



Sensing and predictive treatment of **frailty and associated co-morbidities** using advanced personalized models and advanced interventions

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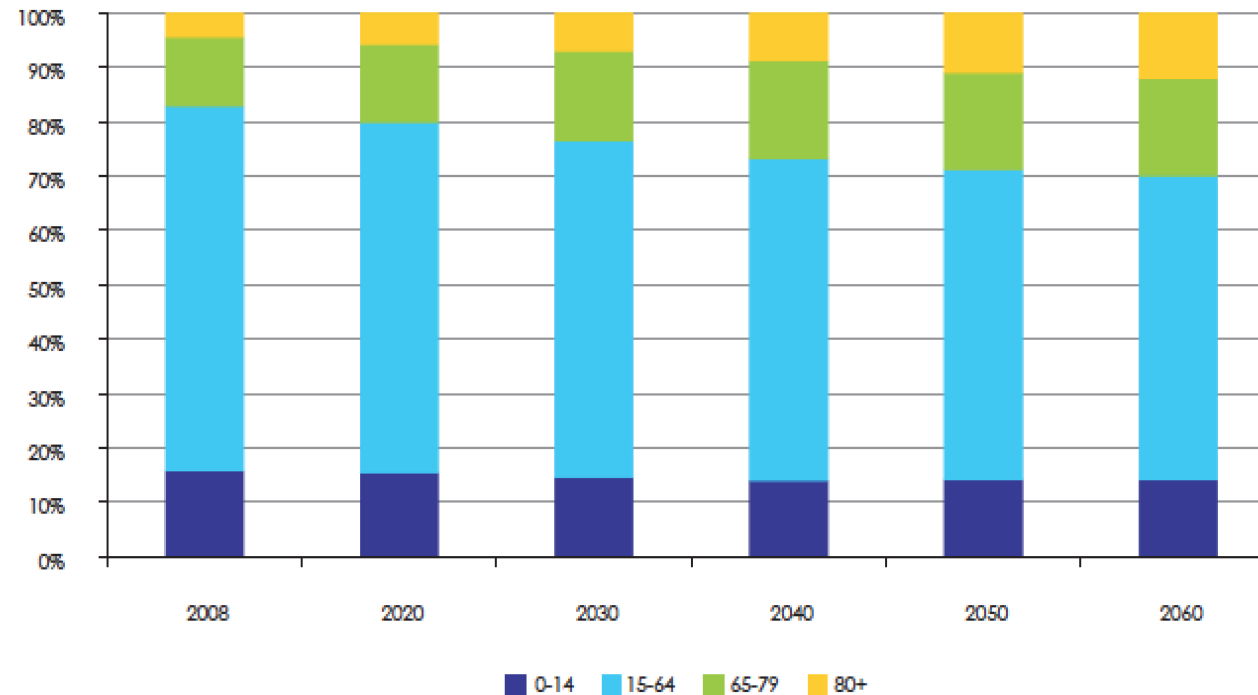


FRAILSAFE Final Event, Apr. 3, 2019

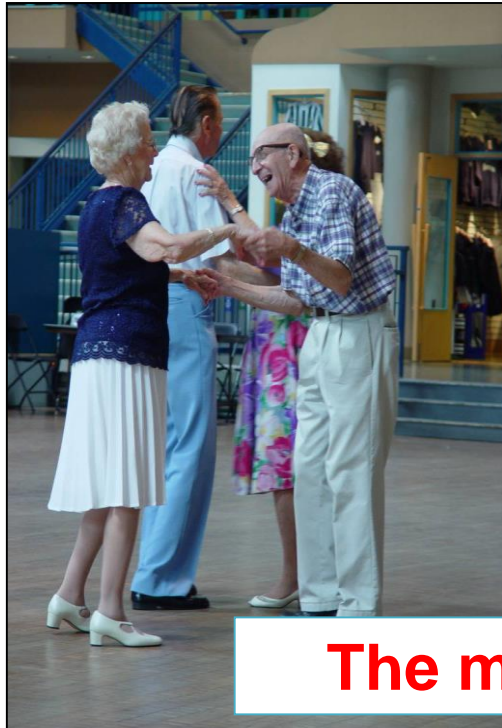
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 690140

