



## **Exploring the Opportunity Space**

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<http://www.concept.ntnu.no/english/>

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## Recent case studies

- Perverse incentives and public investments
- Use of carbon prices in cost-benefit analyses
- Cost (under)estimation up front
- Non-monetized impacts in economic analysis
- Decision making during the front-end phase
- Logical minimalism and major decisions
- Sustainability and public investments
- Application of a minimal evaluation procedure
- The opportunity space and choice of conceptual solutions

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## Analysis and decision making: There are different degrees of complexity

- **The obvious** - causality is obvious to all, we can apply *best* practice.
- **The complicated** - causality requires analysis/expert knowledge, we can apply *good* practice.
- **The complex** - causality can only be perceived in retrospect, we can merely sense *emergent* practice.
- **The chaotic** - there is no causality at systems level, we can only try to develop *novel* practice.

(Snowden, 2000)

Predictability	High	<b>Obvious</b> apply best practice	<b>Complicated</b> Apply good practice
	Low	<b>Complex</b> Identify emergent practice	<b>Chaotic</b> develop novel practice
		High	Low
		Causality	

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## The degree of complexity dictates which approach to use up front

Known means	Programming (The obvious)	Negotiation (The complicated)
	Experimentation (The complex)	Clarification (The chaotic)
Unknown means	Goal agreement	Goal disagreement

(Christensen, 1985)

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## And our ability to solve complex problems is restricted

The concept of bounded rationality acknowledges that human abilities are fallible and limited, information is never perfect, and money and time add limits

- **The *optimizing model***, seeking the best or optimal solution.
- **The *satisficing model***, seeking a solution that will work well enough for dealing with the situation



Decision making is defined as a search process guided by aspirational levels

(Simon, 1960)

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## The outcome is also shaped by decision logics

- **Instrumental:** key decision makers have strong opinions about the perceived most viable conceptual solution
- **Institutional:** decisions are guided by institutional norms and practices, past experience (path dependency), etc.
- **Environmental:** decisions are affected by external events or determinants
- **Accidental:** decisions are affected by shifting problems, solutions, and decision makers (garbage can logic)

(Whist/Christensen, 2011)



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## But regardless of such worries - Quality at Entry (QaE) matters

$QaE = f(\text{identification, preparation, appraisal})$

- A large majority of the projects that were well prepared up front had a satisfactory outcome
- The majority of projects that were inadequately prepared turned out to be unsuccessful

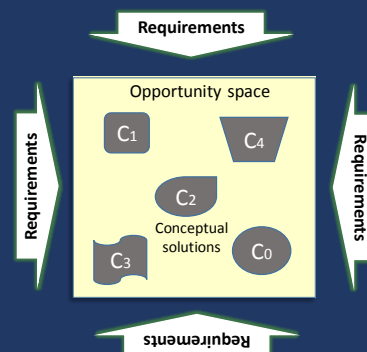
	Adequate QaE	Inadequate QaE
Satisfactory outcome	80 %	35 %
Un-successful	20 %	65 %

World Bank 1998, (n=1125)

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## The Norwegian QA Scheme: An early systems analysis to ensure Quality at Entry

1. **Needs assessment:** mapping stakeholders' needs and preferences as compared with societal needs
2. **Strategy analysis:** based on the needs assessment, defining societal and effect goals for the project
3. **Overall requirements:** clarify conditions to be met; with focus on overall functionality, not technical solutions and details
4. **Opportunity space:** identify alternative conceptual solutions. It is imperative that this space is not defined too narrowly
5. **Alternatives analysis:** analyze the feasibility of alternatives and the zero option, including an economic analysis
6. **Conditions for the pre-project phase:** outline an execution strategy for the recommended alternative.

