Paving the way to culturally-competent robots: the CARESSES project

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The concepts expressed in this presentation have been contributed by all CARESSES partners, and in particular:

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Antonio Sgorbissa,
EU Coordinator,
University of Genova, Italy

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- Methodology
- Key issues and challenges

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Paving the way to culturally-competent robots: the CARESSES project.

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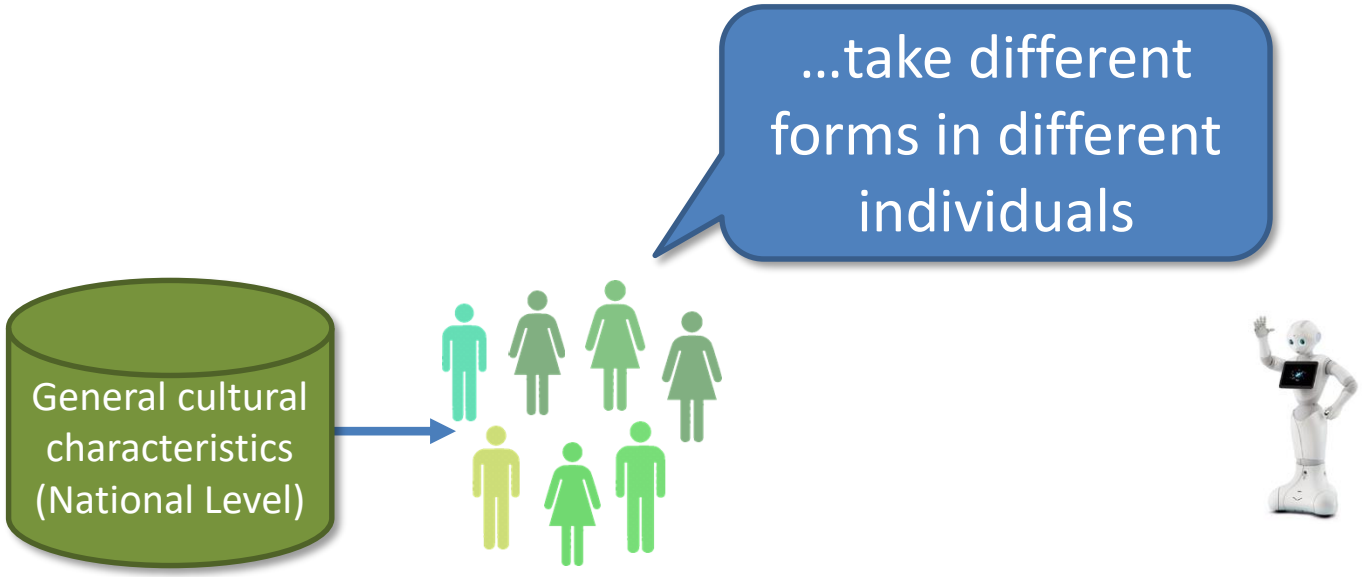

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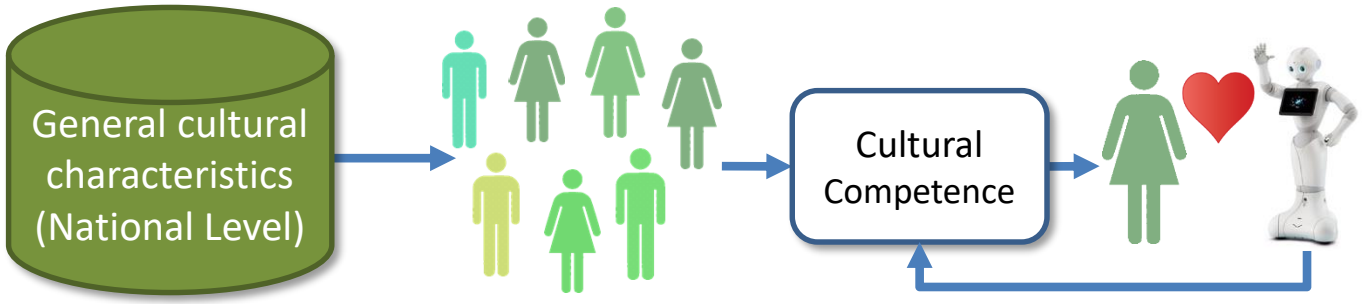

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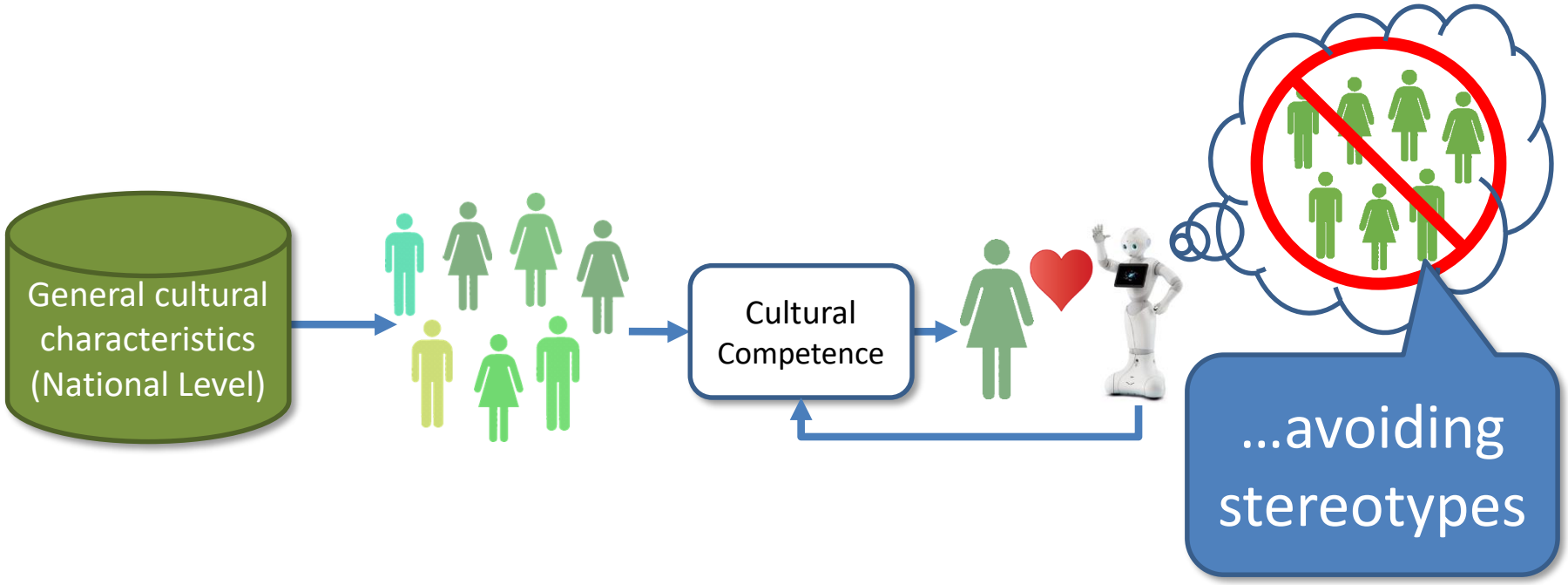

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“If you date an Italian man, he will pay the bill at the restaurant.” [1]

[1] http://www.theitalianbridge.com/italian-blog/italian-men-more-than-just-a-stereotype

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In the best case, stereotypes consider the most frequent event instead of the whole distribution.

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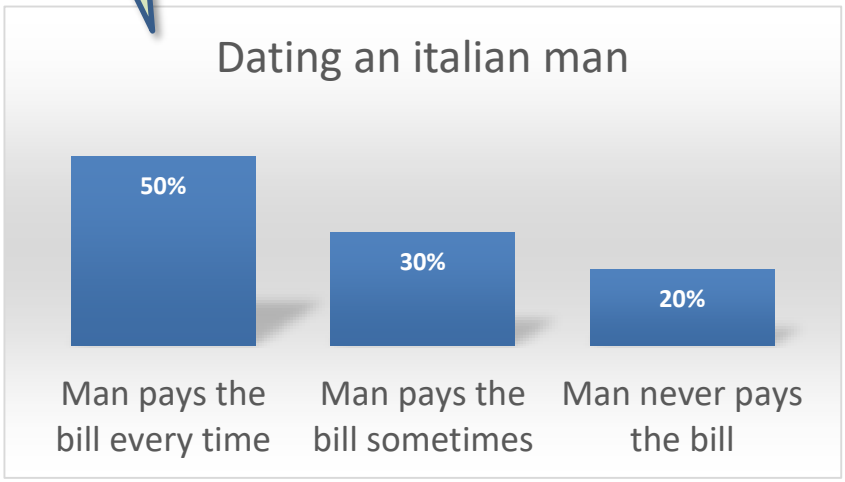

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In the best case, stereotypes consider the most frequent event instead of the whole distribution.

In the worst case, they are an inaccurate representation of the reality.

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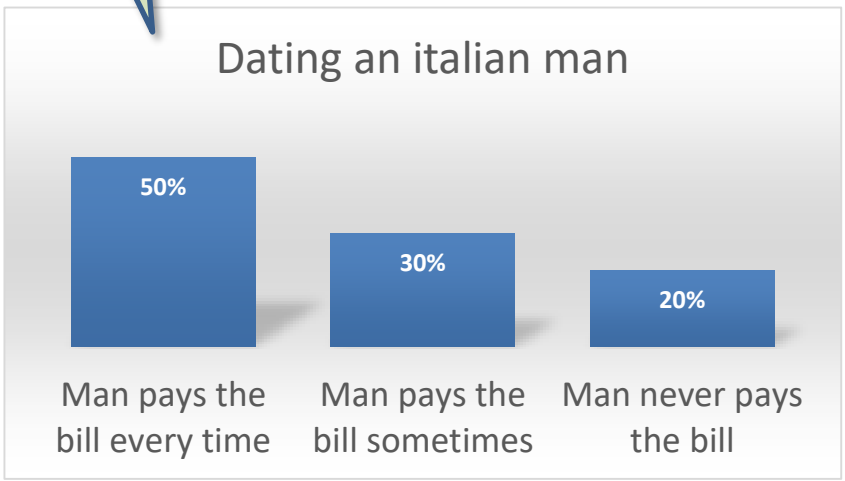

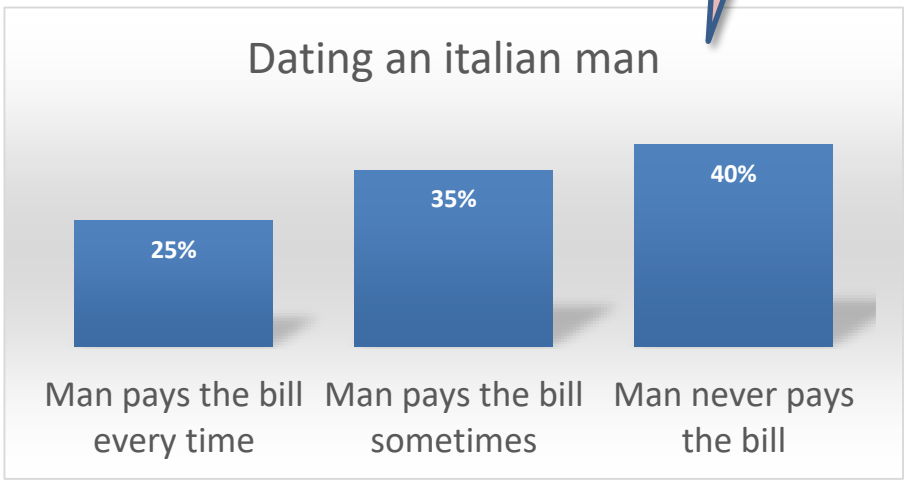

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From a commercial perspective, stereotyped representations can lead to FAILURE.

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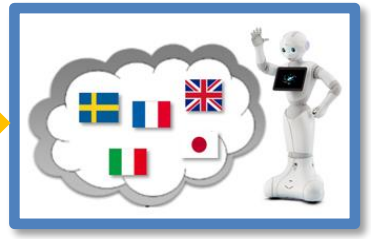
Cultural competence



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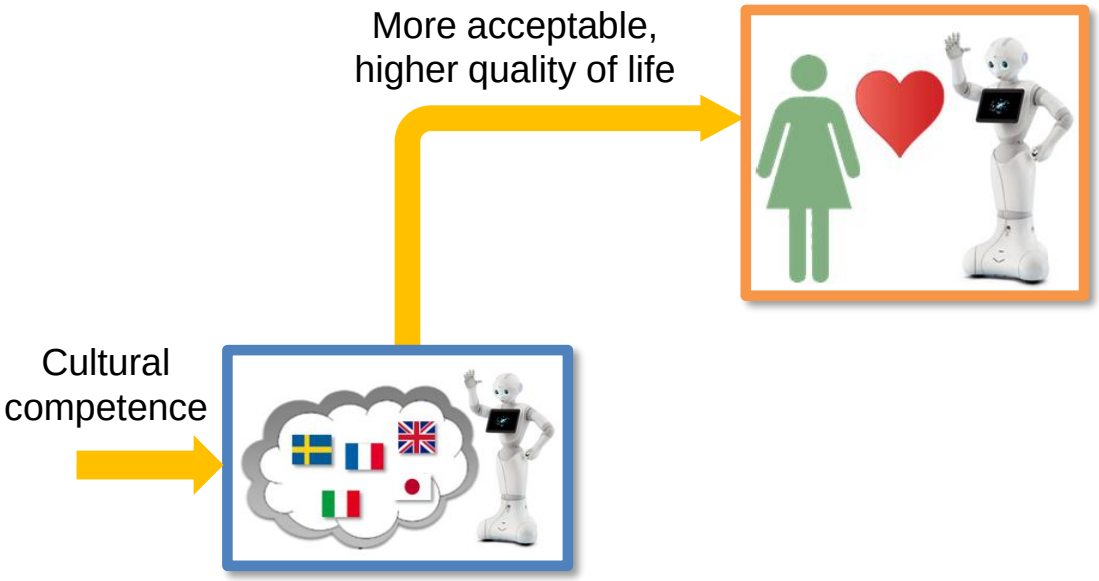

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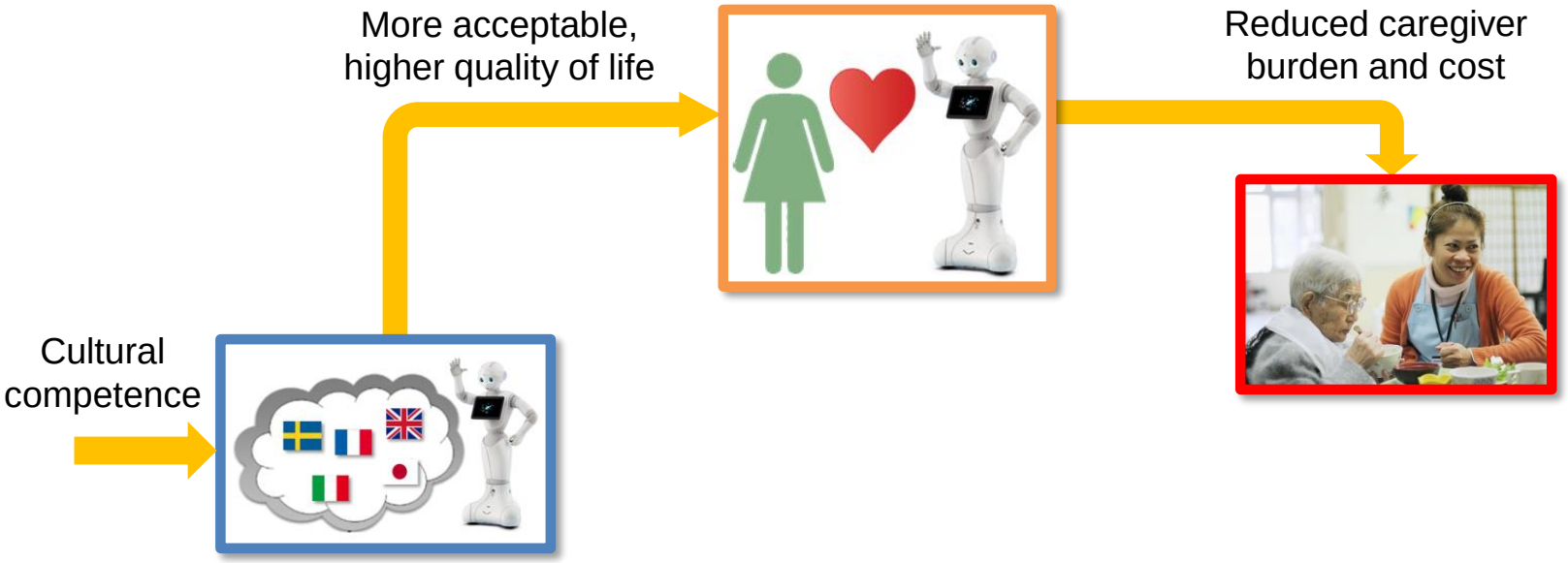

