A pre-validation methodology for developing and selecting digital solutions for older people

Lessons Learned from the Italian Pilots

University of Florence – Department of Industrial Engineering

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Online, February 24th ,2023

Digital solutions: What does it mean and cost to be inclusive? Lessons learned from three Large-Scale Pilots

Pharaon – Pilots for Healthy and Active Ageing

pharaon

CALL: Societal Challenges – Health, demographic change and wellbeing
Trusted digital solutions and Cybersecurity in Health and Care
Focus Area on Digitising and transforming European Industry and services

Internet of Things
Horizon 2020 call:
DT-TDS-01-2019:
Smart and healthy living at home

Project Coordinator: **Prof. Filippo Cavallo (UNIFI)**

[Dec 2019 – Nov 2023]

Total Budget: **21.3 M€** (funding budget 18.8M€)

Contact:
Website: www.pharaon.eu;
Facebook: fb.me/pharaon.project
Twitter: @PharaonProject;
LinkedIn: Pharaon - Pilots for Healthy and Active Ageing
https://www.linkedin.com/groups/12335464/

Pharaon Pilot Sites

3'400 users including older adults, professionals, volunteers, informal caregivers
over **6 pilot sites**
in **5 EU countries**

6 different pilot sites in multiple domains:
Murcia (Spain)
Andalusia (Spain)
Portugal
The Netherlands
Slovenia
Italy

Healthcare
Energy
Smart City
Mobility and Trasportation

Target: 3'400 users

3

Presentation and Description of the pilot: The Challenges

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The objective of the Italian pilot is to: **Propose personalized Integrated care for frail older adults**

Tuscany

Apulia

Target groups	#
Older adults	300
Informal caregivers	300
Formal caregivers	100

UNIVERSITÀ DEGLI STUDI FIRENZE — DIEF DIPARTIMENTO DI INGEGNERIA INDUSTRIALE

ERICSSON — Ericsson Nikola Tesla d.d.

orthokey

CO-ROBOTICS — THE WORKFORCE MULTIPLIER

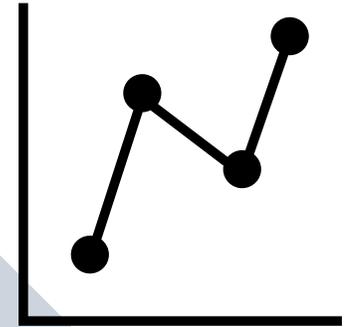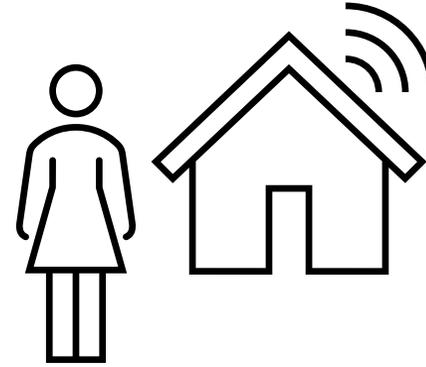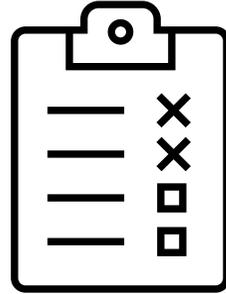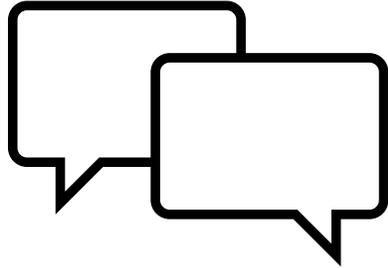|	OUR CHALLENGES
PCH1	The behaviour and the approach of elderly to friendly technological devices- **Acceptance and usability**
PCH2	**Health status** definition and its progress over time - Monitoring through passive and active methods.
PCH4	Promote **Social Cohesion- Development** of an integrated platform to facilitate connectiveness.
PCH5	Define specific **personalized care plan** on the basis of user´s needs
PCH10	**Support to caregivers towards** more efficient and personalized care services

Pharaon Phases with Pharaon Users

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| Need Analysis & Requirement | Pre-validation of Technology | Long Deployment Phase (12 Months) | Sustainability and Impact |

+ Technology
from open calls

The selected services: Needs Analysis

Monitoring Health

Stimulation
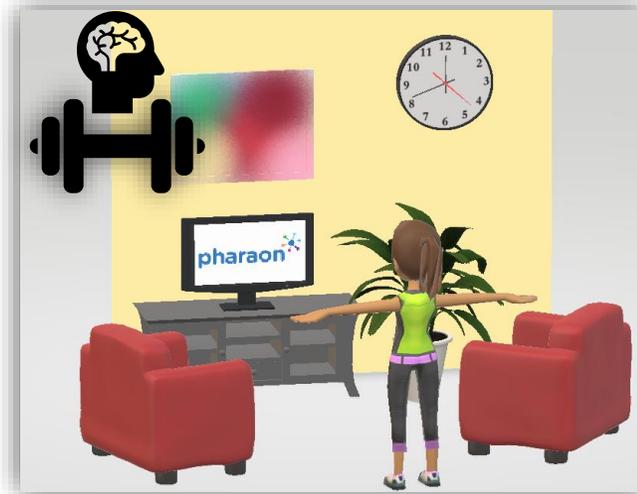
Socialization

PCH1	The behaviour and the approach of older to friendly technological devices

Older Adults
- **PCH2** - Health status definition and its progress over time

Informal/Formal Caregiver
- **PCH10** Support to caregivers towards more efficient and personalized care services
- **PCH2, PCH4**

Older Adults
- **PCH2** - Health status definition and its progress over time

Informal/Formal Caregiver
- **PCH5** Define specific personalized care plan on the basis of user´s needs
- **PCH10**

Topic of Open Call I

Older Adults
- **PCH4** - Promote social cohesion

Informal/Formal Caregiver
- **PCH10** Support to caregivers towards more efficient and personalized care services
- **PCH2, PCH4**

Need Analysis & Requirement → Pre-validation of Technology → Long Deployment Phase (12 Months) → Sustainability and Impact

September 2021 – January 2022 Tests
January – March 2022 Data Analysis

sensors — MDPI

Article

Design and Evaluation of Personalized Services to Foster Active Aging: The Experience of Technology Pre-Validation in Italian Pilots

