



**Should Artificial Intelligence be used to empower people with profound intellectual disabilities?**

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[www.insension.eu](http://www.insension.eu)

Personalized intelligent platform enabling interaction with digital services to individuals with profound and multiple learning disabilities



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PARTNERS:



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People with profound intellectual and multiple disabilities



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## People with PIMD

- **profound intellectual disability (IQ < 20) combined with other disabilities:** severe forms of motor disabilities, sensory disabilities (hearing or visual impairment), severe forms of epilepsy (on heavy medicamentations, frequent epileptic seizures up to grand mal)
  - **communication:**
    - (usually) no verbal language
    - often on a pre-symbolic level
    - use of unconventional behavior signals
  - **long-term high need for therapy, care, support (WHOLE LIFE!)**
- **difficult social participation!**

## Non-symbolic interaction (1)



Request an item

Receive the item



**AUGMENTATIVE AND ALTERNATIVE  
COMMUNICATION**

## Non-symbolic interaction (2)

- Reactions to the happenings around through:
  - gestures
  - facial expressions
  - vocalizations
  - gaze
- These signals are highly individual!

## Non-symbolic interaction (3)

**ACCEPT**

(I WANT IT)



**DEMAND**



**COMMENT**

**DISAPPROVE**

(I DON'T WANT IT)



**PROTEST**

## Physiological affective response

- *„heart rate and skin temperature can give information about the emotions of persons with severe and profound ID” [Vos et al. 2012]*
- *„frequent consistent physiological reactions” to stimuli [Lima et al. 2013]*
- *„a shallow, fast breathing pattern, used less thoracic breathing, had a higher skin conductance and had less RSA when experiencing positive emotions than when experiencing negative emotions” [Vos et al. 2010]*





## The INSENSION Platform



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# INSENSIION

*IT IS ENTIRELY POSSIBLE THAT BEHIND THE PERCEPTION OF OUR SENSES, WORLDS ARE HIDDEN OF WHICH WE ARE UNAWARE*

*Albert Einstein*



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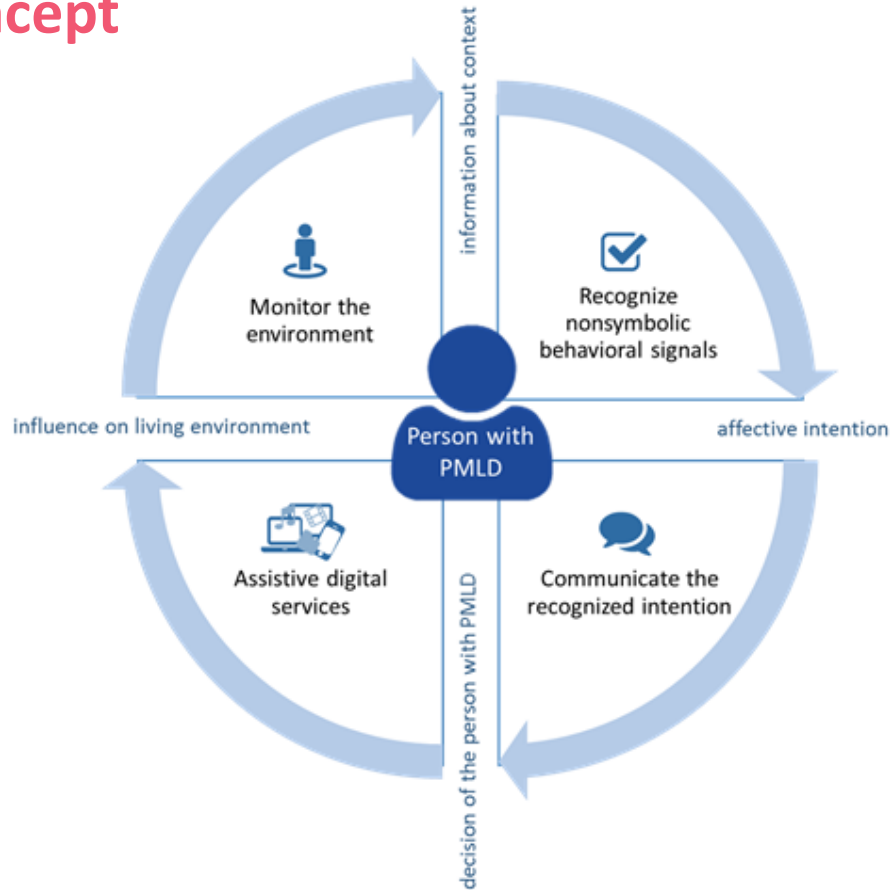


