FONDAZIONE CASSA DI RISPARMIO DI PISTOIA E PESCIA

PISTOIA TOSCANA Capitale Italiana della Cultura 2017

Centro Monteoliveto "Casa dell'Anziano"

8° CONVEGNO NAZIONALE SUI CENTRI DIURNI ALZHEIMER

Pistoia

16-17 Giugno 2017

Spazio espositivo "La Cattedrale"
Area ex Breda
Via Sandro Pertini, 396
Pistoia

Managing Active and healthy aging with the use of caring service Robots (**MARIO**): il futuro dell'assistenza ai malati di Alzheimer

Antonio Greco

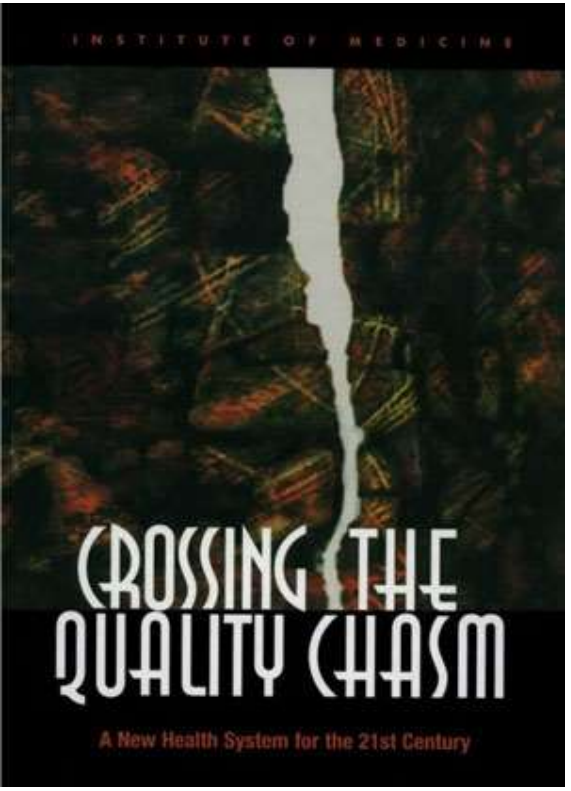
IRCCS "Casa Sollievo della Sofferenza"

UOC di Geriatria

San Giovanni Rotondo (FG)

MARIO

CASA SOLLIEVO DELLA SOFFERENZA • SAN GIOVANNI ROTONDO •



The IOM Quality report: *A New Health System for the 21st Century*

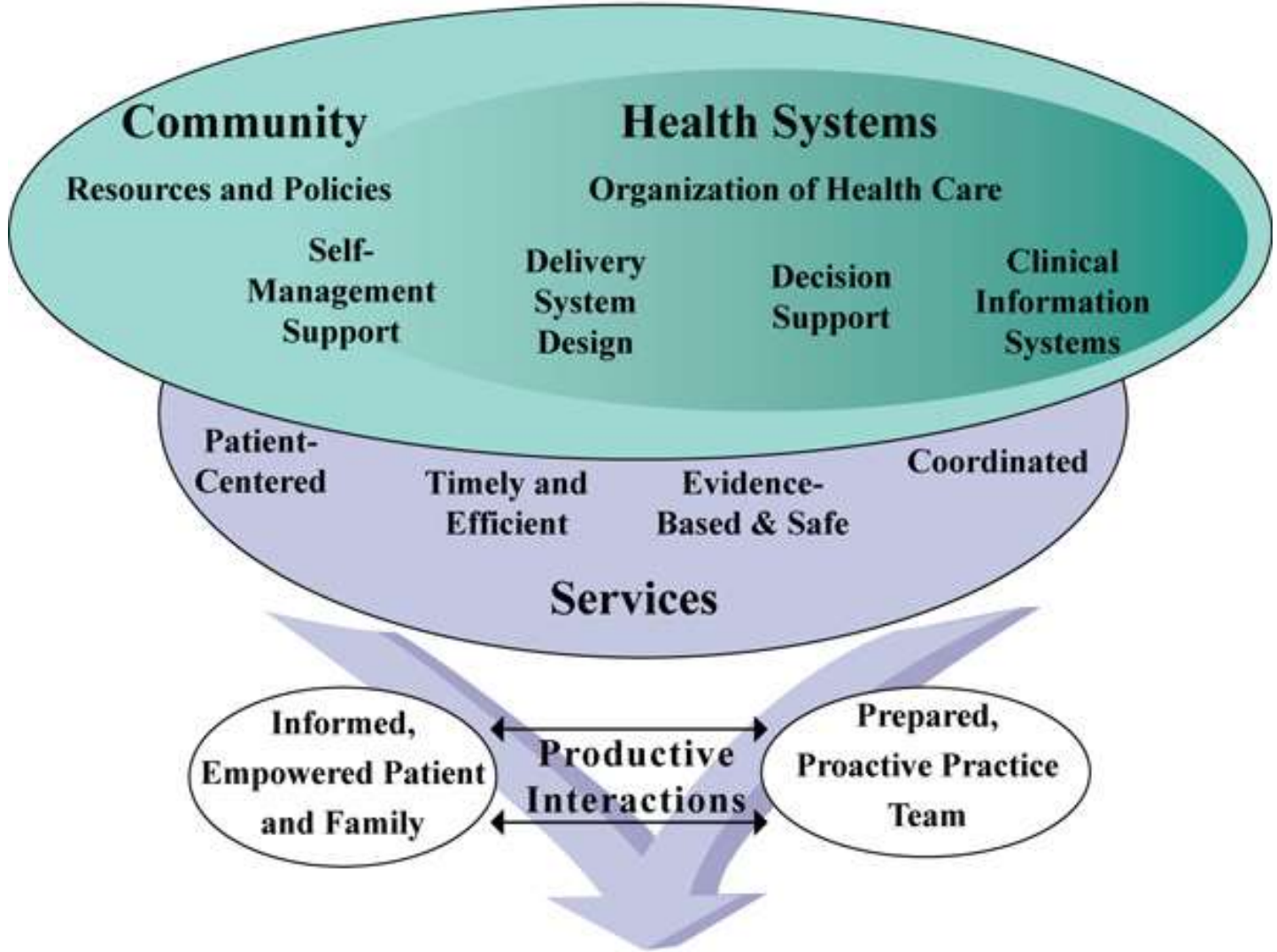
The IOM Quality Chasm Report Conclusions:

The current care systems **cannot** do the job."

"Trying harder will not work."

"Changing care systems will."

The Care Model



Improved Outcomes

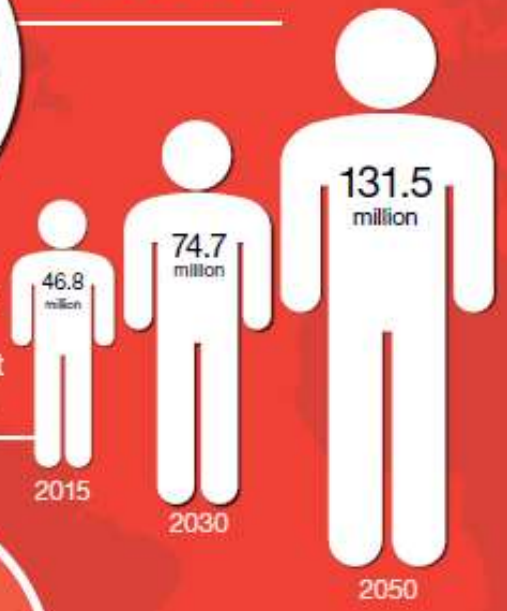
Developed by The MaColl Institute

INFOGRAPHIC

The global impact of dementia

Around the world, there will be 9.9 million new cases of dementia in 2015,

one every 3 seconds



46.8 million people worldwide are living with dementia in 2015.