Letizia Lorusso [1], Miran Mosmondor [2], Andrej Grguric [2], Lara Toccafondi [3], Grazia D'Onofrio [4], Sergio Russo [1], Jure Lampe [5], Tarmo Pihl [6], Nicolas Mayer [7], Gianna Vignani [3], Isabelle Lesterpt [8], Lucie Vaamonde [8], Francesco Giuliani [1], Manuele Bonaccorsi [9], Carlo La Viola [10], Erika Rovini [10], Filippo Cavallo [10] and Laura Fiorini [10,*]

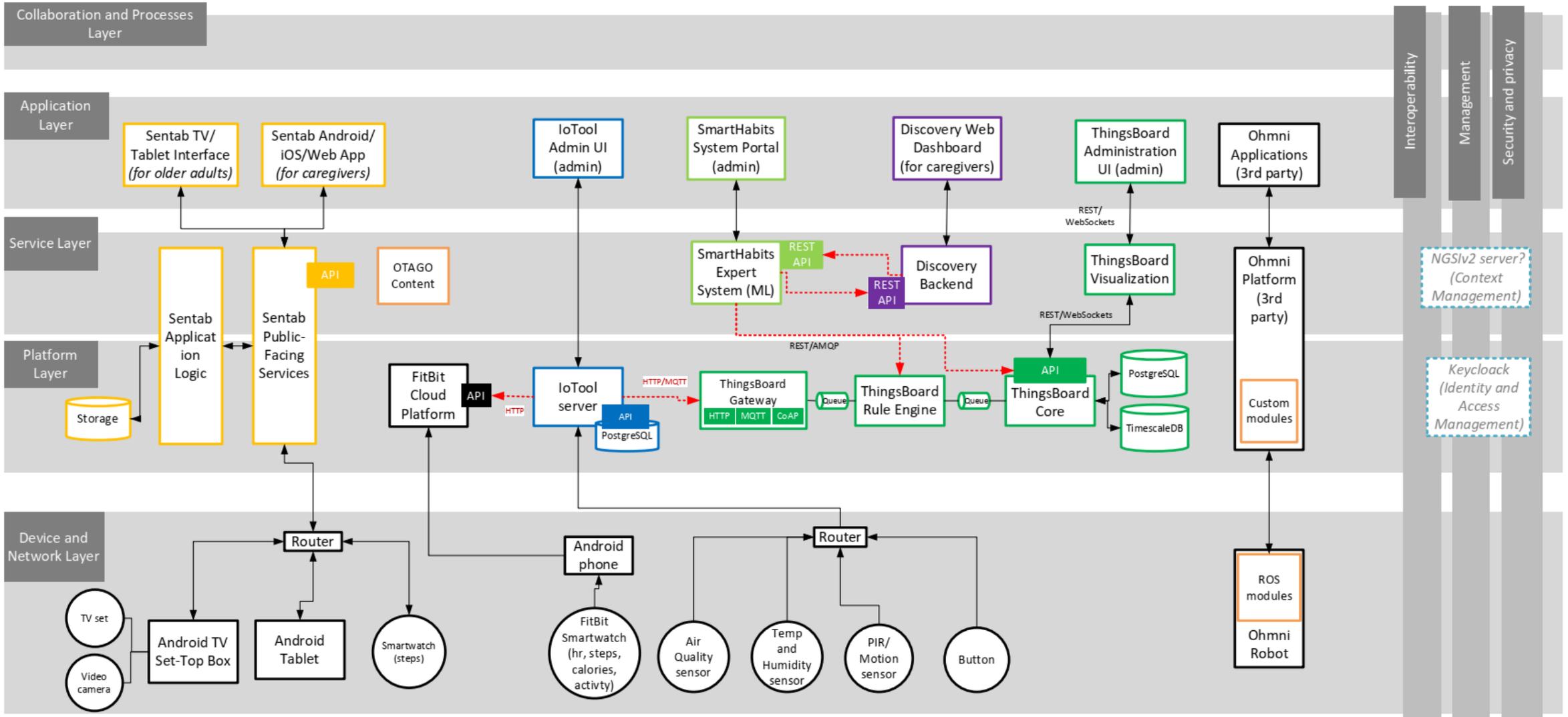# Selected technologies from Pharaon Consortium
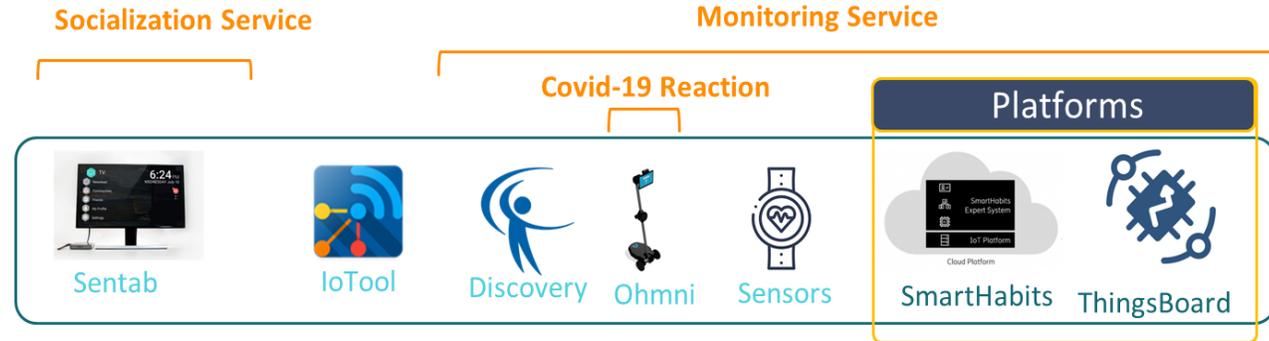
Tested in Phase 1	Tested in Phase 2	
Technology	Socialization & Stimulation service	Monitoring Service
SENTAB[A] (Older adult device on Tablet)	● [2]	
SENTAB (Older adult device on TV)	● [1]	
SENTAB[A] (caregiver web application, namely Vanilla app)	●	
Environmental sensors (temperature & humidity, PIR) (Shelly sensors)		●
Smartwatch MAXhealth Band		●
Thingsboard & Smarthabits		●
Discovery Dashboard[A]		● [2]
Ohmni robot[A]		● [1]

[A] tested during Phase 1 and Phase 2 of the pre-validation
[1] tested only in Tuscany pilot; [2] tested only in Apulia