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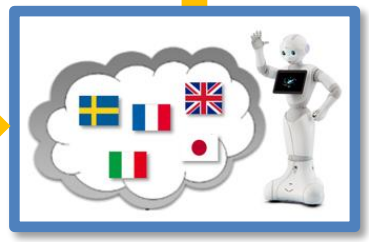
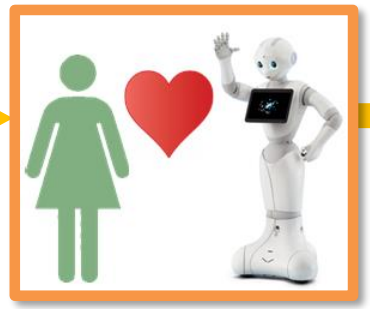
Cultural competence



More acceptable, higher quality of life



Reduced caregiver burden and cost

Easier to commercialize in different countries

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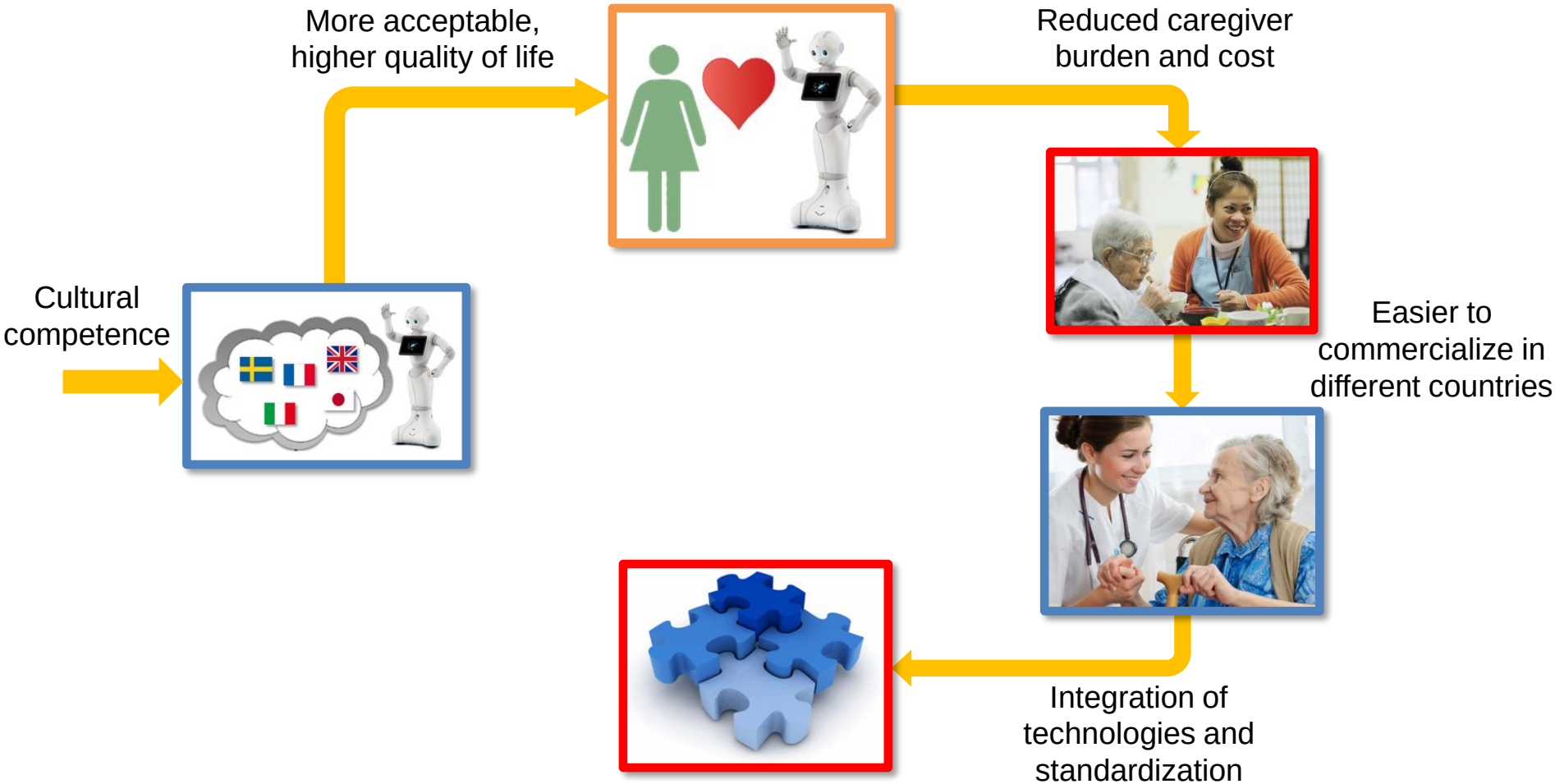

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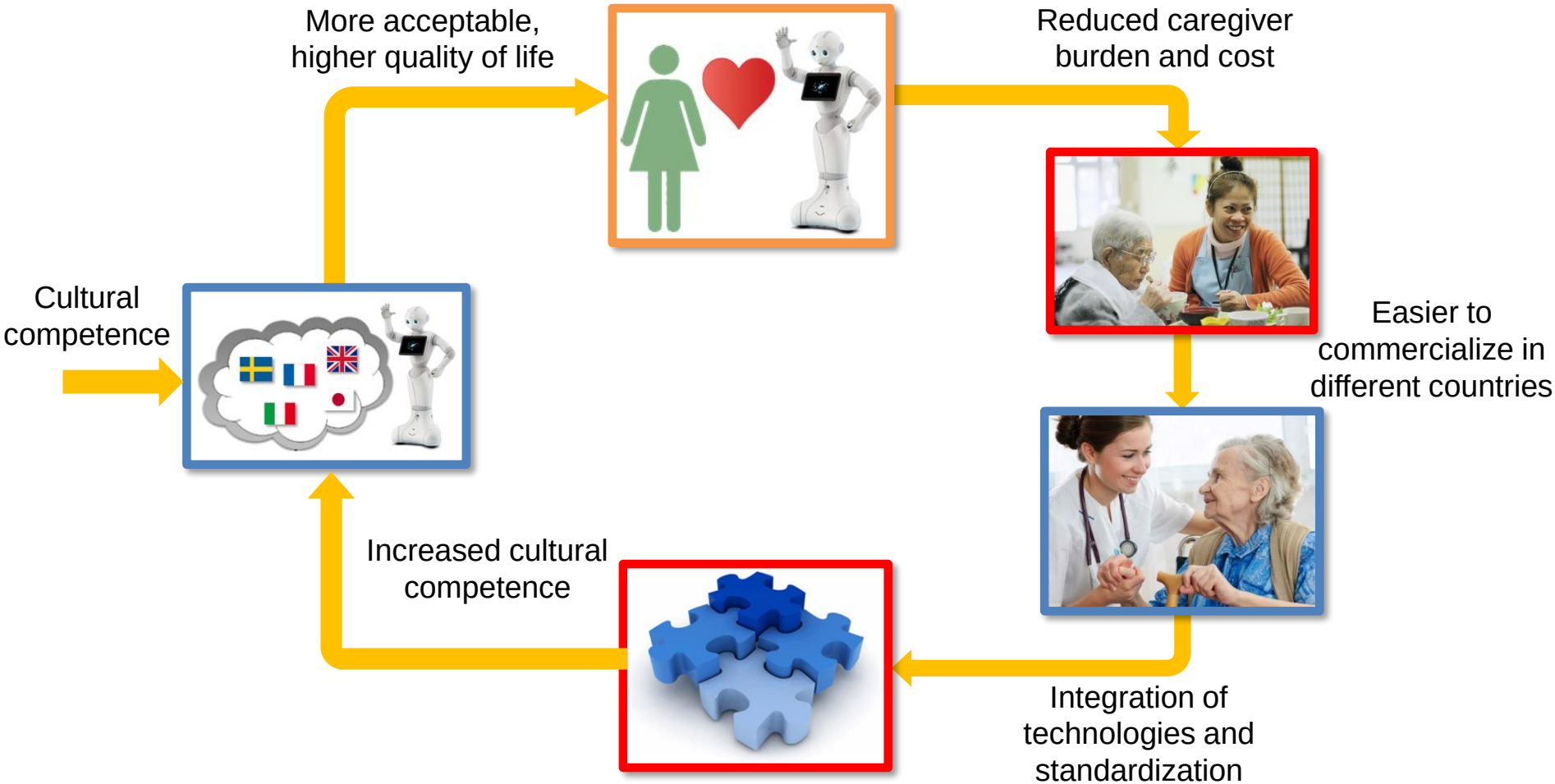

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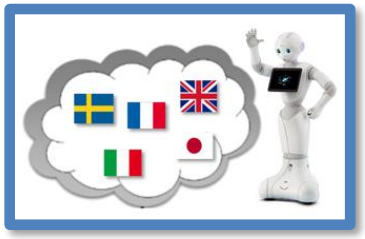
Some practical examples...



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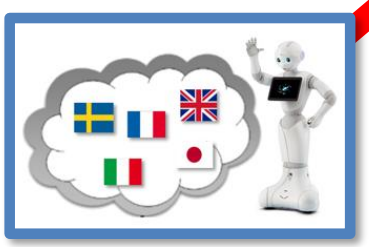
Some practical examples...

Choose the right action



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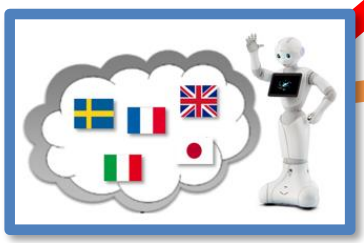
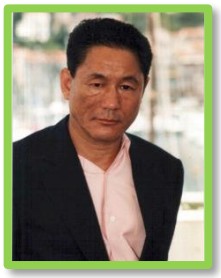
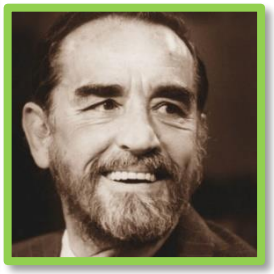


Choose the right action

Choose the right topic of conversation (which actor, food, holidays?)





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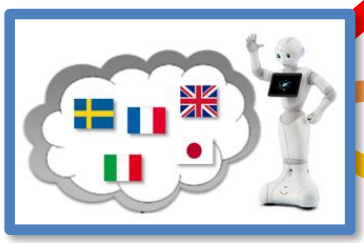

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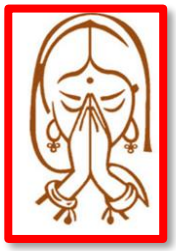

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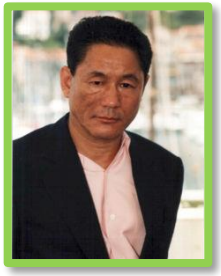

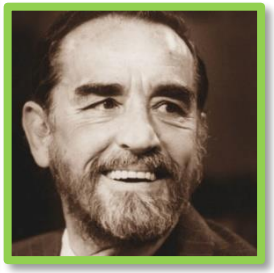

- Know the environment, furniture and objects.

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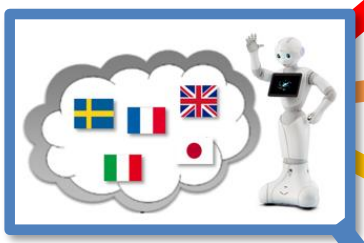
Some practical examples…



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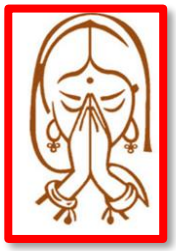

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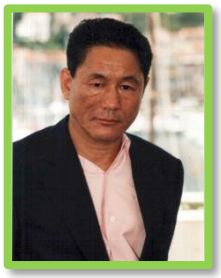

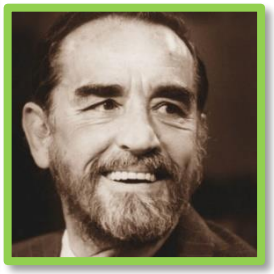

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Other…

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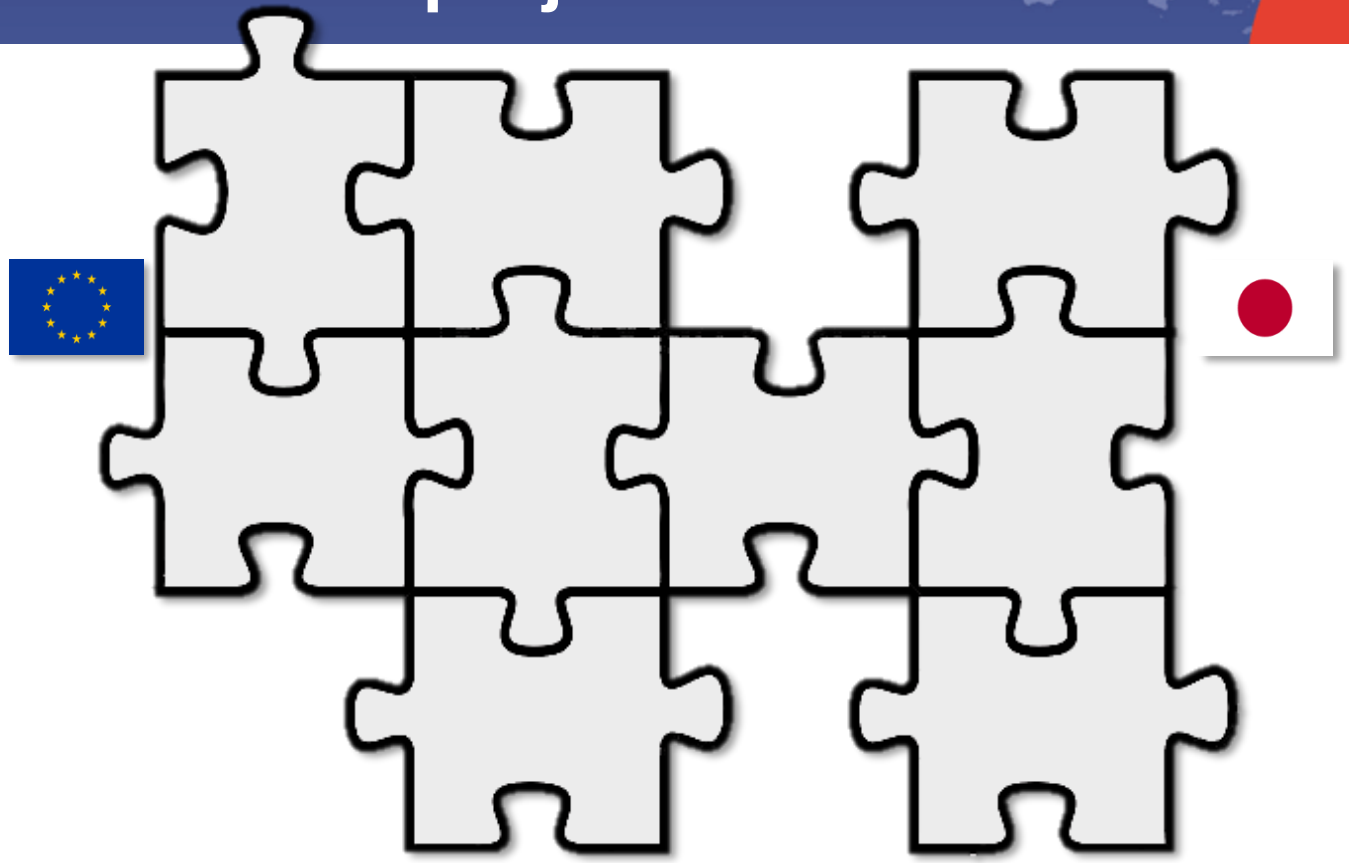

