

Working method to enhance end-user value for aging-in-place

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Aging-in-place

Automation in construction

Outline

Problem

Workforce & the Aging Society

Modeling activities from the perspective of robotization

Solutions

Lessons from the construction industry

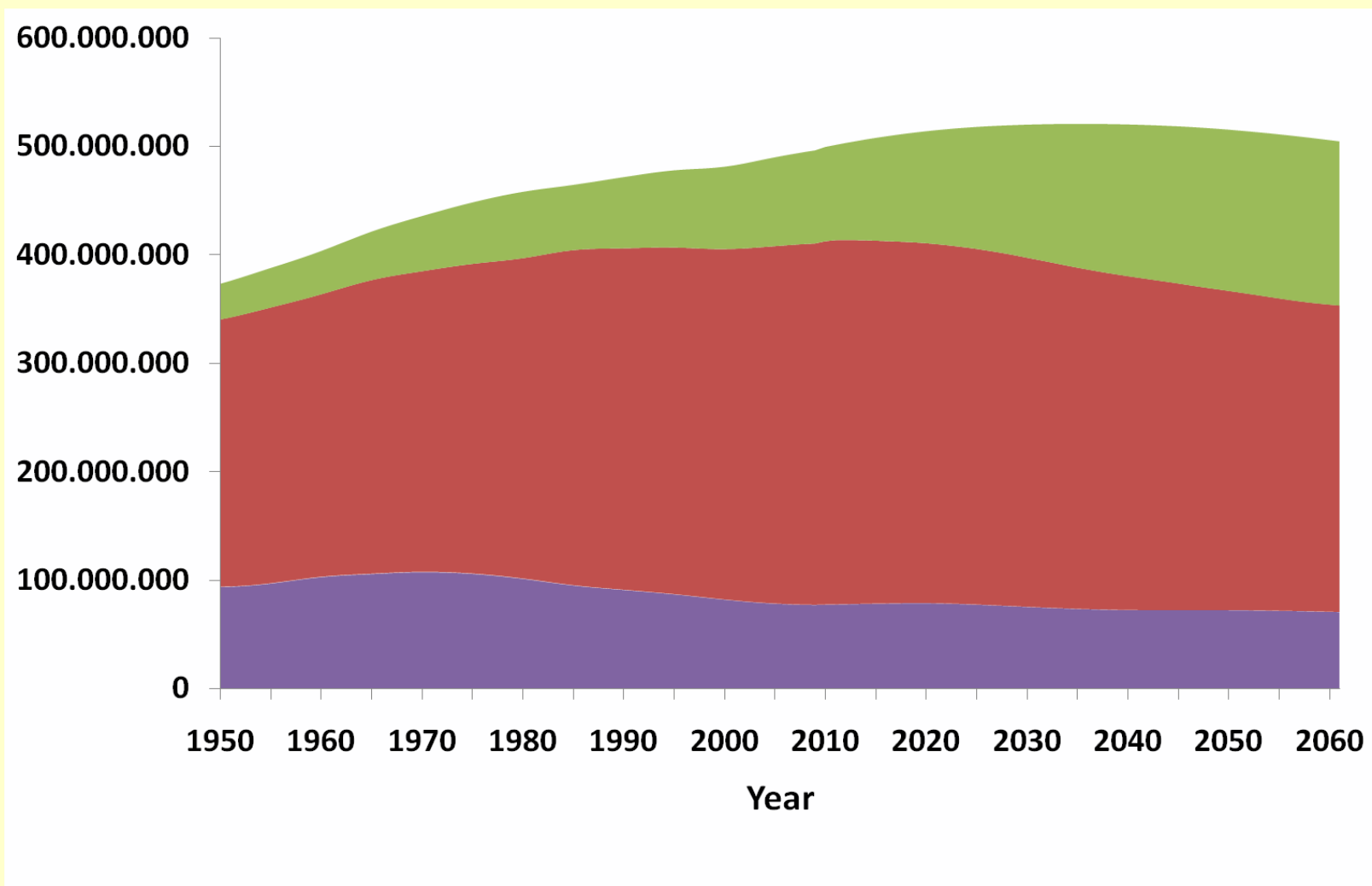
Working methods to enhance end-user values

