

# Robotizing housing

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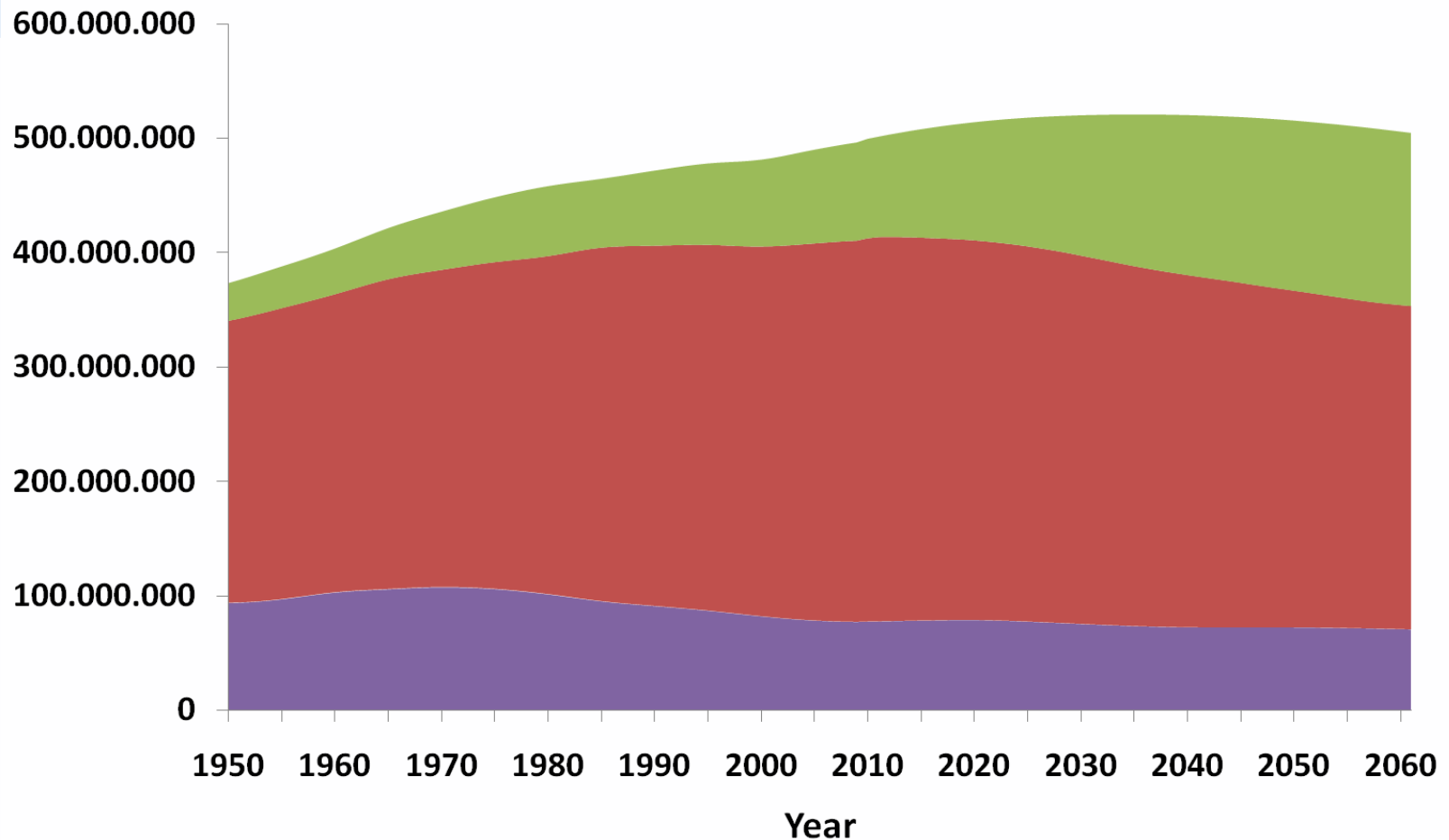
Where innovation starts

