Motivation & Creativity

block-course “Systematic Innovation” at

Durham University

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Durham University

KUTAISI INTERNATIONAL UNIVERSITY

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Kutaisi International University

Lecture

- A path-goal model for motivation and creative action
- Strengthening problem solving capabilities
- A first innovation case study

Access and exploitation of Drucker's sources by common key tools

	Motivation & Creativity	Organization & Change	Benchmarking	Innovation Networks	Consulting	Competitive Intelligence
The Unexpected	Analytical Skills & Creative Implementation	Collection & Provisioning of Data		Customer Network to Understand the Situation	Interpretation & Implementation Support	Analytical Support
Incongruities	Analytical Skills & Creative Implementation	Collection & Provisioning of Data		Networks to Understand the Situation	Interpretation & Implementation Support	Analytical Support
Process Needs	Analytical Skills & Creative Implementation	Collection & Provisioning of Data	Determine 'Best in Class' Solutions		Interpretation & Implementation Support	Determine Competitive Advantages
Industry & Market Structure Change	Problem Awareness & Analytical Skills	Company Culture Embracing Change	Determine 'Best in Class' Solutions	Gain Impulses and New Ideas	Consultants as Knowledge Provider	Determine Competitive Advantages
Demographics	Problem Awareness & Analytical Skills	Company Culture Embracing Change		Gain Impulses and New Ideas	Consultants as Knowledge Providers	Analytical Support
Change in Perception	Problem Awareness & Analytical Skills	Company Culture Embracing Change		Gain Impulses and New Ideas	Consultants as Knowledge Providers	Analytical Support
New Knowledge	Problem Awareness & Analytical Skills	Company Culture Embracing Change		Gain Impulses and New Ideas	Consultants as Knowledge Providers	Analytical Support
Sudden Flash of Inspiration	Motivation to Solve a Problem	Stimulating Work Environment				

Elements of structured innovation gathering

within the organization

- Motivation & Creativity
- Organization & Change

partnership approach

- Benchmarking
- Creativity & Innovation in Networks

pure external information

- Consultants as Innovation Accelerators
- Competitive Intelligence

Topics

A Path-Goal Model for Motivation and Creative Action

Strengthening Problem Solving Capabilities

A First Innovation Case Study

In this section we aim to discuss the aspects of motivation leading to creative performance

Definition (Motivation)

Motivation is the experience of desire or aversion. (You want something, or want to avoid or escape something.)

As such, motivation has both

- an objective aspect (a goal or thing you aspire to) – and
- an internal or subjective aspect (it is you that wants the thing or wants it to go away)

The subjective aspect of motivation connects it to needs, desires, wants or other drives within the individual.

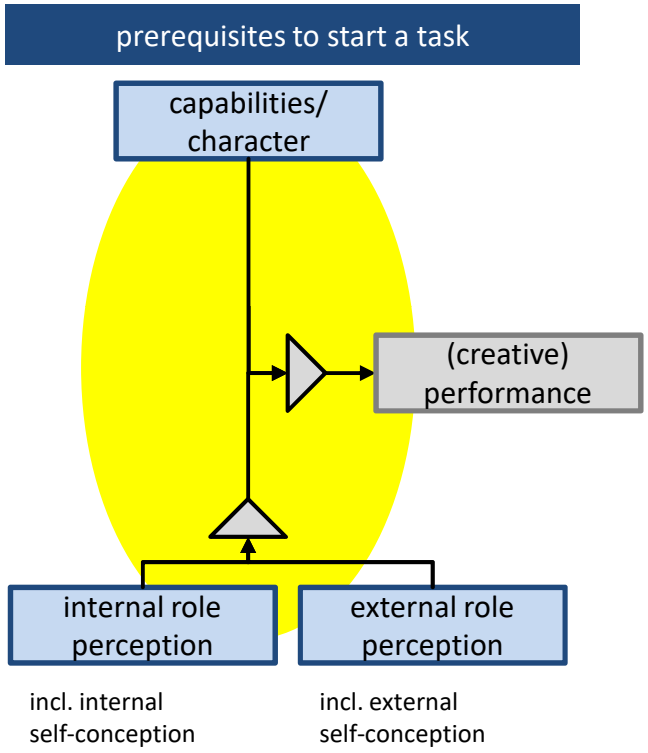
Definition (Creativity)

Creativity involves the production of novel, useful products, or, in other words: something original and worthwhile.

According to E.P. Torrance (1966):

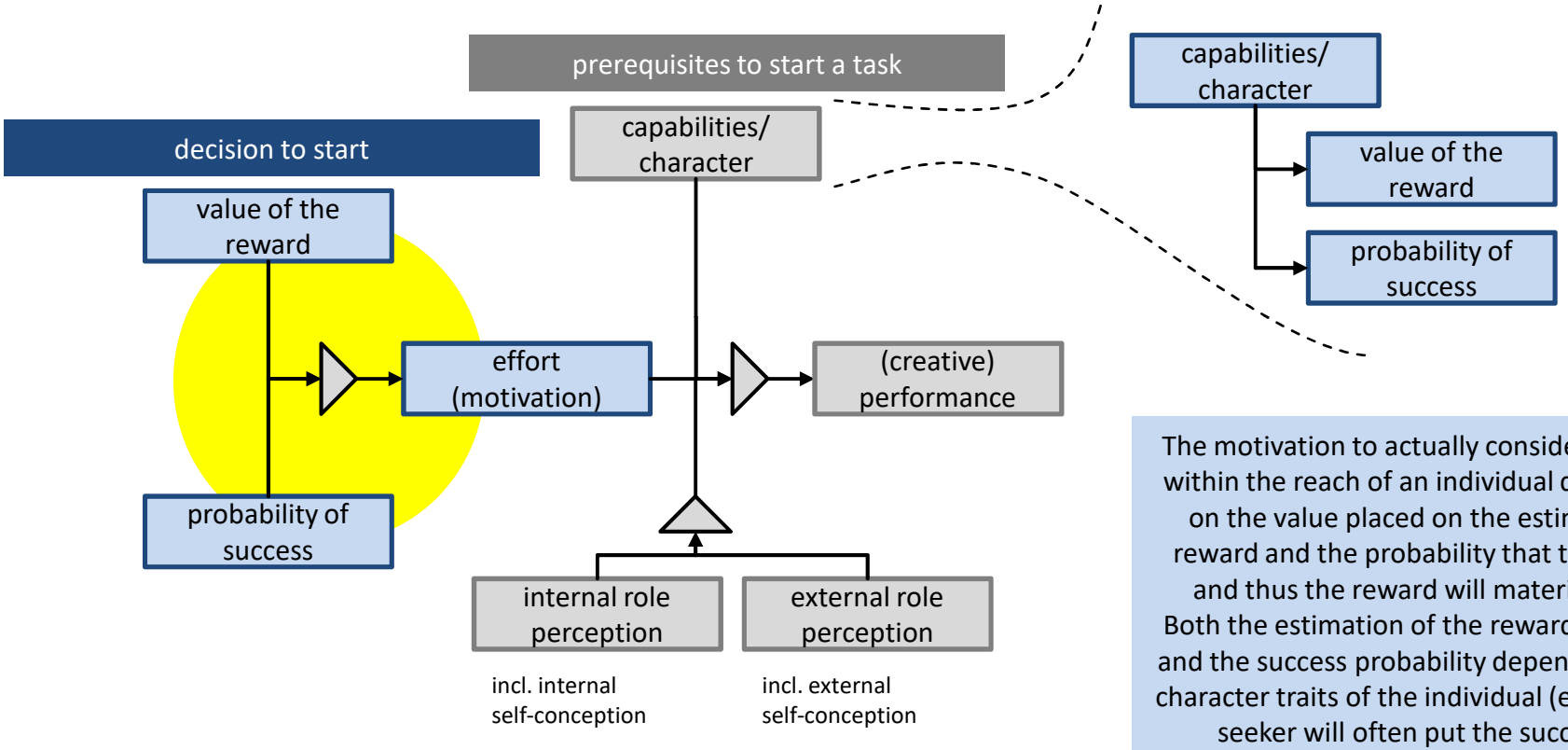
> A process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.

Let us examine the role of motivation for the accomplishment of a task (creative performance) in a process model (1/ 3) …



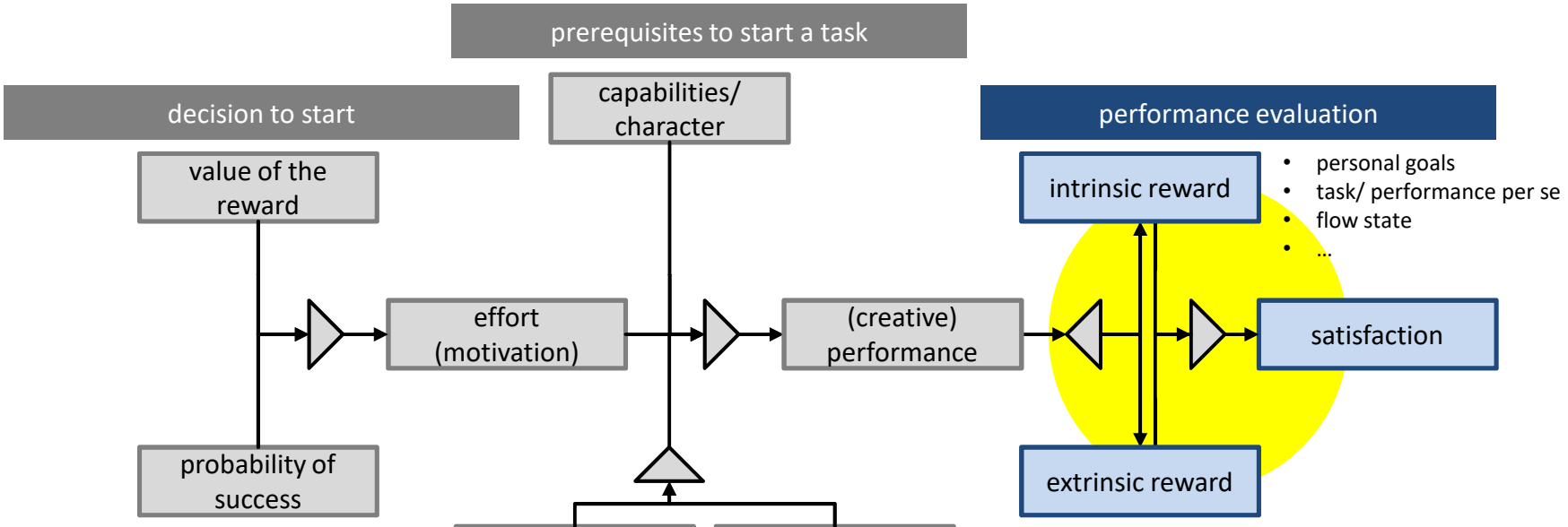
In order to perform a task an individual will ask themselves if they have the right knowledge/ skills/ experience at hand, if it matches their interest and personal traits and how they perceive themselves in the social (work) environment they are in: do I have an adequate role or am I an outsider who is not considered to perform that task?

