Systems analysis for problem structuring

*Part 2: the multi-actor perspective*

Wil Thissen, Faculty of Technology, Policy and Management (TPM)
Systems analysis for problem structuring
The multi-actor situation

1. Recapitulation
2. From mono-to multi-actor systems analysis
3. Analysis and interpretation
4. Example: wind power
5. Concluding remarks
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The multi-actor context

- Actor 1
  - Norms
  - Perceptions

- Actor 2
  - Norms
  - Perceptions

- Actor 3
  - Norms, Perceptions

- Actor n
  - Norms
  - Perceptions
From mono- to multi-actor systems analysis

Explore what factors may be influenced by other actors
Explore how use of the means of the problem owner may affect other actor’s interests
Perform the actor-network analysis, identify the critical actors
For the critical actors:
• Identify objectives, criteria, means, causal relations
• Extend the mono-actor analysis
• Iterate and check for consistency!
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Analysis and interpretation

- Common goals?
- Conflicting values?
- Analyse cross-impacts
- Potential for coalitions, arrangements between actors?
- Knowledge gaps?
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Example: Wind Power at Sea
Granting Subsidies

number of new wind farms

size of the windparks

average windspeed at sea

storage capacity

number of international connections

Balance supply and demand of energy

installed capacity at sea

number of new wind farms

scale advantages

Waterdepth off-shore windfarm

investment cost

distance between the windfarm and the connection point at land

Transport costs of the generated energy

Distance to coast

costs of energy provision

security of supply

percentage off-shore power generation

Dep. of Energy (DE) mono-actor diagram
From mono- to multi-actor systems analysis

Explore what factors may be influenced by other actors
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From mono- to multi-actor systems analysis

Explore what factors may be influenced by other actors

Explore how use of the means of the problem owner may affect other actor’s interests

Perform the actor-network analysis, identify the critical actors

For the critical actors:
  • Identify objectives, criteria, means, causal relations
  • Extend the mono-actor analysis
Which actors hold an INTEREST or may be affected?

- Granting Subsidies
- Granting licenses
- Distance to coast
- Investors
- Other users of the Northsea
- Energy companies and R&D agencies

Factors:
- Average windspeed at sea
- Storage capacity
- Number of international connections
- Installed capacity at sea
- Number of new wind farms
- Size of the windparks
- Scale advantages
- Waterdepth off-shore windfarm
- Distance between the windfarm and the connection point at land
- Investment cost
- Transport costs of the generated energy

Key points:
- Balance supply and demand of energy
- Percentage off-shore power generation
- Security of supply
- Costs of energy provision
- Energy companies
- Network administrator 'Tennet'
- Ministry of Infrastructure and Environment
- TenneT

Network administrator 'Tennet':
- Security of supply
- Percentage off-shore power generation
- Costs of energy provision

Ministry of Infrastructure and Environment:
- Costs of energy provision
- Security of supply
- Percentage off-shore power generation
- Security of supply

Energy companies:
- Costs of energy provision
- Security of supply
- Percentage off-shore power generation
- Security of supply

Directly affected:
- Investors
- Other users of the Northsea
- Energy companies and R&D agencies

 '?' indicates uncertainty or lack of impact.
From mono- to multi-actor systems analysis

Explore what factors may be influenced by other actors
Explore how use of the means of the problem owner may affect other actor’s interests

**Perform the actor-network analysis, identify the critical actors**

For the critical actors:
- Identify objectives, criteria, means, causal relations
- Extend the mono-actor analysis
Main conclusions actor-network analysis

- **Subjects**
  - Env ngo's
  - NGOs
  - Knowledge institutes
  - Construction companies
  - Windmill producers
  - Min Econ Affairs (Fisheries)
  - the Oil and gas industry
  - Min I&E DG Water & Space+
  - TenneT
  - Energy companies
  - Harbor authorities
  - Shipping sector
  - Banks
  - Private equity
  - Local authorities

- **Power**
  - Low
  - High

- **Interest**
  - Low
  - High

- **Leave out for now**
- **Take along in analysis**
- **Maybe take along**
From mono- to multi-actor systems analysis

- Explore what factors may be influenced by other actors
- Explore how use of the means of the problem owner may affect other actor’s interests
- Perform the actor-network analysis, identify the critical actors
- **For the critical actors:**
  - Identify objectives, criteria, means, causal relations
  - Extend the mono-actor analysis
  - Iterate and check for consistency
Focus: Min. of Infra. and Environment (I&E)

- Wind speed at sea
- Storage capacity
- Number of international connections
- Average windspeed at location
- Balance supply and demand of energy
- Number and size of new wind farms
- Installed capacity at sea
- Remaining space for other uses
- Investment cost
- Transport costs of the generated energy
- Security of supply (DE)
- Percentage off-shore power generation (DE)
- Efficient use of space at sea (I&E)
- Safety at sea (I&E)
- Costs of energy provision (DE)

Granting Subsidies (DE)
Granting licenses (DE and I&E)
Assign priority locations for wind energy near coast (I&E)
## Score card Dept. Energy (DE) & Min. Infrastructure and Environment (I&E)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Means</th>
<th>Security of supply DE and Energy companies</th>
<th>Percentage off-shore power DE</th>
<th>Efficiency use of Space at sea I&amp;E</th>
<th>Safety at Sea I&amp;E</th>
<th>Costs of energy provision DE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giving Subsidies DE</td>
<td>-</td>
<td>+</td>
<td>?</td>
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<tr>
<td>Granting Licences DE and I&amp;E</td>
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<td>?</td>
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<tr>
<td>Shorter distance to coast I&amp;E</td>
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Conclusions for I&E

No direct value conflicts, but:
• All actions stimulating wind power may negatively impact safety at sea!
• Impacts on efficiency of use uncertain, depend on opportunity costs other uses, location, other factors
  → I&E will not be a natural ally for DE!
Focus: Dept. Energy & Energy Companies

- Wind speed at sea
- Storage capacity
- Number of international connections
- Average windspeed at location
- Balance supply and demand of energy
- Installed capacity at sea
- Revenues from sea power
- Return on investments in sea wind farms (EC)
- Market prices electricity
- Security of supply (DE&EC)
- Percentage off-shore power generation (DE)
- Investment cost
- Transport costs of the generated energy
- Costs of energy provision (DE)

- Granting Subsidies
  - DE
- Granting licenses
  - DE and I&E
- Investing in wind farms
  - Energy Companies
- Assign priority locations for wind energy near coast
  - I&E
Score card Dep. Energy (DE) & Energy Companies (EC)

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Conclusions for energy companies

• Energy companies share some of the goals of the Department of Energy and the same dilemma
• Energy companies have a strong interest in close to coast locations
• Actions of DE will also benefit Energy companies
• Return on investment depends on many factors, some outside the model (e.g., electricity prices that depend on global energy resource prices)
Score card three main actors

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Overall conclusions

• No immediate conflicts with the two other actors
• Support by ministry Infrastructure and Environment is crucial
• Willingness of energy companies to invest also depends on uncertain outside factors
• Security of supply remains a concern -- involve other actors
• Extend analysis for Tennet, shipping companies
Knowledge gaps

- Search for locations
  - with little interference with other uses
  - where wind farms do not jeopardize safety
- Investigate conditions for attractive return on energy company investments
  - Influence of location choice on costs
  - Possible influence of external factors
  - Sensitivity to subsidies
- Investigate factors and actors affecting security of supply
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