



A Barcelona company helping caregivers to take time off through computer vision

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Eurocarers Annual General Assembly and 10th Anniversary

14th June 2016

Who we are?



- ✓ **Dr. Jordi Gonzalez**, entrepreneur, Computer Vision and Machine Learning expert
- ✓ **Dr. Xavier Baró**, entrepreneur, Computer Vision and Machine Learning expert
- ✓ **Martha Mackay**, entrepreneur, social innovation and management expert
- ✓ **Dr. Fernando Alonso**, Economist, PhD “Person-environment fit.
- ✓ **Dr. Sergio Escalera**, Computer Vision and Machine Learning expert. Head of the Human Pose Recovery and Behavior Analysis Group

Our expertise:

- ✓ International recognized computer vision experts, more than 150 novel methods
- ✓ Experts in eHealth – several funded FP6, FP7, H2020 projects
- ✓ Experts in adaptation of the environment fit to the inpatient, elder, and caregiver
- ✓ Some of our close partners:



Goal to achieve

Making carers life easier



TIME OFF

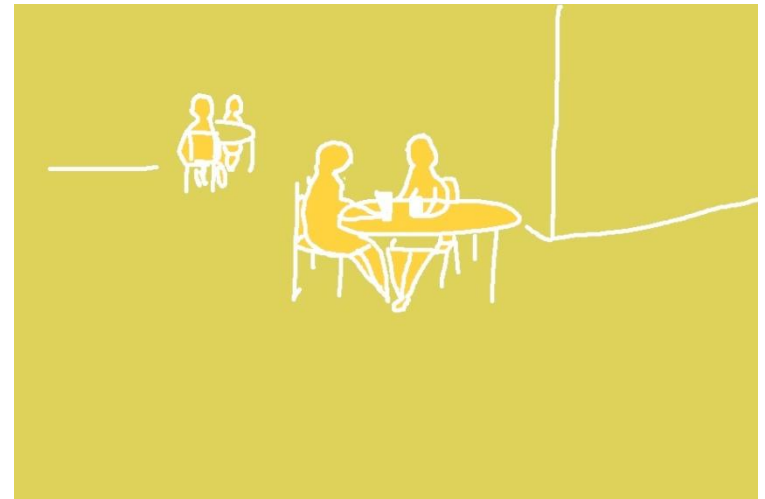
tranquillity

independence

stress - free



Instrumental duties



social life

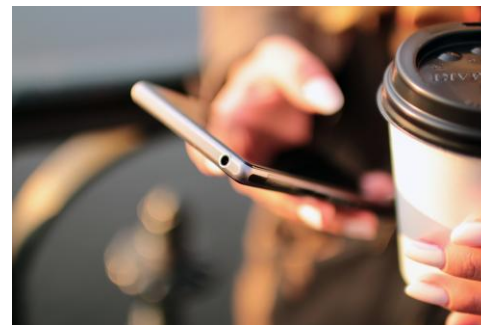
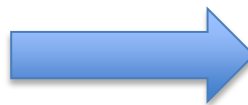
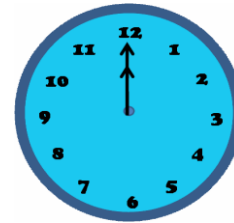
leisure

What is our contribution?