Let us examine the role of motivation for the accomplishment of a task (creative performance) in a process model (2/ 3) …



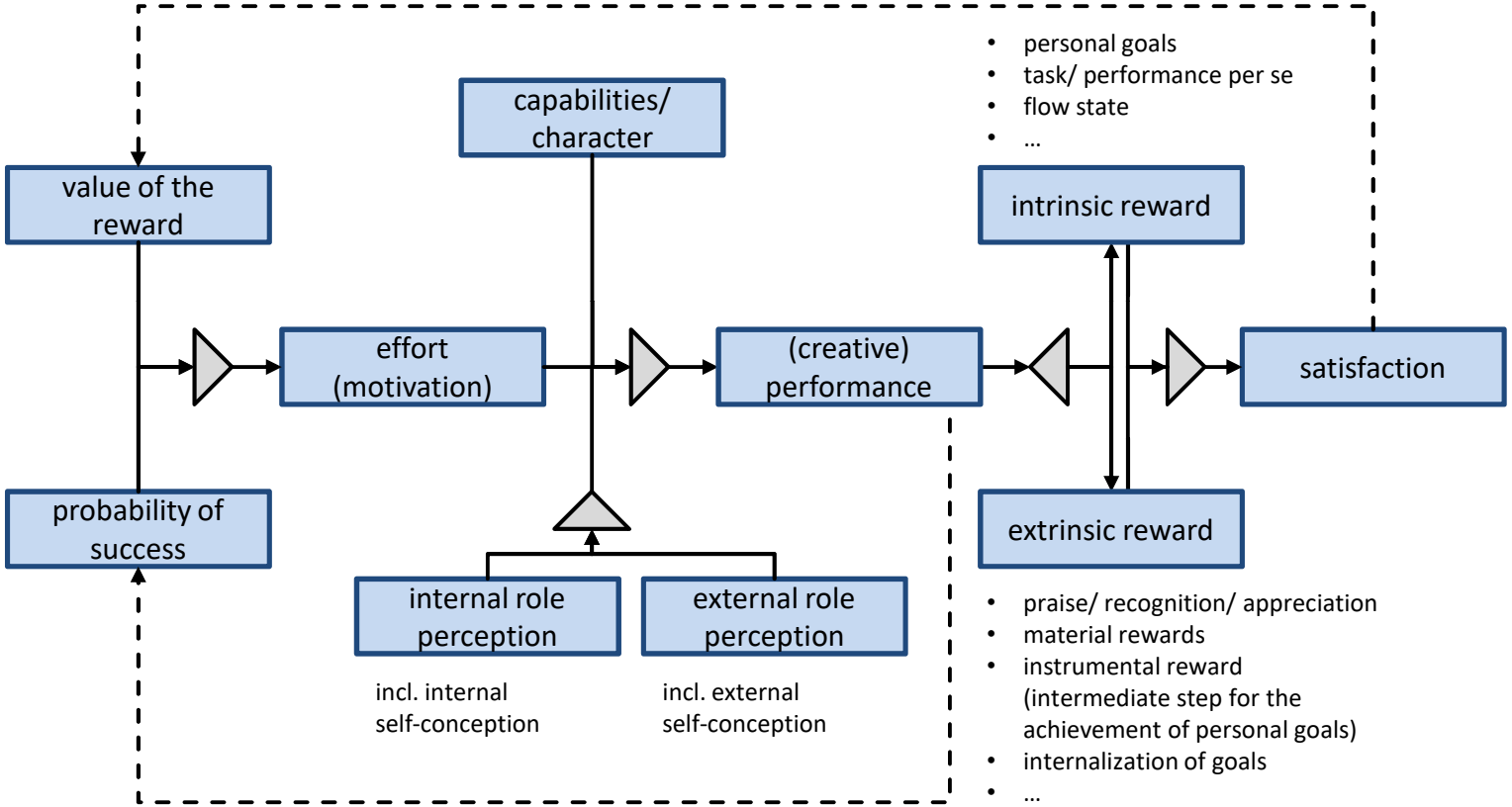
The motivation to actually consider a task within the reach of an individual depends on the value placed on the estimated reward and the probability that the task and thus the reward will materialize. Both the estimation of the reward's value and the success probability depend on the character traits of the individual (e.g. a risk seeker will often put the success probability unreasonably high).

Let us examine the role of motivation for the accomplishment of a task (creative performance) in a process model (3/ 3) …



Next, satisfaction from the performance of a task is received if intrinsic and/ or extrinsic reward goals are met to a considerably high degree.

… which leads to an extended path-goal model describing motivation as the result of anticipated rewards



Summary:
Implications of the path-goal model

That the value of a rewards plays a key role in considering a task is quite obvious. So is the role perception that especially can hinder taking actions. Here, the company culture and leadership style can serve as encouraging factors to think beyond role boundaries or have them set permeable for the execution of creative tasks.

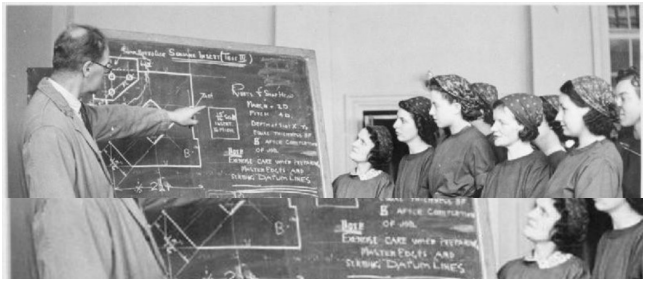
Though, that also the perceived probability of success plays a major role is often not discussed. Indeed, in many business situations, the expectations on gains are quite often the real drivers for decisions. Think about buying stocks.

It seems fair to say that we humans are typically rather bad in evaluating probabilities and are seriously blinded by huge potential wins (or fears of already made investments in a declining business). Think of the roulette gambling strategy where you double your stake one you loose.

It is worth to further explore the factors that lead us to assign values to a success probability in order to better understand certain ‘reasoning’ and, in the context of motivation and creativity, lower the barriers to undertake the right actions.

Work satisfaction, and thus motivation, depends on leadership that provides, amongst others, structure, freedoms, and loyalty

"Employees inherently dislike work, therefore, they need to be led autocratic!"



"Employees are self-motivated; work is natural for them, like sleep or play. Therefore, they need to participate in decisions!"

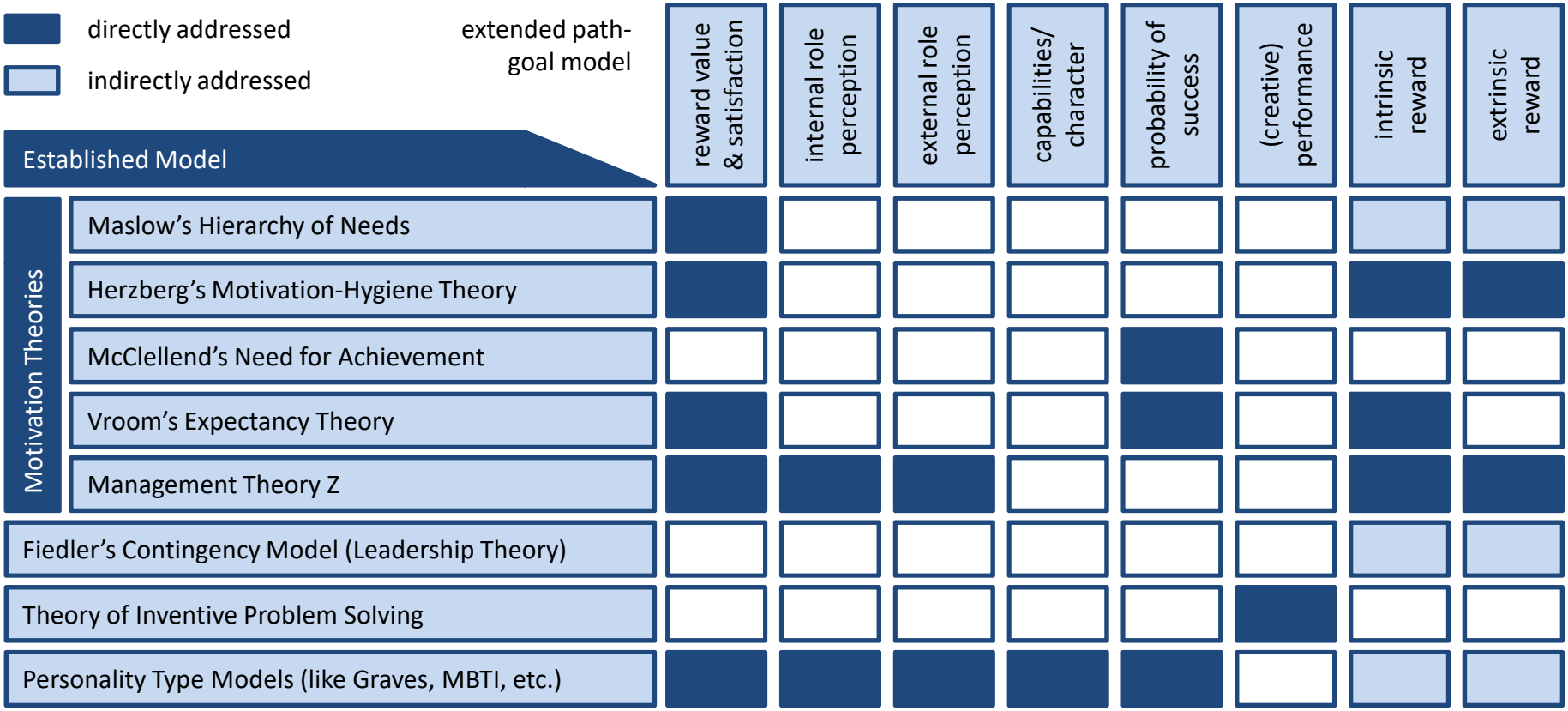
"Employees want to be in a loyal and belong to a larger structure. Therefore, companies need to focus on their well-being (on and off the job)!"

