

Improve Everything Always!

Howard Smith, CSC CTO EMEA, Author
Founder SouthbeachInc.com



Innovate Europe 2005, London, October 2005



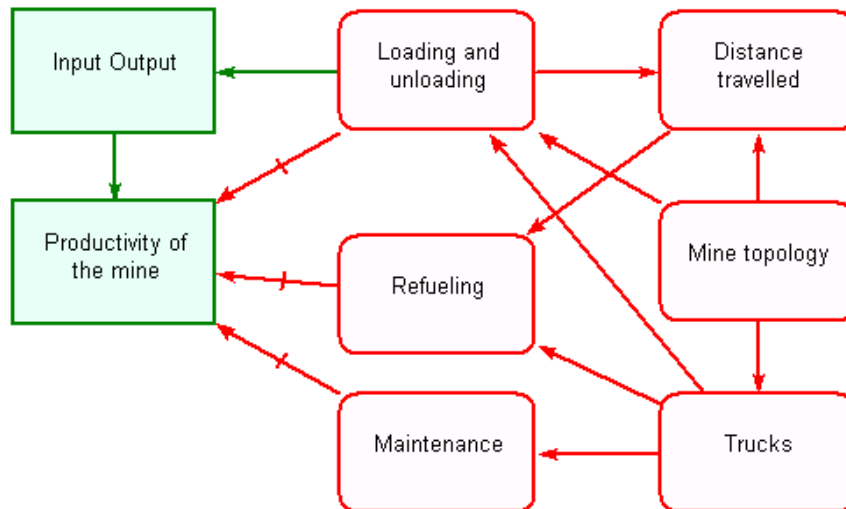
EXPERIENCE. RESULTS.

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Chevron: Impossible customer problem

Problem: Mining waste management

Wasted time, materials, fuel, lubricant ...



11. Find an alternative way to obtain [the] (Input Output) that offers the following: provides or enhances [the] (Productivity of the mine), does not require [the] (Loading and unloading).

8. Find a way to eliminate, reduce, or prevent [the] (Trucks) in order to avoid [the] (Loading and unloading), (Maintenance) and (Refueling), under the conditions of [the] (Mine topology).



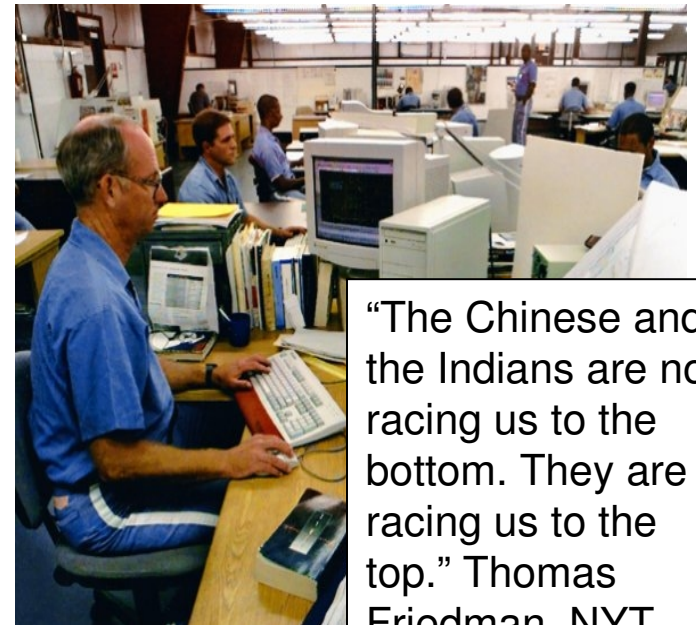
Twin drivers of innovation in 2005 and beyond



“We are all just a moment of complacency away from an abyss called **commodity hell**, where you compete only on price, where share goes to the least common denominator ...” Jeff Immelt, GE

Globalization

- Lower growth, higher risk
- Excess capacity – getting that order
- Strong competitors in emerging economies
- Outsourcing options and multi-sourcing
- Better educated, cheaper, global, labour
- Price transparency – perfect information
- Fleeting value from new product launches
- Distribution-oriented, consolidating channels



“The Chinese and the Indians are not racing us to the bottom. They are racing us to the top.” Thomas Friedman, NYT

Do you have problems?

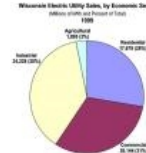


Known Problems
you must solve and
for which you have
no known solution



Unknown Problems
preventing progress
that must be revealed,
and subsequently solved

New
concepts



Business
coming in

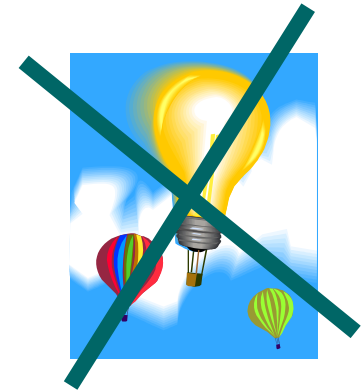


Barriers, obstacles, contradictions, inertia

Research ... Development ... Operations ... Marketing ... Sales ... Distribution

The innovator is a problem solver

- A special place in the mind or just plain old-fashioned hard work?



Directed Evolution



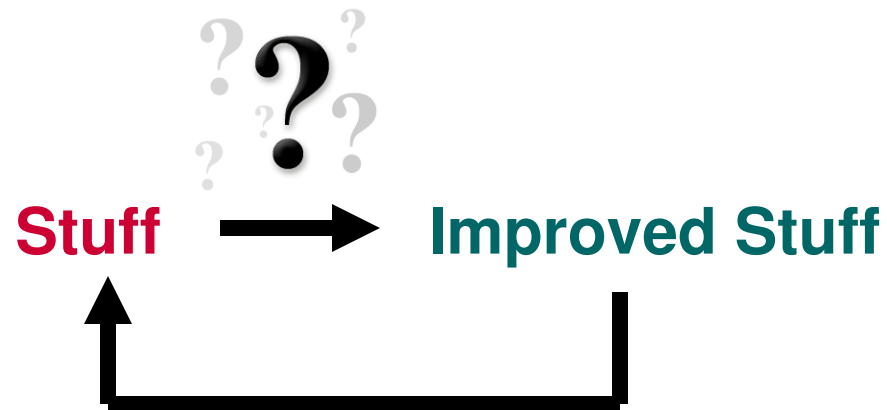
Process Improvement



Problem Solving

What Innovation Is

Innovation is the reliable business process by which firms create significant value from all sources of creativity and knowledge



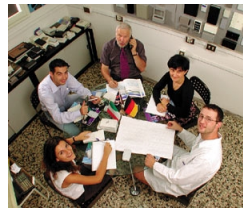
Stuff can be ...



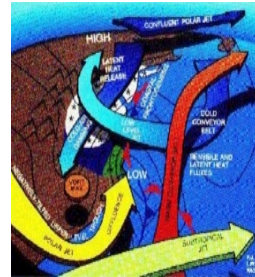
Products



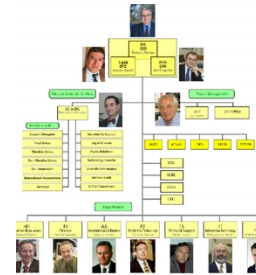
Services



Solutions



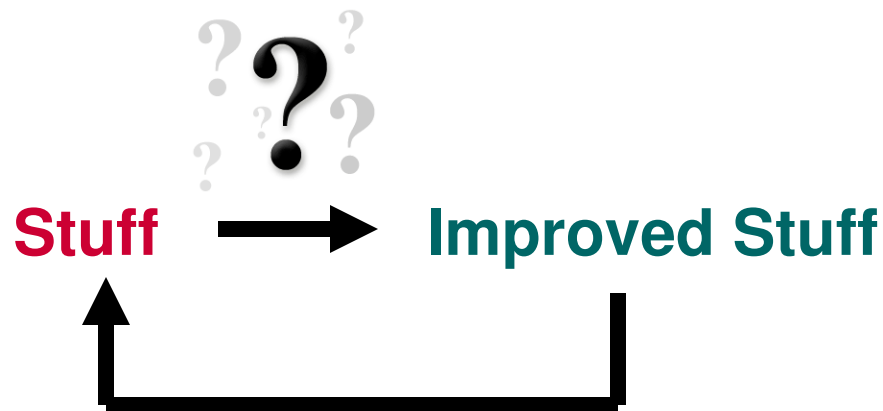
Processes



Organizations



Ideas





To improve stuff, we must decompose

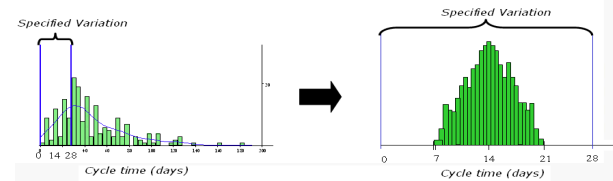
Stuff





EXPERIENCE. RESULTS.

Is there a convergent method for innovation?



Quality Movement

- 1950 Widgets
- 1960 Manufacturing
- 1970 Operations
- 1980 TQM
- 1990 Six Sigma Processes
- 2000 New Six Sigma

Everything is useful and harmful



Personal transport

Freedom of movement

Pollution

Useful

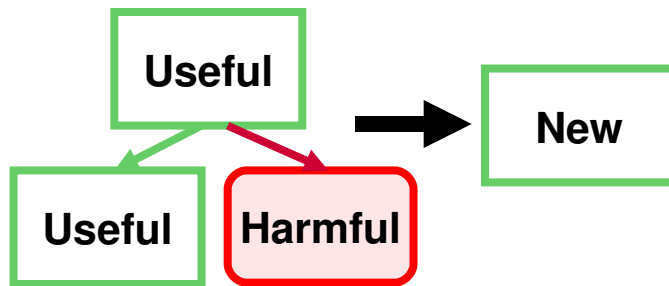
Harmful



Is it useful or harmful

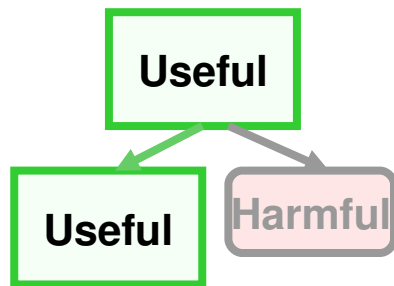


Decomposition opens pathways to improvement



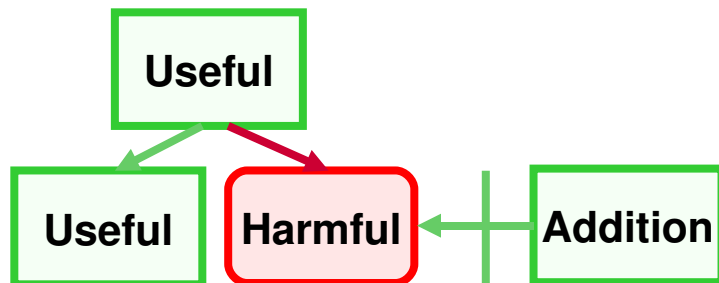
Example 1

Replace the system with a new system that does not exhibit the harmful function



Example 2

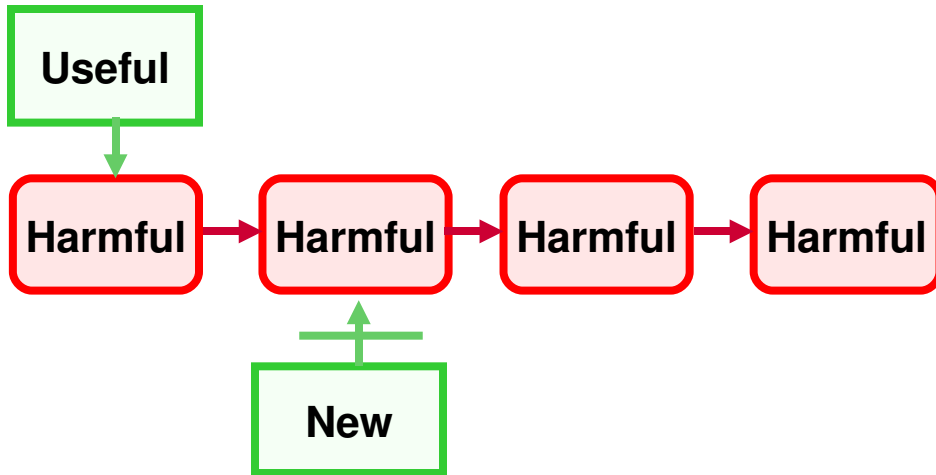
Find a way to eliminate or reduce the harmful function



Example 3

Add a compensating function to limit the impact of the harmful function

More examples of innovation

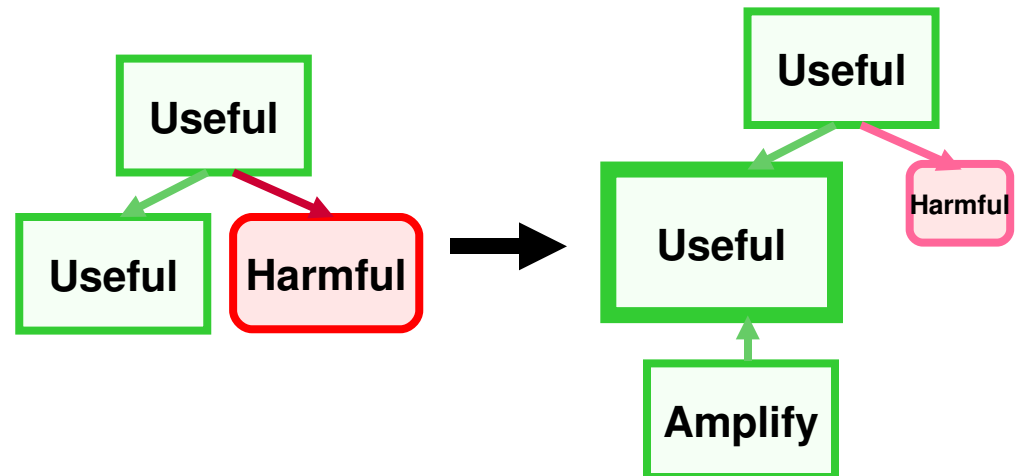


Example 4

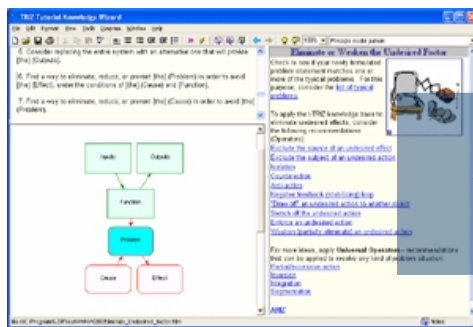
Compensate a harmful side effect to break a chain of harmful knock on effects

Example 5

Amplify the useful output, to the extent that the harmful function becomes insignificant



We can automate the generation of solution pathways



1. Find an alternative way to obtain [the] (Personal transport) that offers the following: provides or enhances [the] (Freedom of movement), does not cause [the] (Pollution).

