A novel public-private alliance to generate socioeconomic, biomedical and technological solutions for an inclusive Italian ageing society

Annex 1 - Project proposal
(Article 10, paragraph 3 and Article 12 of the Call)

<table>
<thead>
<tr>
<th>No.</th>
<th>Age-It Enlarged Partnership</th>
<th>Acronym</th>
<th>Spoke</th>
<th>Affiliate to Spoke</th>
<th>Co-founder of the Hub</th>
<th>Type of partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Università degli studi di Firenze</td>
<td>UNIFI</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>2</td>
<td>Università degli Studi di Milano-Bicocca</td>
<td>UNIMIB</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>3</td>
<td>Università degli Studi del Piemonte Orientale &quot;Amedeo Avogadro&quot;</td>
<td>UPO</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>4</td>
<td>Università degli Studi di Padova</td>
<td>UNIPD</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>5</td>
<td>Università Ca' Foscari Venezia</td>
<td>UNIVE</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>6</td>
<td>Alma Mater Studiorum – Università di Bologna</td>
<td>UNIBO</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>7</td>
<td>Università degli Studi di Roma “La Sapienza”</td>
<td>SAPIENZA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>8</td>
<td>Università degli Studi di Napoli Federico II</td>
<td>UNINA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>9</td>
<td>Università degli Studi del Molise</td>
<td>UNIMOL</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>10</td>
<td>Università degli Studi di Bari Aldo Moro</td>
<td>UNIBA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>11</td>
<td>Università della Calabria</td>
<td>UNICAL</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>12</td>
<td>Consiglio Nazionale delle Ricerche</td>
<td>CNR</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
</tbody>
</table>

Other universities, research institutes and private entities (not monitored by the Ministry of University and Research)

<table>
<thead>
<tr>
<th>No.</th>
<th>Age-It Enlarged Partnership</th>
<th>Acronym</th>
<th>Spoke</th>
<th>Affiliate to Spoke</th>
<th>Co-founder of the Hub</th>
<th>Type of partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Istituto Nazionale di Statistica</td>
<td>ISTAT</td>
<td>X</td>
<td>X</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>14</td>
<td>Istituto Nazionale di Ricovero e Cura per gli Anziani - IRCCS INRCA</td>
<td>INRCA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>15</td>
<td>Istituto Neurologico Mediterraneo Neuromed I.R.C.C.S.</td>
<td>NEUROMED</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>16</td>
<td>Università Commerciale Luigi Bocconi</td>
<td>BOCCONI</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>17</td>
<td>Università Cattolica del Sacro Cuore</td>
<td>UNICATT</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>18</td>
<td>SISSA – Scuola Internazionale Superiore di Studi Avanzati</td>
<td>SISSA</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>19</td>
<td>Università Vita-Salute San Raffaele</td>
<td>UNISR</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Public</td>
</tr>
<tr>
<td>20</td>
<td>Istituto Nazionale Prevenzione Sociale</td>
<td>INPS</td>
<td>X</td>
<td>X</td>
<td>Public</td>
<td>Public</td>
</tr>
<tr>
<td>21</td>
<td>Tech4Care srl</td>
<td>TECHACARE</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>22</td>
<td>Generali Italia S.p.A.</td>
<td>GENERALI</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>23</td>
<td>HealthWare Group</td>
<td>HEALTHWARE</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>24</td>
<td>Beta 80 S.p.A Software e Sistemi</td>
<td>BETAB80</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>Private</td>
</tr>
<tr>
<td>25</td>
<td>Municipia S.p.a.</td>
<td>MUN</td>
<td>X</td>
<td>X</td>
<td>Private</td>
<td>Private</td>
</tr>
</tbody>
</table>

Sub-TOT (monitored by MUR) 8 12
Sub-TOT (not monitored by MUR) 2 13
TOT 10 25

Other entities (not Spoke or affiliates)

<table>
<thead>
<tr>
<th>No.</th>
<th>Age-It Enlarged Partnership</th>
<th>Acronym</th>
<th>Spoke</th>
<th>Affiliate to Spoke</th>
<th>Co-founder of the Hub</th>
<th>Type of partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>26</td>
<td>Confooperative</td>
<td>CONF</td>
<td>X</td>
<td>Private</td>
<td></td>
<td>Private</td>
</tr>
<tr>
<td>27</td>
<td>Sanofi srl</td>
<td>SANOFI</td>
<td>X</td>
<td>Private</td>
<td></td>
<td>Private</td>
</tr>
</tbody>
</table>

Sub-TOT 2 2
TOT 10 25 2
Index

A. SCIENTIFIC QUALITY .................................................................................................................................3
   A1. Objectives and activities of the research programme ..........................................................................................3
   A2. Description of the 10 spokes ..............................................................................................................................9
   Challenge 1 The demography of ageing. A Data Science approach to decision-making ........................................9
   Challenge 2 Improving the understanding of the biology of ageing .......................................................................11
   Challenge 3 Clinical and environmental factors, functional status and multimorbidity: Stratifying progression and prognosis of diseases, frailty and disability .................................................................13
   Challenge 4 Trajectories for active and healthy ageing (behavioural and psychological determinants) ............15
   Challenge 5 Care sustainability in an ageing society ...............................................................................................17
   Challenge 6 Silver Economy: Work, Participation, Retirement and Welfare ..........................................................19
   Challenge 7 Cultural and political dimensions of ageing societies .......................................................................21
   Challenge 8 Interventions to reduce the burden of age-related diseases, disorders and disabilities ..................23
   Challenge 9 Advanced Gerontechnologies for active and healthy ageing ............................................................25
   Challenge 10 Mainstreaming ageing by building institutional mechanisms for better and future-oriented health policy making and prevention .................................................................27
   A3. Additional entities participating only to the Hub constitution .......................................................................29
   CONFCOOPERATIVE ...........................................................................................................................................29
   SANOFI SRL ........................................................................................................................................................31

B. CHARACTERISTICS, FEASIBILITY AND CONTROL ........................................................................................33
   B1. Quality and composition of the critical mass involved .........................................................................................33
   B2. Governance and structure ................................................................................................................................34
   B3. Spoke activities, work plan and related working groups and budget .................................................................37
   B4. A gender-balanced approach ............................................................................................................................54
   B5. Feasibility assessment ........................................................................................................................................55
   B6. Involvement of early and mid-stage researchers (≤ 10 years from their PhDs) ................................................57
   B7. SMEs, start-ups and spin-offs involvement ........................................................................................................59
   B8. Key-performance indicators ................................................................................................................................61

C. PROGRAM IMPACT ............................................................................................................................................63
   C1. Impact.................................................................................................................................................................63
   C2. Sinergies with other programmes .......................................................................................................................73
   C3. Technology Readiness Level (TRL), Social Readiness Level (SRL), and Age-It prospects ................................78

The proposal complies with page limits imposed by the Call:
- 6 pages for Section A.1;
- 2 pages per Spoke/affiliates in Section A.2;
- 30 pages for Section B;
- 25 pages for Section C.
A. SCIENTIFIC QUALITY

A1. OBJECTIVES AND ACTIVITIES OF THE RESEARCH PROGRAMME

**Age-It** is a research programme that aims at generating a quantum leap, making **Italy** the leading scientific hub in research on ageing, and a state-of-the-art “empirical laboratory” regarding the ageing process. **Age-It will set the gold standard** in terms of socioeconomic, biomedical, policy, and technological solutions for an inclusive ageing society. **Italy will become a benchmark for other, also non-European, rapidly ageing societies.**

Relevance of the research programme

**Population ageing is a major, and unprecedented, 21st century phenomenon.** As a trend, it concerns the whole world, both in terms of increasing chances for individuals to reach old age (even if not necessarily in good health), and of a rising share of older people over the total population. Global ageing is driven by the reductions in fertility and improvements in survival, typically occurring through the demographic transition. International migration partly mitigates, in some countries, the speed of changes in the age structure. Hence, the demographic transition has triggered several dynamic processes involving society, markets, welfare states, cultural and political change, within a global interconnected system. These concurrent megatrends have caused dramatic changes in the landscape of our societies, positioning high-income countries into unchartered territory. Ageing is a multi-faceted complex process, presenting challenges and risks, but also offering ground-breaking opportunities to promote inclusive well-being for the society as a whole.

The **Age-It** programme follows the view of the World Health Organization, which promoted the adoption of policies and strategies based on the “active and healthy ageing” framework concept (WHO 2015). Accordingly, ageing is not considered as a time of mere decline in mental and physical functioning, leading to a condition of health and socioeconomic dependency that makes older people a “social problem”. Older age should be rather seen as a period of life in which individuals can use their maturity to represent a precious resource for society, and an opportunity for building economically prosperous, socially just, and environmentally sustainable societies.

**Italy is leading global ageing:** 23.3% of the population is 65 or older, and 7.5% is 80 or older (United Nations Population Division 2020); life expectancy in 2015-20 is among the highest in the world, both at birth (83.3 years) and at the age of 65 (21.1 years), with current very low levels of fertility (1.24 children per women in 2020) and net migration likely to accelerate the ageing process. This position as a frontrunner of ageing, together with the country’s extraordinary regional disparities (North vs. South, Coastal vs. Inland, Rural vs. Urban), make **Italy the ideal “empirical laboratory”** to address how different combinations of biological, clinical, cultural and socioeconomic factors, in addition to a variety of institutional responses by health and social care systems to the ageing process, are leading to different individual and societal outcomes. Italy thus represents an exceptional context to design, test, and implement diverse innovative solutions, and to adopt different models of intervention for prevention, health and long-term care, working arrangements, political agendas and societal outreach.

Nonetheless, while Italian scholars and specific research groups have had important individual achievements in this field, Italy cannot be considered an international reference hub of research on ageing and the contributions to the realization of national active and healthy ageing policies have been so far limited. Structural bottlenecks have hampered the advancement of research in the world of ageing: the prevalence of discipline-specific analytical frameworks, the limited transdisciplinary collaboration, the scattered availability of data, and the difficulty in translating the various scientific studies into policies. These four limitations are clearly interrelated. Likewise, the less-than-optimal opportunities for public-private and for academic and professional collaboration have so far limited the scope for transferring new research findings into practise or for contributing to a coherent national active and healthy ageing strategy. There is an urgent need to develop and coordinate a world-class, joint, comprehensive, interdisciplinary research effort to rethink policy, medical, institutional, technological, and market-oriented solutions in a broad, ambitious, and common agenda. **This effort will allow to transform ageing from a challenge, as currently considered, into an opportunity to increase the prosperity and inclusiveness of Italian society in the next decades.**

Overall objective of the research programme

The overall objective of Age-It is to provoke a quantum leap in Italy’s contribution to research on ageing, making it a leader in research as well as in strategic European and global value chains, in accordance with the objectives and priorities of the National Research Plan (NRP) 2021-2027. Applying a holistic, interdisciplinary, and problem-solving approach, Age-It will overcome the fragmentation of different perspectives on ageing, involving a critical mass of partners including research and educational institutions, care providers and civil society associations,
businesses and industries. It will therefore include actors from all the relevant public and private, profit and non-profit spheres, also opening the path to reduced time-to-market for added-value products and services. In this perspective, all activities are planned on the basis of five core objectives:

1. Producing an **interdisciplinary blueprint of research on ageing**, that will last well beyond the time of the programme itself, and will set the gold standard at the national and international level (OECD 2017; OECD 2020);
2. Unleashing the potential of fundamental and applied research on ageing, to push forward the frontiers of knowledge and drive **breakthrough life-changing innovation** in relation to social, environmental and economic changes, and biomedical factors, with a focus on **sustainable development** and a human-centred approach, also through the promotion, creation and development of **start-ups and spin-offs** from research;
3. Setting the basis for an **architecture of the welfare system** fully participating to the recovery effort, which will **make Italy a more inclusive and cohesive society**. This objective involves different domains: the pension system, health and long-term care systems (an integrated care model), and active labour market policies. It will aim at **decreasing inequalities in the standard of living and ultimately reduce unequal ageing**;
4. Training a **new, gender-equal generation of cross-disciplinary scholars**, with a particular focus on increasing the social and economic capital, and private-public collaboration, in the research communities of southern Italian regions and inner areas. The scholars will be able to reach worldwide excellence in their own discipline with the ability to use tools and concepts with an interdisciplinary approach to the different ageing dimensions;
5. **Bridging the gap between academia and enterprise to upskill professionals** on techniques providing the practical knowledge and skills to deliver future solutions.

The **Age-It Model** is built to better understand and successfully address the challenges and consequences of the Italian ageing society (Figure A.1).

---

**Figure A.1.** The Age-It model: a research, business and education alliance for boosting innovation

**Age-It brings together transdisciplinary competences** covering, among others, demography, geriatrics and gerontology, neurology, cardiology, immunology, data science, education science, epidemiology, biology, genetic research, engineering, sociology, law, political science, and economics – **encompassing universities, research centres, private firms, public institutions and civil society** – therefore creating a new collaborative platform that will deliver a **wide portfolio of innovative technological and organizational methodologies and solutions** to allow individuals to age healthily in an inclusive ageing society.

**Challenges and specific objectives**

**Age-It embraces a “hub and spoke” model** that focuses on our goals, by: 1) ensuring that Age-It activities complement relevant national and regional priorities and programmes (such as NRP, National Operative Programmes, Regional Operative Programmes) within the framework of the European Union strategies; 2) allowing
its key innovations to be extended beyond the local and national level, and to have a broad impact across and beyond Europe. Age-It identifies the ten most relevant challenges to allow individuals to age well and to build an inclusive ageing society (Figure A.2) as the foundation of the Spoke infrastructure, which consists of six thematic (horizontal) challenges and four cross-integration (vertical) challenges.

- The project originates from the demographic megatrends that are shaping our society: the first challenge is thus the understanding of the micro and macro demographic drivers of ageing adopting a Data Science approach to decision-making (#1).
- Addressing and facing population ageing necessitates a focus on pivotal thematic challenges: improving our understanding of the biology of ageing (#2), of the clinical and functional factors related to multimorbidity (#3), of the life course trajectories of active and healthy ageing (#4), and of the world of care provision (#5). These challenges are intertwined with the Silver Economy (i.e., work, participation and welfare at older ages, but also new consumption and activity models) (#6) and with the political and cultural dimensions of an ageing society (#7).
- The thematic challenges are systematically integrated by three additional cross-integration challenges: The importance of interventions and technologies to reduce the burden of age-related diseases, disorders and disabilities (#8), the technological developments towards meeting the (new) needs of older people (#9), as well as the overall mainstreaming and re-thinking of ageing-related policy-making (#10).

**Figure A.2.** The 10 challenges of ageing, 6 thematic challenges and 4 cross-integration challenges

At the intersection of these 10 challenges, in order to maximise the impact of research findings on practices and policies, Age-It identifies four so-called “out-reaching activities”: education and knowledge sharing; co-creation, innovation and technology transfer; research framework and databanking; valorisation and exploitation of results. In addition, the foundation of the research program is anchored to the three NRRP cross priorities (that of ensuring gender equality, involving young researchers, and investing in the “Mezzogiorno” – South areas), and the two NRRP key fields of intervention (attention to climate change and investing in intangible assets, All VI Reg (UE) 2021/241).

The overall Age-It governance structure is outlined in Section B2. All the activities are designed according to the principles of the European Institute of Innovation and Technology Knowledge and Innovation Communities. The ten Spokes will work together to generate a proactive research infrastructure, ensuring within-spoke and between-spoke synergies and interactions, thanks to boards and committees that include representatives from all partners: the Ethics Committee; the Steering Committee; the Spoke Coordination Group; the Scientific Advisory Board; the Data Management Board; the Innovation and Technology Transfer Board; the Dissemination Board; and the Stakeholders Board (see Section B2 for details).
The 10 challenges addressed through the Age-It “Hub and Spoke” model

**Challenge [1] The demography of ageing. A Data Science approach to decision-making**

**Spoke 1 (UNIFI)** aims to: 1) advance knowledge on demographic dynamics (longevity, fertility, family life, migration) underlying the ongoing ageing process also based on novel data integrations between registers and (social and health) surveys; 2) monitor population ageing by developing a working prototype that collects and analyses both historical and real-time data to support policy and decision-making; 3) understand the demographic, economic and social (short- and long-term) consequences of population ageing, identifying threats and opportunities, by providing a set of specific and relevant population projections in terms of households, labour force participation and care needs; 4) define a set of proposals to slow down population ageing and its negative effects for unequal ageing (e.g., fertility and migration policies, pension system), also through AI and a Data Science approach.

**Challenge [2] Improving the understanding of the biology of ageing**

**Spoke 2 (CNR)** aims to: 1) better understand the mechanisms and pathways of differentiated biological ageing process (e.g., genetics, epigenetics, biochemistry, biological, physiological, and “omic” aspects of ageing); 2) identify relevant biomarkers to improve disease early detection and risk prediction of unhealthy ageing, and to reduce screening costs extending them to larger portions of people at risk; 3) define potential therapeutic targets and implement preclinical models to validate interventions (e.g., developing personalised medicine protocols, and implementing “novel drug-design” therapies); 4) implement novel biological tools of ageing measurements like DNA methylation age, telomere length, DNA PhenoAge and others possible epigenetic clocks to better improve the prediction and risk stratification of the ageing process beyond normal chronological age.

**Challenge [3] Clinical and environmental factors, functional status and multimorbidity: Stratifying progression and prognosis of diseases, frailty and disability**

**Spoke 3 (INRCA)** aims to: 1) define a methodological framework to evaluate clinical and functional status in age-related diseases, multimorbidity, frailty and disability; 2) evaluate the predictive role of biomarkers in age-related disease, multimorbidity, frailty and disability; 3) analyse factors with a major impact on disease’s set up and progression, to identify novel risks stratification tools; 4) design and preliminary test management strategy to approach ageing, multimorbidity and frailty aimed to slow down their progression to disability; 5) assess the impact of climate change and pollution on ageing focusing on those health outcomes that may be influenced by outdoor environmental factors to drive recommendations in order to build resilience in our ageing society.

**Challenge [4] Trajectories for active and healthy ageing (behavioural and psychological determinants)**

**Spoke 4 (UNINA)** aims to: 1) provide evidence and knowledge on age-related changes in cognition, motivations, emotions, and behaviours as people get older, focusing on both the “normal” ageing process and on pathological cases; 2) formulate best practices and (ICT) interventions to prompt functional attitudes and motivational changes, and sustain cognitive and emotional functioning (e.g., definition of population-based contact tracing methods to advice through text messaging for vaccinations and other health promotion strategies, or to tailor quality/quantity of physical exercise and nutrition); 3) define a web multimedia repository of strategies to create an age-friendly environment and community, easily consultable by local governments, to promote the mobility and independence of older people, enhancing their quality of life.

**Challenge [5] Care sustainability in an ageing society**

**Spoke 5 (UNIBO)** aims to: 1) provide a comprehensive and evaluative picture of care flows and, at the same time, offer a set of proposals for collecting data on care; 2) balance formal and informal support and care provision in a context of a growing ageing population (e.g., by reducing gender inequalities and the burden of unpaid family care work); 3) design technological, medical, organizational and institutional interventions to make the care provision system sustainable, also as best practices for other societies; 4) formulate policy recommendations on care provision at national and regional level built upon the scientific evidence provided, by validating it with the contribution of relevant stakeholders, and integrating it with in-depth analyses from different perspectives (demographic, economic, social, health, technological, and gender-based).

Spoke 6 (UNIVE) it investigates the role of the silver economy in order to foster inclusive and cohesive welfare policies focusing on a positive approach at the microeconomic level. These include: 1) increasing the labour market participation of older people, especially in meaningful work (e.g., by accounting for individual preferences, needs and capacities); 2) promoting the digital and green transition of older workers (e.g., reducing the age-digital divide and removing barriers and inequalities in training) within the firm; 3) favouring a cultural transition about the ageing processes both at the individual and the societal level (e.g., acting on financial and healthy literacy at older ages); 4) enhancing participation, especially in old age and retirement years, in the area of informal and voluntary work (as a dimension of active ageing).

Challenge [7] Cultural and political dimensions of ageing societies

Spoke 7 (BOCCONI) focuses on a normative approach, it aims to: 1) identify the main sources of inequality induced by population ageing in Italy within and between generations (e.g., distributive effects of transport infrastructures in favour of the older population); 2) provide useful analytic tools and indicators to monitor and analyse age-related inequalities and discriminations (e.g., instances of cultural discrimination and political representation, cultural traits, social definitions of age, cultural determinants of health); 3) suggest fair and effective solutions to manage the ageing process and favour intergenerational reforms (e.g., policies on social relations across generations, social and economic inclusion, sustainable mobility; political sustainability of welfare state programs).

Challenge [8] Interventions and technologies to reduce the burden of age-related diseases, disorders and disabilities

Spoke 8 (UNIMIB) aims to: 1) support the needs and strengthen abilities to foster the health of older patients (e.g., promotion of polypharmacy control, adherence to vaccination plans); 2) design and adopt innovative technologies in different life domains – mobility, cognitive functioning, communication – and environments, like hospital and home (e.g., to monitor health, enhance social participation, make the hospital stay smart and comfortable, contrast the development of hospitalisation-acquired disability syndromes, facilitate communication); 3) create a large dataset that can be exploited (also through AI models) to develop personalized intervention, and articulate multisectoral policies which enhance social participation and good practices of social innovation among older people.

Challenge [9] Advanced Gerontechnologies for active and healthy ageing

Spoke 9 (UNIFI) conceives innovative, disruptive, and usable technologies for ageing well by pursuing the following activities: 1) development of AI and robotic sensing technologies to provide support for prevention, early disease detection and health monitoring (e.g., wearable sensors for physiological signal monitoring and ultra-portable echography, to be used also in home environment); 2) elaboration of big data analysis applications to fuse information from different sensors to develop tailored actions (e.g., innovative clinical protocols and technologies, targeted therapeutic procedures and interventions); 3) implementation of innovative care models, products and services based on ICT, in different environments like home, hospital, community (e.g., integration of developed technologies on intelligent platforms, innovative methods and AI models for the psychophysiological assessment of subjects, tools to facilitate daily life activities).

Challenge [10] Mainstreaming ageing by building institutional mechanisms for better and future-oriented health policy making and prevention

Spoke 10 (UPO) – strongly intertwined with all previous ones – addresses the political responses to ageing. In Italy, a disparate set of public institutions respond to the health and social needs of older adults, which makes it often cumbersome for them and their families to navigate such system, with potential negative repercussions for their health and well-being, in addition to consequences on the consumption (at times inappropriate) of healthcare services. This Spoke aims to: 1) suggest strategies to increase the inclusion of underrepresented populations and synergies between national and regional programmes; 2) provide policy makers with effective tools to improve the implementation of health promotion and prevention programs targeting older adults (e.g., clinical guidelines); 3) improve policies aimed to provide a defined boundary between acute care and therapeutic obstinacy; 4) understand how the needs of the ageing population are satisfied with the current institutional responses and how organizations can improve their responses; 5) empirically investigate the impact of community care on the use of hospital resources by older people.
Holistic, interdisciplinary and problem-solving approach

Age-It stems from three cross-cutting concepts to address ageing, which necessitate a holistic, interdisciplinary, and problem-solving approach. First, this programme acknowledges the dynamic nature of ageing through a holistic view by adopting a life course approach at the individual and family level and for society as a whole. Three life course principles in particular provide the foundation of our holistic approach: cumulative contingencies (previous experiences shape a person’s current status); linked lives (events in one domain of a person’s life influence all of their other domains); and historical time period (the period in which individuals live moderates the timing and sequencing of key life course transitions). Micro-level (individuals), meso-level (e.g., households, care providers, volunteering organizations, and firms) and macro-level (society, institutions) are all pivotal. We aim at explaining the interactions between and across the regional, national, European and beyond European levels. Second, this programme makes a step forward in research on ageing, moving from multidisciplinary to interdisciplinary research by unifying, for the first time, a world-class team of 350 experts from different scientific areas – i.e., biomedicine, socio-demographics and technology – to enhance research on ageing for Italy. Conducting path-breaking research means, in this context, using a common language and setting up a common framework. Third, Age-It will be based on and implement a problem-solving, evidence-based approach that will develop methods, solutions and concepts for the research on ageing, including artificial intelligence as well as developments in the availability of medical, behavioural, and social (big) data.

Impact and ground-breaking nature: Ageing well in an inclusive society

Novel approaches as well as data perspectives that transcend the traditional disciplinary boundaries are urgently needed to set the stage for a new Italian research programme on ageing. Based on the unique transdisciplinary characterisation of the Age-It consortium and its stellar cast, the programme will offer several achievements. These include, but are not limited to: (i) reaching an in-depth understanding of the process of ageing and its biological, clinical, behavioural, socioeconomic and environmental determinants; (ii) promoting healthy ageing and independence in later life, as well as addressing functional status, chronic and degenerative diseases, through more effective and digitally supported prevention, early diagnosis, monitoring and evaluation strategies; and (iii) proposing solutions to build a future economically prosperous, environmentally sustainable and socially just ageing society.

We ensure synergies by design as Age-It incorporates transdisciplinary perspectives that merge the biomedical, social and technological within and between Spokes. Age-It will triangulate results from these different approaches to untangle ageing dynamics. The results of Age-It will have a significant impact on the economic, social and cultural systems of Italy, and on its international image for decades to come. To this end, Age-It will promote the creation of the Italian Institute of Ageing (IIA) to make Italy a leading scientific hub on research on ageing. The IIA has clearly become an absolute priority for a strategic approach to population ageing, a pervasive process affecting all levels of the Italian society. Indeed, one of our key stakeholders – the CNEL, Consiglio Nazionale dell’Economia e del Lavoro – intends to propose an ad-hoc bill for the foundation of the IIA.

Experience, technical and scientific capacity, and key collaborations of the Consortium

Age-It consortium is composed by 25 partners (Spokes and affiliates), collaborating across and within 10 Spokes, each targeting a specific ageing challenge. The Spokes will perform the research activities coordinating the joint effort of 350 researchers, hire additional personnel and manage other cascade calls to involve further staff, organizations and economic operators.

The 350 Age-It researchers have been carefully selected among the 25 partners in light of their previous experience in leading and/or taking part in large research projects, and their broad national and international research networks will be utilized in the programme. The Age-It members have experience in using advanced research methods and data, and have published widely on the topics they will work on. In addition, the ability to conduct interdisciplinary research has been fostered by the use of an ad-hoc form that prioritized the selection of researchers who were more inclined to conduct interdisciplinary research within the institutions involved, as testified by participants’ CVs.

In the following sections we provide the description of the ten Spokes, including their consistency with the objectives and priorities of the National Research Plan, their experience, ability to perform the Research Programme and to work according to a holistic and problem-solving approach. In addition, main national and international collaborations available at each Spoke are described. We include at the end of the section a brief description of two entities, Confcooperative and Sanofi, which are supporting the Research Programme by joining the composition of the Hub, without becoming Spokes or affiliated entities (i.e., without receiving funding by the Programme).
A2. DESCRIPTION OF THE 10 SPOKES

Challenge 1  The demography of ageing. A Data Science approach to decision-making

<table>
<thead>
<tr>
<th>Spoke 1</th>
<th>UNIFI</th>
<th>Co-Leader</th>
<th>ISTAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>INPS</td>
<td>UNIMIB</td>
<td>UNIBO</td>
</tr>
</tbody>
</table>

This challenge contributes to the understanding of the demographic dynamics (fertility, fecundity, family life, migration, longevity) underlying population ageing, with a special emphasis on inner areas. The Spoke will offer a data-driven research infrastructure on the demography of ageing for the whole Age-It consortium. The Spoke adopts an interdisciplinary and local approach to monitor and project population ageing in terms of households, kinlessness, labour force participation and care needs at the national and specific regional levels.