leadership is employee and situation based;
there are no general strategies that always work

thus, we focus on the "extreme" theories, such that every leader can combine them (use the spectrum between them)

but, be careful, you **must** be congruent

Note, the path-goal model holistically covers essential aspects known from several other established motivation/ etc. … theories

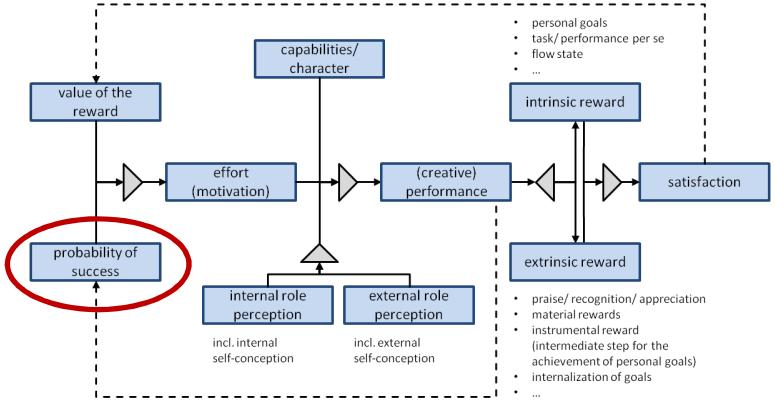


Topics

A Path-Goal Model for Motivation and Creative Action

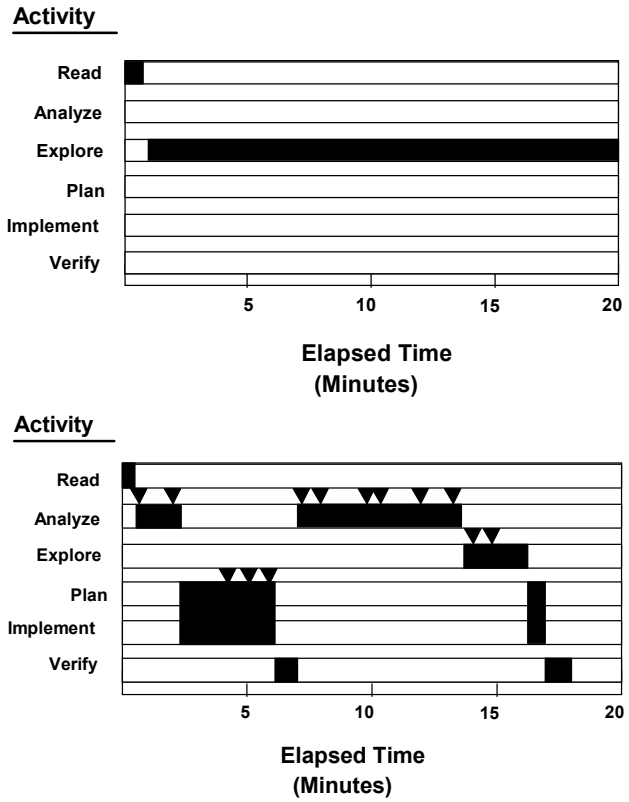
Strengthening Problem Solving Capabilities

A First Innovation Case Study



Solving a difficult problem actually is an iterative process where progress is evaluated continuously until the best solution approach can be carried out

Alan H. Schoenfeld, University of California, Berkeley, CA, USA

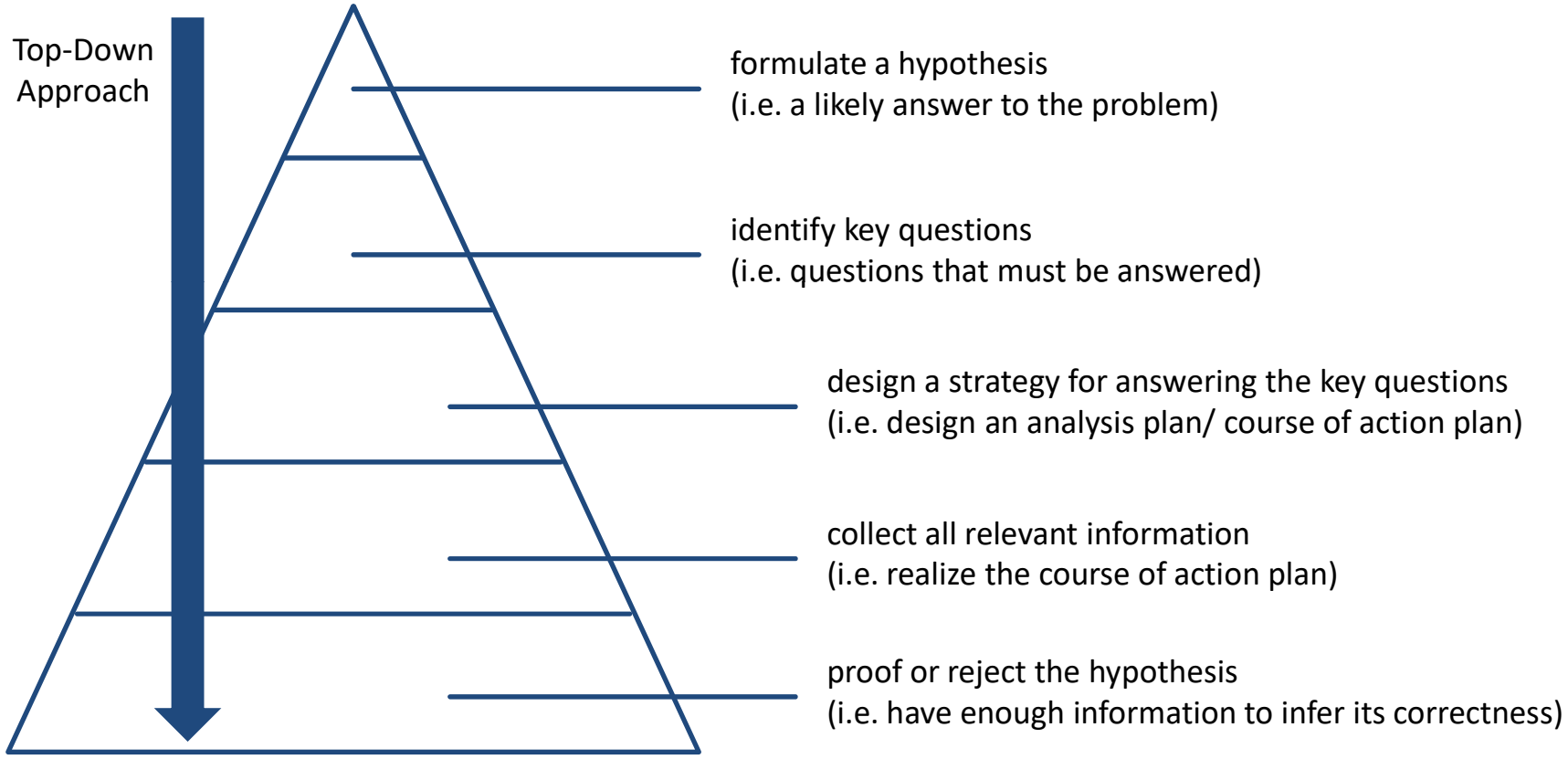


In the 1980s Alan H. Schoenfeld analyzed the way how students (newbies) and trained mathematicians (expert) solved difficult mathematical problems.

He observed that roughly 60% of the students participating in his test read the problem quickly chose an approach to it. Then they pursued that approach regardless of clear evidence that they were not making any progress.

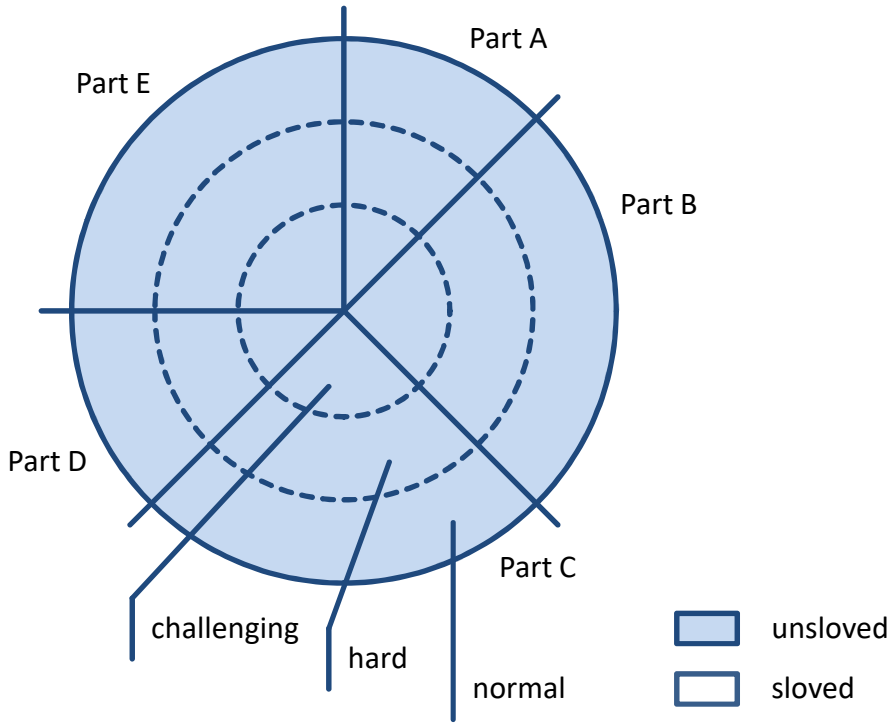
Contrary to this approach, the typical approach of a faculty member to solve a difficult two-part problem was such that they spend almost half of their allotted time of 20 minutes with making sense of the problem. Thus analyzing and systematically exploring the problem and starting the implementation of the solution only when convinced of working in the right direction. Moreover, they gave explicit comments on the state of the problem solution (triangles), like “hmm. I don’t know exactly where to start here” or “Ok, all I need to be able to do …”.