2. Try to resolve the following contradiction: The useful factor [the] (Personal transport) should be in place in order to provide or enhance [the] (Freedom of movement), and should not exist in order to avoid [the] (Pollution).

3. Find a way to eliminate, reduce, or prevent [the] (Pollution) under the conditions of [the] (Personal transport).

4. Find an alternative way to obtain [the] (Freedom of movement) that does not require [the] (Personal transport).

5. Consider replacing the entire system with an alternative one that will provide [the] (Freedom of movement).

Personal transport

Freedom of movement

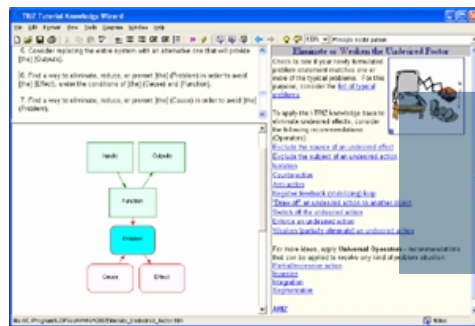
Pollution

Useful

Harmful



Systematic process opens exhaustive solution options



3.1. Find a way to benefit from [the] (Pollution).

3.2. Try to cope with [the] (Pollution).

3.3. Consider ways to compensate for the harmful results of [the] (Pollution).

3.4. Consider creating a situation that makes [the] (Pollution) insignificant or unimportant.

5.1. Consider transition to the next generation of the system that provides [the] (Freedom of movement), but which will not have the existing problem.

5.2. Consider enhancing the current means by which the primary useful function is achieved, to the extent that the benefits will override the primary problem.

Personal transport

Freedom of movement

Pollution

Useful

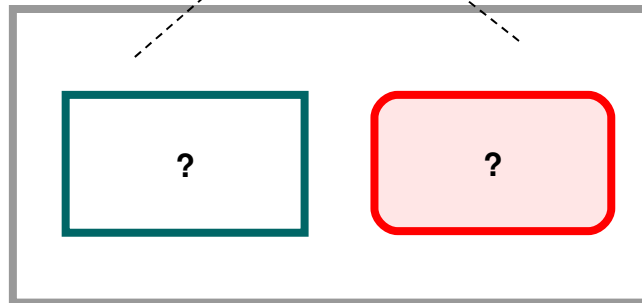
Harmful



To whom are things useful and harmful?



- Customer
- Supplier
- Citizen
- Government
- Child



To you

To me

Useful or harmful?



Everything is useful and harmful from many perspectives

Loss of rural environment

Freedom of movement

Pollution

Oil profits



High speed economy

Environmental damage



Selected pathways create the innovation manifesto

1.3. Find a way to obtain [the] (Freedom of movement) without the use of [the] (Personal transport).

1.4. Find a way to decrease the ability of [the] (Personal transport) to cause [the] (Pollution).

3.2. Find a way to obtain [the] (Oil profits) without the use of [the] (Pollution).

3.3. Find a way to decrease the ability of [the] (Pollution) to cause [the] (Environmental damage).

5.3. Find a way to obtain [the] (High speed economy) without the use of [the] (Freedom of movement).

5.4. Find a way to decrease the ability of [the] (Freedom of movement) to cause [the] (Loss of rural environment).

8.1. Consider transition to the next generation of the system that provides [the] (High speed economy), but which will not have the existing problem.

8.2. Consider enhancing the current means by which the primary useful function is achieved, to the extent that the benefits will override the primary problem.

9.2. Try to cope with [the] (Loss of rural environment).

9.3. Consider ways to compensate for the harmful results of [the] (Loss of rural environment).

9.4. Consider creating a situation that makes [the] (Loss of rural environment) insignificant or unimportant.

10.2. Try to cope with [the] (Environmental damage).

10.3. Consider ways to compensate for the harmful results of [the] (Environmental damage).

10.4. Consider creating a situation that makes [the] (Environmental damage) insignificant or unimportant.

11.2. Find additional benefits from [the] (Oil profits).

12.1. Consider transition to the next generation of the system that provides [the] (Oil profits), but which will not have the existing problem.



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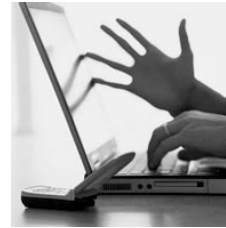
Aspects



Brand



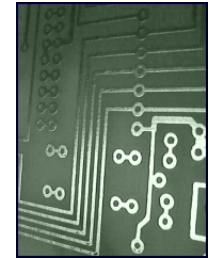
Experience



Usability



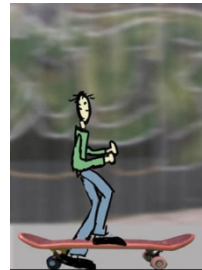
Design



Technology



Performance



Function



Market



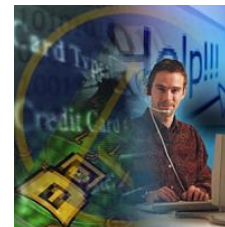
Business model



Manufacture



Delivery

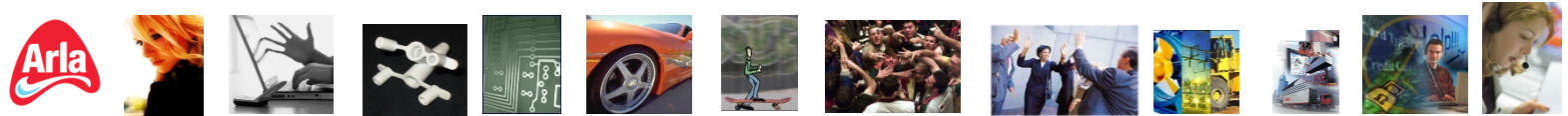


Service



Support

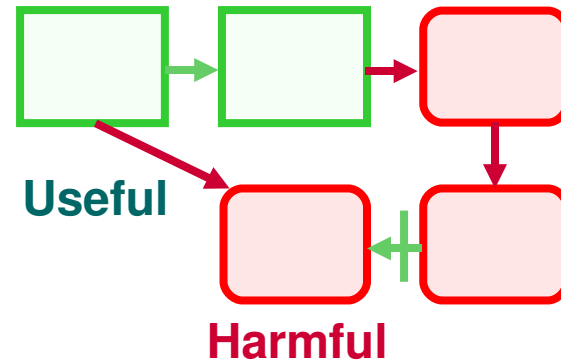
To improve, we must decompose in many ways



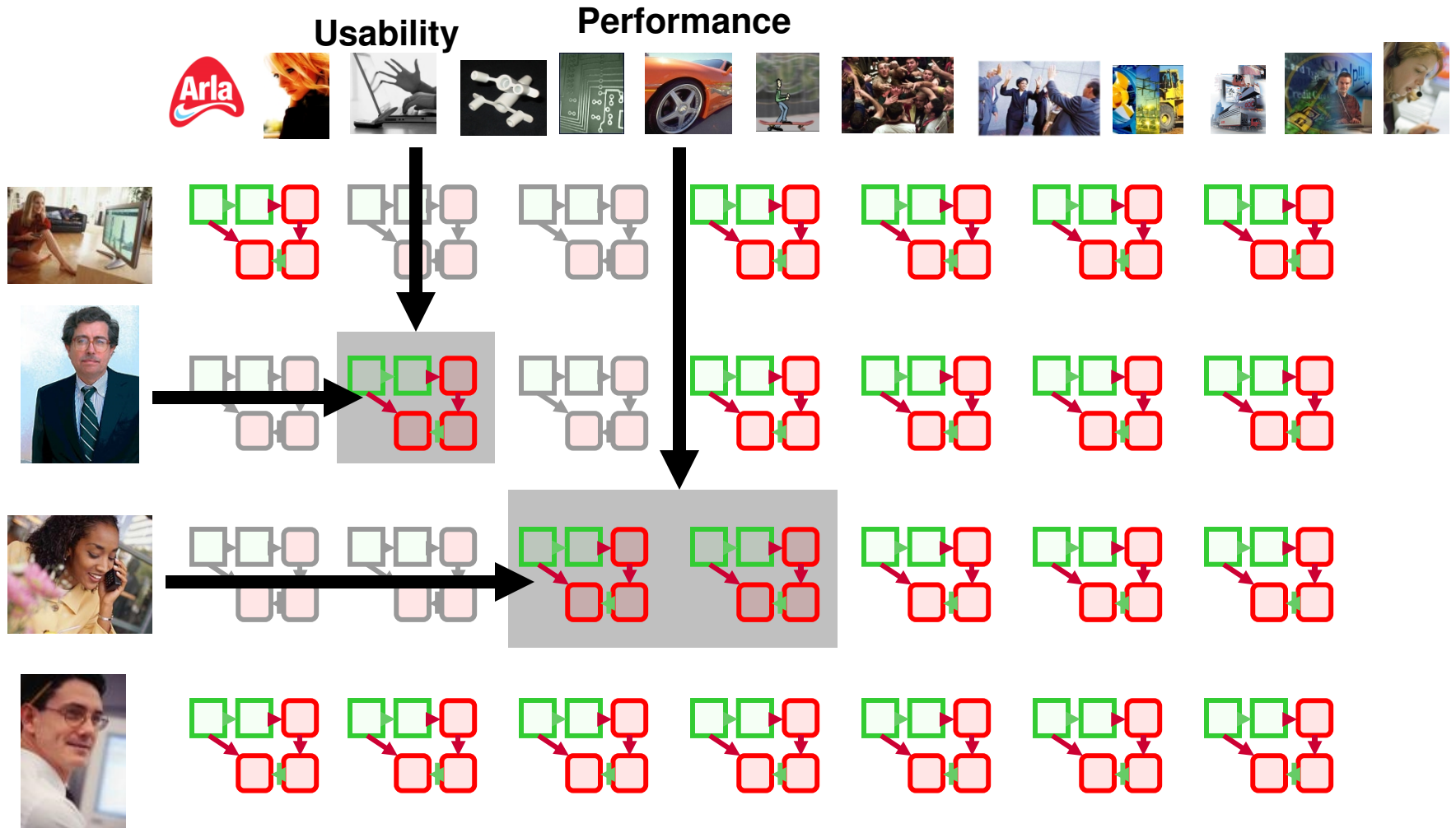
Aspects

Perspectives

Functions



Many models are needed – expect contradictions



The more cars the better?



2. Try to resolve the following contradiction: The useful factor [the] (Personal transport) should be in place in order to provide or enhance [the] (Freedom of movement), and should not exist in order to avoid [the] (Pollution).