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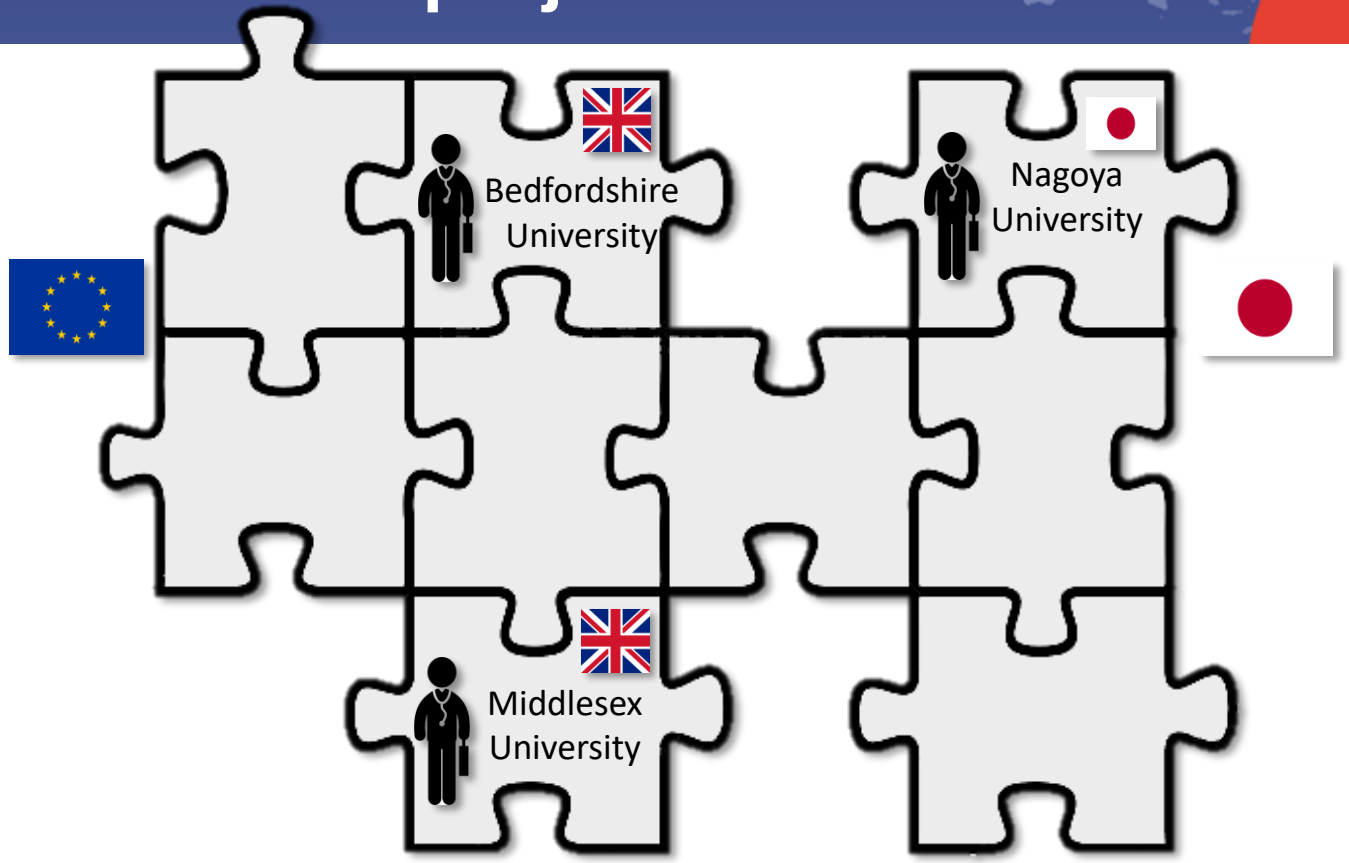
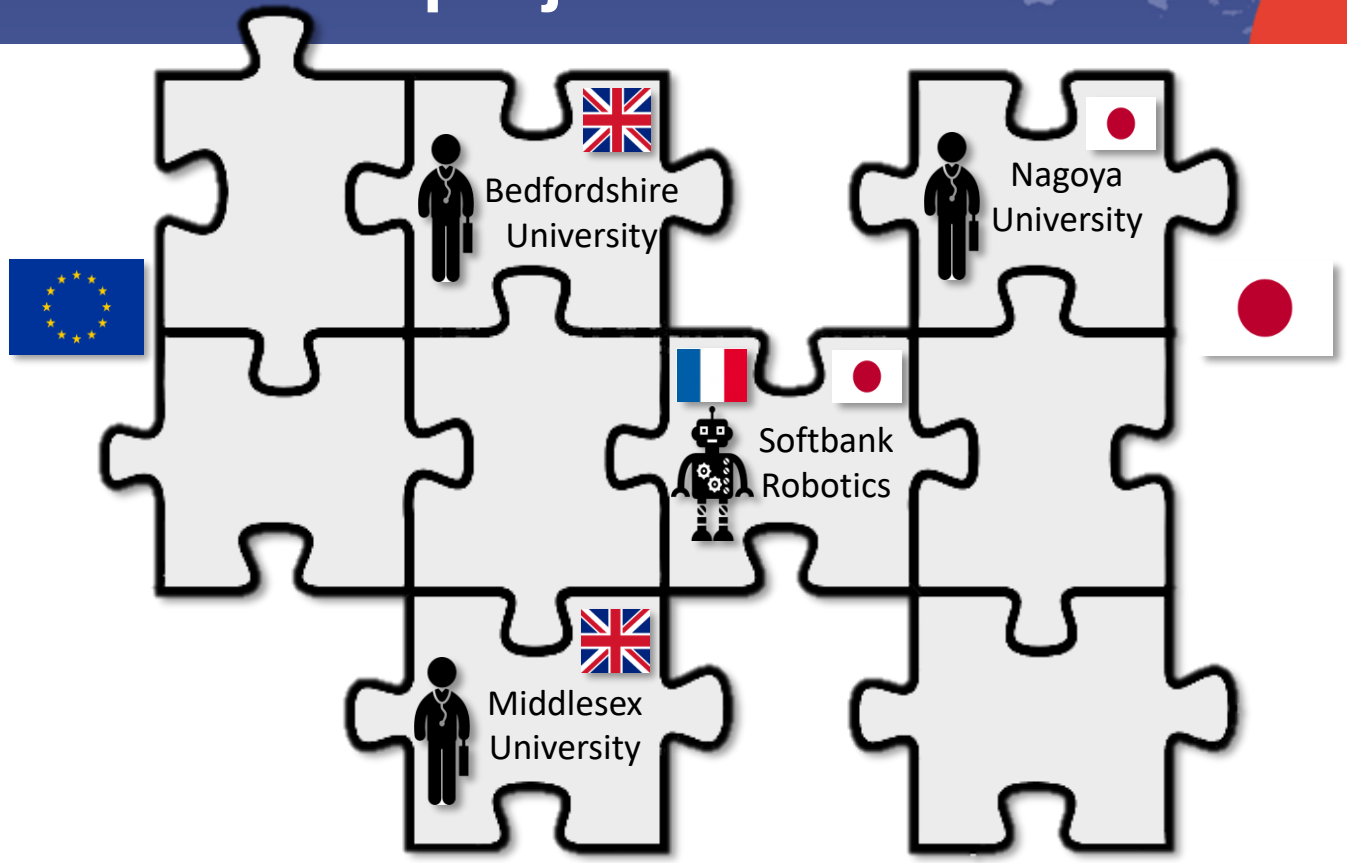


Health & user evaluation

Paving the way to culturally-competent robots: the CARESSES project.



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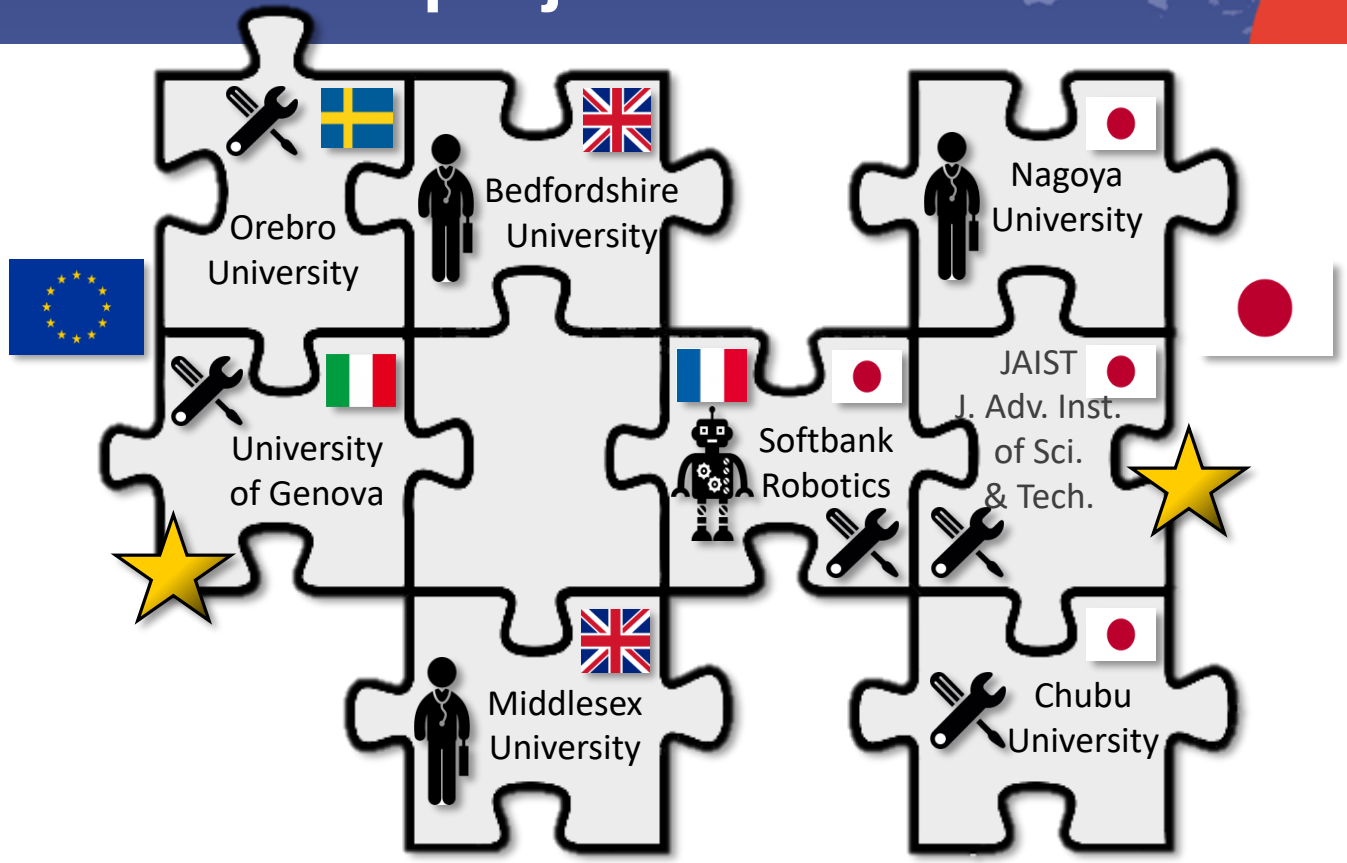

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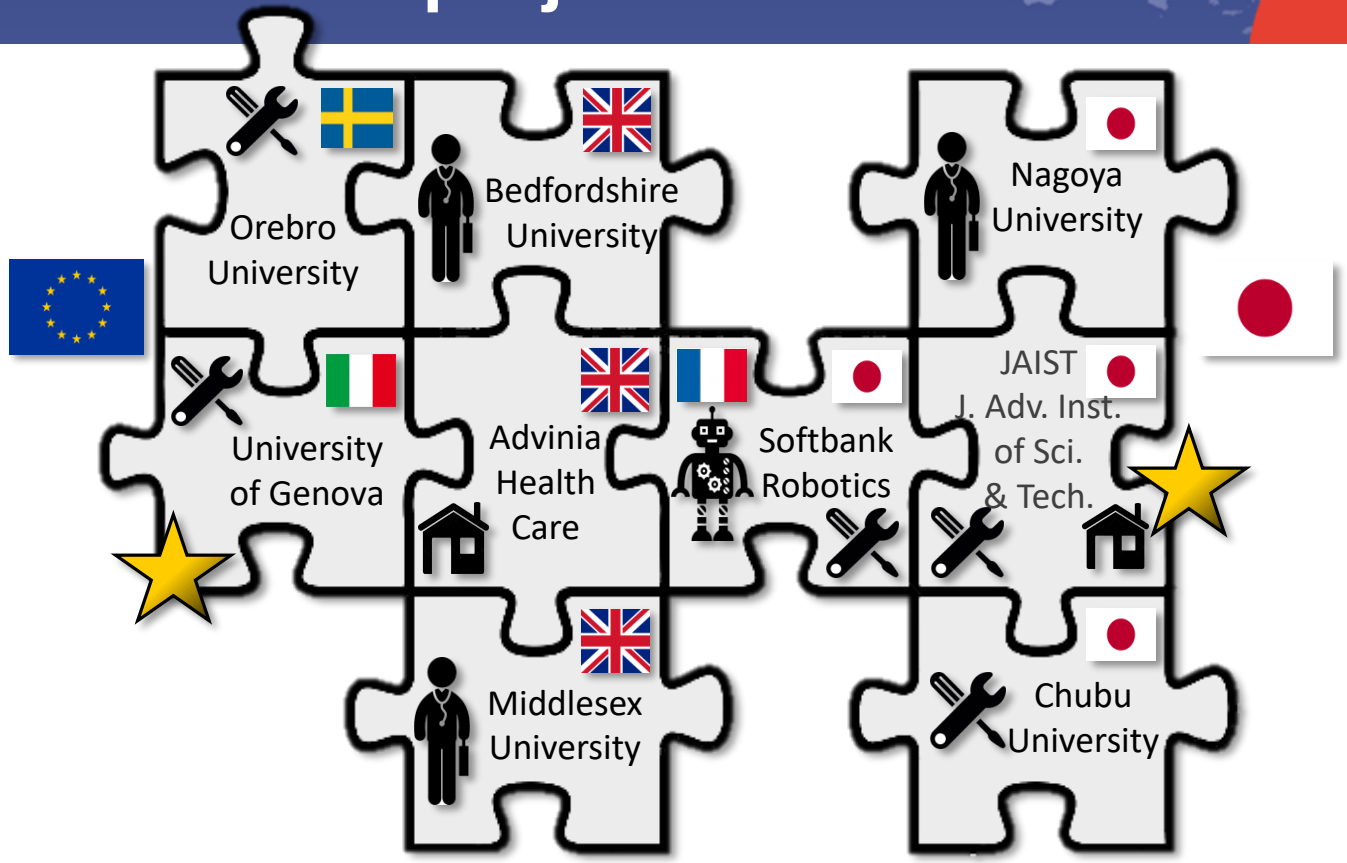

Health & user evaluation

Robot technology

Technical development

Testing facility

EU-Japan Centre for Industrial Cooperation
日欧産業協力センター

www.EUbusinessinJapan.eu

Paving the way to culturally-competent robots: the CARESSES project.

Transcultural
Robotic
Nursing

Paving the way to culturally-competent robots: the CARESSES project.

Transcultural Robotic Nursing

Observing interactions between persons and caregivers…

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Transcultural Robotic Nursing

...and writing guidelines for Culturally competent robots.

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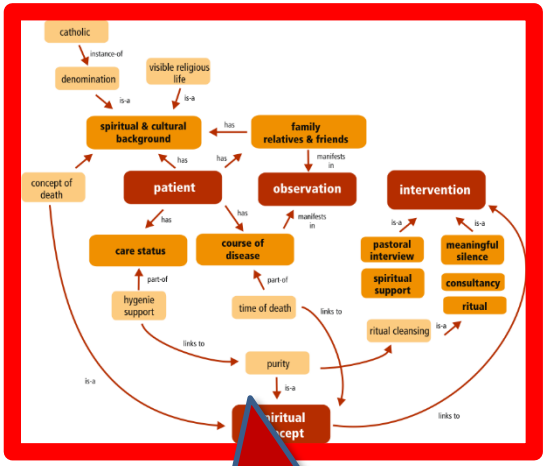
Transcultural Robotic Nursing

Cultural Knowledge Representation

Paving the way to culturally-competent robots: the CARESSES project.