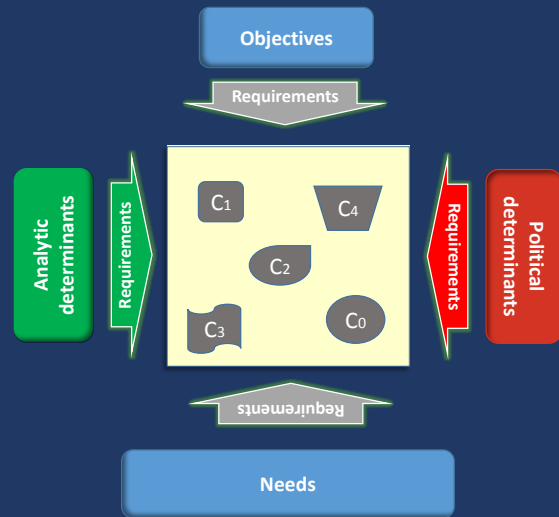


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## The opportunity space

- Requirements should not restrict the choice of technology etc. to only allow a certain type of conceptual solutions
- There should be at least two conceptually different solutions
- The Zero option alternative should be analyzed to the same depth
- The aim is to broaden the analyses to identify viable alternatives and exclude non-viable ones
- Ultimately, the main purpose is to stimulate a culture and practice that explores alternative concepts to a greater extent.

(MoF, 2006)



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## Example: The Stad Shipping Tunnel

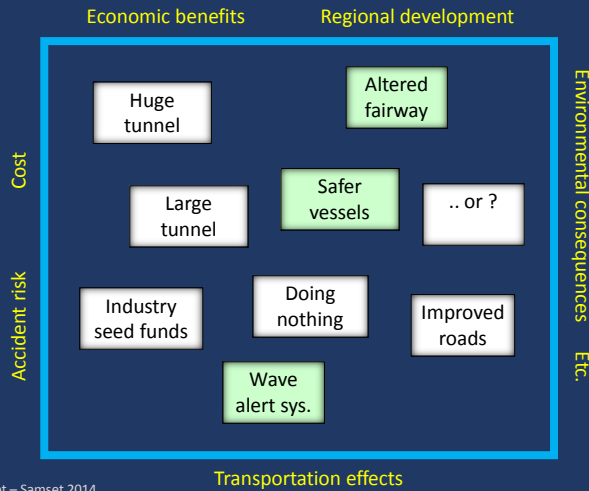


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An enormous tunnel, which would make it possible for large ships to avoid the rough seas in bad weather, outside a stretch of coastline of four kilometers



## Example: The Stad Shipping Tunnel



### Requirements:

- Should focus on economic, societal and environmental effects and not the technical aspects of the conceptual solutions (MoF)

### Observations:

- Requirements were restricted to one conceptual solution only (shipping tunnel):
  - Biological (water quality, organic organisms, biotopes)
  - Local effects (Air quality, noise, cultural heritage sites)
  - Legislative aspects (not specified)
  - Tunnel specific aspects (dimensions, lining, etc.)

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## Example: The Stad Shipping Tunnel

	Economic benefits	Regional development	Environmental impact	Accident risk	Investment cost	Migration
Zero option	0	0	0	0	0	0
Huge tunnel	Negative	?	Considerable	Some	Very high	0
Large tunnel	Negative	?	Considerable	Some	Very high	0
Altered fairway	Moderate	0	0	Improved	0	0
Wave alert system	Moderate	0	0	Improved	Low	0
Seed funds	Moderate	0	Some	0	Moderate	Positive
Road tunnels	Considerable	Positive	Considerable	Improved	High	Positive

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# A case study on how the opportunity space was defined and utilized in a selection of project appraisals (PA) and quality assurance (QA) reports