Contradiction

Freedom of movement

Pollution

Useful

Harmful

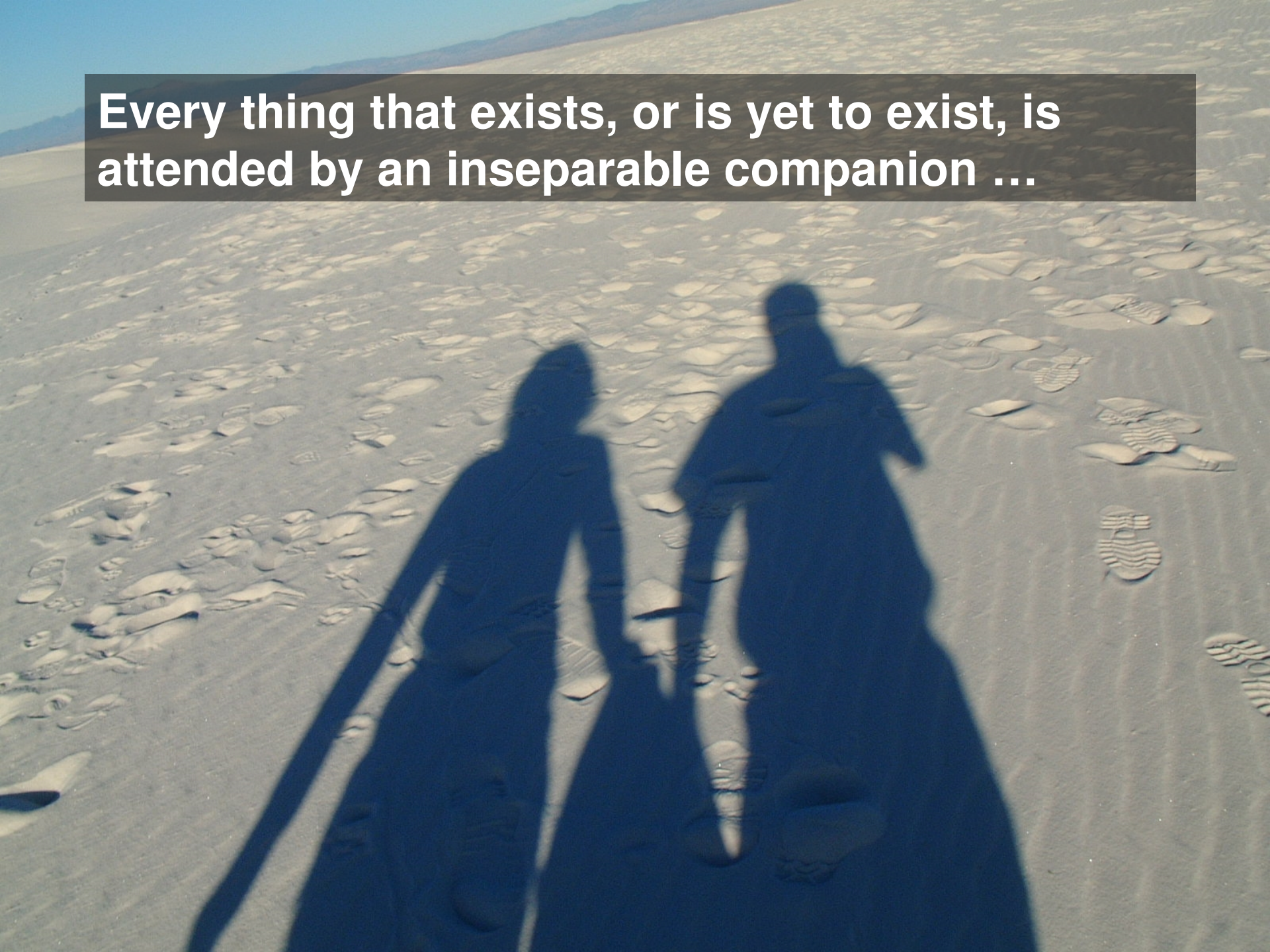


Hydrogen
Internal
Combustion

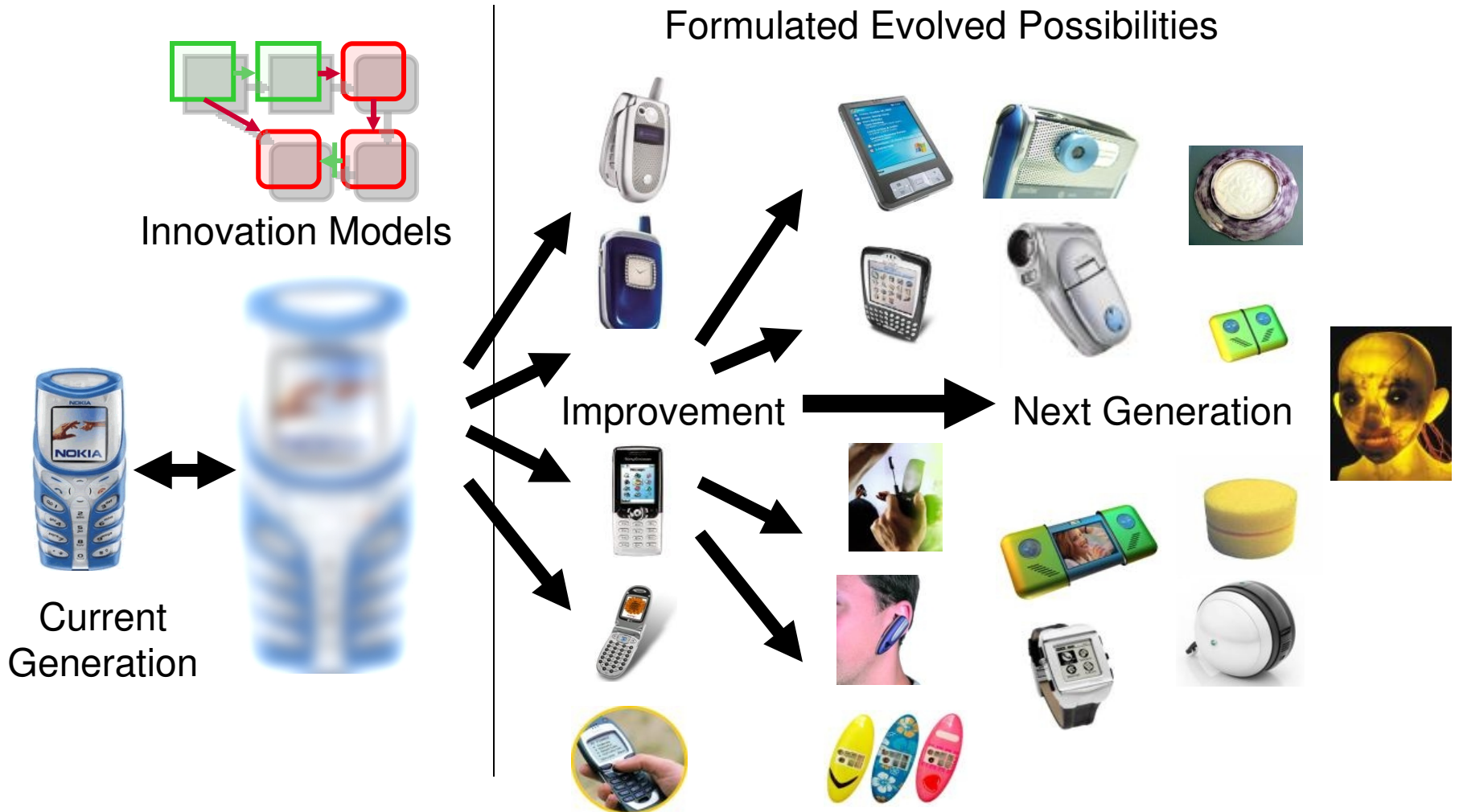
“Air leaving the tailpipe could actually be cleaner than the air coming into the engine”

<http://www.ford.com/en/innovation/engineFuelTechnology/hydrogenInternalCombustion.htm>

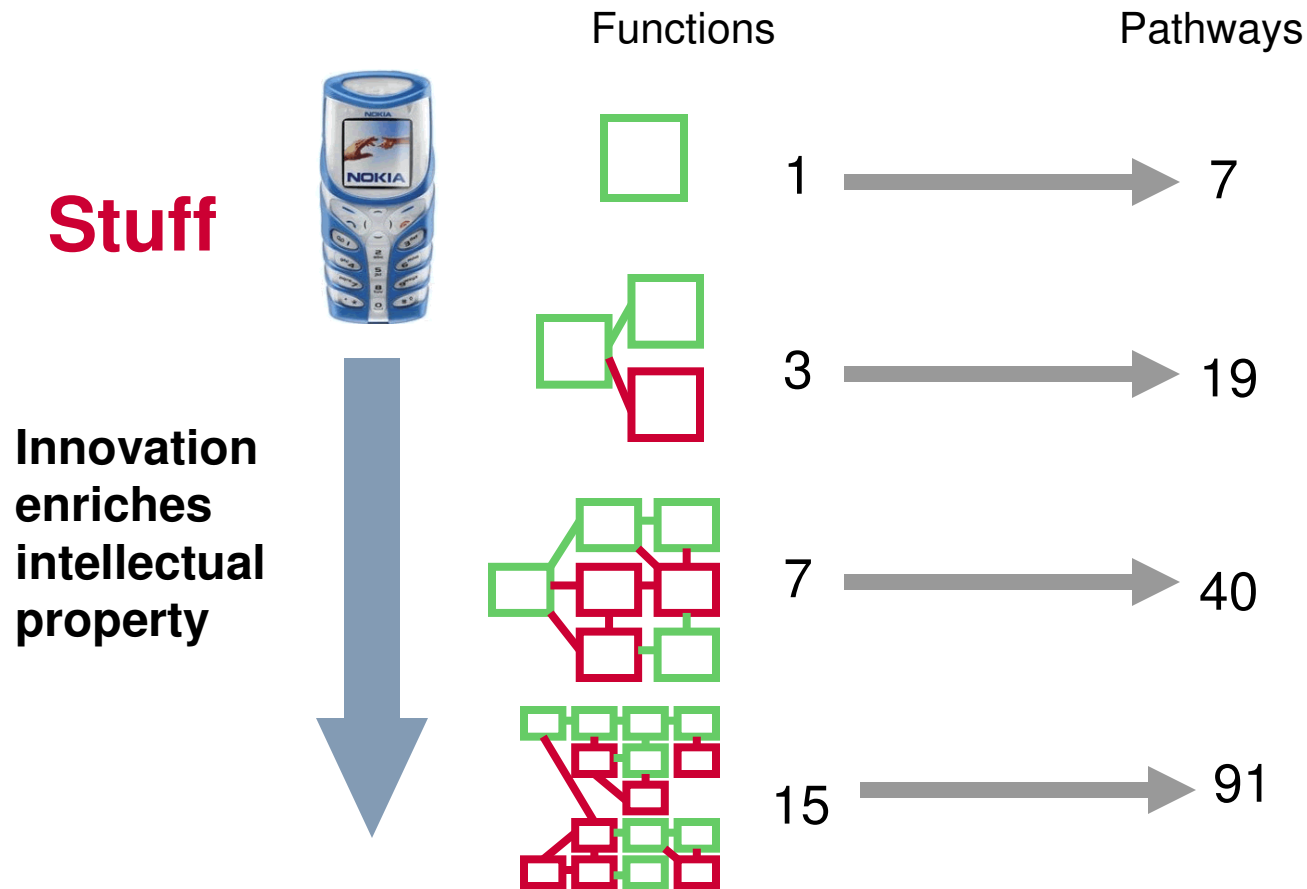
Every thing that exists, or is yet to exist, is attended by an inseparable companion ...



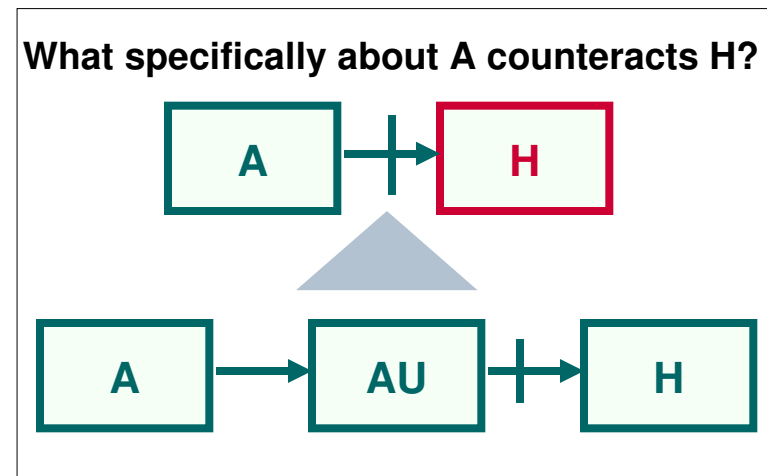
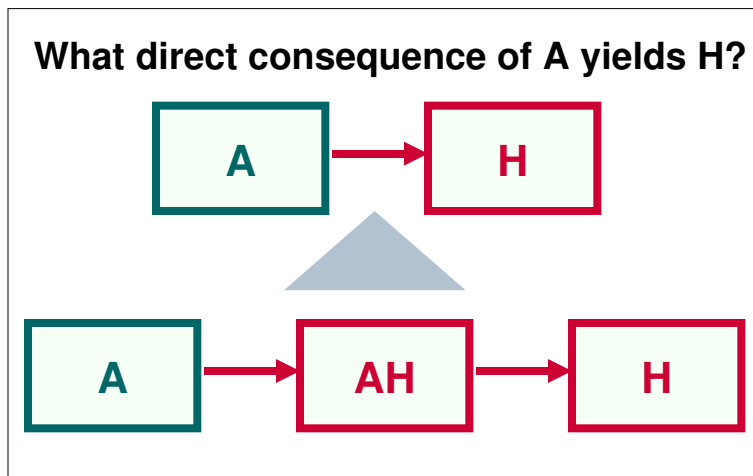
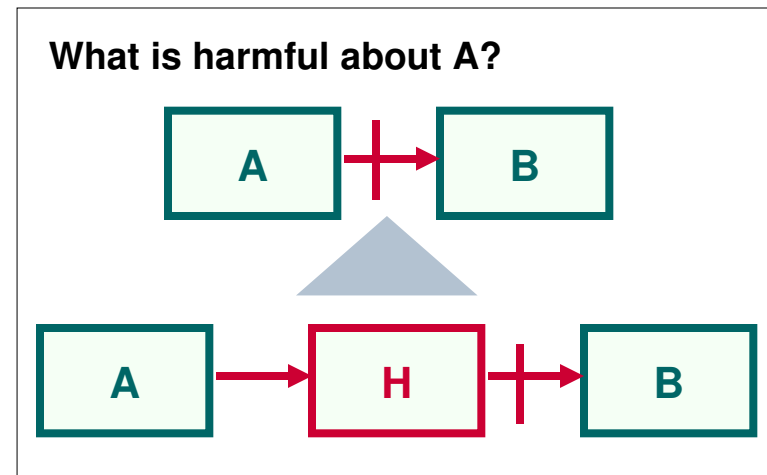
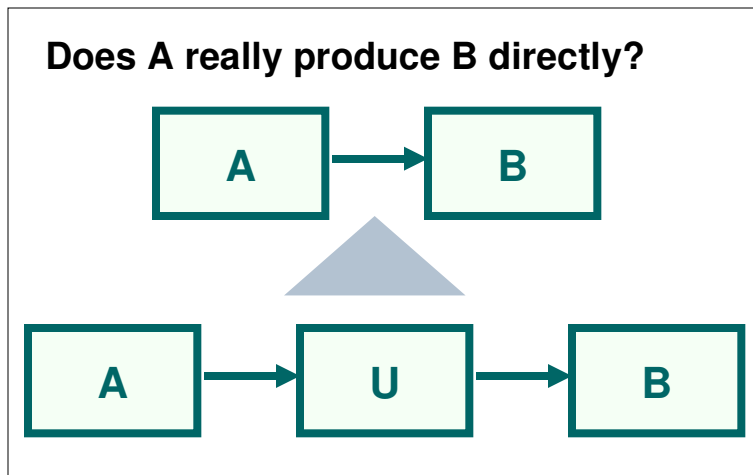
The innovation shadow-self



