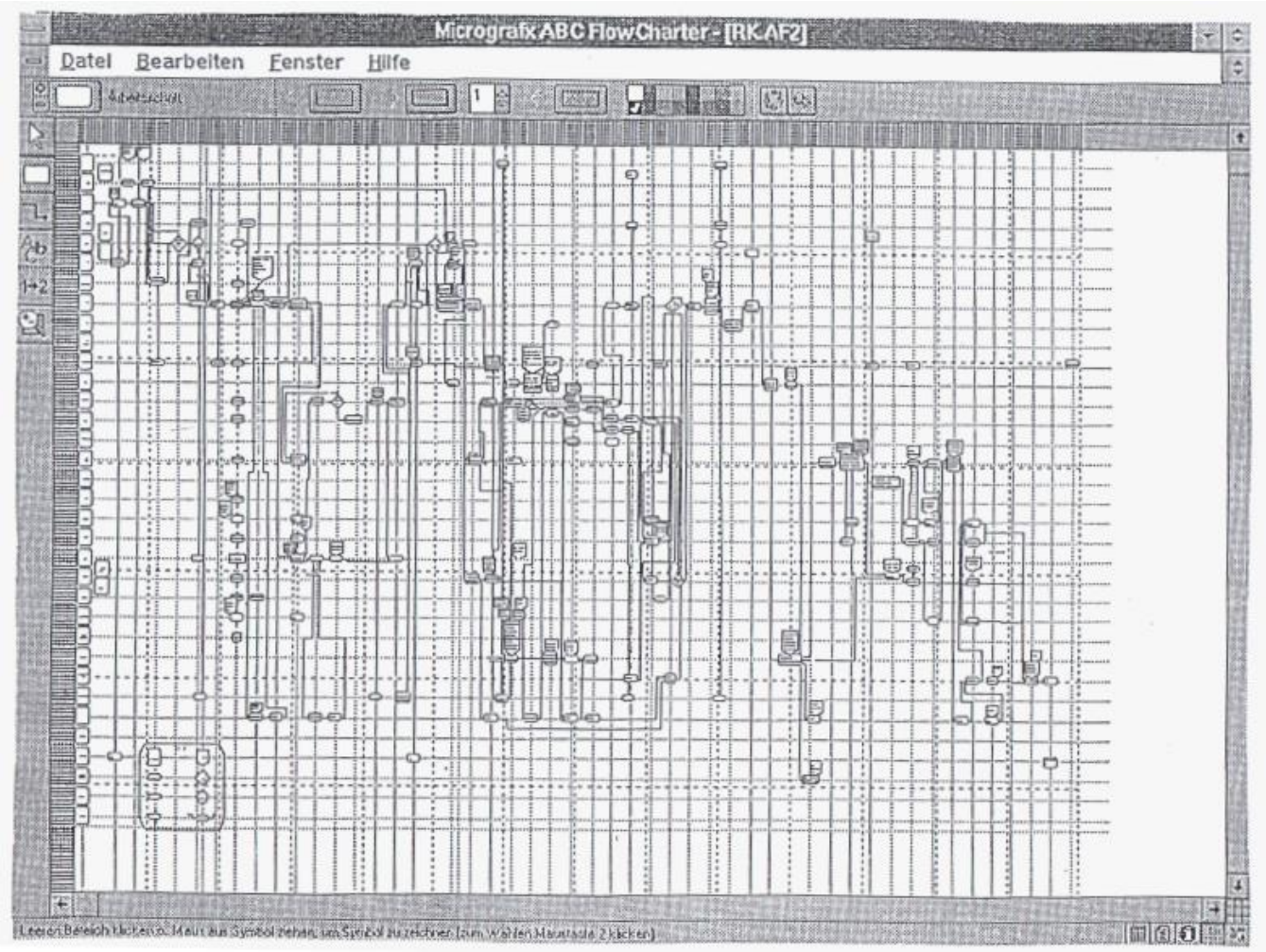
- Guideline and check.list for the project team
- High transparency for the project environment
- Fixed structures and milestones make project controlling easier.

