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**Practical approach to enhance the functionality of  
infrastructure systems in case of natural disasters**

**Dr. Jost A. Studer**

**STUDER ENGINEERING, Zurich**

# Outline

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- **Importance of function of infrastructure systems**
- **Characterisation**
- **Pragmatic methodology to strengthen infrastructure systems in disasters**

# Importance of function of infrastructure systems

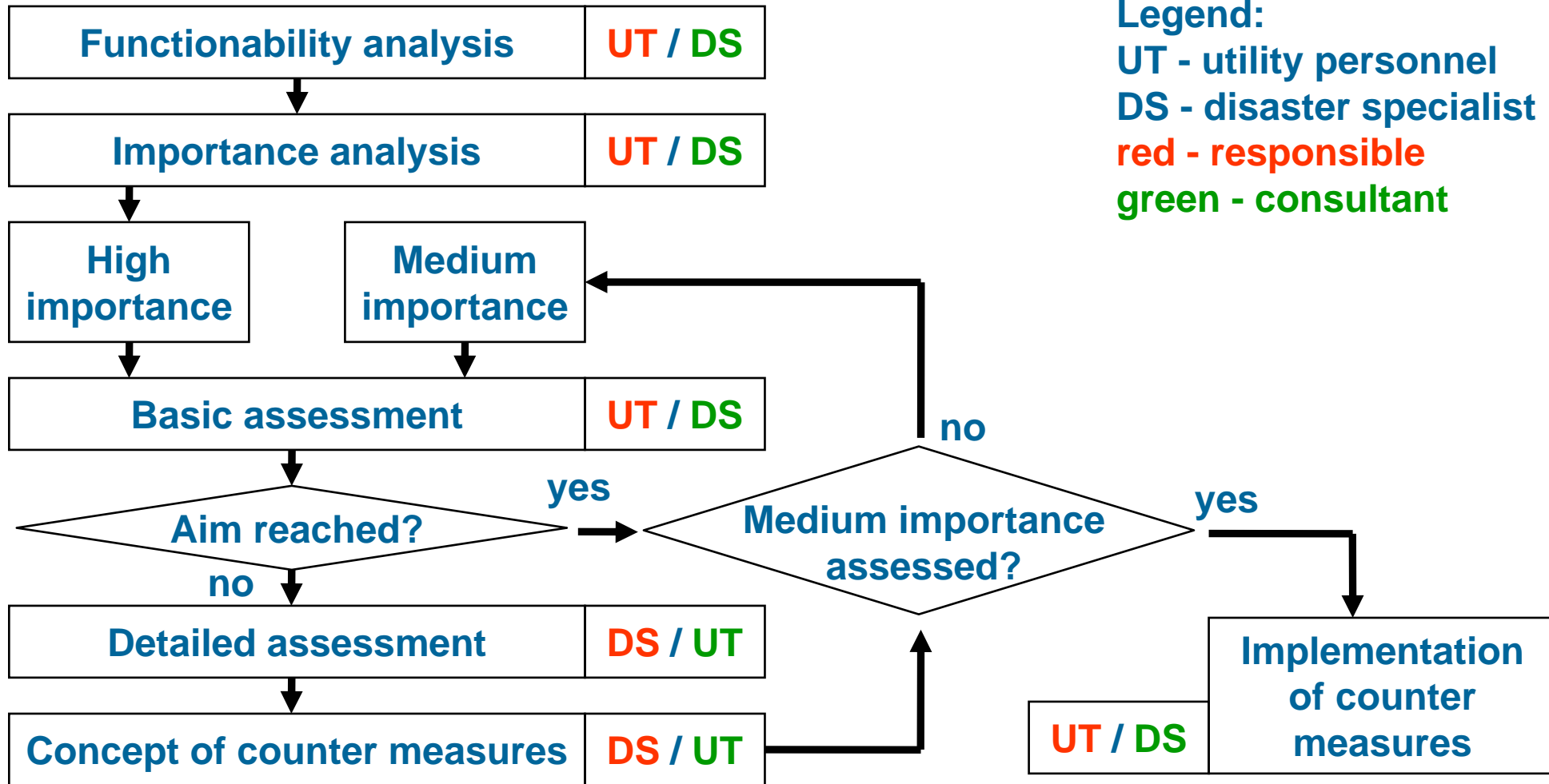
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- **Disaster response**
  - Management (Fire / Police)
  - Transportation system
  - Telecommunication
  - Health
  