Italian System View Diagram

Grguric A, Mosmondor M, Huljenic D. Integration and Deployment of Cloud-Based Assistance System in Pharaon Large Scale Pilots—Experiences and Lessons Learned. *Electronics*. 2022; 11(9):1496. https://doi.org/10.3390/electronics11091496
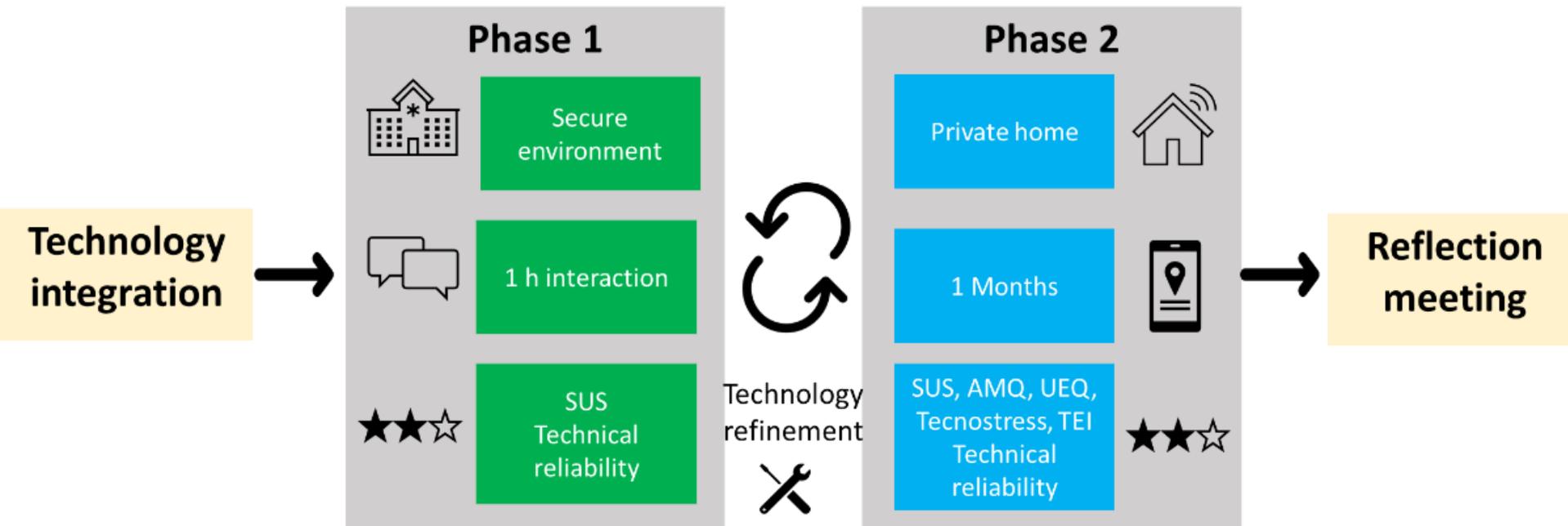
Pre-validation experimental setting

Methodology and peculiarities of the italian pilot

Phase	Older Adults	Informal caregiver	Formal caregiver	Total
1	10	10	7	27
2	14*	9	7	30

* 3 participants dropped out from the study.

Key Performance Indicators

Evaluation Framework used				
Domain	**Questionnaire**	**Phase 1**	**Phase 2 T0**	**Phase 2 TF**
Usability	System Usability Scale	YES	YES	YES
Acceptability	Almere Model	-	YES	YES
User Experience	User Experience Questionnaire	-	-	YES
Training	Training Evaluation Inventory	-	YES	-
Technostress	Perceived Stress related to technology adapted	-	YES	-