The standard process does not replace project planning; it gives however a structure which has to be filled in specifically.

Conventional Standard Processes for Product Development

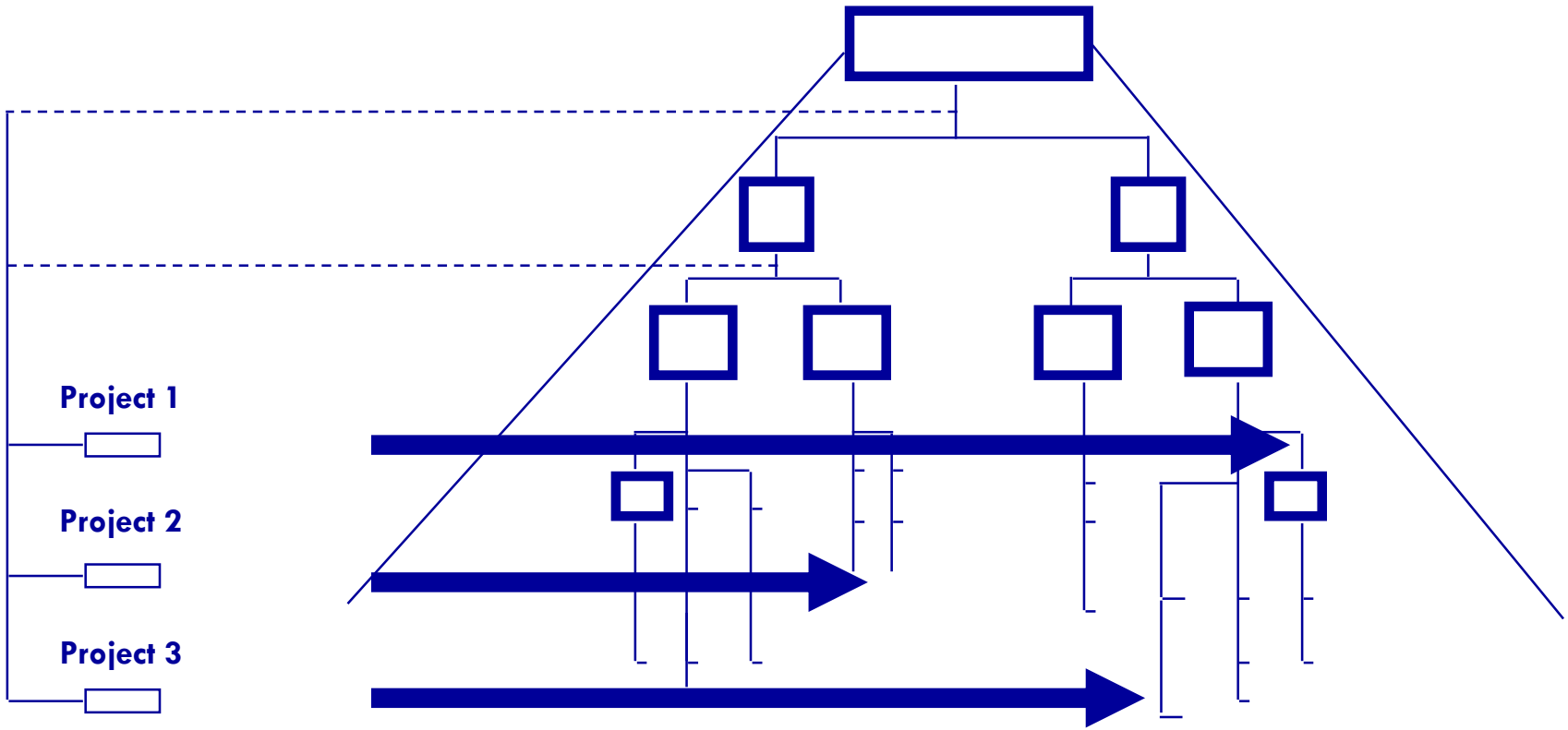
- Often only technical development
- Sequential sequence of activities
- The process phases are dominated by the functional divisions (development, manufacturing, marketing)
- No cross-functional teams