In Europe: Percentage of people over 80 years 5% in 2015, 10% in 2040

Graph 15 - Projection of changes in the structure of the population by main age groups, EU27 (in %)



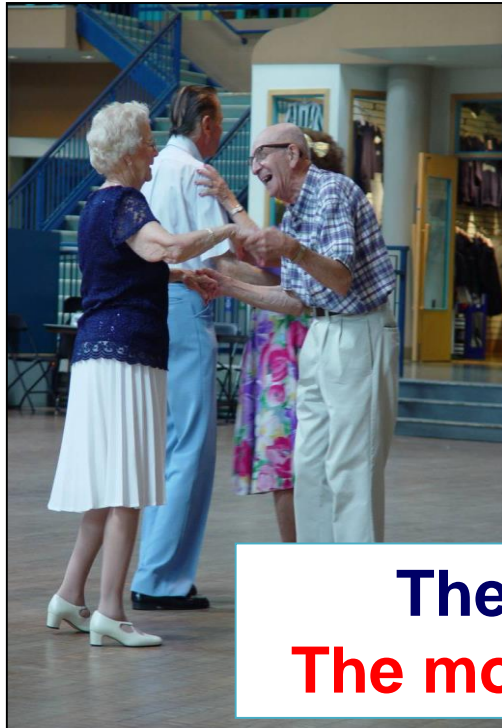
Source: Eurostat, EUROPOP2008.