Analysis activities

Design solutions

Workforce & Aging Society

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



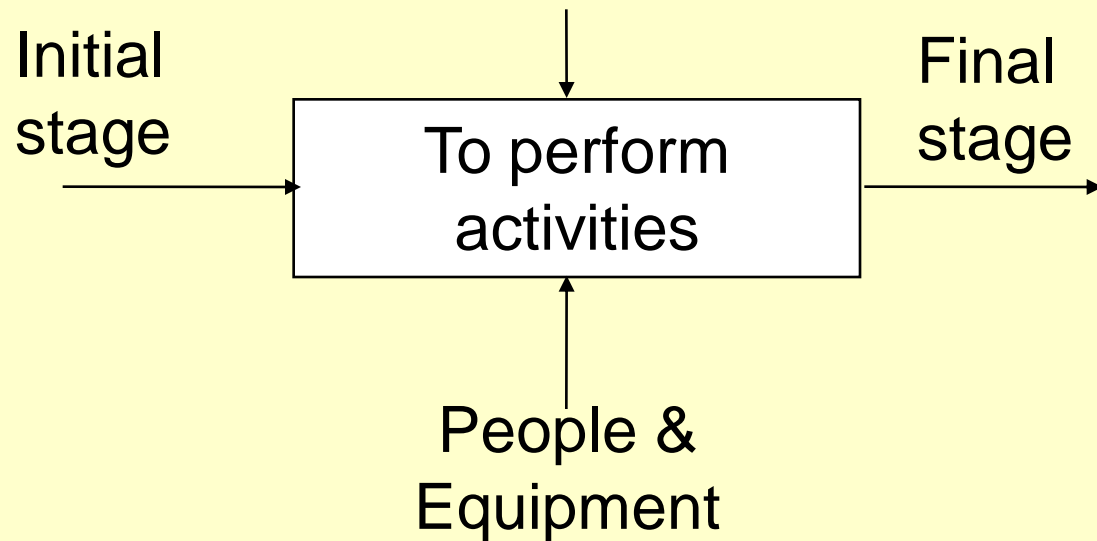
Daily activities in the house



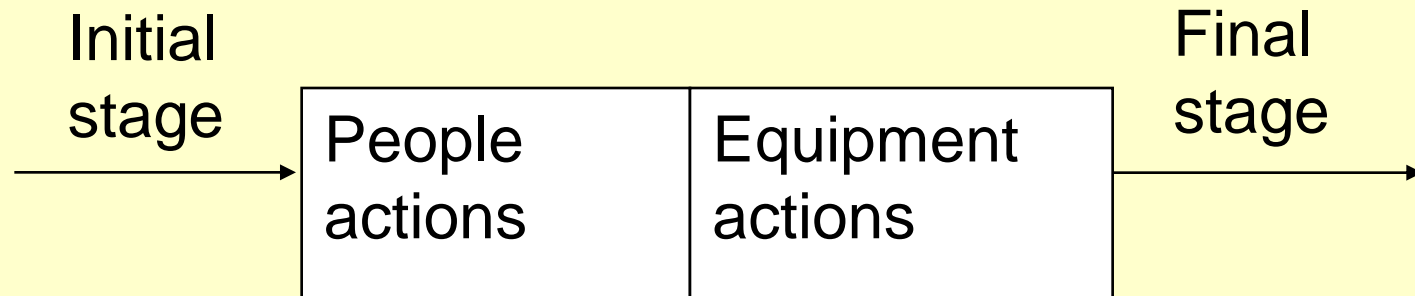
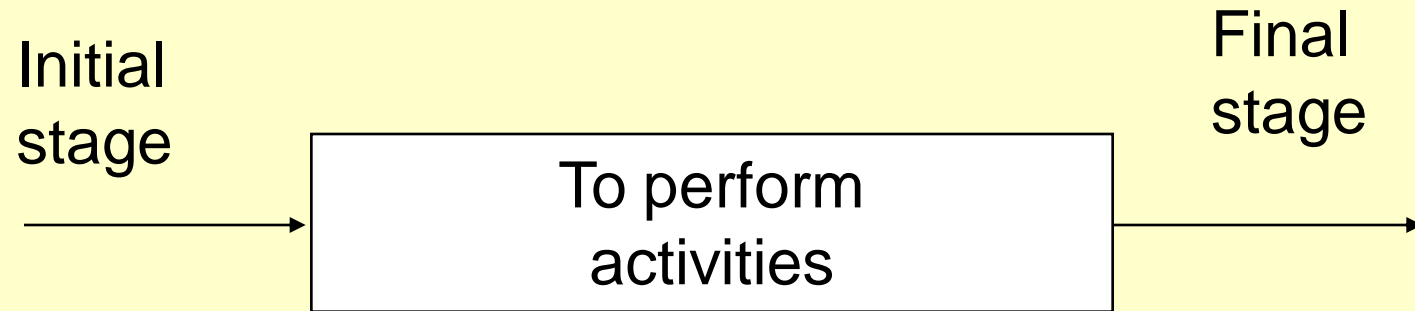
Daily activities round the house



Modeling activities by SADT (Structured Analysis and Design Technique)



People and equipment actions



Activity aspects:

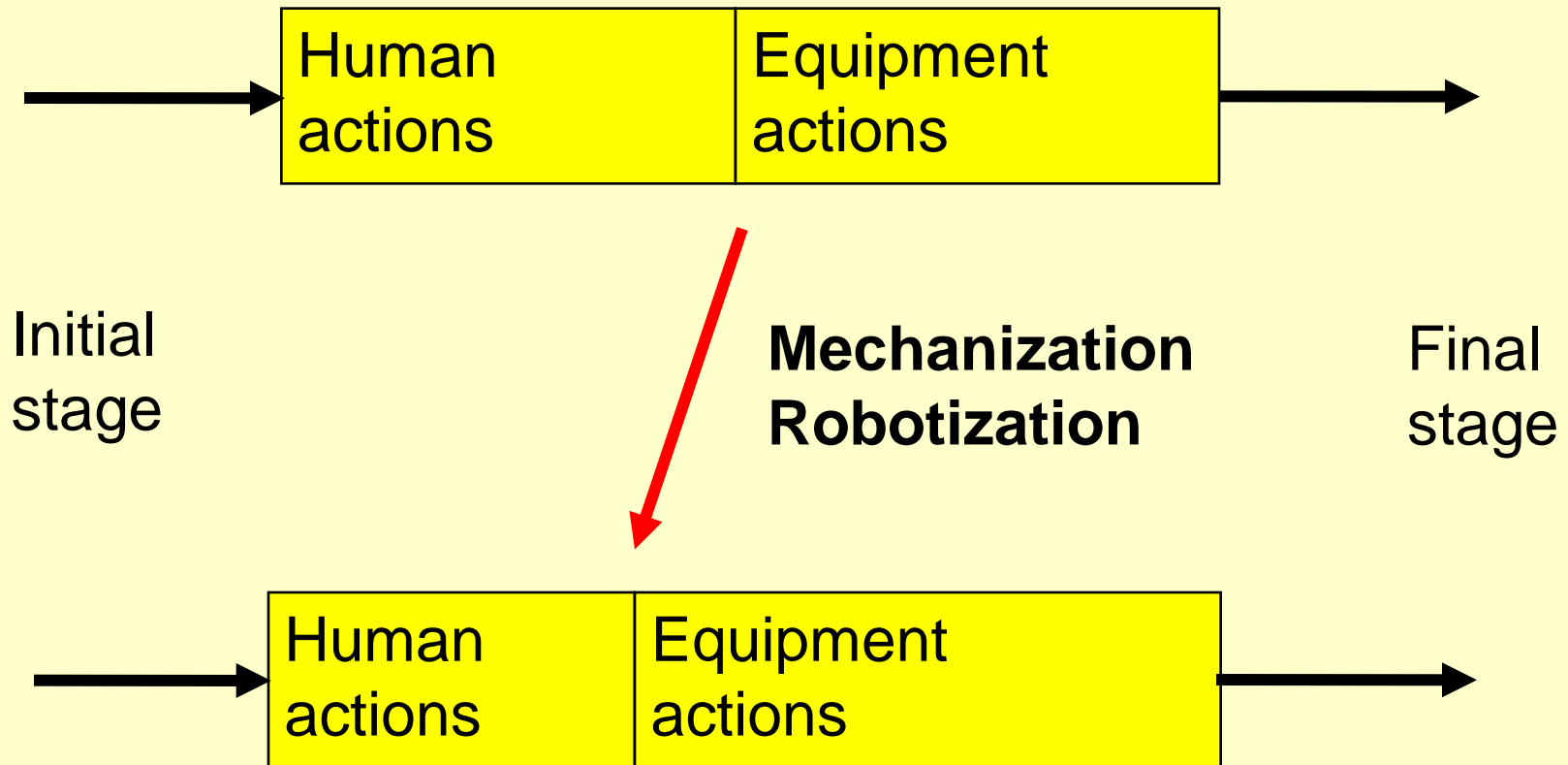
- Physical actions
- Mental actions
- Social actions



People & Equipment

| Actions | People | Equipment |
|--|---|--|
| Provide strength and energy WALKING | Movement system: *muscles *lungs | Power tools: *energy sources *Transmissions WHEELCHAIR |
| Receive and issue Information DISCUSSION | Senses: *eyes *ears *voice *hands | Telecommunications tools: *scanner *microphone *monitor *keyboard HEARING AID |
| Make decisions TAKING MEDICINES | Thought system: *brain *memory | Computer equipment: *computer *software *artificial intelligence EQUIPMENT WITH ALARM |

Mechanization & robotization concept



Lessons from the construction industry



Mechanization & robotization concepts in construction

Initial stage



Mixing sand and cement by a spade

Final stage



Sand and cement are already mixed in the factory



Finishing a concrete floor



Assembling a wall panel



Mechanization & robotization concepts in housekeeping

Initial stage



Vacuum the house

Final stage



Robot



Playing with a puppet



Robot which reacts on voice

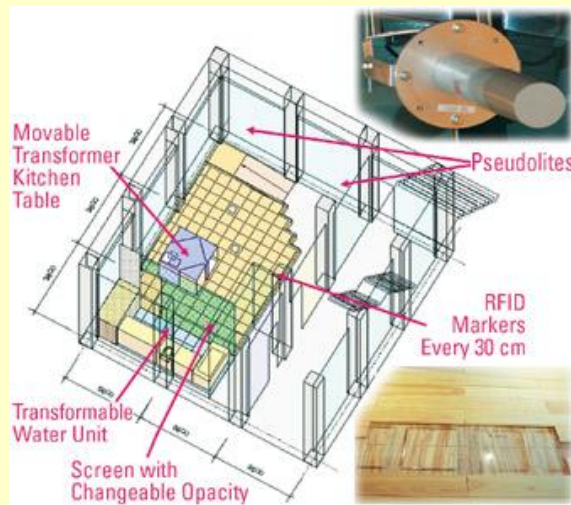
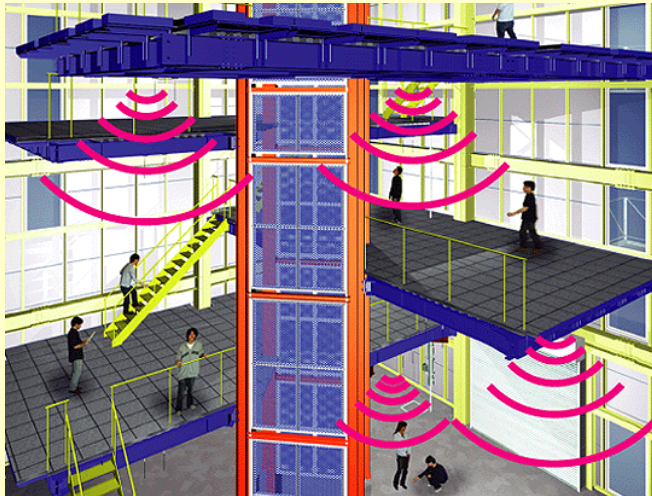