Example of an Innovation Process – before Reorganization

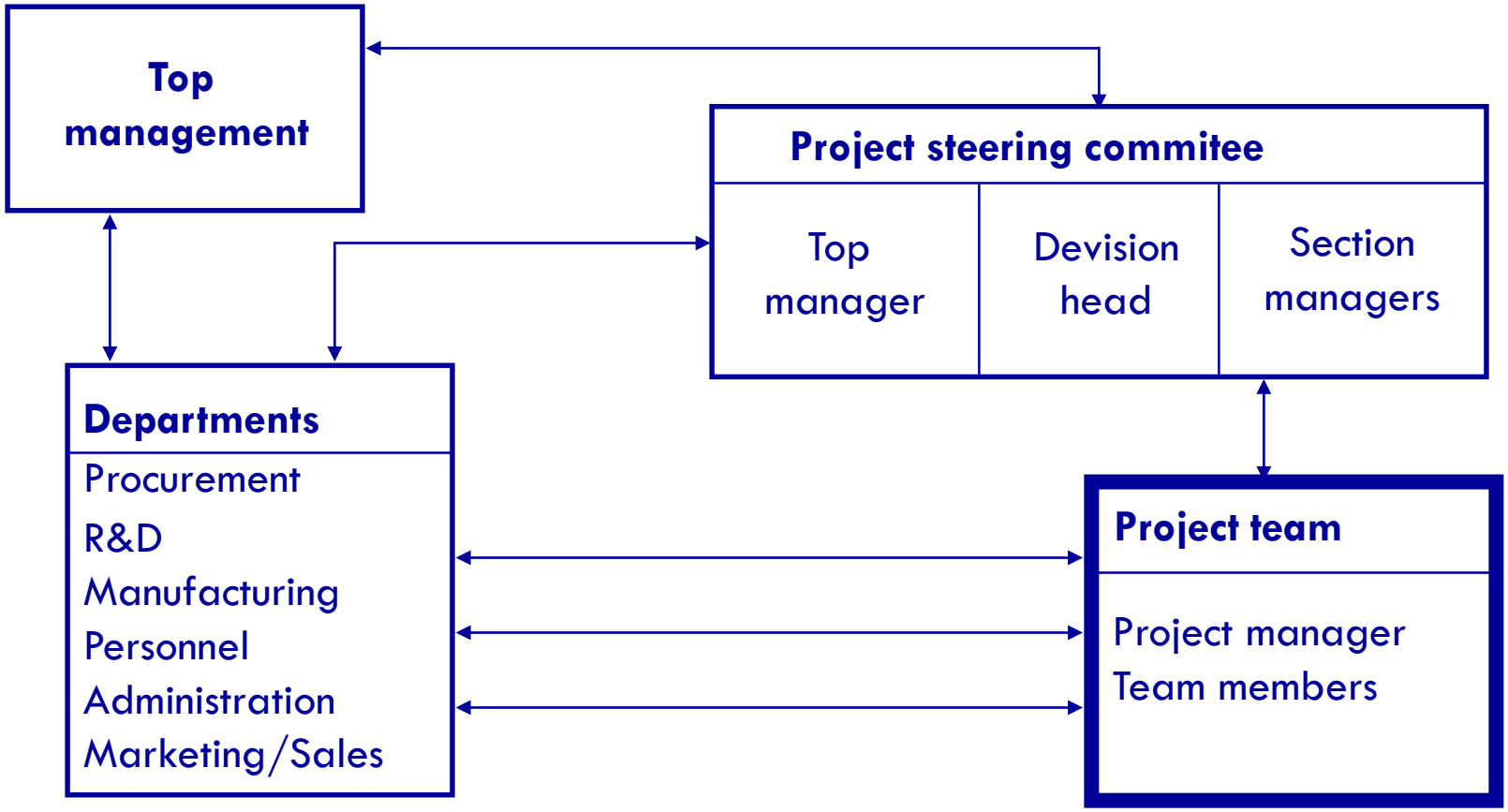


XI. Project Management for R&D Projects