An ambient monitoring and
intelligent visual warning system

RESPITE SYSTEM



**GROWING DEMAND OF
CARE**



Increased pressure on
carers



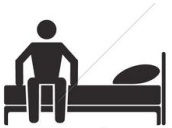
CARERS RESPITE
Adequate relief





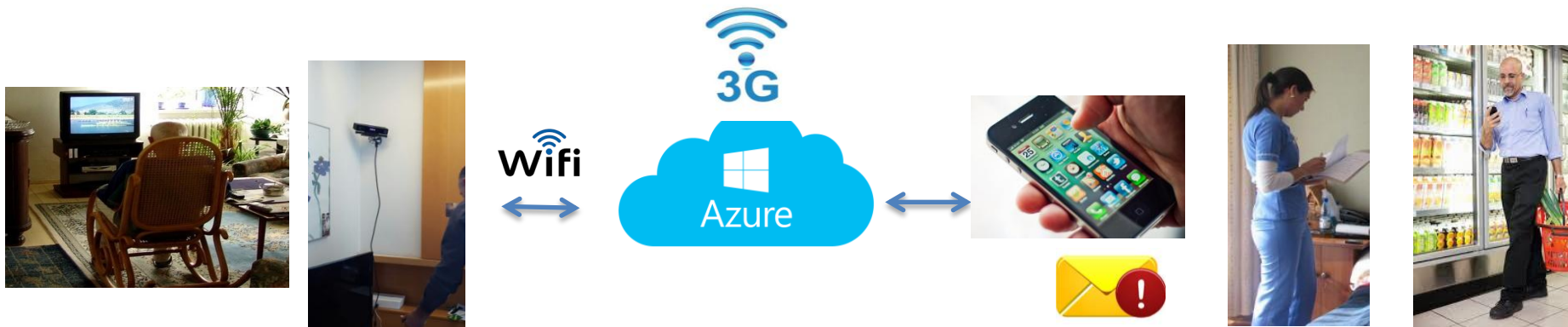
BASIC FUNCTIONALITIES:

Alarms set are **customizable** and adjusted to the needs of the caregiver and caretaker and its location.

- Leaving the room 
- Coming back 
- Standing up 
- Sitting 
- Falling 
- Agitation 
- New person comes in 
- Faint 
- Getting up 

AMBIENT MONITORING & WARNING

Worldwide Innovative system: Computer vision and artificial intelligence advances



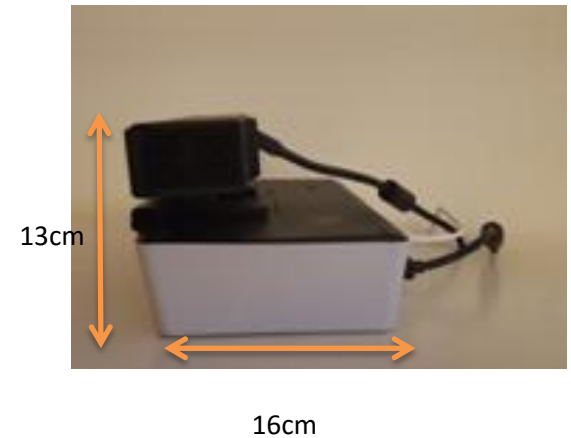
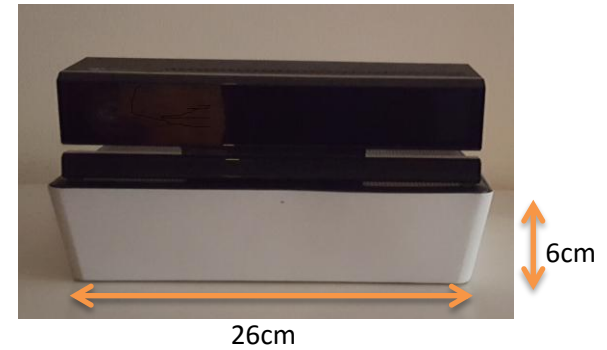
↓
PRODUCT