Stepping stairs



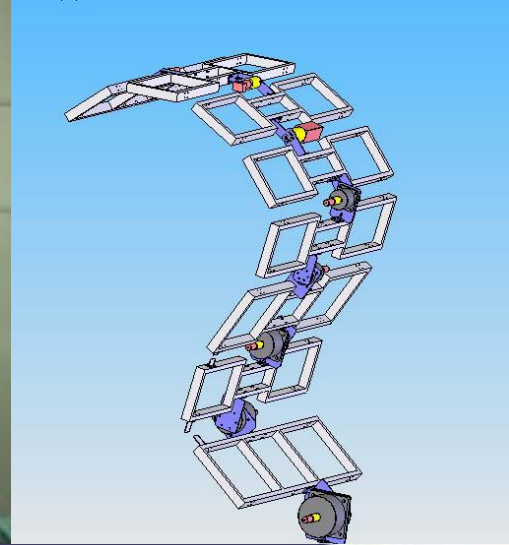
Chair lift

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.*

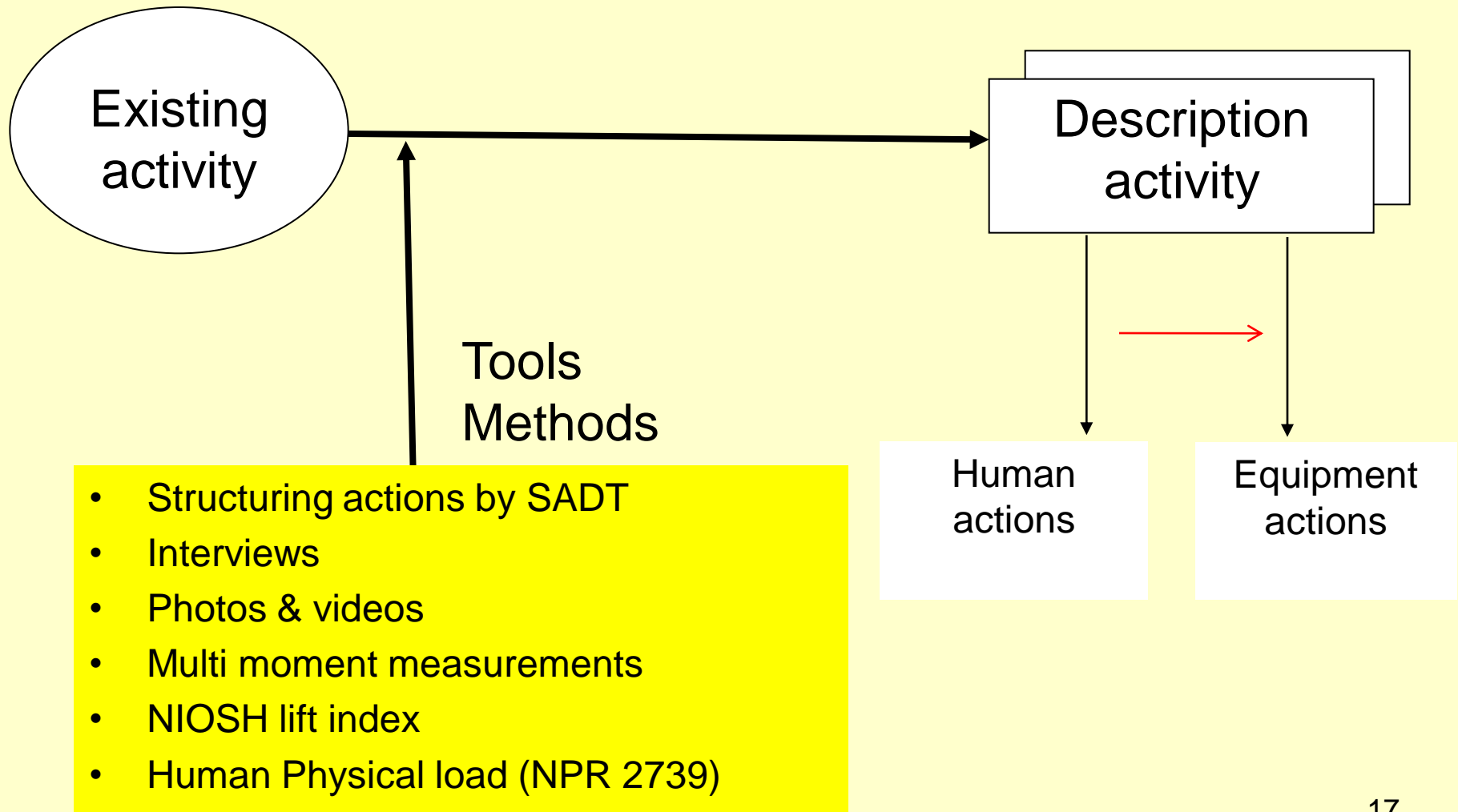
House as a robot



How to generate end-user values

- ❑ Analyzing activities and actions
- ❑ Collaborative design

Analyzing ADL



Analyzing peeling potatoes



Exercise analyzing Activity Daily Living

Peeling potatoes



Analyzing activities

Initial stage

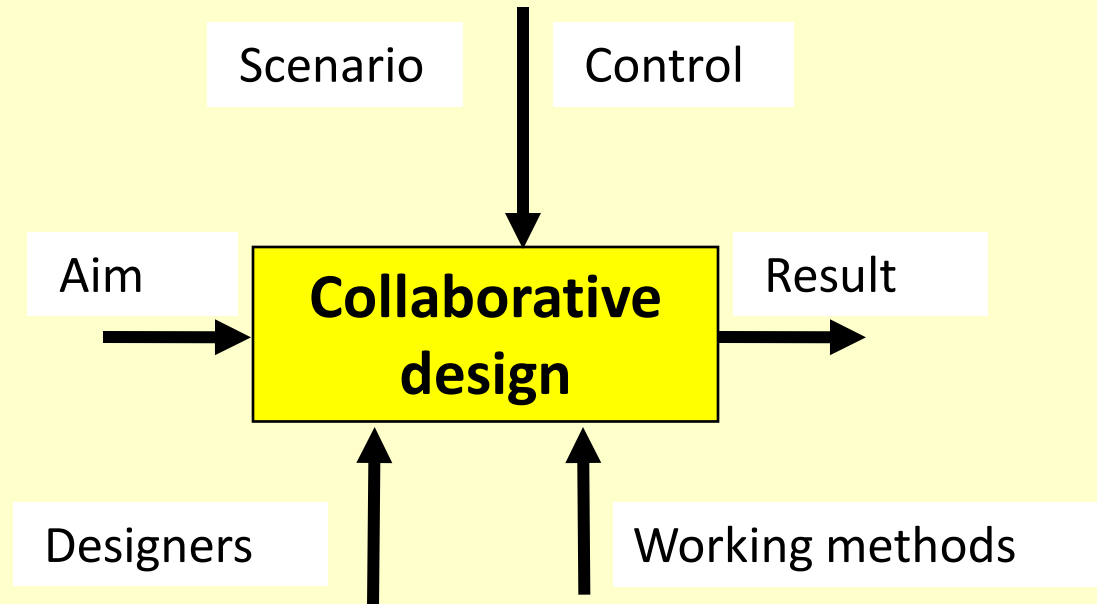


| Sequence | Activity | Equipment used for the activity and describing its sub-activity. | Describing the sub-activities by people |
|----------|----------------------------|--|--|
| 1 | Making the workplace ready | Chair: sitting Newspaper: peelings storage | Choosing a comfortable working place |
| 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 |