The Concept of Project Management



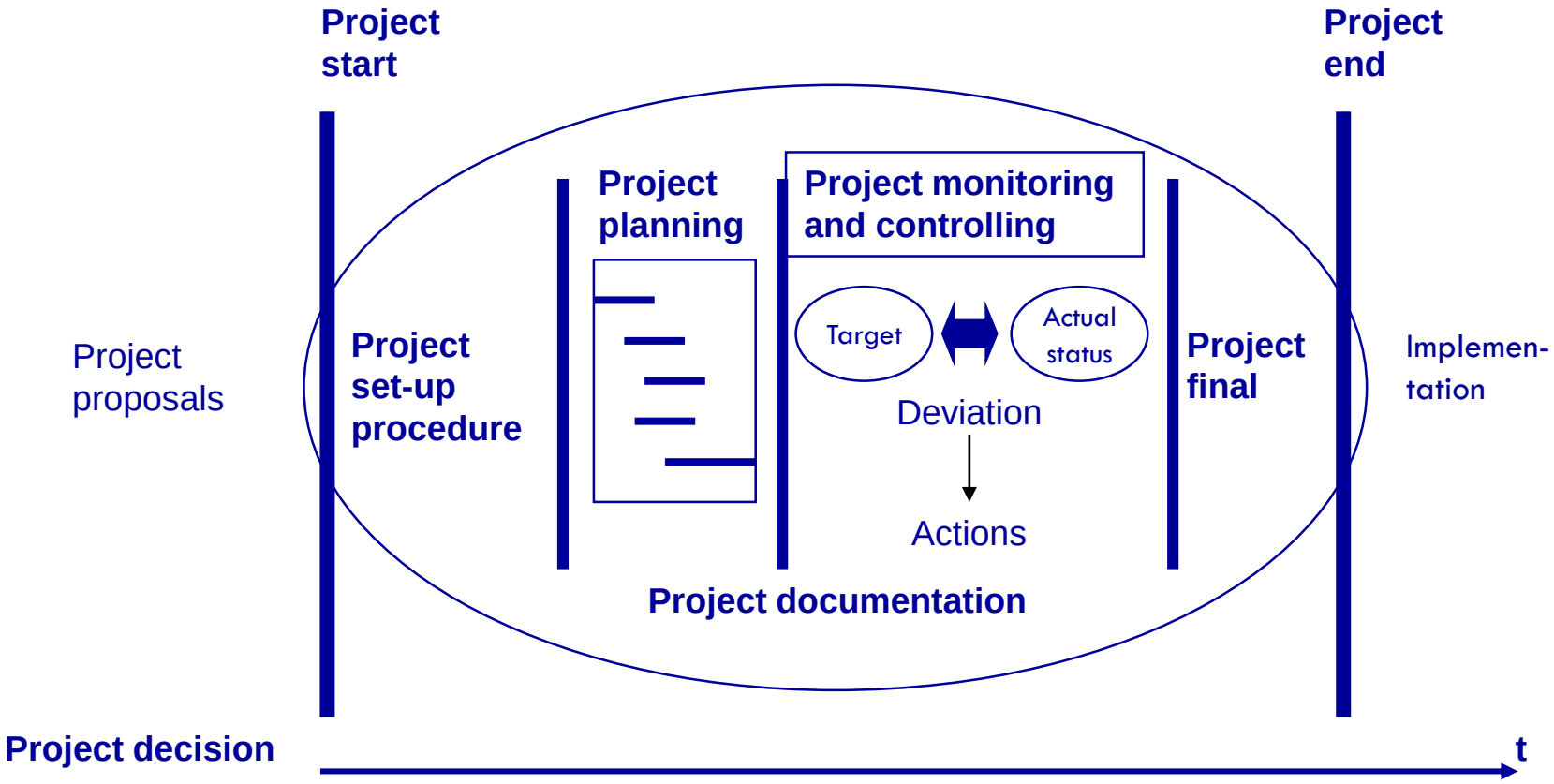
Management of Innovation Projects
Organizational Set-up