# Outline

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

# Workforce & Aging Society

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

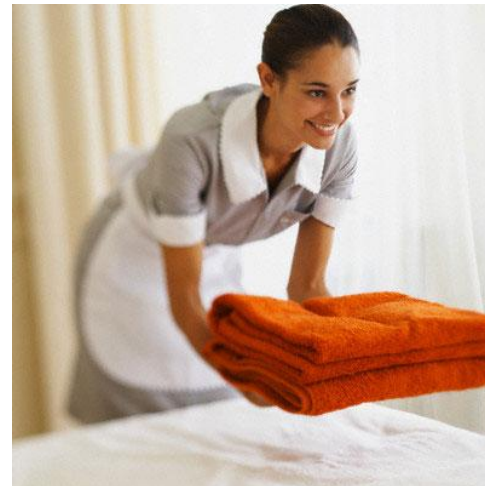


United Nations, Department of Economic and Social Affairs, Population Division. *World Population Prospects: The 2008 Revision*, CD-ROM edition; 2009;  
<http://unstats.un.org/unsd/demographic/products/socind/population.htm>; retrieved February 2010

# Workforce at the construction site



# Daily activities aging society



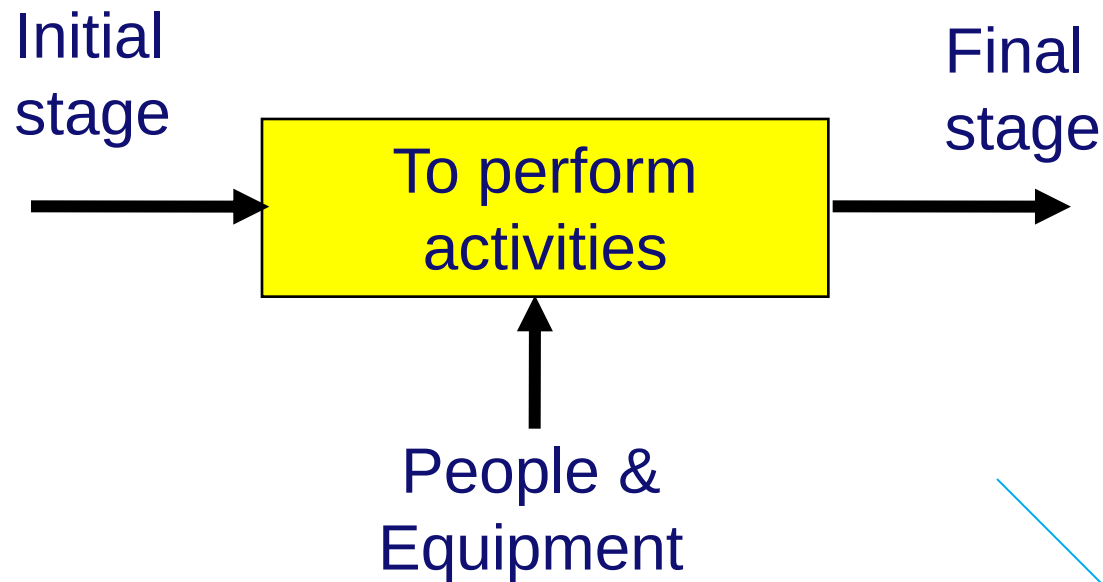
- In the house -

# Daily activities aging society



- Round the house -

# Modeling performing activities



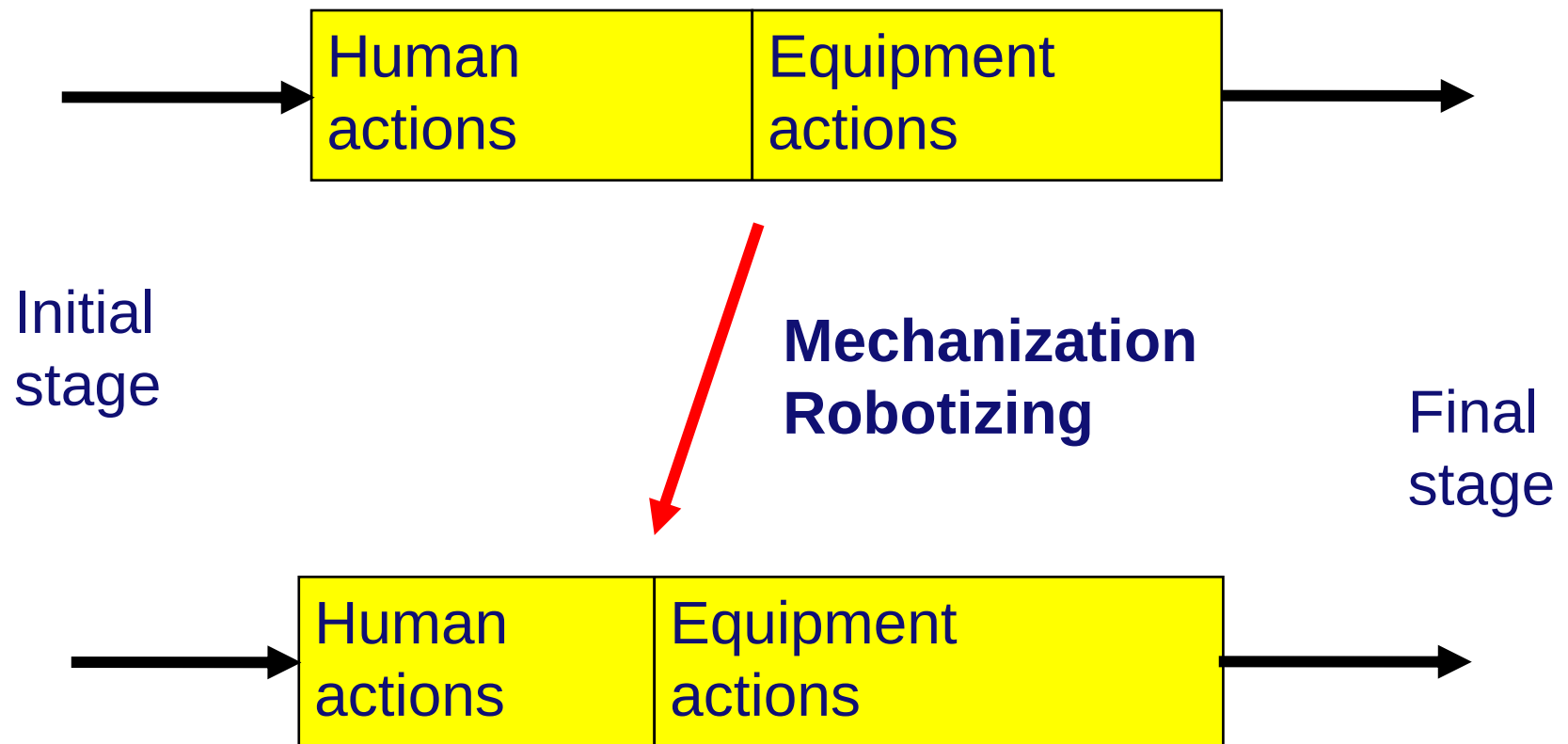
Based on the method SADT  
(Structured Analysis and Design Techniques)

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

