

# Robotizing housing

Frans J.M. van Gassel

Autumn 2010

**TU** / **e**

Technische Universiteit  
**Eindhoven**  
University of Technology

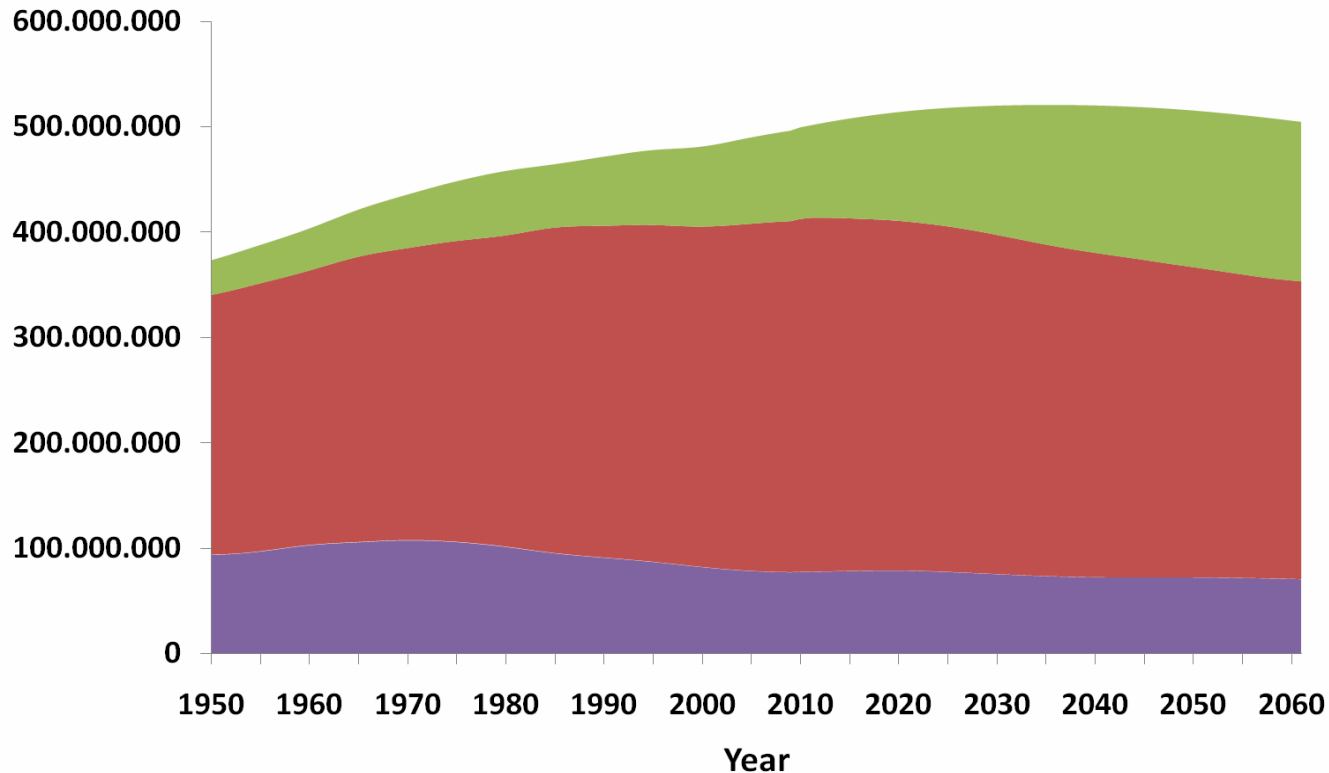
**Where innovation starts**

# Outline

- ❑ Problem potential workforce
- ❑ Modeling performing workforce activities
- ❑ Mechanization and robotizing actions
- ❑ Realizing solutions by:
  - Analyzing activities
  - Collaborative design

# Youth & Workforce & Aging Society

Youth (<15) & Potential Workforce (15-65) & Retired (>65) for Europe (27) over 1950-2060



United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects: The 2008 Revision, CD-ROM edition; 2009;  
<http://unstats.un.org/unsd/demographic/products/socind/population.htm>; retrieved February 2010