Generally, problem solving needs to be viewed as a hypothesis driven approach that leads to validation or rejection of an answer hypothesis

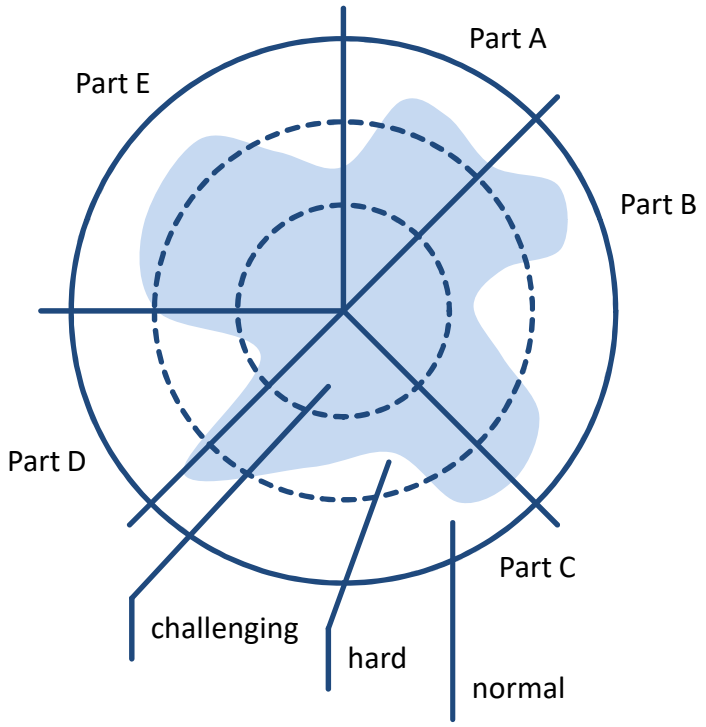


Moreover, it is always to be recommended to segment a problem and then start the solution process from the “easy” questions to the “hard” ones

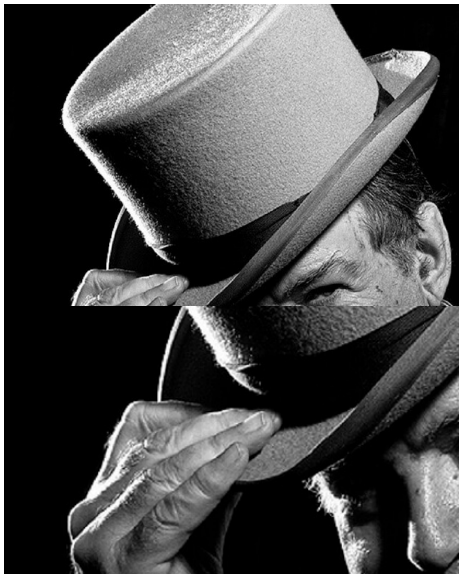
Segmentation of the Problem



Start the Solution From Outside-In for Each Part



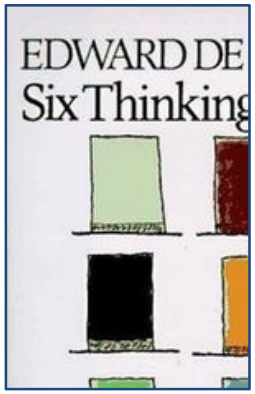
A condensed approach to holistically cover all aspects of a given problem is the method of De Bono's "six thinking hats" (1/ 2)



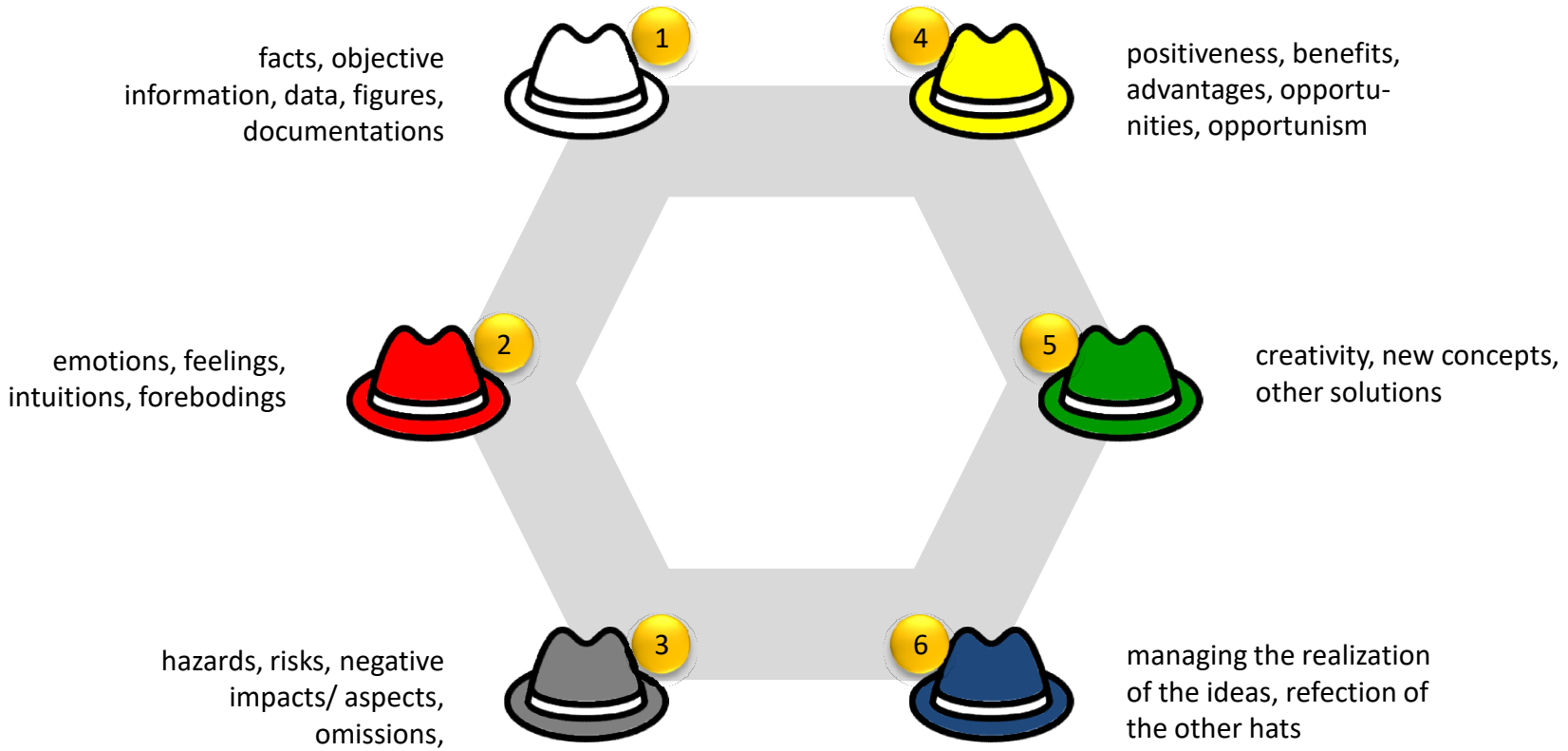
Eduard de Bono
(19. May 1933 – 9. June 2021)

The premise of the method is that the human brain thinks in six distinct directions which can be deliberately challenged, and hence planned for use in a structured way allowing one to develop tactics for thinking about particular issues.

In each of these directions the brain will identify and bring into conscious thought certain aspects of issues being considered (e.g. gut instinct, pessimistic judgment, neutral facts). None of these directions is a completely natural way of thinking, but rather how some of us already represent the results of our thinking.



A condensed approach to holistically cover all aspects of a given problem is the method of De Bono's "six thinking hats" (2/ 2)



De Bono's "six thinking hats" in action (1/ 3): Use these templates to structure your case study discussions

1 1st step: the white thinking hat

facts, objective information, data, figures, documentations, …

How do the objective facts look like? What figures, which kinds of scientific data or what reliable results are there?

With the white thinking hat you view the world in an objective, emotionless, and neutral way and collect data and facts only.

Application to the case study:

2 2nd step: the red thinking hat

emotions, feelings, intuitions, forebodings, …

How do you fell about the situation? What emotions do you have? What does your intuition and your gut feeling say?

With the red thinking hat you view the world only in terms of emotions, intuition, and forebodings.

Application to the case study:

De Bono's "six thinking hats" in action (2/ 3): Use these templates to structure your case study discussions

3 — 3rd step: the black thinking hat

hazards, risks, negative impacts/ aspects, omissions, …

Which objectively justifiable negative aspects and facts are there? Which threads, risks, imponderables exist?

With the black thinking hat you are the devils advocate and can let your pessimistic side loose.

Application to the case study:

4 — 4th step: the yellow thinking hat

positiveness, benefits, advantages, opportunities, opportunism, …

Which objectively justifiable positive aspects and facts are there? What chances exist? What are additional benefits?

With the yellow thinking hat you view the world benevolently optimistic and positive.

Application to the case study:

De Bono's "six thinking hats" in action (3/ 3): Use these templates to structure your case study discussions

5 5th step: the green thinking hat

creativity, new concepts,
other solutions, …

Which creative and new ideas do you have? What could be done in another way?

With the green thinking hat you use your fantasy and have a creative and playful perspective. New ideas are welcome.

Application to the case study:

6 6th step: the blue thinking hat

managing the realization of your insights,
refection of the other hats, …

Can you summarize the gathered insights? Have you considered all hats equally? Are there open questions?

With the blue thinking hat you take a meta perspective, and also think about the consequences and implications of your insights.