## The goal

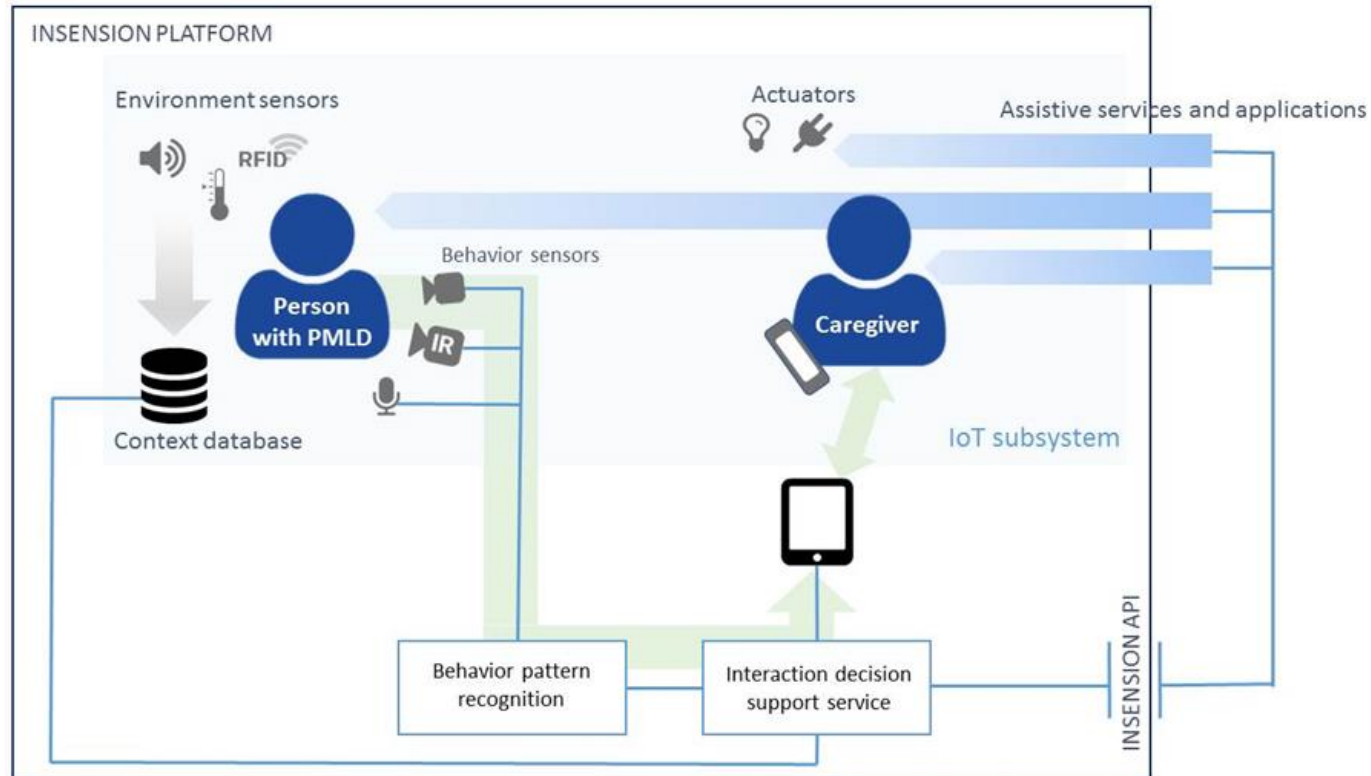
Design and develop an ICT platform that enables persons with profound intellectual and multiple disabilities (PIMD) to use digital applications and services that:

- can enhance the quality of their life
- increase their ability to self-determination
- and enrich their life.