# Workforce at the construction site



# Daily activities aging society



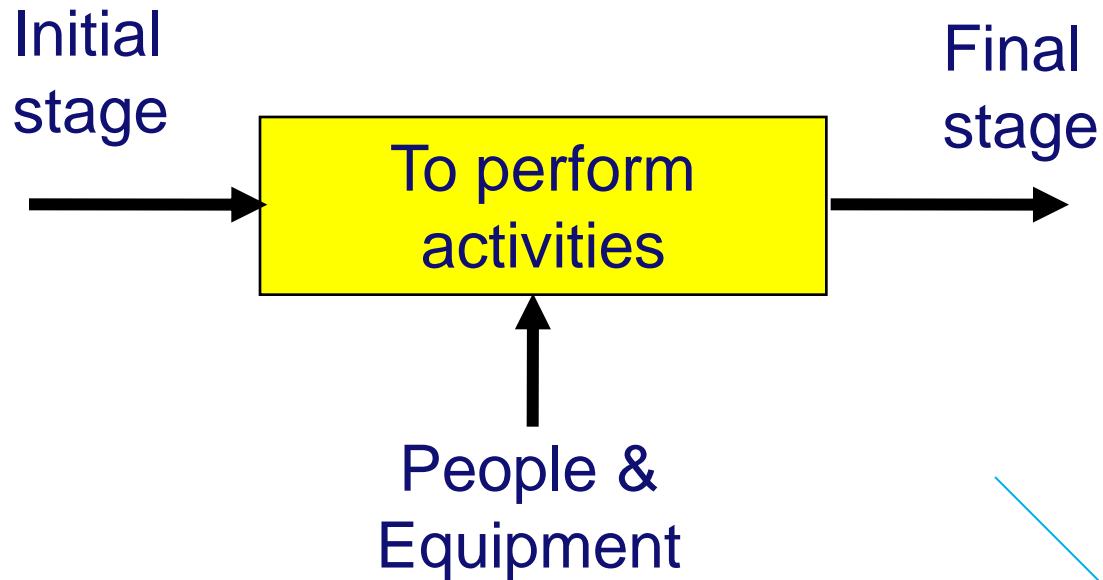
- In the house -

# Daily activities aging society



- Round the house -

# Modeling performing activities



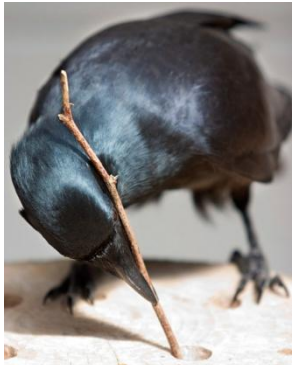
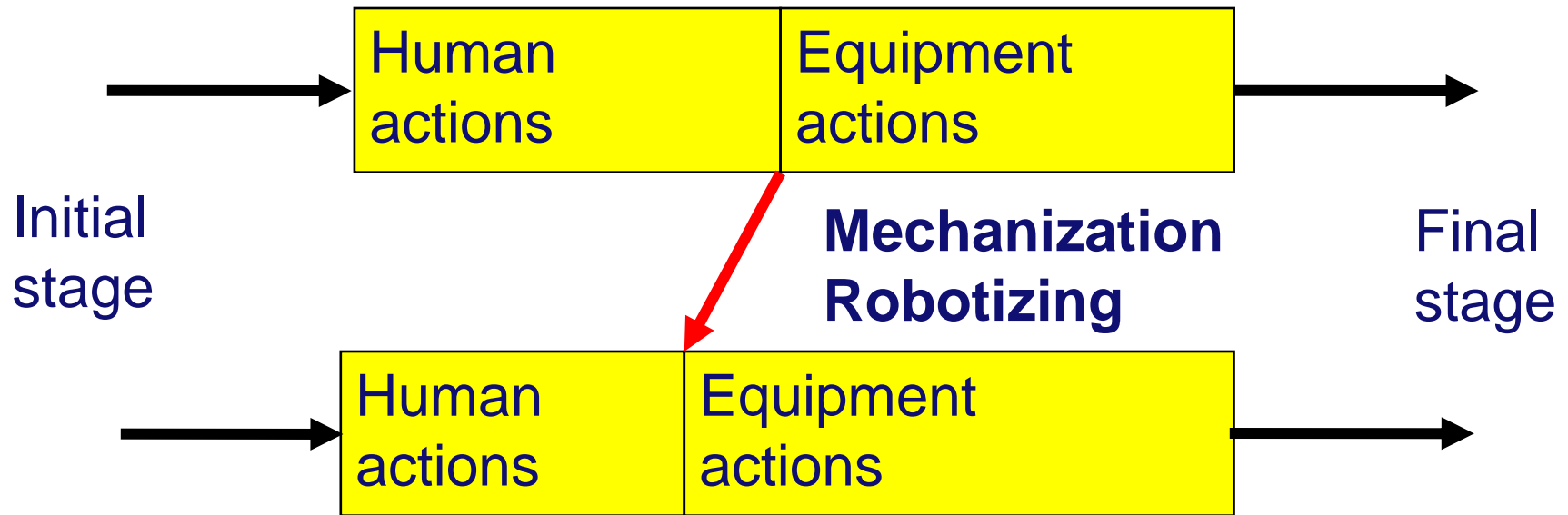
Based on the method SADT  
(Structured Analysis and Design Techniques)