This number will almost double every 20 years.

Much of the increase will take place in low and middle income countries (LMICs):
in 2015, 58% of all people with dementia live in LMICs, rising to 63% in 2030 and 68% in 2050.

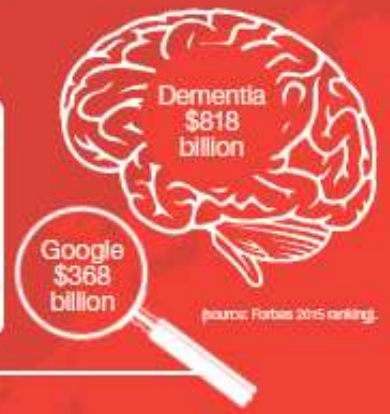
The total estimated worldwide cost of dementia in 2015 is US$ 818 billion. By 2018, dementia will become a trillion dollar disease, rising to

US$ 2 trillion by 2030

If global dementia care were a country, it would be the

18th largest economy

in the world exceeding the market values of companies such as Apple and Google



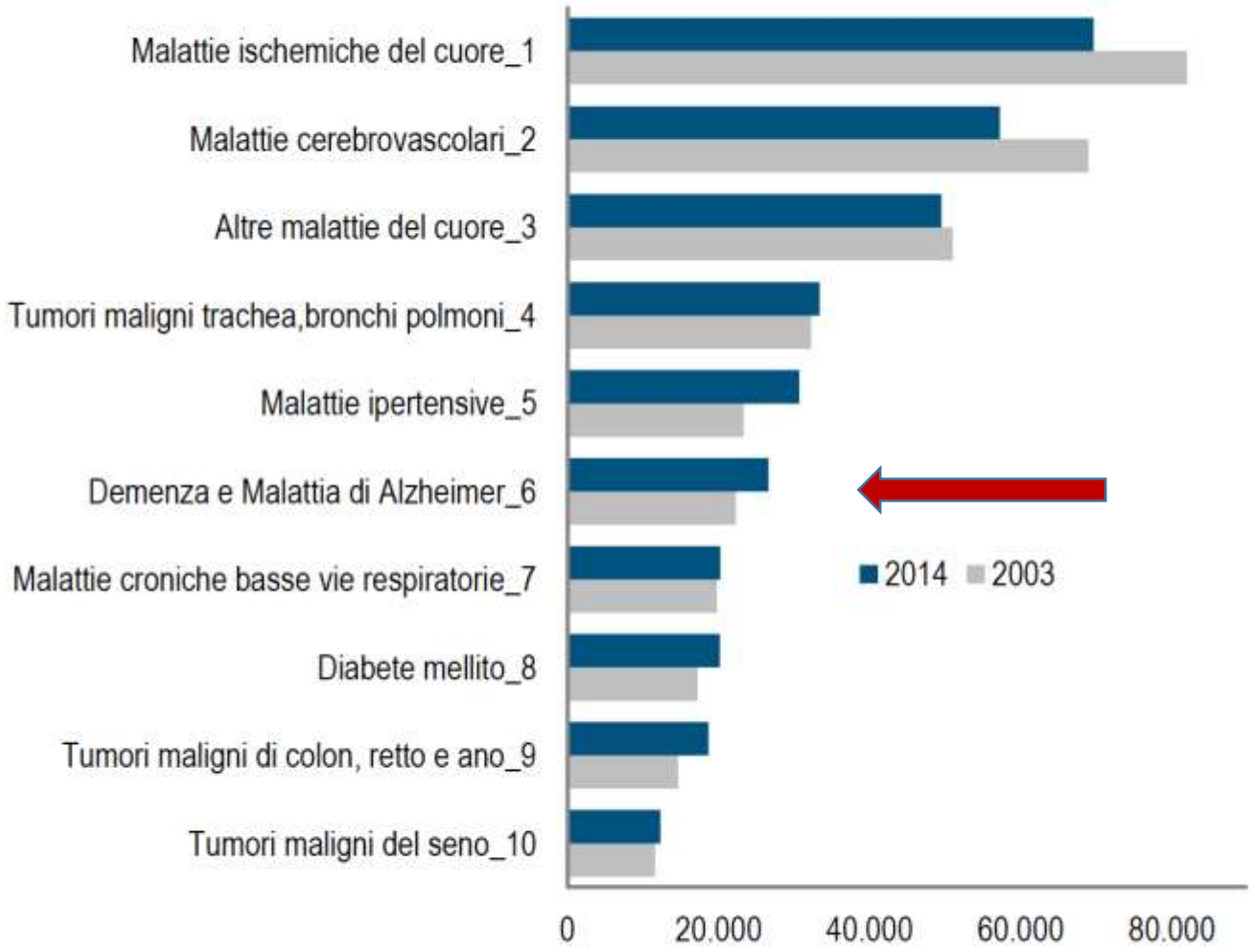
(source: Forbes 2015 ranking).

This map shows the estimated number of people living with dementia in each world region in 2015.

We must now involve more countries and regions in the global action on dementia.

Rapporto
ISTAT
Maggio 2017

FIGURA 1. NUMERO DI DECESSI PER LE 10 PRINCIPALI CAUSE DI MORTE IN ITALIA. Anni 2003 e 2014



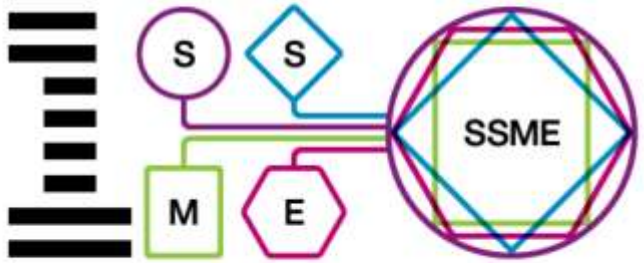
In the hospital of the future:

1 Fundamental standards of care must always be met.[1]
2 Patient experience is valued as much as clinical effectiveness.
3 Responsibility for each patient's care is clear and communicated.
4 Patients have effective and timely access to care, including appointments, tests, treatment and moves out of hospital.
5 Patients do not move wards unless this is necessary for their clinical care.
6 Robust arrangements for transferring of care are in place.
7 Good communication with and about patients is the norm.
8 Care is designed to facilitate self-care and health promotion.
9 Services are tailored to meet the needs of individual patients, including vulnerable patients.
10 All patients have a care plan that reflects their individual clinical and support needs.
11 Staff are supported to deliver safe, compassionate care, and committed to improving quality.