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**, through research on new sociodemographic needs, conciliating the requests of equity and solidarity with the sustainability of economic resources.
- **5.2.5 [Social transformation and inclusive society]**, especially where it refers to ageing and low fertility, policies to deal with them and their potential impact on sustainability; mobility and migration, and their links with productivity, depopulation of territories, welfare systems sustainability, integration and social protection; inequality and inclusion (e.g., by gender, age, ethnicity) and policies to deal with them; innovative methods and technologies for education and social research, and strategies for urban regeneration and territorial government.
- **5.4.1 [Digital Transition i4.0]**, **5.4.3 [Artificial Intelligence]**: implementation of methodologies to collect and analyses big data in real time to monitor and project population ageing and its features.

2. Experience of Spoke 1 and affiliated entities

This Spoke brings together a top-qualified team of demographers, sociologists, economists, education scientists, medical doctors, as well as statisticians and computer scientists – encompassing the academia, research institutes, and private companies – to address the demography of ageing. Spoke members selection prioritised previous experience in leading and/or taking part in large research projects, and their broad national and international research networks will be exploited in the project.

The collaboration with ISTAT – the Spoke co-leader – and INPS extends the scientific competence of the team members by widening the experience in methodological innovation for data collection and analysis. Such direct collaboration within the Spoke will also facilitate access to the best and most up-to-date existing national databases, derived from both administrative sources and survey data as well as their novel integration within a solid conceptual framework and in line with the international best practices. ISTAT’s participants include the Head of Service “Population register, demographic and living conditions statistics” (Prati) and the Head of the Division “Information and Application Architecture” (Scannapieco).

The University of Florence hosts the Florence Center for Data Science, an interdepartmental research centre for the production, the treatment, the analysis and the evaluation of data with a complex structure from a Data Science perspective, to support the decision-making process (https://datascience.unifi.it). The Florence Center for Data Science represents a rare, if not unique, balancing of statistical, mathematical, computer sciences, computer engineering and application-specific expertise. The Florence Center for Data Science will work in close collaboration with BETA 80, a large Italian private company working in the ICT sector since 1986, affiliated to this Spoke, and active in several regions, to address digital transformation (cloud, AI for operations, and Big Data Analytics) for innovating services following a data-driven approach to the study of the demography of ageing.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Our team includes researchers with a long and extensive experience in managing complex research programmes, both at national and international level. Examples are two ongoing ERC grants on determinants of “Economic uncertainty and fertility in Europe” (UNIFI) and “Genes, genealogies and the evolution of demographic change and social inequality” (UNIBO), three ongoing PRIN projects (UNIFI, UNIBA, UNIPD, BOCCONI; UNIMIB, IRPPS-CNR and UNINA; UNIBO, UNIMOL, UNIPD), and several others that have recently expired (such as a Joint Program Initiatives, JPI More Years Better Lives 2017-2020, in UNIFI (Care, Retirement, and Wellbeing) and SAPIENZA (Age Well Account). Worth mentioning are also other research projects on themes relevant for this research, such as inner areas and local population projections (UNIBO), ageing and health (SAPIENZA), and a tender
granted by **EUROSTAT** and **CEDEFOP** (Eu Agency) to integrate big data about the labour market (online job advertisements) into official statistics (UNIMIB).


**4. Holistic and problem-solving approach**

This Spoke brings together **complementary yet distinct knowledge, expertise and resources in a new way**. The Spoke focuses on questions of pressing importance regarding the demography of ageing, whose answers will have transformative scientific potential. Importantly, **most of the PIs involved in this project have already worked together on previous occasions**. The **most important deliverables that we intend to produce are of very practical nature**: 1) a set of population projections with some of their most relevant consequences in terms, e.g., of households, kinlessness, labour participation and care needs; and 2) a working prototype that collects and analyses both historical and real-time data to support policy and decision making, delivering information readily, and making them interpretable at a geographically detailed level.

**5. National collaboration**

The researchers involved in this project have collaborated with all the most important national research institutes, among which, in alphabetical order: ASGI (Associazione per gli Studi Giuridici sull’Immigrazione), FIERI (Forum Internazionale ed Europeo di Ricerche sull’Immigrazione), INAPP (Istituto Nazionale per l’Analisi delle Politiche Pubbliche), IRPPS-CNR (Istituto di Ricerca sulla Popolazione e le Politiche Sociali), ISMED-CNR (Istituto di Studi sul Mediterraneo), ISMU (Iniziative e Studi sulla Multietnicità), and LOLA (Laboratory on Longevity and Ageing).

**6. International collaboration**

Most of the participants in this research are members of IUSSP (International Union for the Scientific Study of Population; De Santis is chief editor of N-IUSSP, its weekly engagement magazine), and EAPS (European Association for Population Studies). The other most relevant institutions and research centres with which our scholars are directly connected are: INED (Institut National d’Etudes Démographiques), IPUMS International (Integrated Public Use Microdata Series); MPIDR (Max Planck Institute for Demographic Research); University of Essex (Research Centre on Micro-Social Change of the Economic and Social Research Council); Leverhulme Centre for Demographic Science, University of Oxford; VID (Vienna Institute of Demography); LABFAM, University of Warsaw (Interdisciplinary Center for Labor Market and Family Dynamics); SUDA (Stockholm University Demography Unit); Hertie School of Governance, Berlin. With some of these institutions, in recent years we have developed international research projects, among which CREW (Care, Retirement, and Wellbeing); Joint Program Initiative AWA (Age Well Account); GBD (Global Burden of Disease), Institute of Health Metrics and Evaluation.
Challenge 2  Improving the understanding of the biology of ageing

<table>
<thead>
<tr>
<th>Spoke 2</th>
<th>CNR</th>
<th>Co-Leader</th>
<th>UNIPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>UNICAL</td>
<td>SAPIENZA</td>
<td>INRCA</td>
</tr>
<tr>
<td></td>
<td>UNISR</td>
<td>Neuromed</td>
<td>UPO</td>
</tr>
</tbody>
</table>

This challenge addresses the **intrinsically multifactorial nature of ageing** – namely, which are the overarching underlying mechanisms that drive it, and whether and to what extent such mechanisms are at play in different cell types, tissues and organs. Spoke 2 **probes the mechanisms and consequences of ageing by multiple interdisciplinary and often orthogonal approaches, in different cell and animal systems, to generate a set of testable hypotheses**, resulting from the integration of several datasets including omic ones, that will be validated by the use of relevant cell and animal models.

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**: analysis of the common biological and physiological determinants of non-communicable diseases which are typical of the old age in rich societies, where they represent a social burden for the healthcare systems.

- **5.1.3 [Biotechnologies]**: pathogenesis and diagnosis (molecular, cellular and genetic hallmarks of ageing), the implementation of systems of diagnosis, therapy and follow-up for non-communicable diseases linked to ageing (search for new early markers for both diagnosis and target intervention); the study of ageing related diseases, focusing on comorbidity, multimorbidity and brain ageing, the promotion of health (e.g., in terms of diseases prevention and access to healthcare).

- **5.1.2 [Pharmaceutical and pharmacological technologies]**: for a correct evaluation of the ways in which drugs affect the human body as a single biological system complex, it is necessary to develop new models that allow to apply the principles of the biology of systems (systems biology). This approach, integrates all available information on systems involved in the normal functions of the organism and their alterations in the disease state (physiological pathways and pathological), omics data and experimental and clinical results through the use of specific mathematical software, in order to predict efficacy and adverse drug events.

2. Experience of Spoke 2 and affiliated entities

Spoke 2 brings together a **top-qualified consortium of molecular and cellular biologists, biochemists, physicists, computational scientists, medical doctors, gerontologists, geriatricians and epidemiologists** encompassing academia, research institutes, and private entities – synergically working to deliver a variety of highly specialized methods, technological and institutional solutions to face individual and population ageing. As a mere indicator of previous experience and accomplishments, the members of this Spoke include ERC awardees, EMBO members and PI directly or indirectly involved in **spin-off and start-up founding**, demonstrating the solid core of this team. Indeed, most of them hold patents that are internationally granted. The Spoke leader, CNR, has a number of Institutes and laboratories spread all over Italy working on different aspects of ageing and on the biology of ageing, as shown by previous achievements. Similarly, the other institutions have long-standing experience in the different fields of the biology of ageing, and can bring to the consortium, in addition to their experience, very valuable samples they have collected during their activity.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Several of the components of this Spoke are recognized leaders not only in experimental and computational science but also in the **management of complex and interlaced research programs**. Indeed often, PIs are research delegates for their host University or research organization and/or head of departments. We host awardees of past and ongoing **ERC programs**, European Joint Programmes (EJP), transcontinental (NIH and HFSP) grants and national interregional schemes from MUR and MISE including **PRIN**, 5x1000 AIRC, Cariplo, Telethon, and CNR inter-institutional projects, as mere examples. Noteworthy, several of these competitive grants engage activities in the South of Italy, and some PI act as consultants to MIUR and MiSE for the evaluation of PON projects (dedicated to Mezzogiorno).

Of note, the groups of the UNICAL, UNIBA and INRCA have worked on projects (some in collaboration with each other) aimed at the **monitoring of the health conditions of the ageing populations of the Mezzogiorno**, highlighting the specific features (and the specific needs) of this populations. The dual affiliations of some of the PI further testifies the ability to lead research activities across institutions.
4. Holistic and problem-solving approach

Spoke 2 is highly interdisciplinary as requested by the systems biology approach which is typical of this field and as demonstrated by the vast breadth of expertise ranging from sophisticated AI approaches to “omics” data to more translational, clinical and epidemiological studies. In general, a quick perusal of the track record of publications, grants and patents testifies of our multidisciplinary approaches, often pioneering them. The holistic and problem-solving approach is within the best practice with the goal of generating a tangible impact, by leveraging novel biologically knowledge, on the clinical perspective of developing new diagnostic and therapeutic strategies. A special attention will be devoted to unveling the basic mechanisms of the ageing process in order to prevent the age-related decline of homeostasis which is the basis of most of the degenerative and incapacitating diseases characterizing old subjects. Therefore, we plan to deliver knowhow and results that will enhance ageing studies in Italy and set the bases for interventions for the benefit of the Italian ageing population.

5. National collaboration

The researchers involved in this project have collaborated with all the most important national research institutes, as demonstrated by their publication record and granting ability. In particular, the network of collaborations includes several of the most prominent public and private Italian Universities and, among the others, the following research institutions: Italian Institute of Technology (IIT), Mario Negri Institute, Humanitas University, TIGEM, Centro Cardiologico Monzino IRCCS.

6. International collaboration

The researchers involved in this project have collaborated and collaborate with many of the most important international research institutes on ageing, as demonstrated by the publication record shared with the participants to this Spoke. Some of the most relevant institutions and research centres with which our scholars are directly connected are: University of Cambridge, UK; INSERM, France (Institut National de la Santé et de la Recherche Médicale); University of Wageningen, The Netherlands; University of Helsinki, Finland; Hannover Medical School, Germany; Stanford University, USA; Max Planck Institute for Ageing, Germany; Oxford University, UK; Mount Zion Medical Center, San Francisco, USA; Yale University School of Medicine, USA; Karolinska Institutet, Stockholm, Sweden; Leibniz Research Institute for Environmental Medicine, Germany; University of Southern Denmark; Leiden University, The Netherlands; University of Goteborg, Sweden; University of Strasbourg, France; University of Southern California, USA; Deutsches Zentrum für Neurodegenerative Erkrankungen (DZNE), Germany; St. Jude Children’s Research Hospital, Memphis, USA; University of Melbourne, Australia.
Challenge 3  Clinical and environmental factors, functional status and multimorbidity: Stratifying progression and prognosis of diseases, frailty and disability

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**: diagnosis systems for non-transmissible and/or age-related diseases; clusters of pathology and organ damage, their distribution, risk factors; role of nutritional status, obesity, sarcopenia and level of physical activity on the progression of chronic degenerative diseases; optimising patient selection and stratification.

- **5.4.3 [Artificial Intelligence]**: artificial intelligence for health (tools for health data diagnosis and tools to increase doctors’ skills in their daily work).

- **5.5.2 [Climate change, mitigation and adaptation]**: impacts of climate change on health and well-being; environmental determinants of the progression of chronic degenerative diseases; development of climate adaptation interventions.

2. Experience of Spoke 3 and affiliated entities

The spoke brings together a top-qualified consortium of geriatrics, gerontologists, internists, neurologists, cardiology, rheumatologists, endocrinologists, orthopaedists, nephrologists, immunologists, biologists, epidemiologists as well as statisticians and computer scientists – working in the academia and research institutions – to address individual risk assessment, patient stratification, and prevention of age-related diseases, multimorbidity and frailty in the older population. All Spoke members have been selected based on their previous experience in leading and/or taking part in large research projects, and their broad national and international research networks will be utilized in the project.

IRCCS INRCA – Spoke leader – is the only public institution of scientific research and care (IRCCS) recognized in Italy for its specialization in geriatrics and gerontology. IRCCS INRCA has premises in Marche, Lombardy and Calabria regions, and works in close collaboration with the regional healthcare systems and social associations to protect the health and well-being of older people. It pursues excellence in: care services provided in its hospital facilities, scientific research on ageing integrating biomedical, technological and socioeconomic competencies. Moreover, it leads the Ageing Network, the only research network on ageing in Italy that involves 13 IRCCS from the South of Italy, as well as the North and Centre.

The collaboration with the UNICATT – Spoke co-leader – ensures outstanding expertise in the field of internal medicine, geriatrics and gerontology, maximizing the identification and management of healthcare needs of frail and multimorbid older people across different settings, boosting the conception, development and implementation of comprehensive geriatric assessment tools.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Our group includes researchers with a long and extensive experience in managing complex research programmes, both at national and international level. IRCCS INRCA is characterised by a multidisciplinary and multi-location character throughout the national territory, with a special focus on increasing capacity building in the Calabria Region. IRCCS INRCA carried out several national and European large collaborating projects on basic, translational and clinical, both as Coordinator and partner. The most relevant projects are: **H2020 RIA Screening for Chronic kidney disease among Older People across Europe SCOPE H2020; EU Health Programme Joint Action**, a comprehensive approach to promote a disability-free Advanced age in Europe; the ADVANTAGE initiative; SPRINT-T - Sarcopenia and physical frailty in older people: multicomponent treatment strategies (FP7 IMI); MUR
SiRobotics; H2020 EU-Japan Virtual coach for smart ageing e-VITA. Spoke and affiliate entities include researchers with a long and extensive experience at national and international level in managing research and innovation projects/programmes: **ERC grants** (IRCCS INRCA, UNINA, UNIBO, UNICATT, UNISR, UNITO, UNIPD), **PRIN projects** (UNIFI, UNIPD, UNIBO, UNITO, SAPIENZA), Ministry of Health Targeted call (IRCCS INRCA, NEUROMED, UNICATT, UNISR, UNIPD), National Operative Programme on Research (IRCCS INRCA, SAPIENZA, UNIPD).

Most researchers of Spoke 3 have developed specific clinical studies on older population (InCHIANTI study – INRCA, UNINA, NEUROMED; Cattolica and Reportage – INRCA), with a special focus on southern Italy (Osservatorio Geriatrico Regione Campania; Moli-sani project). All the partners have fruitful ongoing collaborations with southern Institutions.

4. Holistic and problem-solving approach

Spoke 3 will apply an interdisciplinary, holistic and problem-solving approach thanks to the involvement of a team comprising professionals from various disciplines who will work in collaboration to address age-related diseases, multimorbidity and frailty of older people. The interdisciplinary researchers complement one another's expertise and will actively coordinate to work toward a shared multidimensional approach to transform the way healthcare is delivered through scientific and technological breakthroughs. The research program will engage the whole value chain and integrate needs and strengths to create the best solutions with the highest chances of implementation. The approach will allow researchers to better characterise ageing phenotypes, develop methods, solutions and concepts for improved treatment and management of age-related diseases, multimorbidity and frailty, as well as to provide advances in medical and diagnostic technology, including artificial intelligence as well as developments in the availability of medical, behavioural and social data (big data).

5. National collaboration

Spoke 3 consortium is composed by partners with long experience in national collaboration. All of the partners have strengthened their ability to network with national and international research structures capable of giving added value to research, training and clinical performance activities by signing numerous agreements with bodies of excellence. All the researchers involved in this Spoke have strong collaborations with the most important national research institutes and Universities (ISS, Human Technopole, ITT, Canavese Bioindustry Park). Partners actively contributes to national research networks, such as: Ageing, Cardiology, and Neurology Networks of INRCCS; Italian Society of Gerontology and Geriatrics (SIGG), Italia Longevo and other thematic networks.

6. International collaboration

Researchers involved in Spoke 3 collaborate with many important research institutes at European level on Geriatrics and Specialties, and on cross-country comparative research topics. Moreover, partners have ongoing collaborations with several research institutes in USA and CANADA. In addition, partners collaborated with CHINA (Huazhong University of Science and Technology), JAPAN (Shiga University; Takai Hospital) and ISRAEL: Department of Internal Medicine, Hasharon Hospital, Weizmann Institute. All partners are involved in international scientific research networks, such as: special Interest Group on Cardiovascular Medicine of European Union Geriatric Medicine Society (EUGMS), European Society of Cardiology (ESC), Dominantly Inherited Alzheimer Network (DIAN), The Genetic Frontotemporal dementia Initiative (GENFI), International Genomics of Alzheimer’s Project (IGAP), COVID-19 network, M-POHL Action network on Measuring Population and Organizational Health Literacy of EIHI – WHO Europe, European Alliance of Associations for Rheumatology (EULAR ), European Workshop for Rheumatology Research (EWRR), European Society for Clinical Nutrition and Metabolism (ESPEN), European University Hospital Alliance (EUHA), Global Dietary Database, Global Burden of Disease (GBD) network; Global Lung Function Initiative (GLI) Network; NCD Risk Factor Collaboration (NCD-RisC) group; European Infrastructure of Biobanks and Biomolecular Resources (BBMRI-ERIC).
Challenge 4  Trajectories for active and healthy ageing (behavioural and psychological determinants)

<table>
<thead>
<tr>
<th>Spoke 4</th>
<th>UNINA</th>
<th>Co-Leader</th>
<th>UNIPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>UNIMOL</td>
<td>SAPIENZA</td>
<td>UNICATT</td>
</tr>
</tbody>
</table>

This challenge addresses age-related changes in cognition, emotions, behaviours and physiological functioning as people progress through older ages. Spoke 4 will develop and implement innovative interventions targeting specific physical ageing processes and risk factors for diseases and their progression. This Spoke will follow a person-centred perspective that focus on multidimensional approaches to health in the physical, cognitive, behavioural and social domains.

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**: adopting a multidisciplinary approach, we will improve the knowledge of the determinants of health in all its domains: physical, psychological, mental, biological and functional; we will design and validate innovative, person-centred approaches and motivational aspects favouring healthy ageing; we will strengthen health promotion through innovative tools.

- **5.1.4 [Technologies for health]**: we will collaborate for the development of mobile tools to support bilateral dialogue between professionals and the citizen/patient, collecting/sharing information on lifestyles, compliance to treatments and offering new personalised interventions (e.g., Virtual Reality).

- **5.2.5 [Social transformation and inclusive society]**: we will foster the creation of smart health-friendly communities where empowered citizens share health-related information and access user-friendly tools for health. We will support health and digital literacy with targeted approaches during the life course, to reduce health inequalities. Physical and mental health conditions of sexual and gender minority (LGBTQIA+) older adults will be also considered.

- **5.4.1 [Digital Transition i4.0], 5.4.3 [Artificial Intelligence]**: we will design and implement innovative approaches to ensure GDPR-compliant knowledge sharing for health through primary and secondary use of data.

2. Experience of Spoke 4 and affiliated entities

The Spoke involves an excellent, multidisciplinary group of clinicians, pharmacists, psychologists, architects, economists, data scientists – engaged in different knowledge fields through academia, research institutes, and private companies – to address health challenges posed by ageing. Participants have been selected based on previous experience in research projects, and in national/international networks to strengthen the achievements of the proposal. The Spoke leader (UNINA) has been engaged from 2013 to 2020 in the European Innovation Partnership on Active and Healthy Ageing (EIPonAHA), contributing to develop and implement innovative, life course approaches in line with the European Blueprint for the Digital Transformation of Health and Care. The Spoke co-leader (UNIPD), is characterised by experts in ageing in different disciplines: clinicians, public health specialists, demographers, psychologists, data scientists, economists. They collaborate in several international and national research projects on active ageing, on its determinants, on health inequalities, on well-being in old age. UNIPD has also a strong collaboration with national and local institutions for the development of solutions to improve health conditions and well-being of older adults. Since 2010, SAPIENZA has coordinated more than 20 projects targeting older adults across Europe related to: psychological determinants in physical activity, volunteering, retirement, traffic safety, physical and mental health, healthy ageing and well-being. UNIMOL has participated to the construction of the Moli-sani database and has developed programs for promotion of physical activity during the life course. UNICATT has a successful team of multidisciplinary experts in the field of ageing, sharing the applications of psychologically- and technologically-based solutions, providing novel theoretical, social, and clinical applications to unsolved ageing issues, exploring community engagement and societal changes for healthy ageing, including the role of informal caregivers.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

This Spoke is by construction strongly rooted in fundamental and applied research in the Mezzogiorno. Researchers from UNINA have a large experience in implementing and coordinating international projects (e.g., PROEIPAHA - Support Action to the European Innovation Partnership on Active and Healthy Ageing, WE4AHA - Widening the support for large scale uptake of Digital Innovation for Active and Healthy Ageing, ProCareGivers –
funded by the Department of Policies for Families), where they contributed in concept development, collaborative elaboration, methodology outline, pilots, and distribution of efforts in synergetic and/or complementary WPs and tasks. Synergies with local health agencies were also undertaken, to strengthen the transfer of innovations to current service provision and allow the involvement of some local health agencies located in Mezzogiorno in European innovative procurement projects.

4. Holistic and problem-solving approach

Participants share a challenge-driven approach to the different dimensions of ageing trajectories during the life course that facilitates the identification of specific bottlenecks to address through person-centred innovations. The proposal is developed around a proactive, anticipatory concept of disease prevention, health promotion, care and cure supported by digital solutions and implemented through change management and process re-organization that pose different research questions. The monitoring of psychophysical conditions, the use of technological devices for an efficient and innovative approach to health, the use of artificial intelligence and social microbotics, confer methods of interface and socio-health assistance that can be integrated with bioengineering medicine, social sciences, sport sciences, nutrition and psychology. The effort will be to investigate how telemedicine, remote control and health monitoring can contribute to timely recognitions of insufficiencies, alterations and management of health risk and compromised health conditions. A biopsychosocial model will be elaborated, according to biological, psychological (e.g., motivations, emotions, cognitive processes and behaviours), and social (e.g., socioeconomic, socio-environmental, and cultural) factors influencing active and healthy ageing.

5. National collaboration

Spoke’s participants are involved in reciprocal and external national collaborations, through several projects as PRIN (2017 Actlife: is active life style enough for health and wellbeing?; 2011 Impact of Physical Activity on healthy ageing: multidisciplinary analysis of mechanisms and outcomes; 2020 - SOcial and health Frailty as determinants of Inequality in Ageing), National funded projects as VRA - Virtual Reality Innovation for Caregivers of Alzheimer’s Disease patients. A collaboration with the ISTC-CNR (Institute of Cognitive Sciences and Technologies) is active on semantic memory, language and abstractness; with the University of Palermo (physical exercise, training, balance, and ageing) and the Laboratory of Longevity and Ageing.

6. International collaboration

Spoke’s participants are involved in international networks such as EU_SHAFE – Europe enabling Smart Healthy Age-Friendly Environments; NET4AGEFRIENDLY - International Interdisciplinary Network on Smart Healthy Age-friendly Environments; Aachen University, Germany; University College Cork, Ireland (healthy ageing). Bar Ilan University; European Space Agency, EU; Harvard University, USA; Hokkaido University, Japan; Institute of Applied Health Research, University of Liverpool, UK; Karolinska Institutet, Sweden; McGill University, Canada; NASA, USA; Penn State University, USA, Pompeu Fabra Universitat, Barcelona, Spain; Royal Holloway, University of London; Stanford University; Universidade do Québec en Outaouais, Canada; University Medical Centre Groningen; University of Alberta; University of Barcelona; University of Cambridge, UK; University of Glasgow: University of Montreal; University of Sussex, Brighton, UK; University of Toulouse-Jean Jaurès, FR; University of Twente; University of Valencia; Warsaw School of Economics, Poland; UTMB, Galveston, TX, US (nutrition, exercise and ageing).
Challenge 5  Care sustainability in an ageing society

<table>
<thead>
<tr>
<th>Spoke 5</th>
<th>UNIBO</th>
<th>Co-Leader</th>
<th>UNIMOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>UNIMIB</td>
<td>UNIPD</td>
<td>INRCA</td>
</tr>
</tbody>
</table>

This challenge addresses the issue of providing care to an increasingly ageing society also by focussing on the wellbeing, integration and productivity of caregivers. Spoke 5 aims at promoting environmentally, economically and socially sustainable integrated solutions regarding the world of care provision. Spoke 5 will thus identify, test and implement multisectoral interventions and policies for the care of older people, including medical, institutional and technological solutions to the development of person-centred, affordable and integrated long-term care provision, in the context of differentiated geographical and economic local contexts (including inner areas).

1. Consistency with the objectives and priorities of the national research plan

- **5.4.1 [Digital Transition i4.0]**: societal transformations and actions toward an inclusive society (human-centred approach); digital transition; innovation in education and human capital formation (life-long learning).
- **5.2.5 [Social transformation and inclusive society]**: design of demographic and social policies aiming at eradicating inequalities between territories and groups through effective communication campaigns; development of innovative methods in the education and work environments.

2. Experience of Spoke 5 and Affiliated entities

The spoke brings together experts in different disciplines relevant for an integrated, holistic and solution-based approach to the challenges involved in the provision of care within the context of an ageing society. In particular, the team – encompassing the academia, research institutes, and private companies – has a strong background in the study of the ageing process from the perspective of medical sciences; demography and sociology; survey methods and data analysis; clinical and social psychology; health economics; social policy; public health organization; laws and legal medicine; computer science, monitoring and data systems and training. The professional CVs of the WP coordinators demonstrate the ability to produce innovative research, leading to breakthrough in the understanding of institutional, medical, social and technical aspects of care. Moreover, the activities carried out by the Spoke members include the transferring and transformation of research outputs into technological, social, legal and medical solutions that contributed to more efficient, effective and sustainable processes of care giving.