Transcultural Robotic Nursing

Cultural Knowledge Representation



Preparing a framework for cultural knowledge representation…

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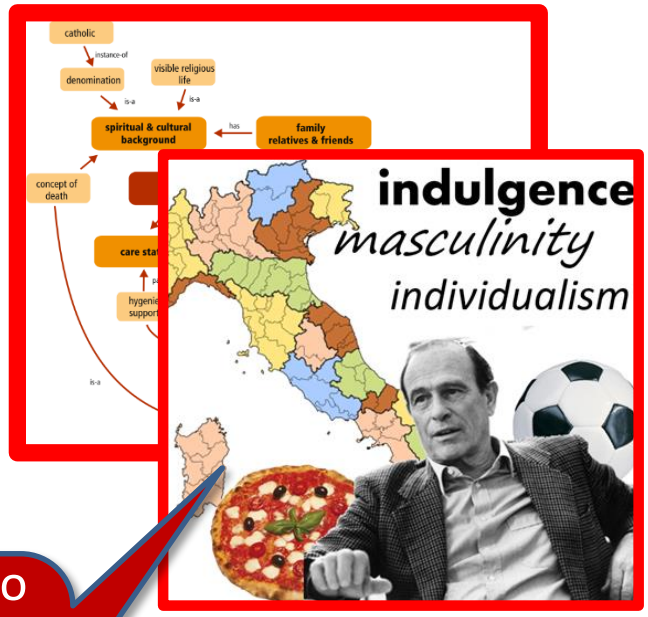
Transcultural Robotic Nursing

Cultural Knowledge Representation



…that can be used to encode cultural knowledge about groups and individuals.

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Transcultural Robotic Nursing

Cultural Knowledge Representation

Culturally sensitive planning and execution

Paving the way to culturally-competent robots: the CARESSES project.

Transcultural Robotic Nursing

Cultural Knowledge Representation

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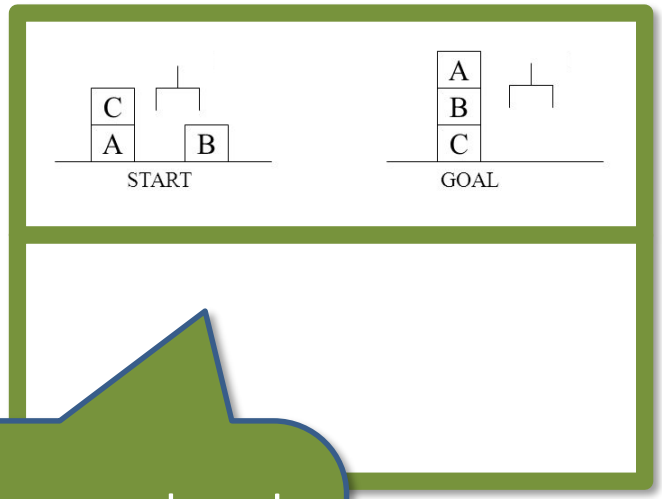

Defining a framework and policies for planning actions by taking into account the cultural identity of the assisted person…

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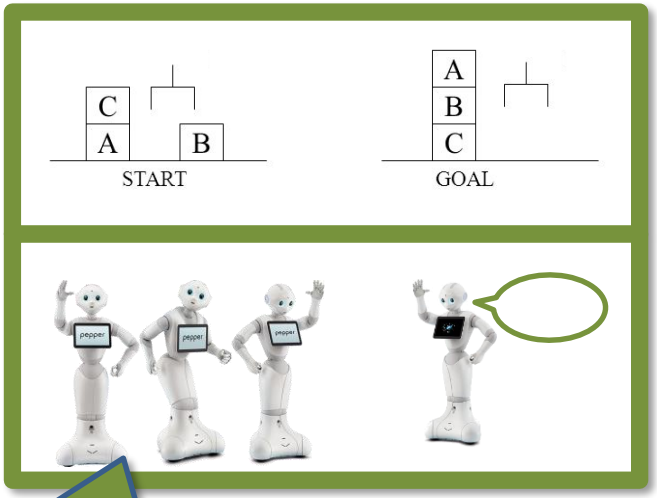
Transcultural Robotic Nursing

Cultural Knowledge Representation

Culturally sensitive planning and execution



…by considering both sensorimotor behaviour and verbal interaction.

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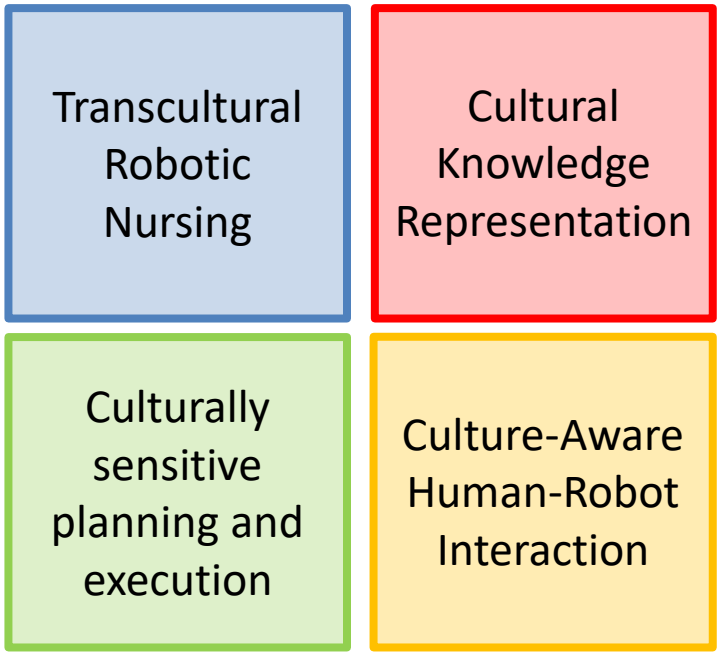

Paving the way to culturally-competent robots: the CARESSES project.

Transcultural Robotic Nursing

Cultural Knowledge Representation

Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

Design culturally competent sensorimotor behaviour and verbal interaction patters.

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Transcultural Robotic Nursing

Cultural Knowledge Representation

Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

Explore the opportunity of a smart ICT environment?

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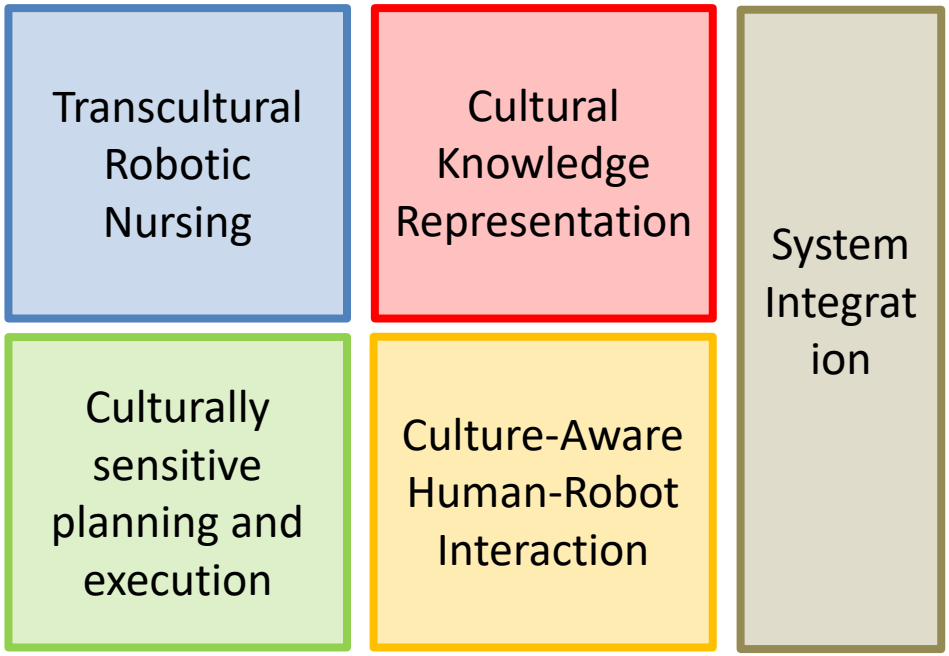

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Transcultural Robotic Nursing

Cultural Knowledge Representation

System Integration

Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

ECHONET

UNIVERSAAL

Integration of EU and Japan technologies for smart ICT environments

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Transcultural Robotic Nursing

Cultural Knowledge Representation

System Integration

Testing in Health-Care Facilities

Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

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Transcultural Robotic Nursing

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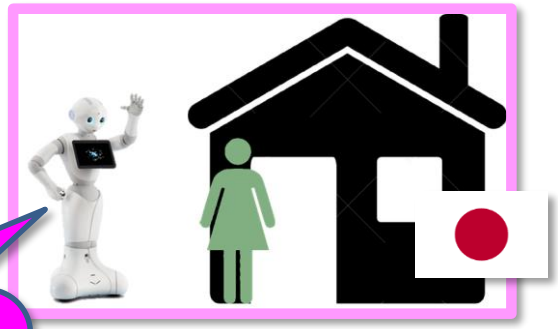

Make tests with persons in their own living space in a natural way.

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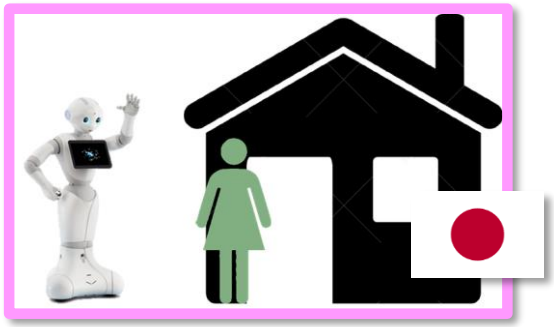
System Integration

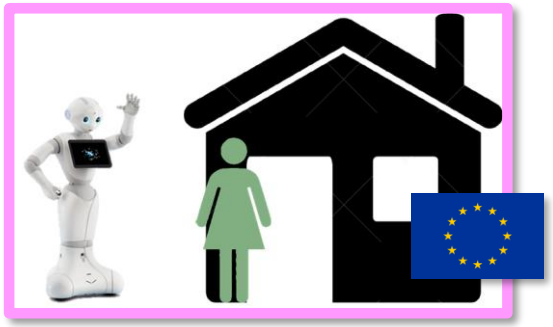
Testing in Health-Care Facilities



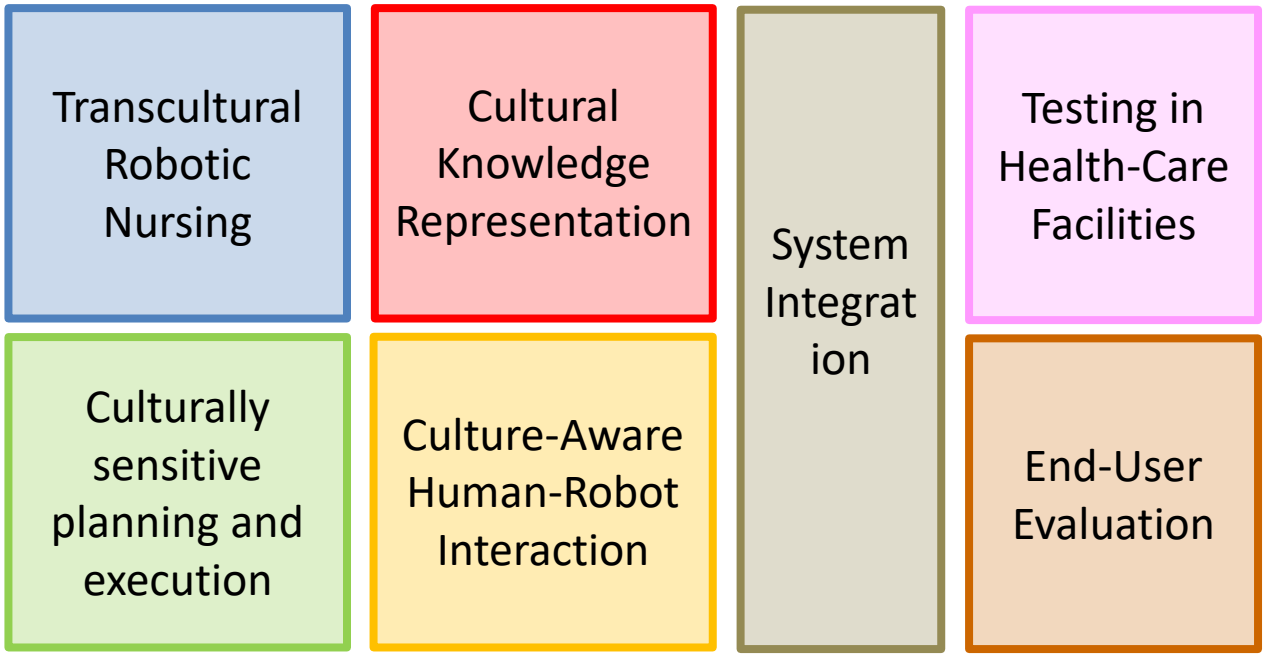
Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

Both in the EU and JAPAN



Paving the way to culturally-competent robots: the CARESSES project.



Paving the way to culturally-competent robots: the CARESSES project.

Transcultural Robotic Nursing

Cultural Knowledge Representation

System Integration

Testing in Health-Care Facilities

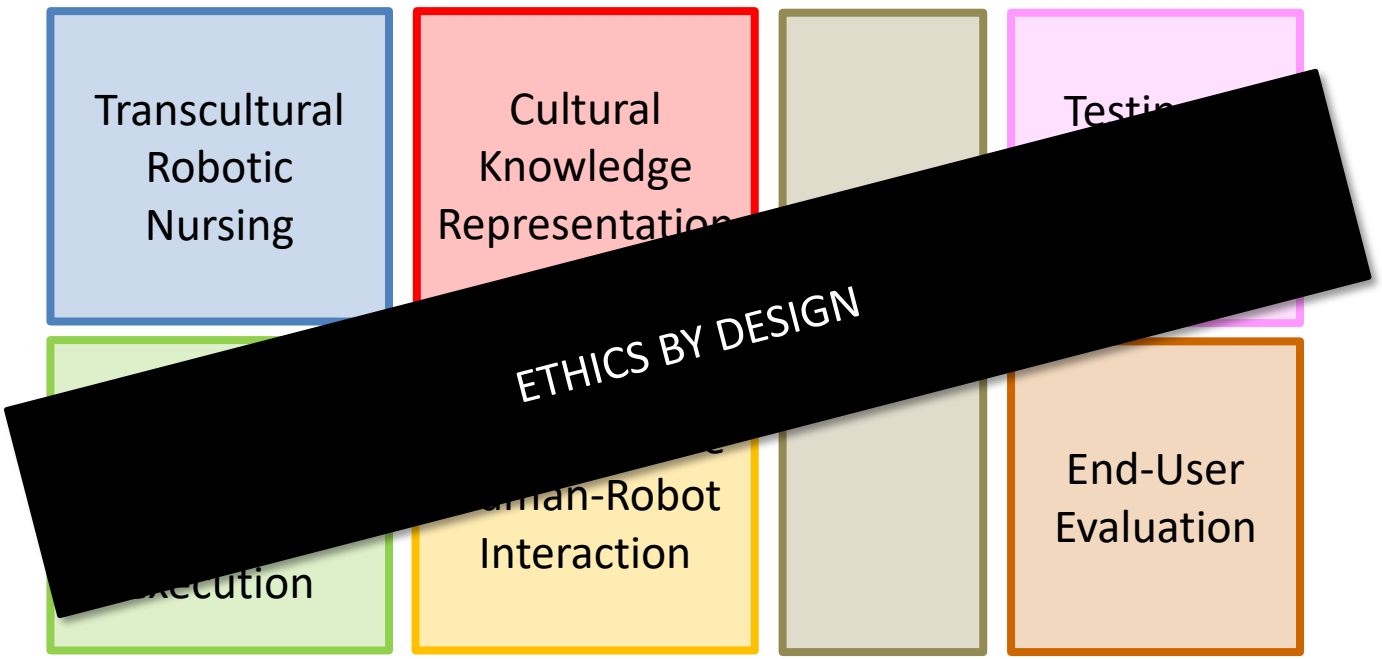
Culturally sensitive planning and execution

Culture-Aware Human-Robot Interaction

End-User Evaluation

Assess the impact of cultural competence and pave the way for future studies.

Paving the way to culturally-competent robots: the CARESSES project.