↓
VIDEO



THE PROTOTYPE



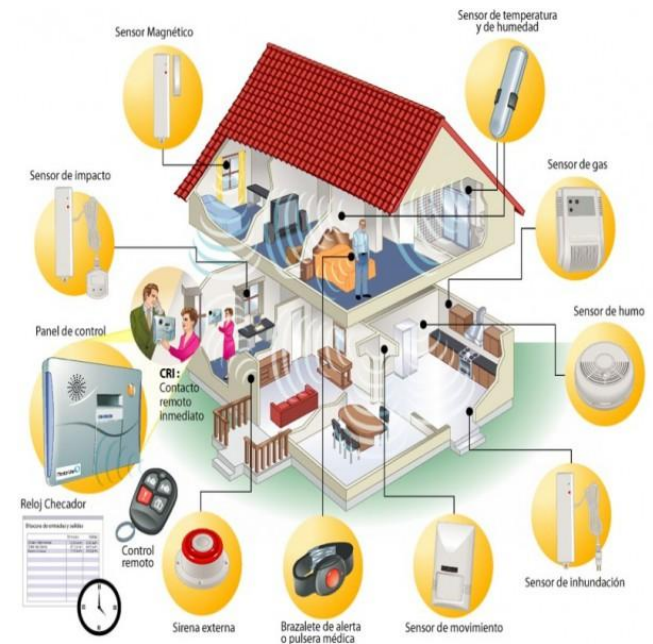
USE EXAMPLES: CURRENT ALTERNATIVES – TOTO CASE



TOTO needs monitoring:

His son wants to monitor home environment to detect if his father leaves the room, thus he included **sensors at doors...** But he also wants to know if his father falls, so he also included **accelerometers, gyroscopes**, in his fathers **collar...** But also he installed a **blanket ground pressure** next to the bed since he knows his father does not wear the collar at night and he wants to know when he wakes up or falls. He wants to include much more sensors, still many more places can be sensorized!!! But...

How can I communicate those huge amount of sensors? Do I need one sensor per each risk situation? How can I guarantee my father uses/wear all of them? Etc.



USE EXAMPLES: CARE RESPITE - JENNY CASE



JENNY needs monitoring:

Her grandsons want to take care of her but sometimes they need a respite to attend other personal and job responsibilities.

In their phone, Jenny's grandsons have **personalized all those risks events** they want to be automatically notified:

-Leaving the room...

-Falling...

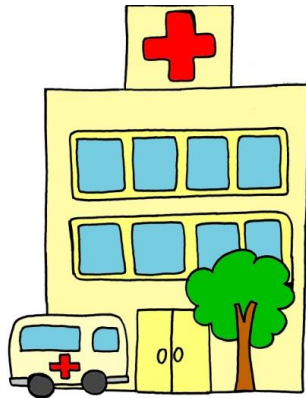
Etc.

Only **one non-invasive Care Respite device is left in the room** where Jenny stays, and Jenny's grandsons receive an automatic alarm in the mobile when a risk event is produced!



**Jenny and grandsons feel safe and Calm.
They can perform a more careful care while
attending other responsibilities!**

USE EXAMPLES: CARE RESPITE - PEDRO CASE



PEDRO is a caregiver of a residence:

He has to supervise **many elders at night**, where several people sleep in ten bedrooms per floor. He is the only supervisor of his floor and he does not want to disturb the elders by continuously entering in the room. He is also worried and stressed since he does not know what happens inside the room and he thinks an elder can be injured and when he arrives it could be too late...

Then, he installed a **CareRespite system per room:**

-It works in darkness!

-It receives automatic alarms from each bedroom each time an elder agitates, wakes up, and falls, automatically and real-time!

Pedro says: "wauu this is a real care!"