# People & Equipment

| Actions                                            | People                                                                                                        | Equipment                                                                                                                                                        |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Provide strength and energy<br><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<br><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<br><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



Mixing sand and cement by a spade



Sand and cement are already mixed in the factory



Finishing a concrete floor



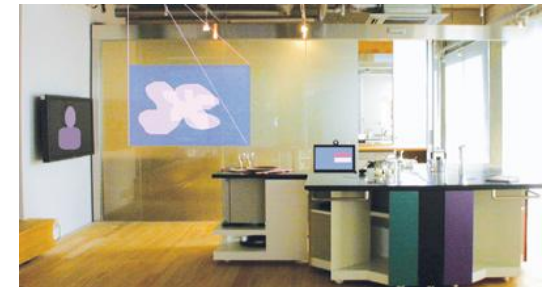
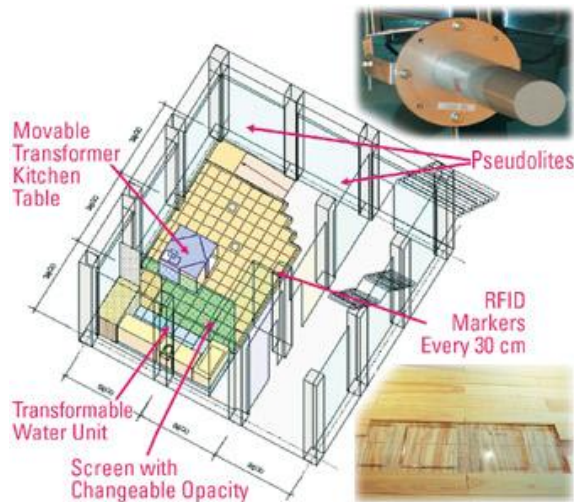
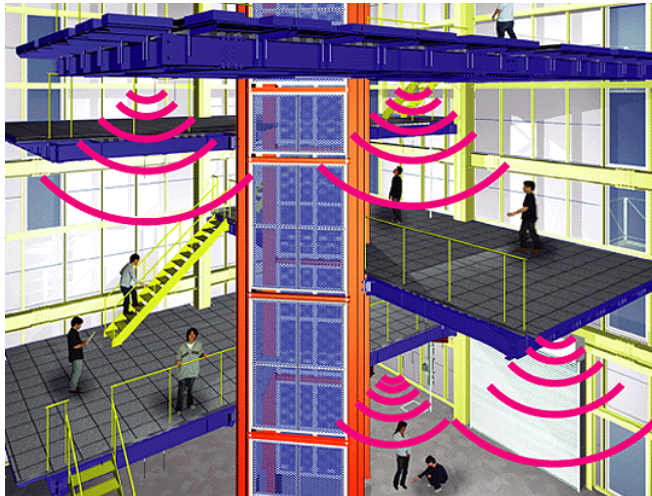
Assembling a wall panel