Future hospital: caring for medical patients sets out a vision for collaborative, coordinated and patient-centred care. Achieving this vision will require radical changes to the structure of our hospitals and ways of working for staff. The recommendations in the report must be the first step in a longer programme of activity designed to achieve real change across hospitals and the wider health and social care economy.

IBM has been pioneering and leading Service Science

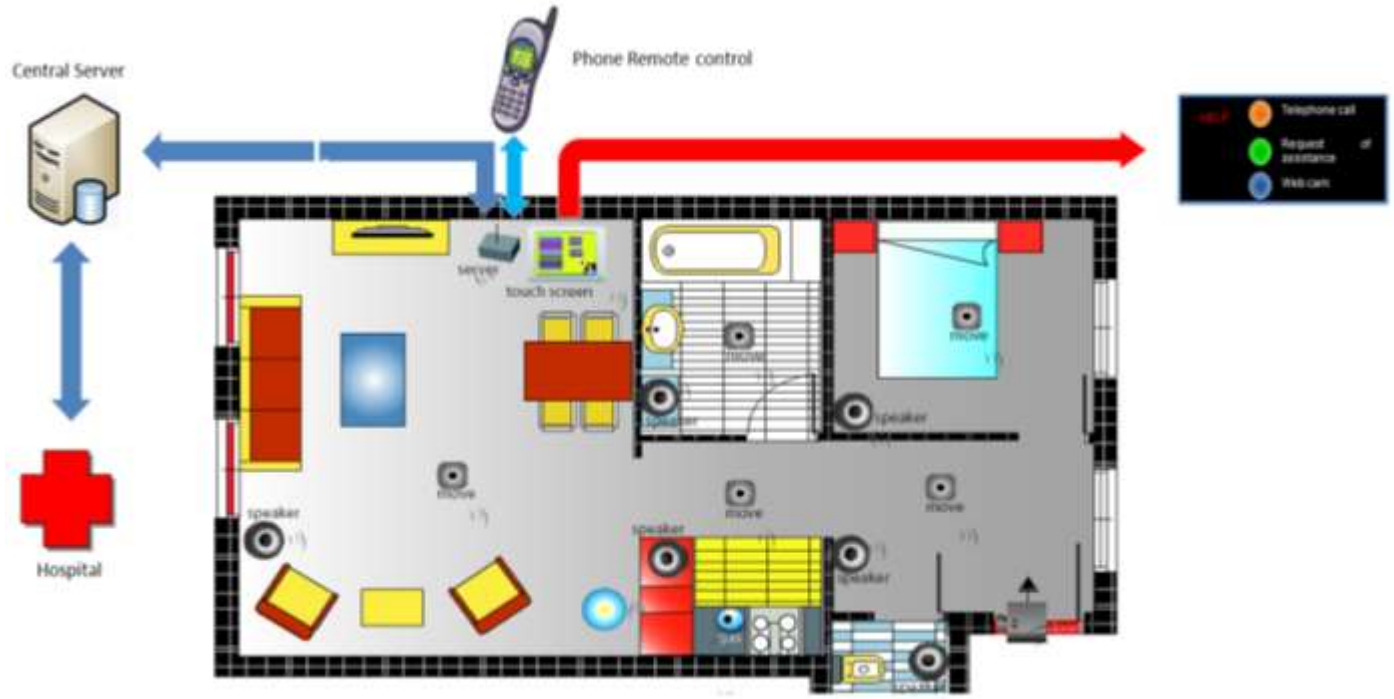
The Invention of Service Science



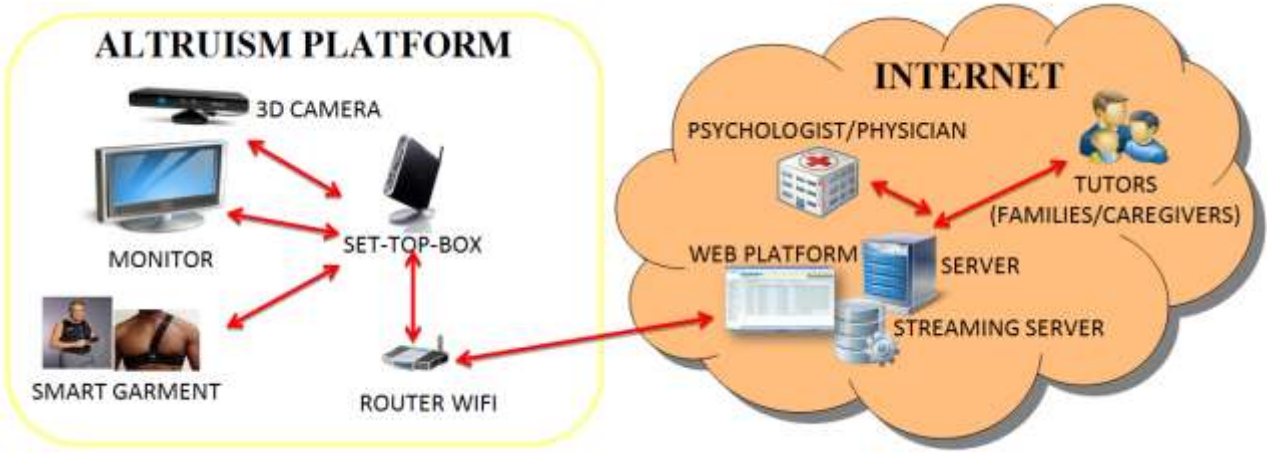
The idea that there ought to be a new scientific discipline called service science had its genesis in a phone conversation in September of 2004. Jim Spohrer, who was starting up the IBM ® Research Service Research department, was on the line with Henry Chesbrough, a professor of business and innovation at the University of California at Berkeley. Spohrer complained to Chesbrough that he was having trouble finding job candidates who had the right mix of knowledge, including computer science, engineering, management and social science.

Smart HOme for elderly PEople

HOPE: House plant and implemented devices



Alzheimer patient's home by a rehabilitation-based Virtual Personal Trainer Unique Information System Monitoring



Platform achieved by the following low-cost commercial component

SET TOP-BOX

(Embedded PC)