THE COMPETITORS & THE ADDED VALUE

ATOMISED & HETEROGENOUS MARKET

Cameras



C

Home sensors



FS

Mobile sensors



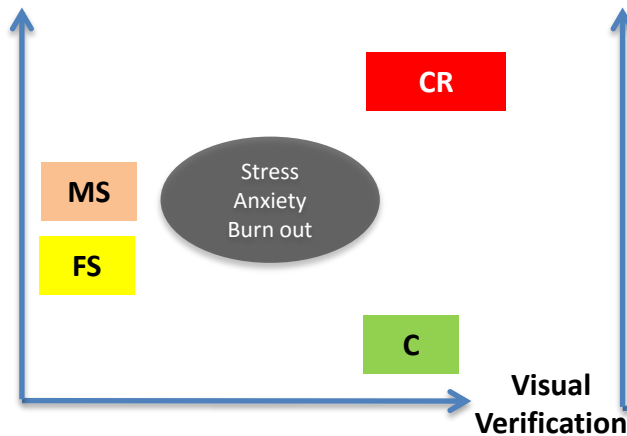
MS

CARE RESPITE

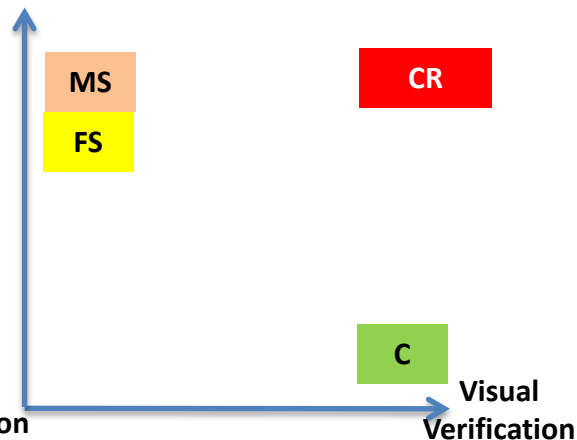


CR

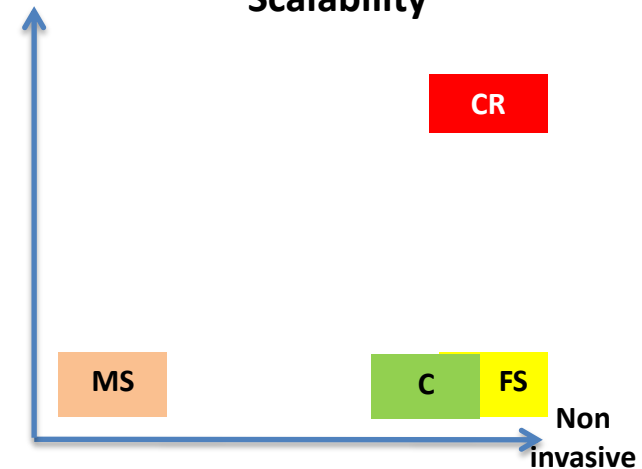
Intelligence



Privacy & Intimacy



Scalability



OUR PROGRESS

And lab
pilots
validation

2015

Patent +
Licensing + FTO
and spin-off
creation

Best UOC
University transfer
project prize

2016

Pilots
validation in
real
environments
by Early
Adopters

2016

Improvements
+ CE +
manufacturing

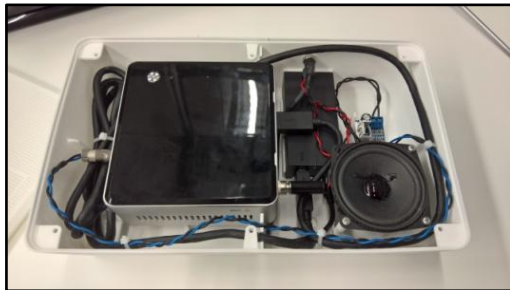
2016

First sales
last quarter

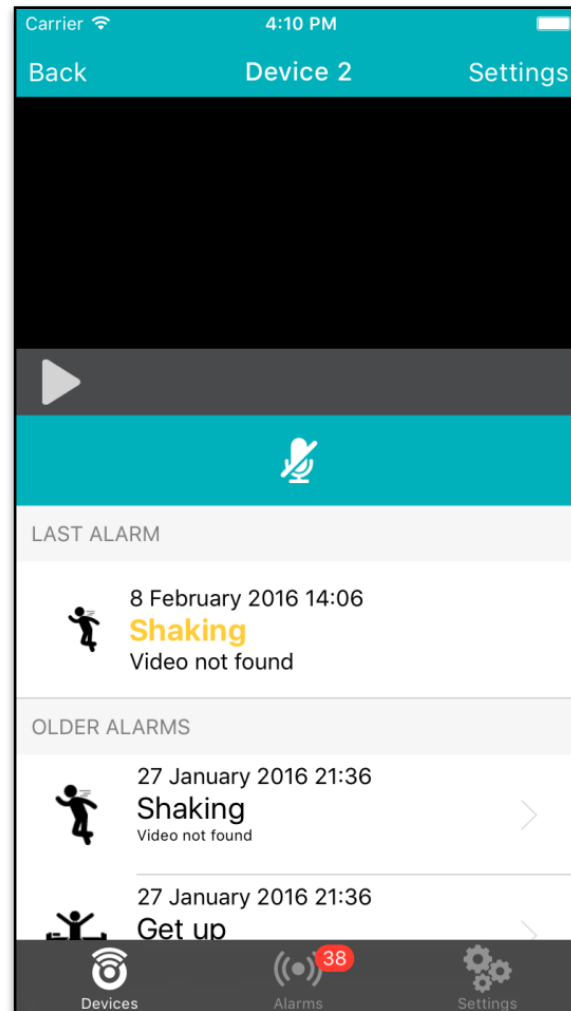
2016