UNIBO – the Spoke leader – includes skills and experience in terms of innovation and technology transfers in the areas of: integration of formal and informal care provision and its social determinants; psychosocial intervention on care providers; multidimensional, medical monitoring of the health of care receivers and givers; economics evaluation of public systems of care provision and organizational innovation; legal aspects of digital monitoring of health of older individuals; tackling the digital divide in health monitoring and assessment in the older population; technological solutions for data collection and analyses in collaboration with BETA 80. UNIMOL – the Spoke co-leader – has an extensive experience in the creation and transferring of social, technological and policy innovations in the field of care provision in later life, with a specialization in terms of policy, training and technological solutions fitting the needs of inner areas and rapidly ageing communities. Remote monitoring of frailty and age-related diseases, biometrics tools development, the integration of economics and legal aspects connected with care provision are further areas of specialization of UNIMOL. The INRCA team has a longstanding experience in the care of older people, that represents the core of INRCA’s institutional mission as the only IRCCS acknowledged by the Ministry of Health in this area. INRCA’s Centre for Socioeconomic Research on Ageing has a long track record of externally funded international and national research projects, most of them involving a collaboration with civil society representatives and SMEs, thus implying a substantial component of direct and timely innovation and technology transfer in the different sub-areas addressed (e.g., web-based solutions for people with dementia and their informal caregivers, telecare for older people with rehabilitation needs). UNIMIB team has a proven experience in the assessment of the adequacy of urban environments to the needs of an ageing population – especially in terms of the environmental impact of age-friendly urban spaces. These skills are integrated with the capacity of developing digitally-based solutions for the improvement of well-being of older individuals. The experience of UNIPD is in the analysis of healthcare management and legal aspects connected with the relation between care providers and receivers. ISTAT brings high level skills in terms of innovative processes in data analysis and data integration, particularly in terms of the fine-grained, geospatial analysis of care needs and resources – which is only possible via the integration of different sources, types and levels of data (contextual, environmental, and individual).
3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

The group has an extensive experience in the management of large co-financed projects in the areas of clinical medicine and social aspects of ageing: H2020 (UNIBO) PRIN (UNIBO, UNIMOL), FARBAR (UNIBO) and CARISBO (UNIBO). Pertinent are projects on policy design and evaluation at the local level, the implementation and utilization of digital tools, big data and AI in the context of health status monitoring. The group also includes experience in consultancy to large international organizations (such as OECD, World Bank, EC) on the topics of unequal ageing, informal and formal caregiving. UNIMOL is part of European (ESRC, Socrates and Grundtvig) as well as national projects (FAMI, Cariplo and PON). UNIMOL has been in the EAPS Working Group on Demographic Change and Care of Older People and in the ESF funded network FAMSUP (Family Support for Older People). UNIMIB has an ongoing project with the Japanese Society for the Promotion of Science in the field of rehabilitative aspects of smart cities, ageing and digital networks, tele-rehabilitation and walkability. The UNIPD team has managed a number of co-financed projects in the field of lean and safety of care provision to older individuals with multiple chronic diseases. The ISTAT team has conducted a large number of projects, both at national and international level, that demonstrate the ability and extensive experience of handling the complexity of multilevel and multidimensional data collection, data integration and data analysis processes.

UNIMOL hosts the Research Centre on Inner Areas and Apennines that produces analyses and policy recommendations for inner areas mainly located in the Mezzogiorno. INRCA’s Centre for Socioeconomic Research on Ageing has managed in the last five years over 20 projects in the field of the care of older people, most of them funded by the EU, for a total of over three million euros. In most cases, these were nation-wide projects, involving either empirical data collections or expert consultations including representatives of Mezzogiorno regions, through INRCA’s seat in Calabria (Cosenza).

4. Holistic and problem-solving approach

The team of scholars involved in this Spoke is characterised by a very high level of interdisciplinarity. The holistic and interdisciplinary approach is also present (i) within the different institutions involved in the project; (ii) within the research works of most of the Spoke members, who have an extensive experience in conducting studies involving simultaneously medical, technological, legal and social aspects of the process of care giving and receiving. A problem-solving approach clearly emerges from the past work of the Spoke members in terms of producing, disseminating and introducing, both at the academic and policy level, important innovations in terms of organizational, legal, technological, policy, social and medical solutions to the various challenges posed by the care needs of an increasingly ageing society.

5. National collaboration

Spoke members have been part of important national institutions such as the Consiglio Nazionale dell’Economia e del Lavoro, the Family Policy Department, the Ministry of Health, and collaborate with the Istituto Nazionale per l’Analisi delle Politiche Pubbliche, with the IRCSS Research Center Institute for Neurology, the Laboratory on Longevity and Ageing, and the Italian Society of Gerontology and Geriatrics.

6. International collaboration

International research collaborations on the study of ageing include collaborations with: Aging Studies Institute, Syracuse University, US; Institute of Gerontology at King’s College London, UK; Max Planck Institute for Demographic Research, Germany; Institute for Social and Economic Research, University of Essex, UK; University of Southern Denmark; French National Research Agency; Eurocarers (European Association Working for carers); United Nations Economic Commission for Europe; Age Platform; Population Europe; Research Center for Advanced Science and Technology, University of Tokyo, Japan; National Innovation Center Ageing, Newcastle University, UK; European Centre for Social Welfare Policy and Research; Joint Programme Initiative - More Years Better Lives; International Association of Gerontology and Geriatrics for the European Region; International Longevity Network; Karolinska Institute, Sweden; CoE AgeCare (Centre of Excellence in Research on Ageing and Care), University of Jyväskylä, Finland; Swedish National Family Care Competence Center; Stockholm University Demographic Unit, Sweden.
**Challenge 6 Silver Economy. Work, participation, retirement and welfare**

<table>
<thead>
<tr>
<th>Spoke 6</th>
<th>UNIVE</th>
<th>Co-Leader</th>
<th>UNICATT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>INPS</td>
<td>CNR</td>
<td>UNICAL</td>
</tr>
</tbody>
</table>

This challenge addresses the consequences of the digital and green transition for older people, affecting the labour market, the goods and services market, and the financial markets in a new socioeconomic landscape. It will propose solutions for a new architecture of the welfare state, including pensions, health care and long-term care, by uncovering the relevant connections between the health, the economic and the social domains over the life course. These actions aim at empowering older people by improving their ability to take decisions and to enjoy good standards of living. Researchers in Spoke 6 adopt an evidence-based interdisciplinary approach and impact evaluation methodologies, to ensure an effective policy design.

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**: health promotion, prevention and access to health care (socioeconomic determinants of health, access to health-care at older ages and long-term care insurance).
- **5.2.4 [Creativity, Design and Made in Italy]**: Quality of work – social inclusion: life-improvement at the workplace. Inclusive society: social innovation within organizations and co-design in society. Contribution of the silver economy to the sustainable development goals.
- **5.2.5 [Social transformation and inclusive society]**: innovation, democracy (intergenerational fairness, welfare sustainability and collaborative governance); mitigating unequal ageing (e.g., by gender); promoting the digital transition, economic and financial inclusion. New models of consumption for the green transition.

2. Experience of Spoke 6 and Affiliated entities

Spoke 6 brings together high-profile researchers, who have done extensive international work on the challenges of an ageing society and policy solutions, particularly at the micro level of individuals, firms and organizations. They focus on evidence-based methodologies and impact-evaluation of policies. UNIVE plays a key role in the SHARE Projects (Survey of Health, Ageing and Retirement in Europe), collaborating in the creation of longitudinal data (including retrospective panel data) on ageing. The collaboration with UNICATT, CNR and other partners strengthens the critical mass on labour market research, on fostering productivity at older ages and empowering older people. UNICATT is involved in healthy ageing and the labour market (HALM), changing working arrangements (REassessing FLEXibility) as well as the role of creativity for active ageing (CREA.CON - CREATivity in CONtext). Enhancing the expertise on the digital and green transitions and the silver economy will be possible thanks to the presence in the Spoke of researchers from the CNR, who have proven experience on the social impact of technology and social innovation (the project FuturICT 2.0 or the project eRep – Social Knowledge for e-Governance) and from UNINA project “Silver Starters”. The collaboration with the Italian Institute for Social Security – INPS completes this research effort and allows the partnership to focus on the most urgent socioeconomic challenges of the silver economy, given the unique vantage point, the extensive knowledge of the INPS researchers and richness of information of its data. Researchers of Spoke 6 are also experts in the field of welfare (pensions, pension reforms and retirement, disability provisions, long-term care insurance). UNIVE collaborates (since 1998) with the National Bureau of Economic Research-NBER (USA), for an International Social Security Project and for a Long-term Care Project. UNIVE has worked on gender disparities and migrant vulnerabilities (DomEQUAL). UNICATT worked on eHealth and Aging (HARVEST), on rehabilitation through virtual reality and on empowering and equipping older people in the management of health. Besides the participation of INPS, Spoke 6 has the advantage of the participation of Assicurazioni Generali, a leading insurance company with national coverage, which guarantees a special focus on the technology-transfer dimension of research within Spoke 6 – as technical and policy prototypes must result in operational and feasible solutions.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

UNIVE has collaboration with the National Institute of Ageing – NIA – USA and with the SHARE countries. It has experience in policy evaluation, questionnaire design, in the creation of longitudinal data, training of interviewers (across all Italian regions) and in the advancement of Research Infrastructures. It has been principal investigators of PRIN projects on ageing, with partners UNINA and the University of Palermo. INPS and Assicurazioni Generali have national coverages, with branches all over Italy. UNICATT has experience on technological advances on digital competences for older workers, methodological advances in Rehabilitation through virtual reality (“Empowering and
Enlarged Partnership 8 – Age-It: Annex 1

Equipping Europeans with health information for Active Personal Health Management and Adherence to Treatment in ambient assisted living Programmes (AAL).

This Spoke has strong synergies with the Mezzogiorno area. UNICATT collaborates with UNIBA and Università di Palermo. CNR coordinates Action FuturICT. “The FuturICT Knowledge Accelerator and Crisis-Relief System: Unleashing the Power of Information for a Sustainable Future”, the GLODERS FP7 project, simulating development on normative behaviour, and EMIL, “EMergency In the Loop: simulating norm of innovation” – Information Society Technologies. This line of investigation has the contribution also for the context of Mezzogiorno thanks UNINA with experience on Silver Starters in Self-employment.

4. Holistic and problem-solving approach

Partners of Spoke 6 have done extensive holistic, interdisciplinary research. The SHARE data (and other data sets) interrelate the health, economic, and the social domain. Researchers of Spoke 6 have worked at the individual/household level but also at the firm, regional and national level. They carried out policy-oriented research, based on impact evaluation, looking at solutions in work, participation and retirement issues. Extensive joint interdisciplinary research work and publications with epidemiologists (CNR of Padua on Ageing) and occupational physicians (Policlinico Gemelli, Rome). Expertise in the areas of economics, sociology, econometrics, demography, statistics, psychology, engineering and informatics, actuarial science and financial mathematics.

5. National collaboration

UNIVE collaborates with the Università di Padova; CNR Branch in Padua “Ageing”; Università Bocconi di Milano, Università di Napoli Federico II, ISPRA (Istituto Superiore per la Protezione e la Ricerca Ambientale), Università di Roma Tor Vergata, Università di Palermo; Università di Bologna; Banca d’Italia, Università di Torino; Università del Piemonte Orientale, Scuola Normale Superiore, European University Institute, Istituto Superiore di Sanità, Collegio Carlo Alberto di Torino. UNICATT works with the Italian “Agenzia per la Tutela della Salute di Milano” (ATS); Joint Research report on Healthy Ageing for the Fondazione Auxologico (joint with physicians); Research report on Healthy Ageing for the Fondazione Ferrero (joint with physicians and epidemiologists); Laboratory on Longevity and Ageing. UNINA works with Silver Starters, EIT Health (European Institute of Innovation and Technology).

6. International collaboration

Spoke 6 collaborations include project with the 27 countries plus Israel of SHARE. University College London, University of York, City University London, Birbeck University of London, St. Mary's University, (UK); National Institute of Ageing, NIA, University of Southern California, University of California Santa Barbara, Johns Hopkins University (US); Champlain College, Burlington, Vermont, University of Ottawa and McGill University (Canada); Tilburg University, Centerdata at Tilburg University, Utrecht University (The Netherlands); Sciences Po, Université Dauphine (France); Pompeu Fabra University, Complutense University (Spain); Universidade Federal de Santa Maria (Brazil); Miriam College (Philippines); Catholic University of Louvain (Belgium); Martin-Luther Universitat - Halle-Wittenberg, Center for Empirical Research in Economics and Behavioral Sciences (CEREB), University of Erfurt, Max-Plank Research Institute (Germany), Institute for Social Research (Norway); University of Lausanne (Switzerland), Leyden Academy on Vitality and Ageing University of Luxembourg; VIVE-Copenhagen (Denmark); Academy of Emergency Medicine and Care (ACEMC); Webster University, Geneva; Institute of Communication and Health, Università della Svizzera Italiana, Lugano (Switzerland).
Challenge 7  Cultural and political dimensions of ageing societies

<table>
<thead>
<tr>
<th>Spoke 7 Affiliates</th>
<th>BOCCONI</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIBO</td>
<td></td>
</tr>
<tr>
<td>UNISR</td>
<td></td>
</tr>
<tr>
<td>UNIBA</td>
<td></td>
</tr>
<tr>
<td>Co-Leader</td>
<td>UPO</td>
</tr>
<tr>
<td>UNICAL</td>
<td>UNIVE</td>
</tr>
</tbody>
</table>

This challenge addresses the **cultural and political issues raising from population ageing** using a holistic, multidisciplinary approach. Spoke 7 will contribute to the entire project by developing a **normative framework to address intergenerational equity and increase inclusion**, by contributing to the understanding of the cultural determinants of individual and societal decisions, by assessing the political sustainability of intergenerational policies, and by providing **guidelines and legal advices** to implement policy and technological solutions leading to the creation of an age-friendly future society.

1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [Health – general themes]**, by addressing inequality in health outcomes with a special focus on the cultural determinants of health care.
- **5.2.5 [Social transformation and inclusive society]**: by exploiting a multidisciplinary integrated approach including inputs from a variety of disciplines (political philosophy, demography, sociology, law, economics and political science) the Spoke will: address the issue of justice in the determination of intergenerational policies; examine the multidimensional aspects of inequalities (gender, socioeconomic, regional and spatial) in old age and provide suggestions to improve social and economic inclusion; study new form of identity and cultural scripts related to the ageing process; analyse the political sustainability of welfare states under population ageing and the role of information in shaping policy preferences across generations; address the legal issues raised by an ageing society.
- **5.4 [Digital, industry, aerospace] & 5.5 [Climate, energy, sustainable mobility]**, in general, this Spoke contributes to the understanding of, and provide normative grounds for, the political support for all policies and reforms entailing a strong intergenerational element, such as environmental and climate change policies, digital transition and automation, sustainable mobility.

2. Experience of Spoke 7 and Affiliated entities

This Spoke is composed of top-qualified social scientists from private and public institutions in a variety of disciplines from political philosophy to demography, sociology, economics, political science and law. **Members of this Spoke have previous experience in leading and/or taking part in large research projects, as well as direct involvement in government consulting and policy-making.** Their broad national and international research networks will facilitate the achievement of the research outcomes. Their policy-making experience will guarantee a policy-oriented approach to the issues. BOCCONI – Spoke leader – hosts the **AXA Research Lab on Gender Equality**, which promotes research in social sciences related to gender and promotes gender equality in the economic and social spheres through rigorous scientific methodologies; the **Donden Polities and Institutions unit** conducts interdisciplinary research on collective decision-making within the political realm, with particular focus on inequality and redistribution; and the **Baffi-CAREFIN Analysis In Pension Economics unit** analyses pension and retirement issues both with a research and a policy-making approach, and is part of the Cintia (**Center of international initiative of insurance and research on ageing**) Network.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

The institutions involved in this Spoke have extended experiences in scientific projects strictly related to the ageing process and more in particular to its cultural and political dimensions. Members of this Spoke include **ERC awardees, PIs and co-investigators in NIH/NIA, Horizon 2020, EU 7-th framework, PRIN and other national and international projects focused on ageing**, funded by a host of international and national programs and donors, including EU, MIUR, Research Council of Norway, Portuguese Foundation for Science and Technology, Swiss National Science Foundation, French ANR, Fonds de recherche du Québec-Canada, Unicredit Foundation, Axa Research Fund, Fondazione Cariplo.

Several studies of affiliates from UNICAL focused on **regional disparities in the Italian labor market, highlighting the need for specific policy measures to address population ageing in the Mezzogiorno.** Some of these researches have been financed by Prin 2017 Linea Sud/South Line: “Public policy evaluation in the wake of the great recession”, with Tullio Jappelli (UNINA) and Vitorocco Peragine (UNIBA). Related publications in

4. Holistic and problem-solving approach

This Spoke is highly interdisciplinary with researchers from a wide range of disciplines in social sciences: political philosophy, demography, sociology, economics, political science and law. With a vast breadth of expertise and a strong commitment to work together on ageing-related issues from different perspectives, this research team has the ability to secure a holistic outlook of the cultural and political aspects of ageing. The problem-solving approach is guaranteed by the mix of positive and normative methods. WP2 aims at proposing policies to reduce inequality and increase inclusion in ageing societies. WP3 analyses the cultural aspects that may enhance or undermine the success of these policies and should thus influence their design. WPs 1 and 4 examine the normative and positive aspects of the intergenerational conflict in our democracy, and aim to provide policy suggestions to increase intergenerational cohesion. WP5 addresses the legal issues arising in an ageing society with the goal of designing law proposals to avoid forms of age-based discriminations.

5. National collaboration

All the institutions and the researchers involved in this Spoke have long-term collaborations with the main Italian universities and research centres. These collaborations have been established with joint research projects, such as PRIN, joint academic publications, joint partnerships in higher education and research networks, such as CINTIA - Center of international initiative of insurance and research on ageing (Banca d’Italia, Università Ca’ Foscari di Venezia, Università commerciale Luigi Bocconi, Università di Padova, Università di Torino, Università di Bologna).

6. International collaboration

All the institutions and the researchers involved in this Spoke have long-term collaborations with many international universities and research centres. Institutional collaborations have been established with joint research and teaching networks. They include CIVICA (European University of Social Sciences), Central European University in Hungary, Sciences Po in France, Stockholm School of Economics in Sweden, the London School of Economics and Political Science in United Kingdom, and SHARE European Research Infrastructure Consortium (SHARE ERIC), in which are involved Universities and research institutions from 14 European countries plus Israel. Individual collaborations by Spoke members with colleagues in international universities and research centres were established with joint research publications and are described in their CVs.
Challenge 8  Interventions to reduce the burden of age-related diseases, disorders and disabilities

<table>
<thead>
<tr>
<th>Spoke 8</th>
<th>UNIMIB</th>
<th>Co-Leader</th>
<th>UNIBA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>CNR</td>
<td>SAPIENZA</td>
<td>INRCA</td>
</tr>
</tbody>
</table>

This challenge addresses the multifactorial aetiologies of age-related disabilities and disorders with multicomponent clinical and technological interventions, targeting several risk factors simultaneously. Spoke 8 will design multidomain interventions to promote active ageing and prevent functional and cognitive decline in older populations in different Italian regions and settings (home, hospital, long-term care facilities), including their deep phenotyping through genotyping, biomarkers, omics and analysis of environmental factors. The Spoke will rely on technological and Artificial Intelligence developments integrated within the Age-It consortium, still adopting a problem-/clinical-oriented approach.

1. Consistency with the objectives and priorities of the national research plan

- 5.1.1 [Health – general themes], 5.1.4 [Technologies for health], 5.1.2 [Pharmaceutical and pharmacological Technologies]: lifestyles and ways to promote healthy, safe, inclusive and sustainable living environments (e.g., home, hospitals, work), following a One Health approach.

- 5.2.4 [Creativity, Design and made in Italy]: development of interventions and policies, also based on AI, to improve quality of life and quality of urban environments, and more generally oriented to life-improvement, health and well-being.

- 5.4.1 [Digital transition i4.0] and 5.4.4 [Robotics]: development of technologies and digital services designed for older adults, with the aim to improve their well-being as persons and patients, reduce costs, and facilitate forms of support to patients.

2. Experience of Spoke 8 and affiliated entities

This Spoke brings together a top-qualified and multidisciplinary consortium of clinicians, psychologists, biologists, pharmacologists, geneticists, immunologists, biophysicists, chemists, biostatisticians, computer scientists, AI experts, biomedical and electronic engineers, experts in robotics, ICT solutions, sensors and Micro/Nanosytems development experts, economists, belonging to universities (Milano-Bicocca, Sapienza and Bari), research institutes (CNR Padua, Lecce, Bari, Firenze, Roma, INRCA Ancona and Cosenza), and private companies (BETA 80). This team will perform detailed characterizations and assessments of older subjects in different settings: home, hospitals and long-term care facilities to deliver an array of multicomponent (medical, psychological, technological and public health) interventions to make ageing a positive experience, to promote well-being and to reduce the burden of age-related diseases, disorders and disability. Innovative ICT solutions for data collection, management and analysis to facilitate sharing of data among healthcare professionals in hospital and community will be developed, as well as technological assessments to explore the effect of novel technological solutions in different settings and evaluate cost-effectiveness. Our Spoke members have previous experience in leading and taking part in large research projects, and their broad national and international research networks will be utilised in the project.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Our Spoke members have a long and extensive experience in managing complex research programmes and projects at European, national and regional levels. Examples are the coordination of several EU projects in FP6, FP7, H2020, Horizon Europe ONR, ERC grants, Marie Sklodowska-Curie Actions, FET Open, PON, PRIN and other projects funded by MIUR (including the project “Institute for Stem-cell Biology, Regenerative Medicine and Innovative Therapies”, total 13.798.052,03€, aimed at the development of a Research Centre for the implementation of Innovative Therapies in Southern Italy, San Giovanni Rotondo, FG), Ministry of Health, AIFA, Cariplo foundation, AIRC, as well as the coordination of several clinical trials.

Of relevant interest are the following activities in the Mezzogiorno, and in particular for Puglia Region: the “Make it ReAAL” European project, the participation in the European Innovation Partnership on Active and Healthy Ageing (EIPAHA), the Reference Site WiFi on Active and Healthy Ageing.

4. Holistic and problem-solving approach

Different backgrounds and areas of expertise of spoke members will allow us to address this ambitious goal: the multidisciplinary approach will be functional to characterise the multifactorial disorders and complexity of old age.
and to personalize the approaches. Possible preventive strategies also need multicomponent clinical and technological interventions targeting several risk factors simultaneously. For these reasons, the main and holistic approach of this program will be the **design of multidomain interventions to promote active ageing and prevent functional and cognitive disorders in older populations from different Italian Regions**, after their deep phenotyping of patients through genotyping, biomarkers, omics and analysis of environmental factors. Multicomponent interventions, including combined clinical and technological approaches, will be designed in older hospitalized patients and in long term care facilities to prevent onset or progression of disability. Strategies to improve a multidisciplinary approach among health care providers in the hospital, long term care facilities and community settings will also be exploited with a problem-solving approach and with large use of ICTs. Finally, analysis of costs and benefits of such interventions and a roadmap for their integration in the national health system and in the industrial ecosystem will be prepared.

5. National collaboration

The researchers involved in this project are actively collaborating with several Italian Universities (Bari, Bologna, Brescia, Calabria, Campania “Vanvitelli”, Catania, Catanzaro "Magna Graecia", Cattolica del Sacro Cuore Roma, Ferrara, Firenze, Genova, LUMSA Roma, Messina, Milano, Napoli Federico II°, Novara, Padova, Palermo, Piemonte Orientale, Pisa, Polytechnic of Bari, Polytechnic of Marche, Polytechnic of Turin, Salento, Torino, “Tor Vergata” Roma, Udine, Verona, Vita Salute San Raffaele Milano) and national research institutes (Scientific Institutes Carlo Besta, Mario Negri, Don Gnocchi, Italian National Institute of Health (ISS), Istituto Auxologico Italiano, Humanitas San Pio 9, IFOM (Istituto Fondazione di Oncologia Molecolare), Fondazione IRCCS Casa Sollievo della Sofferenza di San Giovanni Rotondo (FG), Institute Cavaliere Ottolenghi (NICO), Istituti Clinici Scientifici Maugeri Pavia, Istituto Italiano de Tecnologia Genova, Galliera Hospital Genova, IRCCS Fondazione Santa Lucia, Fondazione Neurone, IRCCS San Raffaele Milano, IRCCS Monzino Milano, ARESS Puglia (Agenzia Strategica Regionale per la Salute e il Sociale), ISMETT (Istituto Mediterraneo per i Trapianti e Terapie ad alta specializzazione), Rizzoli Orthopaedic Institute, IRCCS De Bellis Castellana Grotte, IRCCS "John Paul II" Cancer Institute, Miulli Hospital (Puglia’s FAOIO branch).

6. International collaboration

Participants in this research are actively collaborating with several Universities from Europe: Ghent, Katholieke Universiteit Leuven and Innovation Sprint (Belgium); Montpellier and Poitiers, Institut Pasteur de Lille, Lumiere Lyon 2, Paris, Limoges (France); Köln, Heidelberg, Potsdam, Max Planck Institute Frankfurt, Ulm (Germany); Athens, Patras, Cyprus (Greece); Debrecen (Hungary); Luxembourg Institute of Science and Technology (LIST, Luxembourg); Trinity College Dublin, Cork (Ireland); Amsterdam, Erasmus Medical Center, Academic Hospital of Maastricht, Leiden University Medical Center (The Netherlands); Valencia, Regional University Hospital and Biomedical Research Institute of Málaga (IBIMA), Hospital Universitario Ramón y Cajal (IRYCIAS) Madrid, Barcelona (Spain); UCL, Oxford, St George’s London, Nottingham, Bristol, Newcastle (UK). Collaborations with Universities of Albania (Medicine “Mother Teresa” Tirana), Arab Emirates (Abu Dhabi, Houston Methodist), Australia (Flinder, Western Australia and Sydney), Brasil (Sergipe), Canada (Toronto, McGill University, Toronto Western Hospital), Slovenia (University Medical Center of Ljubljana), US (National Institute on Aging, Florida, Emory Atlanta, Mount Sinai, Cincinnati, Baylor College of Medicine Houston, Texas, Binghamton, Georgia Institute of Technologies) are also ongoing. Researchers are members of several international consortia: European DNA bank for deciphering the missing heritability of Alzheimer’s disease (EADB), Genetic Epidemiology of Parkinson Disease (GEO-PD), International Research Society for Public Management (IRSPM), European Public Health Association, International Movement Disorders Society (MDS), European Academy of Neurology (EAN), European Geriatric Medicine Society (EuGMS), European Interdisciplinary Council on Aging (EICIA), International Society of Mycotoxicology, European Innovation Partnership on Active & Healthy Ageing (EIPAHA), European Academy for Medicine of Ageing (EAMA).
1. Consistency with the objectives and priorities of the national research plan

- **5.1.1 [General Themes], 5.1.4 [Technologies for health]:** development of advanced systems including wearable/portable technologies and robots, based on smart materials, advanced-interfaces, AI-algorithms (including virtual and augmented reality) to enhance the promotion of active and healthy ageing and to identify digital biomarkers that can be used to prevent and monitor frailty in older people,

- **5.4.1 [Digital Transition i4.0], 5.4.3 [Artificial Intelligence], 5.4.4 [Robotics]:** valorisation and exploitation of digital innovation, AI, and robotics for citizens’ health (especially the frailest and most disadvantaged), in living and working environments (both real and virtual) and in outdoor urban spaces, based on a human-centred approach. Development and application of novel biomedical technologies based on AI and robotics for prevention and health monitoring in older adults.