+ Qualitative data collected through the Reflection meeting

Usability

System Usability Scale (SUS) and qualitative Feedback

Discovery

SUS

Phase 2 TF   Phase 2 T0   Phase I

Sentab

SUS
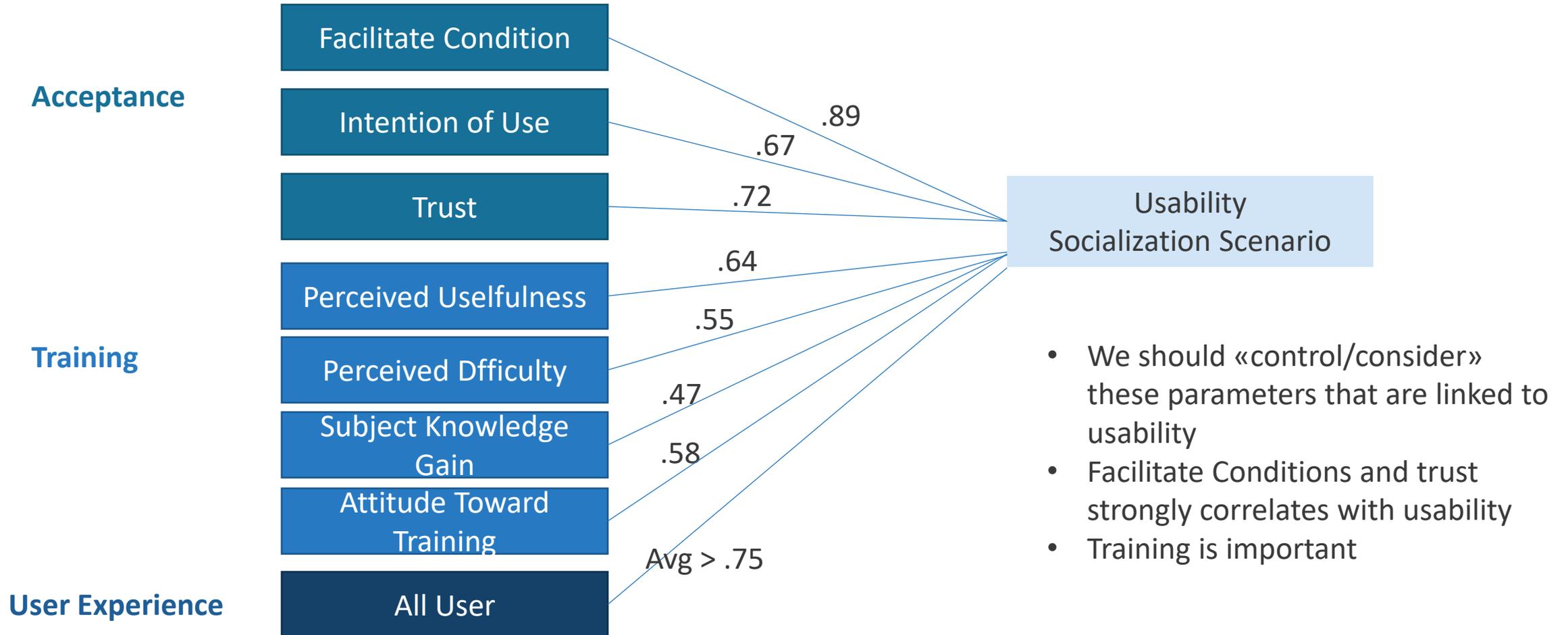
Phase 2 TF   Phase 2 T0   Phase I
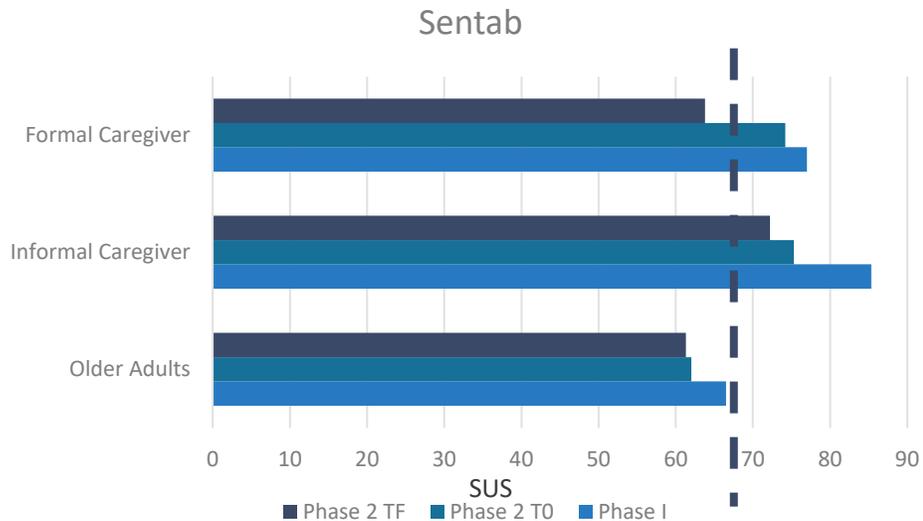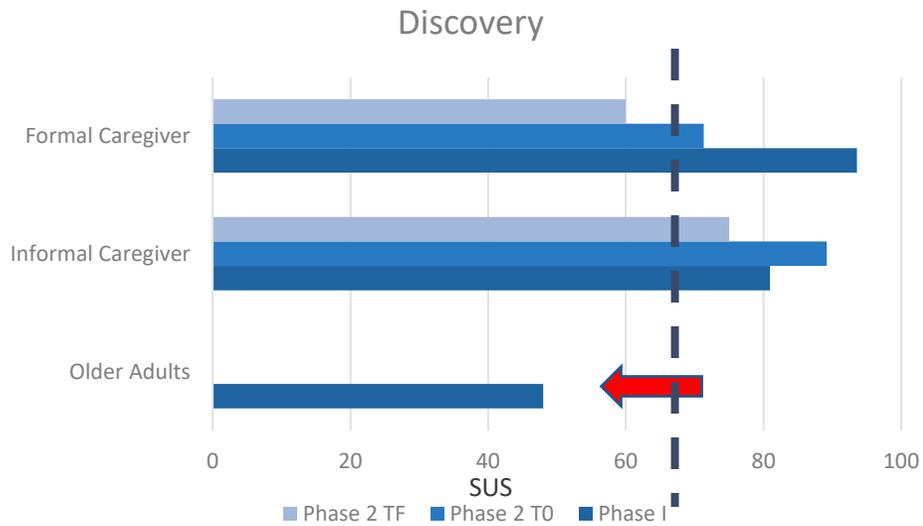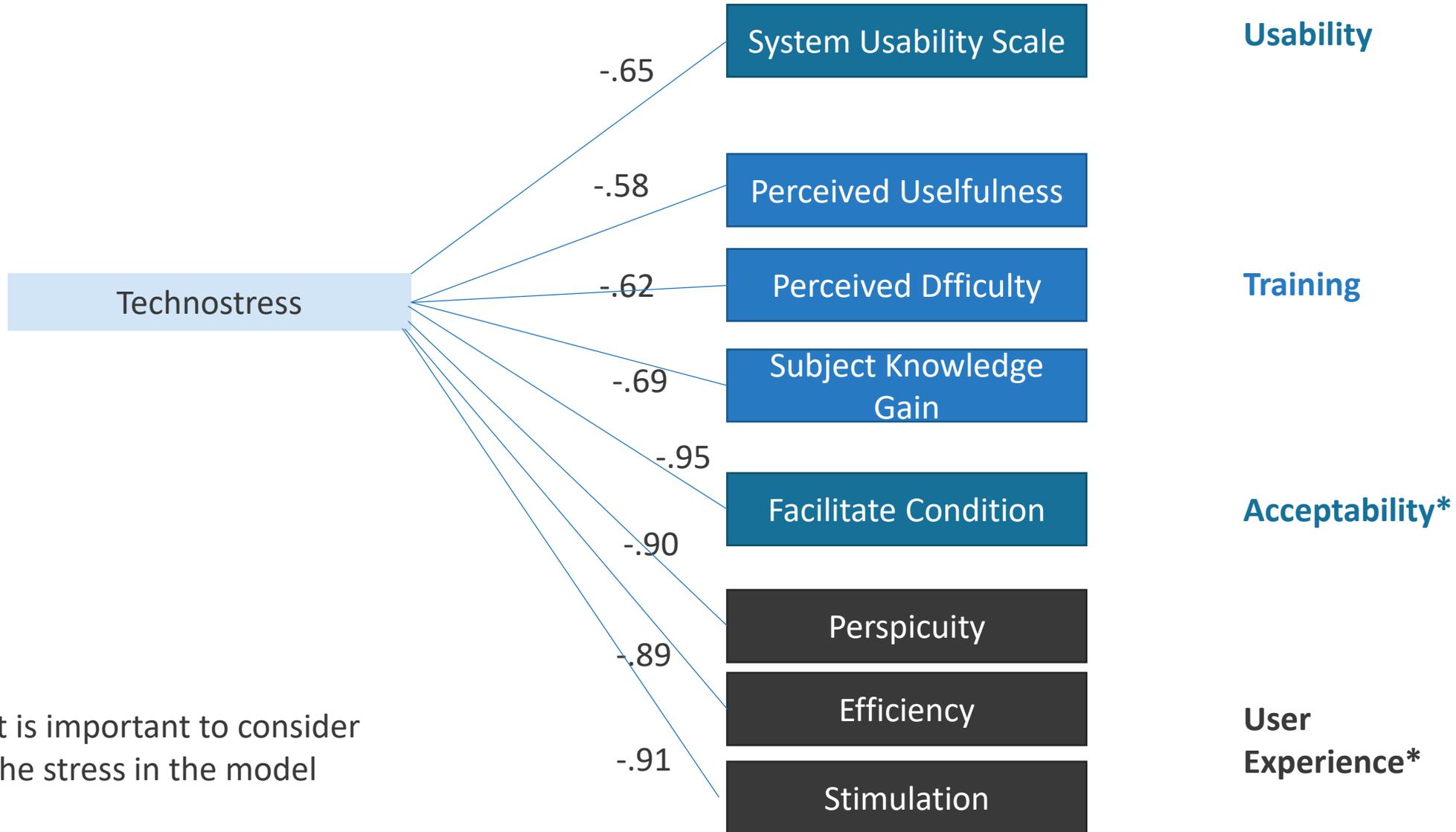

Consequences for the deployment

- The smatwatch was not ease to use. We move to another solutions.