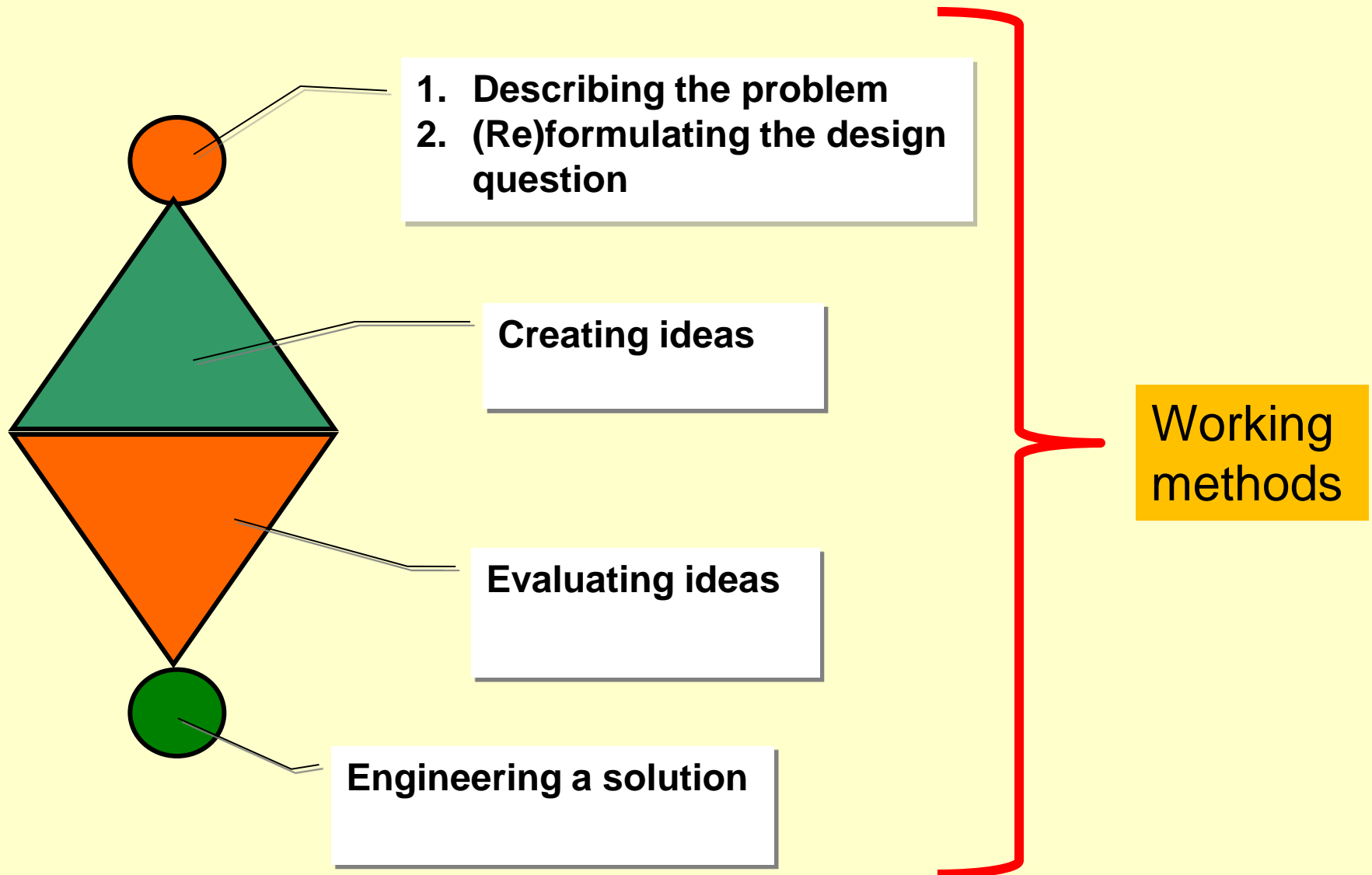
End stage



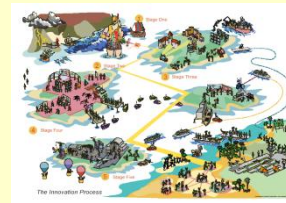
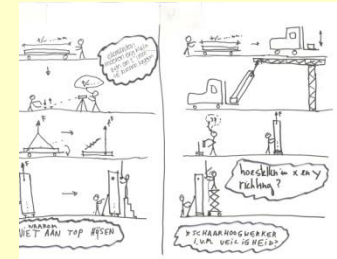
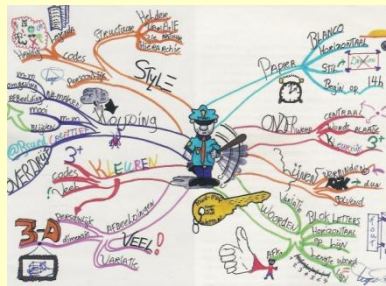
Collaborative design



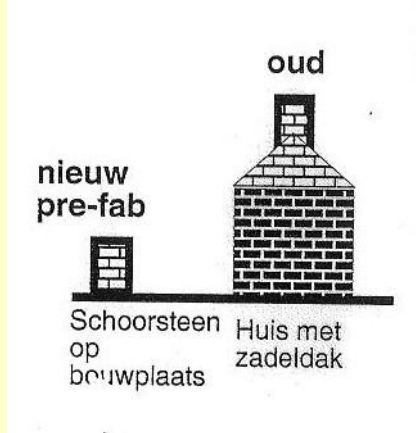
Scenario collaborative design



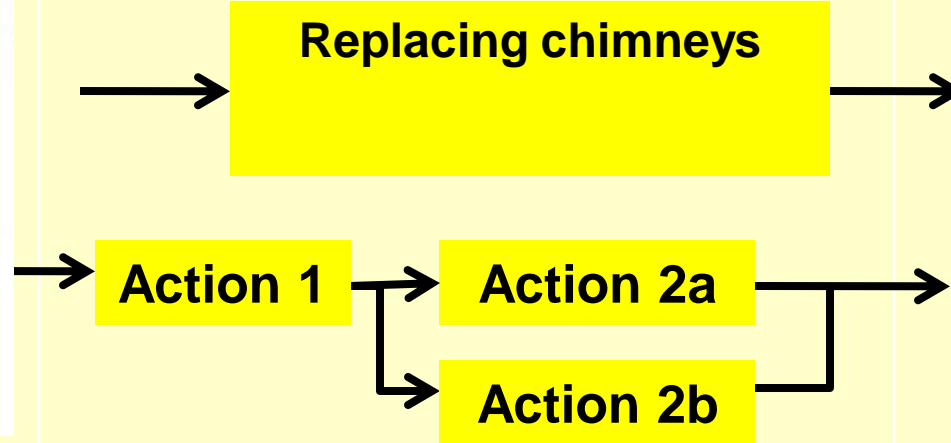
Ruimte maken met behulp van werkvormen