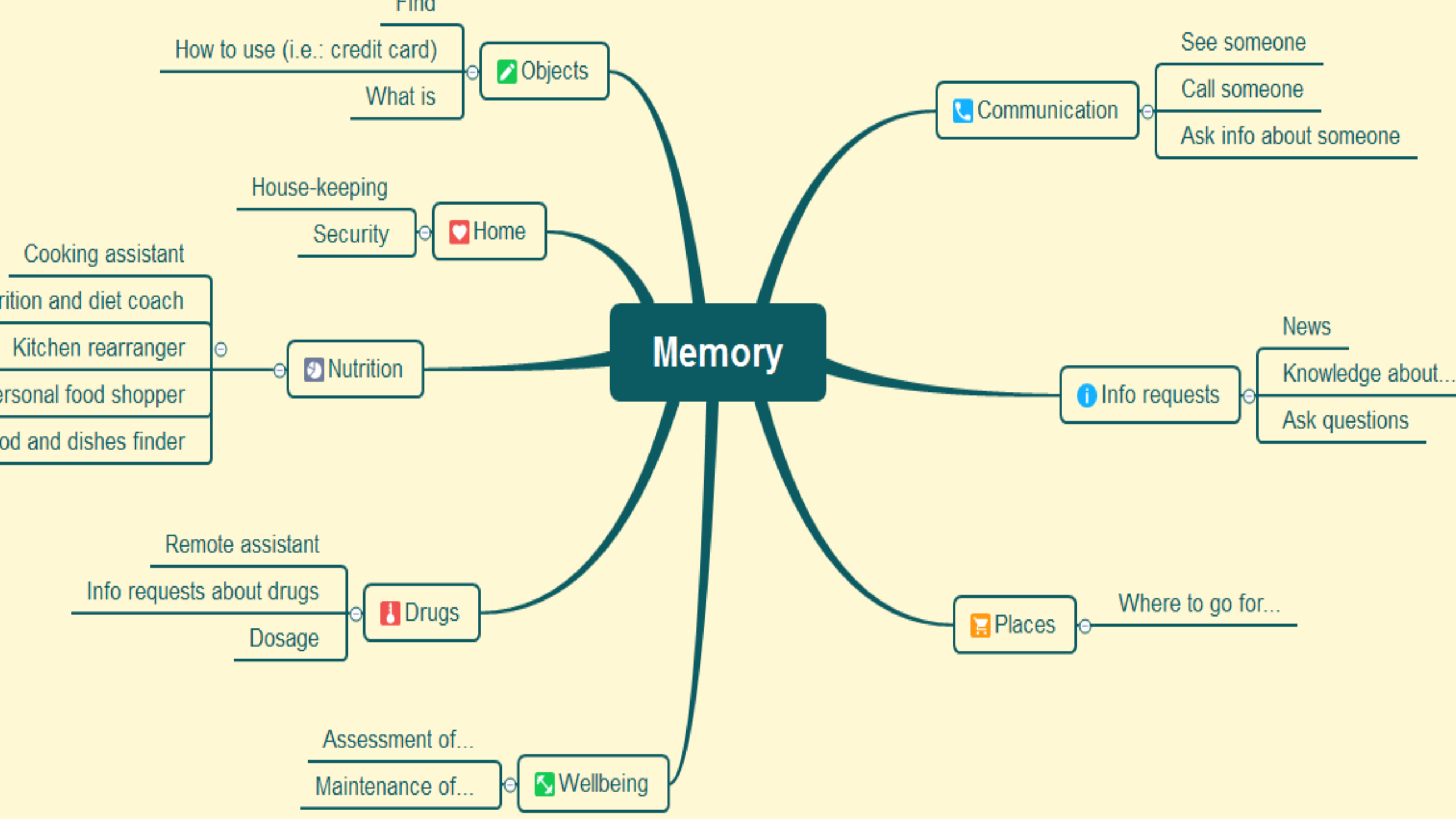
3D SENSOR

(Microsoft Kinect©)

BIOMEDICAL SENSOR

(Smartex WWS e-shirt)


JULIANNE MOORE
ALEC BALDWIN
KRISTEN STEWART
STILL
ALICE


Memory
Objects
Find
How to use (i.e.: credit card)
What is
Home
House-keeping
Security
Nutrition
Cooking assistant
rition and diet coach
Kitchen rearranger
ersonal food shopper
od and dishes finder
Drugs
Remote assistant
Info requests about drugs
Dosage
Wellbeing
Assessment of...
Maintenance of...
Communication
See someone
Call someone
Ask info about someone
Info requests
News
Knowledge about...
Ask questions
Places
Where to go for...

Partners

- ✓ National University of Ireland, Galway
- ✓ ROBOSOFT
- ✓ RU Robot
- ✓ Ortelio Ltd
- ✓ City of Stockport
- ✓ Consiglio Nazionale delle Ricerche
- ✓ R2M Solution
- ✓ Casa Sollievo della Sofferenza Hospital
- ✓ Caretta-Net
- ✓ University of Passau

Imagine MARIO with Brian

- Knows Brian as a person
- Support his failing memory

MARIO objectives 1/2

- ✓ To address and make progress on the challenging problems of **loneliness**, **isolation** and **dementia** in older persons through multi-faceted interventions delivered by service robots.
- ✓ To conduct near **project length interaction with end users** and assisted living environments.
- ✓ To assist caregivers and physicians in the **comprehensive geriatric assessment (CGA)** through the use of service robots.
- ✓ The **use of near state of the art robotic platforms** that are flexible, modular friendly, low cost and close to market ready.

Impact

- ✓ Less demand on social workers, caregivers, and medical experts:
  - MARIO robots are able to perform **CGA** and **MPI** assessments
  - MARIO robots tackle the problems of **loneliness**, **isolation** and **depression** giving simple access to a range of support functionality both within and outside the home / institution.
- ✓ Highly **personalised applications** to robots, while reducing the development costs and the response time to address existing and new needs.

KOMPAI PLATFORM

from Robosoft

Robot semantics based on Semantic Web practices and technologies: Linked Data principles, RDF, SPARQL, RIF.

Semantic Web-based machine reading/listening in robots. FRED, will be extended and improved for dealing with context-based grounding and interpretation of natural language input.

"Entity-centric" knowledge management: each entity and its relations have a public identity that provides a first "grounding" to the knowledge used by robots. Such identity is given by resolvable URIs that use simple Web and Internet protocols to provide useful knowledge as a representative of real world entities.

Mario Ontology Network (MON) will reuse and extend the Ontologies for Robotics and Automation. MON will evolve over time by integrating ontologies emerging from interaction with assisted humans, sensors or with other robots.

Ability to advance robot knowledge by learning new ontology patterns from its experience with users and the robot network in place. New emerging patterns and expressions are fed back to the robot's cognitive system in order to address emotional needs of end users in compliance with the social and behavioral

Robot social skills: a sentiment analysis framework based on deep parsing of natural language and supported by MON will deal with moods and expression recognition providing robots.

Second Trial (April 2017): Implemented apps

- My Music app
- My Game apps
- My News app
- My Calendar app
- My Family and Friends app
- CGA apps

Table 4. Demographic characteristics of the patients with dementia that had used MARIO robot during second trial.	
	All
	(n = 8)
Gender - Males/Females	6/2
Males (%)	75.00
Age - Mean ± SD	80.50±6.59
Educational level - Mean ± SD	4.25±1.75
Hospitalization days - Mean ± SD	5.63±3.89
Time of interaction with MARIO (min/die) **-** Mean ± SD	77.50±39.91
My Music app (min/die) **-** Mean ± SD	25.63±4.96
My Games app (min/die) **-** Mean ± SD	18.75±15.53
My News app (min/die) **-** Mean ± SD	6.87±5.94
My Calendar app (min/die) **-** Mean ± SD	3.75±3.54
My Family and Friends app (min/die) **-** Mean ± SD	3.13±2.59
CGA app (min/die) **-** Mean ± SD	20.63±17.41