Our options expand as we add knowledge

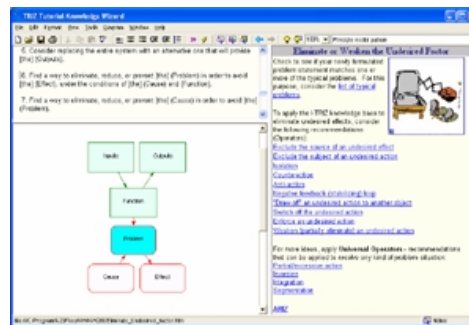
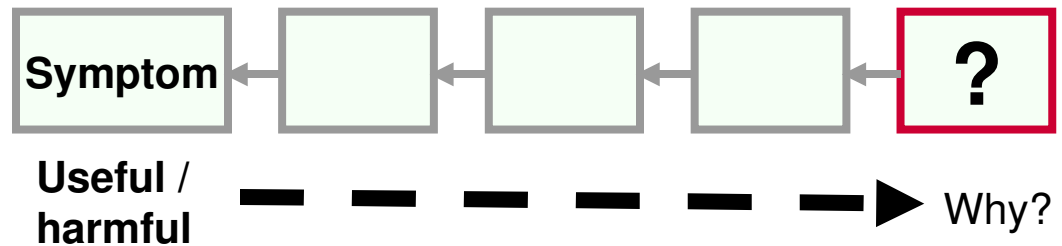
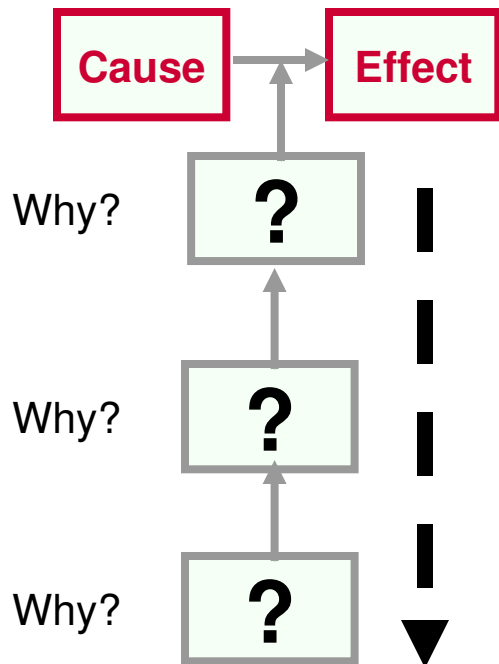


Innovation expands by asking questions, e.g.

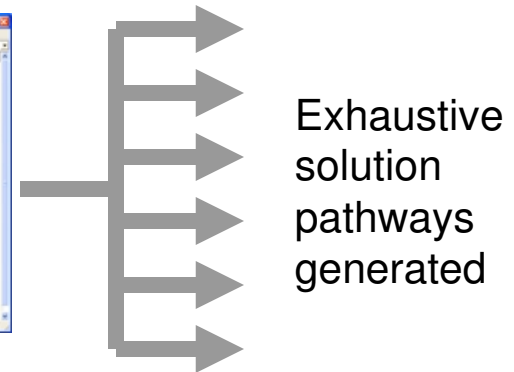


Lateral thinking and systematic methods are complementary

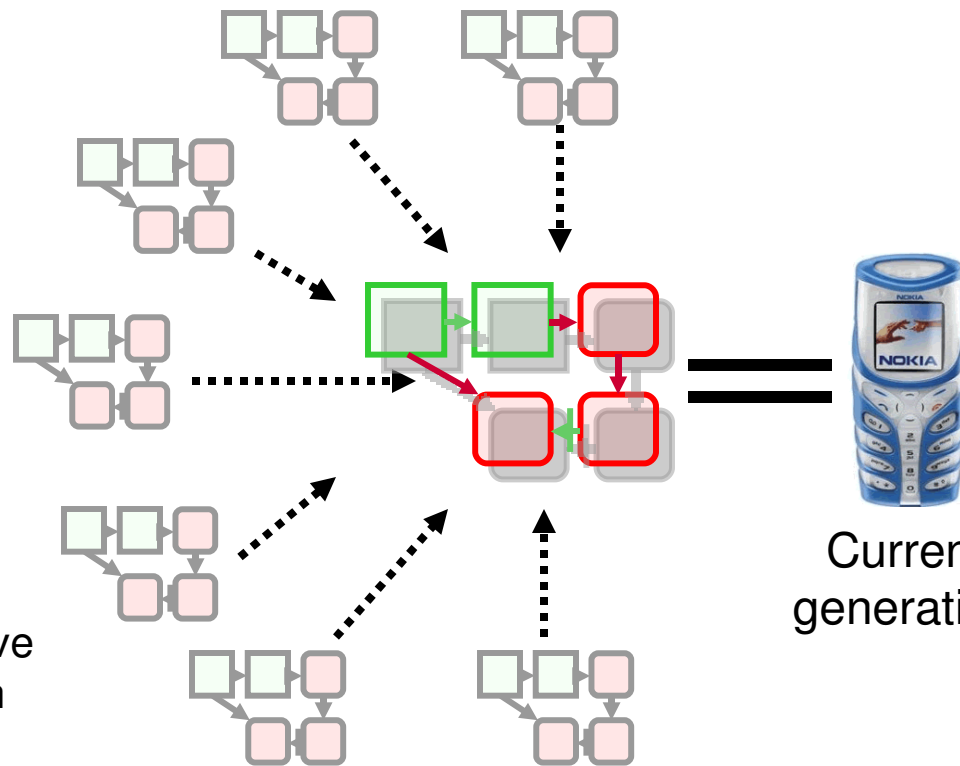
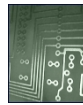
Example technique:
Five Whys



Formulator expands intellectual property



An alignment of many models is required

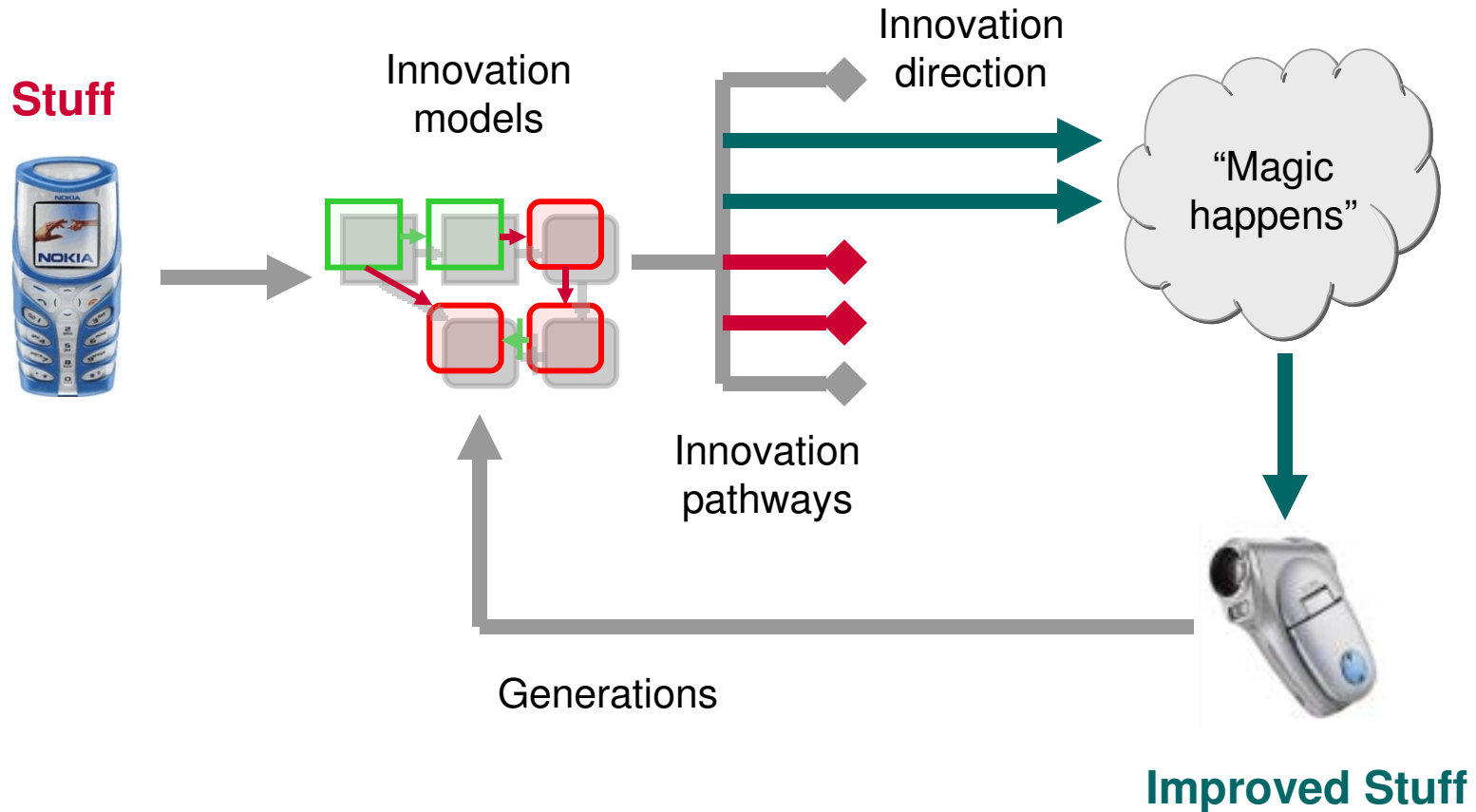


Aspect innovation models

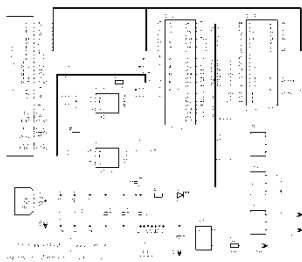
Current generation

Perspective innovation models

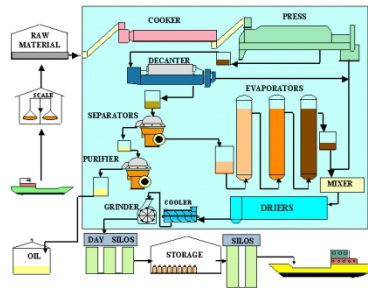
The high level innovation process looks like this



