Faculty of Automation and Computer Science

Ambient intelligence and big data analytics for managing transitional care
H2020 / AAL H2HCare

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Presentation Outline

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  - Older Adult Post-Discharge Monitoring and Follow-up Service
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Context

- **Challenges of discharging elderlies with heart failure from hospital to home**
  - High number of seniors with heart failure frequently hospitalized
  - Elderlies have difficulties in adopting the recommended lifestyle changes and following the prescribed treatment plan
  - Lack of a care support network to reduce patient anxiety/worries and to offer coaching support for patients during convalescence
  - Patients and family caregivers lack knowledge to optimize self-management in recovery and avoid hospital readmission if deterioration occurs
  - Elderly patient follow-up after discharge, often requires high-frequency home visits => high costs, difficult to conduct and time-intensive for health professionals

Hesitations in discharging patients leading to an unnecessarily prolonged hospitalization; high risk of readmission during their convalescence periods after discharge

Need to enable the remote and daily monitoring of important care aspects

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Context

- **Solution**
  - Recent development of miniaturized sensors and wearable devices have the potential of changing this situation, by enabling the remote daily activities monitoring in relation to post-discharge recommendations
    - **Sensors** can be used to track the adherence to medication plan or lifestyle changes and anticipated physiologic responses or problems
    - **Social robot technology** may facilitate proactive intervention and coaching, the robot acting as a substitute of the professional when the patient is at home.

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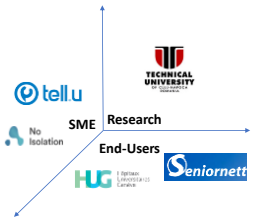
H2HCare project identity card

- **ID:** aal-2019-6-128-CP (AAL159/2020)
- **Title:** Social robot-based solution for elders' Care management and coaching after discharge from Hospital to Home (H2HCare)
- **Lifetime:** 01.04.2020 – 31.03.2023
- **Program:** ACTIVE AND ASSISTED LIVING 2019 (AAL 2019) - H2020
- **Budget:**
  - **378750 Euro (UTCN-DSRL)**
  - 1.600.000 Euro (Total)



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H2HCare objectives and targeted end-users

Develop a system that integrates novel social robotics technologies, with artificial intelligence and Ambient Assistive Living solutions to holistically address the needs of elders with heart failure during transitional care process and avoid hospital readmission

TARGETS

- **Assess the readmission risks associated with each older adult patient by considering in a holistic manner the elders' health condition, social and behavioral aspects**
- **Configure and personalize the monitoring infrastructure according to the assessed readmission risk**
- **Provide personalized coaching and motivation at home using social digital assistants, to facilitate the implementation of post-discharge lifestyle changes recommendations and treatment plan**
- **Monitor daily life activities remotely to check the adherence to post-discharge lifestyle changes recommendations and treatment, by integrating IoT sensors and artificial intelligence**

End-users
Primary end-users: Elders suffering from heart failure discharged from hospital who may experience preventable problems in transitional care which may lead to hospital readmission
Secondary end-users: Caregivers and doctors
Tertiary end-users: Healthcare providers

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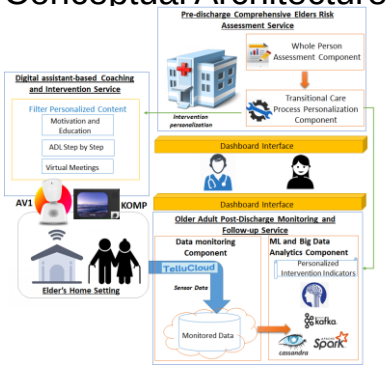
H2HCare Conceptual Architecture



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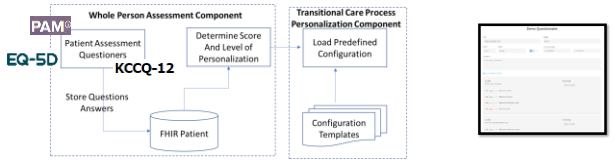
Pre-discharge Comprehensive Elders Risk Assessment Service

- **Pre-discharge Comprehensive Elders Risk Assessment Service**
  - Assess the readmission risks associated with each older adult patient and configure and personalize the H2HCare digital assistant-based intervention accordingly



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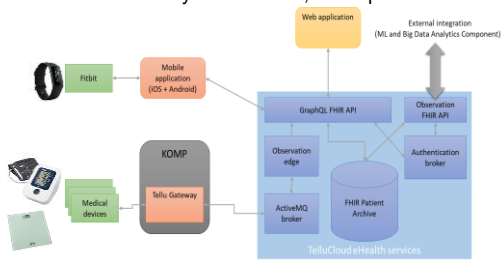
Older Adult Post-Discharge Monitoring and Follow-up Service (I)

- **Data monitoring component**
  - Monitor the elder's daily life activities, blood pressure and weight



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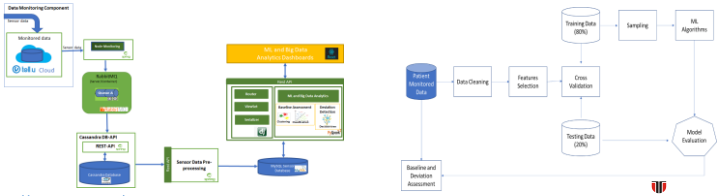
Older Adult Post-Discharge Monitoring and Follow-up Service (II)

- **ML and Big Data Analytics component**
  - Assess the adherence to the prescribed post discharge lifestyle changes recommendations
  - Detect sudden or gradual changes in patients' activity routines which may signal progression of symptoms that can lead to re-hospitalization



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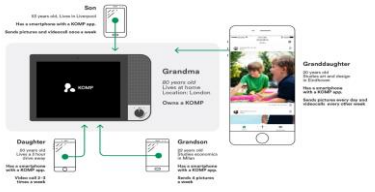
Digital assistant-based Coaching and Intervention Service

- Provides a personalized care and coordinated guidance, motivation and support for the elder patient and associated informal caregivers
- Use an interactive KOMP digital assistant to communicate, respond, and receive and send messages to stakeholders
- Investigate the potential use of AV1 digital assistant for creating direct communication channels between end-users



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Related publications

- Papers
  - Anghel, I.; Cioara, T.; Moldovan, D.; Antal, M.; Pop, C.D.; Salomie, I.; Pop, C.B.; Chifu, V.R. Smart Environments and Social Robots for Age-Friendly Integrated Care Services. Int. J. Environ. Res. Public Health 2020, 17, 3801. https://www.mdpi.com/1660-4601/17/11/3801
  - A. V. Vesa, V. Simion, R. Rus, M. Antal, C. Pop, I. Anghel, T. Cioara and I. Salomie, Human Activity Recognition using Smartphone Sensors and Beacon-based Indoor Localization for Ambient Assisted Living Systems, IEEE International Conference on Computer Communication and Processing (ICCP 2020), 3 – 5 September 2020, Cluj-Napoca, Romania
- More info: https://h2hcare-aal.eu/
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