2. Experience of Spoke 9 and affiliated entities

This Spoke brings together a high-qualified group of bioengineers, electronic, computer and mechanical engineers, physicians, neuroscientists, psychologists, architects, encompassing universities, research centres and industrial companies to promote active and healthy ageing. Each involved entity has been selected on the basis of previous experience in leading and participating in local, national and international projects on the active and healthy ageing topic. These consolidated academic and industrial collaborations and partnerships will ensure feasibility of the project. Principal Investigators (PIs) are also selected based on their expertise and strong track record in the field of the Spoke 9 themes. UNIFI is the Spoke 9 leader and provides expertise in social assistive robotics, human machine interfaces, wearable systems and machine learning in digital diagnosis, therapy and prevention, remote monitoring systems for assistance, coaching or follow-up of older frail citizens, microelectronics systems for biomedical applications, human centred design approaches. Other affiliated entities have top-end expertise in: neurorobotics, exoskeletons, and Brain-Computer Interfaces (UNIPD); smart metasurfaces, microwave sensors, and radars for non-invasive monitoring and robots for limb rehabilitation (UNICAL); multisensory distributed system for home monitoring (UNIROMA1); virtual and augmented reality, including the metaverse (UNICATT); Semantics and AI, minimally invasive complex systems for the monitoring/estimation of human activities, mood/stress level, physiological, biomarker and neurovegetative parameters in structured living environments for coaching to promote active and healthy ageing (CNR); end-users' engagement and participatory design (INRCA). The very technological nature of this spoke is strengthened by the participation of three crucial national private realities in the world of tech services, MUNICIPIA, TECH4CARE and HEALTHWARE.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Management and implementation capability of the projects is demonstrated by the participation of Spoke9 leader and Affiliated Entities in previous complex and highly competitive (e.g., Marie Skłodowska-Curie Actions (MSCA), Future and Emerging Technologies (FET), Electronic Components and Systems for European Leadership (ECSEL) research programs (e.g., FP7, H2020, PON, PRIN). Also, the PIs for each entity have wide experience in coordinating and actively participating in several national and international projects related to the theme of active and healthy ageing. Most of these projects include interdisciplinary and intersectoral collaboration, highlighting mechanisms of knowledge in multi-dimensional domains. The Spoke leader UNIFI-DIEF is currently coordinating the large-scale project Pharaon (H2020-SC1-FA-DTS-2018-2, Total budget: 21.3M€) involving 40 partners across EU and leading the Italian pilot - one site located in Apulia - that promotes AHA services. UNIFI-DINFO is participating in ROVER
Enlarged Partnership 8 – Age-It: Annex 1

(H2020-MSCA-RISE-2019) on technology for monitoring vital signs in diagnostic procedures and in Moore4Medical (H2020-ECSEL-2019-IA-876190) promoting open platforms for emerging medical devices. UNIPD is currently the project leader of MAIA (H2020-MSCA-RISE 2019) age-friendly workplaces and in Soft Act soft exoskeleton (Ministero degli Affari Esteri) in collaboration with Harvard University. UNICATT is leader of Gravitate – Health funded by the Innovative Medicines Initiative 2 Joint Undertaking and H2020 that explores the use of technology as community engagement tools to facilitate and support healthy ageing. National projects related to the themes of the Spoke demonstrate the ability of the Entities in permeating the territory and exploit the outcomes of the research in practical applications: e.g. RELOAD (UNIPD - POR FESR 2014-2020); e-Health integrated services for the domestic assistance of people with fragilities (UNIFI-DINFO - Fondazione CR Firenze); SELFIE-CHECK: automated CHECK UP through sensor network and artificial intelligence (UNIROMA1 - POR FESR Lazio 2014-2020); Strategies and planning scenarios for a healthy city and active ageing (UNIFI-DIDA - Fondazione CRF 2022-2023); Place4Carers: Engaging Family Caregivers in Meaningful Actions for Successful Ageing (UNICATT - Fond. Cariplo). As for the reference to Mezzogiorno, UNIFI-DIEF and CNR are involved in the PON SI -Robotics for active and healthy ageing (Total budget: 10M€) and UNIFI-DINFO is leading CONUS: Conic open scanner for ultrasound research advancement (PRIN 2020).

4. Holistic and problem-solving approach

The Spoke 9 offers a unique combination of expertise in relevant research fields that ensure an interdisciplinary approach. This allows a unique, out-of-the-box problem-solving approach to cutting-edge topics, building on the richness of diverse competencies through the collaborative work of engineers, physicians, psychologists, architects, neuroscientists. While challenging, multidisciplinary teams provide the means for unconventional thinking. Moreover, the intersectoral collaboration of the affiliated entities with Small Medium and Large Enterprises allows for the development of practical solutions that satisfy on-field analyses requests and integrate them with cutting-edge approaches.

5. National collaboration

The entities involved in this Spoke collaborate with the most prestigious national universities (e.g., Universities of Basilicata, Bologna, Campania, Campus Biomedico, Roma Tor Vergata, Salerno, Sant’Anna, Politecnico Torino, Trento, Trieste), third-level research hospitals and cooperative networks (LegaCoop) in the field of new technologies and services for the “Aging Society”. Several joints lab with universities and hospitals linked to the topics of Spoke 9 have been established: e.g., RING Lab in Fondazione Don Gnocchi, Florence; BioRobotics of Parkinson joint Lab in Ospedale delle Apuane, Massa; Medical ICT joint research laboratory, with the USL-TC and ARS, Florence. The collaborations consolidated within this Spoke include also clusters, partnerships and networks like I-RIM, Rete Innovativa Regionale RIVELO, SMILE - Italian Cluster for Smart Living, InnovAAL a PPP on AAL and active and healthy ageing, and C.H.I.CO. Cluster of Health Innovation and Community.

6. International collaboration

The entities involved in this Spoke collaborate with most of the forefront international Universities and Research Centres in the field of technologies for ageing, healthcare and well-being, among the most relevant are: Harvard and Stanford University and Massachusetts Institute of Technology in US, McMaster University in Canada, University of Barcelona and Universidad Politécnica de Madrid, University of Lyon, KU Leuven, Technical University of Munich (Germany), Imperial College (UK) in EU, Active Intelligent System Lab, Iwate University in Japan. Furthermore, UNIPD is contributing for the new ISO 25551:2021 and ISO 25550:2022 for “Ageing societies”, while UNIFI for ISO/TC 314 for “well-being” and “Home Care”.

Challenge 10  Mainstreaming ageing by building institutional mechanisms for better and future-oriented health policy making and prevention

<table>
<thead>
<tr>
<th>Spoke 10</th>
<th>UPO</th>
<th>Co-Leader</th>
<th>BOCCONI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliates</td>
<td>UNINA</td>
<td>UNISR</td>
<td>UNIMIB</td>
</tr>
<tr>
<td></td>
<td>INRCA</td>
<td>UNIBO</td>
<td>UNIVE</td>
</tr>
</tbody>
</table>

This challenge integrates all the previous ones by addressing **policies on frailty and integrated care and their application** in order to i) suggest strategies to increase **inclusion of underrepresented populations** and **synergies between national and regional programs**, ii) understand health, social, biological, and economic disparities related to ageing in order to **enhance the present policies and to develop risk-based strategies to improve the health status and well-being of older adults**. Spoke 10 will provide policy makers with effective tools to improve the implementation of health promotion and prevention programs targeting older adults. The final aim is to inform policies to match the appropriate services to the needs of older people and guarantee an integrated response across different institutional settings (NHS, community social care, formal home care).

1. **Consistency with the objectives and priorities of the national research plan**

- **5.1.1 [Health – general themes]:** by exploring successful strategies and progress achieved in ensuring access to high-quality long-term care and palliative care in ageing societies examining national strategies and experiences in the provision of long-term care, including at home and within the community, as well as the long-term sustainability and resource needs of long-term care systems.
- **5.1.4 [Technologies for health]:** by improving knowledge aimed to increase those digital technologies useful to allow homogenous approach of policies implementation in real life contest among all levels, local, regional and national.
- **5.2.5 [Social transformations and society of inclusion]:** by integrating ageing issues across all policy fields and at all levels of government looking at examples of mainstreaming ageing at the national, regional and local levels. By implementing exploration of the twin-track approach to mainstreaming, considering ageing both from a societal and individual perspective, through a discussion of the whole-of-government and whole-of-society approaches to policy making. By implementing the support provided to families and informal caregivers, such as adaptations to social protection systems, measures aimed at reconciling employment and care work.

2. **Experience of Spoke 10 and affiliated entities**

This Spoke brings together a top-qualified group of several professional figures synergically working to deliver a range of **highly specialized approaches to identify strategies and policies for managing population ageing**. All Spoke members have previous experience in leading and/or taking part in large research projects, spinoff, and start-up funding. Their broad national and international research network will be exploited for the purpose of the present project. All partner relies on multidisciplinary research teams capable to address the challenges posed by the program, which require the ability to efficiently manage time and resources. UPO – Spoke leader – has an established expertise in both leading and collaborating to national and international projects. The UPO Department of Translational Medicine has obtained the certification of excellence from the Ministry of University and Research. The team of philosophers from UNISR has expertise in medical ethics, bioethics, and epistemology. They coordinated European research projects in the ethical issues of life-span enhancement (FP IV), in the impact of neurosciences on ethics (PRIN) and on the moral distress of healthcare workers assisting chronic patients (Cariplio). UNIBO hosts a number of research centres such as the School of Health Policies, the Centre for Comparative Public Policy, the CeUms on the humanisation of care and social health, the Computational Social Sciences Center. UNINA Departments (Public Health, Economy-Management-Institutions and Electric-IT Engineering), have proven expertise in 1) implementation and evaluation of care models focused on one health approach; 2) basic and clinical research on health promotion interventions, healthy lifestyles, best practices in hospital and territorial setting; 3) economic and social research focused on policies, organization and management for health systems and 6) development of innovative technologies for health. UNIVE works with the NIH/NIA to produce harmonized ageing survey data with its key role in the SHARE Projects (Survey of Health, Ageing and Retirement in Europe). It works on gender disparities and migrants’ vulnerabilities (VULNER and DomEQUAL) and on policy solutions for the management of care, also at the local level. BOCCONI - Centre for Research on Health and Social Care Management (CERGAS) research focuses on institutional design, funding, integration models and service delivery, with the aim to develop actionable knowledge to improve both policy making and service provision. UNIMIB is presently involved in more than 100 European grants (H2020, COST Actions, Justice, EIT-KIC etc.) and brings a capacity for the interdisciplinary analysis of complex systems, merging quantitative research competence, e.g., in the statistical study
of the relationships between institutions' strategies and patients' behaviors, and qualitative participatory research with individuals, communities, and organisations.

3. Ability of individual Spoke and affiliated entities to manage and implement projects in fundamental and/or applied research (with special reference to Mezzogiorno)

Spoke 10 group includes researchers with a long and extensive experience in management and in implementation of project. As aforementioned, the UPO team involved in this project has experience in managing national and international project. It has been involved in 21 FP7 Projects (1 ERC grants), 21 H2020 Projects (7 as Coordinator), 1 HORIZON EUROPE Project, 9 INTERREG IT-CH; in addition to several PRIN Projects. The UPO Department of Translational Medicine (DIMET) has proven expertise in ageing. In particularly, the DIMET ageing project has contributed to the certification of excellence received from the Ministry of University and Research. The researches of UNIBO here involved, are experts in managing co-financed projects in the areas of epidemiology, health services research and health economics and in policy design and evaluation at the regional/local level. Recently UNIBO researchers have been involved in projects on incorporating the gains from healthy ageing in health system planning, implementation of a novel clinical pathway of care for common musculoskeletal disorders in primary care, developing health system performance assessment in Croatia, Slovenia, and Latvia. The researchers from UNI have been leading programs related to Public Health and Health Systems. Researchers from UNIMIB are experts in the statistic evaluation of health systems and policies and in designing eco-systemic projects to enhance care through interprofessional learning. CERGAS has more than 40 years of experience in applied scientific research in of health policy, health economics, healthcare management and social policy and innovation. Researchers from UNISR are philosophers with an expertise in bioethics, medical ethics, social philosophy and epistemology.

The overall activity of Spoke 10 is strongly devoted to mainstream and rethink policymaking across all regions, with a special emphasis on the Mezzogiorno. For instance, researchers from UNINA are experts in management, organization and IT engineering, and have long experience in Mezzogiorno-oriented projects and research about public administration, health services and public health.

4. Holistic and problem-solving approach

This Spoke comprises researchers from different fields ensuring both an interdisciplinary approach to the project and a comprehensive perspective on the theme of ageing policies and programmes. In general, the experience developed by the Spoke members in terms of networking skills, among national and international collaborations, lays the foundations for an effective problem-solving approach. The most important deliverables that we intend to produce are: 1) develop and implement a systematic collection of policies and strategies to increase inclusion of underrepresented populations in research on ageing; 2) develop risk-based strategies to improve older adults’ health status and well-being for increasing an independent living, including personalized interventions and smart digital solutions; 3) implement tools for improving health promotion and prevention programs targeting older adults, according to clinical guidelines; 4) implement a territorial network logic, involving participants in interprofessional and intersectoral partnerships; 5) develop an older adults need map for identifying population profiles and create a data cohort for analysing both hospital and community-based service utilization.

5. National collaboration

The researchers involved in this project have collaborated with several institutions that provide health care programmes for ageing people at the community level and with all the major national research institutes, among which: Italian NHS at all levels and related institutions; Ministero dell’Economia e delle Finanze. Other collaborations: CINTIA Center of International Initiative of Insurance and Ageing Research; RUIAP Rete Universitaria Italiana per l’Apprendimento Permanente; ANPAL Agenzia Nazionale Politiche Attive del Lavoro; GNAP Gruppo Nazionale Apprendimento Permanente; INDIRE Ricerca per l’innovazione della scuola italiana; EPALE Piattaforma elettronica per l’apprendimento, Forum Terzo Settore, CSVnet, Gruppo Abele, Fond. ALSOS.

6. International collaboration

The researchers involved in this project have collaborated with distinguished international institutes that perform research, education and healthcare services. Several collaborations have been established with the World Health Organisation. Other international collaborations are with the Association of Home Care and Assistance, Switzerland; Ludwig-Maximilians-Universitaet Munich, Germany; Panepistimio Thessalias, Greece; Zdravstveno veleuciliste, Croatia. Other international collaborations include: CEMS the Global Alliance in Management Education; U7+ Alliance of world universities; ALEUESS Alliance of Leading European Universities in Economic and Social Sciences, GULF (Global University Leaders Forum); GNAM (Global Network for Advanced Management); ILPN (International Long Term Policy Network). Collaboration with international universities have been carry out (i.e., University of Eastern Finland; University of Maynooth (Ireland); Canterbury Christ Church University (UK); University of Pusan (South Korea); University of Newcastle (UK).
A3. ADDITIONAL ENTITIES PARTICIPATING ONLY TO THE HUB CONSTITUTION

CONFCOOPERATIVE

1. Previous experiences, scientific and design skills of each participant concerning the Specialization Area of the Extended Partnership in terms of innovation and technology transfer

Founded in 1919, Confcooperative, The Confederation of Italian Cooperatives, is the main organization in Italy for representing, supporting and safeguarding the cooperative movement and the Italian social enterprises by number of companies (17,000), employed people (527,000) and turnover achieved (81 billion euros). The members represented are over 3.1 million. Since 1958, Confcooperative has been part of the Economy and Labor National Council (CNEL). The Confederation is made of 22 Regional Unions; 81 Provincial Unions; 7 Inter-provincial Unions, which represent the Confcooperative within its territorial districts. The 22 Regional Unions include the autonomous provinces of Trento and Bolzano. Confcooperative is a complex structure, which includes nine National Federations, which operate in all economic sectors.

<table>
<thead>
<tr>
<th>SECTORS OF ECONOMY</th>
<th>Nr. of members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>2777</td>
</tr>
<tr>
<td>Fishing</td>
<td>371</td>
</tr>
<tr>
<td>Habitat</td>
<td>1024</td>
</tr>
<tr>
<td>Healthcare</td>
<td>376</td>
</tr>
<tr>
<td>Banking</td>
<td>244</td>
</tr>
<tr>
<td>Consumption and Utilities</td>
<td>577</td>
</tr>
<tr>
<td>Culture Tourism and Sport</td>
<td>1096</td>
</tr>
<tr>
<td>Jobs and Services</td>
<td>4067</td>
</tr>
<tr>
<td>Social Sector</td>
<td>6087</td>
</tr>
<tr>
<td>Mutual Societies</td>
<td>79</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>16,698</strong></td>
</tr>
</tbody>
</table>

Confcooperative supports cooperatives also thanks to a wide network made of cooperative national organizations, sister companies and bodies: Fondosviluppo Ltd., Confcooperative’s financial company, is the Mutualistic Fund for promoting and developing co-operation through loans, grants and equity participations; ICN spa, a consultancy company, offers business consultant services, training courses and other activities for improving cooperative management; Cooperfidi Italia soc.coop – The National Collective Guaranty Co-operative Enterprise, provides with collective guaranty to pursue both improvement and modernization of small and medium enterprises, enhancing the access to bank credits; CFI founded in 1986 - to manage the “Marcora Fund”, which safeguards employment by creating new workers owned enterprises (workers buyout). Today CFI is the institutional investor engaged in developing operations for workers’ production co-operative enterprises as well as for social co-operatives; Coopermondo, the NGO for International development projects also member of the European and member of the EU development platform; Assimoco Ltd. - the Insurance group of the Co-operative Movement.

2. Demonstrated ability to manage and implement projects in fundamental and/or applied research with particular reference to the area of the partnership (with special reference to Mezzogiorno)

Confcooperative represents about 6,500 co-operative enterprises in Healthcare and Social Sector with almost 20 billions of turnover, 371 thousand members and around a half of the total Italian employees in the social and Healthcare sectors (270 thousand workers). Confcooperative is also very committed to the implementation of actions aimed at research and technology and skills transfer, it established several University spin-offs. NODE soc. Coop., is Confcooperative’s ICT company, provides specialized systems and digital solutions to the enterprises adhering to Confcooperative and to all SMEs existing in the national territory. It is also a Digital Innovation Hub. In the healthcare and social sectors, many experiences are particularly relevant. For example, a patent on telemedicine promoted by OSA soc. Coop and named “BED SENSOR” PRESSURE, a digital platform on genetics counseling named “Genoma Access” promoted by Cooperativa Kaleidos and “EBTNA LAB” a social enterprise focused on biotechnologies. Other experiences are implemented about senile dementia, in term of services and cares researches (for example, “Anthropos soc. Coop” in Apulia”). Generally, all the social cooperatives work offering all the services on the long-term care, managing structures, centers, home-care services and other activities. Often, they operate towards Consortium, such as the more important and relevant in Italy, “Consorzio Gino Mattarelli”.

2006 – 2008 ORP-Puglia Measure 5.3 and 2012-2015 OP-Puglia ESF Call for proposal “Global Grant – Small
Subsidies” Intermediary Body: Syndicate association APE-Fondosviluppo-Confcooperative. It participated, in the Apulia region, in the Intermediate Body of two Global Grants with the coordination of the program management. Through the Global Grant, the EU promotes local development actions through the delegation in the implementation of the actions to the Intermediate Body, in order to ensure greater proximity between the lender and beneficiaries. The Intermediate Body replaced the Public Administration at all stages: information, promotion, consulting, drafting and issuing of calls, investigation and selection, delivery, monitoring and control, in order to make the support tool closer and usable. The recipients of the G.G. "Small subsidizes” were the actors of the Third Sector. Overall, about 500 projects have been granted for a total of € 15 million of financial resources paid. Confcooperative therefore has employees with consolidated experience in the decentralized management of public support tools for SMEs. It carries out business creation and incubation activities, as well as involvement in various living labs. Confcooperative is the lead partner together with Leader S.C.C. and the “Basile Caramia” Center for Research, Experimentation and Training in Agriculture (CRSFA). The initiative aims to create innovative companies in the sector: Health, well-being and socio-cultural dynamics and Food safety and sustainable agriculture, in Apulia and Basilicata regions, and is aimed at 50 young talents and aspiring entrepreneurs, supported by coaching, mentoring, and tutoring.

In the Extended Partnership Confcooperative will be able to involve its members in fundamental and applied research activities, technology transfer and enhancement of research results. Furthermore, the cooperatives involved will be able to activate research doctorates as well as participate, with their own managers and qualified personnel, in the planned Higher Education initiatives. Confcooperative will be able to participate in promotion and dissemination activities. The whole system of social cooperatives, a significant component of the Third Sector, may also be involved in guaranteeing social and working inclusion paths for disadvantaged people.

3. **Existing national and international collaborations with other institutions and centres of high scientific quality**

Confcooperative maintains both formal and informal relations with the main Italian universities and with many centres of applied research related to the business world, in particular in the agri-food and the health sectors. In addition, it collaborates with Aiecon (a think tank that focuses on non-profit, promoted by University of Bologna) and with Euricse (promoted by the Università di Trento). Confcooperative promotes two post-graduate master degrees on cooperative economics at Roma3 and Università di Bologna, Master in Economics of Cooperation MUEC, proposed jointly by the Departments of Economics and Business Sciences and activated at the School of Economics and Management at the Alma Mater Studiorum University of Bologna. Specifically, Confcooperative collaborates on the healthcare issues with “Dipartimento Scienze dell’Invecchiamento, Neurologiche, Ortopediche e della Testa-Collo della Fondazione Policlinico A. Gemelli”, with the “Fondazione Italia Longeva”, with “Ospedale Pediatrico Bambino Gesù, IRCCS”, with SDA Bocconi School of Management, with “Agenzia nazionale per i servizi sanitari regionali (AGENAS)” and with “Facoltà di Economia dell’Università Cattolica del Sacro Cuore”, promoting together with the “Altems” departement a specific course on “Third sector and Healthcare”. In order to the new professionals on welfare and social assistance workers, Confcooperative has a partnership with the LUMSA, above all about programs and courses for training social workers. Confcooperative collaborates with all the Apulian University in implementing innovation, developing research projects, promoting Research Assistants and PhDs. Furthermore, Confcooperative promotes specific research, publications or it participates in education courses dedicated to workers, managers and sector-specific operators. Confcooperative also contributes to the realization and dissemination of research and development projects, prototyping of new products or organizational processes, thus experimenting with new enterprises, new products or other innovative solutions for cooperatives. It has carried out several initiatives to promote and disseminate the results of research initiatives carried out in Italy and abroad.

Confcooperative is actively engaged at International Political Tables and Discussions within ILO, FAO and UN DESA as member of the International Cooperative Alliance (ICA), advocating and fostering political activities in order to contribute to the implementation of the UN 17 SDGs. ICA established in 1895, advocates the cooperative movement worldwide. Today, cooperatives globally represent 12% of humanity as businesses driven by values and not by the remuneration of capital. Cooperatives provide jobs for 280 million people and Top cooperatives generate a turnover of 2.14 Trillion USD. Confcooperative is also member of Cooperatives Europe. It is the reference partner of COOPERMONDO, Confcooperative’s NGO for international cooperation involved in several development cooperation projects in the developing countries. Confcooperative collaborates with Fairtrade in order to implement ethical auditing in the Italian food chain. It has been more than 20 years that Confcooperative collaborates with Mediterranean Universities Union (Comunità Università del Mediterraneo CUM) that has its legal site at the University of Bari. CUM in a University Consortium with 160 member belonging to 17 Mediterranean Countries.
1. **Previous experiences, scientific and design skills of each participant concerning the Specialization Area of the Extended Partnership in terms of innovation and technology transfer**

**Sanofi in Italy:** Sanofi S.r.l. belongs to the Sanofi Group. In Italy the Company boasts a diversified business that covers the entire drug value chain: clinical research and development, R&D in API and drugs production, medical information, and sales. Sanofi s.r.l. deals with the research, manufacture, processing, and packaging, on its own and on behalf of third parties of chemical, pharmaceutical products, including biological products (human vaccines, sera, diagnostics, processing of blood and its derivatives), of medicinal specialties, medical devices, para pharmaceuticals, over-the-counter products but also probiotics, some supplements and more generally nutraceutical products.

Sanofi’s vaccines business unit partners with the public health, medical and scientific communities to improve access to life-saving vaccines and increase vaccination coverage, while striving to develop new and improved vaccines to enhance health and well-being. In 2021 we welcomed new technologies and people from Translate Bio, Kiadis and Tidal Therapeutics, and we also launched our mRNA Center of Excellence to concentrate expertise across the company. Based on two sites in France and the US, our new center unites 400 dedicated employees from R&D, manufacturing, clinical studies, and teams from regulatory and digital around a shared purpose: to pursue mRNA-based vaccines, and therapeutics for cancer, immune-mediated diseases, rare diseases, and vaccine-preventable diseases. In influenza, we’re using both new mRNA technologies and long-established platforms to develop vaccines designed to offer protection beyond flu, addressing the elevated risks of heart attack and stroke following an influenza infection. We’ve set the bar high with existing vaccines that prevent severe complications, and that have both low reactogenicity and good thermostability.

Sanofi employs in Italy more than **2,000 people** including workforces and collaborators: **more than 1000 are employed in our industrial plants** (Pharma Company ranked 3rd in the Country for number of employees). Annual investments for 75 million euros for its industrial footprint and 11 million euros for Clinical development activities (Pharma Company ranked 9th in the Country for R&D investments).

In the last three years (2019-2021), Sanofi invested around **150 million euros** in our industrial apparatus, triggering a further segment from the institutions. We can consider 200 million euros overall, contemplating also fundings attracted from the Regions and MISE (Ministry of Economic Development). **Sanofi Italy Headquarters and offices are in Milan and in Rome.** 4 industrial sites: **Origgio** (Varese, north of Italy, Lombardy Region), belonging to Opella Healthcare Italy s.r.l, in **Anagni** (Frosinone, Central Italy, Lazio Region), **Scoppito** (L’Aquila, Central Italy, Abruzzo Region) and **Brindisi** (South of Italy, Puglia Region) owned by EuroApi Italy s.r.l.

Origgio site is the Sanofi **Worldwide R&D&I center for Probiotics** with expertise in multiple delivery forms, manufacturing technologies, digital sustainability evolution, for international products covering more than 70 different markets worldwide & suppling key Brands, leaders in probiotics & digestive wellness.

In 2019, an Innovation Agreement was approved by MISE (signed in 2022) for a research project creation of approximately € 20 million that will allow the manufacture of the innovative "**Probiotikà pilot Accelerator Center.**" (around 500 sq m) focused on innovation and R&D.

The activities of the Probiotikà Center are aimed at developing new innovative nutraceutical products to support the immune system and **for the healthy aging area**, through modulation of the microbiome.

2. **Demonstrated ability to manage and implement projects in fundamental and/or applied research with particular reference to the area of the partnership (with special reference to Mezzogiorno)**

**Sanofi Group**

Sanofi is today a global healthcare company and around 100,000 people, across some 100 countries, are dedicated to transforming the practice of medicine. Over the last 50 years, Sanofi has grown into a diverse, global healthcare leader, with a rich heritage of patient-centric scientific discovery. This history includes the first treatments for many rare diseases and the establishment of standards of care in diabetes and cardiovascular disease. Sanofi’s commitment to public health has helped protect hundreds of millions of people from influenza every year for decades and pushed polio to the brink of eradication, while its scientific vision has led to breakthrough innovations in the treatment of inflammatory diseases.

Since September 2019, Sanofi worked to optimize its products portfolio and to leverage on all their 4 divisions to maximize results and growth opportunities: General Medicine, Specialty care, Vaccines and Consumer Healthcare. **R&D pipeline**

Recent breakthroughs in science and technology have revealed new opportunities in Sanofi areas of priority and expertise: vaccines and specialty care. Novel biologics are enabling Sanofi to address seemingly intractable problems in drug and vaccine design, while digital and data systems are bolstering our patient-centric R&D
With a strong focus on difficult-to-treat diseases and immunization, Sanofi R&D pipeline (as in February 2022) includes 91 clinical-stage projects, 34 of which are in phase 3 or have been submitted to regulatory authorities for approval. Some of these are new molecular entities while others are existing products with potential new indications, or different formulations. All of them are made possible by people who volunteer to participate in a clinical. Sanofi key R&D assets: Oncology, Immunology and Inflammation, Neurology, Rare Diseases and Rare Blood disorders, Vaccines.

Thanks to our unique legacy in vaccines and expanding suite of technologies, we’re well placed to bring ten new vaccine candidates into the clinic by 2025, six of which will use mRNA technologies through our new Center of Excellence. We’re intensifying our work in influenza, meningitis, and respiratory syncytial virus (RSV), and progressing in new areas including pneumococcal disease, chlamydia, and acne.