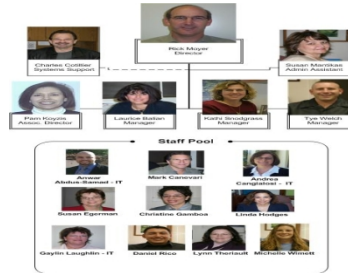
We must improve everything always



Engineering design



Process design



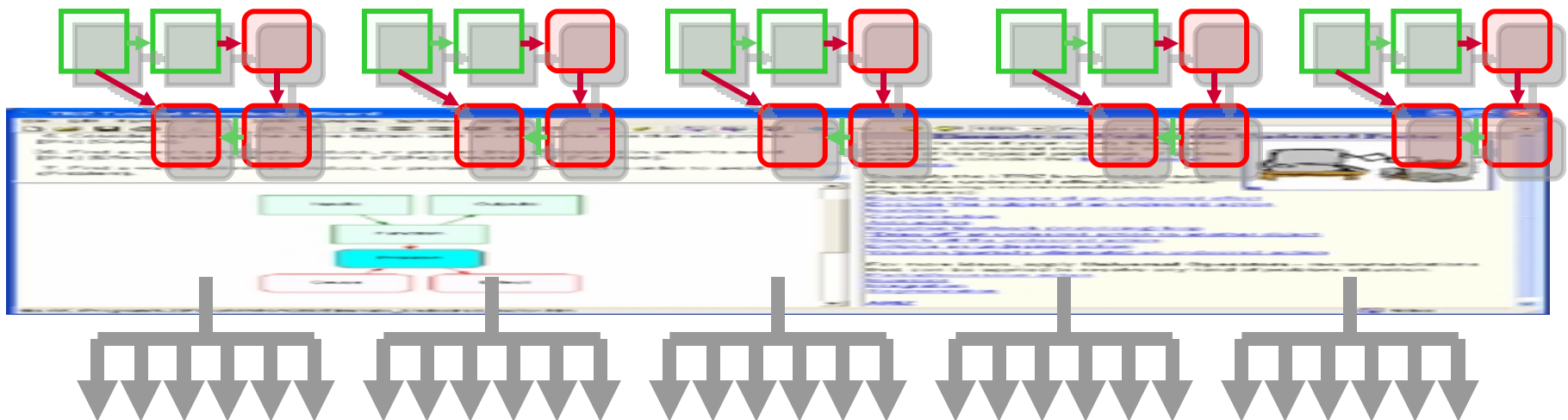
Organizational design



Production design



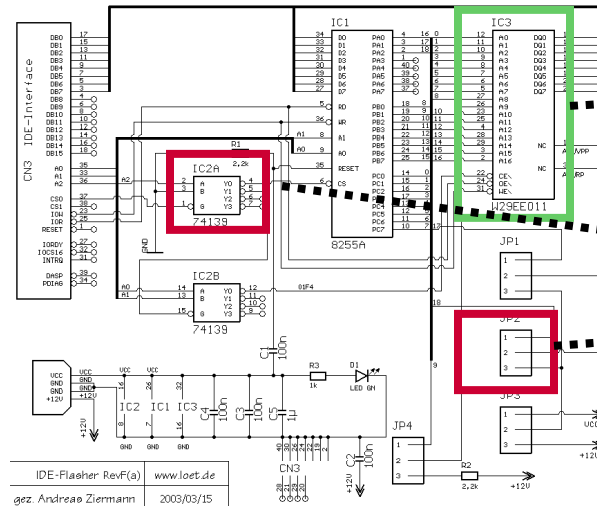
Operations design



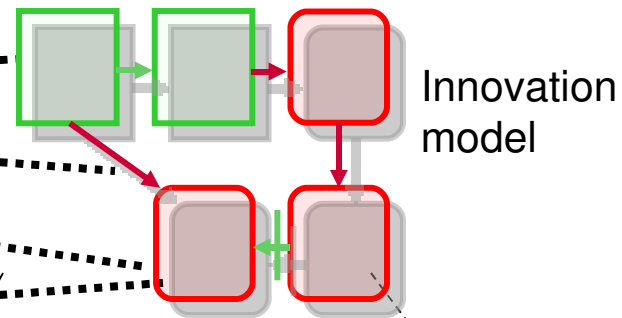
Improvement, renewal, replacement

We can open existing intellectual property to innovation

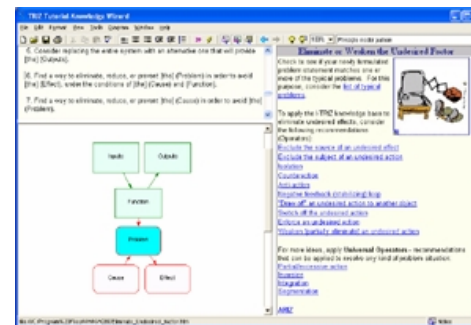
Schematic, document, etc.



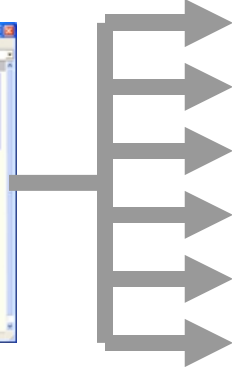
Innovation mark-up



Innovation model

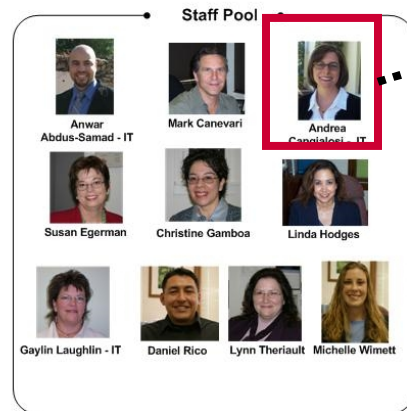
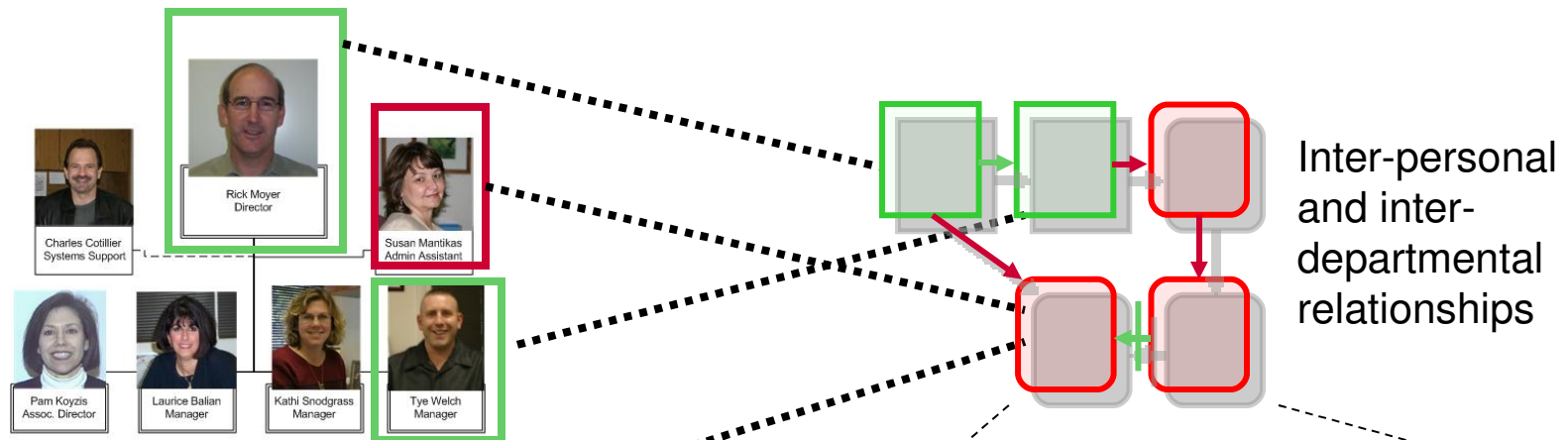


Formulator



Innovation pathways

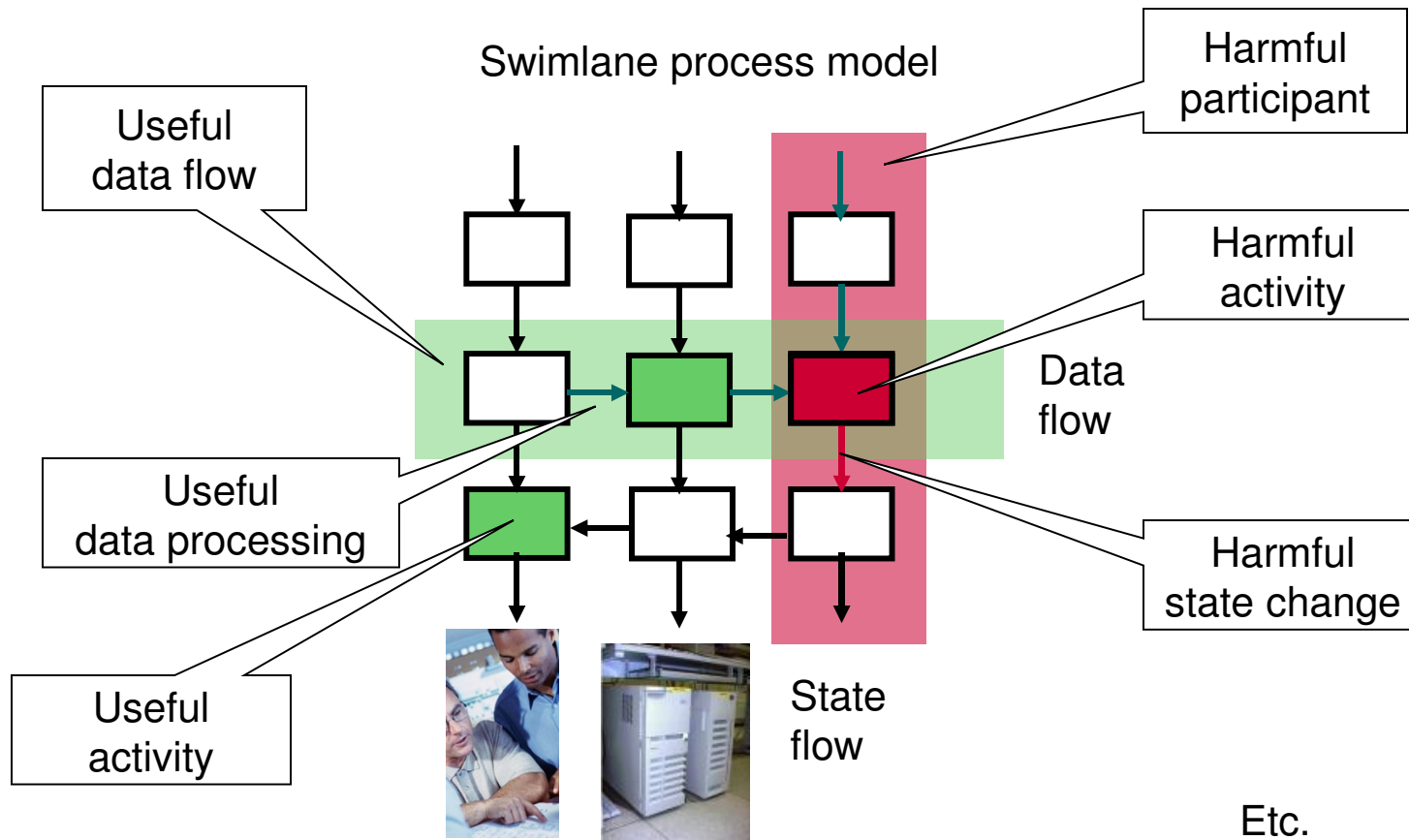
We can mark-up any artefact to create innovation



Org chart innovation mark-up

3. Find a way to protect [the] (Direction) from the harmful influence of [the] (Mid Management).
 - 3.1. Try to compensate for the harmful influence of [the] (Mid Management) towards [the] (Direction).
 - 3.2. Try to reduce the sensitivity of [the] (Direction) to the harmful influence of [the] (Mid Management).

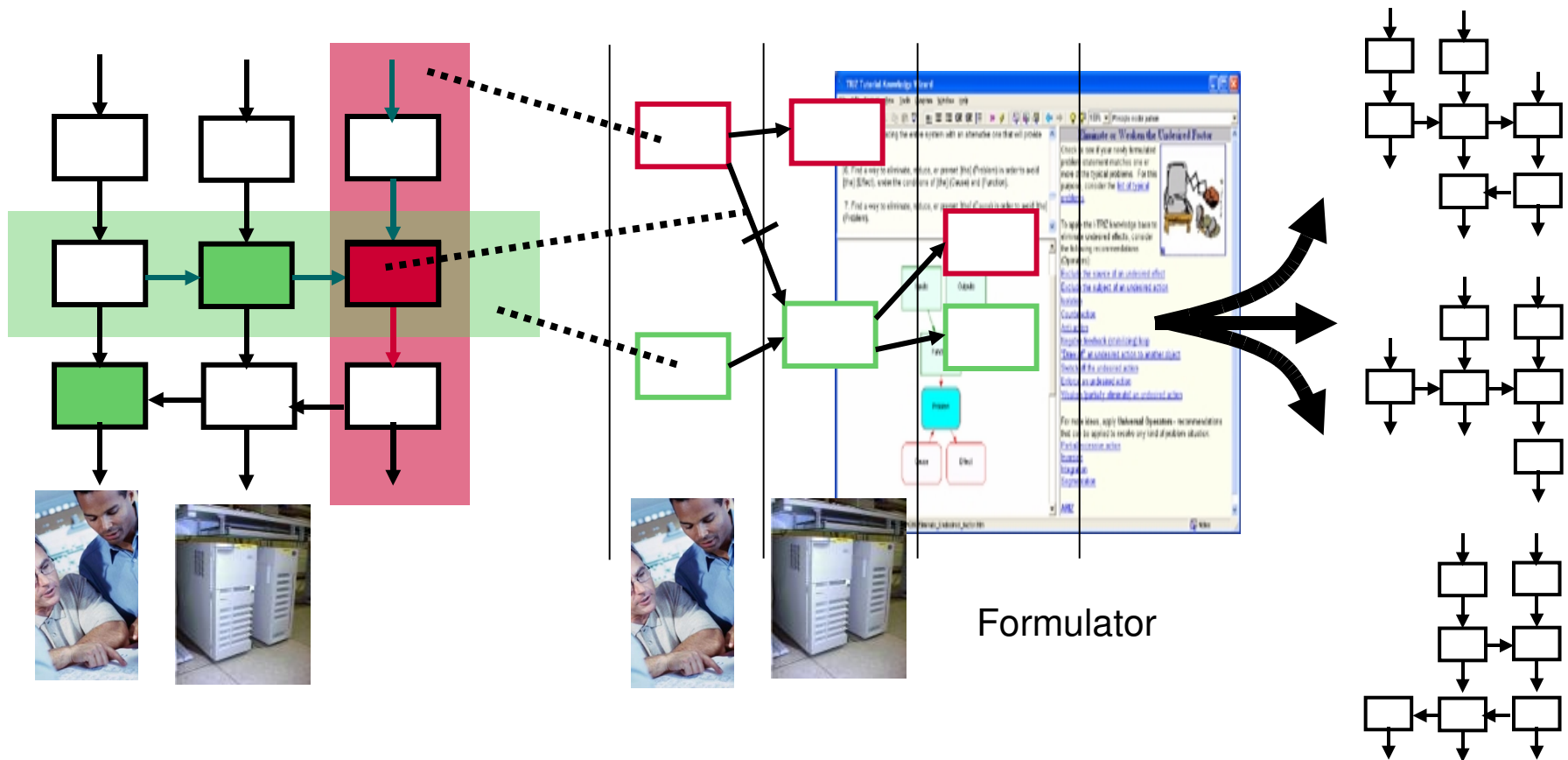
Processes can also be analyzed for innovation