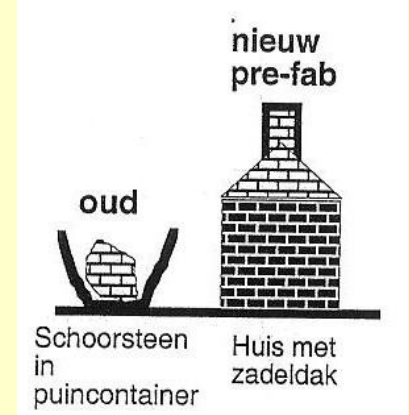
Initial stage



Designing an improved activity



End stage



Characteristics initial stage

- Old chimney on the roof
- New chimney on the ground
- Pre fab chimney

Requirements

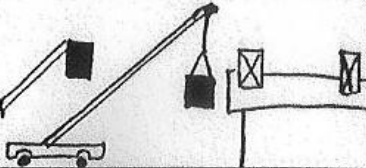
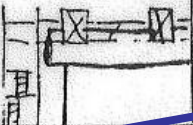
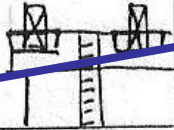
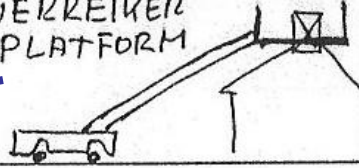