# Mechanization and robotizing actions in housekeeping

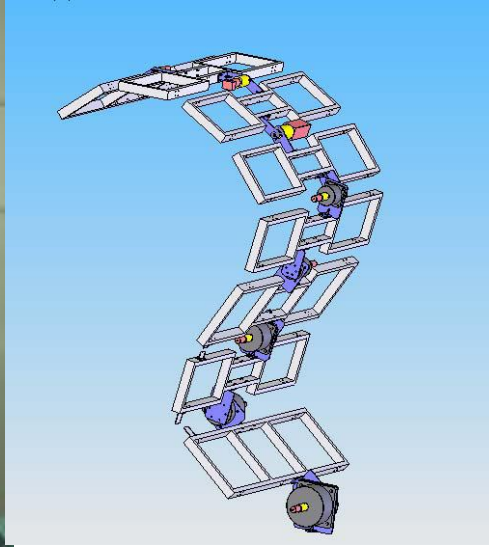
| Initial stage                                                                      |                       | Final stage                                                                          |                             |
|------------------------------------------------------------------------------------|-----------------------|--------------------------------------------------------------------------------------|-----------------------------|
|    | 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



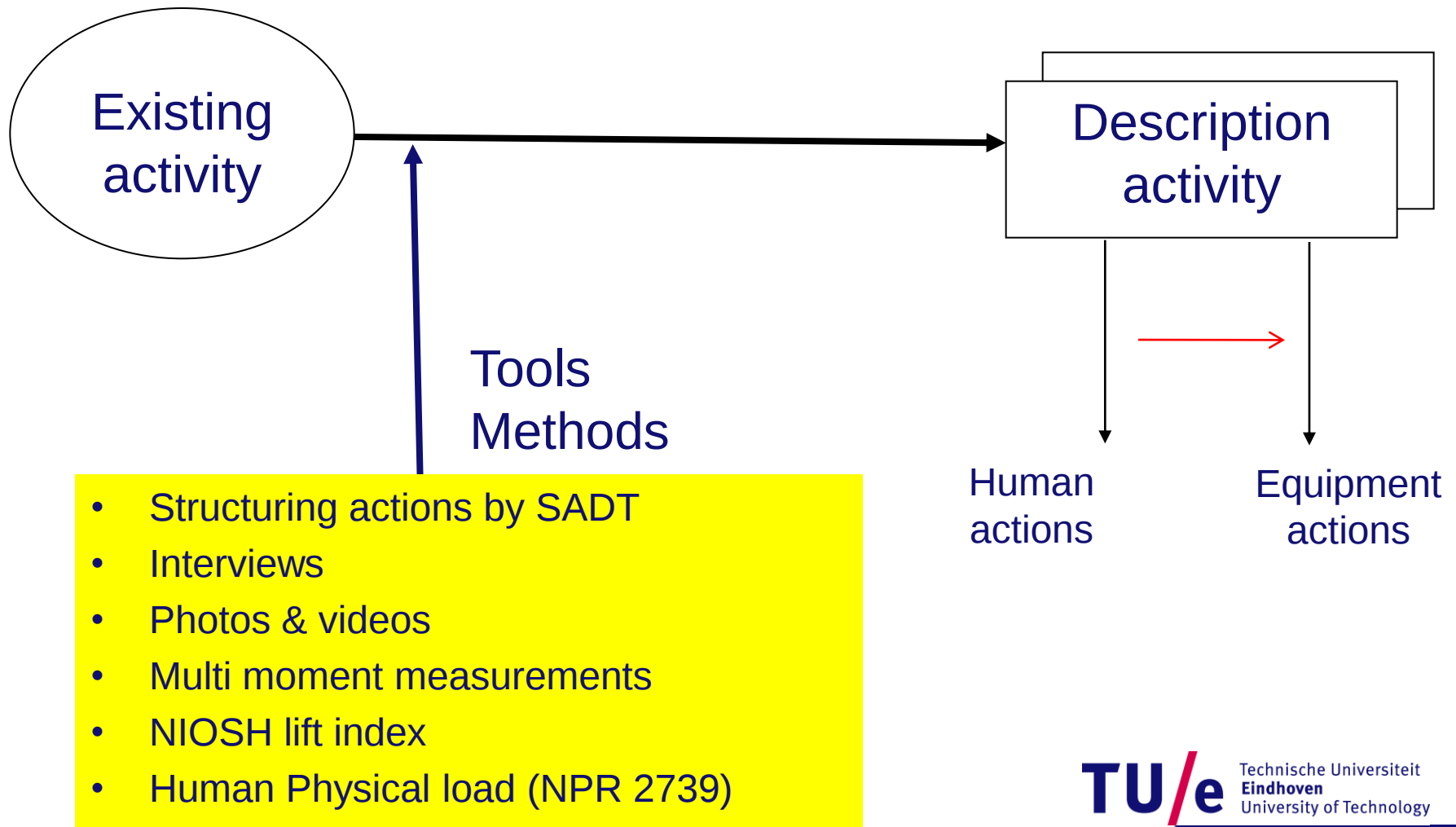
Clemson University US