... opening pathways to alternate process designs

“As Is” Process model → Innovation model → Reengineering options

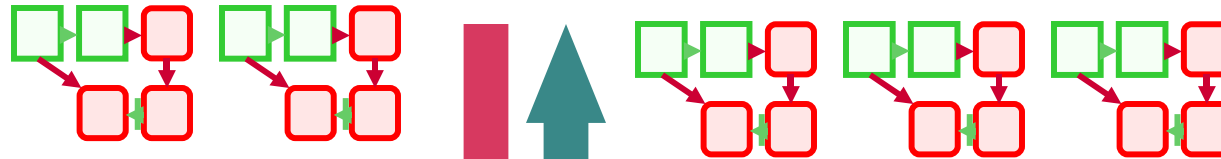
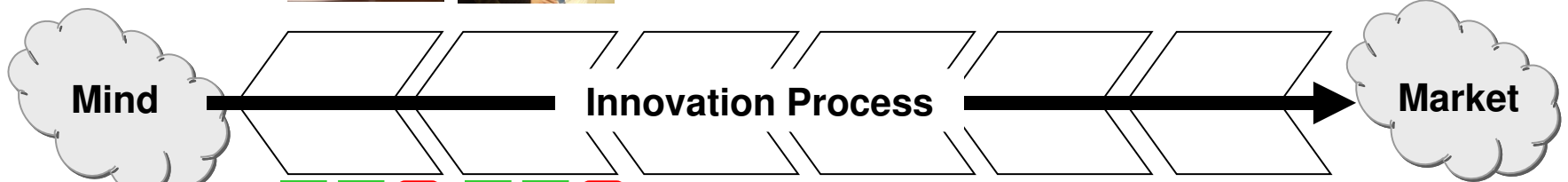


The innovator is a problem solver

Resources few
Projects many



Projects few
Resources many

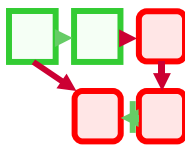


Problem

Solution



Improved Stuff



Delivered Stuff

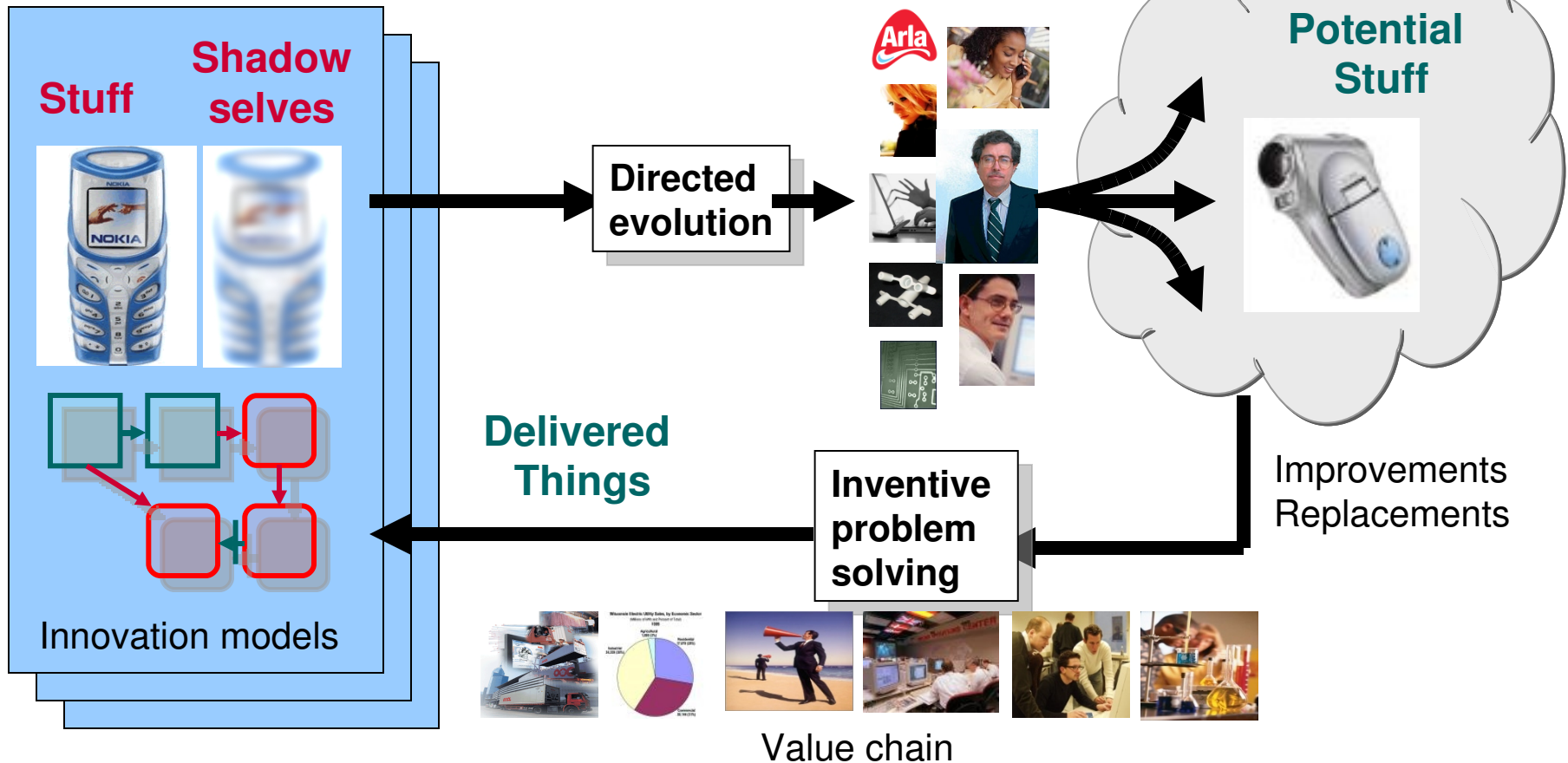


Technical feasibility ... Market feasibility ... Manufacturing feasibility ... Delivery feasibility