Specialities of Innovation Project Management

- Special set-up procedure
- High degree of situative management
- Detailed planning up to the next milestone; remaining phases are only roughly planned
- Difficulty to monitor the progress in achieving the technical objectives
- Special controlling
- High importance of internal coordination
  - multifunctional teams
  - multifunctional steering committee
  - high frequency of project team sessions
- High relevance of soft factors
- Selection, prioritization and phase-in of projects into R&D
- Multi-project-management

Phases of an R&D Project



Project Planning and Controlling Tools

- Bar-diagram (Gantt-chart)
- Network-plan
- Milestone-trend-analysis
- Cost-trend-analysis
- Monthly-check-charts

What is an Elevator Pitch?

A **short, simple description** of your business idea that anyone could understand by the time you ride up three floors in a typical elevator.

Very Important Point

- An elevator pitch is *not* a sales pitch
- It is NOT a pitch of a great idea, team or product
- You ARE pitching what your business will do for **customers, investors,** and/or **society**
- You want to pitch how your business solves a **real problem** or addresses a **burning need** that exists today

Elevator Pitch "Must Haves" and Caution

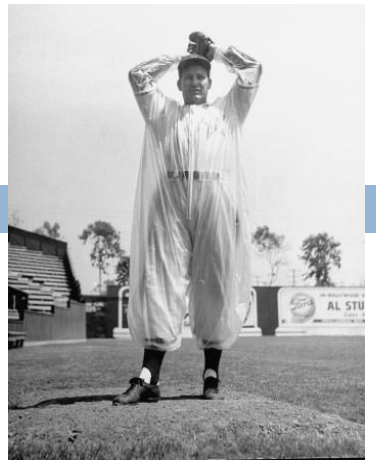
Interesting opening: opening much immediately grab interest of recipient

Passion: if you are not excited about your idea, no one else will be

Short: you only have one minute to deliver your pitch

Caution: Do not take too long to get to the pain/problem that you are solving—you could lose the listener's attention

Elements of the Pitch



The following points are included in effective elevator pitches

1. The **hook**: pitch opening that grabs the listener's attention
2. Brief description of **product/service**
3. Brief **target market** description
4. Brief description of how the business is **different** from the **competition**
5. Brief description of how you will **make money**
6. Brief description of the **resources** you need from **investors**
7. Brief description of the **returns/payback** the investor can expect
8. Memorable tagline/pitch **closing**

The Hook/Pitch Opening

- The hook should grab the attention of the listener and set the stage for the concept
- Many ways to do this including identifying the problem/need you address
  - We help resolve the housing crisis
- If possible, help your listener relate to the problem
  - Questions can be effective: Have you ever had your cell phone fail inside a building?
  - *Very brief* personal stories can also be effective openers

Product/Service Pitch

- Guidelines to keep in mind when developing the product pitch:
  - KISS – Keep It Simple, Stupid
  - Limit technical terms/details
  - Highlight customer benefits, not technical benefits

The KISS of death: Too much detail

- INEFFECTIVE:

  Our medical technology is the first automatic anesthetic gas scavenging system that will scan patient's using an anesthetic vaporizer thus providing analytical, diagnostic and therapeutic techniques similar to those used by National Laboratories in 2007, but that were updated in 2011 to include the new immunology reports

- EFFECTIVE:

  We provide the most accurate medical diagnostic equipment available on the market.

Geek speak: Listeners Tune Out What They don't Understand

- INEFFECTIVE:

  We provide non-penetrable debridement medical equipment technologies for lymph node excision by integrating it with our 4851-bit encryption algorithm that is integrated with the newest 245-bit Dorland operators.

- EFFECTIVE:

  We allow medical professionals to operate on cancer patients using the least invasive equipment on the market.

Customer Benefits, Not Technical Benefits

Technical Benefits

- Unmatched assimilation
- Dimensional attributes
- Largest system adapability

SO WHAT???