Paving the way to culturally-competent robots: the CARESSES project.

More details in:

Barbara Bruno, Nak Young Chong, Hiroko Kamide, Sanjeev Kanoria, Jaeryoung Lee, Yuto Lim, Amit Kumar Pandey, Chris Papadopoulos, Irena Papadopoulos, Federico Pecora, Alessandro Saffiotti, Antonio Sgorbissa,
Paving the Way for Culturally Competent Robots: a Position Paper, RO-MAN2017, IEEE International Symposium on Robot and Human Interactive Communication, Lisbon, Portugal, 28-31 August 2017

Barbara Bruno, Nak Young Chong, Hiroko Kamide, Sanjeev Kanoria, Jaeryoung Lee, Yuto Lim, Amit Kumar Pandey, Chris Papadopoulos, Irena Papadopoulos, Federico Pecora, Alessandro Saffiotti, Antonio Sgorbissa,
The CARESSES EU-Japan project: making assistive robots culturally competent, foritaal 2017, Ambient Assisted Living 8th Forum, Genova, Italy, June 12-15

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- The idea
- Methodology
- Key issues and challenges

Paving the way to culturally-competent robots: the CARESSES project.

- Transcultural Robot Nursing

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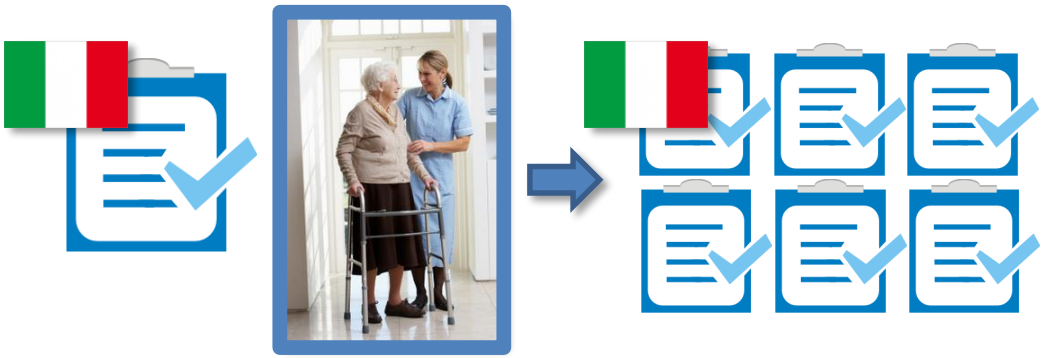

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- Cultural knowledge representation

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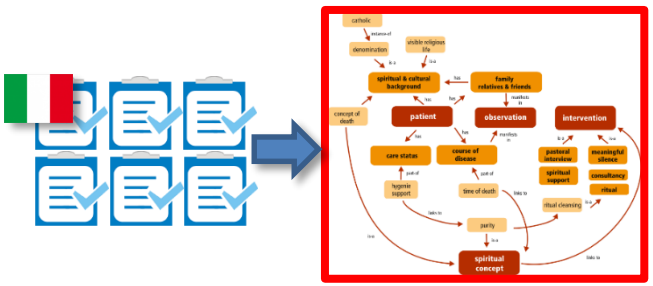

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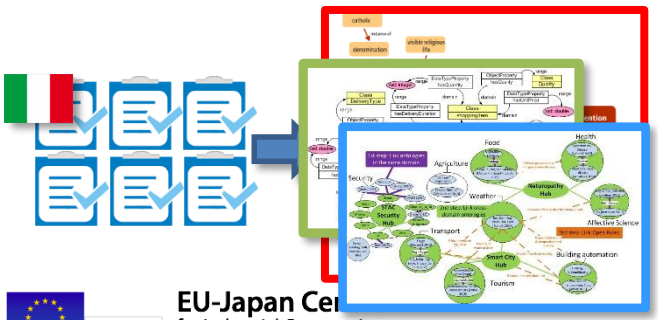

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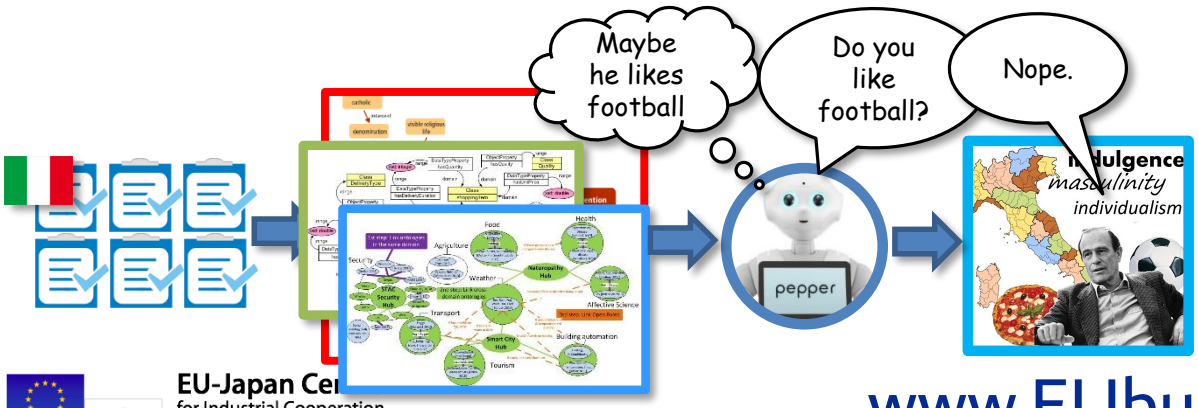

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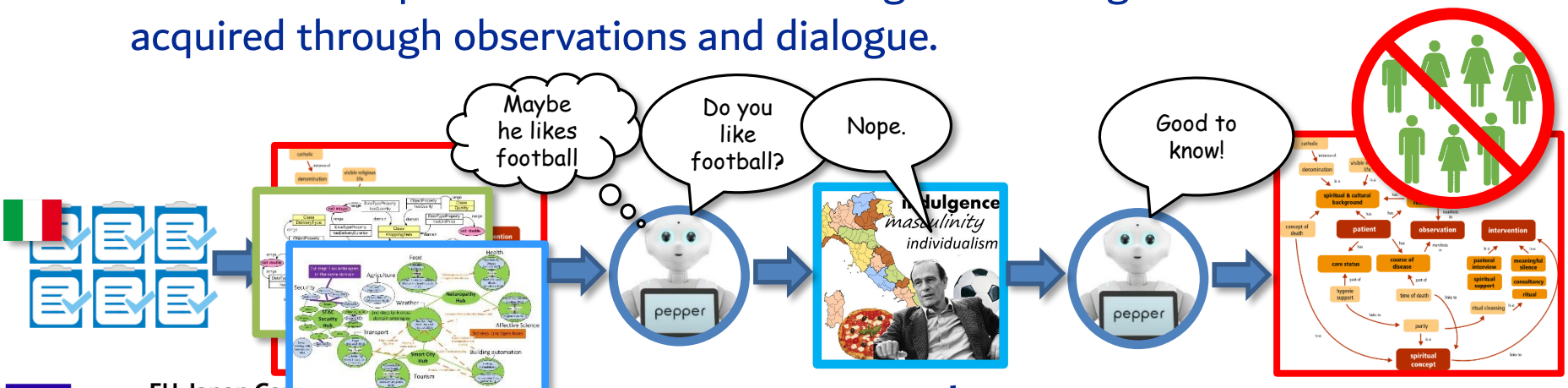

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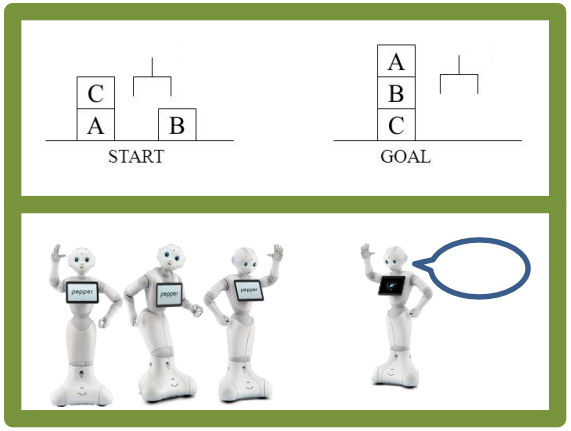

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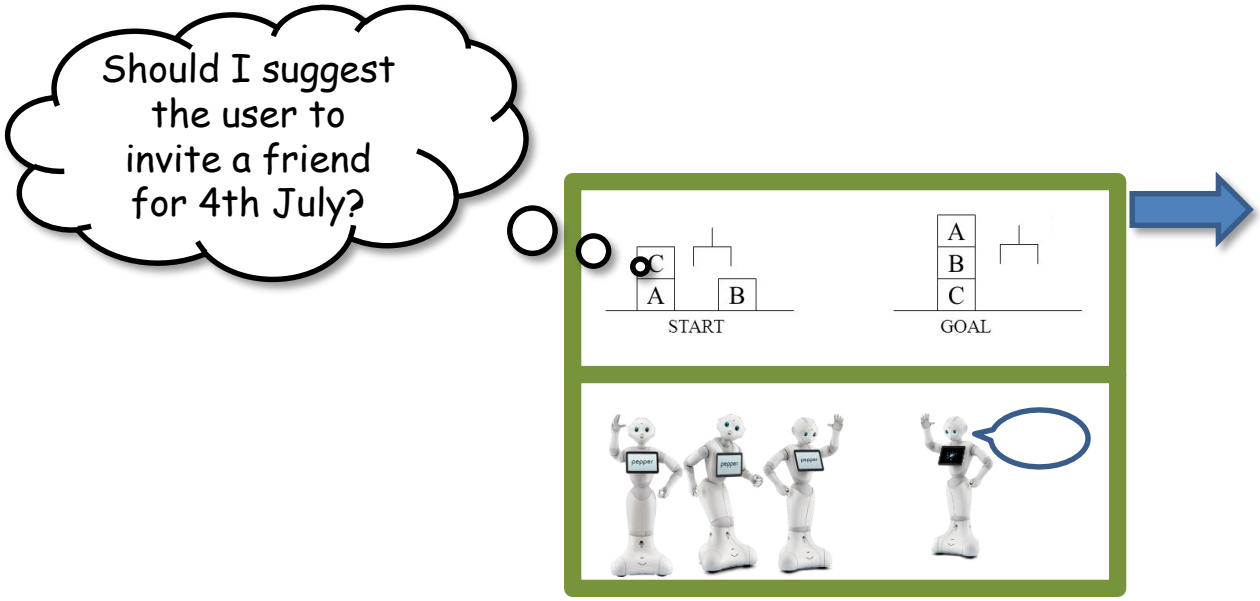

Use cultural information to set the right goal at the right time

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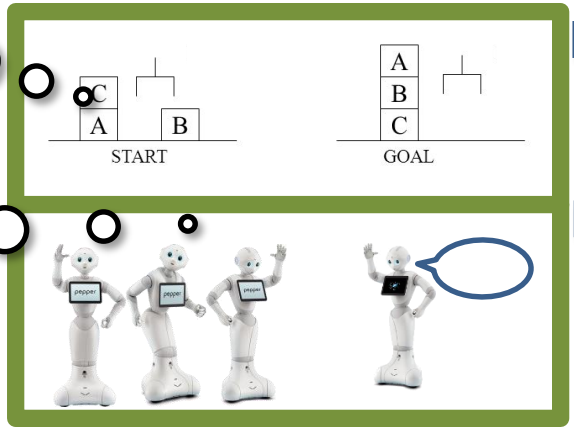
Should I suggest the user to invite a friend for 4th July?

Should I greet the visitor with a bow or shaking hands?



Use cultural information to set the right goal at the right time

Use cultural information to choose among alternative actions

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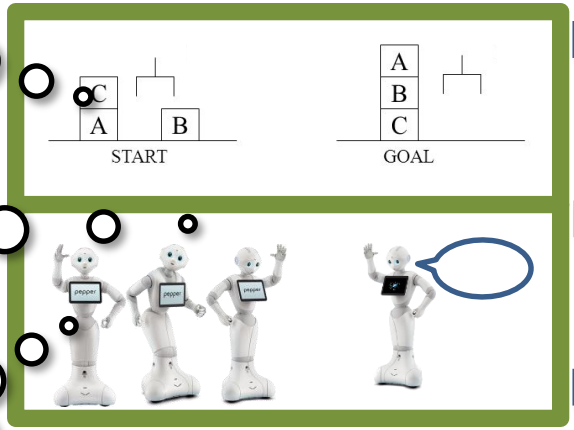

Use cultural information to set the right goal at the right time

Use cultural information to choose among alternative actions

Use cultural information to parametrize behaviours

Paving the way to culturally-competent robots: the CARESSES project.

- Culture-aware interaction in a smart ICT environment

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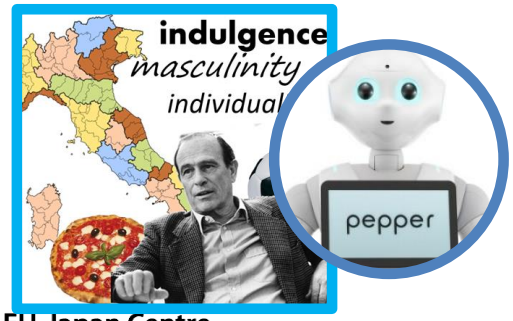

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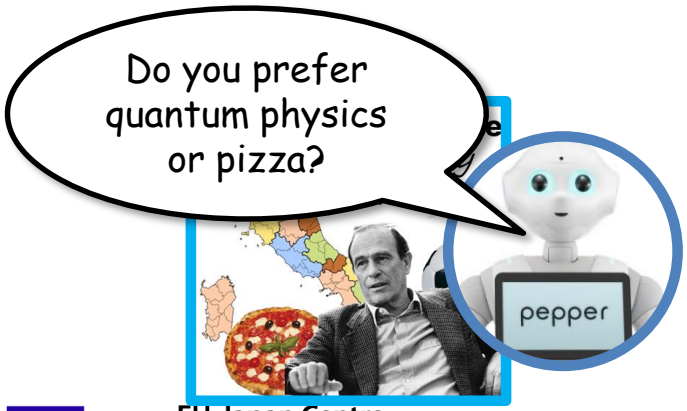

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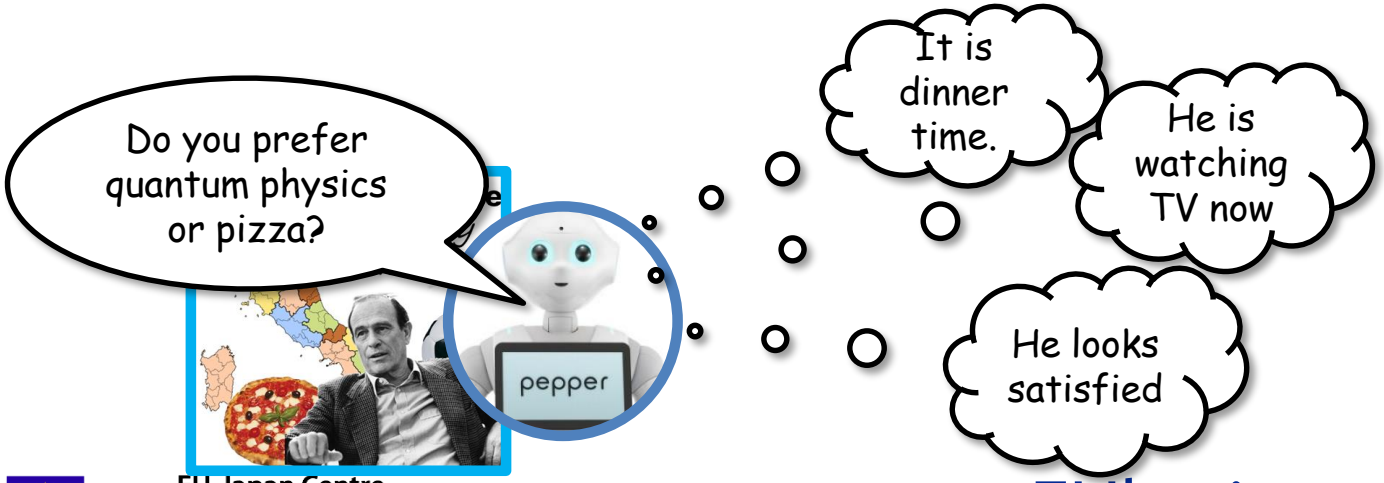