- Discovery was not usable for oldr adults (PH1) so we decide to not include it in the final services.

- Ohmni robot received very positive feedback also during the PH1 and PH2 we decide to keep it in

- Older adults loved see person on the TV because the face are very big.

Factors that may have an influence on the Usability

Acceptance, Training and User Experience can have an impact on the perceived usability

The influence of the stress

Technostress

-.65 → System Usability Scale — **Usability**

-.58 → Perceived Uselfulness

-.62 → Perceived Dfficulty — **Training**

-.69 → Subject Knowledge Gain

-.95 → Facilitate Condition — **Acceptability***

-.90 → Perspicuity

-.89 → Efficiency — **User Experience***

-.91 → Stimulation

It is important to consider the stress in the model

Spearman or Pearson Correlation Coefficients

* Reduced sample size

Lessons we learned in our pilot from Pre-validation

Stress related to the use of the technology could have an impact on the user's general perception of the technology

Training is really important
- Older adults has low digital literature, but they are available to learn.
- Change the way we did training thus to achieve average TEI score > 3.5

Attitude of the caregiver(s) can influence the use of the technology
- We understand that the role of the caregiver is crucial. If they are active the service is well perceived.
- We provide a common training to pharaon system

Technology should be reliable, otherwise we incentivize drop-out reducing the trust in the technology

The socialization Services implemented after the pre-validation

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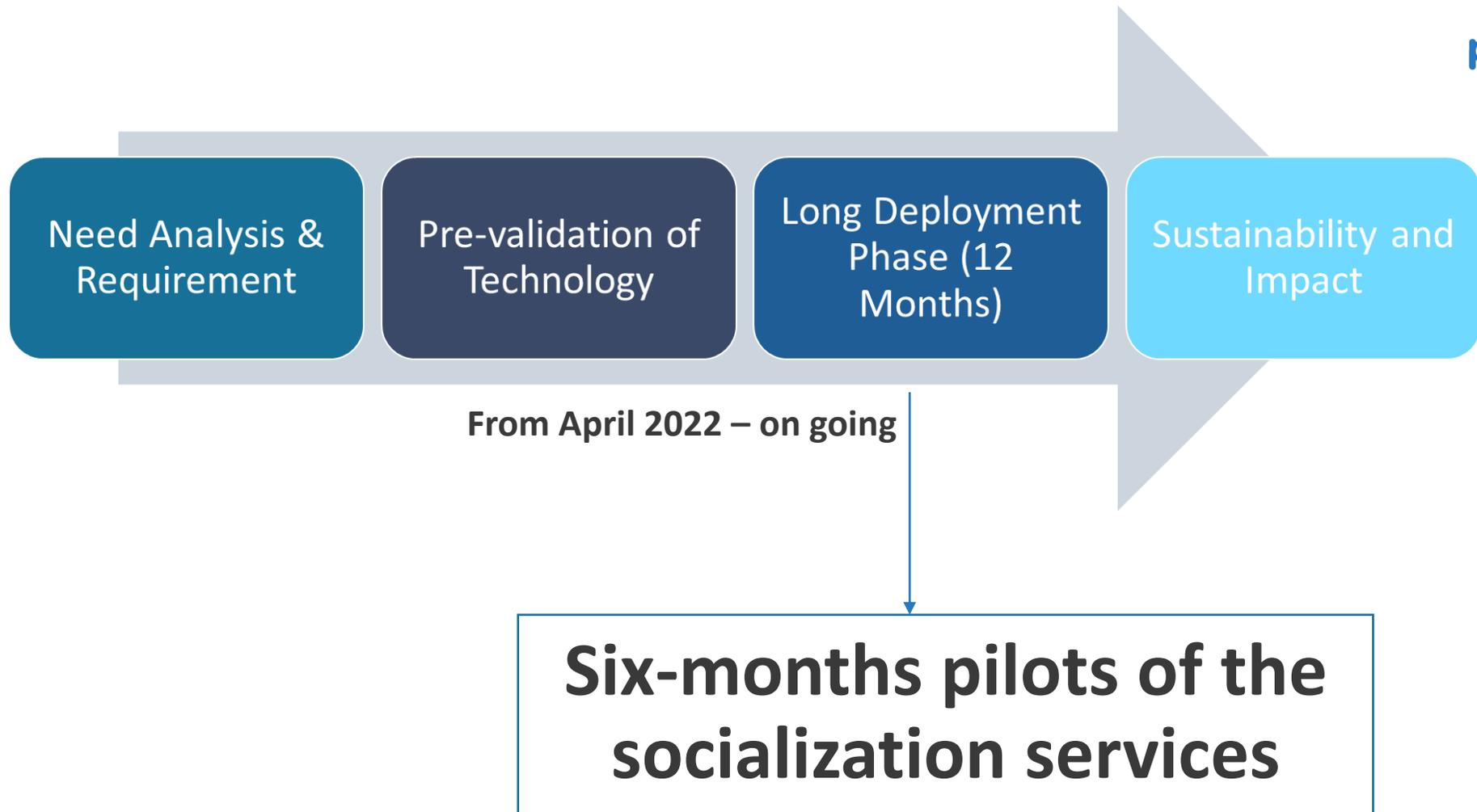
The Italian Pilot

Updates on the deployment status

LEAD: University of Florence

Pilot Members: Umana Persone, Casa Sollievo della Sofferenza, CoRobotics, Ericsson Nikola Tesla, Orthokey

Technology Providers: Ericsson Nikola Tesla, CoRobotics, SENLAB, SENTAB, Ascora

Laura Fiorini | Pilot Coordinator (UNIFI)
Lara Toccafondi | Proj. Manager for Tuscany (UP)
Sergio Russo | Technical Collaborator for Apulia (CSS)

Intervention group
- 20 older adults
- 20 caregivers
- 9 formal caregivers

Tested the socialization services for 6 months.