Projektnummer	Projektnavn	Sektor	År	Ansatt	Ansatt type	Offentlig	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings	Utviklings						
4	1 86 Nybygg Veterinærhøgskolen	A	2006	Doerre	x	ja	x	Utvikl	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
5	2 78 Nasjonalbudsjettet	A	2006	Terrestre	x	ja	x	Utvikl	1	1	1	1	0	1	0	0	1	0	0	0	0	0	0	0		
6	3 74 Færdiggjøring av kyst- og havneanlegg	F	2007	Utdre	x	ja	x	Utdre	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	
7	4 101 Landbruksinvesteringer i distrikter	F	2007	Melior	x	ja	x	Utdre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8	5 100 Bolleforflytning	S	2007	Melior	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
9	6 113 Høgskolen i Molde	S	2008	Utdre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
10	7 104 Mekaniserte brigader	F	2008	Doerre	x	Utdre	Utdre	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
11	8 118 Dobbeltrussel Avne- og Arvattunell	S	2008	Doerre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
12	9 Videregående skole i Båre	S	2011	Melior	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
13	10 165 Modernisering av IKT i Nidar	A	2011	Melior	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
14	11 162 Transportmidler i Tromsø	S	2011	Doerre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
15	12 Sted og tur	A	2012	Utdre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
16	13 173 Anlegg for livsvitenskap	A	2012	Doerre	x	ja	x	Utdre	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	14 183 Nasjonal innarbeidingskap	A	2012	Utdre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
18	15 170 Helse og sosialtjenesteproduksjon i Midt-Norge	S	2012	Utdre	x	ja	x	Utdre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
19	16 177 Et Merkevareprodukt - Ballangen	S	2012	Utdre	x	ja	x	Utdre	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
20	17 179 Alnabru Goddortunell	S	2012	Terrestre	x	ja	x	Utdre	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
21																										
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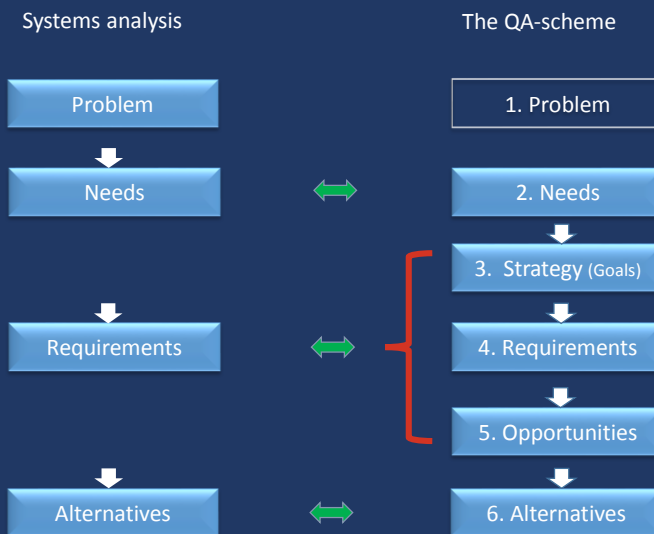
### Sample

- 17 projects
- Transport/Defense/Others

### Scope/focus

- Needs
- Goals
- Requirements
- Opportunity space
- Alternatives

## The sequence of analyses



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## 1. The problem analysis

The problem is not	The problem is
The absence of pesticides	That crops are infested with pests
That the frigates are too old	That the defense system is weakened in one area
The lack of a shipping tunnel	<ul style="list-style-type: none"> <li>• Safety at sea</li> <li>• Regularity of sea transport</li> <li>• Damage to the cargo</li> <li>• etc.</li> </ul>

### Requirements:

- ❑ A separate analysis of underlying problems or a root cause analysis is not explicitly required

### Observations:

- + Needs were commonly interpreted as the absence of one specific solution to a problem, thus restricting the options that could be considered.
- There is a need for an initial problem analysis to establish the root causes and allow all relevant options to be considered

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## 2. The needs analysis



### Requirements:

- ❑ Should include a stakeholder analysis
- ❑ Should assess relevance in relation to societal needs

### Observations:

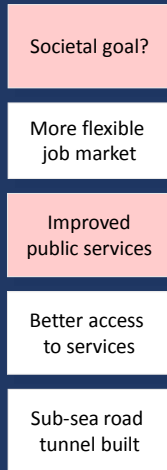
- + The needs analyses and stakeholder analyses were generally of good quality
- The main focus, however, was only on the key stakeholders and the users
- Only half of the reports had a thorough analysis of overarching societal needs

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### 3. Strategy analysis

Example:

The project will give island and mainland communities increased access to **services** and more flexible **employment opportunities** by linking them together with a **ferry-free connection**.



Requirements:

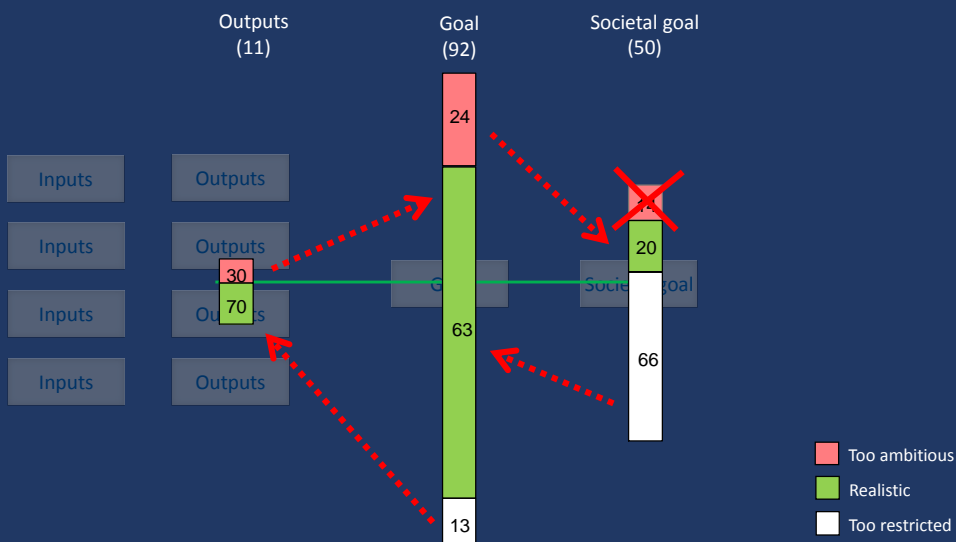
- Should define the goals on the basis of the needs analysis
- For the society: societal goals, for users: outcome

Observations:

- + In most projects, the goals were consistent with needs
- Much remains to be done to ensure clear goals, and at a reasonable level of ambition
- In many cases, the societal goal was unrealistically ambitious

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### Analysis of PA/QA documents (n=16)



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## 4. Requirements

Example: National tugboat preparedness:

1. The number of accidents due to vessels adrift should not exceed the current level or be reduced.
2. Amount of emissions from vessels adrift should be reduced.
3. The number of injuries should be reduced.
4. Total economic losses from damage to the vessel and cargo should be reduced.
5. The operating model for towing preparedness should be predictable.
6. The measure will comply with current payment and working conditions.
7. The measure will abide by applicable laws and regulations.
8. The ship must have traction to tow a casualty
9. The vessel must have a stability which ensures that the ship does not capsize because the tow

Requirements:

- The requirements should be focused on performance and effects
- They should not be project specific but related to societal aspects

Observations:

- + Requirements were treated thoroughly in the documents.
- Most requirements, however, were restricted to technical and functional aspects.
- Requirements narrowed the window of opportunities too much in half of the projects

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## 4. Requirements

Example: National Museum of Art and Culture

1. Co-location of public and exhibition functions
2. Co-location of all functions of the National Museum
3. Facilities for the public with reception, changing rooms, café/restaurant and shop facilities
4. Education and communication
5. Library / Documentation and engravings collection
6. Exhibit space
7. Storage and operation space
8. Magazine
9. Conservation / restoration, workshops and photo / film Administration offices

Requirements:

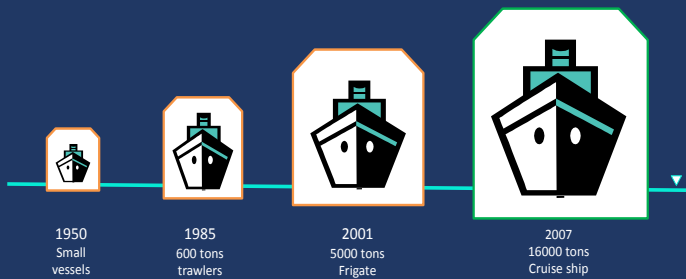
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## 5. Alternatives analysis



### Requirements:

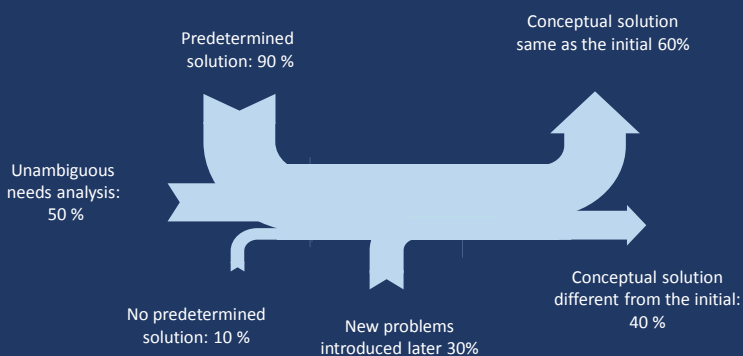
- The analysis should comprise the zero option alternative and at least two conceptually different alternative solutions

### Observations:

- + The analyses were generally comprehensive and all reports identified several options.
- However, the tendency is that the window is defined too narrowly.
- The options are sub-optimized solutions of the same concept and the best concept may not be identified