Department of Architecture, Building & Planning / PEBE group

# How to generate solutions

- ❑ Analyzing activities and actions
- ❑ Collaborative design

# Analyzing ADL



# Description analyzed activities

Initial stage

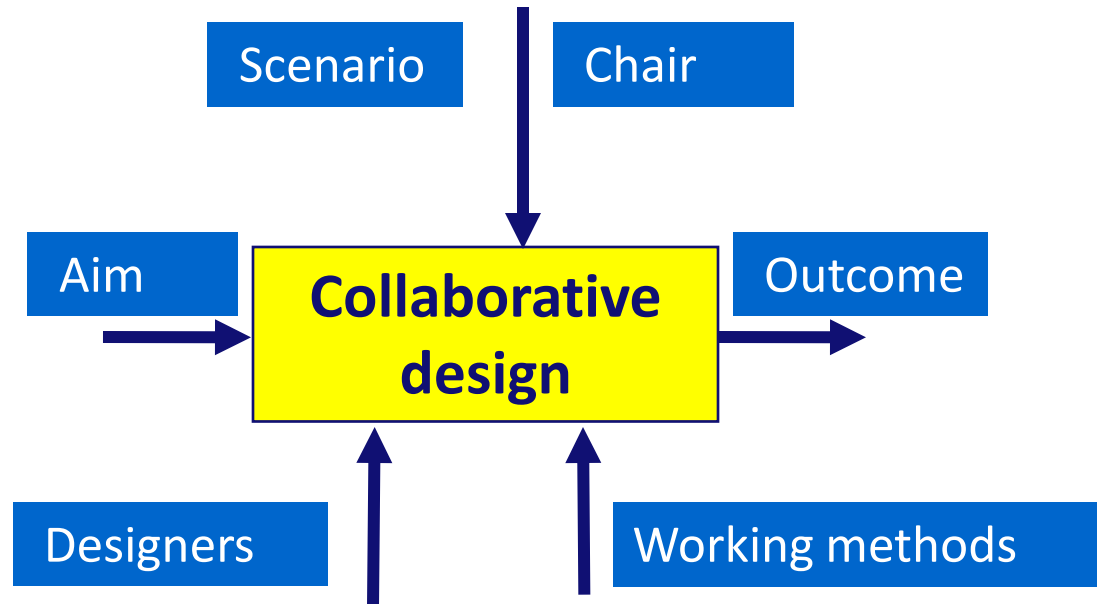


| Sequence | Activity                   | Equipment used for the activity and describing its sub-activity. | Describing the sub-activities by people                          |
|----------|----------------------------|------------------------------------------------------------------|------------------------------------------------------------------|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