We are having reflection meeting to learn lessons and fine-tunes next steps

Effect of the technology on the quality of life and loneliness
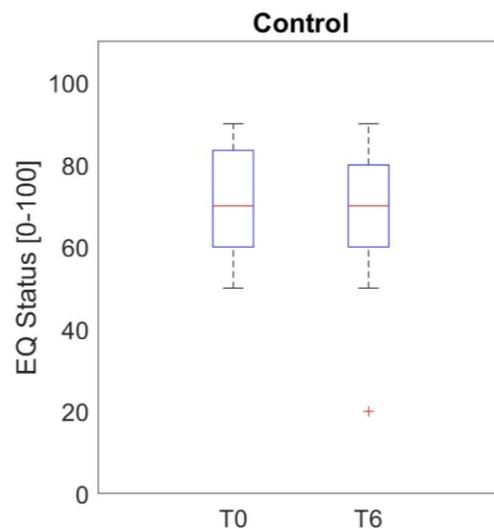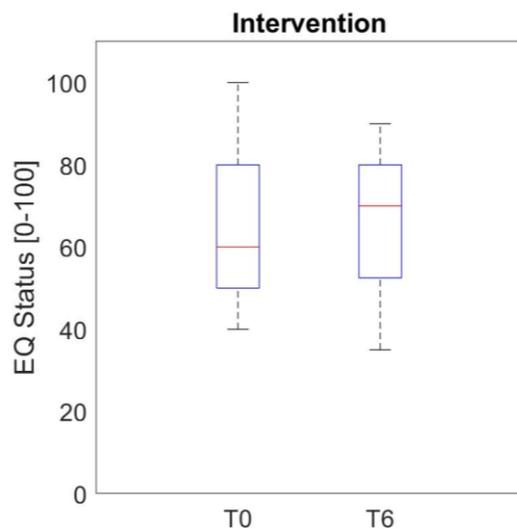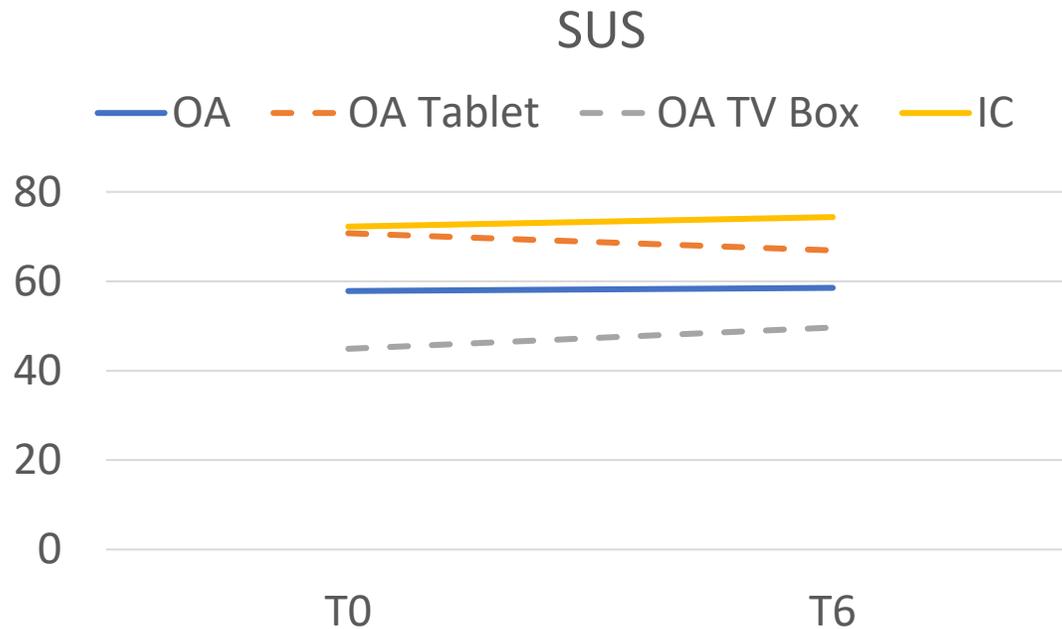

EQ-5D-3L VAS

- No significant differences intra- and inter-group at T0 and T6

- Mean values increase of +16% for the intervention group
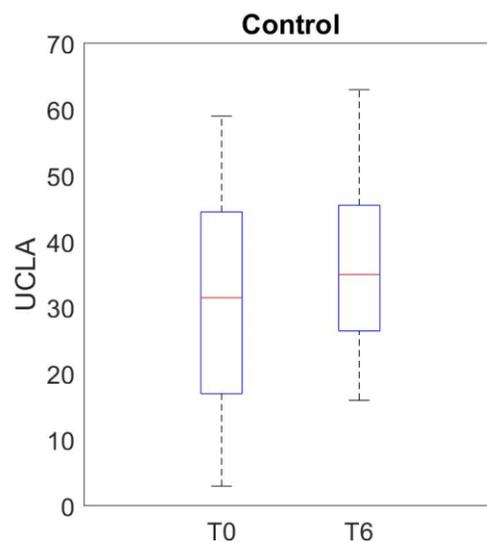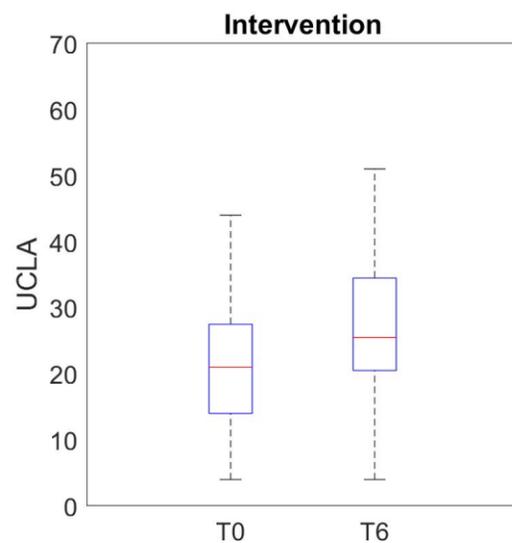
Loneliness index

- No significant differences intra- group at T0 and T6

- Differences between intervention and control group at T6

- Mean values increase of +23 % Intervention group and + 18% control group

The usability of the service Increase after use

SUS

Legend: OA (solid blue), OA Tablet (dashed orange), OA TV Box (dashed gray), IC (solid yellow)