([http://en.wikipedia.org/wiki/Structured\\_Analysis\\_and\\_Design\\_Technique](http://en.wikipedia.org/wiki/Structured_Analysis_and_Design_Technique))







# People & Equipment

<b>Actions</b>	<b>People</b>	<b>Equipment</b>
Provide strength and energy <b>WALKING</b>	Movement system: <ul style="list-style-type: none"><li>* muscles</li><li>* lungs</li></ul>	Power tools: <ul style="list-style-type: none"><li>* energy sources</li><li>* transmissions</li></ul> <b>WHEELCHAIR</b>
Receive and issue Information <b>DISCUSSION</b>	Senses: <ul style="list-style-type: none"><li>* eyes</li><li>* ears</li><li>* voice</li><li>* hands</li></ul>	Telecommunications tools: <ul style="list-style-type: none"><li>* scanner</li><li>* microphone</li><li>* monitor</li><li>* keyboard</li></ul> <b>HEARING AID</b>
Make decisions <b>TAKING MEDICINES</b>	Thought system: <ul style="list-style-type: none"><li>* brain</li><li>* memory</li></ul>	Computer equipment: <ul style="list-style-type: none"><li>* computer</li><li>* software</li><li>* artificial intelligence</li></ul> <b>EQUIPMENT WITH ALARM</b>

# Mechanizing and robotizing actions



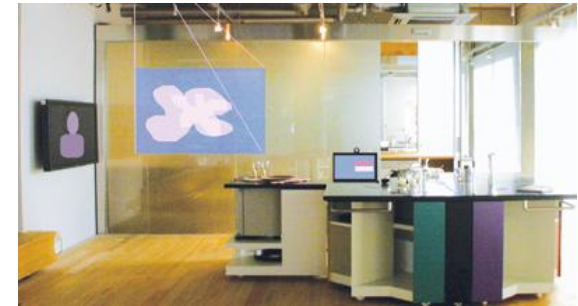
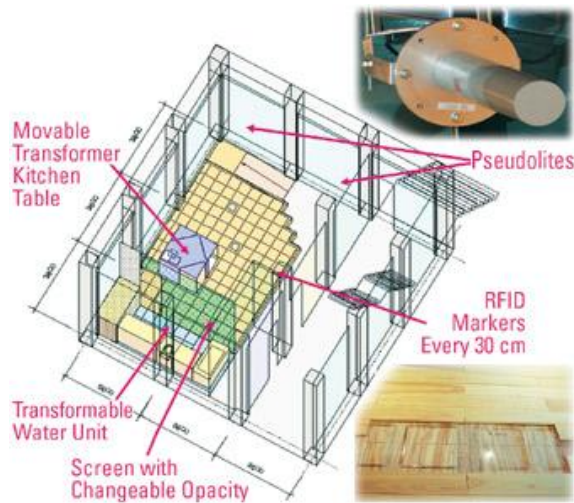
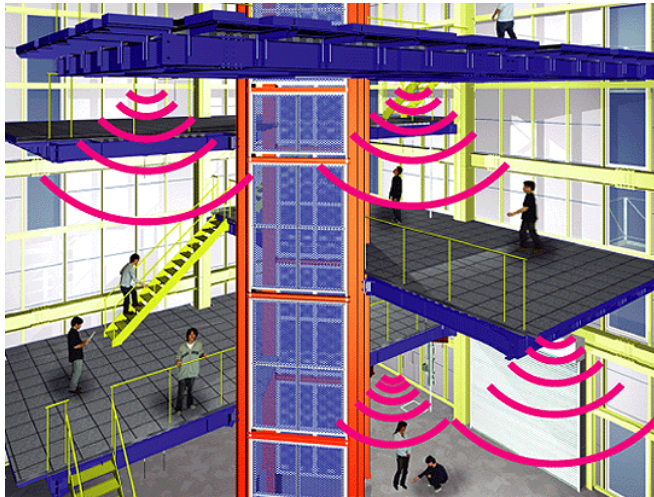
# Mechanizing and robotizing actions in construction