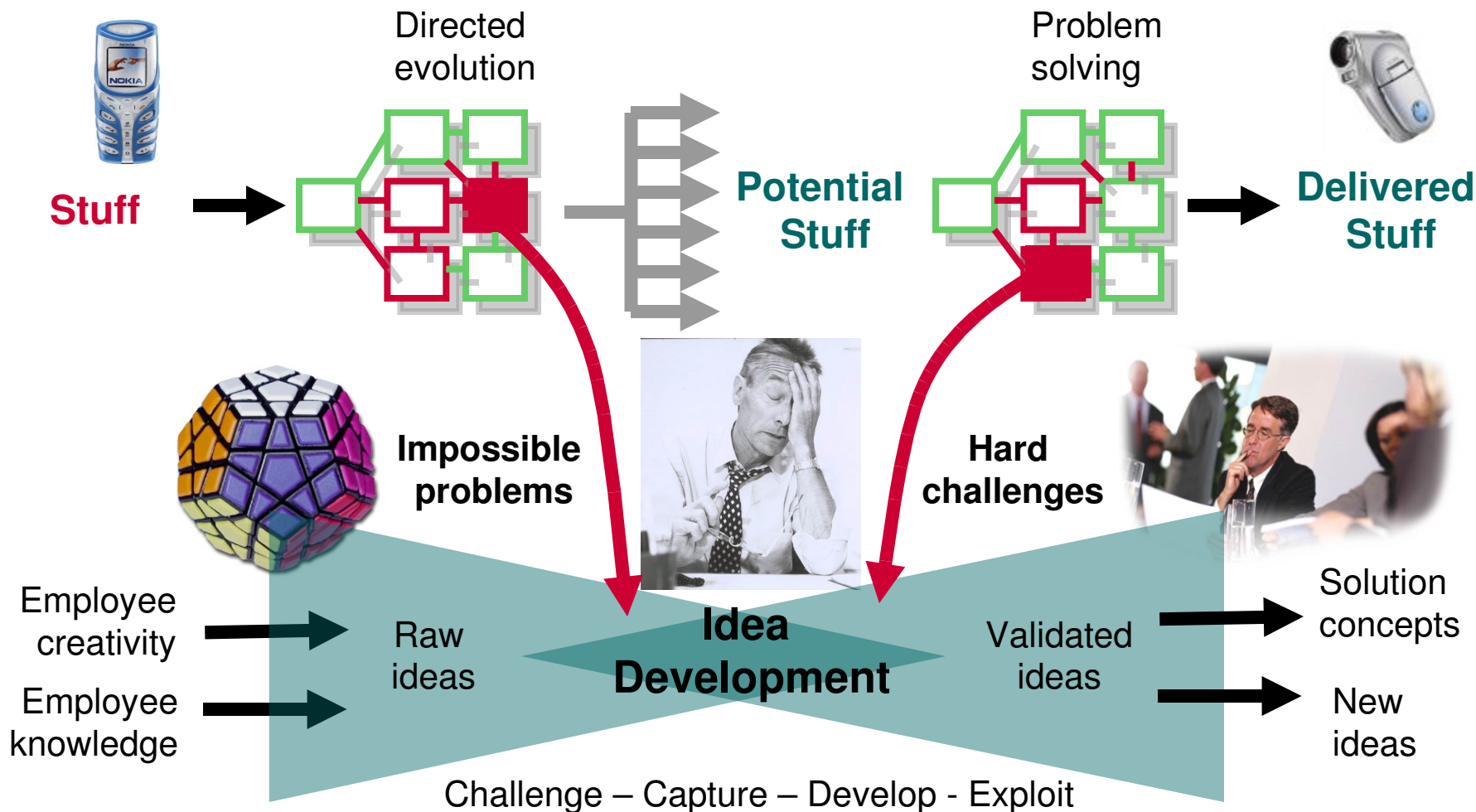
The expanded innovation process

Current product & service portfolio

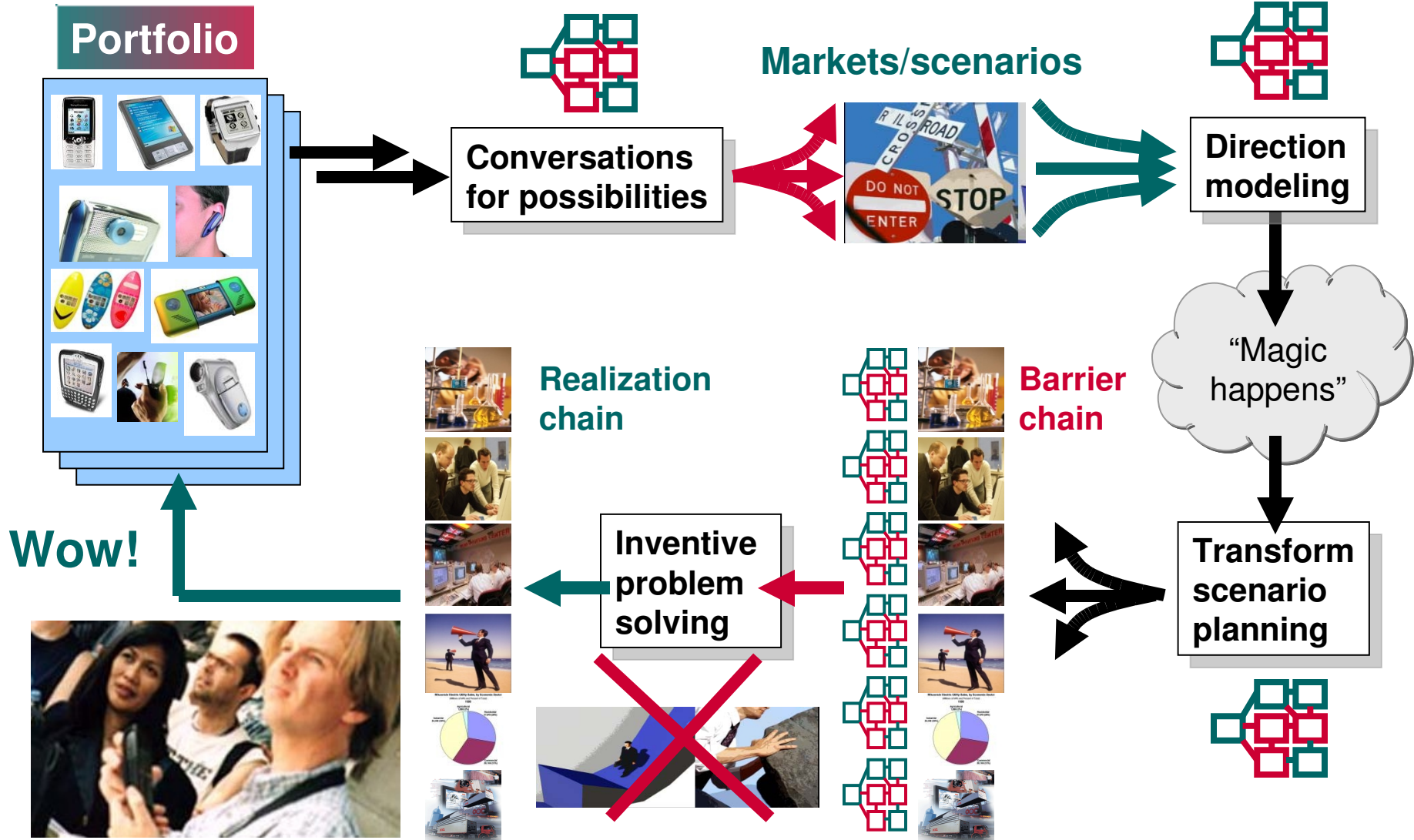
Aspects & perspectives



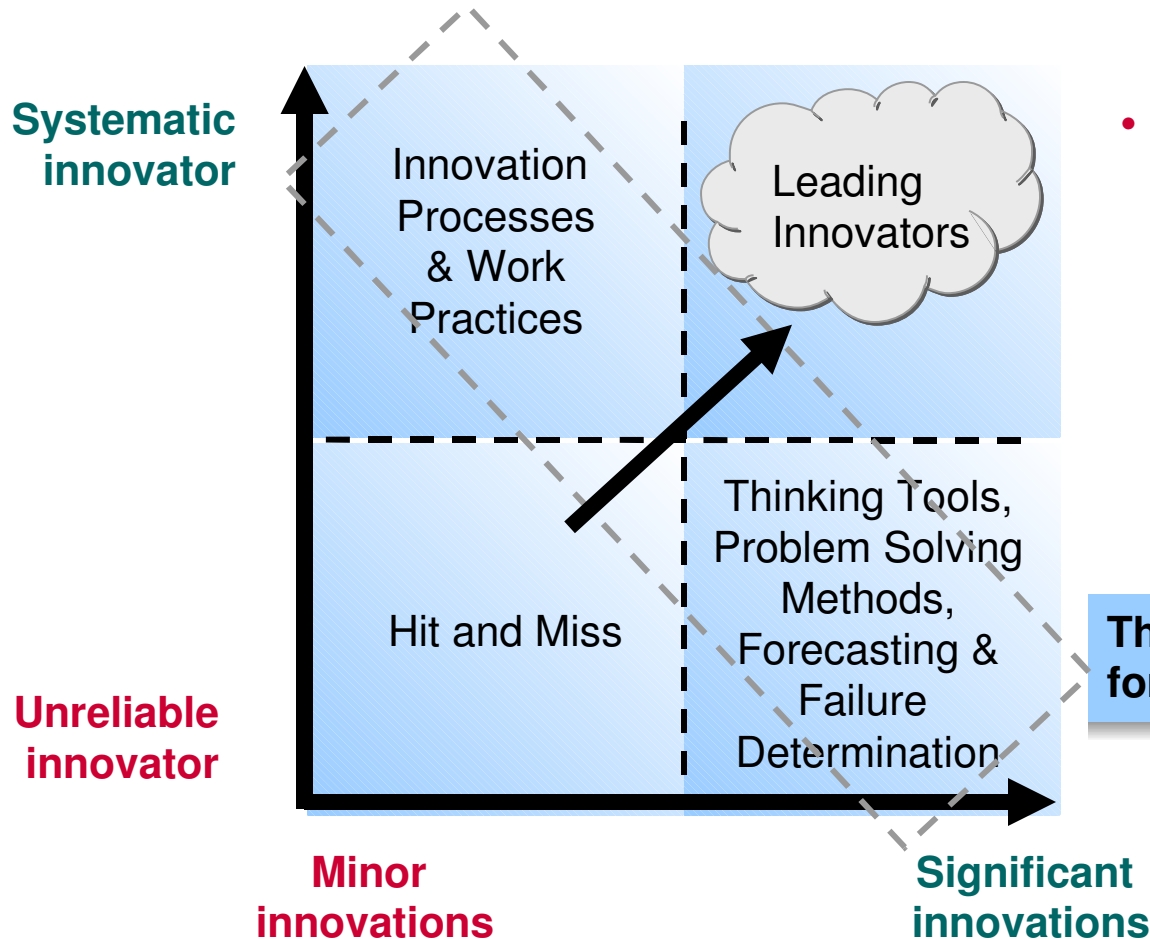
Because we are talent limited, it's all hands to the pump



We can also innovate the portfolio



We must also improve innovation

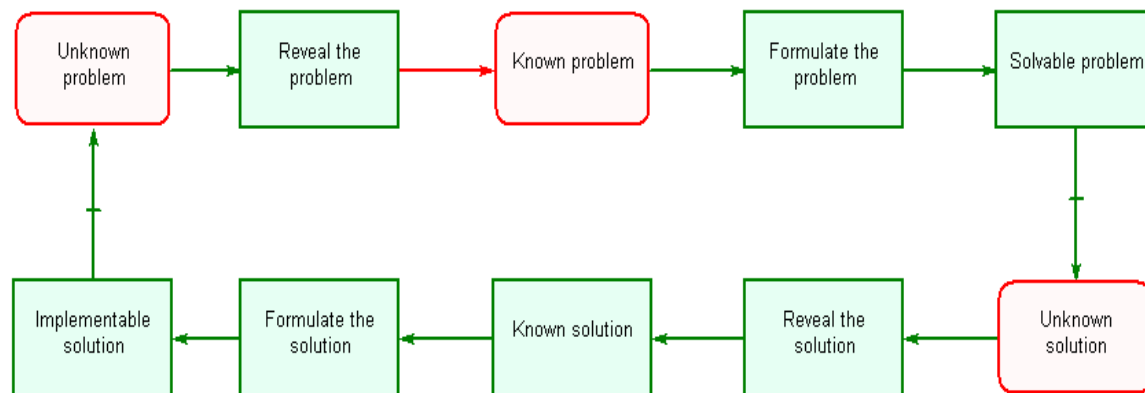
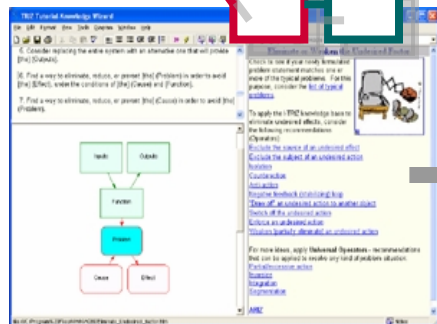
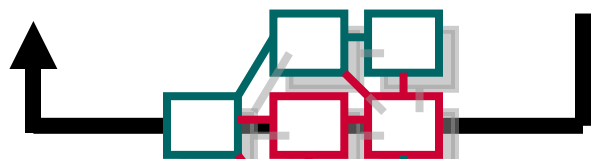


- Tautology: Leading innovators continuously strive to improve their capability to innovate
 - How?
 - By solving problems

Innovation can create improved innovation process

Innovation Process

Innovation Process

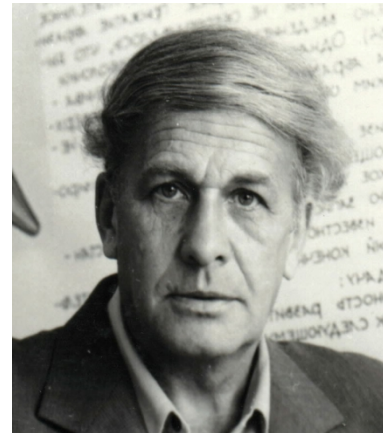


Example

A next generation inventive problem solving process created using TRIZ

The roots of systematic innovation should be acknowledged

- Genrich Saulovich Altshuller
- Father of TRIZ
- Controlling and predicting innovation
- 15 October 1926 – 24 September 1998



- Boris Zlotin and Alla Zusman
- TRIZ masters and inventive methodologists
- Pioneering the foundations for the development of a modern TRIZ methodology
- Ideation International

A fool with a tool is still a fool, and better tools are needed - leading to a convergence of innovation methods

5. Consider replacing the entire system with an alternative one that will provide [the] (Outputs).

6. Find a way to eliminate, reduce, or prevent [the] (Problem) in order to avoid [the] (Effect), under the conditions of [the] (Cause) and (Function).

7. Find a way to eliminate, reduce, or prevent [the] (Cause) in order to avoid [the] (Problem).

Eliminate or Weaken the

Check to see if your newly formed problem statement matches one of more of the typical problems. For purpose, consider the [list of typical problems](#).

To apply the I-TRIZ knowledge to eliminate undesired effects, consider the following recommendations (Operators):

- [Exclude the source of an undesired effect](#)
- [Exclude the subject of an undesired action](#)
- [Isolation](#)
- [Counteraction](#)
- [Anti-action](#)
- [Negative feedback \(stabilizing\) loop](#)
- ["Draw off" an undesired action to another object](#)
- [...](#)
- [...](#)
- [...](#)

Universal Operators - recommendations
 Give any kind of problem situation:

file://C:/Program%20

ARIZ

Notes

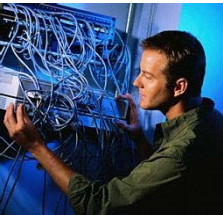
Solution directions generated by the tool's traversal of the model

Hypertext of 'TRIZ operators' (solution patterns) with examples

TRIZ model showing causal relationships between functions of the thing being improved

Ideation's 'Knowledge Wizard' – A basic TRIZ support tool

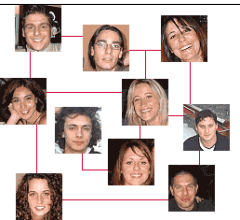
The scope of innovation is broad



Technical Systems:
Machine, device, equipment, manufacturing process, process related to design, utilization of materials, etc



Intellectual Systems:
Religious and philosophical concepts, scientific theories and hypotheses, arts, etc



Social Systems:
Various groups of people, organizations and associations, management systems, business processes, legal systems, etc



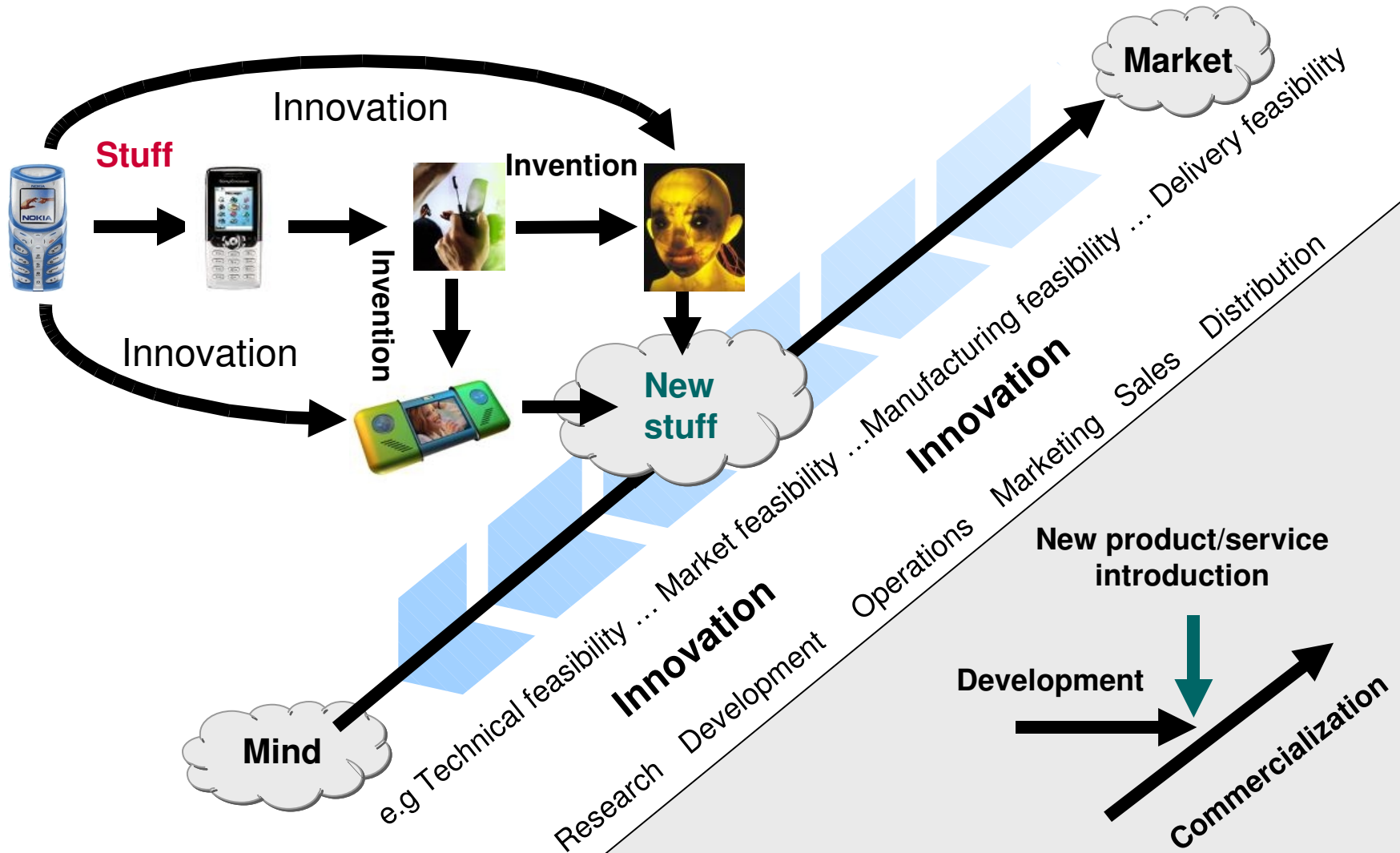
Service Systems:
Education, medicine, information technology, entertainment and related processes



Science, engineering, products, services, processes, business, info tech, finance



So innovation is more than just a good idea





EXPERIENCE. RESULTS.