Application to the case study:

The Theory of Inventive Problem Solving (TRIZ) provides a structured/ methodological approach to innovations

Raphael Borissowitsch Shapiro
(13. Jan. 1926 – 16. Jul. 1993)

during the 1950s and 60s:

comprehensive analysis of approx. 40000 patents with respect to their economic success

⇓

generally applicable guidelines and laws for innovation

essential innovation guidelines:

1. a large amount of innovations is based on 40 of general solution principles
2. the overcoming of contradictions (between 39 technical parameters) renders innovations possible
3. the evolution of technological systems follows certain patterns and laws

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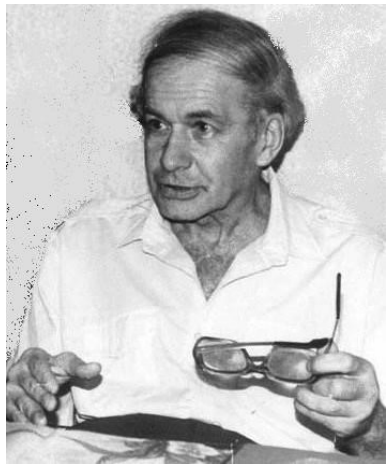
structured, methodological & systematic

"Theory of Inventive Problem Solving"

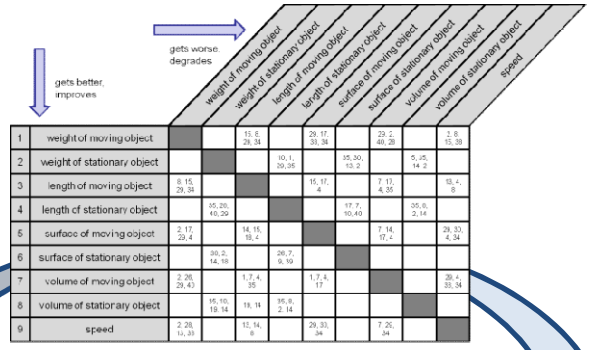


Genrich Saulowitsch Altschuller
(15. Oct. 1926 – 24. Sep. 1998)

Herby, a specific problem is transformed to an abstracted setting for which standard solutions exist that are then further concretized

innovation = overcoming contradictions

difficult problems that require an inventive/ innovative solution approach typically arise from a contradiction between the optimization goals of technical parameters



TRIZ key insights:

- 39 technical parameters
- 39x39 contradiction matrix
- 40 innovative principles

TRIZ methods & tools

Standard/ General Setting or Problem

Standard/ General Solution

abstraction

concretization

Specific Problem

Specific Solution

direct approach/ trail and error

Example:
How to make a faster boat?

Specific Problem

- Boats must float on water to support their weight
- Water's viscosity increases with speed, requiring more energy, which slows down the boat

General Problem (Contradiction)

- Wight of the moving object
- Speed (of the moving object)
- Use of energy by moving

weight vs speed

General Solution

TRIZ principle of Anti-Weight

- Make clever use of the energy
- Compensate for the weight of the moving object by merging it with other objects that provide lift

Specific Solution

- Raise the boat above water by using lifting surfaces under the boat
- This leads to the hydrofoil boat

Key is the contradiction matrix that contains prosing innovation principles for each combination of conflicting technical parameters

example: part of the contradiction matrix

gets worse, degrades

gets better, improves

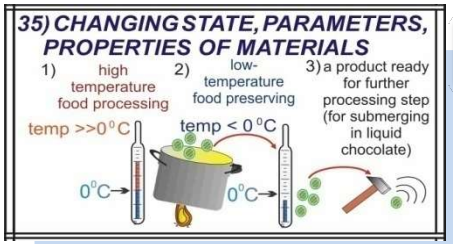
		1 weight of moving object	2 weight of stationary object	3 length of moving object	4 length of stationary object	5 surface of moving object	6 surface of stationary object	7 volume of moving object	8 volume of stationary object	9 speed
1	weight of moving object			15, 8, 29, 34		29, 17, 38, 34		29, 2, 40, 28		2, 8, 15, 38
2	weight of stationary object				10, 1, 29, 35		35, 30, 13, 2		5, 35, 14, 2	
3	length of moving object	8, 15, 29, 34				15, 17, 4		7, 17, 4, 35		13, 4, 8
4	length of stationary object		35, 28, 40, 29				17, 7, 10, 40		35, 8, 2, 14	
5	surface of moving object	2, 17, 29, 4		14, 15, 18, 4				7, 14, 17, 4		29, 30, 4, 34
6	surface of stationary object		30, 2, 14, 18		26, 7, 9, 39					
7	volume of moving object	2, 26, 29, 40		1, 7, 4, 35		1, 7, 4, 17				29, 4, 38, 34
8	volume of stationary object		35, 10, 19, 14	19, 14	35, 8, 2, 14					
9	speed	2, 28, 13, 38		13, 14, 8		29, 30, 34		7, 29, 34		

innovation principles that can be used in the case that the length of the stationary object decreases but its volume may increase

in 2003 the original matrix got up-dated to cover the empty spots

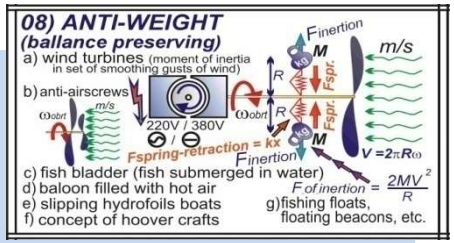
the contradiction matrix is of course already digitalized

For instance, the improving length of a stationary object with a degradation of its volume can be solved by applying principles 35, 8, 2, and 14



Parameter Changes

- Change an object's physical state (e.g. to a gas, liquid, or solid.)
- Change the concentration or consistency.
- Change the degree of flexibility. Change the temperature.



Anti-Weight

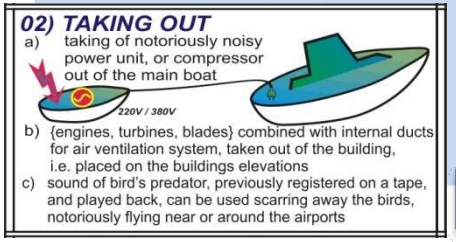
To compensate for the weight of an object,

- merge it with other objects that provide lift.
- make it interact with the environment (e.g. use aerodynamic, hydrodynamic, buoyancy and other forces).

35, 8, 2, 14

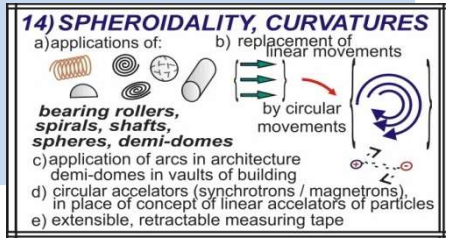
Separate an interfering part or property from an object, or single out the only necessary part (or property) of an object.

- Locate a noisy compressor outside the building where compressed air is used.
- Use the sound of a barking dog, not the dog, as a burglar alarm.



Taking Out

- Instead of using rectilinear parts, surfaces, or forms, use curvilinear ones; move from flat surfaces to spherical ones; from parts shaped as a cube (parallelepiped) to ball-shaped structures.
- Use rollers, balls, spirals, domes.
- Go from linear to rotary motion, use centrifugal forces.



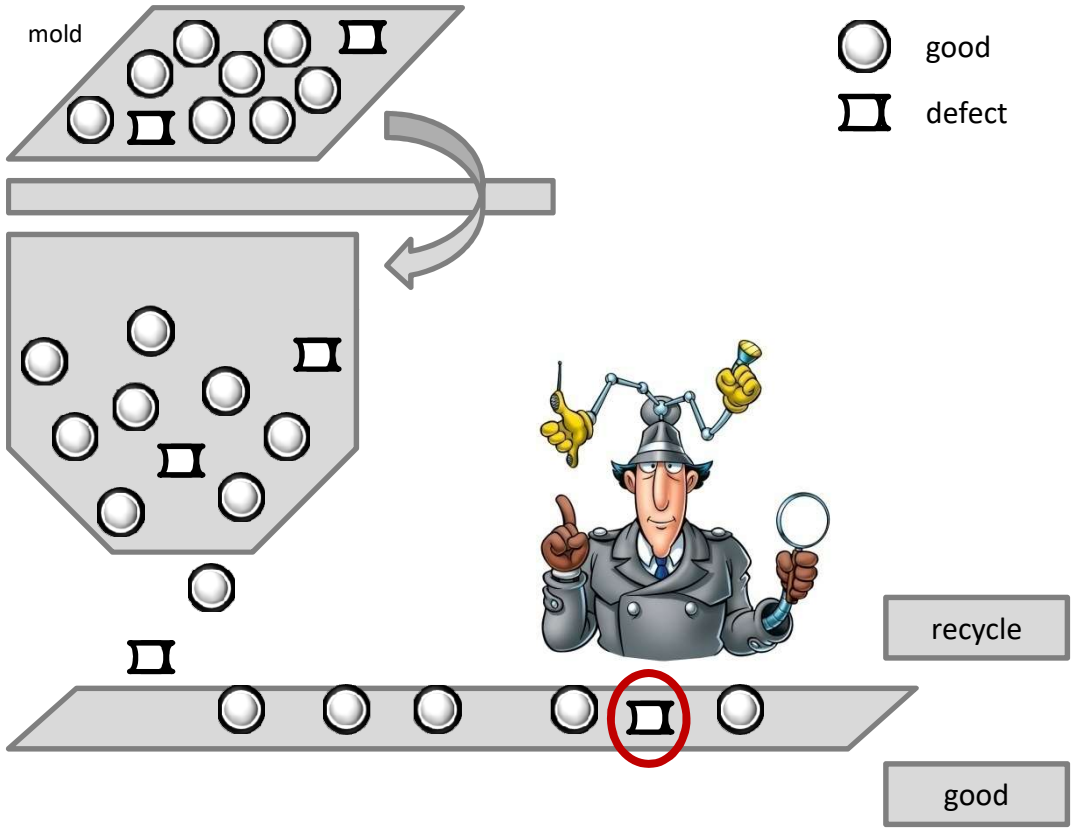
Spheroidality - Curvature

Example:
Application of innovation principle 14 (Spheroidality - Curvature)

Example for Principle 14

Situation:

- During the production of pharmaceutical pills certain defects are unavoidable
- These defects are sorted out by dedicated inspectors
- In order to save costs, you want to replace the inspectors with a 200 T GBP video inspection system
- This offers to be a high return on investment project, but capital is not available
- Hence, we have to “find another way”



Example:
Application of innovation principle 14 (Spheroidality - Curvature)

Example for Principle 14

Solution:

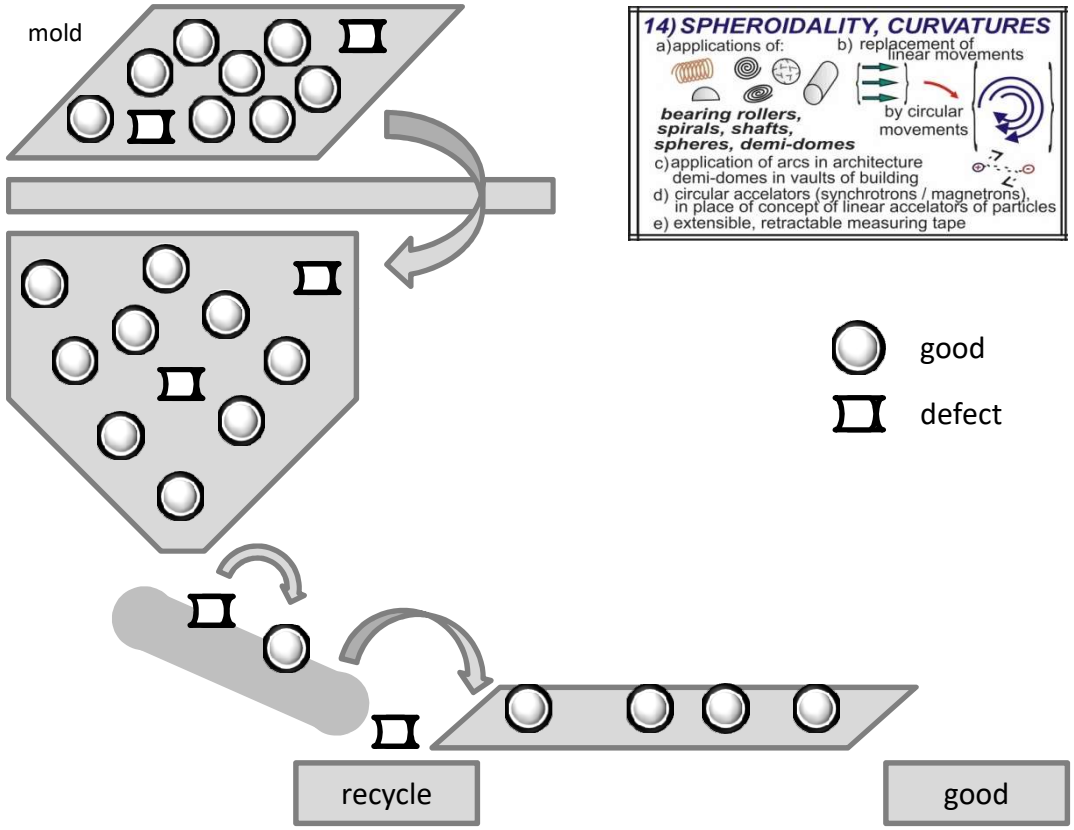
- What is the ideal idea of the solution?

  Well, we do not want any defect pills in the bottles

- What are the resources/ technical parameters we have?

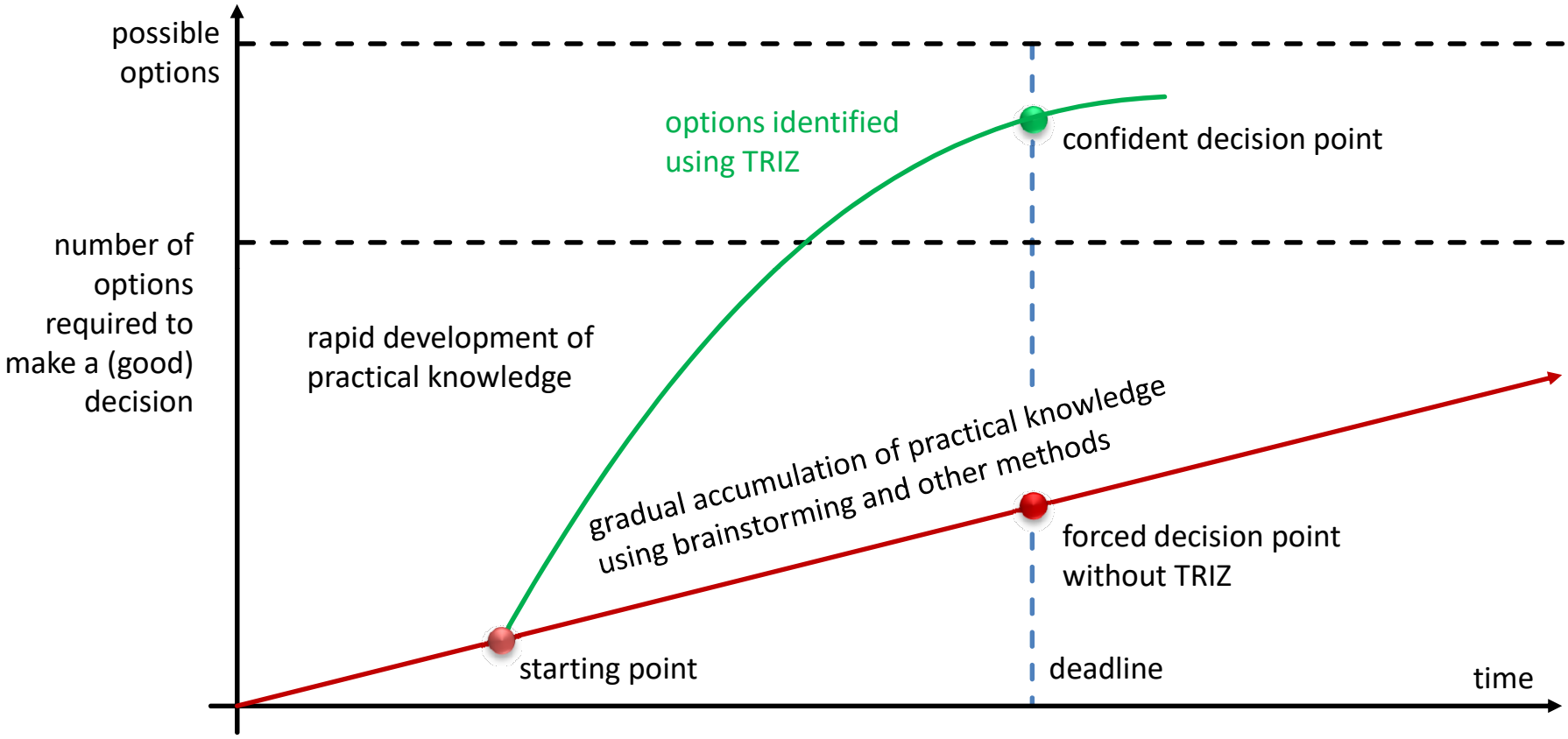
  The good and defect pills differ in shape. The good pills are spherical and can easily roll on a shaking rack. The defect ones do not have this technical property

- Can we use the defect as a resource to solve the problem?

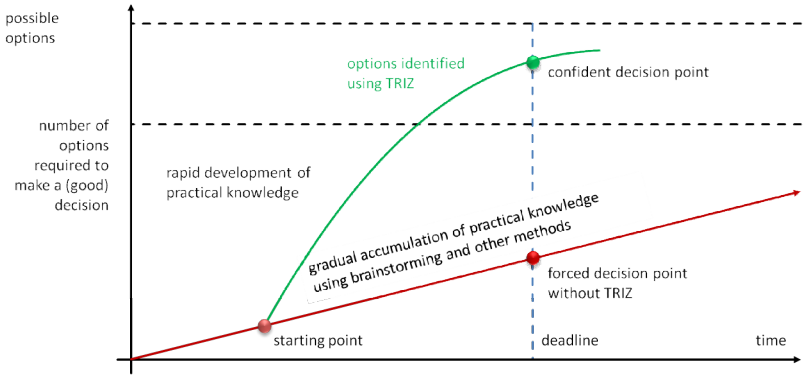


Due to its systematic approach TRIZ solutions are often superior to solutions obtained by traditional methods (1/ 2)

https://deskofacommonsensei.wordpress.com/2016/12/20/improving-solution-quality-in-six-sigma-using-triz-innovative-methodologies/



Due to its systematic approach TRIZ solutions are often superior to solutions obtained by traditional methods (2/ 2)



- The TRIZ process combines a creative brainstorming environment with a focus and instructional knowledge-based problem-solving method based on the most repetitive and innovative solutions in history.
- The result is an exhaustive set of conceptual solutions quickly generated to explore using standard solutions, principles and scientific effects, otherwise it will take longer to discover and combine into a feasible ideal solution.

Group-work:
Find a way to avoid production defects without X-ray sorting

Group-work (15 min)

Situation:

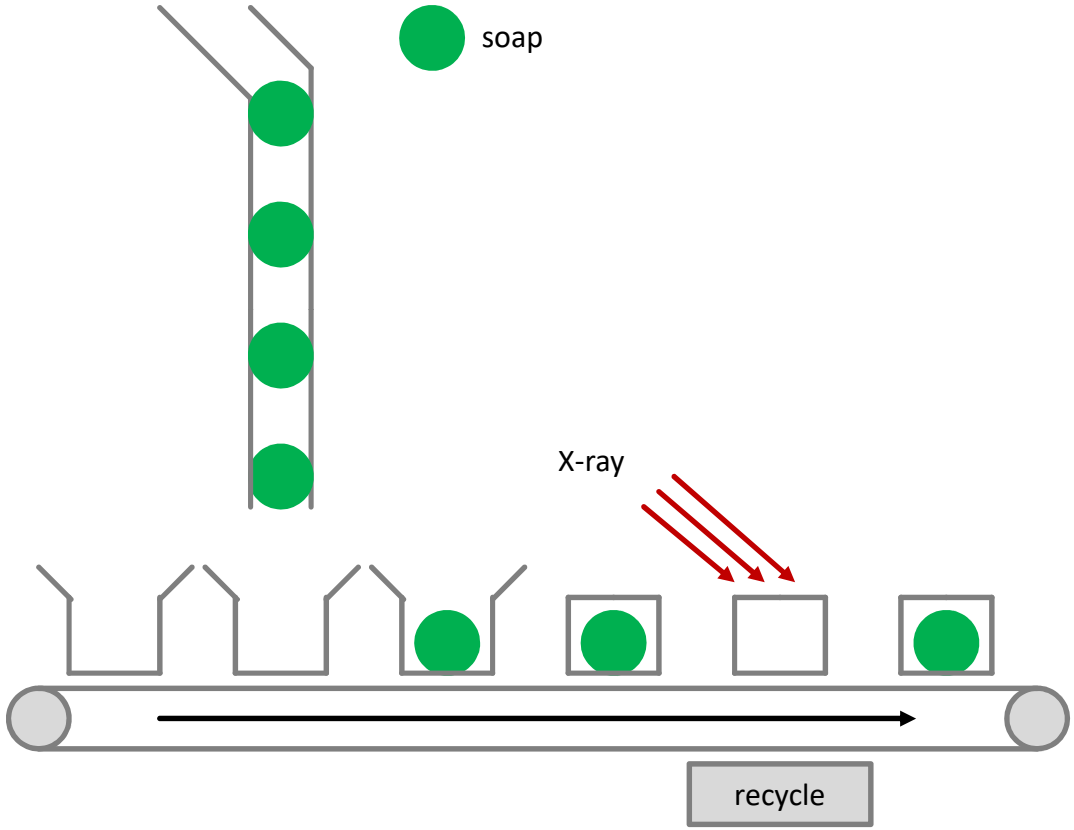
- We need to replace the X-ray sorting in order to keep an environmental certificate that is important to our customers
- What is the ideal idea of the solution?