A “first in class” Global industrial footprint

The industrial footprint represents the bridge between R&D and the patients Sanofi serve, an essential link in enabling to bring the best of our scientific discoveries, breakthrough medicines to people around the world. Key figures:

- 67 Industrial sites around the world at the end of 2021
- 4.8 billion of pharmaceuticals, Consumer healthcare and vaccines units sold in 2021
- 1 billion every year invested to transform and modernize our industrial network
- Massive digitalization program initiated in 25 sites of which 1 fully digitalized

3. Specify any existing national and international collaborations with other institutions and centres of high scientific quality

Collaboration with the main Italian and foreign Universities to develop clinical and educational projects as well as to improve innovative technologies and solutions, from research and development to the first industrialization. In May 2021, Sanofi has entered into a three-year research collaboration with Stanford University School of Medicine. Together, the two organizations will work to advance the understanding of immunology and inflammation through open scientific exchange. Looking to the future, we’re cultivating our expertise and investigating several new molecules that target this pathway, shoring up our robust pipeline this includes our acquisition of Kymab and its expertise in human monoclonal antibodies. And we started a new collaboration with Stanford University scientists to advance knowledge about autoimmune and inflammatory conditions. In January 2022, Exscientia and Sanofi establish strategic research collaboration to develop AI-driven pipeline of precision-engineered medicines

Sanofi entered into a collaboration with GSK to develop an adjuvanted vaccine for COVID-19, using innovative technology from both companies, to help address the ongoing pandemic. Sanofi will contribute its S-protein COVID-19 antigen, which is based on recombinant DNA technology.

Sanofi will produce this vaccine for the whole Europe in Italy, in the Anagni plant.
B1) QUALITY AND COMPOSITION OF THE CRITICAL MASS INVOLVED

Age-It will connect the most relevant research organisations involved in study of ageing in Italy, with additional private partners. The final shortlist of researchers has been created using the three following and combined criteria:

1) ambition to connect the top scientists in the field;
2) need to ensure their broadest representativeness in terms of disciplinary background;
3) need to involve women, promising juniors and researchers from the South of Italy (Mezzogiorno).

Age-It has the potential to provide a huge and effective critical mass in terms of expertise, infrastructures, networking and activities’ integration to address the innovation needs of the relevant stakeholders in the world of ageing. The Age-It programme fully complies with all call requirements, as indicated in the Table B.1 below.

Table B.1. Compliance of Age-It program with call requirements

<table>
<thead>
<tr>
<th>Call article and clause</th>
<th>Requirement</th>
<th>Value reached/estimated</th>
</tr>
</thead>
<tbody>
<tr>
<td>art. 3, c. 3</td>
<td>&gt;40% budget allocated for use in Southern regions</td>
<td>41.7%</td>
</tr>
<tr>
<td>art. 5, c. 1</td>
<td>10-50% budget allocated to cascade calls</td>
<td>23.5%</td>
</tr>
<tr>
<td>art. 7, c. 2</td>
<td>≥100 researchers to be hired</td>
<td>139</td>
</tr>
<tr>
<td>art. 7, c. 2</td>
<td>40% female researchers (to be hired)</td>
<td>40% (at least)</td>
</tr>
<tr>
<td>art. 7, c. 2</td>
<td>40% female doctoral students (to be hired)</td>
<td>40% (at least)</td>
</tr>
<tr>
<td>art. 7, c. 2</td>
<td>≥30% resources for intervention field 022</td>
<td>75.1%</td>
</tr>
<tr>
<td>art. 7, c. 2</td>
<td>≤70% resources for intervention field 006</td>
<td>24.9%</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>250-350 researchers in the critical mass</td>
<td>350</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>15-25 million EUR allocated for hiring researchers</td>
<td>22,243,497.97 €</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>5-10 Spokes</td>
<td>10</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>max. 25 Spokes/affiliates</td>
<td>25</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>max. 12 Spokes/affiliates under the MUR</td>
<td>12</td>
</tr>
<tr>
<td>art. 7, c. 3</td>
<td>at least 30 researchers per Spoke with 3 person/months per year</td>
<td>YES</td>
</tr>
<tr>
<td>art. 8, c. 1</td>
<td>80-160 million EUR for the program budget</td>
<td>115,243,888.77 € (costs)</td>
</tr>
</tbody>
</table>

Table B.2 below shows the details of the critical mass participation, with breakdowns for Spokes and Affiliates. The details include the number of staff personnel shared with Age-It per project-year and the number of staff personnel ready to dedicate to Age-It at least 3 months per programme-year.

Table B.2. Age-It Spokes, affiliated partners, number of researchers of the critical mass and new researchers

<table>
<thead>
<tr>
<th>Spoke and Challenge</th>
<th>Spoke / Affiliates</th>
<th>Critical mass</th>
<th>Person Months</th>
<th>Researchers/Technologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenge 1 - Spoke 1</td>
<td>Y1 Y2 Y3</td>
<td>159</td>
<td>1,558</td>
<td>19</td>
</tr>
<tr>
<td>Challenge 2 - Spoke 2</td>
<td>Y1 Y2 Y3</td>
<td>197</td>
<td>1,917</td>
<td>24</td>
</tr>
<tr>
<td>Challenge 3 - Spoke 3</td>
<td>Y1 Y2 Y3</td>
<td>146</td>
<td>1,437</td>
<td>13</td>
</tr>
<tr>
<td>Challenge 4 - Spoke 4</td>
<td>Y1 Y2 Y3</td>
<td>174</td>
<td>1,706</td>
<td>18</td>
</tr>
<tr>
<td>Challenge 5 - Spoke 5</td>
<td>Y1 Y2 Y3</td>
<td>151</td>
<td>1,493</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 6 - Spoke 6</td>
<td>Y1 Y2 Y3</td>
<td>148</td>
<td>1,478</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 7 - Spoke 7</td>
<td>Y1 Y2 Y3</td>
<td>176</td>
<td>1,729</td>
<td>20</td>
</tr>
<tr>
<td>Challenge 8 - Spoke 8</td>
<td>Y1 Y2 Y3</td>
<td>139</td>
<td>1,390</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 9 - Spoke 9</td>
<td>Y1 Y2 Y3</td>
<td>150</td>
<td>1,488</td>
<td>15</td>
</tr>
<tr>
<td>Challenge 10 - Spoke 10</td>
<td>Y1 Y2 Y3</td>
<td>152</td>
<td>1,514</td>
<td>14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spoke and Challenge</th>
<th>Spoke / Affiliates</th>
<th>Critical mass</th>
<th>Person Months</th>
<th>Researchers/Technologists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Challenge 1 - Spoke 1</td>
<td>Y1 Y2 Y3</td>
<td>159</td>
<td>1,558</td>
<td>19</td>
</tr>
<tr>
<td>Challenge 2 - Spoke 2</td>
<td>Y1 Y2 Y3</td>
<td>197</td>
<td>1,917</td>
<td>24</td>
</tr>
<tr>
<td>Challenge 3 - Spoke 3</td>
<td>Y1 Y2 Y3</td>
<td>146</td>
<td>1,437</td>
<td>13</td>
</tr>
<tr>
<td>Challenge 4 - Spoke 4</td>
<td>Y1 Y2 Y3</td>
<td>174</td>
<td>1,706</td>
<td>18</td>
</tr>
<tr>
<td>Challenge 5 - Spoke 5</td>
<td>Y1 Y2 Y3</td>
<td>151</td>
<td>1,493</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 6 - Spoke 6</td>
<td>Y1 Y2 Y3</td>
<td>148</td>
<td>1,478</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 7 - Spoke 7</td>
<td>Y1 Y2 Y3</td>
<td>176</td>
<td>1,729</td>
<td>20</td>
</tr>
<tr>
<td>Challenge 8 - Spoke 8</td>
<td>Y1 Y2 Y3</td>
<td>139</td>
<td>1,390</td>
<td>17</td>
</tr>
<tr>
<td>Challenge 9 - Spoke 9</td>
<td>Y1 Y2 Y3</td>
<td>150</td>
<td>1,488</td>
<td>15</td>
</tr>
<tr>
<td>Challenge 10 - Spoke 10</td>
<td>Y1 Y2 Y3</td>
<td>152</td>
<td>1,514</td>
<td>14</td>
</tr>
</tbody>
</table>
The participants are well-distributed among diverse disciplines – their distribution according to the three Age-It scientific founding pillars is: 51%, 33%, and 16% participants belonging to biomedical sciences, social sciences, and science & technology area.

**B2) GOVERNANCE AND STRUCTURE**

Age-It Hub, located at the University of Florence, will implement the programme through the activities of ten Spokes and their affiliated partners. It will oversee the management of the research program, the accounting and reporting of the relevant documentation from the Spokes and to the funding body (MUR), supported by a research programme project manager (PM) acting as director of the Hub, and the Hub secretariat. In order to carry out their own activities, Age-It Hub, as legal entity, Spokes and their affiliates will define through specific agreements the management of their relationship, the obligations related to the accounting and reporting, intellectual property rights (e.g., regarding possible exploitation of the results obtained during the project) and the Hub governance.

The legal nature of the Hub will be that of a private non-profit consortium company with limited liability (S.C.A.R.L.), with 22 founding members. Twelve of founders are public universities, one is a public research institution supervised by MUR (CNR), one a public higher education institution (SISSA), and one is a public research and hospital institute – IRCCS (INRCA). All of them are also involved in the overall programme as Speak or affiliated to a Spoke. Six private companies are also Spokes or affiliated entities, and two additional private organizations are only participating to the composition of the Hub (but not as Speak/Affiliated entities). The Age-It proposal applicant body will be UNIFI.

**Box B.1. Founding members of Age-It S.C.A.R.L.**

| Public organizations: UNIFI, UNIMIB, UPO, UNIPD, UNIVE, UNIBO, SAPIENZA, UNINA, UNIMOL, UNIBA, UNICAL, CNR, INRCA, SISSA; |
| Private organizations: NEUROMED, BOCCONI, UNICATT, UNISR, TECH4CARE, BETA80; |
| Additional private organizations which are not Speak/Affiliates: CONF, SANOFI |

The Governance of Age-It will include key elements, both as expected by law for the legal form chosen and for an optimal coordination and implementation of the Hub activities plan (Figure B.1). Age-It will use gender equal approaches in all policy choices and staff selections, above all when appointing the offices, boards and assemblies required by its governance model.

**General Assembly (GA):** it will be composed by representatives of all the Hub shareholders, with the majority held by the public Universities and the research institutions supervised by MUR, referred to in art. 1, paragraph 1, from letter a) to letter p) of D.Lgs 218/2016, as required by the tender, chaired by Age-It president. The first meeting of the GA, pending the appointment of the President, will be chaired by the Rector of the proposal applicant University.

**Board of Directors (BD):** it will be appointed by the GA, with the majority held by the 9 public Universities and the research institutions supervised by MUR (D.Lgs. 218). Its composition will be defined at the first meeting of the GA. The BD elects the President from among its members. The BD will elect the Hub research programme project manager (PM), oversee the correct implementation of the Hub program, approve the topics for the research and innovation projects open calls, evaluate possible opportunities or issues for Age-It partners, manage administrative and financial questions as required by law.

**Age-It President:** will be elected by the members of the BD, among its members, and will be in charge of the representation and overall supervision of Age-It.

**Board of statutory auditors:** it will carry out the managerial, administrative and financial supervision of the operations and control on the consolidated financial statements as required by law.

**Ethics Committee (EC):** independent committee of experts in the field, including a chairperson appointed among its members, which will provide guidance and feedback on ethical issues, by covering equity, ethical alignment with
regulatory compliance, fairness, privacy, risk assessment, social trust and acceptance, sustainability and transparency. This is without prejudice to the competence of the Ethics Committees provided for by current legislation and the Hub’s members internal regulations.

Programme Research Manager (PM): PM will act as director of Age-It and it will be appointed by the Board of Directors. The PM will manage and coordinate all the activities of Age-It, being in constant and close contact with all the partners, ensuring and monitoring the implementation of the Hub research programme and the correct execution of the required accounting and reporting procedures.

Age-It secretariat: it will provide administrative, financial, accounting and reporting support to the PM, to ensure the respect of accounting and reporting due date delivery from Spokes to MUR, and to assist the correct collection and conservation of the required administrative and financial documentation, facilitating verifications by the authorized bodies, including on-spot verifications. A specific unit will be dedicated to monitor and control the execution of the project according to quality control standard procedures.

Steering Committee (SC): a SC will be constituted including one representative of each Spoke and affiliated partner, chaired by the PM. The SC will hold periodic meetings to share results updates, promote inter- and multi-Spoke activities, verify possible opportunities or issues for Age-It partners. In agreement with BD indications, SC will also define the topics, time and procedures regarding the open calls for additional researchers, doctorates and technologists, and for research and innovation additional projects, exploiting the cascade funding included in the budget proposal (see below for details about open calls schemes, implementation, progress monitoring, reporting) – the final approval remaining a prerogative of the BD. SC will verify open calls progress monitoring and reporting.

The SC coordinate the interaction for the whole Consortium and thus works in close collaboration with Spokes’ leaders and co-leaders. The interaction plan of Age-It encourages social innovations on regional policy and personal and community levels. The goal is to offer concrete solutions to the challenges and consequences of population ageing through (i) the provision of evidence-based targeted regional tools and recommendations for developing social and health services that best respond to individual needs stemming from local demographic structures and networks and (ii) the provision of popularised and accessible evidence-based knowledge.

Spoke Coordination Group (SCG): for each Spoke, a specific coordination group will be formed including a representative of the Spoke leader, co-leader, and affiliated partners. Each SCG will be chaired by the Spoke leader, the Spoke co-leader, or by one representative from affiliate partners, if considered appropriate. Each SCG will coordinate the implementation of the Spoke activities plan, monitor deliverables and milestones progress, organize the launch of the possible open calls for additional personnel recruitment, if appropriate (see open calls plan below). Each SCG may also appoint specific groups to support the implementation of the activities.

Scientific Advisory Board (SAB): It will advise the Hub on the content of the Programme with an external point of view about the global performances and the standard of research. The SAB will ensure that Age-It programme receives appropriate feedbacks and further encouragement to consider novel research avenues within the NextGenerationEU framework. In addition, the SAB will monitor the progresses of the programme by taking part in the GA meetings. Whenever appropriate it will make recommendations to improve performance. Age-It SAB will consist of six confirmed experts, selected to ensure quality and independence, representing the key scientific aspects of the programme:

- Prof. Dr. Luigi Ferrucci, Scientific Director of the National Institute of Aging in the US, geriatrician and an epidemiologist; a world leader researcher on the causal pathways leading to progressive physical and cognitive decline in older persons.
- Prof. Dr. Marco Pahor, Director of the Florida Institute of Aging, Professor and Chair of the Department of Aging and Geriatric Research, University of Florida, is internationally known leader in the area of physical activity, ageing, disability and function in clinical trials, population-based studies, and comparative research.
- Prof. Dr. Emily Grundy, demographer and gerontologist (ISER, Essex, UK), has extensively worked on families and social networks in later life, especially in relationship to health and care; associations between family life courses, health and well-being at older ages and trends and differentials in later life health, disability and mortality.
- Prof. Dr. Anna Maria Lusardi, economist (George Washington University, US), is a leading expert on saving and pensions, retirement planning, retirement savings, debt and debt management among older households.
- Prof. Dr. Leopoldina Fortunati, sociologist of communication and culture (University of Udine), has worked in the field of social robotics, information technologies, gender studies, cultural processes and communication.
- Dr. Martina De Sole, Director at ENoLL (European Network of Living Labs), works on promotion of research and innovation and to implement cooperation policies in science and innovation among European countries.

Data Management Board (DMB): This board – composed by a team of experts encompassing data producers, data users, administrative staff, and legal experts selected by the SC from the best expertise across the 25 Age-It partners – will be in charge of developing and updating the data management plan and of coordinating the overall Age-It
Datatransmission of Results will operate in close collaboration with the Stakeholder Board (see next point). The Plan for the Exploitation and Stakeholders come from the governmental, non-governmental, research and industry sectors. different aspects of ageing, but they are united in planning the best solutions for the wellbeing of older people.

They all were directly involved in the Age-It development in the ageing of the population and its consequences. Our Stakeholders comprises public and private institutions that are particularly sensitive to the implications of the research questions and progress, as well as engage them in the elaboration of policy analysis and recommendations. Our Stakeholders comprises public and private institutions that are particularly sensitive to the ageing of the population and its consequences. They all were directly involved in the Age-It development in the truly proactive participative process. As the programme in general, our stakeholders are also interested in different aspects of ageing, but they are united in planning the best solutions for the wellbeing of older people.

Stakeholders Board (StB): It consists of a key group of policy stakeholder. Age-It will constantly inform them on the implications of the research questions and progress, as well as engage them in the elaboration of policy analysis and recommendations. Our Stakeholders comprises public and private institutions that are particularly sensitive to the ageing of the population and its consequences. They all were directly involved in the Age-It development in a truly proactive participative process.

Dissemination Board (DiB): This board – composed by an interdisciplinary team of experts selected by the SC encompass across the 25 Age-It partners – will supervise the development and update of the dissemination plan. DiB will operate in close collaboration with the Stakeholder Board (see next point). The Plan for the Exploitation and Dissemination of Results (PEDR) of the DiB is detailed in Section C.1.1.

Stakeholders Board (StB): It consists of a key group of policy stakeholder. Age-It will constantly inform them on the implications of the research questions and progress, as well as engage them in the elaboration of policy analysis and recommendations. Our Stakeholders comprises public and private institutions that are particularly sensitive to the ageing of the population and its consequences. They all were directly involved in the Age-It development in a truly proactive participative process. As the programme in general, our stakeholders are also interested in different aspects of ageing, but they are united in planning the best solutions for the wellbeing of older people.

Stakeholders onboard. The complete list of stakeholders is detailed below, and their letters of support to the Age-It programme may be found in this Appendix online (https://bit.ly/Age-It Appendix).

National bodies. We involved national organizations such as: INAPP (the National Institute for the Analysis of Public Policies, a national body entrusted to the monitoring, analysis and evaluation of public policies affecting the labour market); ISS (the Italian National Institute of Health, the main centre for research, control and scientific advice on public health in Italy); CNEL (the National Council for Economics and Labour, an institution established by the Italian Constitution, with the mission to contribute to the economic and social policy planning, monitor and evaluating the services provided by the public administration).

NGOs and professional associations. We involved stakeholders working directly with older people and promoting intergenerational solidarity: AUSER (Associazione per l’Invecchiamento Attivo); ADA (Associazione per i Diritti degli Anziani); ANTEAS (Associazione Nazionale tutte le Età Attive per la Solidarietà); Italia Longeva; Legacoop Sociali; NNA Network (a scientific network which regularly monitors the care services for dependent people); RUIAP (Rete delle Università Italiane per l’Apprendimento Permanente, given the relevance of lifelong learning-related issues). Associations of professionals working within the care services have been involved as well: CNOAS (Ordine degli Assistenti Sociali); PROMIS (Programma Mattone Internazionale Salute); and ANCI (the Association of the Italian Municipalities).

Research networks. Key research organizations expressed their interest in collaborating. These include: the Aging Network (Rete Aging, the only research network on ageing in Italy, whose purpose is to identify and adopt the best practices to improve citizens’ health, supporting innovative clinical trials towards the implementation of Personalised Medicine); SIGG (Società Italiana di Gerontologia e Geriatria, a scientific association founded to preserve rights and dignity of older people through research and collaboration with institutional subjects; AISP (Associazione Italiana per gli Studi di Popolazione, a scientific association founded to study population dynamics that unites Italian demographers and social statisticians); LoLA (The Laboratory on Longevity and Ageing, a network of researchers from different disciplines dealing with longevity and population ageing operating across 15 research departments distributed over the whole Italian territory); SMILE (The Smart Living Technologies’ Cluster, which will support the involvement of Tech-companies active in the market of innovative solutions for the silver market); AitAAL (Associazione Italiana Ambient Assisted Living). 

Industry representatives and networks. To assure the process of technological transfer we will also benefit from the input from AC75, a start-up accelerator in supporting and investing in the area of Silver Economy, and from Giomi Care, an Italian reality representing a large network of private health and care institutions.
Age-It Financial Reporting. For the purposes of accounting and reporting of expenses, the Hub shall comply with national and EU regulations, in addition to regulations relating to works, services and supplies public contracts. As indicated in the tender, simplified costs will be used for personnel (calculated with standard scales of unit costs, DIM MIUR-MISE 116, 24.01.2018), a flat rate of 15% of direct personnel cost will be used to calculate indirect costs, a maximum 10% of direct personnel cost will be used for management and administrative costs. The expenses relating to the activities carried out by affiliates shall be reported to the Spoke which in turn shall report to the Hub, and from the latter to the MUR. The Hub shall also report the expenses incurred in carrying out its own activities. The organization of Age-It will be responsible for the implementation of a coordination system capable of evaluating, monitoring and measuring the progress of the expense reporting for each Spoke. Age-It will implement a shared process to standardize collection of financial data from each Spoke and transmit it to the MUR through the dedicated information systems.

Cascade calls and hiring of additional personnel. The 10 Spokes will perform the research and innovation activities hiring additional personnel to this purpose, through specific open calls. The Spokes are thematic specialized units, aggregating partners’ expertise and infrastructures to provide effective response to the Age-It stakeholders’ innovation needs and sector challenges. The Spokes will carry out the research programme according to the activities plan (see B3), in coordination with PM and BD. Each Spoke will be coordinated by its SCG. A particular attention will be paid to proof of concept and validation projects in connection with research results developed within the activities of the research programme, to check their potential and bring them closer to the market.

B3) SPOKE ACTIVITIES, WORK PLAN AND RELATED WORKING GROUPS AND BUDGET

The research programme will be implemented by the ten Spokes acting in a synergic way. When designing the overall research plan, we aimed at ensuring the best match between the composition of the working groups in each Spoke, the skills of the executing subjects, and the detailed activities planned. The Spokes’ participants are allocated to the different work packages and activities to balance research priorities, capacity and coordination skills, and to ensure that adequate know-how is provided for an interdisciplinary approach to each specific task, with the final aim to build comprehensive and complementary, or synergic, research. The researchers involved in each Spoke encompass a range of different disciplines who developed the Spoke content together, testifying its interdisciplinarity and transdisciplinary, rather than a multidisciplinary focus. They have large previous experience in leading and/or taking part in competitive research projects, which led them to develop an extensive and solid research network, and have published widely on the topics considered, often pioneering them.

The detailed activity plan, partners roles, the articulation of the final working groups, and the main milestones for each Spoke are reported in the following sections. However, before going into the details of each specific Spoke, shared milestones and co-joint activities have to be mentioned (with month of realization):

<table>
<thead>
<tr>
<th>Spoke-specific meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Kick-off meetings (specific for single Work-Packages, M1)</td>
</tr>
<tr>
<td>• Common Spoke General Workshop (with researchers and stakeholders to maintain a participative process, and discuss together theoretical perspective, first results and strengthen cross-WP collaborations, M10)</td>
</tr>
<tr>
<td>• Mid-term spoke general workshop (key findings and prospects, M20)</td>
</tr>
<tr>
<td>• Final spoke general workshop (pivotal achievements, implications, Age-It prototypes and solutions, M34)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cross-Spokes meetings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systematic meetings between thematic Spokes (#2, 3, 4, 5, 6, 7) and cross-integration Spokes (#1, 8, 9, 10). For instance, policy implications from each Spoke will be developed jointly with Spoke 10, and technological innovation is developed in Spokes 8 and 9 jointly with input from other Spokes. A cross-fertilisation workshops programme is envisaged, where within each spoke (vertical) and among different spokes (horizontal between different spokes) an annual meeting will be organised in person or online. Cross-fertilisation meetings among spoke leader and co-leader can help the consortium to open up the whole question and give the opportunity to reflect on what they wanted from this aspect of the project and to begin to map areas on which to focus. Examples of topics of such workshops are: Recruitment of young researchers; Working with institutions; The process of co-creation; Evaluation and social impact; Community Dialogue; intellectual property rights in co-creation work, Entrepreneurship for researchers, and so forth.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age-It events:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Kick-off Age-It event (to lunch Age-It consortium, M12)</td>
</tr>
<tr>
<td>• Mid-term Age-It event (to disseminate Age-It activities so as to impact society, M24)</td>
</tr>
<tr>
<td>• Final Age-It event (Conference to present the blue-print for the IIA – Italian Institute of Ageing, M36)</td>
</tr>
</tbody>
</table>
Challenge [1] The demography of ageing. A Data Science approach to decision-making

PI: Vignoli, UNIFI; Co-PI: Prati, ISTAT

Structure: Activities are organised around 6 WPs, which are both “horizontal” (i.e., focused on the various demographic domains of longevity, fertility/family, migration, and ageing biosocial aspects; WP 1 to 4), and “vertical”, or “cross-cutting” (data and data analysis and analytics; WP 5 and 6).

Disciplines: Demography, medicine (endocrinology), epidemiology, sociology, law, economics, education, survey methods and data analyses techniques, statistics, and computer science.

WP1 Longevity and health (De Santis, UNIFI): WP1 focuses on longevity, its limits (if any), and its consequences on population ageing, morbidity and possible extensions of the different (economic and family) stages of life. The WP will investigate why longevity progressed fast before the financial crisis of 2008, slowly between that and the Covid pandemic, and declined after that. Key differentials (e.g., by gender, SES) will be explored, as so will the consequences of bereavement, which is especially harmful for the old.

Outputs (month): Policy brief on indicators and measures to support longevity, health and life (M18), ~3 scientific publications on longevity in times of Covid-19, morbidity implications of ageing, and bereavement effect (~M30), Laymen summary of main results (M34)

WP2 Fertility and family life over the life course (Vignoli, UNIFI): WP2 aims to: 1) address the cultural, economic, and institutional causes of low fertility (the so-called “ageing from the bottom”) and elaborate policy input – in close collaboration with Spoke 10 – to support desired fertility; 2) combine sociodemographic analyses with biomedical studies on sexual life, infertility, and medically-assisted procreation; 3) understand how diverse experiences in several domains of life (e.g., partnerships and employment) affect late-life outcomes; 4) design and realization of a national Ph.D. programme on Population Ageing and the Life Course (Ph.D. Population Studies – PopS).

Output (month): Design of a new PhD programme PopS (M6), Policy brief on indicators and measures affecting fertility (M18), ~3 scientific publications on family policy and fertility; and family and sexual life at older ages (~M30), Laymen summary of main results (M34)

WP3 Migration, integration and ageing (Paterno, UNIBA) WP3 aims to: 1) monitor international migration, defining possible policies/legal aspects to manage flows (also focusing on care needs of elderly) and immigrants’ integration; 2) define indicators and policy actions (e.g., improving the health of immigrants, their integration and the education performance of their children); 3) measure the ageing impact of internal migration in local contexts. This WP will work in collaboration with Spoke 5 regarding migrants’ carers and Spoke 10 regarding the formulation of policy recommendations.

Output (month): Policy brief on measures to support migrants’ integration in the ageing societies (M18), ~3 scientific publications on role of migration and integration in a rapidly ageing Italy (~M30), Laymen summary of main results (M34)

WP4 Biodemographic and social aspects of ageing (Miglio, UNIBO): WP4 aims to: 1) understand the differential effects of biological factors and social factors (marital and fertility histories) on longevity and morbidity; 2) address the demographic (by age and sex) stratification of disability and the occurrence and impact of Covid-19 on disability in later life, taking into account vaccination received in the studied population; 3) inspect the transmission of social inequality across generations, including the degree of intergenerational correlation of fertility and longevity over time, to provide the first comprehensive analysis of how parents-children similarity in demographic traits have evolved in Italy. 