Y-axis: 0, 20, 40, 60, 80
X-axis: T0, T6

SUS T0, t6 differences OA and IC

	M0	M6
Older Adults	57.8	58.13
Informal caregiver	72.25	73.87

Open Points

- In Tuscany the Older adults had problem with the remote controller of the TV
- In a similar project they received a different feedback from the OA. We have to think on the role of facilitators.
- At the moment the older adults (and their caregivers) are not forced to use the technology. Can we change it without introducing a bias?
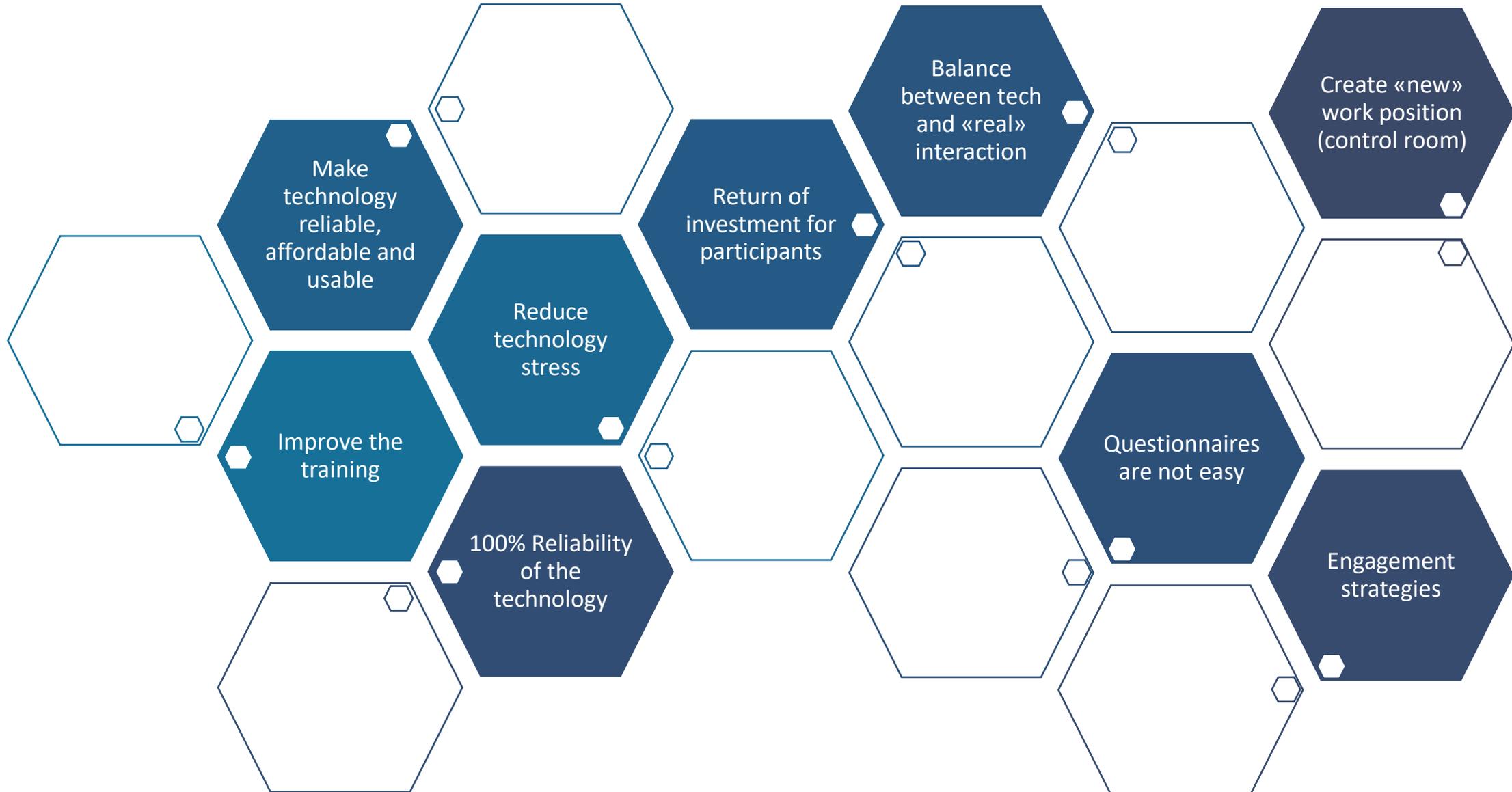
What we are doing now
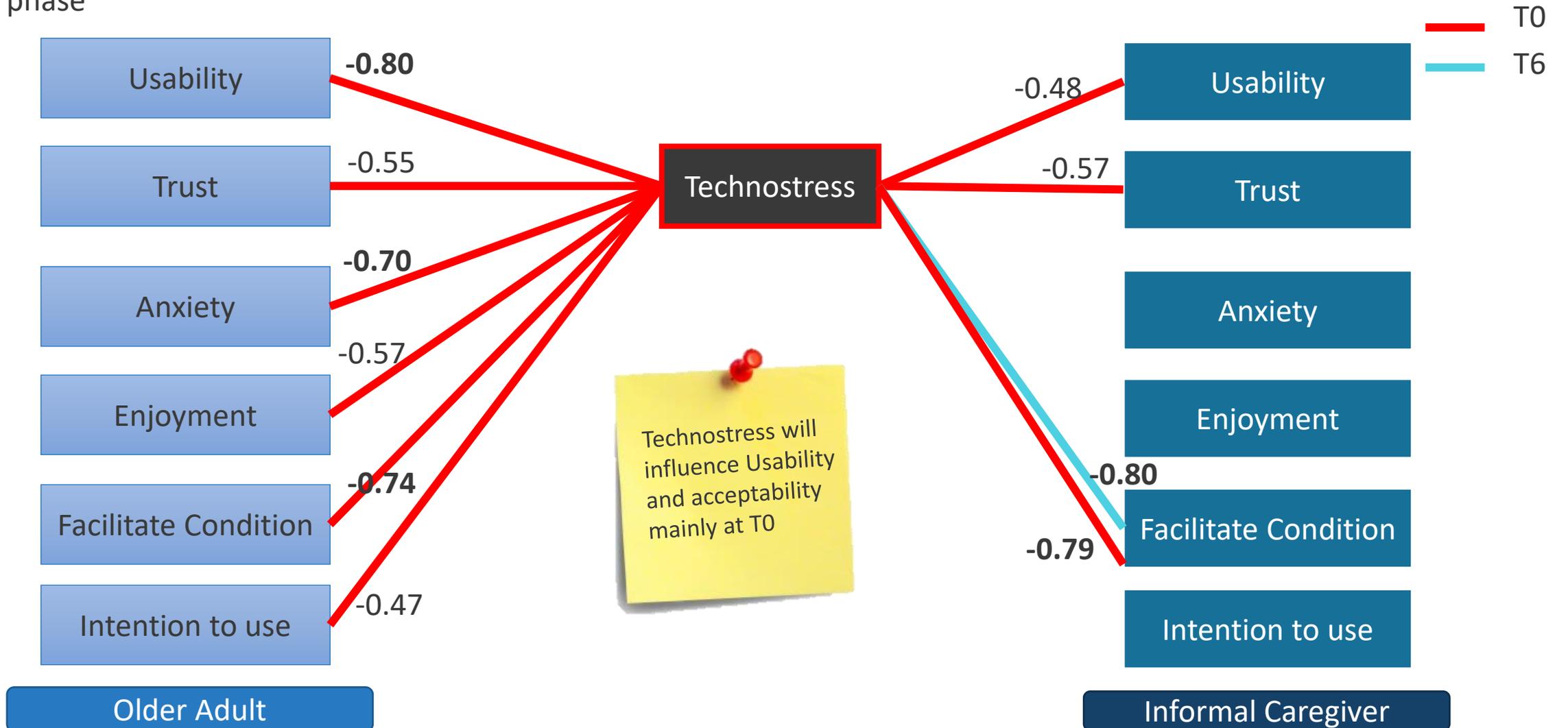