  What are your suggestions?

- What are the resources/ technical parameters we have?

  What are your suggestions?

- Can we use the defect as a resource to solve the problem?



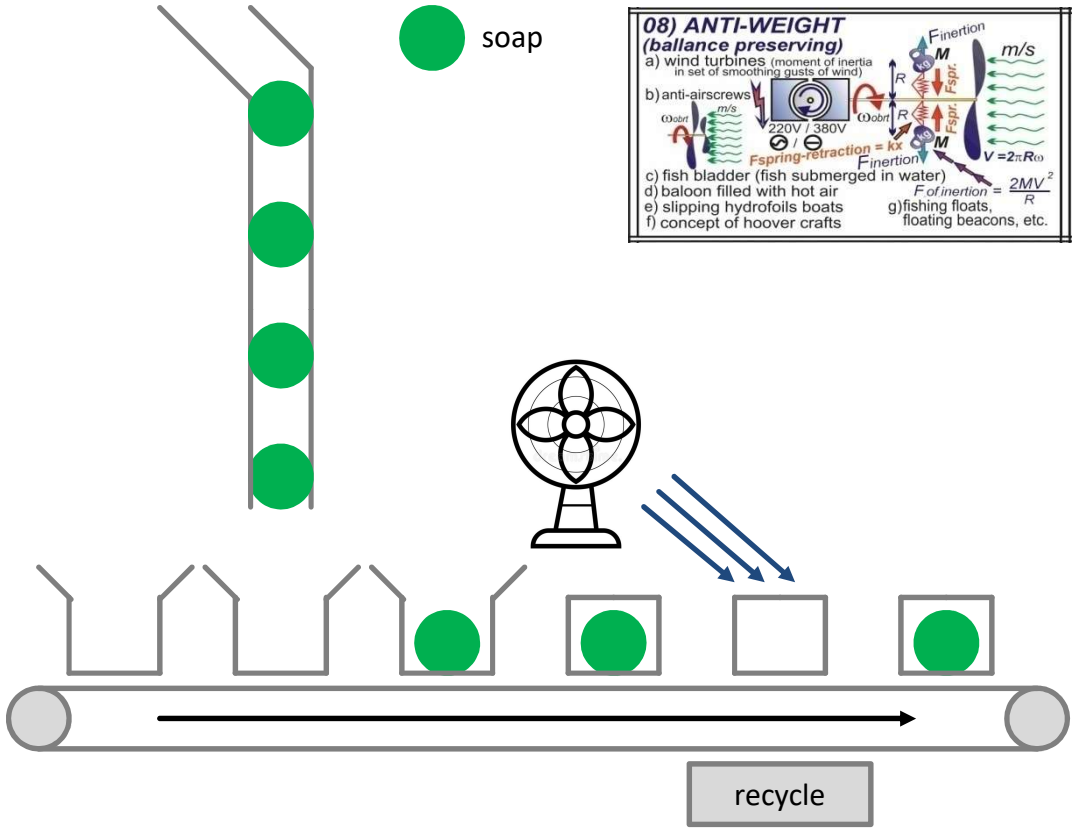
Group-work:
Find a way to avoid production defects without X-ray sorting

Solution

Solution:

- Technical parameters at the defect:
  - loss of substance (parameter that is getting worse)
  - loss of weight (parameter that is getting better)

  Due to the defect (no soap inside the box) the box is considerably lighter compared ‘good’ product
- We can use a stream of air to blow the defect product from the assembly line into a recycling basket



Summary 1: The abstraction of a specific problem is achieved by considering 39 technical parameters

1. Weight of moving object
2. Weight of stationary object
3. Length of moving object
4. Length of stationary object
5. Area of moving object
6. Area of stationary object
7. Volume of moving object
8. Volume of stationary object
9. Speed
10. Force
11. Stress or pressure
12. Shape
13. Stability of the object's composition
14. Strength
15. Duration of action by a moving object
16. Duration of action by a stationary
17. Temperature
18. Illumination intensity
19. Use of energy by moving object
20. Use of energy by stationary object

Specific Problem

abstraction

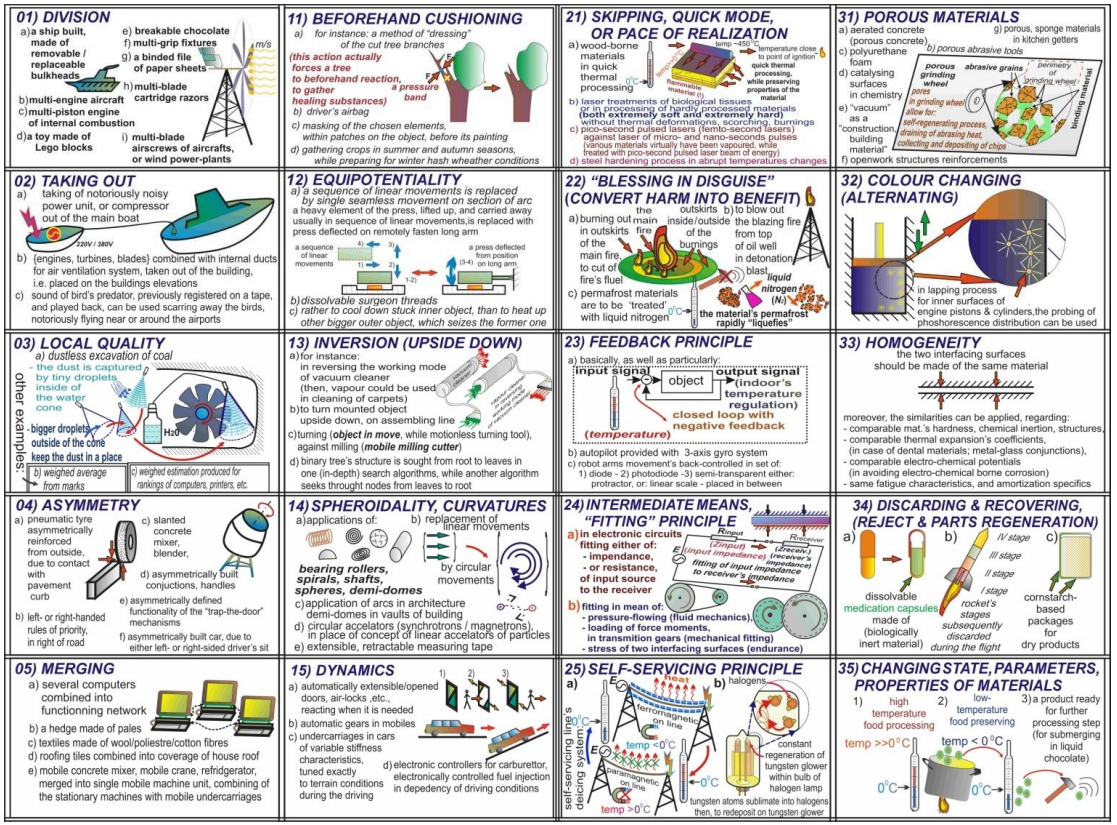
Standard/ General Setting or Problem

39 parameters to improve
x
39 parameters getting worse

21. Power
22. Loss of energy
23. Loss of substance
24. Loss of information
25. Loss of Time
26. Quantity of substance/ the matter
27. Reliability
28. Measurement accuracy
29. Manufacturing precision
30. External harm affects the object
31. Object-generated harmful factors
32. Ease of manufacture
33. Ease of operation
34. Ease of repair
35. Adaptability or versatility
36. Device complexity
37. Difficulty of detecting and measuring
38. Extend of automation
39. Productivity

Summary 2: The solution of the general problem is achieved by considering 40 innovation principles (1/ 2)

1. Skipping
2. “Blessing in disguise”
3. Feedback
4. Intermediary
5. Self-service
6. Copying
7. Cheap short-living objects
8. Mechanics substitution
9. Pneumatics and hydraulics
10. Flexible shells and thin films
11. Porous materials
12. Color changes
13. Homogeneity
14. Discarding and recovering
15. Parameter changes
16. Phase transitions
17. Thermal expansion
18. Strong oxidants
19. Inert atmosphere
20. Composite materials



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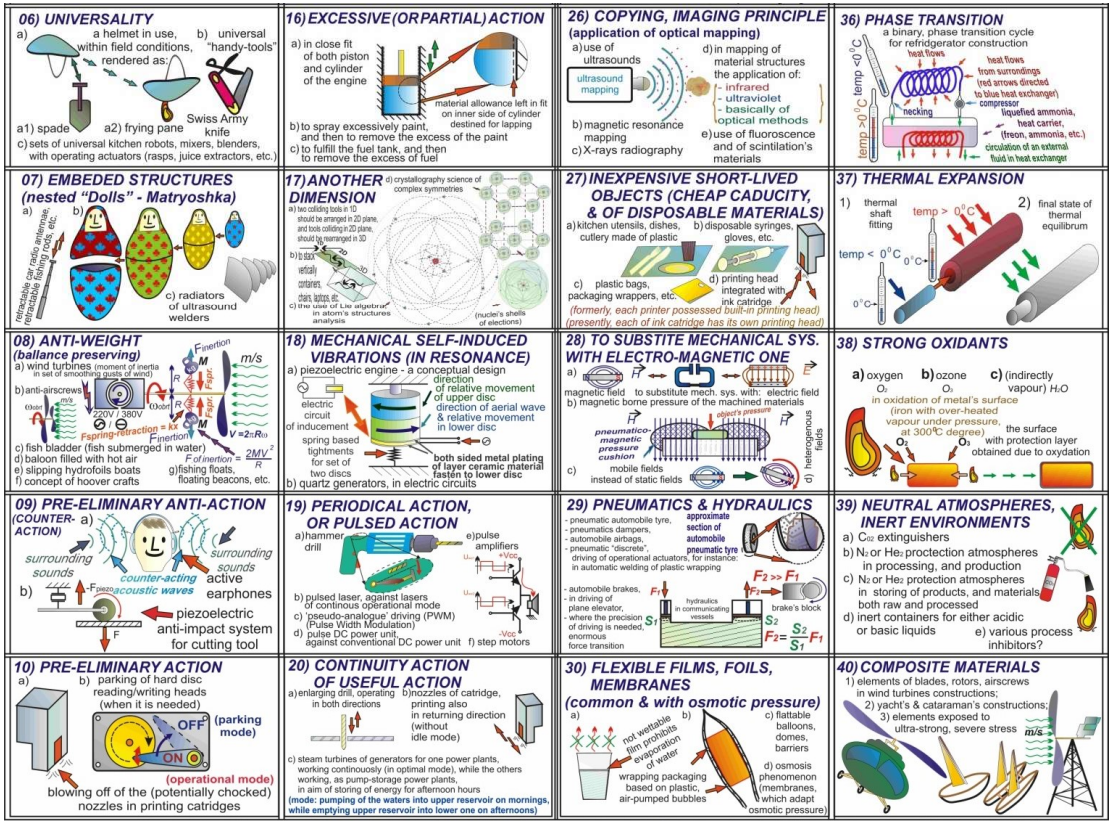
Summary 2: The solution of the general problem is achieved by considering 40 innovation principles (2/ 2)