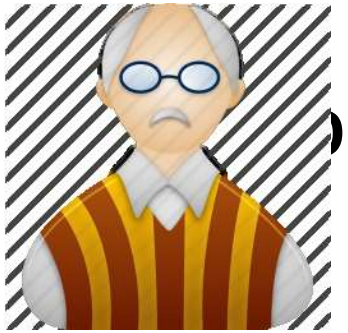
Table 5. Clinical characteristics of the patients with dementia that had used MARIO robot during second trial.			
	Admission	**Discharge**	**P value**
MMSE - Mean ± SD	24.01 ± 2.37	24.39 ± 2.26	0.180
CDR - Mean ± SD	0.63 ± 0.35	0.50 ± 0.27	0.157
CDT - Mean ± SD	2.63 ± 1.85	2.50 ± 1.93	0.317
FAB - Mean ± SD	12.75 ± 3.49	12.75 ± 3.49	-
NPI - Mean ± SD	6.25 ± 7.59	2.00 ± 2.77	**0.027**
GDS-15 - Mean ± SD	3.75 ± 3.62	1.63 ± 1.85	**0.042**
HRSD-21 - Mean ± SD	5.00 ± 5.66	1.13 ± 2.42	0.068
MSPSS - Mean ± SD	79.00 ± 5.95	80.50 ± 5.43	0.317
SDRS - Mean ± SD	24.25 ± 1.75	24.50 ± 1.85	0.317
BRS - Mean ± SD	18.13 ± 1.64	20.63 ± 1.77	**0.041**
QoL-AD - Mean ± SD	33.50 ± 5.63	38.25 ± 3.81	0.066
QoL-Family - Mean ± SD	37.25 ± 3.37	37.25 ± 3.37	-
CBI - Mean ± SD	4.50 ± 5.09	3.50 ± 4.18	**0.046**
TBA - Mean ± SD	9.25 ± 0.46	9.25 ± 0.46	-

Table 6. Distribution of Almere Model Questionnaire domains in patients with dementia during the second trial.

Code	Construct	Definition	%
ANX	Anxiety	Evoking anxious or emotional reactions when using the system	0
ATT	Attitude	Positive or negative feelings about the appliance of the technology	90
FC	Facilitating condition	Objective factors in the environment that facilitate using the system	100
ITU	Intention to use	The outspoken Intention to Use the system over a longer period in time	70
PAD	Perceived adaptivity	The perceived ability of the system to be adaptive to the changing needs of the user	80
PENJ	Perceived enjoiment	Feelings of joy or pleasure associated by the user with the use of the system	100
PEOU	Perceived Ease of use	The degree to which the user believes that using the system would be free of effort	30
PS	Perceived sociability	The perceived ability of the system to perform sociable behavior	80
PU	Perceived usefulness	The degree to which a person believes that using the system would enhance his or her daily activities	90
SI	Social influence	The user's perception of how people who are important to him think about him using the system	60
SP	Social presence	The experience of sensing a social entity when interacting with the system	20
TRUST	Trust	The belief that the system performs with personal integrity and reliability	60
USE	Use/Usage	The actual use of the system over a longer period in time	60

ViTA : Virtual Trainer for Aging

March 2016

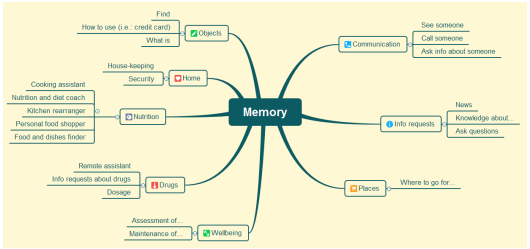


lder Adults

Memory is our individual as well as our social treasure.
We need to preserve each piece of memory to sustain our wellbeing but also affect everyone surrounding us

ViTA

Individual Memories



Past, Present and Future memories

Care Givers

Caregiving is a micro-social phenomena including formal and informal contributors.
Care giving to preserve memories means coaching aged to sustain memory functions as well as collect memory fragments to build a future treasure

Aged converse in a multimodal ways with a personal advisor that provides access to memory events as well as helps to reinforce memories

Older Adults

VITA Advisor

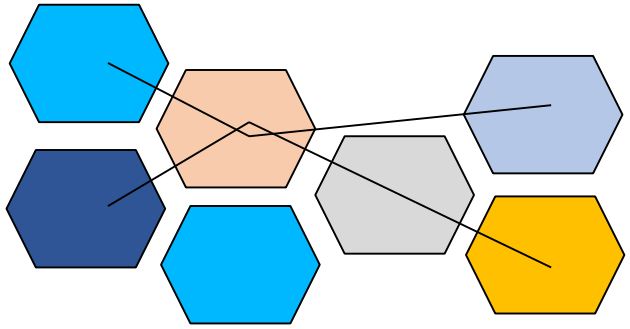
Tablets

Social Robots

Smart Objects

Personal Stories

Memory Events & Connections



Past, Present and Future memories

Care Givers

Memory Coach

Individual's Memory Events are preserved and cared by "Memory Coaches" Memory Coach is one of the

key role of all caregivers.

What is ViTA Advisor?

It is a conversational multi-modal agent supporting aged as well as a tool to collect meaningful data about the context of individuals

POSSIBLE DIALOGUES

AskMe
A simplified dialogue around light disease, its treatment and care pathways.

Keep-in-touch/RemideMe
A dialogue to stimulate and support the patient to remember relevant facts.

Step by Step
A dialogue to stimulate and support the patient in small steps for a task.

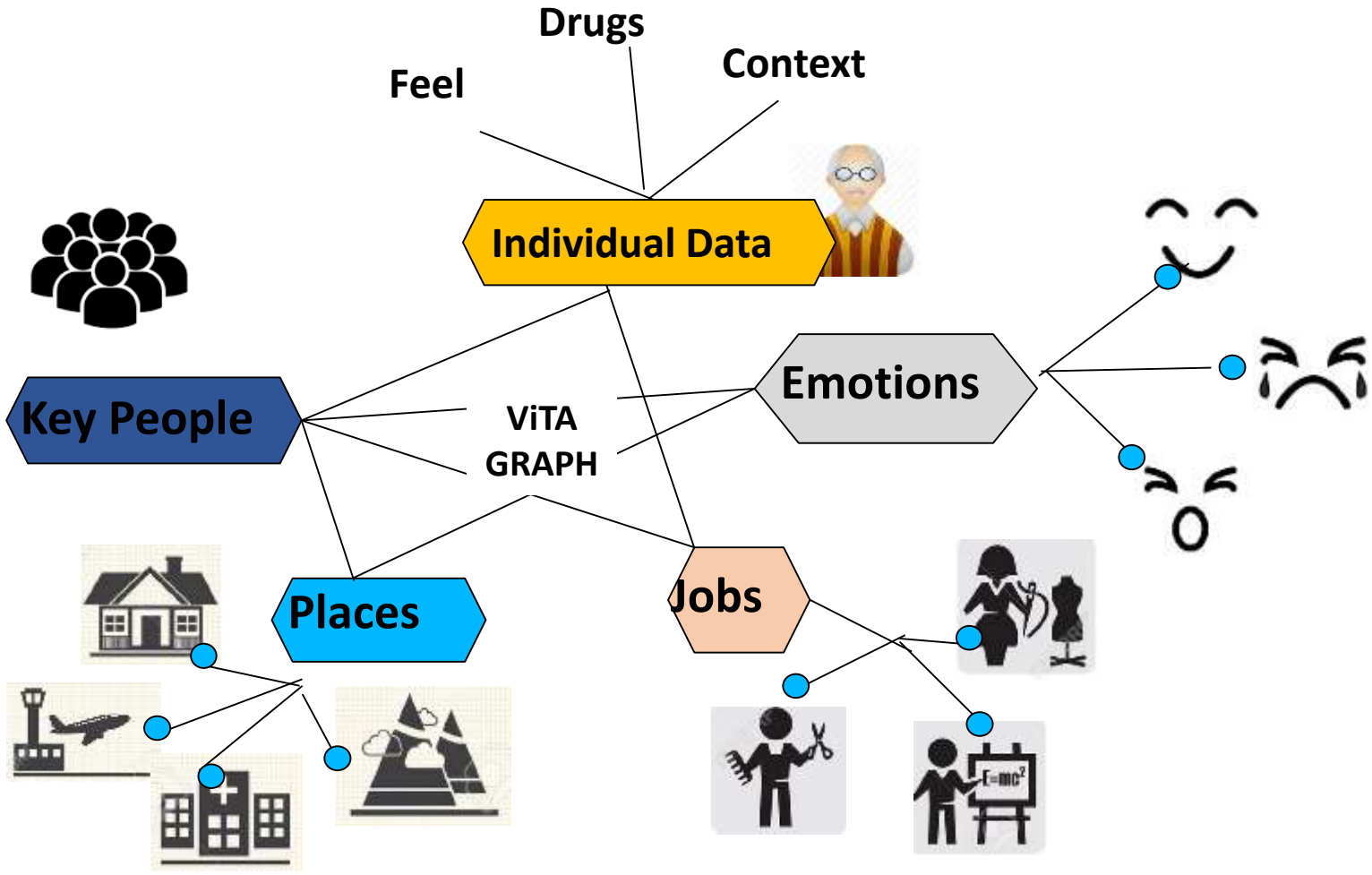
How do you feel?
A dialogue on everyday life of the patient and its context.