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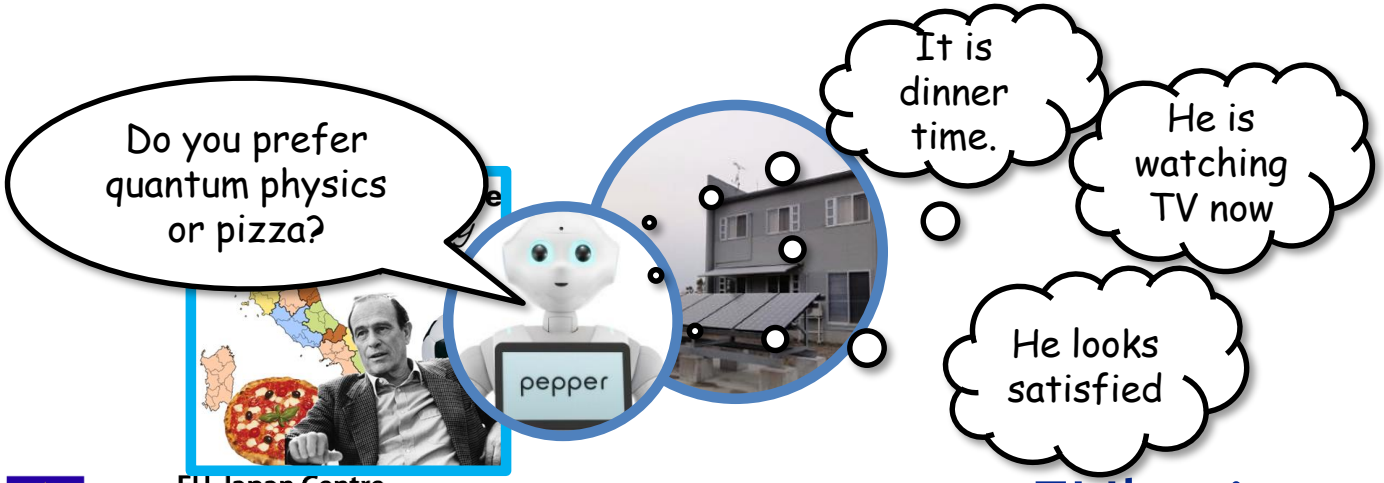

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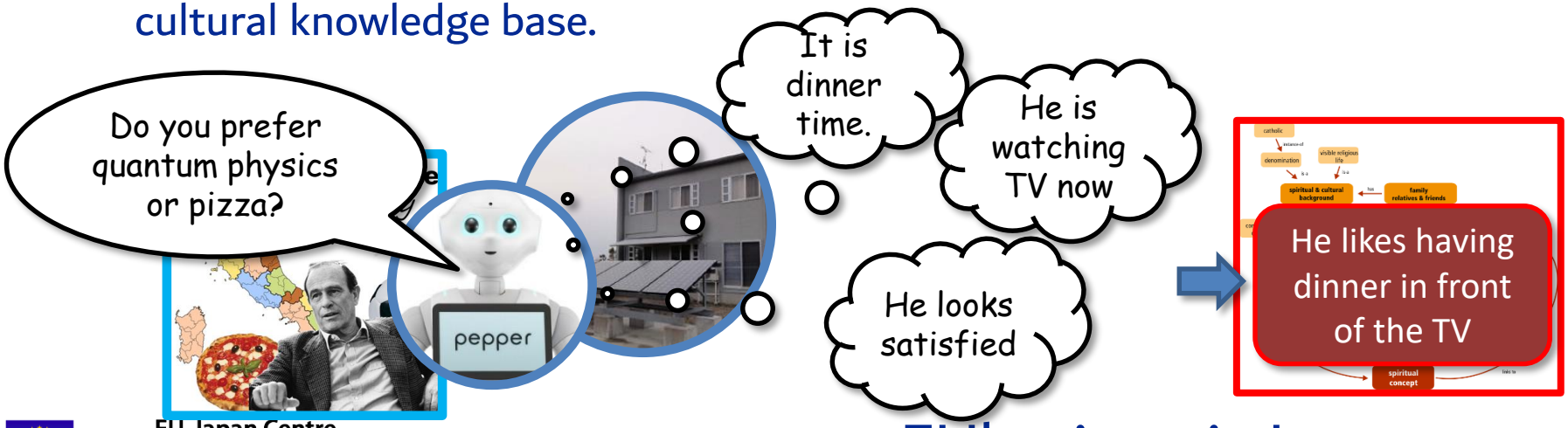

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Explored in details in the following presentation by Prof. Nak Young Chong

Paving the way to culturally-competent robots: the CARESSES project.

- Testing in Health-Care facilities: Key issues and challenges

Paving the way to culturally-competent robots: the CARESSES project.

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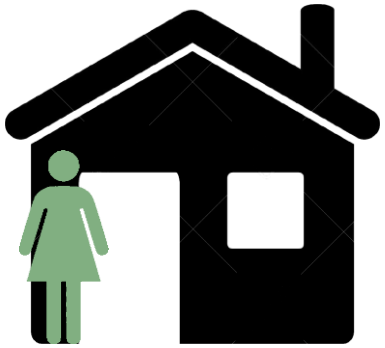

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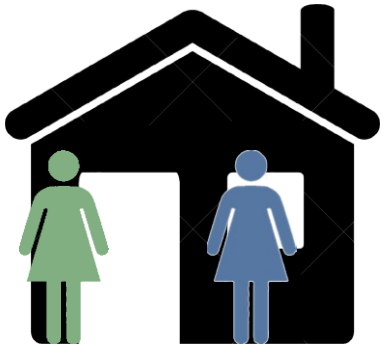

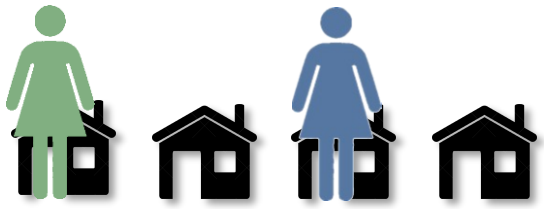

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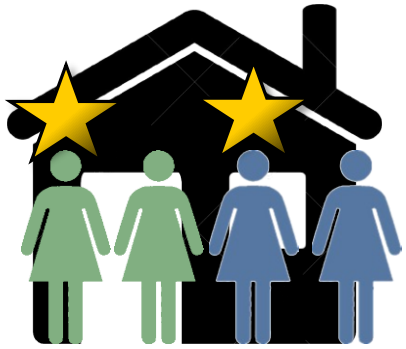

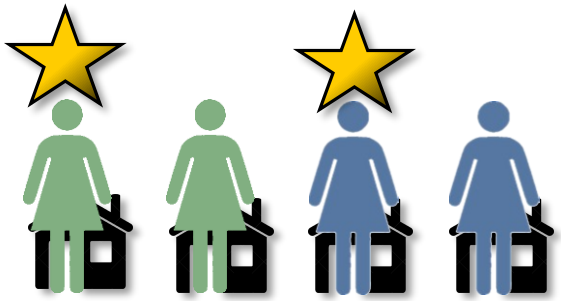

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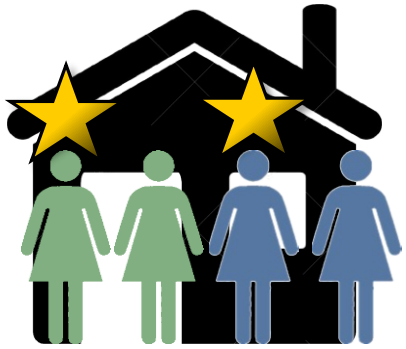

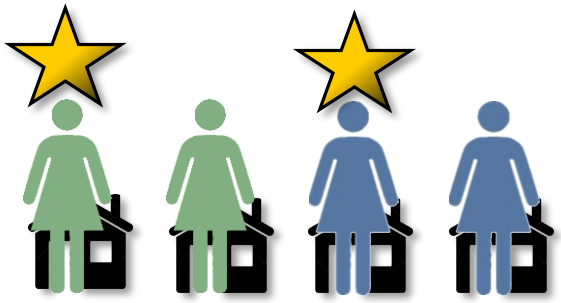

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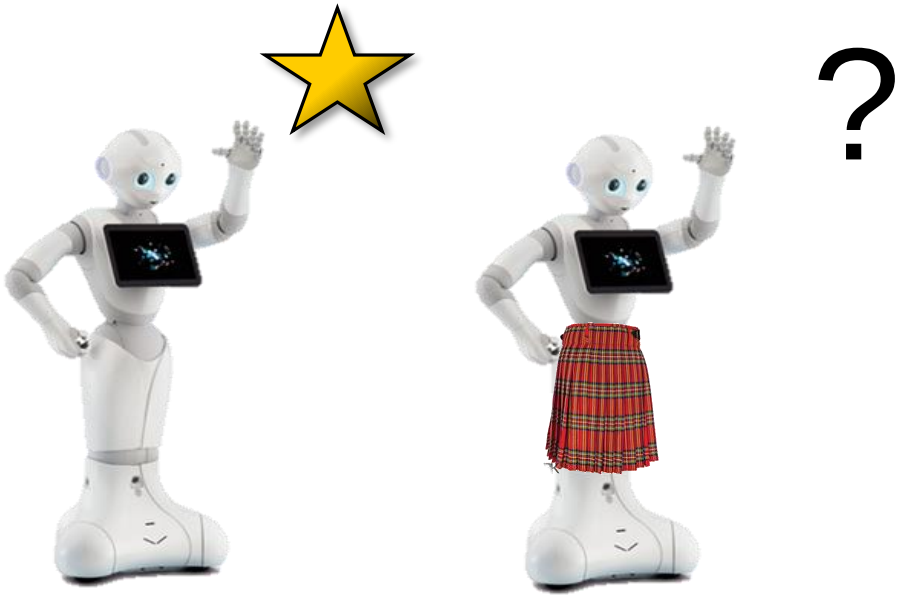

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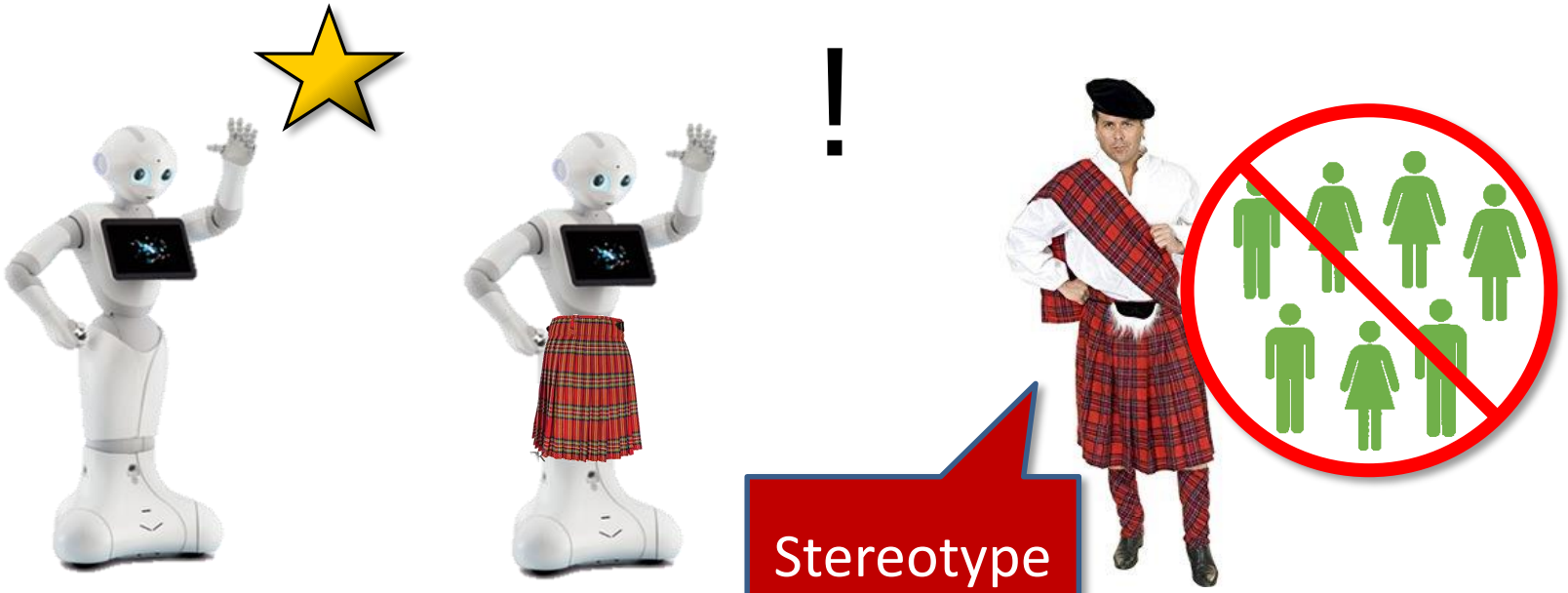

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- End-user evaluation: Key issues and challenges

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  - Client satisfaction with robot;
  - …
  - To acquire sufficient information to prepare a roadmap and guidelines for future similar trials

Recommendations Summary

- Avoid stereotypes: culture-generic information (e.g., at national level) can only be a starting point for acquiring user-specific information.

Conclusions

- Cultural competence can make robot more acceptable, which increase the quality of life of the users but also makes robots easier to commercialize in different countries.
- Designing a culturally competent robot requires the contribution of different disciplines, and has an impact on all RTD activities.

Culture-Aware Interaction in a Smart ICT Environment

Nak Young Chong,
Japanese Coordinator,
JAIST, Ishikawa, Japan

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- Culture-Aware Interaction
- iHouse Smart Home
- HISUISUI Health Care Facility
- Standardization

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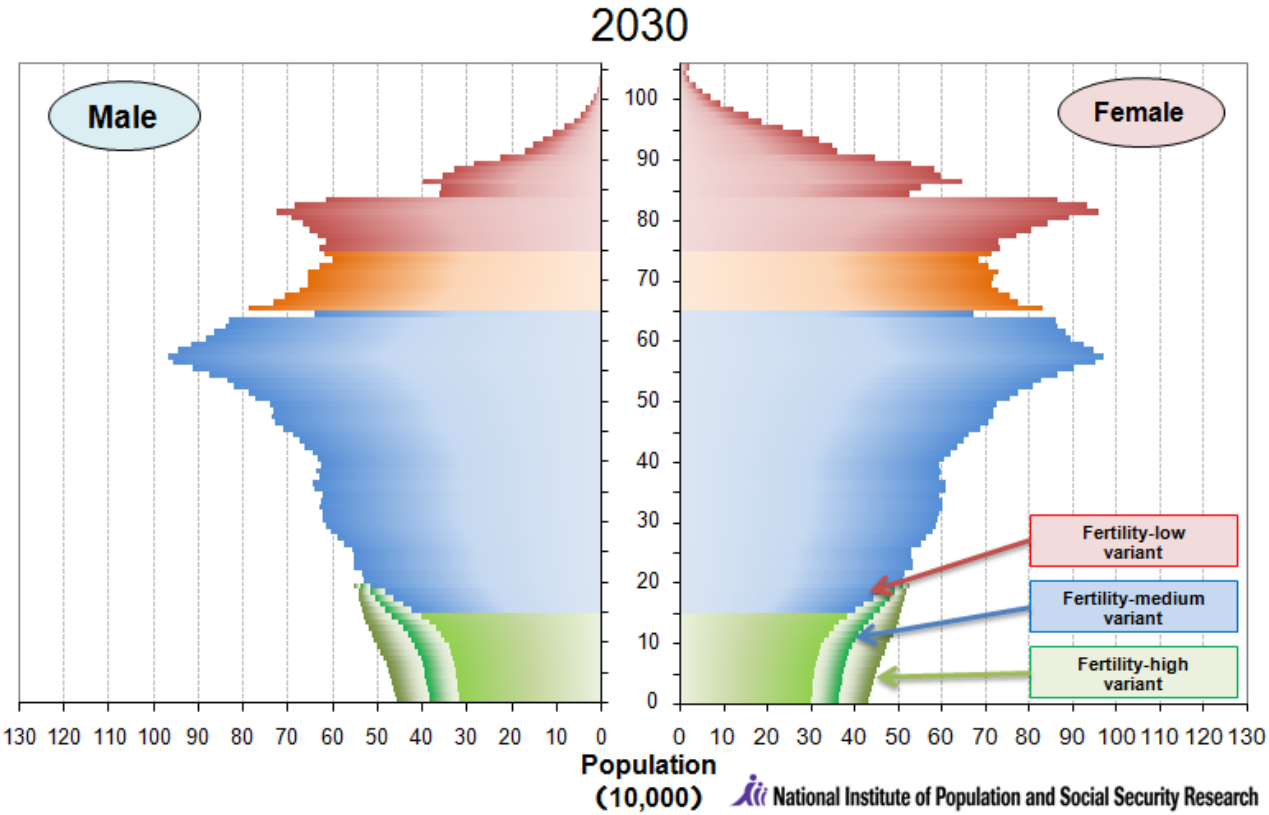
Background and Motivation