Initial stage		Final stage	
	<p>Mixing sand and cement by a spade</p>		<p>Sand and cement are already mixed in the factory</p>
	<p>Finishing a concrete floor</p>		
	<p>Assembling a wall panel</p>		<p>Humanoid robot</p>

# Mechanization and robotizing actions in housekeeping

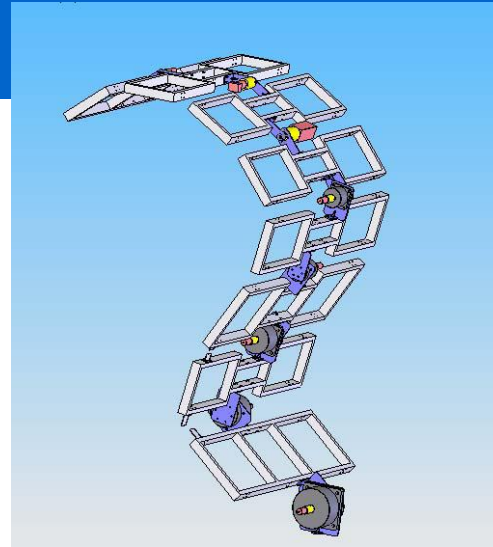
Initial stage		Final stage	
	Vacuum the house		Robot
	Playing with a puppet		Robot which reacts on voice
	Stepping stairs		Chair lift

# House as a robot



*The **WABOT-HOUSE** laboratory in Japan is a symbiotic society where robots and human beings share the same sphere of living embraced by the natural environment. The detail shows a floor adaptable system.*