- **Emergency assistance**
  - Transport
  - Health
  
- **Reconstruction**
  - Transport
  - Energy
  - Telecommunication

# Characteristics of infrastructure systems

		linear elements	structural points
<b>Energy distribution system</b>	<ul style="list-style-type: none"> <li>• electricity</li> <li>• water</li> <li>• gas</li> <li>• heat</li> <li>• petrol</li> </ul>	<ul style="list-style-type: none"> <li>• back bone</li> <li>• grid</li> </ul>	<ul style="list-style-type: none"> <li>• control points</li> <li>• "Transformers"</li> </ul>
<b>Transportation (terrestrial)</b>	<ul style="list-style-type: none"> <li>• rail</li> <li>• road</li> </ul>	<ul style="list-style-type: none"> <li>• network - main</li> <li>- local</li> </ul>	<ul style="list-style-type: none"> <li>• stations</li> <li>• control points</li> </ul>
<b>Transportation (non terrestrial)</b>	<ul style="list-style-type: none"> <li>• water</li> <li>• air</li> </ul>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• posts</li> <li>• storage etc.</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• transportation</li> </ul>	<ul style="list-style-type: none"> <li>• hospitals</li> </ul>
<b>Telecommunication</b>	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed</li> <li>• back bone</li> <li>• local distribution</li> <li>• Mobile</li> <li>• back bone</li> </ul>	<ul style="list-style-type: none"> <li>• switch stations</li> <li>• control system</li> <li>• antenna / control stations</li> </ul>

# Procedure of evaluation

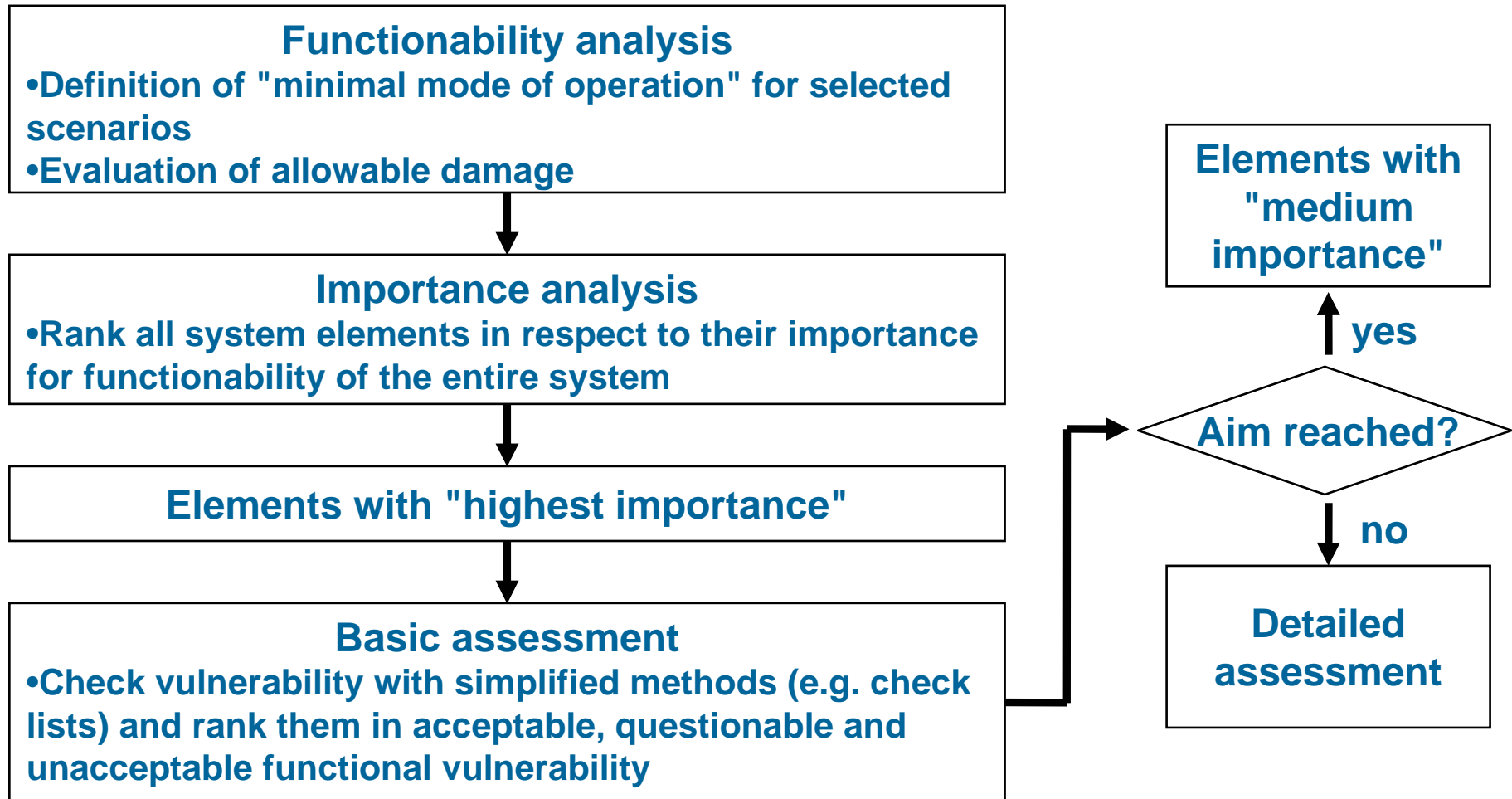


# Advantage of methodology

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- **Takes experience of utility personnel and disaster specialist into account**
- **Strong involvement of utility personnel**
  - ensures that system characteristics are really taken into account
  - enhances the chances that results are implemented

# Procedure of evaluation - initial basic assessment



# Procedure of evaluation - detailed assessment