1. Segmentation
2. Taking out
3. Local quality
4. Asymmetry
5. Merging
6. Universality
7. Nested doll
8. Anti-weight
9. Preliminary anti-action
10. Preliminary action
11. Beforehand cushioning
12. Equipotentiality
13. The other way round
14. Spheroidality – Curvature
15. Dynamics
16. Partial or excessive actions
17. Another dimension
18. Mechanical vibrations
19. Periodic action
20. Continuity of useful action



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Topics

A Path-Goal Model for Motivation and Creative Action

Strengthening Problem Solving Capabilities

A First Innovation Case Study

Case Study:
Boehringer Ingelheim to optimize the current R&D portfolio

Optimizing a Current R&D Portfolio

A major pharmaceutical company needs an assessment of their R&D portfolio. Use de Bono's thinking hats to help it decide what to do.

Founded in 1885, the Boehringer Ingelheim group now is one of the world's top 20 leading pharmaceutical companies. Head-quartered in Ingelheim, Germany, it operates globally with 145 affiliates and more than 44,000 employees. The company's key assets of interest are: respiratory disease, cardiovascular disease, Parkinson's disease, HIV, thromboembolic disease, cerebro-vascular disease, oncology, diabetes and hepatitis. Since it was founded in 1885, the Boehringer Ingelheim company has been committed to researching, developing, manufacturing and mar-keting novel products of high therapeutic value for human and veterinary medicine.

You've been retained by the CEO of Boehringer Ingelheim to look at their current research and development (R&D) portfolio and assess whether they're maximizing their potential with their current projects. Specifically, using de Bono's thinking hats, the CEO's questions to you are:

- How can you help them decide what information you would need?
- What components do you think would round out an R&D portfolio for Boehringer Ingelheim pharmaceutical company?
- Which innovation gathering methods may be beneficial? Why? How can they be applied?

Making sure to understand the situation and additional complications associated wit the case

Situation:

- Boeringer Ingelheim is part of the world pharmaceutical companies
- Internationally operating with several branches outside the headquarter region Germany
- Researching, developing, manufacturing and marketing products for humanitarian medicine
- Researching, developing, manufacturing and marketing products for veterinarian medicine
- **Goal:** Is the company maximizing their potential?

Complication:

- Difficult to introduce innovative concepts in all branches (maybe different approaches per branch/ region are required)
- Allocating the experts efficiently
- Regulatory issues with developing drugs
- Development of new drugs is (very) cost intensive
- Is their portfolio fit for the future?
- The right to exclusively distribute a drug is there only for a certain time

Solution:

- ...

De Bono's "six thinking hats" in action (1/ 3): Boehringer Ingelheim to optimize the current R&D portfolio

1 1st step: the white thinking hat

facts, objective information, data, figures, documentations, …

How do the objective facts look like? What figures, which kinds of scientific data or what reliable results are there?

With the white thinking hat you view the world in an objective, emotionless, and neutral way and collect data and facts only.

Application to the case study:

- Economic progress data from the company and the market are required to judge the market situation correctly
- WHO data on "new" diseases and market trends
- Which products are the cash cows
- What is the available budget for changes
- Need for a legal person in the team to keep track of the regulatory aspects of drug development
- Information about the production level (for all products) incl. the amount of resources required currently

2 2nd step: the red thinking hat

emotions, feelings, intuitions, forebodings, …

How do you fell about the situation? What emotions do you have? What does your intuition and your gut feeling say?

With the red thinking hat you view the world only in terms of emotions, intuition, and forebodings.

Application to the case study:

- Company must be ethical about their operations
- Should not make profit from make people suffering
- Intuition about the next great challenges: old age, male nutrition, effects of increased of world population, effects of climate change

De Bono's "six thinking hats" in action (2/ 3): Boehringer Ingelheim to optimize the current R&D portfolio

3 3rd step: the black thinking hat

hazards, risks, negative impacts/ aspects, omissions, …

Which objectively justifiable negative aspects and facts are there? Which threads, risks, imponderables exist?

With the black thinking hat you are the devils advocate and can let your pessimistic side loose.

Application to the case study:

- Developing new pharmaceuticals is financially risky
- A huge number of employees may not be "useful" (compensation for workers and their image)
- The company should be the first to have a new drug (to address a certain illness)
- We may risk lives with bad decisions

4 4th step: the yellow thinking hat

positiveness, benefits, advantages, opportunities, opportunism, …

Which objectively justifiable positive aspects and facts are there? What chances exist? What are additional benefits?

With the yellow thinking hat you view the world benevolently optimistic and positive.

Application to the case study:

- Outlook to be more profitable
- Saving lives
- Greater well-being of the employees (company culture)
- Increased job opportunities/ new job opportunities/ job safety for people

De Bono's "six thinking hats" in action (3/ 3): Boehringer Ingelheim to optimize the current R&D portfolio

5 5th step: the green thinking hat

creativity, new concepts, other solutions, …

Which creative and new ideas do you have? What could be done in another way?

With the green thinking hat you use your fantasy and have a creative and playful perspective. New ideas are welcome.

Application to the case study:

- Public competition for people for new drug/ manufacturing ideas
- The company should be able to cope with unexpected diseases
- Start working with universities, investment in re-growing resources and new chemical compounds
- Current trends could be taken advantage of, e.g. the need to take care for oneself
- Using this to market the company and gain additional research money, etc.
- Competitors may use more machines/ data mining/ new tech. … are we missing some trends and market structure changes

6 6th step: the blue thinking hat

managing the realization of your insights, refection of the other hats, …

Can you summarize the gathered insights? Have you considered all hats equally? Are there open questions?

With the blue thinking hat you take a meta perspective, and also think about the consequences and implications of your insights.

Application to the case study:

- Development of new drugs is risky but could be rather beneficial for individuals and the society
- We need to be aware of market trends, social trends (aging population), and new/ upcoming disease (more information required)
- We need to be aware of new technologies/ SW … looking for research enabling & speed-up technologies
- Aligning part of the portfolio along ethical guidelines

1-page situation-complication-solution slide: Boehringer Ingelheim to optimize the current R&D portfolio

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Our case studies deal with some aspects of creative problem solving

Economic Priorities at GENCO

Analyze the past, present and future of the company GENCO. Develop priorities and rank them. Use de Bono's thinking hats to cover all aspects.

Professor M's Dilemma

Prof. M invented a production process for a medicament but her commercialization strategy is fuzzy. Use de Bono's thinking hats to cover all aspects.

Realigning Robotics Ltd.

Robotics Ltd. switched from software sales to hardware production, though forgot to align their financial position. What needs to be improved to survive?

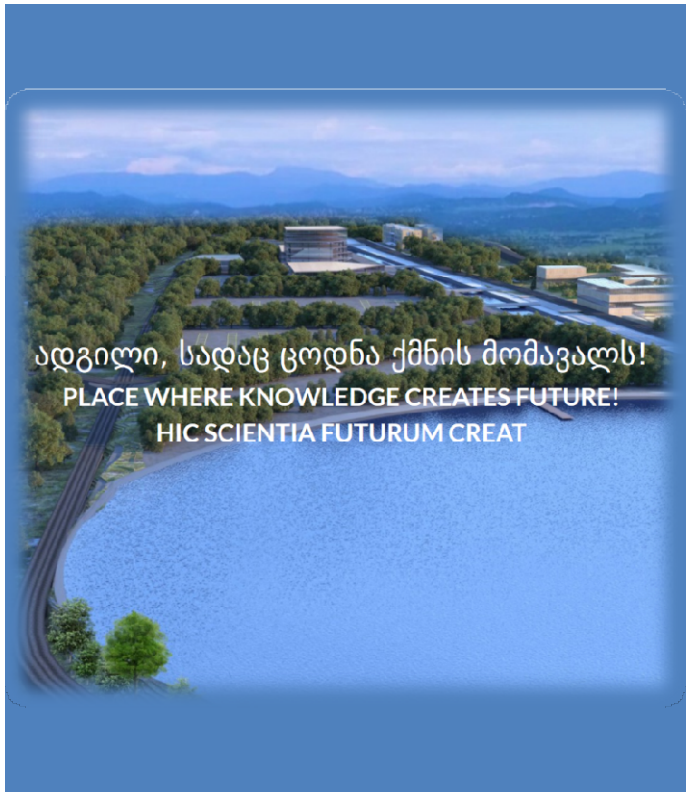
TRIZ Invention Study I

How can you make a pump to draw water from a well or river in a develop-ing country for next to no cost using local materials?

TRIZ Invention Study II

How would you persuade drivers to keep to a sensible speed, whilst not impeding their progress when driving within the legal limits?

Please, arrange in groups of up to five members to discuss one or more of the following case studies. If you are unsure which case to take, go for one that is not discussed by your neighboring group such that all four cases can be presented in the final presentation and we can get the complete picture.



Systematic Innovation

Questions & Remarks?

Thank You Very Much

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