CARE RESPITE: SYSTEM

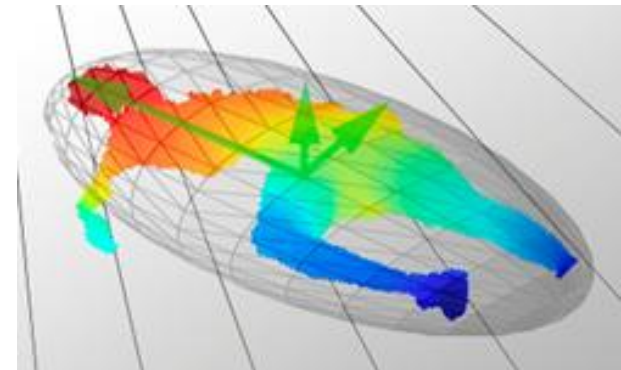
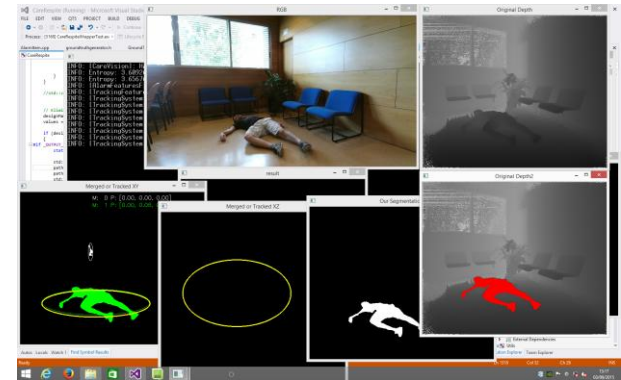
Hardware



Mobile APP



Intelligent data analysis



CARE RESPITE: EVALUATION

Dataset 1: Created to detect alarms

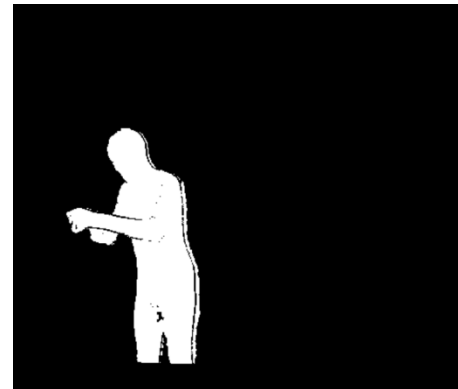
- Environments:
 - Type:
 - Bedroom, living room and laboratory
 - Light conditions
 - Extra sun, low sun, dark
 - Halogen lamps and others
 - Floor
 - Different types of floors
- Persons
 - Male and female
 - Long hair and short hair
 - Different type of dresses (e.g. Material and colour)
 - Tall/small
- Additional actions
 - Open doors/windows, pick objects from the floor, read, eat, move things such as chairs or curtains.