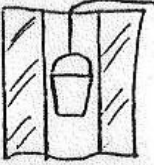
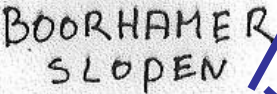
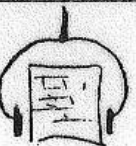
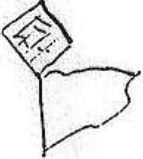
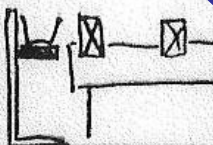
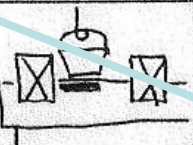
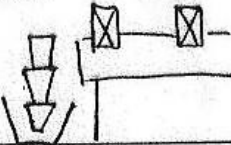
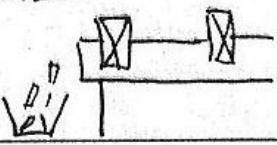

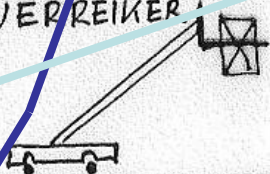
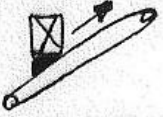
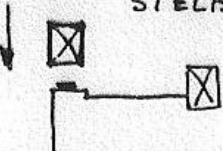
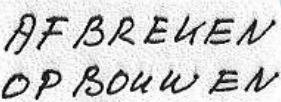
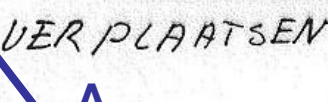
1. Working method suitable for about 100 chimneys in one street
2. Maximum renovation time: four hour per chimney
3. Safe working place on the roof

Wishes

1. Minimal costs
2. Minimal time

Characteristics end stage

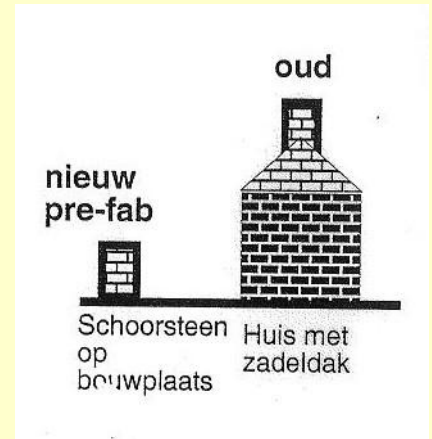
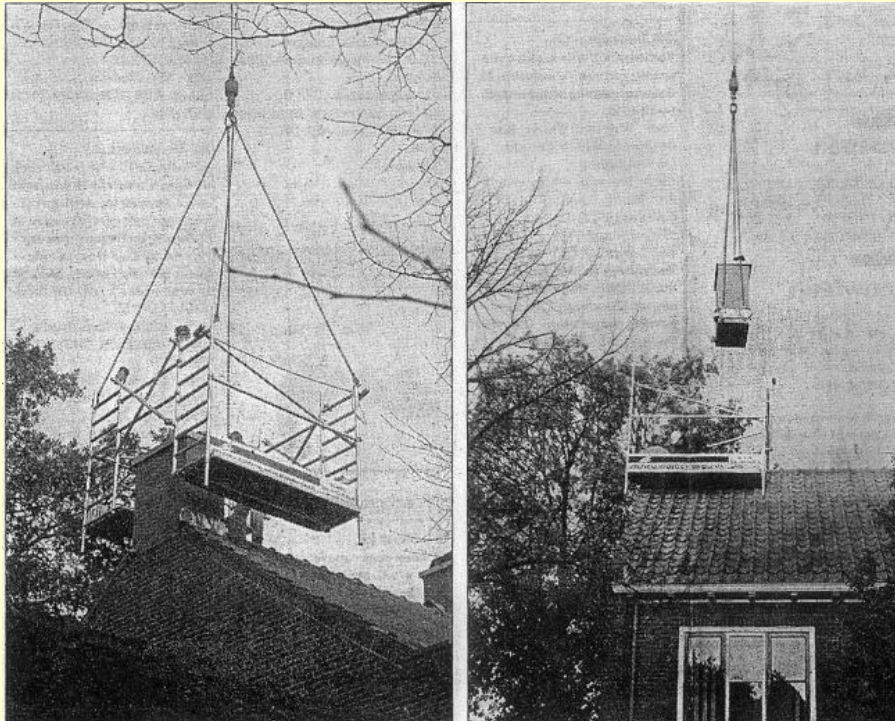
- New chimney on the roof
- Demolished chimney in rubble container

| | Werkwijze I | Werkwijze II | Werkwijze III | Werkwijze IV |
|--|---|---|---|--|
| F1 WERKPLEK BEREIKBAAR MAKEN |  | STEIGER  | PLATFORM LADDER  | VERREIKER PLATFORM  |
| F2 SCHOORSTEEN PIJP SCHOON HOUDEN | PROP  | LUCHT BAL  | EMMER  | |
| F3 OUDE SCHOORSTEEN SLOPEN | BOORHAMER SLOPEN  | KRAAN KLEM  | OMDUWEN  | |
| F4 OUDE SCHOORSTEEN AFVOEREN | LIFT BAK  | KRAAN BAK  | STORTKOPER BAK  | GODIEN  |
| F5 NIEUWE SCHOORSTEEN AANVOEREN | KRAAN  | VERREIKER  | TRANSPORTEUR  | |
| F6 NIEUWE SCHOORSTEEN PLAATSEN | STELALLES  | | | |
| F7 VERPLAATSEN WERKPLEK | AFBREKEN OPBOUWEN  | VERPLAATSEN  | | |