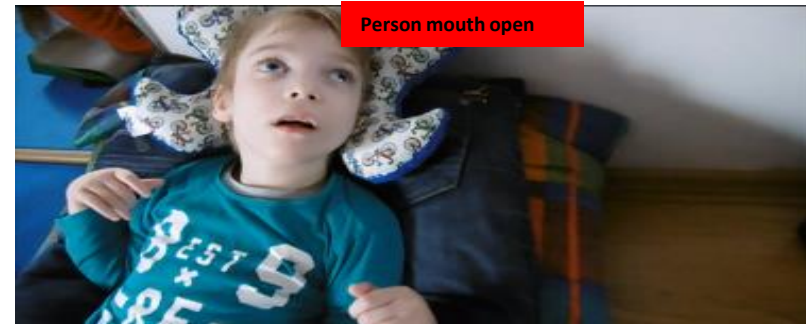
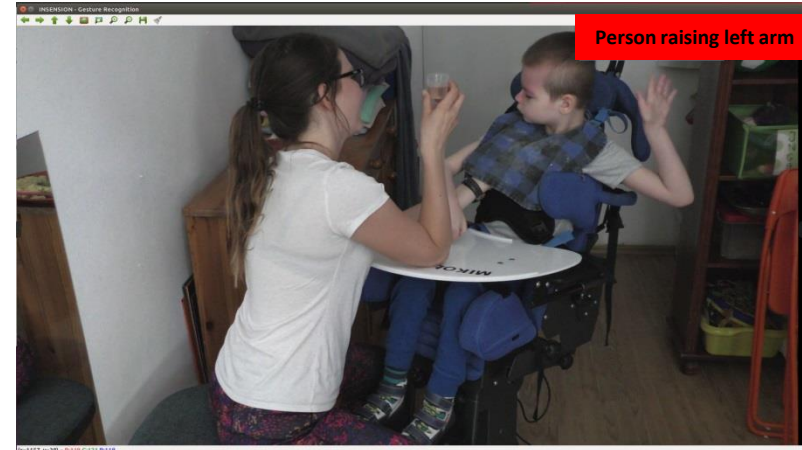
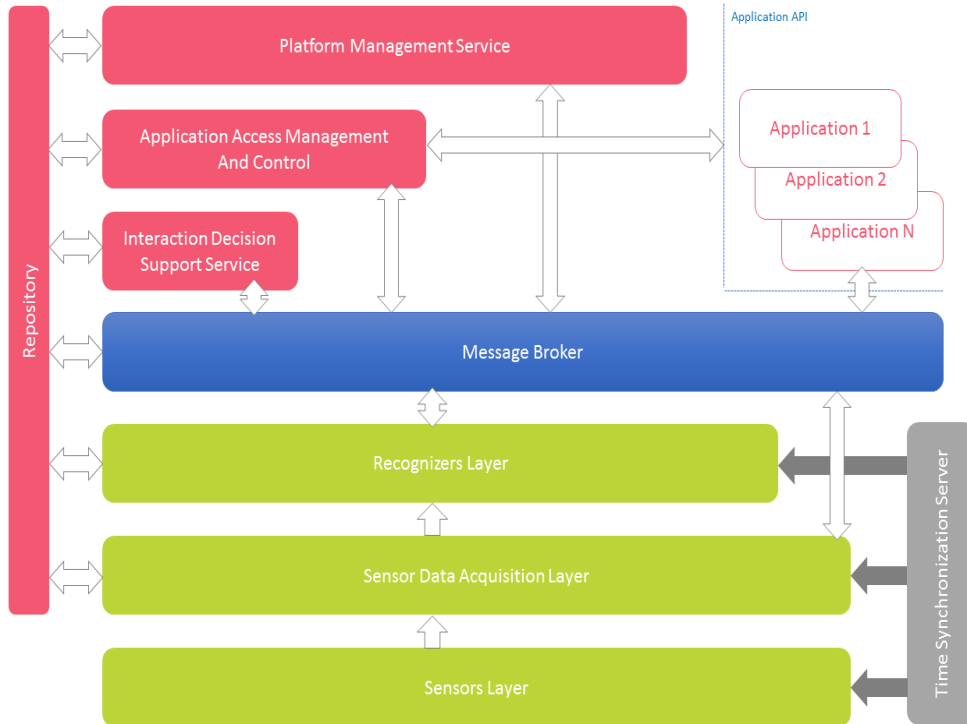
## General concept



# INSENSION platform



# INSENSION platform under development



## Assistive applications

- **Goal of the INSESION platform: provide information on the current need of the end user to external applications**
- **Example applications:**
  - **communication with other people**
  - **multimedia player**
  - **management of *smart* room devices (including a robotic arm)**
- **Example usage scenarios:**
  - **transition**
  - **night support**
  - **interaction about needs resulting from external circumstances**

## Important research (and design) questions

- Is building the INSESION system possible from the technical point of view?
- Is the INSESION system *smart* enough to accurately act on behalf of the primary end user?
- How about the privacy of the end users (primary, secondary, tertiary)?
- To what extent should the INSESION system act on its own once it is able to recognize the meaning of the given behavior of the person with profound disability?



## Should we then use AI for supporting people with PIMD?

- *(We believe)* AI can empower people with profound intellectual and multiple disabilities to take actions themselves, especially when no direct support person is around
- AI system such as INSESION is sort of a prosthesis of verbal communication for a person who is biologically unable to use verbal communication
- Such a system is similar to:
  - wheelchair that allows people with motor impairment to move around
  - white cane that allows people with visual impairment to scan surroundings
  - ...

## The answer

**Not applying Artificial Intelligence on people with PIMD  
due to their incapability of consenting to it  
would refuse them the possibility to benefit from the potential  
of achieving a level of independence**