Tell me
A dialogue to stimulate and support the patient to tell short stories about him/herself thus enriching memory.

What is Memory Coach?

It is a system that supports caregivers to collect meaningful facts and memories of an individual and his context

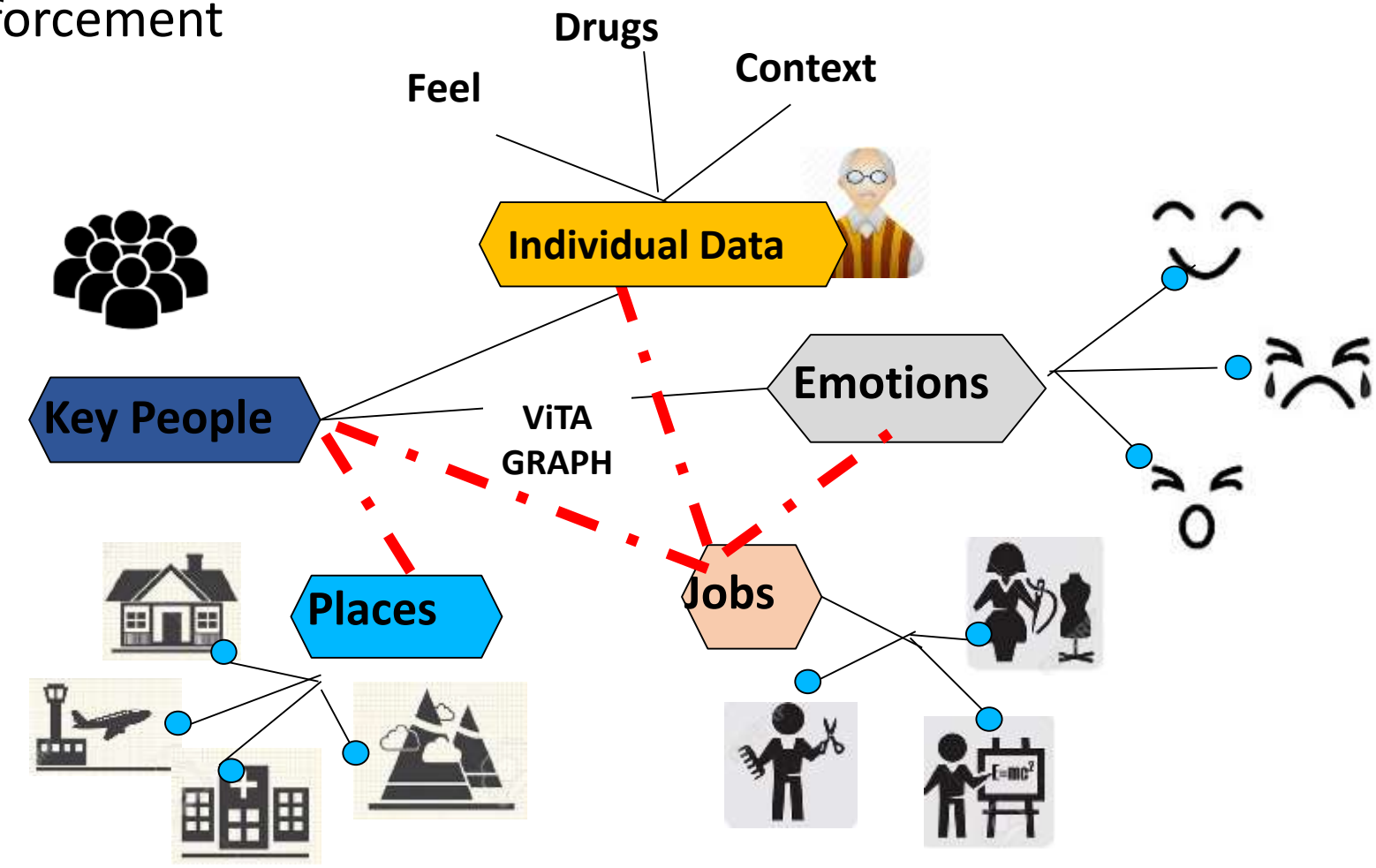
Memory Coach drives Caregivers to build a **Personalized Individual memory** graph that includes different views, i.e.: food, nutrition and cooking, drugs, objects, home, wellbeing, places, communications and asking for info.