Output (month): Policy brief on indicators and measures affecting biological ageing (M18), ~3 scientific publications on bio-socio-demographic drivers of ageing (~M30), Laymen summary of main results (M34)

WP5 Data needs and innovation (Prati, ISTAT): This WP serves as data infrastructure for the whole Age-It consortium. By using a multi-source approach, WP5 will establish novel register-survey integrations through data linkage, across a range of areas, including life histories, health and living conditions. In particular, WP5 aims to: 1) conceptualise trusted smart statistics – i.e. statistics to transform “data” into “information” in a world impregnated with smart technologies – on ageing; 2) build a longitudinal statistical register of population aged 50+; 3) build a longitudinal statistical register of population with migration background; 4) build a longitudinal statistical register on reproductive histories.

Output (month): Set of key indicators for Spokes 1-10 (M12), Smart statistics dashboard to be adopted by ISTAT at national level (M24), ~2 scientific publications on register-survey integration procedures (~M30).

WP6 Age-It, a novel data analytics system on ageing in Italy (Mezzanzanica, UNIMIB): WP6 aims to 1) define socioeconomic and demographic indicators at a fine territorial level for the planning of services; 2) put web data into official statistics to go towards trusted, smart statistics; 3) provide a working prototype to monitor the ageing phenomenon through AI and Big Data Analytics techniques; 4) use data and analytics to estimate the housing needs resulting from demographic transformations; and 5) perform derived forecasts related to households, care needs, kinship and labour force participation.
**Output (month):** Web-app for smart statistics and demographic forecasts at disposal of local policy makers, professionals and citizen (M30), Laymen summary of main findings (M34).

**Other researchers involved:** Guetto UNIFI, Pirani UNIFI, Arpino UNIFI, Rapallini UNIFI, Boffo UNIFI, Burrioni UNIFI, Maggi UNIFI, Landini UNIFI, Bronzini UNIFI, Terzera UNIMIB, Farina UNIMIB, Mercorio UNIMIB, Pelagatti UNIMIB, Impicciatore UNIBO, Comolli UNIBO, Giuliani UNIBO, Abbafati SAPIENZA, Barbi SAPIENZA, De Rose SAPIENZA, Strozza UNINA, Gabrielli UNINA, Orientale Caputo UNINA, Pace UNIBA, Di Comite UNIBA, Carella UNIBA, Scannapieco ISTAT, Castagnaro ISTAT, Conti ISTAT, Corsetti ISTAT, Frova ISTAT, Cecchi INPS, Dachille INPS, Sala BETAB80, Ganora BETAB80.

### Milestones

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 1.1</td>
<td>Ph.D. Programme proposal for approval</td>
<td>UNIFI</td>
<td>6</td>
<td>Report</td>
<td>2</td>
</tr>
<tr>
<td>MS 1.2</td>
<td>Four Policy Briefs (including novel set of indicators) released</td>
<td>All</td>
<td>18</td>
<td>Report</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>MS 1.3</td>
<td>Set of smart statistics indicators for monitoring population ageing</td>
<td>ISTAT, UNIMIB</td>
<td>24</td>
<td>Report</td>
<td>5</td>
</tr>
<tr>
<td>MS 1.4</td>
<td>Open web-app for population monitoring and derived forecasts</td>
<td>ISTAT, UNIMIB, UNIF, BETAB80</td>
<td>34</td>
<td>Event</td>
<td>6</td>
</tr>
</tbody>
</table>

### Cascade calls for funding research by external entities (provisional list)

**Call 1:** Longevity across internal areas - Centenarians (100+), semi-super centenarians (105+) and supercentenarians (110+); **Call 2:** The influence of employment histories on late-life outcomes; **Call 3:** Third wave of longitudinal survey on families ITALI – Italian Lives; **Call 4:** The effect of internal migration on local age structures; **Call 5:** Ageing of the foreign origin population and its consequences on Welfare; **Call 6:** Practices to promote education and to contrast school drop-out of vulnerable young groups in an ageing society; **Call 7:** Environmental hazards and long-term effects on health; **Call 8:** A unified data model for supporting analytics; **Call 9:** Housing: conditions and health inequalities in ageing; **Call 10:** Media coverage in ageing societies.

### Challenge [2] Improving the understanding of the biology of ageing

**PI:** D’Adda di Fagagna, CNR; **Co-PI:** Sandri, UNIPD

**Structure:** Activities are structured in three main areas of intervention 1) mechanisms of ageing 2) identification and functions of biomarkers 3) therapeutic targets validation. Within each of these three areas, we identified two WPs. The purpose of this structure is to generate know how and identify actionable targets in the first two areas of intervention, so that they can be tested and validated in the third one.

**Disciplines:** Molecular and cellular biology, chemistry and biochemistry, physics, computer science, gerontology, and epidemiology.

#### WP1 Cellular senescence & SASP (Colanzi, CNR): WP1 focuses on the study of the process of cellular senescence and in particular of the senescence-associated secretory phenotype (SASP) which is one of the most impacting features of senescence at the organismal level. SASP regulation, composition and impact in a variety of systems will be studied and compared.

**Output (month):** publication of a preliminary scientific report (M12), ~4 publications on scientific journals with cellular senescence or oncology as main topic (~M30).

#### WP2 Mechanisms of age-related tissue degeneration (Sandri, UNIPD): WP2 probes the mechanisms of age-related tissue degeneration. Mitochondria dysfunction, autophagy, inflammation and fibrosis can be key drivers of age-related loss of tissue homeostasis, especially in neurodegenerative diseases. This WP will evaluate their impact on tissue degeneration and all mechanistic insights will be of relevance for all other WPs, which themselves will feedback their findings thus generating a virtuous circle.

**Output (month):** preliminary scientific report (M12), ~4 publications on scientific journals focusing on mitochondrial metabolism, sarcopenia and murine models of premature senescence (~M30).

#### WP3 Hallmarks of ageing: DNA damage, telomere dysfunction, loss of proteostasis, and the search continues (Chiti, UNIFEI): WP3 is dedicated to the study of the hallmarks of ageing: DNA damage, telomere dysfunction, loss of proteostasis, and novel ones. Indeed, beyond established hallmarks of ageing that will be thoroughly investigated for their mechanisms and their contribution, we will also explore the study of novel, innovative hallmarks of ageing emerging from the literature.

**Output (month):** preliminary scientific reports (M12), ~4 publications on scientific journals focusing on generation of misfolded protein oligomers and proteotoxicity due to loss of normal proteostasis as main pathways of ageing and DNA damage (~M30).

#### WP4 Omics approaches to ageing (Passarino, UNICAL): WP4 will exploit different “omics” approaches to the study of ageing. We will use several orthogonal approaches (epigenomics, proteomics, transcriptomics) to identify ageing-specific features and extract meaningful correlations and shared mechanisms controlling the process of ageing also with the support of AI approaches. Biomarkers identified and cross-validated within this WP will be shared within Spoke 3 and exploited to better characterize multimorbidity, frailty and disability phenotypes and stratify hospitalized geriatric patients.
Activities are organised around 6 WPs: WP1 is cross-cutting as it defines the methodological framework; WP 2-3-4-5 study age-related diseases in relation to multimorbidity and frailty, focusing on defining the role of biomarkers, risk stratification, management strategies. Finally, WP6 is specifically dedicated to determining the impact of climate change and pollution on Ageing.

**Challenge [3]** Clinical and environmental factors, functional status and multimorbidity: Stratifying progression and prognosis of diseases, frailty and disability

**PI:** Lattanzio, INRCA; **Co-PI:** Landi, UNICATT

**Structure:** Activities are organised around 6 WPs: WP1 is cross-cutting as it defines the methodological framework; WP 2-3-4-5 study age-related diseases in relation to multimorbidity and frailty, focusing on defining the role of biomarkers, risk stratification, management strategies.

Finally, WP6 is specifically dedicated to determining the impact of climate change and pollution on Ageing.

**Disciplines:** Geriatrics, gerontology, neurology, cardiology, rheumatology, endocrinology, orthopedy, biology, epidemiology, nephrology, immunology, internal medicine as well as statistics and computer science.

**WP1 Methodological framework to evaluate clinical and functional status in age-related diseases, multimorbidity and frailty** (Ferrara, UNINA): WP1 focus on: 1) longitudinal data exploitation and collection (surveying and harmonizing existing longitudinal cohort data for a multidimensional assessment of age-related diseases, multimorbidity and frailty and related outcomes; conceptualising new longitudinal data collections in suitable population cohorts at high-risk of adverse outcomes); 2) assessing gender-sensitive domains (sex, identity, roles, relations, institutionalized, social, behavioural) as modifiers of multimorbidity outcomes; 3) designing and implementing educational programmes on ageing (e.g., Ph.D. Ageing School: Pathophysiology of and prevention of frailty and disability among older adults – AgingPath).

**Output (month):** Design of a new PhD programme AgingPath (M6), Reports on methodology (M12), ~4 scientific publications focusing on new implemented methods of longitudinal data collection, multidimensional assessment of age-related diseases in the context of multimorbidity and frailty (~M30).

**WP2 Age-related conditions in the context of multimorbidity and frailty** (Pappone, UNISR): WP2 will consider specific age-related conditions, such as chronic musculoskeletal diseases, neurodegenerative, cardiometabolic disorders, cardio-vascular diseases and sarcopenia with the aim to provide early diagnosis, better assessment or accurate monitoring in patients with multimorbidity and frailty.

**Output (month):** preliminary scientific report (M12), ~4 publications on scientific journals leveraging on epigenetic clocks like DNAmAge, DNAPhenoAge, DNAGrimAge and others integrated in the context of an “omic” approach to better identify signatures of ageing (~M30).
WP3 The role of biomarkers in age-related diseases, multimorbidity and frailty (Salvioli, UNIBO): WP 3 will focus on understanding the role of biomarkers to: 1) better characterize multimorbidity, frailty and disability phenotypes; 2) improve diagnosis and prognosis; 3) support effective treatment strategies identification. Moreover, it applies AI techniques – in close collaboration with Spokes 5 and 9 – to develop biomarker-based multiparametric predictive algorithms and support optimal clinical use of existing, innovative and novel biomarkers in multimorbid older patients.

Output (month): publication of scientific reports (M12), ~4 scientific publications focusing on identification of accurate diagnostic biomarkers for age-related diseases, multimorbidity, frailty (~M30).

WP4 Multidimensional risk stratification tools (Liperoti, UNICATT): WP4 aims at effectively stratifying risks related to multimorbidity, frailty and disability through the use of advanced statistical and AI techniques to: 1) assess the risk of adverse cognitive and functional outcomes; 2) unveil the existence of clusters of diseases; 3) unveil bidirectional cross-linking between functional dimensions and multimorbidity and their longitudinal trajectories. Finally, it includes tasks to design and validate assessment tools by integrating biomarkers and other multidimensional factors.

Output (month): publication of scientific reports (M12), ~4 scientific publications focusing on developing and applying advanced statistical methods to longitudinal data to stratify ageing outcomes and to validate and to integrate multidimensional factors and tools and improve their predictive role (~M30).

WP5 Management strategies to approach ageing, frailty and multimorbidity (Cherubini, INRCA): WP5 will offer optimal management strategies for multimorbid older patients, along the three axes of socioeconomic, medical and technological assessments. Tasks include: 1) designing appropriate interventions for delay progression or improve prognosis; 2) defining risk groups considering cognitive and functional interactions, key mediators of inflammation, nutritional factors and frailty; 3) implementing proof of concepts and/or pilot studies to assess the feasibility of innovative multidisciplinary stratified care pathways.

Output (month): publication of scientific reports (M12), ~4 scientific publications focusing on new approach for prognosis improvement, tailored stratification and measuring efficacy and efficiency of these pathways (~M30).

WP6 Impact of Climate Change and pollution on Ageing (Donati, NEUROMED): WP6 focus on enquiring the impact of Climate Change and pollution on: 1) clinical and functional trajectories; 3) clinical outcomes; 2) clusters of age-related conditions, multimorbidity and their complex dynamic interactions. The WP ultimate aim is to drive strategic recommendations for communities and policy makers – in close collaboration with Spoke 10 – to build resilience against climate changes and pollution in the older population.

Output (month): publication of scientific reports (M12), ~4 scientific publications focusing on effects of air pollution and climate change on several health and ageing outcomes like cognitive function, cardiovascular and pulmonary diseases (~M30).

Other researchers: Ungar UNIFI, Nacmias UNIFI, Bonaccurso UNIFI, Cecchi UNIFI, Guiducci UNIFI, Sergi UNIPD, Antonini UNIPD, Bussetto UNIPD, Baldini UNIBO, Capri UNIBO, Salvioli UNIBO, Basili SAPIENZA, Gianfrilli SAPIENZA, Laviano SAPIENZA, Pugliese SAPIENZA, Ficuciello UNINA, Ferrara UNINA, Rengo UNINA, Abete UNINA, Olivieri INRCA, Cherubini INRCA, Frati NEUROMED, Forte NEUROMED, D’Ascenzo NEUROMED, Landi UNICATT, Gasbarrini UNICATT, Sani UNICATT, Gremsse UNICATT, Liperoti UNICATT, Marzetti UNICATT, Marra UNICATT, Montalto UNICATT, Rovere Querini UNISNR, Giustina UNISNR, Agosta UNISNR, Pappone UNISNR.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Date</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 3.1</td>
<td>Ph.D. Programme proposal for approval</td>
<td>ALL</td>
<td>6</td>
<td>Report</td>
<td>1</td>
</tr>
<tr>
<td>MS 3.2</td>
<td>Overview of the research activities on selected biomarkers</td>
<td>UNIBO, INRCA, UNIPD, UNINA, UNIFI, NEUROMED</td>
<td>12</td>
<td>Internal Meeting</td>
<td>3</td>
</tr>
<tr>
<td>MS 3.3</td>
<td>Definition of methodologies for the study of specific age-related conditions in older patients with multimorbidity and frailty</td>
<td>UNISNR, UNIBO, SAPIENZA, UNITO, UNIPD, UNIFI</td>
<td>12</td>
<td>Internal Meeting</td>
<td>2</td>
</tr>
<tr>
<td>MS 3.4</td>
<td>Identification of risk stratification algorithms</td>
<td>UNICATT, INRCA, UNISNR, NEUROMED, SAPIENZA</td>
<td>24</td>
<td>Report</td>
<td>4</td>
</tr>
<tr>
<td>MS 3.5</td>
<td>Designing of appropriate interventions and strategies targeting multimorbidity</td>
<td>INRCA, SAPIENZA, UNIFI, UNINA, UNIPD, UNISNR</td>
<td>24</td>
<td>Report</td>
<td>5</td>
</tr>
<tr>
<td>MS 3.6</td>
<td>Report on the analyses of Climate Change and pollution impact on Ageing Health</td>
<td>ALL</td>
<td>30</td>
<td>Report</td>
<td>6</td>
</tr>
</tbody>
</table>

Cascade calls for funding research by external entities (provisional list)

Call 1: Longitudinal studies network on multimorbidity and frailty among older people; Call 2: The role of technology in the assessment of age-related diseases in older patients with multimorbidity and frailty; Call 3: Age-related neurological disorders in the context of multimorbidity and frailty; Call 4: Existing, innovative and novel biomarkers in age-related diseases; Call 5: Defining global outcomes to be considered in designing interventions targeting multimorbid older patients with frailty or disability; Call 6: The role of technology in the management of age-related diseases in older patients with multimorbidity and frailty; Call 7: The...
PI: Iaccarino, UNINA; Co-PI: Bocchezza, UNIPD

**Challenge [4] Trajectories for active and healthy ageing (behavioural and psychological determinants)**

**Structure:** A person-centred approach is developed across six WPs, which focus on multidimensional approaches to health in the physical, cognitive, behavioural, and social domains. The six WPs address different intensity of health needs across multiple health domains during the life course, integrating when appropriate innovative ICTs.

**Disciplines:** Medicine (internal medicine, public health, orthopaedics, ophthalmology, endocrinology, dermatology, neurology), nutrition, psychology, physical exercise, architecture, geriatrics, digital technology, statistics, data analysis.

**WP1 Innovative, “one health” integrated and personalised approaches to health promotion and disease prevention using new anti-ageing strategies** (Iaccarino, UNINA): WP1 will address health promotion and disease prevention intervention to support the improvement of nutritional and physical activity habits during the life course (e.g., personalized counselling, digital literacy) for new anti-ageing strategies. Innovative approaches in the social and psychological domains (including re-training of professionals working in the NHS) will be piloted and tested to improve individual and collective well-being for citizens with different complexity of needs, e.g., chronic/multimorbidity patients.

**Output (month):** Two innovative protocols of interventions for health promotion and disease prevention (M12), ~3 scientific publications on an innovative, “one health” approach taking advantage of new tailored anti-ageing strategies (~M30), publications of end-user guidelines for self-management based on the “one health approach” (M34), laymen material on new anti-ageing strategies (M34).

**WP2 Design effective interventions to improve physiological outcomes and diseases-related conditions in middle-aged and older adults** (Paoli, UNIPD): WP2 will provide specific motivational tools and cognitive exercises to strengthen the brain-body connection. Ageing is a complex process that modifies human body response to exercise and nutrition. Belief and attitudes toward ageing may affect cognitive and psychological function; hence, exercise and nutrition must be tailored on individual needs and health status in older adults through easy-to-use, friendly smart devices/app that should record physiological conditions and adapt exercise and nutrition suggestions to the preferred daily changes.

**Output (month):** Protocol for an innovative cognitive training intervention (M12), Prototype of a new technological application to strengthen the brain-body connection, (M14), ~3 Scientific publications on improving psychological and cognitive outcomes through specific exercise, nutrition and psychological approach (~M30), End-users’ guidelines for self-care of mental health (M34), laymen summaries on cognitive health coping strategies (M34).

**WP3 Integrating digital technologies in the life course approach to active and healthy ageing based on multidimensional mechanisms driving healthy behaviour change** (Illario, UNINA): WP3 aims to design effective interventions to improve physiological outcomes and diseases-related conditions in middle-aged and older adults through specific exercise, nutrition and psychological approach. This WP aims to: 1) investigate environments for active and healthy ageing; 2) address multidimensional approaches to falls prevention; 3) explore secondary use of data for targeted interventions on specific health domains; 4) explore health literacy and dissemination for healthy lifestyles targeting communities and the general population; 5) design, test and validate innovative and personalized training programs based on functional evaluation; 6) address mechanisms underpinning successful ageing in in vitro and in vivo models – i.e., early prevention of ageing.

**Output (month):** Protocol of an innovative ICT-based intervention for healthy ageing (M12), development of a technological tools for a multidimensional healthy ageing process (M14), ~3 Scientific publications on in vitro and in vivo models of successful ageing (~M30), End-users guidelines for fall preventions and healthy lifestyles (M34), laymen summaries on multidimensional approaches to healthy ageing (M34).

**WP4 Promoting Mental Health in middle aged and older people** (Lucidi, SAPIENZA): WP4 aims, in a bio-psycho-social perspective, to identify and act effective and innovative strategies to promote mental health and well-being in later life minimising the cost of care and improving quality of life. The tasks within the WP will explore the potential of Virtual Reality and the role of natural environment for promotion of mental health among older people. Specific dimensions related to sexual and gender minority will be addressed.

**Output (month):** Policy brief on interventions and strategies for promoting mental health, well-being and optimization cost benefits ratio (M12), ~3 scientific publications on mental health in ageing people, use of virtual reality to improve it (~M30), end users’ guidelines about mental health and virtual reality (M34), Laymen materials on mental health, with specific reference to sexual and gender minorities (M34).
WP5 Tools to detect and prevent frailty in old age and causal effects of life-long interventions on healthy ageing (Boccuzzo, UNIPD): WP5 will develop analyses, models, and tools for the identification of vulnerable and at risk of frailty persons in the various stages of life, as well as studies on the causal pathways that generate unhealthy ageing. The analysis will consider the role of individual (e.g., socioeconomic status, formal and informal support) and contextual (e.g., social environments, social cohesion) factors on healthy and unhealthy ageing. Data science approaches to longitudinal databases will be used, boosted with ad hoc qualitative and quantitative surveys.

Output (month): Guidelines for professionals on tools for identifying subjects at risk of frailty (M12), ~3 scientific publications on new models and algorithms to better stratify the different degrees of vulnerability (~M30), creation of new tool for frailty assessment, to be used in different care settings (M30).

WP6 Psychosocial strategies to foster active and healthy ageing: empowering self-care and engagement (Pagnini, UNICATT): WP6 will develop innovative (technology-based) strategies to promote quality of life in old age, in close collaboration with Spoke 9. It will investigate and support psychosocial components that are highly relevant to healthy ageing but have been overlooked by the scientific literature. WP6 will focus on the role of personal engagement in the self-management of older adults and their families and communities, also supported by original technological solutions. The mindful promotion of ageing stereotypes is expected to lead to improved psychological and physical outcomes.

Output (month): Policy brief on innovative strategies to promote quality of life in ageing (M12), technological, mobile, robotic prototype (M16), ~3 scientific publications on technological solution, mobile interventions and robotic assistance in older people care (~M30), laymen summaries of main research findings on the mindful promotion of ageing stereotypes (M34).

Other researchers: Weber UNIPD, Borella UNIPD, Buja UNIPD, Mondini UNIPD, Cellidoni UNIPD, Tanturri UNIPD, Alessandri SAPIENZA, Baiocco SAPIENZA, Borghi SAPIENZA, Attaianese UNINA, Menditto UNINA, Fabbrocini UNINA, Pivonello UNINA, Russi UNINA, Cennamo UNINA, Shonauer UNINA, Freda UNINA, Calcagno UNIMOL, Komici UNIMOL, Dell'Omo UNIMOL, Davinelli UNIMOL, Villani UNICATT, Graffigna UNICATT, Castelnuovo UNICATT, Rumiai SISSA, Barbuio GENERALI.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 4.1</td>
<td>Design of five innovative interventions supporting active and healthy ageing ready to be tested in a pilot</td>
<td>UNIPD, UNICATT</td>
<td>12</td>
<td>Report</td>
<td>1, 2, 3, 4, 6</td>
</tr>
<tr>
<td>MS 4.2</td>
<td>Ethical clearance for pilot studies involving humans obtained</td>
<td>All WP leaders</td>
<td>18</td>
<td>Event</td>
<td>All</td>
</tr>
<tr>
<td>MS 4.3</td>
<td>ICT prototypes ready to be tested in the pilot environment</td>
<td>UNINA, UNIPD, SAPIENZA, UNICATT</td>
<td>18</td>
<td>Prototype</td>
<td>2, 3, 4, 6</td>
</tr>
<tr>
<td>MS 4.4</td>
<td>Validation of an innovative tools to detect and prevent frailty in old age</td>
<td>UNIPD</td>
<td>30</td>
<td>Report</td>
<td>5</td>
</tr>
</tbody>
</table>

Cascade calls for funding research by external entities (provisional list)

Call 1: Scale-up of innovative and validated good practices for active and healthy ageing; Call 2: Designing, testing and validating Innovative and personalised training programs based on functional evaluation; Call 3: Noninvasive assessment of neuromuscular system and frailty; Call 4: IT Tools and media communication for tailor-made promotion of successful ageing; Call 5: Innovative, integrated approaches and smart tools to improve adherence and polipharmacy management; Call 6: Health literacy and dissemination for healthy lifestyles targeting communities and the general population; Call 7: Integrated approach for management of multimorbidity in older adults; Call 8: Mechanisms underpinning successful ageing in in vitro and in vivo models - Early prevention of ageing; Call 9: Designing, testing and validating new interactive tools to improve the cognitive performances; Call 10: Causal effects of public policies over the life course on health outcomes in old age; Call 11: Modelling causal pathways between healthy ageing and individual, social and contextual variables; Call 12: Life course determinants of the inequalities in healthy ageing; Call 13: Optimizing psychological assessment in ageing; Call 14: Social dynamics in ageing: implications for research; Call 15: The contribution of children and adolescents to the adoption of new technologies for the elderly; Call 16: Music as a tool to promote well-being in the elderly.

Cascade calls for funding new researchers (provisional)

Call 1: 4 researchers to be hired

Challenge [5] Care sustainability in an ageing society

PI: Albertini, UNIBO; Co-PI: Tomassini, UNIMOL

Structure. Activities address the sustainability of the Italian care system dealing with the balance between informal and formal, both public and private, care provision to dependent older individuals (WP 1, WP5 and WP6). Spoke 5 aims to provide new technological (WP2, WP4 and WP3), medical and institutional solutions for long term care provision that can be economically, socially and environmentally sustainable and fair.

Disciplines. Medical sciences (geriatrics, rheumatology, physiology, neurology, cardiology); demography and sociology; survey methods and data analyses; social statistics; clinical and social psychology, health economics; social policy; public health; laws and legal medicine; informatics, data science; and bioengineering.
WP1 Care needs of an ageing population (Tomassini, UNIMOL): Using large national representative surveys, WP1 aims to draw an updated picture of care needs by different perspectives to provide a framework to the other WPs on the contribution of emerging technologies, new medical innovations, family arrangements, care homes, legal settings and institutional actions to increase older people and care providers’ well-being.

**Outputs (month):** Policy brief and report on most updated care needs (M12), ~3 scientific publications on surveys results about care need and contributions from technology field (~M30)

WP2 Care giving/receiving monitoring (Domenicali, UNIBO): WP2 will shift the focus of e-health solutions to support caregivers’ health and well-being, given its bidirectional direct link with patients’ health and well-being. WP2 tasks will investigate how technologies can concretely empower caregivers, ameliorate their quality of life, preserving cost-effectiveness owing to reduced use of unnecessary health services. The WP includes desk analysis, original data collection, technology development in collaboration with Spoke 9 and fast prototyping activities. Through cascade calls, WP2 will also spark innovative SMEs and start-ups operating in the field of digital e-health care monitoring/giving solutions, particularly in Mezzogiorno regions.

**Outputs (month):** Prototype of a new monitoring platform to be tested in a pilot (M18), Database of health solutions for caregivers monitoring (M24), ~3 scientific publications on monitoring technologies (~M30), end-users guide for empowerment of caregivers (M36), Laymen summary of main research findings (M36)

WP3 Care at discharge (Testa, UNIMOL): The Italian ministry of Health recently issued new national directives (DM71/2020), following the impact of Covid-19 on patients with respiratory failure, focused to ameliorate the integration between hospital and community health services and to increase the role of telemedicine in the surveillance of these patients. WP3 will develop an innovative prototype platform for e-health provision for patients with respiratory failure related to chronic obstructive pulmonary diseases.

**Outputs (month):** new technology improvements and first prototype e-health platform for patients with respiratory failure (M24), guidelines for end user and families to optimize approach and learning of telemedicine (M34), ~3 scientific publications on effects of telemedicine and integrated territorial hospital approach for older patient with chronic respiratory syndromes (~M30), report on the efficacy of new telemedicine approach for older people with chronic respiratory failure (M34)

WP4 Care provision across different territorial contexts (Bandini, UNIMIB): WP4 will deal with the analyses of innovative care systems for both urban and inner areas favouring the development of inclusive tools to converge different knowledge sources towards a sustainable design of person-centred care provision. Environmental aspects, which vary significantly across different areas and regions, may trigger care needs in the older population. Innovative technological facilities will mark the transition to new care systems through the synergic activation of new generations of computer-based solutions.

**Outputs (month):** a system of taxonomies and territorial classification of care related needs and resources (M24), policy brief on regional inequalities linked to ageing process in urban and inner areas (M24) ~3 scientific publications on main environmental factors influencing care needs (~M30)

WP5 Training professional and informal caregivers (Chattat, UNIBO): WP5 will develop training modules exploiting outputs of the other WPs. These modules for end-users will include basic information about specific diseases and ameliorate skills needed to cope. The output will be an open learning platform easily accessible for professional and informal caregivers in order to build skills and to offer information about available services, models and ways of access.