Business Benefits

- Increase your sales
- Increase your efficiency
- Cut your costs by 25%

Target Market Description: Relate to a Need

- Identify the problem solved or need addressed in a sentence or two
  - We allow any wireless technology to work inside any building that utilizes our wireless networking product
- If possible, mention a customer who uses your product or that has expressed interest
  - The FAA has determined that we are the only system that can quickly screen people at security check points while also exceeding their security needs
- If you do not have existing customers, quantify the size of the market you will target using numbers from a reputable source
  - According to the American Cancer Society, there are 5,000 hospitals in the U.S. that need the updated radiology equipment

Acknowledge Your Competition

Briefly Acknowledge Your Competition

- Identify a couple of your competitors as well as what they provide
  - There are many vendors that provide internal wireless networks like Linksys and Cisco.
  - While no other firms offer a service package as comprehensive as ours, companies like PetSmart and Club K9 Doggie Daycare do offer some pet daycare and grooming options.

Neutralize Your Competition

- Describe one or two differentiators that describe your advantage
  - Unlike the competitors, our firm offers customers a full-service pet daycare, grooming services, and a pet training facility that is run by world-class trainers.

Describe How you Make Money

- Describe your firm's revenue model (e.g., how your firm earns its money)
  - For grooming, customers will pay for the services rendered and for pet training and daycare, customers will have the option of different service-level packages.
  - We will distribute and sell our products through big box retailers as well as directly through our online store
  - We will license our technology to companies like Widgets Corp. to integrate into their existing digital cameras

Investor Requirements and Returns

1. Describe the investment required at this stage of the business planning process
2. Describe for what purpose(s) that money will be used
3. Describe how, when, and with what rate of return you expect to payback investors

- We are seeking $500,000 in initial start-up capital to fund prototype refinement, initiate initial marketing efforts, and website development. Based on our sales estimates, we plan to pay investors back 30% in year one at 20% ROI and 70% in year two at 30% ROI.
- We are seeking a $1,500,000 investment to fund manufacturing, marketing, and initial product distribution. Within five years, we seek to achieve an IPO, at which time investors can expect a payback at about a 20% ROI.

* **Return on investment** (**ROI**) is the concept of an investment of some resource yielding a benefit to the investor. A high ROI means the investment gains compare favorably to investment cost. As a performance measure, ROI is used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. In purely economic terms, it is one way of considering profits in relation to capital invested.

Tagline/Pitch Closing

- End the pitch in a memorable way
- Taglines are often very effective:
  - In sum, GE brings good things to light
  - Acura—the road will never the same
  - Harley Davidson: American by birth. Rebel by choice.
  - In conclusion IBM provide solutions for a small plant
- If you do not have a tagline, closing the pitch with a simple "Thank You" can also be effective and professional

Example 1

http://www.youtube.com/watch?v=i6O98o2FRHw

Example 2

http://www.youtube.com/watch?v=r_Dgsf4iiZg

Elevator Pitch: An Example

- **Hook:** Have you ever had your cell phone fail inside a building?
- **Product:** We provide a wireless communications network that enables any cell phone to work anywhere inside all types buildings, while ensuring your communications are secure.
- **Market:** The *Federal Communications Commission* has determined that over 60% of the 5 million commercial buildings in the U.S. inhibit wireless or cell phone communications from within. The percentage is even higher in international markets, suggesting a huge need for better wireless communications networks.
- **Competition and Differentiators:** There are many vendors that provide internal wireless networks like Linksys and Cisco. However, we are the only vendor that enables communications to penetrate steel and other high density construction materials, which significantly reduces the cost of installation
- **Revenue Model:** We will install the wireless network in a building at no charge, and then charge a usage fee for all calls that we carry on our networks
- **Investment Required and Payback Estimate:** We are seeking a $1,500,000 investment to fund manufacturing, marketing, and initial product distribution. Within five years, we seek to achieve an IPO, at which time investors can expect a payback at about a 20% ROI.
- **Closing:** In conclusion, we make wireless communication simple and effective.

A Final Note

- The most important thing you can do is practice your pitch
- Remember you will be stopped at exactly one-minute
- The most effective pitches will not come across robotic
- The most effective elevator "pitchers" know their material so well that they could easily deliver it in a casual conversation with anyone
- In sum:

Practice, practice, practice!!

Reference: Chadwick (2006)