Analysing the results: preliminary data to discuss together and verify the ipotesis
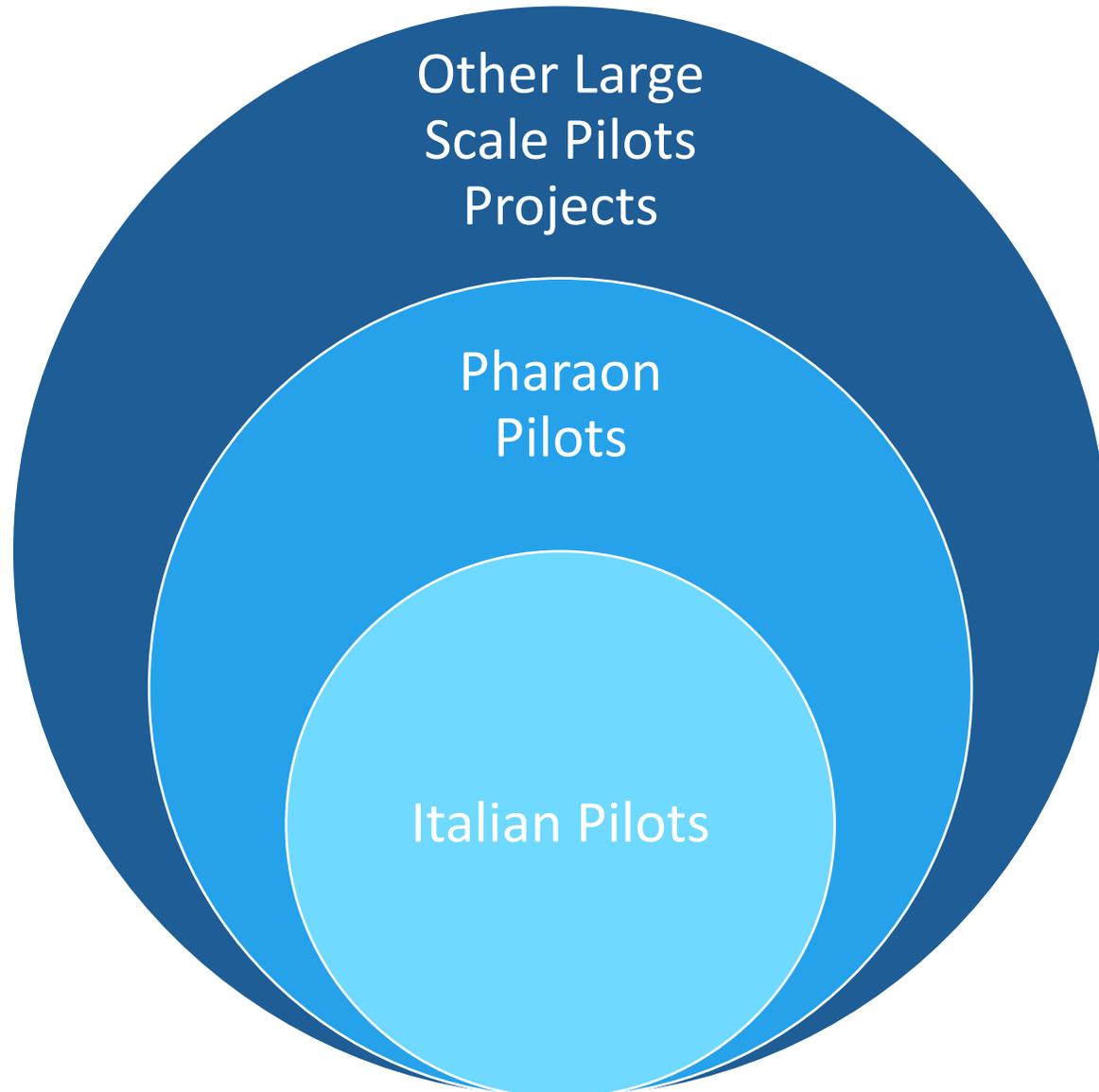
Applying Action Research approach: Focus group with facilitators to highlight best practices and lesson learned.
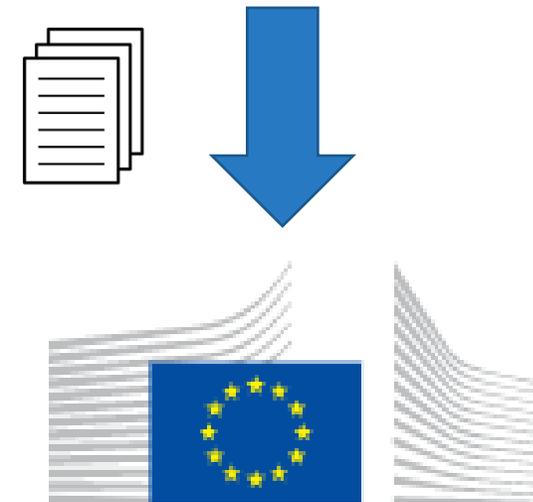
Summary of the lessons Learned

Thank you for your attention

Connect with Pharaon!

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https://www.linkedin.com/company/pharaonproject

 Pharaon Project https://www.youtube.com/channel/UCQEJv9C3T--xLXCldYaBWeQ

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Questions?