# House as a robot



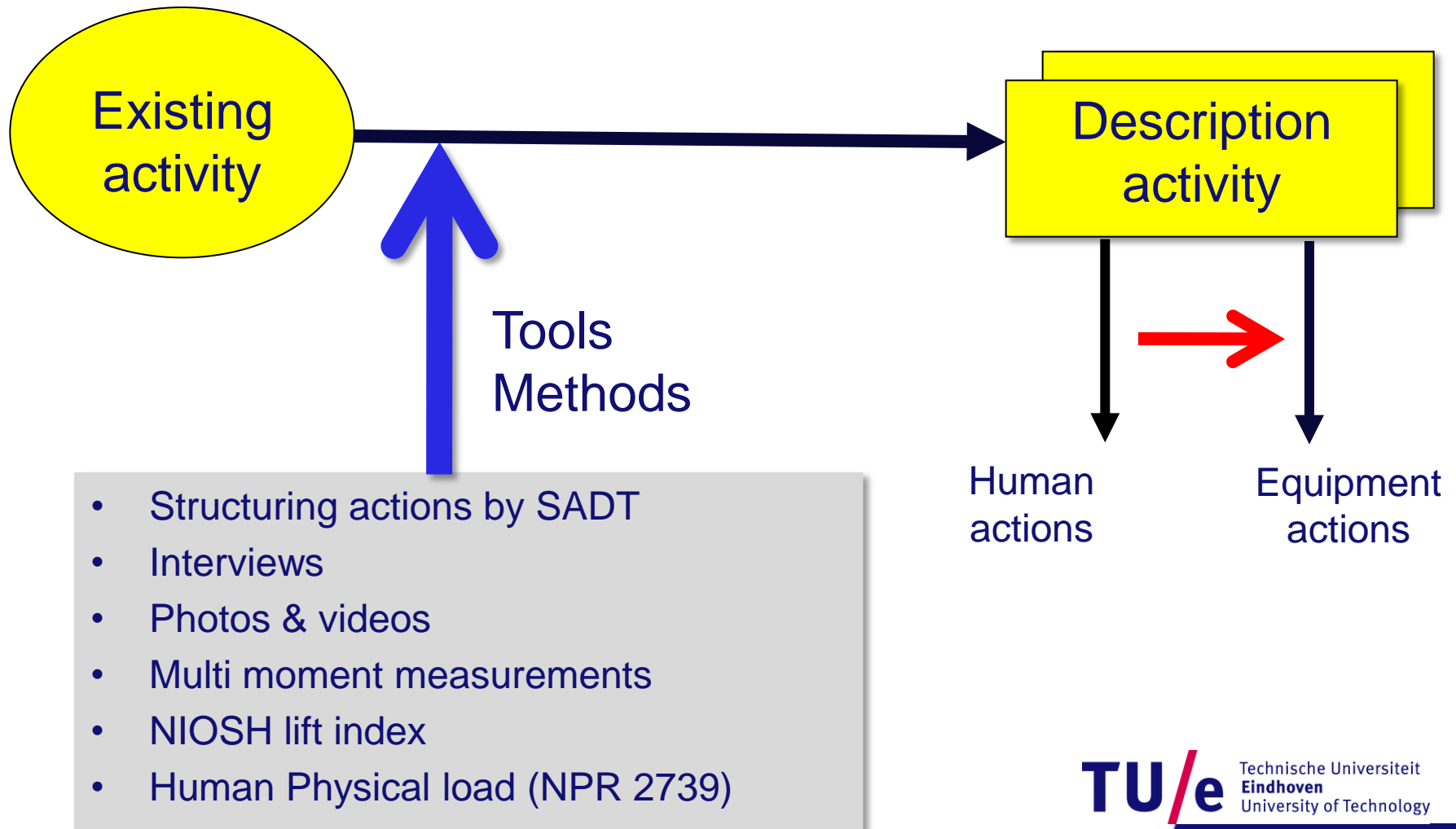
Clemson University US

**TU/e** Technische Universiteit  
Eindhoven  
University of Technology

# How to generate solutions

- ❑ Analyzing activities and actions
- ❑ Collaborative design

# Analyzing activities



# Description analyzed activities

Initial stage

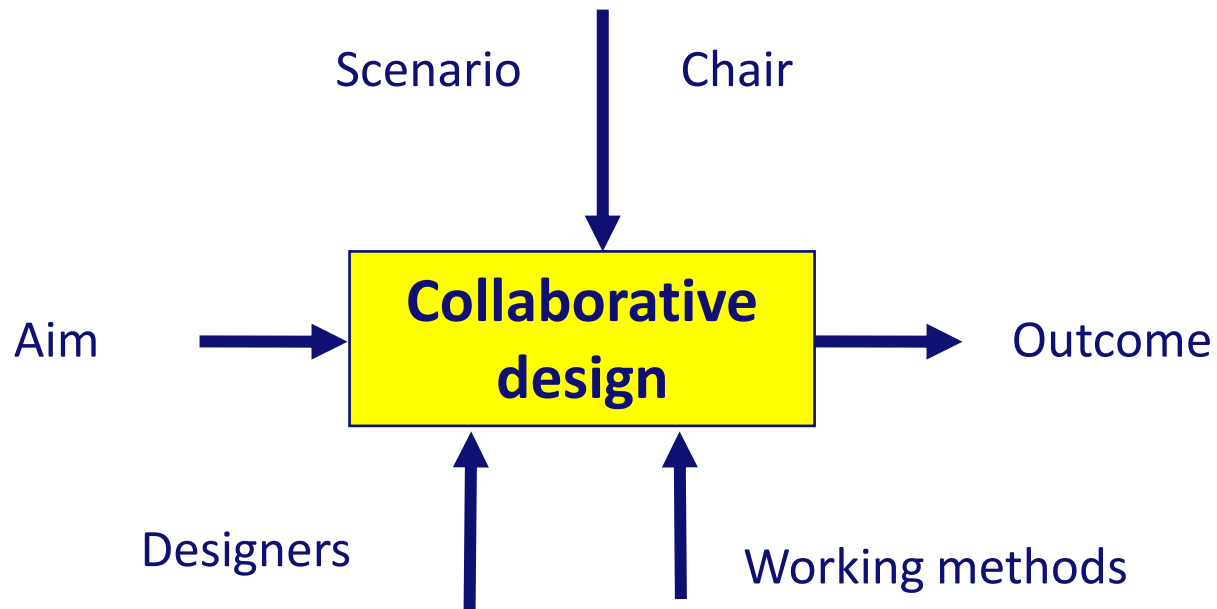


Sequence	Activity	Equipment used for the activity and describing its sub-activity.	Describing the sub-activities by people
1	Making the workplace ready	Chair: sitting Newspaper: peelings storage	Choosing a comfortable working place
2	Filling pan with water	Pan: to store peeled potatoes Tap: water supply	Handling tap and holding pan. Controlling the water flow.
3	Peeling	Knife: peeling the potato	Controlling peeling process Putting the peel on the newspaper