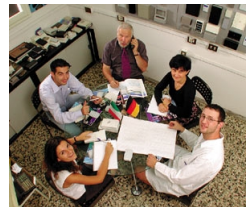
Remember... stuff can be:



Products



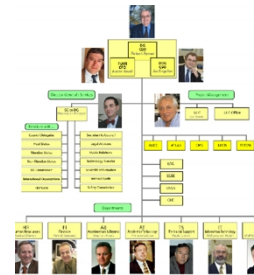
Services



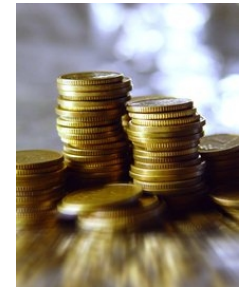
Solutions



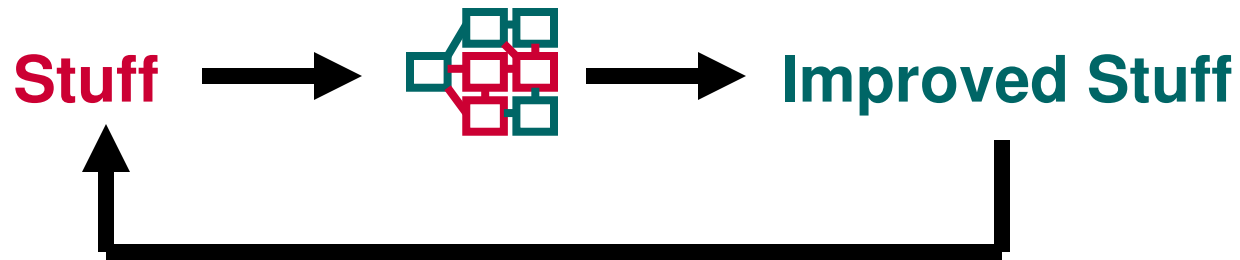
Processes



Organizations



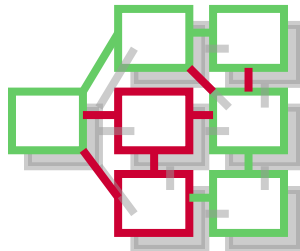
Ideas



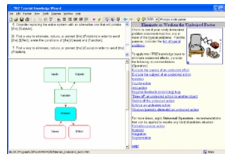


So what's this “magic happens” stuff?

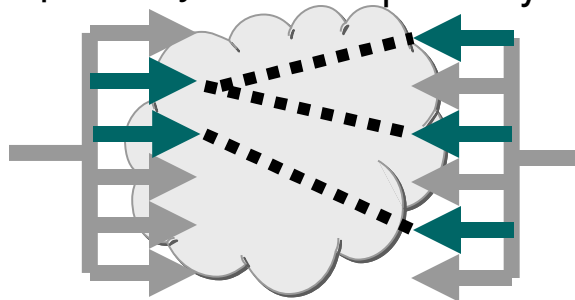
Impossible problems



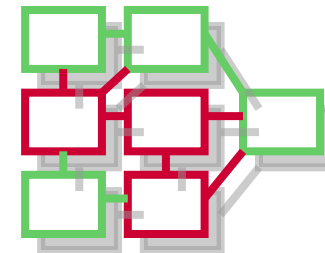
Problem mark-up



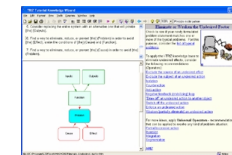
Solution pathways



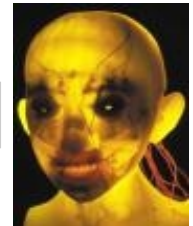
Problem pathways



Solution mark-up

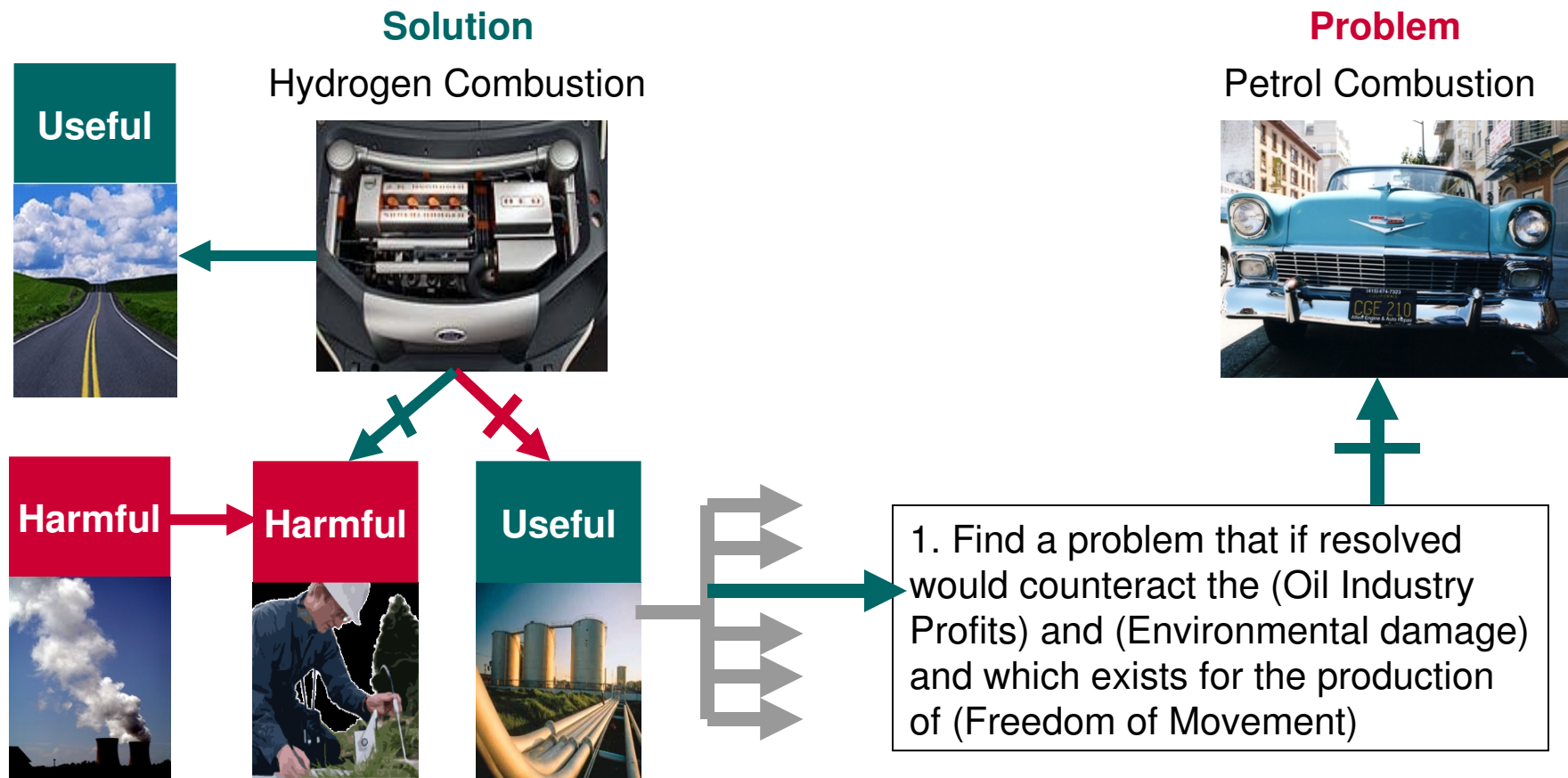


Unlikely solutions



Combinatorial innovation

The same models can describe solutions leading to problem-finding pathways

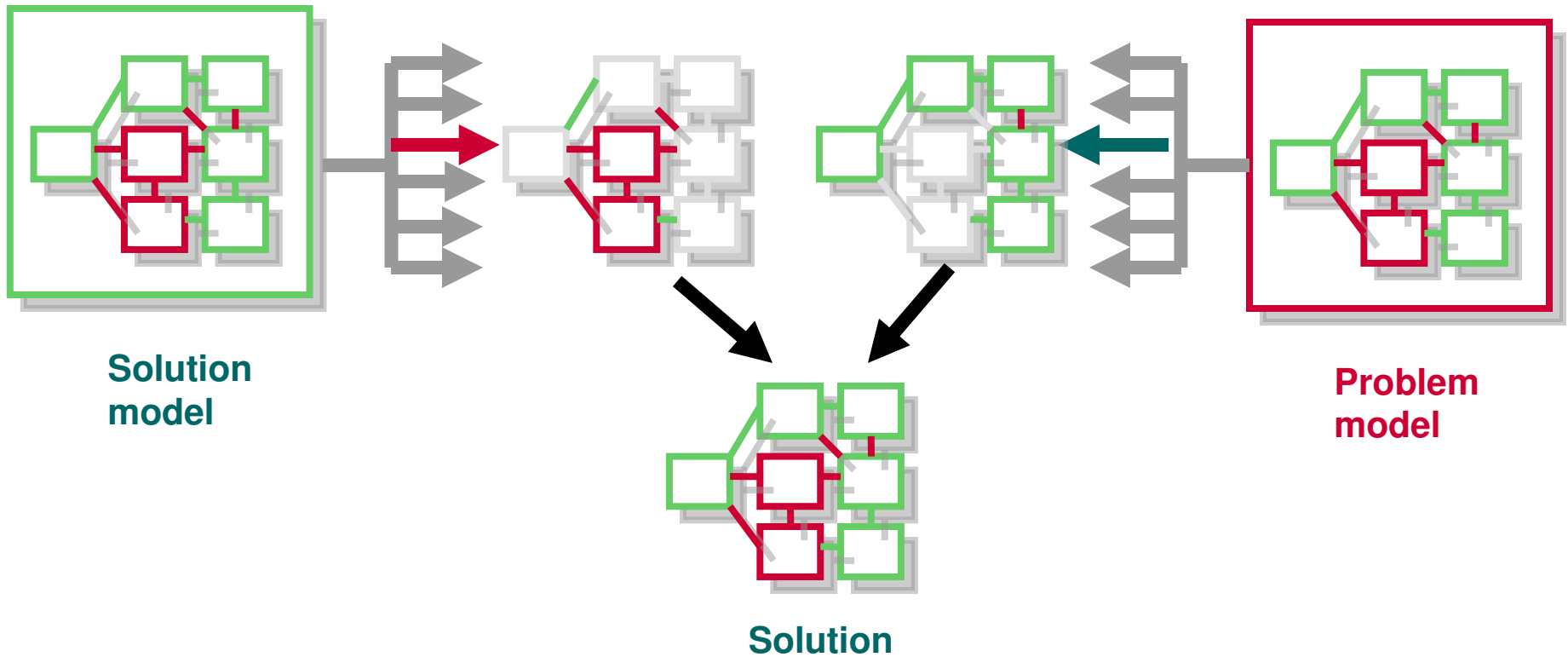




The next generation of knowledge management for innovation

Problem-finding pathways

Solution-finding pathways



(I.Q. = Innovation Quotient)



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IQ test: tick the boxes that apply to your company

- The value in your industry is shifting from perfecting the old, towards inventing the new, in processes, products and services.
- Even when you take on significant new contracts, vast amounts of new work or hundreds of new orders, your share price won't budge.
- You are certain that reducing development time, production costs, and product price by 15 per cent would make your firm and your product a winner.
- It seems that the innovation efforts in your organization are not systematic enough, and are based on chance flashes of genius or ad-hoc ideas raised by individuals in skunk works projects.
- You sense that your R&D staff members are sated and have settled into complacency, and the flow of ideas is not what it was.
- Your company has an excellent product that, "if we could only solve that problem", would conquer the world.
- You feel you are nearing the end of a long and expensive development race and your competitors are about to pass you by and win a valuable brand name and profitable chunks of the market before you are able to act.
- Despite all the consultants, ISO standards and best practices you deploy, the cancer of "it'll be okay", and of undirected improvisation, has taken a grip on your firm, and this is something you are unwilling to accept.

More ticks means more need to improve your operating system for innovation

Read about innovation



"Taking an idea and turning it into cash is an effort that involves almost every part of a company and the participation of all employees."

"What is innovative about innovation today is the realization that it can be done systematically, and that the innovator is an obsessive problem solver."

The Innovator Is A Problem Solver

What Innovation Is



**White paper
38 pages**

"TRIZ looks at innovation as the result of systematic patterns in the past evolution of systems, and includes descriptions of hundreds of such patterns."

"A fool with a tool may still be a fool, but talent without the means for execution lies dormant. Unless the individual, team, or company is solving problems, they are not innovating."

Questions?

<http://howardsmith.editme.com>

<http://www.southbeachinc.com>



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