- Japan: Super-Aging Society
- Changing Demographics
- Cultural Diversity
- Need for culturally Competent Elderly Care Robots

Culture-Aware Interaction

Japan: Super-Aging Society



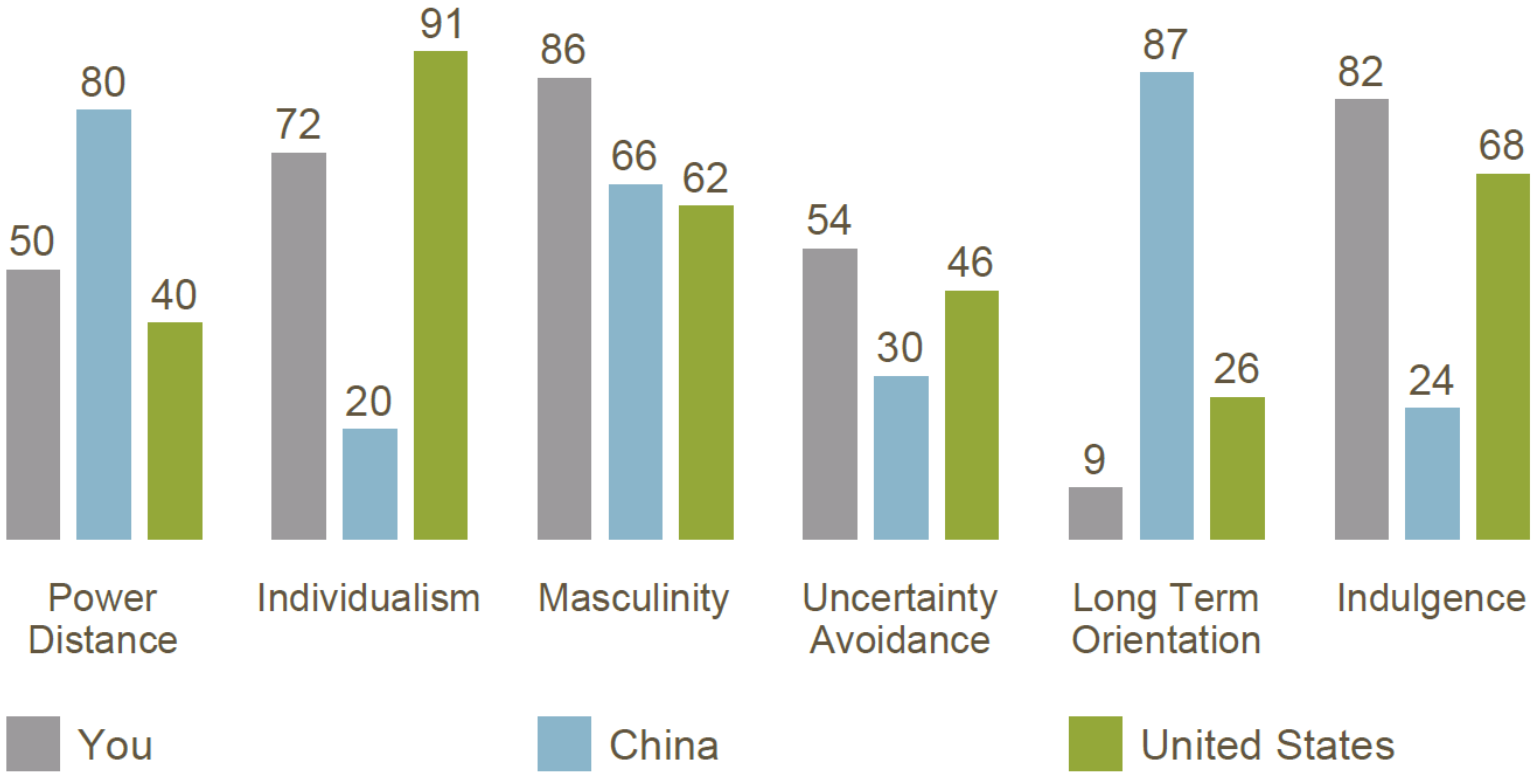
Sources: Census (1920-2010) and "Population Projections for Japan:2011-2060"(2015-2060)

Culture-Aware Interaction

Theoretical Foundations

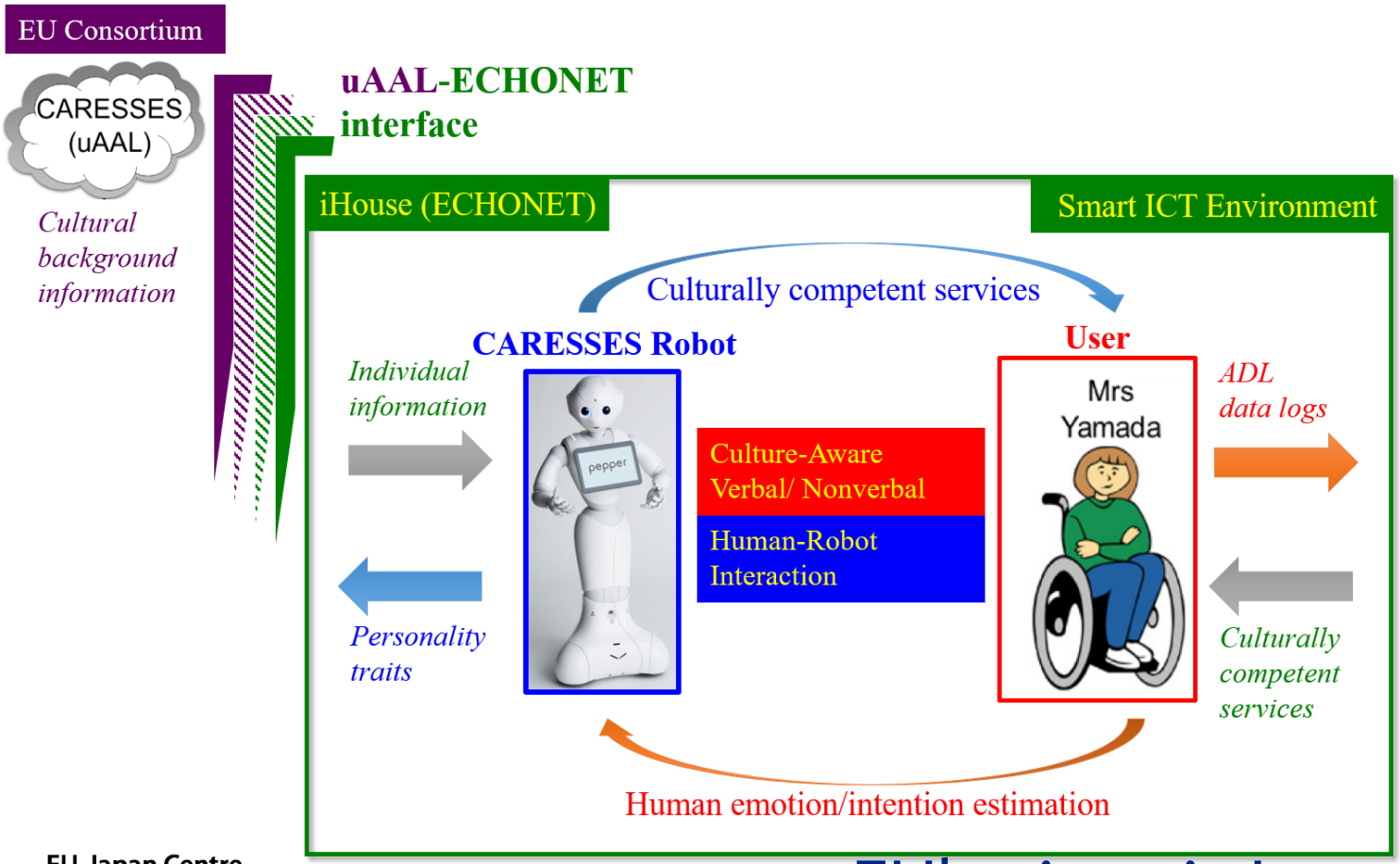
- Hofstede's Cultural Dimensions (National Level)
- Papadopoulos' Transcultural Nursing and Cultural Competence (Individual Level)
- How a robot should behave depending on the cultural identity of the user.