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## Some observations



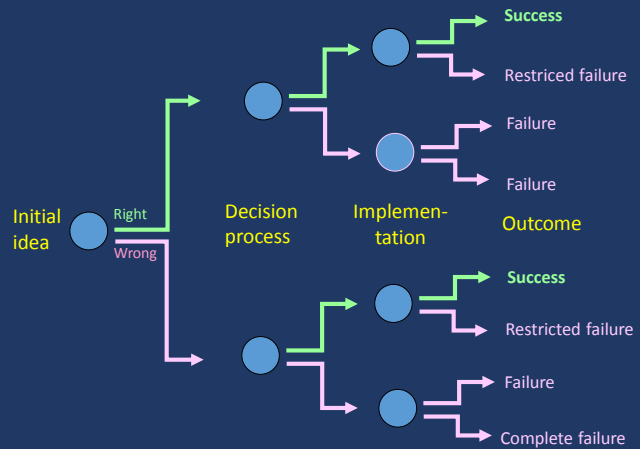
(Whist/Christensen, 2011)

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- ❑ There was not sufficient balance between the overall societal and the detailed project-specific
- ❑ The terms “opportunity space” and “alternative conceptual solutions” were used only rarely in the PA and QA reports
- ❑ The quality of the PA reports varied. Analyses in the transport sector were generally of good quality
- ❑ In half of the projects the opportunity space was too restricted to allow for conceptually different alternatives
- ❑ Path dependency: in most projects the alternatives represented a continuation of the same as before

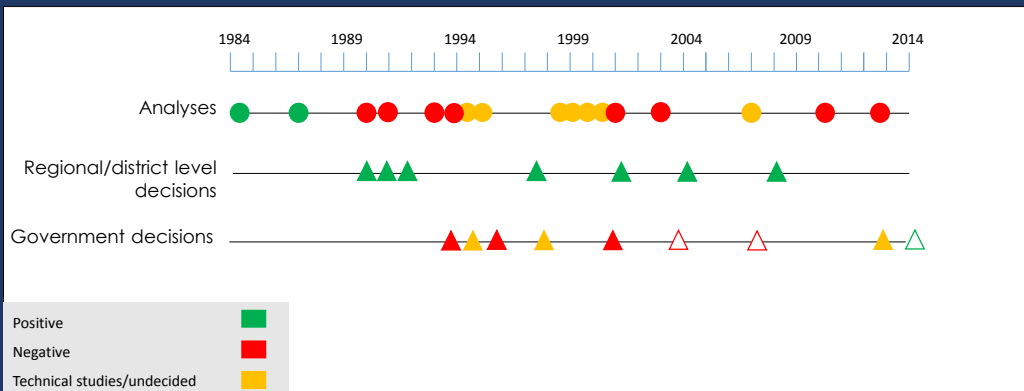
# The final outcome depends on both analysis and decision

The road to success is paved with stumbling stones

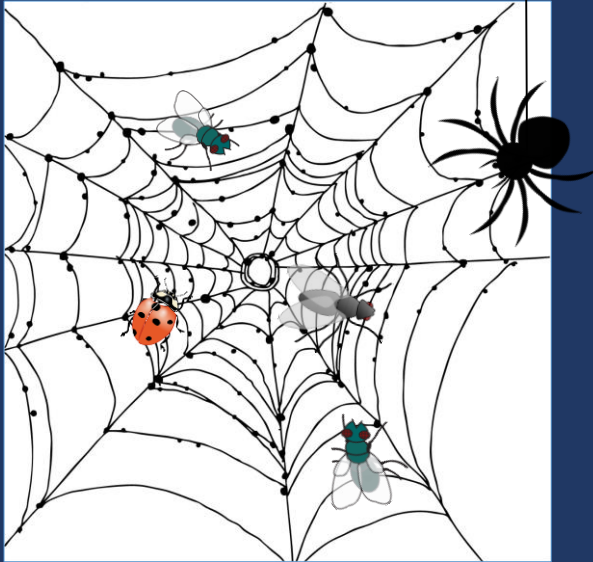


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# Example: a road paved with stumbling stones



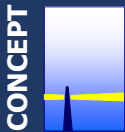
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### Main conclusions:

1. There is considerable room for improvement
2. The challenge is to keep the opportunity space open
3. External quality assurance is a proven means to weed out the worst conceptual alternatives

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Thank you for your attention

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