Building Personal Stories

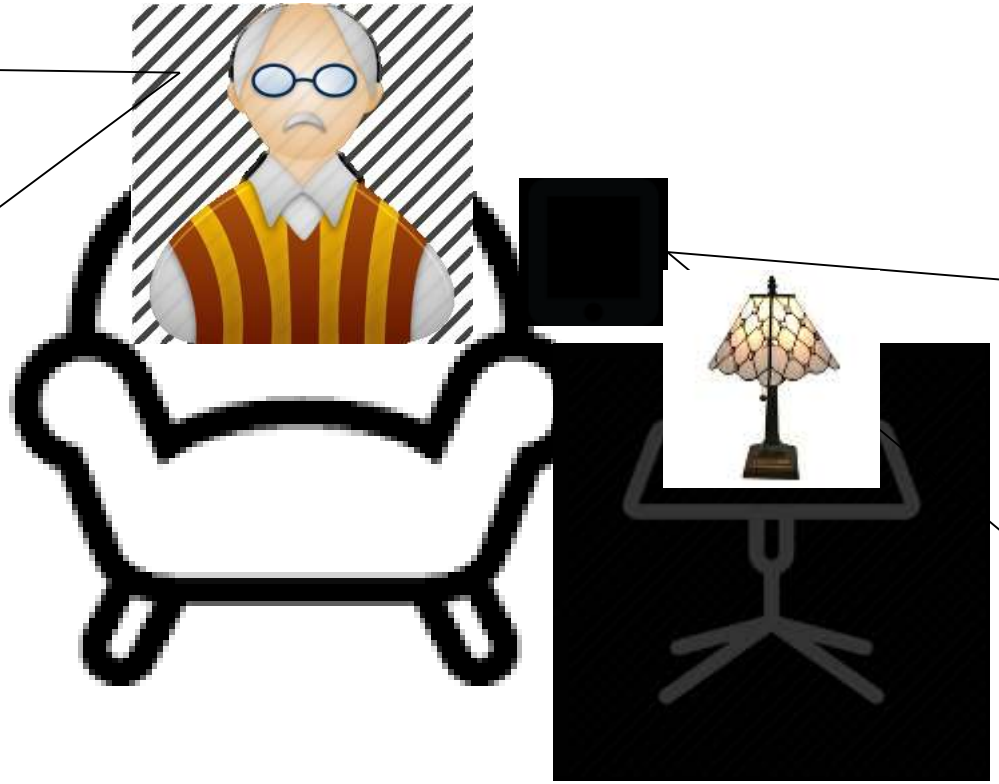
A “personal story” glues a set of relevant memory events to trigger a specific patient mood and/or act as memory reinforcement

Caregivers build ”personal stories” that could include images, audio and textual fragments that can be ”replayed” by the VITA Advisor.
A “Personal Story” is also a multimodal “stimulus” for the patient



Experimental Setting 1: collecting related memory items around a story to reinforce and expand memory

1. Tell me today a story about….



2. A story is found and a sequence of memory item is displayed/played on a tablet…

3. The user talks about the story items (additional piece of knowledge are collected and attached to the story events)

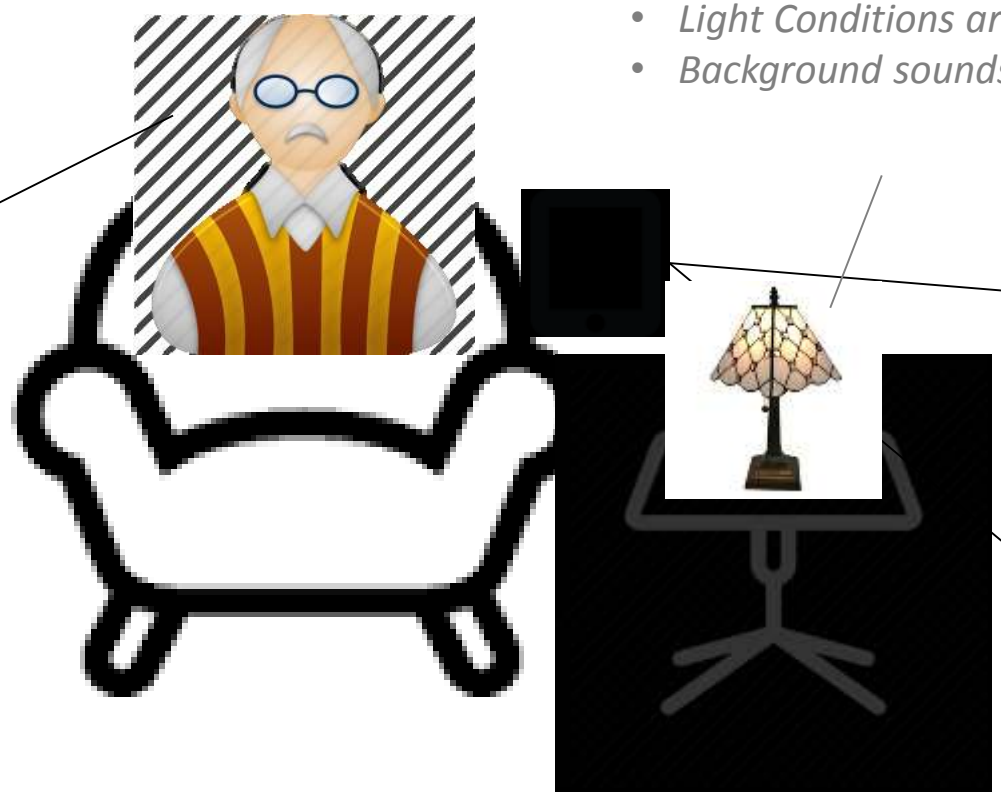
4. The story is modified and stored with the additional items

Experimental Setting 2: stimulate the patient with a multisensorial story form his memory

A light signal could inform that a "story is ready" to be played. Additionally, in dependence and in sync of the story items flow

- *Light Conditions are adjusted*
- *Background sounds could be emitted*

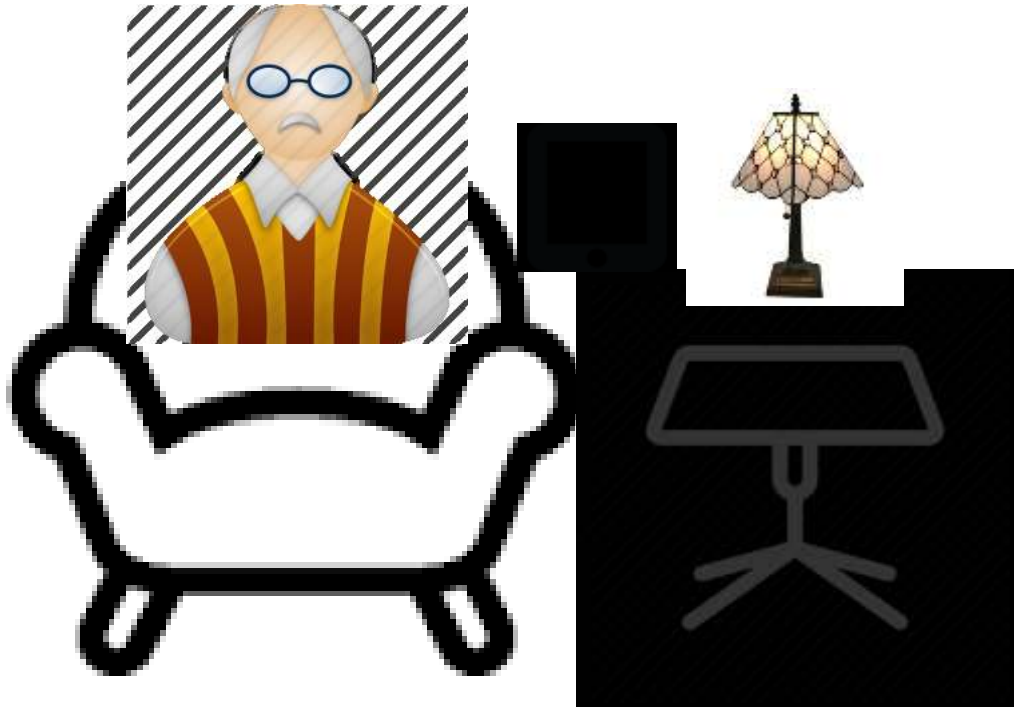
2. During the story flow, the user asks about a specific item "additional" links to other items