**Outputs (month):** training modules and guidelines development for caregivers (M24), developing of web app and software facilitating learning modules interaction (M24), ~3 report publications of development of learning modules (M30), Open Online Learning platform about specific diseases and skills (M34), guidelines for end user, caregivers and families to cope with different diseases approach and needed skills (M34)

WP6 Future care social, economic, environmental sustainability (Lamura, INRCA): The aim of this WP is to support (upon the scientific evidence provided by the other WPs, by validating it with the contribution of relevant stakeholders, and integrating it with in-depth analyses from different disciplinary perspectives) policy recommendations on care provision at national and regional level. WP6 will deliver a series of evidence-based recommendations for policy makers and practitioners, developed in close collaboration with Spoke 10, addressing the most recent developments emerging from the implementation of the National Resilience and Recovery Plan in community care (e.g., DM71/2022).

**Outputs (month):** dataset of indicators (M18), policy brief on recommendations on care provision at national and regional level (M24) ~3 scientific publications on evidence-based recommendations on care provision (~M30), guidelines for end user policy makers and practitioners to appropriate evidence-based caregiving (M34), Laymen summary on evidence-based approach for care provision (M36)

**Other researchers:** Sala UNIMIB, Mantovani UNIMIB, Fusaro UNIPD, Verbano UNIPD, Albertini UNIBO, Domenicali UNIBO, Silvani UNIBO, Ugolini UNIBO, Moretti UNIBO, Ingravallo UNIBO, Montesi UNIBO, Prandini UNIBO, Giova UNIBO, Oliveto UNIMOL, Grignoli UNIMOL, Ricciardi UNIMOL, Lubrano UNIMOL, Resce UNIMOL, Di Costanzo UNIMOL, Verrascina ISTAT, Benassi ISTAT, Santini INRCA, Gagliardi INRCA, Melchiorre INRCA, Vezzoso BETA80.
WP2 aims to: 1) estimate pathways to interventions – discussed and developed in close collaboration with Spoke 10 – green transition on the young-old labour demands, within the firm; 4) estimate a “career tracker”, to identify the policy with measures of productivity, and the impact of automation for older workers; 3) evaluate the effects of the digital and impact on well-being in old age; 2) define KPIs of the impact of ageing on human capital, at the individual and firm level, preferences and attitudes of the older people for demand for goods and services; 4) identify the drivers of co-creation of “know-how” between generations – especially for arts & crafts, and learn about best practices of intergenerational knowledge in general population about retirement related to the risk of injuries and health hazards; 2) estimate the role of co-designing a safe environment and

WP3 Silver economy and social capital

WP2 Active ageing: work, health and well-being (Brugiavini, UNIVE) WP2 aims to: 1) estimate pathways to retirement related to the risk of injuries and health hazards; 2) estimate the role of co-designing a safe environment and of training on the job; 3) develop a multidimensional indicator of “ageing at work” linked to type of job, hazardous and risky tasks, mental health; 4) measure objective and subjective life-work balance for older workers; 5) assess “health and risky tasks, mental health; 4) measure objective and subjective life-work balance for older workers; 5) assess “health and

WP3 Silver economy and social capital (Paolucci, CNR): WP3 aims to: 1) identify the KPIs that foster the transmission of “know-how” between generations – especially for arts & crafts, and learn about best practices of intergenerational knowledge sharing; 2) foster the creation of new forms of entrepreneurship at older ages; 3) understand changes in preferences and attitudes of the older people for demand for goods and services; 4) identify the drivers of co-creation given new products and technological changes; 5) identify investment patterns for a silver ecology and civic engagement. 


PI: Brugiavini, UNIVE; Co-PI: Lucifora,unicatt

Structure: Activities are organised in five WPs, which cover four interconnected dimensions: the relationship between ageing and work, including the relationship between health and labour market activities (WP1, WP2), innovations through the silver economy (WP3), welfare state interventions (WP4) and fighting unequal ageing (resources for old age and insurance – WP5).

Disciplines: Economics, econometrics, demography, sociology, management, psychology, actuarial science, financial mathematics, and engineering.

WP1 Empowering older people and older workers: human capital and productivity (Lucifora, unicatt): WP1 aims to: 1) develop an evidence-based work-related map of risks and trigger points over the life course, with permanent impact on well-being in old age; 2) define KPIs of the impact of ageing on human capital, at the individual and firm level, with measures of productivity, and the impact of automation for older workers; 3) evaluate the effects of the digital and green transition on the young-old labour demands, within the firm; 4) estimate a “career tracker”, to identify the policy interventions – discussed and developed in close collaboration with Spoke 10 – necessary to make ageing at work sustainable and active.

Outputs (month): Policy brief on healthy ageing in the work environment (M30), ~3 scientific publications on main KPIs relating work impact on well-being ageing (~M30), guidelines for private firms and the public sector to empower older workers to co-design their working environment (M34), dissemination material to increase knowledge on the effects of ageing on human capital and resources (M34)

WP2 Active ageing: work, health and well-being (Brugiavini, UNIVE) WP2 aims to: 1) estimate pathways to retirement related to the risk of injuries and health hazards; 2) estimate the role of co-designing a safe environment and of training on the job; 3) develop a multidimensional indicator of “ageing at work” linked to type of job, hazardous and risky tasks, mental health; 4) measure objective and subjective life-work balance for older workers; 5) assess “health and safety literacy” and derive KPIs for social health; 6) simulate the impact of the digital and green transition on working patterns, also in light of an increasing demand for health-related jobs (with WP5).

Outputs (month): Policy brief on pathways to retirement and occupational risks for older workers (M30), ~3 scientific publications on new a multidimensional indicator of “ageing at work” (~M30), new prototype of modules for data collection on objective and subjective experience of older workers at work (M34) Laymen summaries report to increase knowledge in general population about “Health and safety literacy” (M34)

WP3 Silver economy and social capital (Paolucci, CNR): WP3 aims to: 1) identify the KPIs that foster the transmission of “know-how” between generations – especially for arts & crafts, and learn about best practices of intergenerational knowledge sharing; 2) foster the creation of new forms of entrepreneurship at older ages; 3) understand changes in preferences and attitudes of the older people for demand for goods and services; 4) identify the drivers of co-creation given new products and technological changes; 5) identify investment patterns for a silver ecology and civic engagement. 

Outputs (month): Policy brief on the valorisation of social capital in the silver economy (M30), ~3 scientific publications on changes in preferences and attitudes of the older people for demand for goods and services (~M30). Guidelines for end users to allow older people approaching new forms of entrepreneurship (M34), Laymen summaries reports on the transmission of know-how between generations (M34).
WP4 Life-cycle welfare (Borella, UNIVE): WP4 aims to: 1) analyse life course welfare interventions with an impact at older ages; 2) obtain a map of the “geography of retirement” in terms of services, purchasing power and amenities in relation to welfare provisions and for people most at risk of poverty or financial distress; 3) assess the degree of welfare coverage and any mismatch making use of an impact evaluation methodology; 4) learn about models of integrated welfare (including occupational pensions and firm-level health insurance) and the North/South gradient; 5) measure the “pension gap”, i.e., situations of poverty in old age due to lack of resources or lack of information and develop and “integrated model” of saving for retirement.

Outputs (month): Policy brief on welfare interventions with an impact at older ages (M30), ~3 scientific publications on degree of welfare coverage, “pension gap” and geographic area at risk of poverty (~M30), Guidelines for end-users to make them aware of the indicators of “risky” retirement (M34).

WP5 Mitigating unequal ageing: public and private resources for old age (Di Lorenzo, UNINA): WP5 aims to: 1) estimate the impact of the pension reform process on labour supply, wealth accumulation and well-being; 2) understand the role of the public/private pension mix for an ageing workforce and the role financial literacy as a determinant of the pension gap; 3) provide a full map of the financial/insurance instruments which accompany the ageing process using a life course approach; 4) analyse – in collaboration with Spoke 9 – technical solutions in different risk-environments that satisfy the demand for protection in old age; 5) provide a complete taxonomy and regional distribution of the existing LTC provisions and provide estimates and future projections of the sustainability of a Long-Term care (LTC) system.

Outputs (month): Policy brief on pension system reform and sustainability of the LTC system. (M30), ~3 scientific publications on validated financial/insurance instruments useful in the ageing process (M30), Guidelines for end-users on financial/insurance instruments that better fit their retirement plans (M34).

Other researchers: Padula UNIVE, Pasini UNIVE, Cavapozzi UNIVE, Brilli UNIVE, Moscone UNIVE, Corazzini UNIVE, Mammi UNIVE, Da Roi UNIVE, Viotti UNIVE, Coccozza UNINA, Piscopo UNINA, Casillo UNINA, Menzietti UNICAL, Costabile UNICAL, Russo UNICATT, Vitiello CNR, Tesauro CNR, Falavigna CNR, Errichietto CNR, Cappellari UNICATT, Rosina UNICATT, Cottini UNICATT, Manzi UNICATT, Bramanti UNICATT, Aroldi UNICATT, Ricci INPS, Paella INPS, Franchetti UNICA.

WP1 Justice between generations in an ageing society (Galeotti, UPO)

PI: Galeotti, BOCCONI; Co-PI: Galeotti, UPO

Structure: Activities are organised around 5 WPs. Two WPs (WP1 and WP4) deal with the analysis of intergenerational politics. Together, they provide a model for intergenerational justice. Two WPs address diversity (WP2) and cultural (WP3) aspects of ageing. A final WP (WP5) provides the legal framework.

Disciplines: Demography, economics, law, political philosophy, political science, and sociology.

WP1 Justice between generations in an ageing society (Galeotti, UPO): WP1 deals with the several challenges to foster and maintain just relations among citizens within an ageing society. The WP tasks will analyse: 1) the determinants of unbalanced intergenerational relations and how they affect our societies; 2) ageism, prejudices, and discriminatory behaviours; 3) determinants of and interventions that can tackle age-related prejudice; 4) distributive effects of transport infrastructures in favour of the older population. The expected outcome of this WP are normative evaluations and operative prescriptions that could ease the tension between generations.

Outputs (month): novel datasets of mains factors influencing and causing unbalanced intergenerational relations and prejudices (M24), Policy brief on identifying and mitigating causes of prejudice toward the older population (M30), ~3 scientific publications on ageism, prejudices and their determinants and possible interventions (~M30), End users’ guidelines on how to handle discriminatory behaviours (M34).
**WP2 Inequality, diversity and inclusion in ageing societies (Profeta, BOCCONI):** This WP analyses the role of several dimensions of inequalities in shaping cultural and political aspects of ageing societies, adopting a gender lens. It will address: 1) how the current trends in ageing and the increasing presence of women into the labour market change the labour force composition; 2) how ageing and gender equality also interact in the private sphere, influencing family and intergenerational relationships; 3) how the ageing process challenges the role of grandmothers as childcare providers; 4) the distinctive context of domestic violence in later life from a gender perspective.

**Outputs (month):** Innovative software to monitor domestic violence against women in older age (M12), Novel dataset on mains factors influencing age and gender discrimination (M24), Policy brief on ageing and gender equality and their interactions in several environments (M30), ~3 scientific publications on gender inequality related to the ageing process (~M30). End users’ guidelines on how to recognize and avoid gender and age discrimination (M34), Laymen summaries of the main research findings (M36).

**WP3 Cultural aspects of ageing: a life course perspective (Alberio, UNIBO):** This WP tackles cultural aspects of ageing with a life course perspective. It aims to: 1) analyse scripts of life in ageing societies; 2) explore experiences and representations of ageing in the labour market, through an employer-employee perspective; 3) evaluate life quality and territorial policies for age-friendly cities in a gender perspective; 4) explore mobilities and migrations of Italian seniors examining cultural, political and socioeconomic aspects; 5) analyse cultural determinants and socio-cultural representations: justice and empathy in caring practices.

**Outputs (month):** Policy brief on older people quality of life in the urban environment (M30), ~3 scientific publications on cultural aspects of ageing (~M30), End-users’ guidelines on strategies for improving quality of life (M34), laymen summaries on policies for an age-friendly urban environment (M34).

**WP4 Political Effects of Ageing (Galasso, BOCCONI):** Ageing challenges the economic sustainability of intergenerational welfare state programs but increases the relative political power of their main supporters, older people, potentially leading to an “ageing trap.” WP4 will analyse the determinants of age-based political conflict: the cleavage in the political demand of intergenerational policies by older and younger people, which has been made more salient by events, such as the pandemic and global warming; and the political supply of different policy position and information by traditional and populist parties.

**Outputs (month):** new dataset of main conflict factors for balanced intergenerational policies approach (M24), Policy brief on political approach on ageing challenges (M30), ~3 scientific publications on the determinants of age-based political conflicts (~M30), laymen summary on economic sustainability for intergenerational welfare and relationship with complex scenario like global warming and pandemic (M34).

**WP5 Law & Ageing: problems and reform perspectives (Del Conte, BOCCONI):** This WP addresses the legal issues raised by the ageing of our society using the perspective of a personally embedded qualitative social ontology. In this perspective, the relation among different generations constitutes a transgenerational whole, and legal provisions aiming to contrast age discrimination and inequality should be addressed to the transgenerational whole. This WP – working in close collaboration with Spoke 10 – will address several legal issues of ageing: age discrimination in employment contracts and in the labour market; inadequacy of contract models of care relationships between public welfare and private sector.

**Outputs (month):** Policy briefs on main legal issues present in our ageing society (M30), ~3 scientific publications on age discrimination events in the labour market and inequalities in care relationship between public and private sector (~M30), Laymen summary on age discrimination at different level of society (M34).

**Other researchers:** Biale UPO, Meini UPO, Allegri UPO, Pogliano UPO, Dotti UNIVE, Irti UNIVE, Maggian UNIVE, Marchetti UNIVE, Vergolini UNIBO, Zaniboni UNIBO, Carrera UNIBA, Clemente UNIBA, Cincione UNIBA, Venezia UNIBA, Ordine UNICAL, Stranges UNICAL, Rose UNICAL, Williamson BOCCONI, De Vries BOCCONI, Billari BOCCONI, Anelli BOCCONI, Goerlach BOCCONI, Giuppioni BOCCONI, Adda BOCCONI, Sala UNISR, De Vecchi UNISR, Songhori UNISR, Piironi INPS, Arrigoni GENERALI.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 7.1</td>
<td>Finalization of a large survey on determinants of prejudices towards the older population</td>
<td>BOCCONI, UPO, UNIBA</td>
<td>12</td>
<td>Report</td>
<td>1</td>
</tr>
<tr>
<td>MS 7.2</td>
<td>Release of an innovative software for monitoring domestic violence against women in older age</td>
<td>BOCCONI, UNICAL</td>
<td>12</td>
<td>Prototype</td>
<td>2</td>
</tr>
<tr>
<td>MS 7.3</td>
<td>Publication of the policy brief on identification and mitigating causes of prejudice toward the older population</td>
<td>BOCCONI, UPO, UNISR</td>
<td>30</td>
<td>Report</td>
<td>All</td>
</tr>
</tbody>
</table>

**Challenge [8]** Interventions and technologies to reduce the burden of age-related diseases, disorders and disabilities
**WP1 Multicomponent interventions to promote healthy ageing and to prevent functional and cognitive decline in community-dwelling older adults** (Pilotto, UNIBA): WP1 aims to: 1) analyse observational data from large studies in order to identify the multicomponent interventions that are effective to promote healthy ageing and to prevent functional and cognitive decline in community-dwelling older people, stratified according to a multidimensional phenotypic approach and biological risk; 2) explore prospectively the efficacy of multicomponent intervention to prevent functional and cognitive decline by developing personalized multi-component interventions.

**Outputs (month):** Protocols of multicomponent interventions based on appropriate stratifying of the older population to promote healthy ageing (M30), ~3 scientific publications on stratifying algorithms based on a phenotypic multidimensional biological approach (~M30), technological tool to prevent functional and cognitive decline (M36), Training modules and guidelines for personalized healthy ageing intervention (M25).

**WP2 Multicomponent interventions to prevent hospital-associated functional and cognitive decline in older patients** (Bellelli, UNIMIB): WP2 aims to: 1) identify from meta-analyses the risk factors and the multicomponent interventions that are effective to prevent the functional and cognitive decline in hospitalised older patients; 2) implement technological solutions at the hospital wards in order to improve the liveability and safety of the environment; 3) improve the management of polypharmacy and counteract its risks among hospitalized older patients; 4) identify the personalised multicomponent interventions to counteract the functional and cognitive decline in hospitalised older patients.

**Outputs (month):** Protocol of a multicomponent intervention to address risk factors of unhealthy ageing in hospitalized patients (M21), development of a cloud-based medical record system for management of hospitalized patients (e.g. room monitoring to facilitate delirium detection and to monitor physical activities and muscle mass loss among hospitalized older adults) (M24), ~3 scientific publications on risk factors of hospitalized patients, multicomponent interventions and polypharmacy management (~M30), Guidelines for improvement of older patients management in the hospital environments (M34).

**WP3 Multicomponent interventions to improve functional and cognitive wellbeing in older adults in long term care facilities** (Maggi, CNR): In WP3, a trial will be developed, with the aim to assess the effects of multicomponent interventions, including physical exercise and cognitive training administered through the use of new technologies (apps, wearable devices, and so forth), dietary intervention using functional foods targeted to older individuals, and vaccines administration, according to the National Immunization Plan, among institutionalized older adults. The overall objective is to effectively decrease the transition from frailty to disability to total dependence in the long-term care residents.

**Outputs (month):** Guidelines for managing multicomponent interventions involving the use of new technologies in long-term care facilities (M30), ~3 scientific publications on multicomponent interventions such as the use of functional food and physical exercise (~M30), End users’ guidelines about discovered effects of multicomponent intervention on ageing (M34).

**WP4 Data collection, management and analysis to facilitate sharing of data and knowledge among healthcare professionals in hospital and community settings** (Gasparini, UNIMIB): An ICT system will be designed in WP4 to collect, manage and analyse data from multicomponent interventions on different cohorts of older people. This system will be designed in order to manage acquisition, integration, access and data sharing and to perform tasks such as data retrieving, querying, mining, statistics analysis and predictions based on AI models. The system design will take into account a central database, where all relevant data will be stored and managed, and data hubs where data from multicomponent interventions will be collected.

**Outputs (month):** Creation of a new ICT system for hospital data analysis (M24), ~3 scientific publications on new methodologies of data acquisition, integration and elaboration and results (~M30) Recommendations regarding data management and interoperability in home, hospital and long-term care settings (M34).

**WP5 Innovative and emerging technologies for interventions on older adults** (Francioso, CNR): The activities to be performed in WP5 will make use of Key Enabling Technologies and will take into account the input from previous WPs to develop innovative smart technological products and solutions in the three different settings, easily adaptable to older people’s functionalities, to help older people in daily activities, and to evaluate progress of their physical and cognitive decline. This allows to identify specific challenges for early diagnosis, objective evaluation, therapy control, monitoring and rehabilitation.

**Outputs (month):** ~3 scientific publications of integration of technologies and their impact on older people daily activities (~M30), Prototypes of technological products for older people helping in routinary activities evaluating
possible physical and cognitive decline (M34), guidelines for end user and families regarding utilisation on assisting smart technologies for older people (M34).

**WP6 Novel interventions: cost-effectiveness, health policies and beyond-the-project research facilities (Cincotti, SAPIENZA):** WP6 aims to build on data collections and analyses conducted in the previous WPs to generate knowledge useful for: policymakers who must allocate rationales resources in the NHS; health managers who are interested in implementing innovative practices and technologies; company managers who wish to innovate the market; health professionals looking for authoritative and comprehensive training; the general public who may be in need of the interventions. WP6 will work in close collaboration with Spoke 10.

**Outputs (month):** Policy brief on how to allocate and manage resources to improve care to older people and to train healthcare professionals (M24), ~3 scientific publications on new ways of administering and optimizing resources for ageing population (~M30), tech tools for improving training of healthcare professionals (M34).

**Other researchers:** Bellelli UNIMIB, Ferrarese UNIMIB, Romano UNIMIB, Daini UNIMIB, Longhese UNIMIB, Gasparini UNIMIB, Vescovi UNIMIB, Zambon UNIMIB, Franchi UNIMIB, Calciolari UNIMIB, Clerici UNIMIB, Bologna SAPIENZA, Cincotti SAPIENZA, Tamburrano SAPIENZA, Villari SAPIENZA, Pilo UNIBA, Logroscino UNIBA, Solfrizzi UNIBA, Gesualdo UNIBA, De Luca UNIBA, Quaranta UNIBA, Brattico UNIBA, Bochicchio UNIBA, Maggi CNR, Cortellessa CNR, Logrieco CNR, Leone CNR, Coronato CNR, Matteini CNR, Francioso CNR, Corsonello INRCA, Riccardi INRCA, Locati BETA80.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 8.1</td>
<td>Study design for personalized multicomponent interventions in different settings</td>
<td>UNIMIB, UNIBA, SAPIENZA, INRCA, CNR</td>
<td>12</td>
<td>Report</td>
<td>1,2,3</td>
</tr>
<tr>
<td>MS 8.2</td>
<td>ICT system architecture validated</td>
<td>UNIMIB, DETA80</td>
<td>12</td>
<td>Report</td>
<td>4</td>
</tr>
<tr>
<td>MS 8.3</td>
<td>Presentation of technological solutions for smart hospital environment to end-users</td>
<td>All</td>
<td>24</td>
<td>Event</td>
<td>2</td>
</tr>
<tr>
<td>MS 8.4</td>
<td>Prototypes of novel and emerging technologies delivered</td>
<td>All</td>
<td>24</td>
<td>Prototype</td>
<td>5</td>
</tr>
<tr>
<td>MS 8.5</td>
<td>Test of prototypes of novel and emerging technologies in protected environment</td>
<td>All</td>
<td>30</td>
<td>Prototype</td>
<td>5</td>
</tr>
</tbody>
</table>

**Cascade calls for funding research by external entities (provisional list)**

**Challenge [9] Advanced Gerontechnologies for active and healthy ageing**

**PI:** Cavallo, UNIFI; **Co-PI:** Siciliano, CNR

**Structure:** Activities are structured in 4 technological WPs, aiming to investigate and enhance the maturity level of technology in human machine interfaces (WP2), assistive robotics (WP3), smart living environments (WP4) and systems for health monitoring and prevention (WP5). WP1 is conceived to supervise and harmonize all WPs with foundational research topics of ageing, such user centred design.

**Disciplines:** Robotics, neurorobotics and artificial intelligence for robotics, telecommunication and complex systems for information elaboration, electronic and computer science bioengineering, bio-mechatronics, biomedics, industrial design and architectural technology, architectural and urban design.

**WP1 Human centred design and evaluation, certifications, sustainability within the built environment (Ferrante, SAPIENZA):** WP1 will draw the guidelines for the design of physical and digital interfaces of aids, enabling technologies for the improvement of older adults’ quality of life. An interdisciplinary framework for the assessment and monitoring of living environments with technology integration jointly with the development of a health promoting building evaluation and monitoring system in healthcare primary care service will be developed. Finally, design support tools for assessment of the spatial and technological adaptability of housing to home health care will be implemented.

**Outputs (month):** Guidelines for the design of technology interfaces for older adults. (M24), ~3 scientific publications (~M30). Prototypes for smart housing and optimization of living environments for ageing people (M34).

**WP2 Intelligent, adaptable and multi-modal “social machines” (Cavallo, UNIFI):** WP2 aims to enhance software and hardware that allow interaction processes and bridge capabilities between users and service/machines. WP2 will investigate, design, develop and test novel “social machines”, namely social robots, apps, VR/AR tools and devices that will be conceived and integrated to interact and communicate with humans by means of social behaviours and rules. WP2 will generate through “social machines” a number of digital biomarkers of interaction that could be used for early identification of motor and cognitive decline in frailty and dementia.
**Outputs (month):** toolkits with technical analyses on user/machines integration and problem solving on developing of digital biomarkers through cases and scenarios analyses (M24), ~3 scientific publications on technological improvements and possible healthy ageing outcomes coming from utilization of robots, app, VR/AR tools (~M30), development of technological prototypes of robots, app, VR/AR tools (M34).

**WP3 Robotic technologies for assistance and performance augmentation** (Menegatti, UNIPD): WP3 aims to develop a new generation of robots to monitor, assist, and boost motor performance in older people. WP3 will design innovative symbiotic wearable robots to increase performance and prevent falls at home and workplace. We aim at developing: 1) new paradigms for robot perception of humans and of human control of robots (i.e., innovative sensors, advanced algorithms); 2) cutting-edge wearable robots for older humans’ empowering; 3) a seamless approach of human perception and support with wearable actuators and sensors. **Outputs (month):** toolkits for industries with case report analyses to show optimizing strategies for robots-old people interface, guidelines for start-up spin-off for creation of new generation robotic assistance (M30), ~3 scientific publications on efficacy of technologies for falls prevention and monitoring older people (~M30), development of new technologies integrating robots and wearable devices into elderly people’s daily activities (M34).

**WP4 New generation of smart and sensing environments for well-being** (Siciliano, CNR): WP4 aims: 1) to develop a new generation of sensing technologies with defined targets about performances, costs and usability; 2) to process data using AI to measure and predict well-being and support services for the quality of life of ageing people; 3) to implement new generation sensors and sensor networks integrated in the SLE, i.e., home, working environment, daily life activities and outdoor urban spaces. **Outputs (month):** toolkits for industries with case report analyses, market trends to implement sensing technologies at home, working environment and urban spaces (M18), Prototype of sensing technologies and networks in different environments (M34), ~3 scientific publications on AI data processing methods to predict support services (~M36).

**WP5 Advanced age-friendly technologies, methods and materials for prevention and health monitoring** (Costanzo, UNICAL): WP5 will implement solutions to realize personal monitoring at home, reducing operator dependence, while guaranteeing security, reliability and action conformity. It will develop: 1) an ultra-portable echography system, with related processing algorithms with low computational cost; 2) a Time-Domain functional Near-Infrared Spectroscopy instrument optimized for non-invasive physiological monitoring purpose; 3) a local hub including an “age-friendly” interface to perform guided measurements of physiological parameters, designed and equipped with health-monitoring sensors. **Outputs (month):** prototypes of an ultrasound echography system tested in relevant environment (M24), prototype of a Near-Infrared Spectroscopy optimized for non-invasive physiological monitoring tested in relevant environment (M30), prototype of a local hub with age-friendly interfaces to perform guided measurement of physiological parameters tested in relevant environment (M30), ~3 scientific publications on health outcomes coming from application of ultra-portable echography system and form health-monitoring sensors (M36).