Dimensions of National Culture



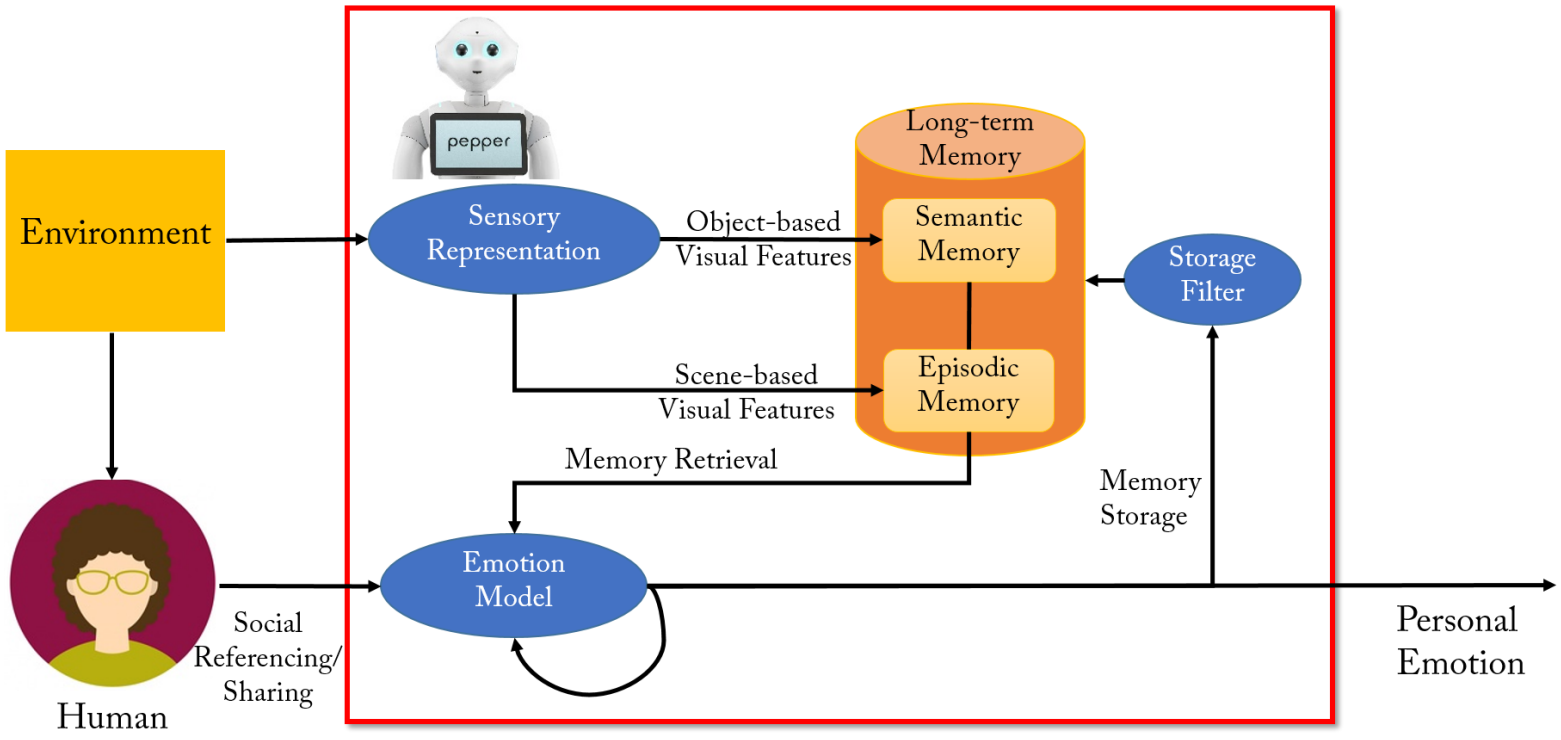
Culture-Aware Interaction

HREI: Human-Robot-Environment Interaction

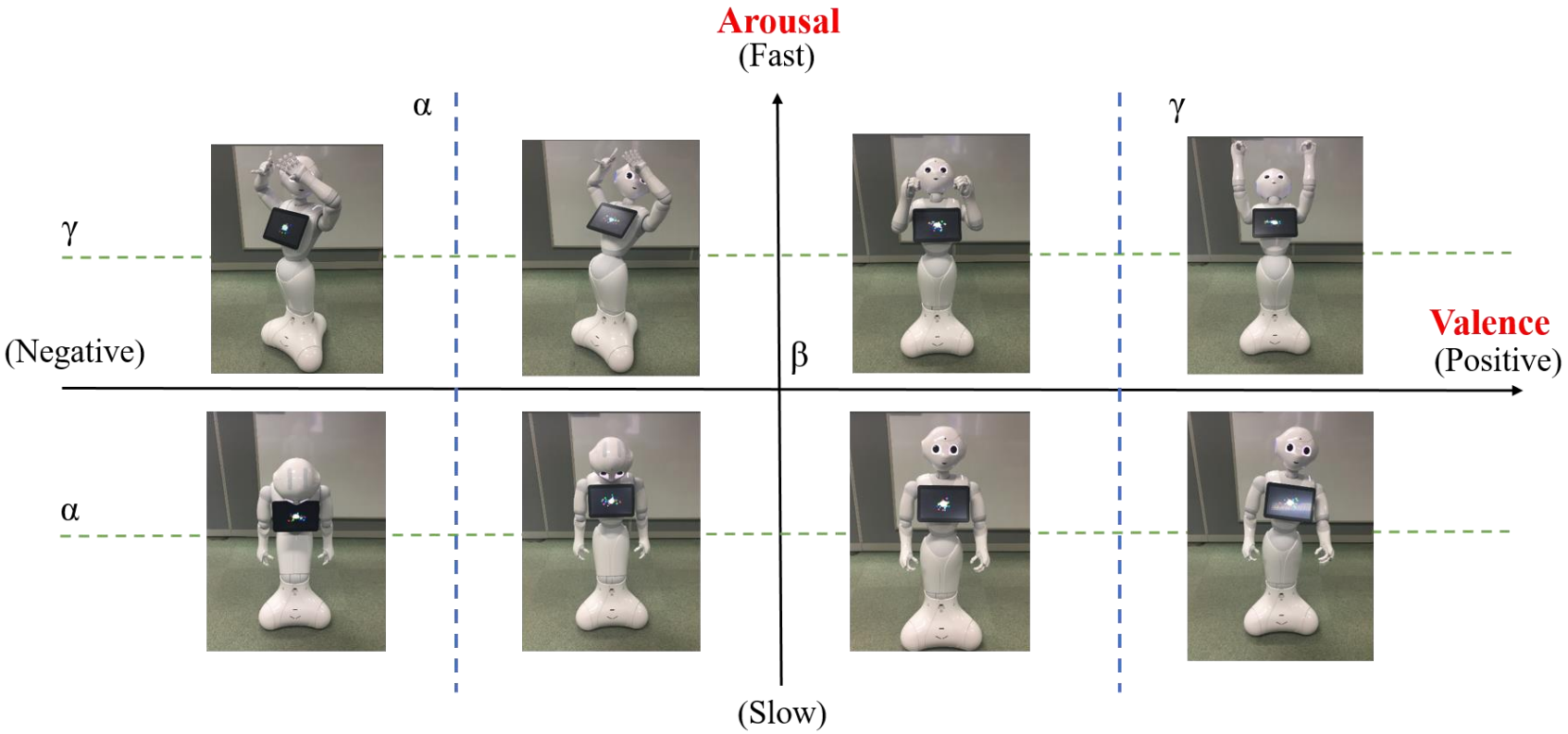


Culture-Aware Interaction

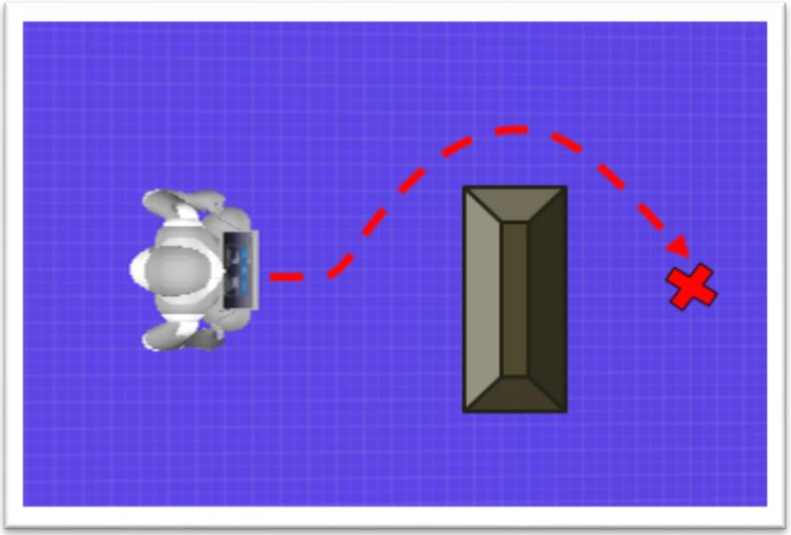
Robot Emotion Generation Model

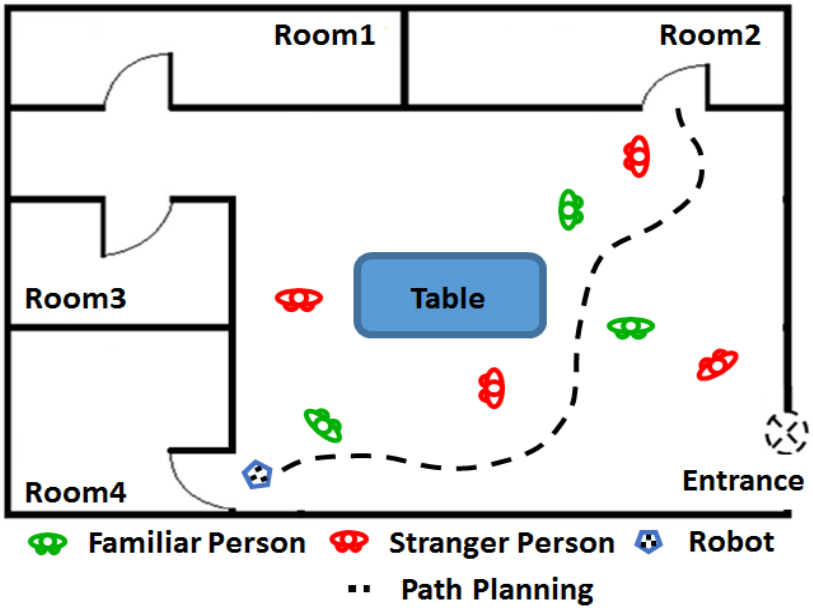


Emotional Body Expression



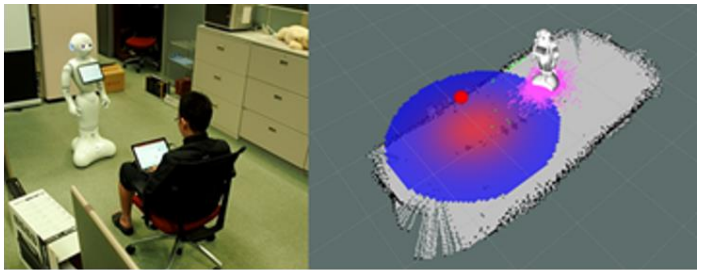
Social Navigation

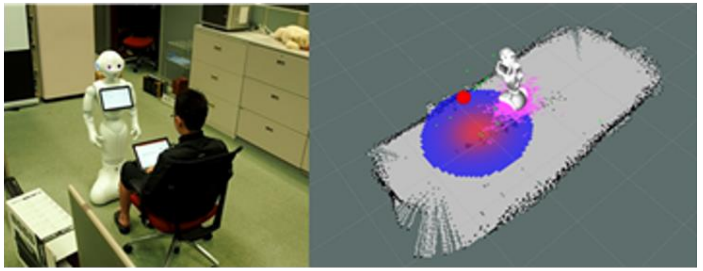


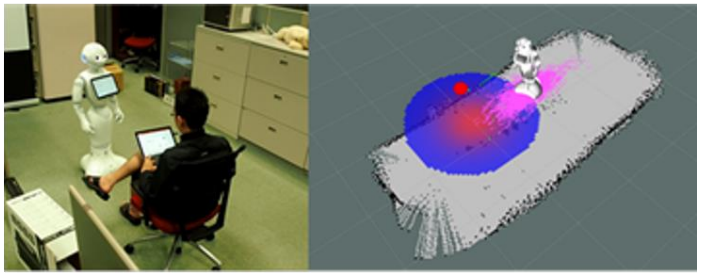


Culture-Aware Interaction

Proxemics: Social Distance







“The interrelated observations and theories of man's use of space as a specialized elaboration of culture.” [Edward T. Hall]

Cultural Identity Assessment

- Multimodal emotion recognition (audio, facial expression, wearable wrist sensors)
- Signal processing and machine learning
- What are good and bad interactions?

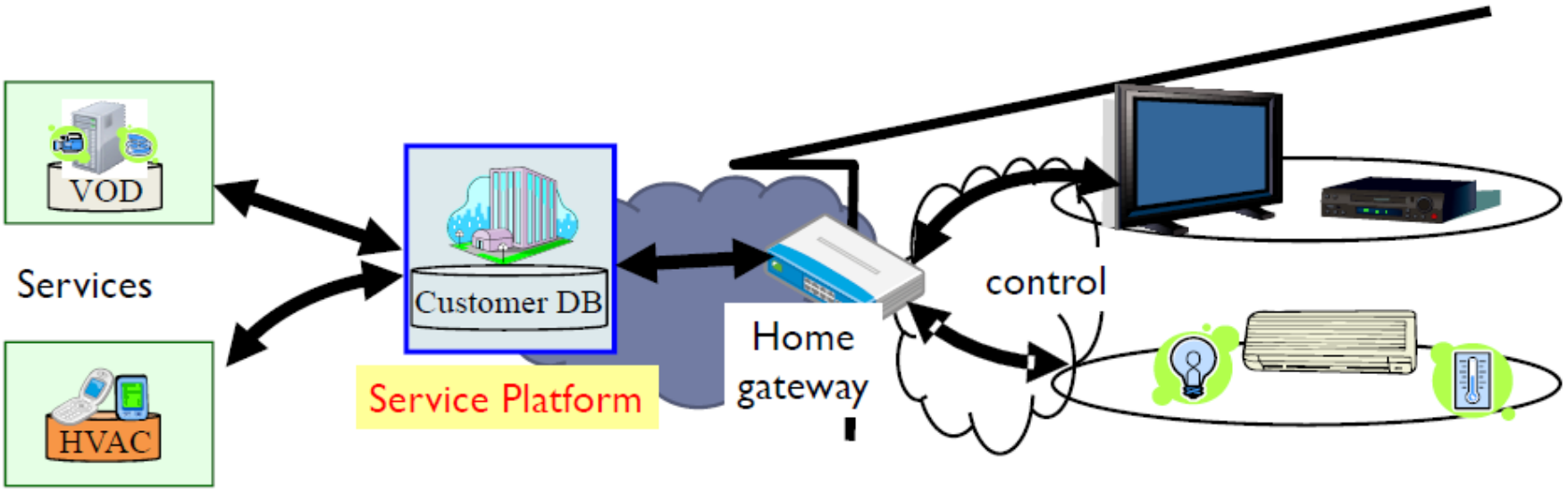
Table of Contents

- Human Robot Interaction
- iHouse Smart Home
- HISUISUI Health Care Home
- Standardization

iHouse Smart Home

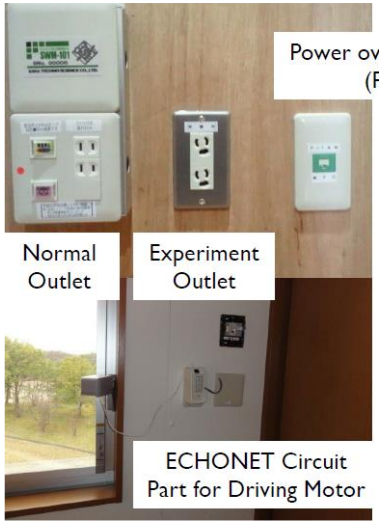
iHouse Smart home: Energy Monitoring & Management System (Nomi, Ishikawa, Japan)

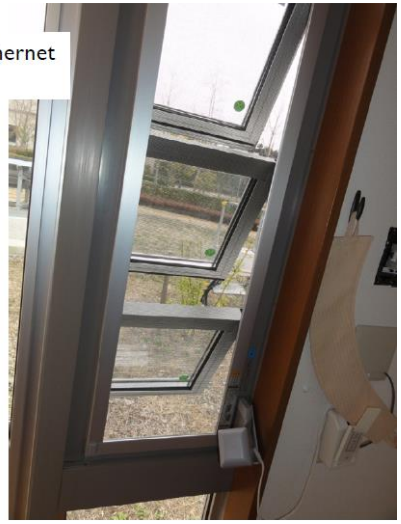
iHouse Smart Home

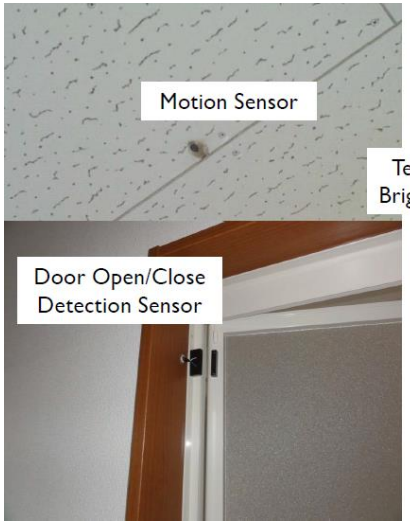


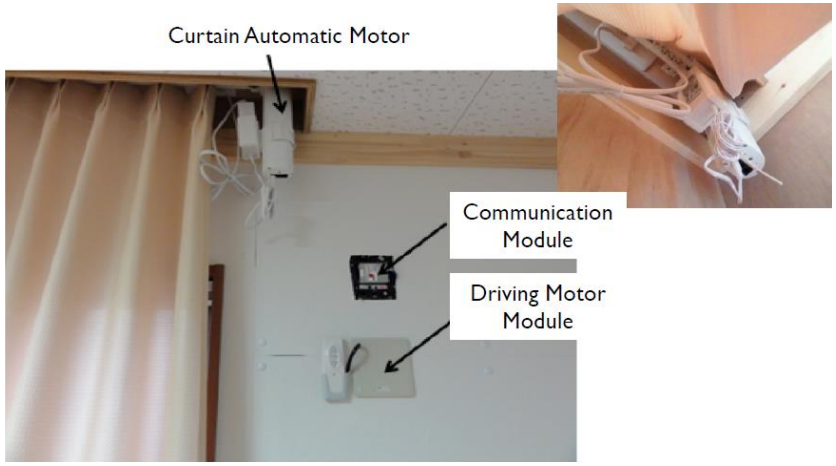
Learning user daily routines, activities, and preferences

iHouse Smart Home









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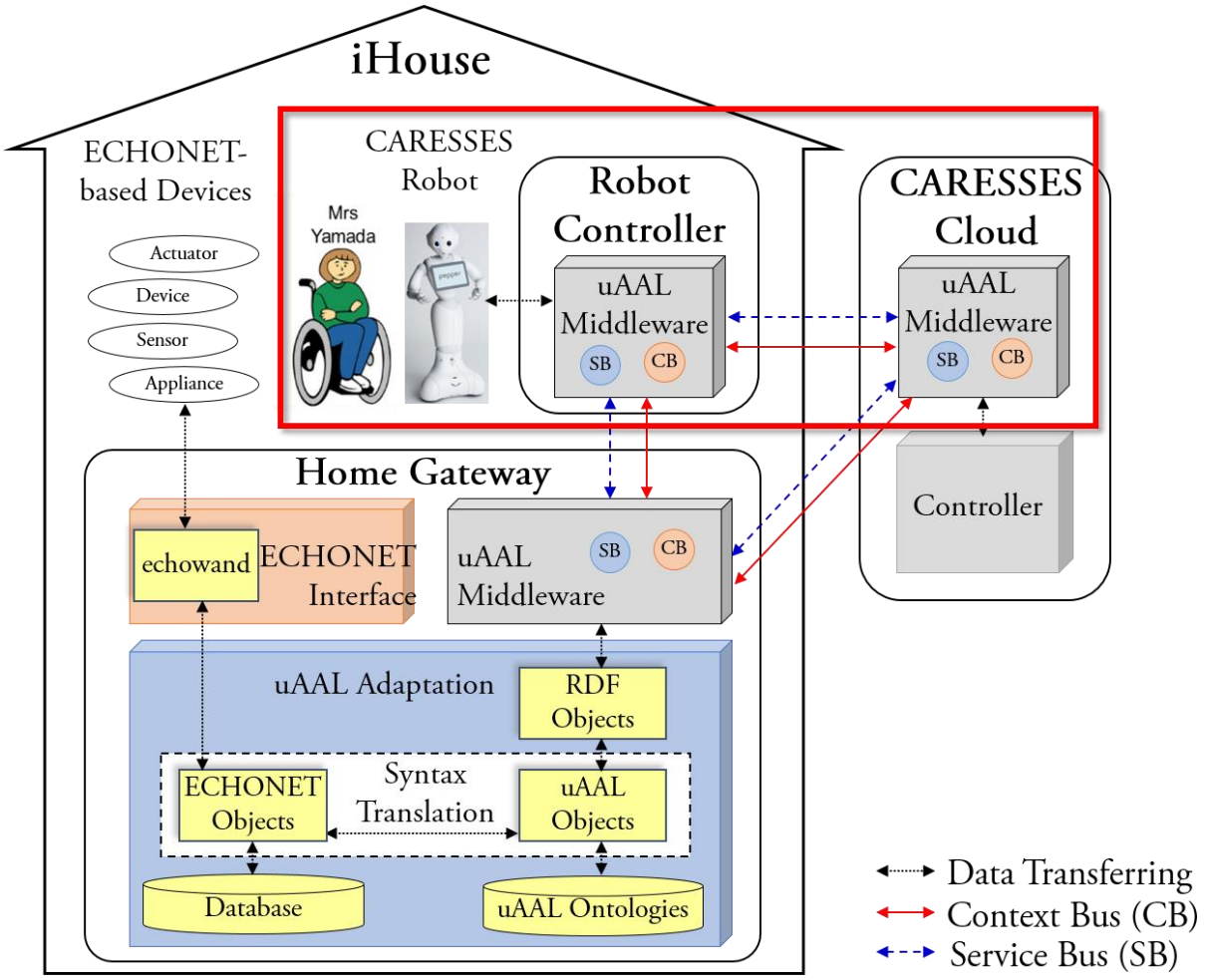
iHouse Smart Home



iHouse Network Infrastructure

- Heterogeneous network integration (ECHONET JPN-universal EU)
- Robot integration into iHouse
- Natural language user interface for smart home control

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HISUISUI Health Care Facility

Nomi, Ishikawa, Japan

HISUISUI Health Care Facility

Geriatric Health Care Service

- Nursing, Short-stay rehab, Day care
- Caregiving needs and expectations
- Role assignment in caregiving (human vs. robot)
- Robot caregiving guidelines and protocols

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IEEE RAS/SC Standardization

IEEE P1872.1 Robot Task Representation

- IEEE RAS/ Standing Committee for Standards
- A robot task ontology for knowledge representation and reasoning
- Expected date of submission of draft 01/2020
- Need for a common vocabulary with clear and concise definition

Recommendations Summary

- Culture-aware verbal/non-verbal interaction
- Smart home system integration
- Testing and assessment in a healthcare facility
- Need for a standard and well-defined robot task representation

Conclusions

- Cultural identity components and assessment
- Heterogeneous ICT network-robot integration
- Human Robot Interaction evaluations: What are good/bad practices?