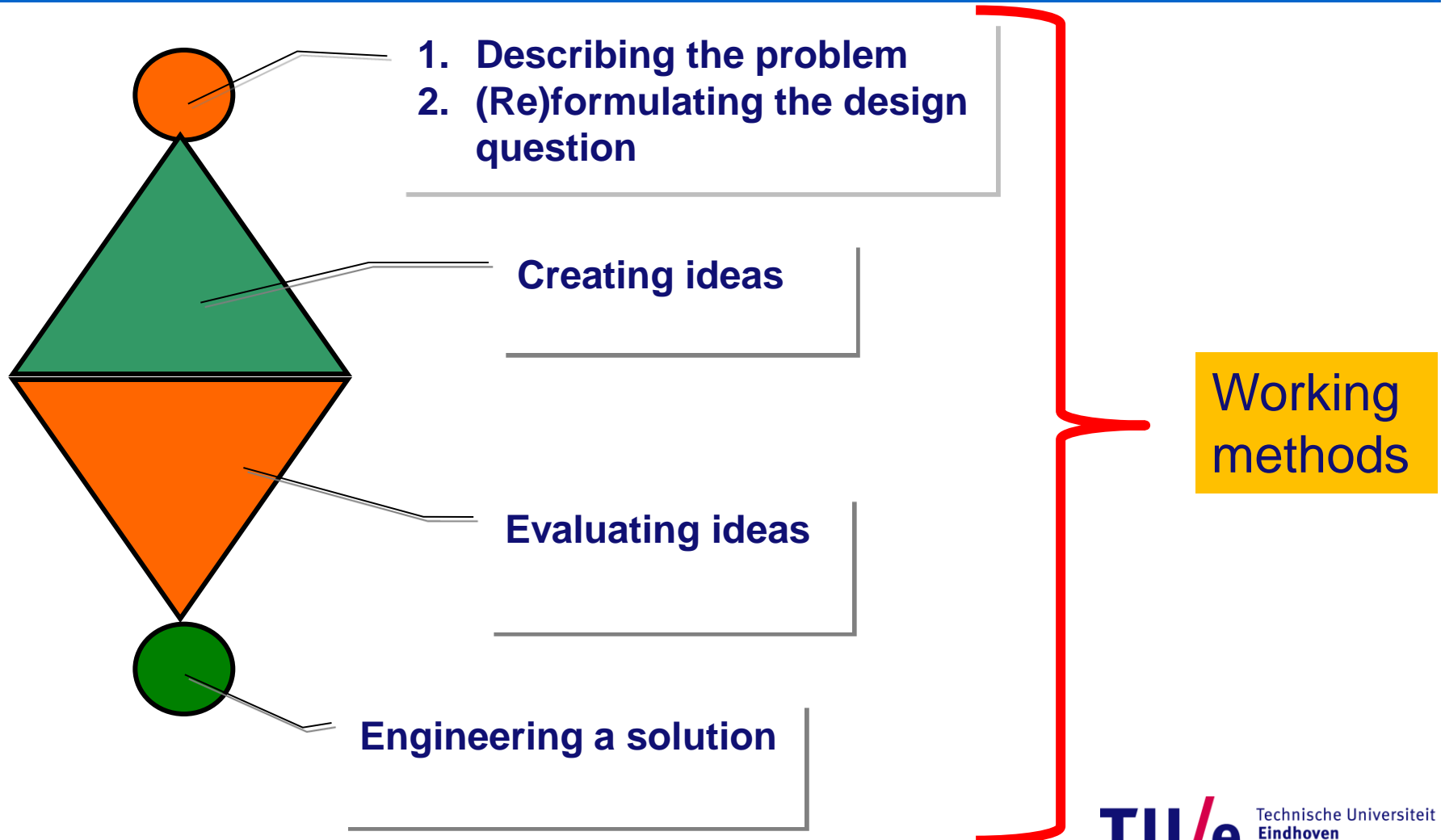
End stage



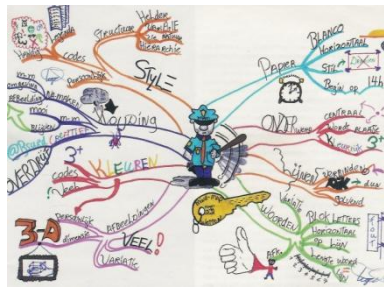
# Collaborative design



# Flow collaborative design meeting



# Creating ideas by working methods



# Questions?