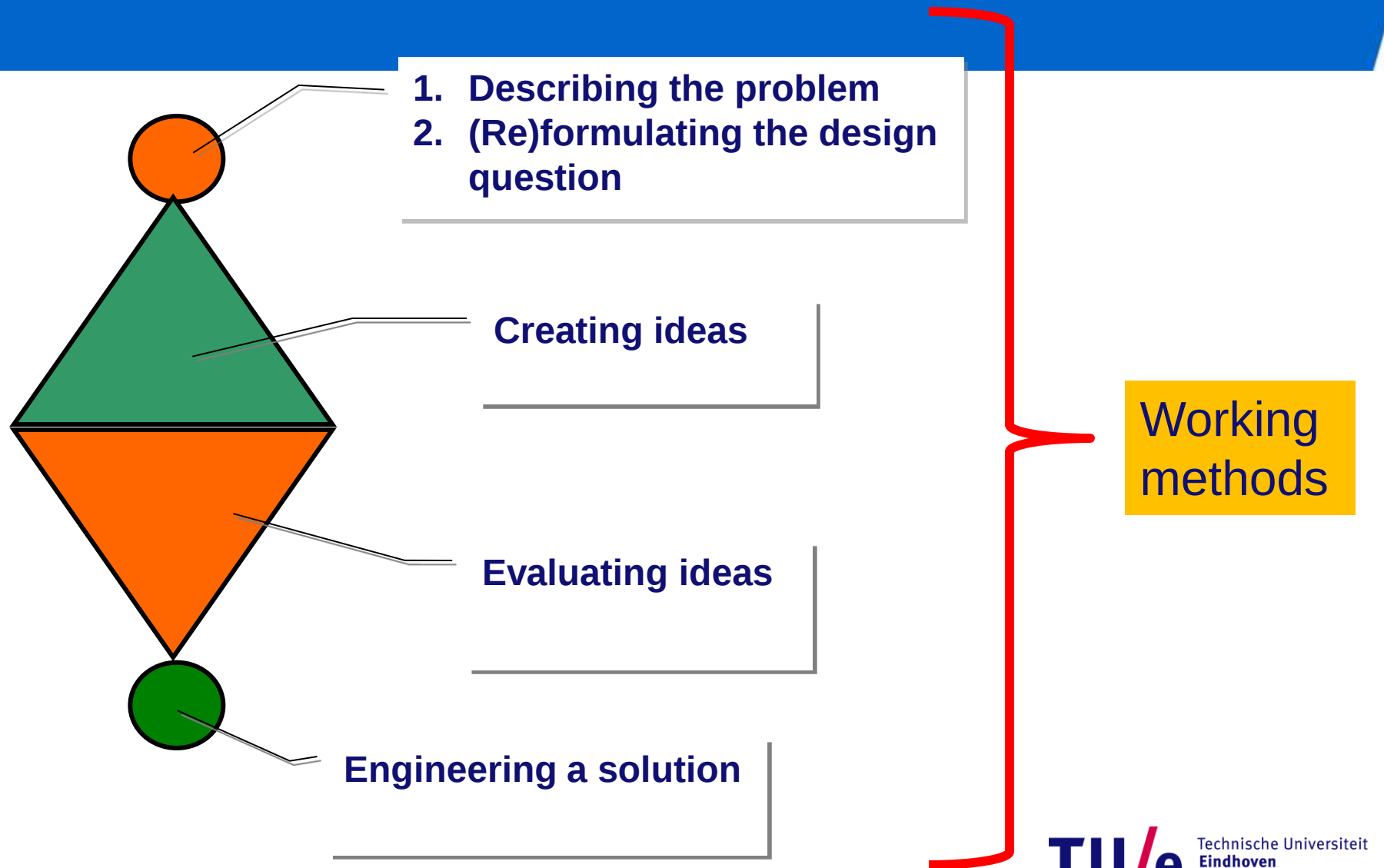
End stage



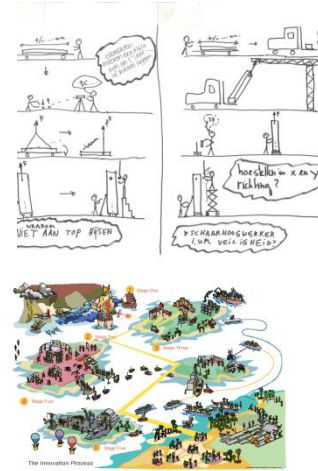
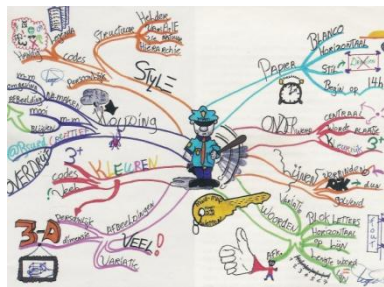
# Collaborative design



# Scenario collaborative design



# Creating ideas by working methods



# Questions?