80+ years



The most growing population

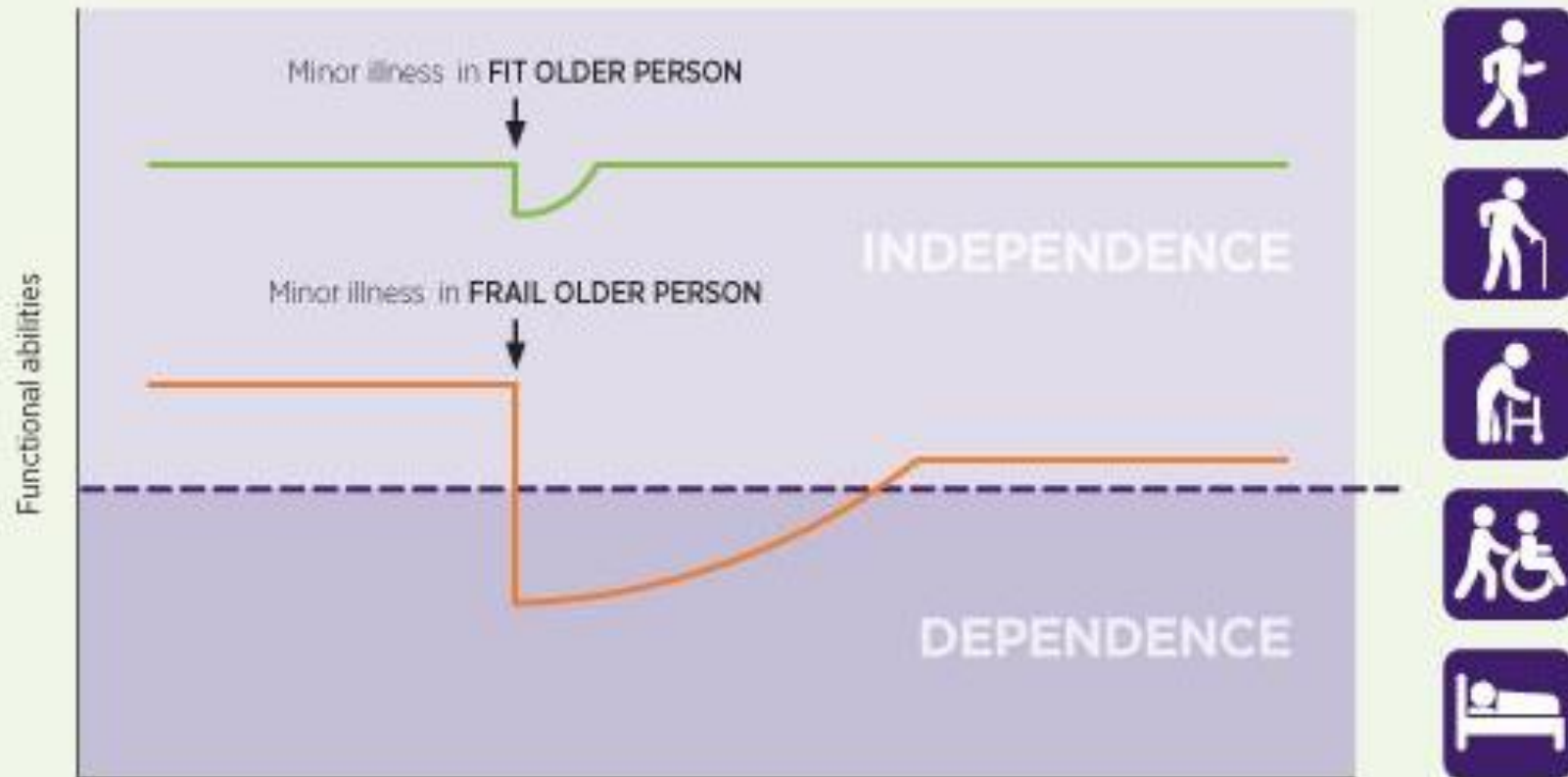


80+ years



The most growing population
The most heterogeneous population

Frailty



Frail older people display low resilience to minor stressors (e.g. urinary tract infection)

Clegg, Andrew and Young, John and Iliffe, Steve and Rikkert, Marcel Olde and Rockwood, Kenneth, "Frailty in elderly people," *The Lancet*, vol. 381, pp. 752-762, 2013.

Adverse events and costs

- Adverse events: falls, injuries, death, hospitalization, increased utilization of healthcare system's medical resources, entrance to nursing home, intake of pharmaceuticals, long-term care, long utilization of non-medical resources (e.g. social services)
- Older people are hospitalized for fall-related injuries 5 times more often than from injuries from other causes
- The average cost of medical and social care for a fall related injury 9.000 €, while the total cost of severe fall-related injuries may > 30.000 €

Frailty: A Societal Challenge

- Frailty is a **dynamic and not an irreversible process**; it seems preventable, may be delayed, or reversed.
- Early detection and intervention are expected to improve quality of life and reduce health services costs