50% with/without alarms

Total: 21 sequences of 3-5 minutes each.

Dataset 2: Created to improve tracking/segmentation

For each problematic situation found in Dataset 1 create a new sequence using an inverse chroma key method.

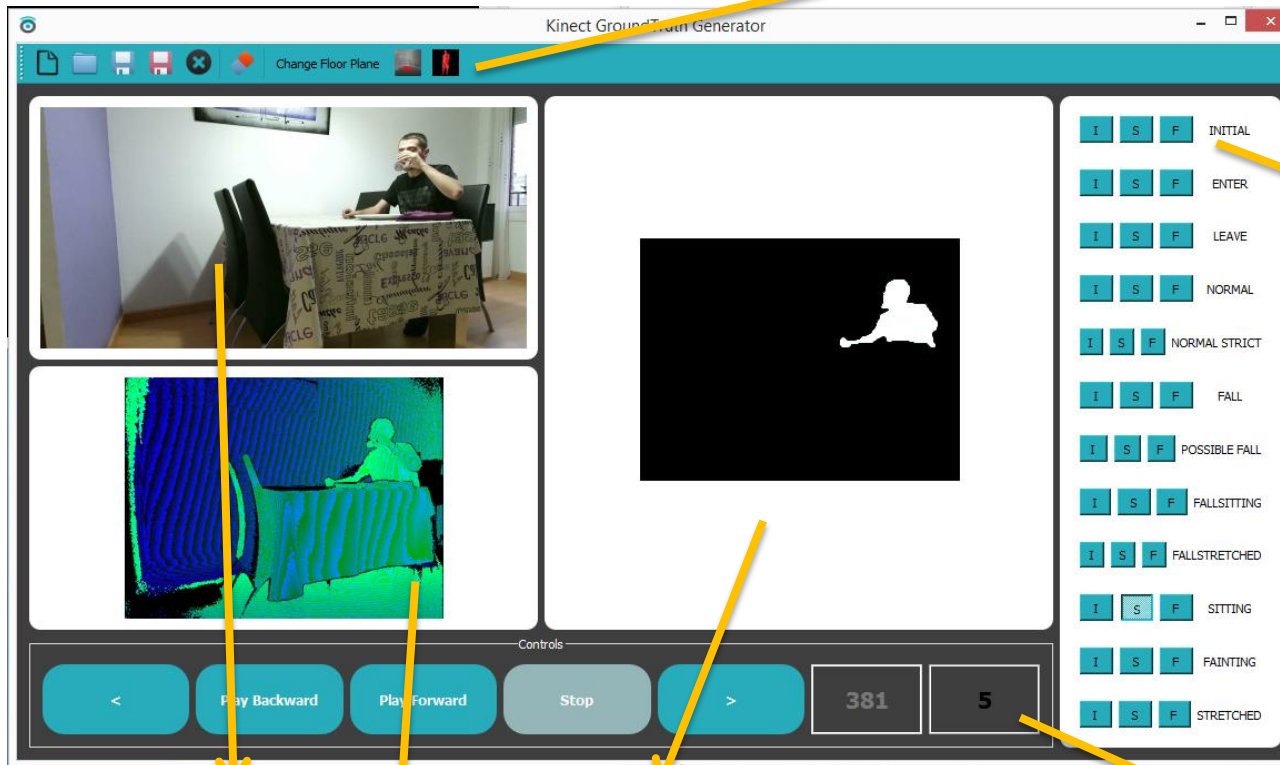


Total: 4 sequences of 5 minutes each.

CARE RESPITE: EVALUATION

Labeling App

Save depth frame to file (PNG)
Save point cloud to file (CSV)



I: Start flag segment
S: State flag
F: End flag segment

The user has only to set the start and end.