B

A

Solution in practice



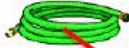















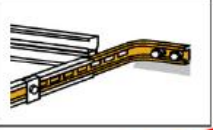













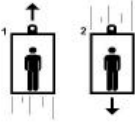















Conclusion

Select the suitable working methods to enhance end-user values

Questions?

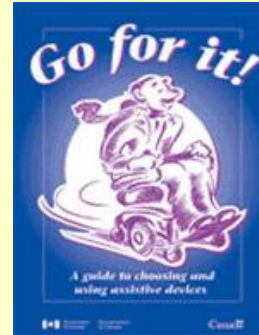


| Cleaning windows | | | | | | |
|------------------------------|--|--|--|--|--|--|
| Connecting to water |  Tap water |  Bucket with water |  Through hose |  Reservoir |  Water-butt |  All-in-one unit |
| Adding detergent |  All-in-one unit |  Empty a bottle in bucket |  Dissolving tablet |  Spraying glasses on window |  In windows integrated detergent nozzle (like a car) | |
| Cleaning windows with sponge |  Sponge with detergent |  Sponge on a stick |  Sponge on a water hose |  Magnetic sponge system for cleaning windows inside and outside at the same time |  Robotic sponge |  Dirt repellent windows |
| Swiping windows |  Wipers |  Rail with wipers |  Wiper on a stick |  Magnetic wipe system for wiping windows inside and outside at the same time |  Robotic wiper |  Self drying windows |
| Drying windows with chamois |  Chamois on stick |  Magnetic chamois for drying windows inside and outside at the same time |  Robotic chamois |  Chamois on a rail |  Self drying windows | |
| Reaching high places |  Robotic system |  Magnetic system |  Using a long stick |  Rail |  Elevator |  Platform |
| Reaching lower places |  Parapet of 1m |  Magnetic system |  Using a stick |  Rail |  Robotic system |  Tilted window |
| Drying difficult corners |  Tilted window |  Robotic system |  Chamois with forms around corner |  Rail |  Self drying windows |  Blowing hot air alongside the corners |



A humanoid robot named Chrome-kid picks up a tee-shirt from a laundry basket to fold it during the housekeeping robot contest in Kawasaki in Kanagawa prefecture, suburban Tokyo on August 17, 2008. 15 hand-made robots participated the preliminary competition and will be vying for the total prize of money 1 million yen in the final next month.

Architectural robots



<http://www.youtube.com/watch?v=MjunOm0oLuA>

<http://www.youtube.com/watch?v=s1E3AtnlS5g>

<http://www.youtube.com/watch?v=-k2j2WKaMws>

[http://www.metacafe.com/watch/2395592/interactive toilet itoi demonstration video/](http://www.metacafe.com/watch/2395592/interactive_toilet_itoi_demonstration_video/)

Form to report activities **Washing hands**

Initial stage Dirty hands, tablet of soap, water

| Sequence | Activity | Equipment used for the activity and describing its sub-activity. | Describing the sub-activities by people |
|----------|-------------------|--|---|
| 1 | Moisten the hands | Tap: delivering water | Turning on and off the tap |
| 2 | Soaping the hands | Tablet of soap: delivering soap | Rubbing the soap |
| 3a | | | |
| 3b | | | |
| | | | |
| | | | |
| | | | |

End stage: Clean hands, dirty water

Activities of Daily Living (ADL)

The current model seeks to define 'what living means' (Roper et al, 2000, p15) and it breaks it down into the following categories:

- Maintaining a safe environment
- Breathing
- Eating and drinking
- Communication
- Elimination
- Washing and dressing
- Controlling temperature
- Mobilization
- Working and playing
- Expressing sexuality
- Sleeping
- Death and dying

Roper N., Logan W.W. & Tierney A.J. (2000). *The Roper-Logan-Tierney Model of Nursing: Based on Activities of Living*. Edinburgh: Elsevier Health Sciences. ISBN 0443063737.

<http://books.google.co.uk/books?id=RJ21IkAZQQ4C>.

Retrieved from "http://en.wikipedia.org/wiki/Roper-Logan-Tierney_model_of_nursing"

DE BAAS DENKT EEN
FLINK EIND VOORUIT,
VREES IK



VIDEO's

<http://world.honda.com/ASIMO/>

<http://www.youtube.com/watch?v=gfVZnGiG-rw>

<http://www-robotics.usc.edu/?l=Robots:Movies>

<http://www.twarobotics.nl/>

Mechanization & robotization ADL



ASIBOT is portable assistive robot for elderly and disease people bringing more freedom in daily tasks as eating, drinking, shaving, make up, tooth cleaning, etc. The robot is under experimentation in the National Hospital of Paraplegics in Toledo.

Paro