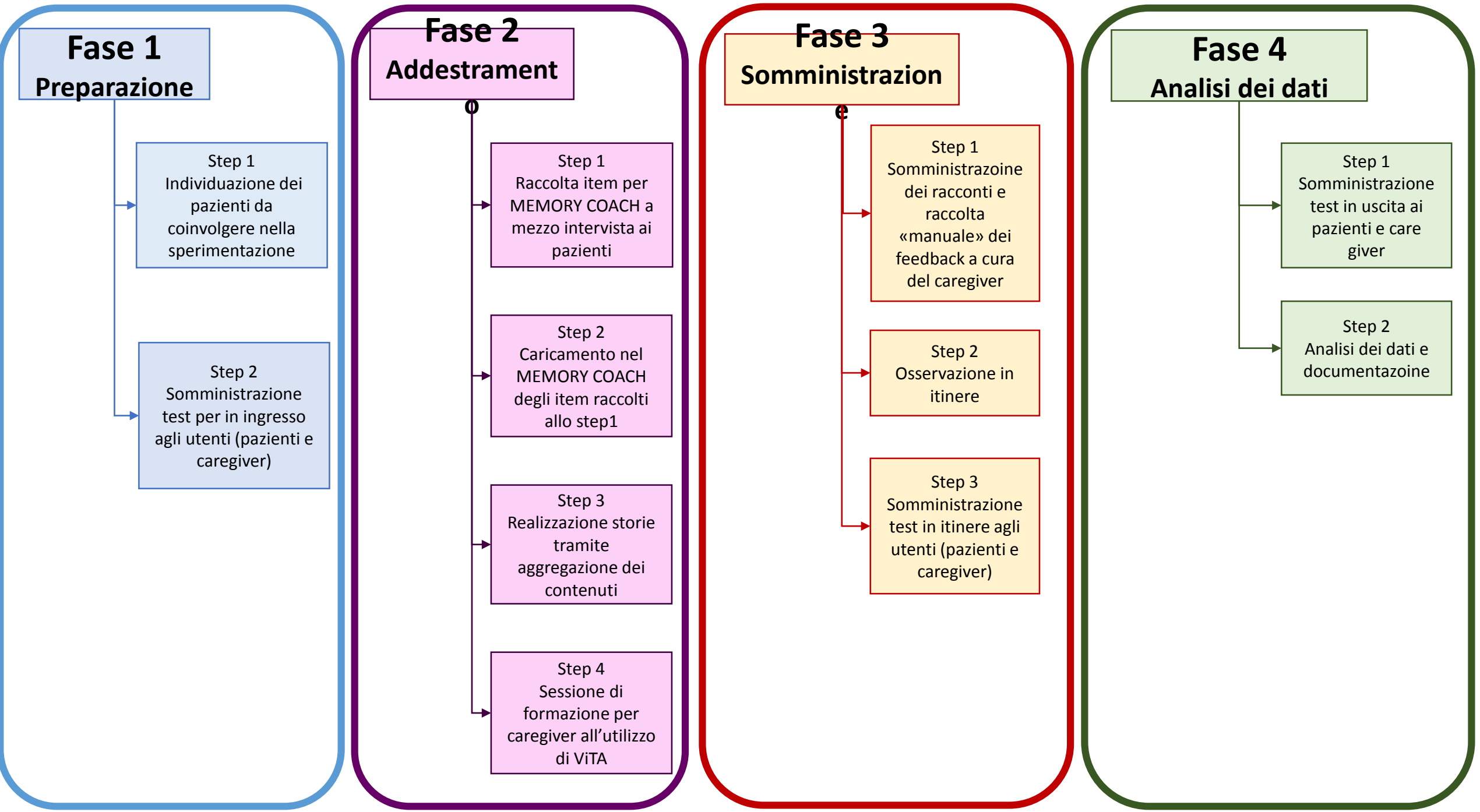


1. A personal story is selected from the memory collection, a sequence of memory item is displayed/played on a tablet…

3. "Related" memory items are proposed according to specific reaction of the patient

STUDY DESIGN




Fase 1
Preparazione
Step 1
Individuazione dei pazienti da coinvolgere nella sperimentazione
Step 2
Somministrazione test per in ingresso agli utenti (pazienti e caregiver)
Fase 2
Addestramento
Step 1
Raccolta item per MEMORY COACH a mezzo intervista ai pazienti
Step 2
Caricamento nel MEMORY COACH degli item raccolti allo step1
Step 3
Realizzazione storie tramite aggregazione dei contenuti
Step 4
Sessione di formazione per caregiver all'utilizzo di ViTA
Fase 3
Somministrazione
Step 1
Somministrazoine dei racconti e raccolta «manuale» dei feedback a cura del caregiver
Step 2
Osservazione in itinere
Step 3
Somministrazione test in itinere agli utenti (pazienti e caregiver)
Fase 4
Analisi dei dati
Step 1
Somministrazione test in uscita ai pazienti e care giver
Step 2
Analisi dei dati e documentazoine

Architecture

Smart Lamp
(IBM TJbot Rasberry)

HTML5
(Tablet Android)

Pepper/Mario
(Social Robot)

NodeRed

Watson
Conversation

Watson Natural
Language
Understanding

Watson Text–to-
Speech

Cedat85 Voice+

IBM Insight for
Weather

IBM Knowledge
Studio

IBM Graph

IBM dash DB

IBM BlueMix

ACCRA

Project ID: 738251
Finanziato nell'ambito di: H2020-EU.3.1.4. - Active ageing and self-management of health

Agile Co-Creation of Robots for Ageing

Dal 2016-12-01 **al** 2019-11-30, progetto in corso

Dettagli del progetto

Costo totale:	**Argomento (i):**
EUR 1 999 711,25	SC1-PM-14-2016 - EU-Japan cooperation on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities
Contributo UE:	**Invito a presentare proposte:**
EUR 1 999 711,25	H2020-SC1-2016-CNECT-EUJ See other projects for this call
Coordinato in:	**Meccanismo di finanziamento:**
France	RIA - Research and Innovation action

ACCRA

Obiettivo

The mission of ACCRA is to enable the development of advanced ICT Robotics based solutions for extending active and healthy ageing in daily life by defining, developing and demonstrating an agile co-creation development process. To this end, a four-step methodology (need study, co-creation, experimentation, sustainability analysis) will be defined and applied in three applications (support for walking, housework, conversation rehabilitation) and assessed in France, Italy, Netherlands and Japan. The three applications will be based on a FIWARE platform integrating a number of enablers including features of universAAL and supporting two robotics solutions, Astro (Robot) and Buddy (Robot companion). The MAST impact assessment framework will be used integrating the following dimensions: user perceptions, user outcomes, ELSI, economic aspects, technical aspects, organisational aspects.
ACCRA is a joint European-Japanese initiative including a multidisciplinary team of 6 European partners and 3 Japanese partners. The project has a three-year duration. It is structured to allow for balanced contribution and efficient synergistic collaboration between Europe and Japan