Color / Depth / Groundtruth Depth

Number of frames for step

Results in our datasets

Results Dataset 1 (Alarms)

Low false alarm rate!!!! 😊

State	Overlap
FALLSITTING	96.3379%
FALLSTRETCHED	91.2346%
SITTING	79.3167%
FAINTING	98.0212%
STRETCHED	81.5158%

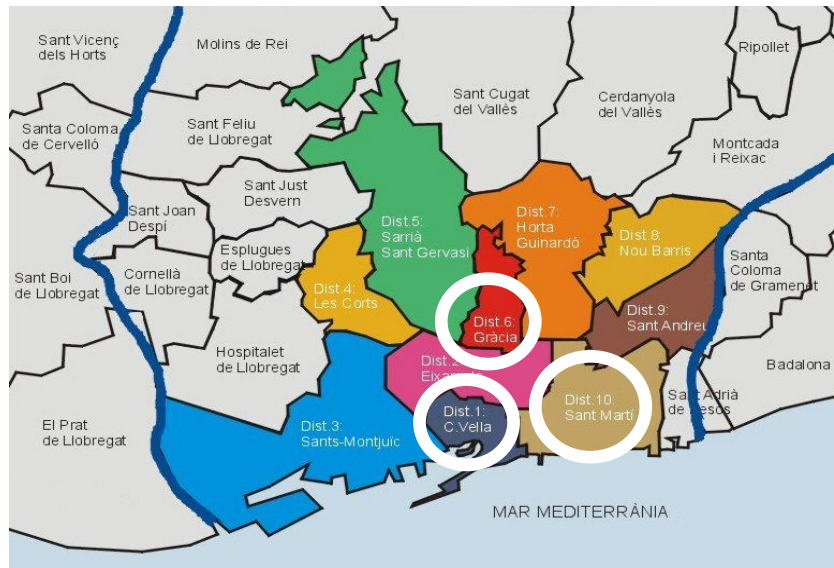
Almost negligible false negative rate! 😊

Results Dataset 2 (Segmentation)

Global segmentation overlap: **53,8314%**

CARE RESPITE: PILOTS TESTING – PRIVATE HOMES

Users chosen by professionals physicians, social assistants and nurses from Barcelona public Primary Health Care Centres [PAMEM](#) (agreement)



IMPACT : 28% of Barcelona residents

District	Nº residents
Gràcia	120.401
Ciutat Vella	100.115
Sant Martí	133.659
Total impact	454.175

Barcelona population: 1.604.555
(Ref. BCN City Council)

PILOTS TESTING – RETIREMENT HOMES

Barcelona City Council retirement homes (agreement)



Ajuntament
de Barcelona

APRIL 2016

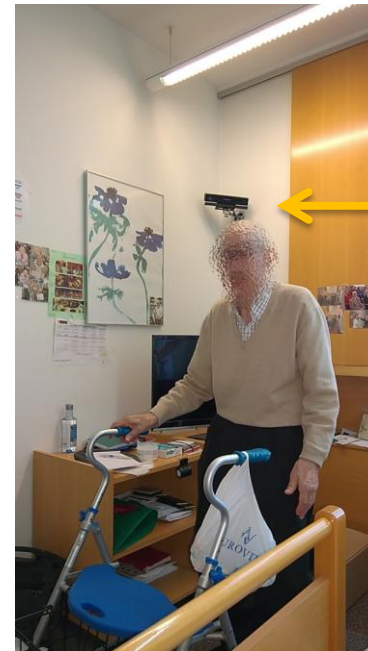
Validation and
usability tests
&
improvements

DECEMBER
2016



capacity: 137
5 floors
Sq meters: 6.690

[Fort Pienc Municipal retirement home](#)