Value of detecting frailty

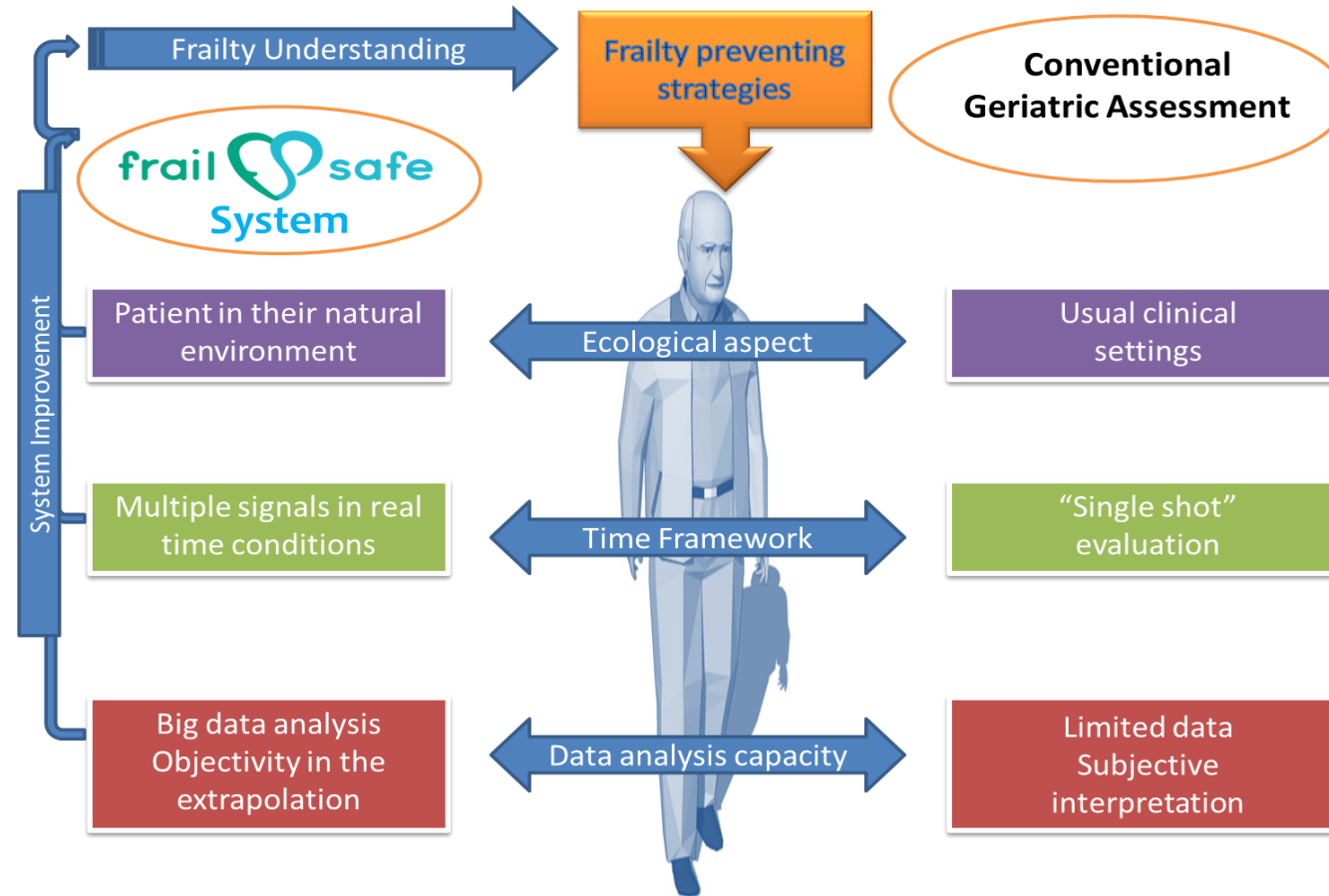
- I- evaluate the risks of functional decline, morbidity and mortality
- II- define the risk/benefit balance of therapeutic strategies
- III- propose specific actions to prevent or regress frailty.

This new holistic approach is impossible without the collaboration of several health professionals.

Frailty models

- Clinical phenotype, **Fried et al. 2001**: presence of 5 core “frail” elements: weakness, poor endurance, weight loss, low physical activity and slow gait speed.
- **Bergman et al. 2008**, extended definition including biological, social, clinical, psychological, and environmental determinants. 7 markers of frailty: nutrition, mobility, activity, strength, endurance, cognition, and mood.
- **Rockwood et al. 2007**, Cumulative Deficit model: CGA Frailty Index (FI-CGA:) consists of a summary measure of deficit accumulation across functional, clinical, and physiological levels. Includes co-morbidity, disability, cognitive, psychological and social factors.

Frailsafe vs Conventional Geriatric Assessment



FrailSafe offers hi-tech, clinically usable tools that lead to an **earlier identification of frailty or pre-frail conditions**, and makes feasible the application of early interventions to prevent worsening or reverse this condition

ICT assisted vs Conventional Assessment

- Assessment in natural environment than in usual clinical settings
- Multiple signals in real time conditions than single shot evaluation
- Big data analytics than analysis of limited data
- Objectivity than subjectivity in the interpretation of results
- Quantitative than just qualitative
- Transforming traditional to digital model (explore and use available digital technologies)
- Earlier identification of conditions make feasible early interventions to prevent worsening
- From reactive medicine to proactive/preventive medicine and precision medicine

Frailsafe

- A **real life sensing** (physical, cognitive, psychological, functional, social) **platform**
Better understanding of frailty and its relation to co-morbidities
- **Quantitative and qualitative measures of frailty** (through advanced data mining approaches on multiparametric data)
- Prediction of short and long-term outcome and risk of frailty
- An **intervention** (guidelines, real-time feedback, AR serious games) **platform** offering personalized physiological reserve and external challenges
- A **safe, unobtrusive and acceptable system** for the ageing population

Video presentation