Camera

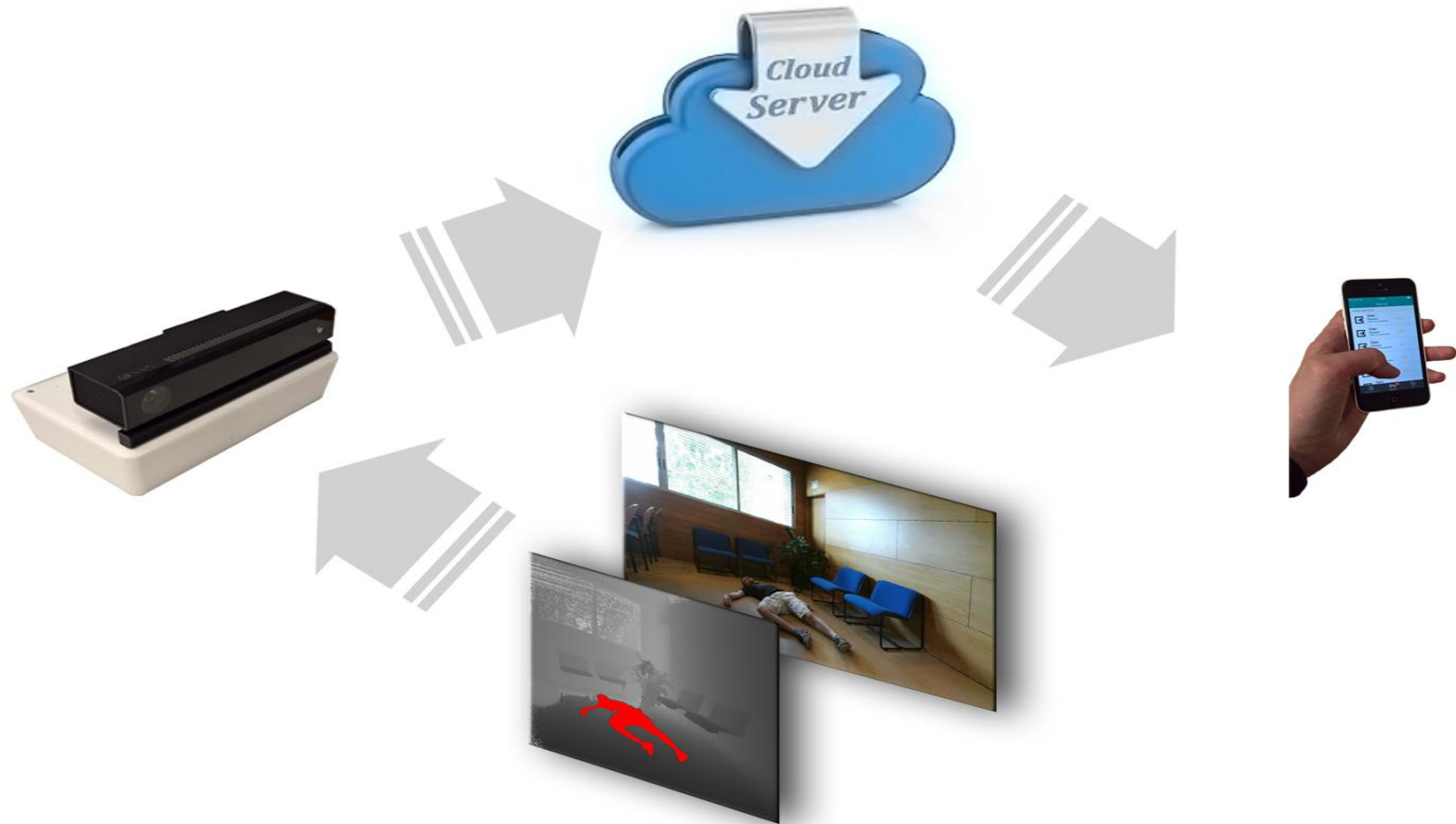
CARE RESPITE: PILOTS HOSPITAL

Hospital Clinic Barcelona (agreement)

CLÍNICA
BARCELONA
Hospital Universitari



DEMO





CARE RESPITE

Thank you!

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Supported by