**Other researchers:** Boni UNIFI, Carpi UNIFI, Corvi UNIFI, Lanatà UNIFI, Ramalli UNIFI, Setola UNIFI, Fiaschi UNIFI, Tosi UNIFI, Del Felice UNIPD, Argenti SAPIENZA, Del Prete SAPIENZA, Napoli SAPIENZA, Carboni UNICAL, Mundo UNICAL, Bruno UNICAL, Gravina UNICAL, Sacco CNR, Barsocchi CNR, Spinelli CNR, Pirrelli CNR, Rossi INRCA, Riva UNICATT, Mancusi UNICATT, Fioravante HEALTHWARE, Bressani MUNICIPIA, Virgillo MUNICIPIA, Costantini MUNICIPIA.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 9.1</td>
<td>Ethical clearance for pilots involving human participations obtained</td>
<td>All</td>
<td>18</td>
<td>Event</td>
<td>All</td>
</tr>
<tr>
<td>MS 9.2</td>
<td>Prototypes of new technological solution for independent living available for demo purposes</td>
<td>All</td>
<td>24</td>
<td>Event</td>
<td>All</td>
</tr>
<tr>
<td>MS 9.3</td>
<td>Guidelines on age-friendly interfaces for ambient assisted living devices published</td>
<td>SAPIENZA</td>
<td>24</td>
<td>Report</td>
<td></td>
</tr>
</tbody>
</table>

**Cascade calls for funding research by external entities (provisional list)**

**Call 1:** Bio-cooperative systems: integration of augmented/mixed reality systems with wearable inertial sensors and haptic/thermal actuators, based on Motor and Cognitive Dual-Task (MCDT) protocols, as well as Social Grasping tasks, for the HRI setting; **Call 2:** Analyzing and defining relative methodologies for the representational plan (connected to the language) and presentational plan (connected to the visuals) of the “roboid” (a robot that is still at the prototype stage but claims to be fully functioning; **Call 3:** Prototype of wearable robot composed by a soft exosuit with visco-elastic actuators; **Call 4:** Mobile robots as sensing platform for continuity in human monitoring and assistance; **Call 5:** Methodologies to monitor the comfort of ageing people considering the acoustic, thermal, visual comfort and indoor air quality also using AI; **Call 6:** Development of a comprehensive digitalized neuropsychological battery encompassing tests to assess subjects' proficiency in several cognitive domains: memory, language, attention, visual ability, and executive functions; **Call 7:** Identification and development of innovative methodologies of sensors and sensor network and data fusion techniques, to measure ageing people activity and health conditions for well-being monitoring, early detection and prevention.

**Structure:** Activities will be performed in collaboration with all other Spokes to develop institutional responses to population ageing. Six WPs are aimed to understand how the needs of the ageing population are developed and satisfied with the current institutional responses (WP 1-3) and how organizations can improve their responses (WP 4-6).

**Disciplines:** Medicine, nursing, epidemiology economics, sociology, engineering, pedagogy, statistics, biology, and philosophy.

### WP1 Align policies and strategies on healthy ageing, on frailty and integrated care (Faggiano, UPO)
WP1 will: 1) develop and align policies and strategies on frailty and integrated care reflecting the most recent WHO concepts and guidelines; 2) scaling up results of EU initiatives and national and local programmes (such as National Chronicity, Prevention and Dementia Plans) to prevent and manage frailty and chronic diseases; 3) develop and implement a systematic collection of policies; 4) develop strategies to increase inclusion of underrepresented populations in ageing research.

**Outputs (month):** policy brief on strategies and policies alignment on frailty and integrated care (M12), ~3 report publications on collection of policies and strategies (~M24), publication of a position paper on policies and strategies integration for facing the challenge of population ageing (M34).

### WP2 Theoretical and data-driven study of the dynamic and mechanisms generating sub-population health-inequalities in longevity and healthy ageing (Camposstrini UNIVE)
WP2 aims to enhance the present policies and develop risk-based strategies to improve the health status and well-being of older adults in diverse populations, by developing statistical analyses and new modelling approaches to understand health, social, biological, and economic disparities related to ageing.

**Outputs (month):** review of current datasets and evidence related to disparities in older age and policies to address them (M12), policy brief on ageing driven disparities into several field (health, social, biological and economic) (M24), ~3 scientific publication on new finding among ageing disparities (M30).

### WP3 Personalized Prevention: a risk-based strategy to promote active life and increase independent living, health status, and well-being of older adults (Ricceri, UPO)
WP3 will identify risk-based personalised interventions through the EPIC-Turin cohort, where a bio-social risk of unhealthy ageing will be computed and subjects will be recalled to receive a personalised prevention program. It will test and evaluate a risk-based strategy to promote healthy ageing in order to design new policies for increasing independent living, health status, and well-being of older adults that could take into account the different risks of unhealthy ageing.

**Outputs (month):** updated dataset of the EPIC-Turin cohort (M24), policy brief on healthy ageing and new policies for increasing independent living, health status, and wellbeing of older adults with a tailored approach (M30), ~3 scientific publications on bio-social risk of unhealthy ageing (~M30), laymen summaries of main results about personalized biosocial risk and opportunities of tailored approach to address them (M36).

### WP4 Policies to improve the compliance with organizational and clinical guidelines in programs of health promotion and prevention for older people (Fiorentini, UNIBO)
WP4 aims to provide policy makers with effective tools to improve the implementation of health promotion and prevention programs targeting older adults through the adoption of a systemic approach focussing on the interaction between institutional, financial, and technological solutions to improve compliance. The policy implications will be based on data platforms merging administrative sources on the consumption of healthcare services with qualitative and supply-side information on the interventions provided by primary care professionals, specialists and various intermediate care structures.

**Outputs (month):** creation of dataset coming from coming from administrative sources on the consumption of healthcare services (M18), policy brief on markers of effective implementation of health promotion, prevention and interventions provided by health care professionals (M30), ~3 publication on adoption of systematic and shared approach to improve the implementation of health promotion and prevention programs (~M30), Guidelines for professionals on strategies to improve compliance to health promotion and prevention programmes (M34).

### WP5 Aligning the new health and social care policies to emerging needs: a bottom-up community-based systemic approach (Formenti, UNIMIB)
WP5 will: 1) implement a territorial network logic in dispersed geographical areas, involving participants in interprofessional and intersectoral partnerships; 2) gather, organise and feed the ecosystem with relevant, not measurable knowledge from the groups; 3) develop and implement a community-based systemic approach.

**Outputs (month):** policy brief on outcomes coming from new policies applied at local and national level in the contest of several different networks and the proximal care system (M30), ~3 publication of experiences reports of ongoing effects of the new policies and strategies coming from participants (~M30), dataset creation of ongoing effects and outcomes (M34), guidelines for policy makers of the dispersed geographical areas on new strategies and policies to promote a community-based systemic approach (M34).
WP6 Investigating the gap between the needs of the ageing population and the institutional responses: what impact on the healthcare systems and older people well-being? (Torbica, BOCCONI): WP6 aims to empirically investigate the needs of the older population to define different policy segments. This goal is of paramount importance to inform policies to match the appropriate services and guarantee an integrated response. Furthermore, this WP aims to investigate the impact of community care (both its social and healthcare component) provided to older people on the consumption of hospital services as well as its effect on health outcomes and well-being.

**Outputs (month):** Dataset of main finding regarding different segments of the ageing population (M24), policy brief on needs of the older population stratified on different segments based on their need profile (M30), ~3 publication on type of needs and matching policies (~M30), guidelines for professionals to promote self-management (M34).

**Other researchers:** Berta UNIMIB, Dal Molin UPO, Capello UPO, Panella UPO, Nazio UPO, Marzullo UPO, Costelli UPO, Zantomio UNIVE, Djordjilovic UNIVE, Lenzi UNIBO, Connelly UNIBO, Spena UNINA, Mele UNINA, Arpaia UNINA, Mercurio UNINA, Principi INRCA, Longo BOCCONI, Fattore BOCCONI, Compagni BOCCONI, Cappellaro BOCCONI, Ghislandi BOCCONI, Mordacci UNISR, Reichlin UNISR, Pongiglione UNISR, Martini UNISR.

<table>
<thead>
<tr>
<th>No.</th>
<th>Milestones</th>
<th>Partner</th>
<th>Month</th>
<th>Type</th>
<th>WP</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS 10.1</td>
<td>Ethical approach to extend the EPIC-Turin cohort obtained</td>
<td>UPO</td>
<td>6</td>
<td>Event</td>
<td>3</td>
</tr>
<tr>
<td>MS 10.2</td>
<td>Creation of a dataset of administrative data to evaluate older people compliance to health promotion strategies</td>
<td>BOCCONI</td>
<td>18</td>
<td>Event</td>
<td>4</td>
</tr>
<tr>
<td>MS 10.3</td>
<td>Presentation of a joint document incorporating emerging policy recommendations from the WP activities</td>
<td>UPO, UNIVE, UNIBO, UNIMIB, BOCCONI</td>
<td>30</td>
<td>Event</td>
<td>1, 2, 4, 5, 6</td>
</tr>
<tr>
<td>MS 10.4</td>
<td>Guidelines for professional on health promotion in the older population, with particular reference to people living in disperse areas released online</td>
<td>UNIBO, UNIMIB</td>
<td>34</td>
<td>Report</td>
<td>4, 5</td>
</tr>
</tbody>
</table>

**Cascade calls for funding research by external entities (provisional list)**

- **Call 1:** The collection, analysis and comparison of laws and policies at the Italian and regional level on the management of ageing, including chronic diseases;
- **Call 2:** Developing a platform to make available the results of the WP1 to policy makers and practitioners;
- **Call 3:** Facilitating data-availability and readability and the capacity of analyses with particular reference to the Italian surveillance systems (mainly PASSI and PASSI d’Argento);
- **Call 4:** Analysis of the population patterns and health and socioeconomic conditions in Southern Italian regions;
- **Call 5:** Longitudinal and cross-sectional collection and analysis of biological, health, life-style and socioeconomic data (2,000 subjects) to identify determinants of healthy and unhealthy ageing;
- **Call 6:** Survey on attitude of professionals towards integrated care, adoption of ICT and data-driven clinical pathways;
- **Call 7:** Estimation of the cost-effectiveness of one or more of the integrated/managed care interventions implemented;
- **Call 8:** Support evidence-based policy making for the set-up of Smart health age-friendly environments;
- **Call 9:** Survey across the four case studies (pilot sites) to monitor services provided, resource mobilisation, awareness and impact;
- **Call 10:** National AI-platform to integrate WP5 activities and decision-making.

**Budget distribution by Spoke and by entity**

Age-It budget proposal is estimated at € 115,243,888.77 (total costs). A thorough assessment of the resources needed to according to each cost categories have been performed, paying attention to the limitations described in the call for proposal. The estimated budget is in line with the call requirements, particularly: 41.7% of the budget will be invested in the **Mezzogiorno area - Southern regions** (as recommended by the NRPP); 18.7% will be allocated to **cascade calls** mechanisms; 75.1% will cover activities in **intervention field 022** and 24.9% in **006**. See Tables B.3 below for more budget details per partner.
Table B.3. Age-It estimated budget per Challenge (Spoke and related affiliates) (in EUR)

<table>
<thead>
<tr>
<th>Partner</th>
<th>Total costs</th>
<th>Of which: intervention field 022</th>
<th>Of which: intervention field 006</th>
<th>Of which: Mezzogiorno</th>
</tr>
</thead>
<tbody>
<tr>
<td>Università degli Studi di Firenze</td>
<td>11,931,712.50</td>
<td>8,813,837.50</td>
<td>3,117,875.00</td>
<td>2,235,600.00</td>
</tr>
<tr>
<td>Università degli Studi di Milano-Bicocca</td>
<td>7,272,090.00</td>
<td>6,265,840.00</td>
<td>1,006,250.00</td>
<td>924,000.00</td>
</tr>
<tr>
<td>Università degli Studi del Piemonte Orientale A. Avogadro</td>
<td>7,621,431.88</td>
<td>4,733,431.88</td>
<td>2,868,000.00</td>
<td>1,293,600.00</td>
</tr>
<tr>
<td>Università degli Studi di Padova</td>
<td>6,101,363.13</td>
<td>5,318,363.13</td>
<td>783,000.00</td>
<td>-</td>
</tr>
<tr>
<td>Università Ca’ Foscari Venezia</td>
<td>5,582,585.63</td>
<td>3,742,585.63</td>
<td>1,840,000.00</td>
<td>900,000.00</td>
</tr>
<tr>
<td>Alma Mater Studiorum – Università di Bologna</td>
<td>6,908,523.75</td>
<td>5,817,148.75</td>
<td>1,091,375.00</td>
<td>720,000.00</td>
</tr>
<tr>
<td>Università degli Studi di Roma La Sapienza</td>
<td>6,404,481.25</td>
<td>5,166,981.25</td>
<td>1,237,500.00</td>
<td>-</td>
</tr>
<tr>
<td>Università degli Studi di Napoli Federico II</td>
<td>12,553,947.50</td>
<td>7,314,814.49</td>
<td>5,239,133.01</td>
<td>10,957,947.50</td>
</tr>
<tr>
<td>Università degli Studi del Molise</td>
<td>3,451,866.88</td>
<td>3,036,491.88</td>
<td>415,375.00</td>
<td>3,451,866.88</td>
</tr>
<tr>
<td>Università degli Studi di Bari Aldo Moro</td>
<td>8,912,825.63</td>
<td>6,534,575.63</td>
<td>2,378,250.00</td>
<td>8,912,825.63</td>
</tr>
<tr>
<td>Università della Calabria</td>
<td>4,852,161.88</td>
<td>4,349,056.88</td>
<td>503,125.00</td>
<td>4,852,161.88</td>
</tr>
<tr>
<td>Consiglio Nazionale delle Ricerche</td>
<td>12,884,980.88</td>
<td>8,789,380.88</td>
<td>4,095,600.00</td>
<td>7,976,101.63</td>
</tr>
<tr>
<td>Istituto nazionale di statistica</td>
<td>493,243.47</td>
<td>439,493.47</td>
<td>53,750.00</td>
<td>-</td>
</tr>
<tr>
<td>Istituto Nazionale di Ricovero e Cura per gli Anziani</td>
<td>4,424,927.22</td>
<td>3,647,427.22</td>
<td>777,500.00</td>
<td>3,237,605.00</td>
</tr>
<tr>
<td>Istituto Neurologico Mediterraneo Neuromed I.R.C.C.S.</td>
<td>2,417,755.47</td>
<td>1,687,755.47</td>
<td>730,000.00</td>
<td>2,417,755.47</td>
</tr>
<tr>
<td>Università Commerciale Luigi Bocconi</td>
<td>3,559,856.25</td>
<td>2,545,026.25</td>
<td>1,014,830.00</td>
<td>-</td>
</tr>
<tr>
<td>Università Cattolica del Sacro Cuore</td>
<td>3,046,761.25</td>
<td>2,701,261.25</td>
<td>345,500.00</td>
<td>-</td>
</tr>
<tr>
<td>SISSA – Scuola Internazionale Superiore di Studi Avanzati</td>
<td>1,063,337.50</td>
<td>1,028,337.50</td>
<td>35,000.00</td>
<td>-</td>
</tr>
<tr>
<td>Università Vita-Salute San Raffaele</td>
<td>2,879,131.25</td>
<td>2,472,881.25</td>
<td>406,250.00</td>
<td>-</td>
</tr>
<tr>
<td>Istituto Nazionale di Previdenza Sociale</td>
<td>289,184.18</td>
<td>289,184.18</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tech4Care srl</td>
<td>325,000.00</td>
<td>215,000.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Generali Italia S.p.A.</td>
<td>192,261.60</td>
<td>192,261.60</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HealthWare Group</td>
<td>123,246.60</td>
<td>90,996.60</td>
<td>32,250.00</td>
<td>123,246.60</td>
</tr>
<tr>
<td>Beta 80 S.p.A. Software e Sistemi</td>
<td>412,486.40</td>
<td>323,736.40</td>
<td>88,750.00</td>
<td>-</td>
</tr>
<tr>
<td>Municipia S.p.a.</td>
<td>331,880.60</td>
<td>243,130.60</td>
<td>88,750.00</td>
<td>-</td>
</tr>
<tr>
<td>Hub Age-It</td>
<td>1,206,826.11</td>
<td>784,436.97</td>
<td>422,389.14</td>
<td>-</td>
</tr>
<tr>
<td>Confederazione Cooperative Italiane – Confcooperative</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOT</strong></td>
<td>115,243,888.77</td>
<td>86,543,436.62</td>
<td>28,590,452.15</td>
<td>48,002,730.57</td>
</tr>
</tbody>
</table>
B4) A GENDER-BALANCED APPROACH

Age-It is firmly committed to supporting the equal rights of all without distinction related to gender, ethnicity, language, religion or minorities, and will contribute to the development of a socially sustainable ageing Italian society. It will offer solutions based on a strong co-integration between socioeconomic, biomedical and science & technology area. There is an even gender balance in the core research team and we are committed to promote gender equality when recruiting scholars. Among the 350 researchers involved in Age-It 47% are women.

Not only Age-It acknowledges a gender balance in the overall staff, but the foundation itself of Age-It ensures a gender balance in top positions and in decision-making. In particular, the governance of the Research Management envisages a gender balanced organisational structure. Among the Spokes’ PI and Co-PI, 40% are women. Similarly, among the WP leaders, 42% are women – see Table B.4. Furthermore 4 out of the 6 members of Age-It Scientific Advisory Board are women.

The actions to be implemented for the promotion of equal gender opportunities follow the gender equality plans in place or under development by the Hub consortium. Age-It will follow the Equality Plan of the University of Florence, in line with most up to date directives implemented by Universities and Research Centres. The areas of intervention cover the gender balance in top positions and in decision-making bodies; gender balance in recruitment; integration of the gender dimension and intersectionality in research; actions to contrast stereotypes in the organization’s culture.

● Gender balance in top positions and in decision-making bodies: the actions devised aim to set up elective mechanisms for governing bodies providing for balance in candidacies and the constraint for voters to express a double preference, varying by gender. Further actions point to the identification of gender balancing measures in management roles and research groups (e.g., gender alternation for management/vice-management or responsibility/co-responsibility of research groups). The objective is to achieve gender balance in top positions and in decision-making bodies, with at least 40% presence of the minority gender in governing bodies and alternation in decision making roles. Plan implementation is expected to be in place after 18 months from the onset of the project.

● Gender balance in recruitment: in order to ensure that recruitment of additional personnel (researchers) and doctoral students of Age-It is composed by at least 40% of women, gender balance will be foreseen in the members of the evaluation committees, who will be provided with information material about unconscious bias in recruitment. Call for Interest to attract female candidates in view of direct appointments will be published. In the same direction, direct appointments will be foreseen addressed exclusively to female scholars and researchers for Spokes or WPs with a female population lower than 40%.

● Integration of the gender dimension and intersectionality in research: content-wise, gender will be the most important dimension to be explored throughout the Age-It programme. This is because women and men display numerous differences, such as biological differences, differences in life styles and health conditions, differences in labour market/occupational status, differences in culturally assigned gender roles, differences in emotional coping (e.g. susceptibility to stress or depression), differential needs (e.g. in terms of health services or social contacts) and differential living arrangements (e.g. women are over-represented among single headed households and single parents). Indeed, Age-It research agenda is strongly dedicated to uncovering and mitigating gender imbalances by looking at: work-life balance; organisational culture within firms and institutions; mortality and morbidity by gender; unequal ageing by gender; welfare provisions at older ages; long term effects of maternity leave interruptions for the career of women, financial literacy of women, financial distress of older women (widows). Additionally, women are overrepresented among care-givers with subsequent issues of workload and burnout. Dedicated sessions on gender equality, inclusion and well-being in ageing research will be carried out in specific Age-It events, or integrated in Age-It major conferences. As a

<table>
<thead>
<tr>
<th>PI</th>
<th>CO-PI</th>
<th>WP1 Leader</th>
<th>WP2 Leader</th>
<th>WP3 Leader</th>
<th>WP4 Leader</th>
<th>WP5 Leader</th>
<th>WP6 Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W</td>
<td>M</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>M</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>M</td>
<td>W</td>
<td>M</td>
<td>W</td>
<td>W</td>
<td>M</td>
<td>M</td>
<td>W</td>
</tr>
</tbody>
</table>

Table B.4 - Age-It gender balance in leadership, Spokes and WPs
further action, mentoring programs for female researchers will be implemented aiming to identify suitable strategies for overcoming obstacles in career paths.

- **Actions to contrast stereotypes in the organization’s culture:** to consolidate a shared culture on the importance of gender equality and the effectiveness of gender balance, an annual report regarding gender balance containing qualitative and quantitative data for the entire Age-It community will be published and disseminated through the partners’ communication channels, identifying indicators and indices for a context analysis. A working group will be created to evaluate the indicators in the report and devise possible actions to improve integration of the gender balance in the Hub and partner organisations. Gender Equality Plans (GEPs) of the partners will be evaluated and suggestions provided by the working group, if appropriate.

**B5) FEASIBILITY ASSESSMENT**

The feasibility and viability of the work plan is ensured by several elements, below synthesized.

1. **Project Management Approach.** The PM and his/her team will implement project management techniques and methods from the PM2 Methodology, in order to be aligned at best to EU standards, expectations and work methods. This is a highly valuable and flexible approach focused on efficiency and stakeholders’ involvement. Therefore, the feasibility of Age-It will be ensured by the quality control plan that will be put in place by the PM, supported by Age-It scientific steering committee and boards. The clear checkpoints set for the programme corresponding to the various milestones and deliverables will ensure the respect of the plan and the early identification of possible issues, and of actions to mitigate them. In addition, during the project preparation we already defined a clear allocation of activities, responsibilities and resources, as testified by the detailed budget and workplan described in section B3. This will consent a quick-start of the activities, little or no further internal re-negotiation among the partners, in case successful funding.

2. **Quality of the Investigators involved.** The feasibility of the Spokes activities is guaranteed by the involvement of qualified PIs and researchers, and a detailed definition of the workplan, accounting for specific skills and expertise and making sure that a correct balance also emerges across regions. Tasks and activities have been detailed and allocated following competences and know-how of the different team members, also accounting for synergies and collaborations among research groups. Researchers in the team have extensively studied several aspects of ageing in the last decade, and have a well-establish record of using data and methodological tools of analysis prospected to be used. The problem-solving approach is guaranteed by the mix of positive and normative methods. Researchers involved have a long and extensive experience in managing complex research programmes, both at national (e.g., PRIN projects, PON, FARE) and international level (e.g., ERC grants, Horizon, Joint Program Initiatives, Research Infrastructures); their list of projects and publications prove their extensive and robust experience and knowledge in the issues related to the project (see participants’ CVs).

3. **The transdisciplinary competence of the Consortium** – covering disciplines like demography, geriatrics and gerontology, neurology, cardiology, immunology, data science, educational science, epidemiology, biology, genetics, engineering, sociology, law, economics, and statistics – makes the implementation of this ambitious project highly feasible despite its path-breaking and innovative vision.

4. **Wide support from stakeholders.** The number and relevance of the stakeholders involved in the project by the Age-It Hub (see Section B2) will guarantee the necessary know-how infrastructure to prepare adequate contents and up-to-date policy solutions for the planned activities, at the same time granting the maximum possible dissemination of these activities. Activities and tasks have been allocated according to a balance between research priorities, capacity and expertise of the participants, which guarantee about the feasibility and viability of the planned activities.

5. **Available infrastructure.** Computer power (including cloud computing), databases and appropriate statistical software needed for the analysis are typically available and being used in the different institutions of the Spokes. Specific needs that may emerge during the project will be promptly dealt with and solved (e.g., by purchasing the hardware or software necessary for specific analyses). Part of the monitoring tools, of the cloud spaces for data storage and elaboration and of the development of the IT infrastructure will be acquired through cascade calls – also contributing to the involvement of spin-offs and start-ups in the Mezzogiorno area.

In addition to the abovementioned factors, the adequacy of the methodological approach has to be mentioned as a factor contributing to the feasibility of the Research Plan. One of Age-It strengths for developing a feasible
A research programme on ageing with an interdisciplinary, holistic and problem-solving approach is the use of a diverse range of data and advanced statistical methods. These techniques are of primary importance to reach the objectives of Age-It and are placed at the service of the principal aims of the project. Although the research questions determine the research method, common guiding principles of methodological rigor and careful selection of the analysis procedures will characterize the Age-It overall research strategy. The causes and consequences of population ageing addressed across the 10 Challenges/Spokes are likely to be heterogeneous across the population, depending on individual and contextual factors, and to follow complex causal pathways. To disentangle and better understand these dynamics, sound descriptive, inferential and causal statistical tools will be used. The main statistical and data science approaches to be utilized include, but are not limited to:

- **Panel data models** including generalized linear mixed models will be used to study the outcomes’ dynamics and highlight structural changes; to gain more insights and support causal claims, fixed effects models will be combined with other methods such as synthetic controls and difference in difference.

- **Methods for the analysis of effects heterogeneity and impact evaluation methods** will be used to investigate how the impact differed with respect to (a combination of) individual baseline factors (e.g., socioeconomic and health status, age, gender, family and housing characteristics). Group identification will possibly rely on newly developed methods of causal machine learning.

- **Methods of mediation analysis**, which will be able to disentangle direct and indirect effects and to identify the role of some variables as effect modifiers or mediators.

- In order to compare and combine results from different groups (e.g., regions), **meta-analysis techniques** will be adopted, when appropriate, to translate micro-level findings into aggregate-level, general conclusions. Additionally, meta-regression methods will be used to quantify the relative importance of different sources of heterogeneity in effects, and to test hypotheses regarding the role that individual, meso-level and welfare-states level characteristics have had in inducing different population responses.

- **Simulation techniques and macroeconomic models** will be exploited to perform the effects of policy changes (e.g., pension reforms, fertility measures, migration policies), to estimate long-terms changes and transitions in the structural parameters (demographics, preferences, productivity, technology), and to lastly make predictions on socioeconomic configurations (e.g., sustainability of pensions).

- **Mixed qualitative/quantitative approach as well as experimental settings** will be developed to combine socioeconomic research and behavioural analysis.

- **Machine learning and Artificial Intelligence** will pave the basis to account for the complex socioeconomic environment and simulating future scenarios.

In our analyses we will address the effects of the outbreak responses on various social groups, such as low and high socioeconomic strata, natives and migrants, and so forth. Gender will be the most important dimension throughout the project (see Section B4).

To assure evidence-based, problem-solving research, the methodologies outlined above are systematically applied to best available data. The data used by each Spoke, and its WPs, are reported in Table B.5; the table recalls surveys (through their acronyms) that are then carefully presented in the online Appendix (https://bit.ly/Age-It_Appendix) in terms of characteristics and level of access. For instance, Age-It collaborates with the European research infrastructures Survey of Health, Ageing and Retirement Europe (SHARE) and Generations and Gender Programme (GGP). Padua University and Bocconi University – both member of Age-It Hub – act as the Italian coordination partner of SHARE and GGS, respectively, with Guglielmo Weber (UNIPD) being the vice-PI of the SHARE-ERIC, Agar Brugiavini (UNIVE) a member of the Management Board of SHARE-ERIC and Francesco Billari (BOCCONI) being the Chair of the Consortium Board of GGP. Also, data from another European Infrastructure, the European Social Survey (in particular the “Timing of Life” module, PI: Francesco Billari) will be used. The collaboration with ISTAT and INPS will ensure access to their data infrastructure and the best and most up-to-date existing national databases, derived from both administrative sources, survey and census data, as well as data and techniques for the analysis of geospatial dimensions of care needs and resources. The Data Management Board (DMB, see Section B2) will assure that Age-It members will cooperate in the preparation of the different databases and in tackling the methodological issues to be faced during the research project. This is essential in a project where several units plan to use partly
Enlarged Partnership 8 – Age-It: Annex 1

overlapping sources. The DMB will ensure that all units use valid and comparable analytical strategies and will guarantee a continuous flow of information and code (through GitHub) exchange on methodological questions.

To be sure, the Table B.5 below systematizes the dataset usage for each individual Spoke and WP, based on the online Appendix (https://bit.ly/Age-It_Appendix). In addition, new data will be used based on ad hoc qualitative and quantitative collections sponsored by cascade calls (e.g., Age-It will support the third wave of ITA.LI, Italian Lives, https://iassc.unimib.it/en/research-projects/itali-en) as well as a possible synergetic relation with the proposal “FOSSR” presented for the NPRR under the Action 3.1.1 “Creation of new research infrastructures, strengthening of existing ones and their networking for Scientific Excellence under Horizon Europe” (see Section C2 for details).

B6) INVOLVEMENT OF EARLY AND MID-STAGE RESEARCHERS (≤10 YEARS FROM THEIR PHDS)

Age-It includes a share of 15% of researchers who received their PhD since no more than 10 years. The actions that are expected to be put in place to involve scholars who have achieved their PhD since no more than 10 years (excluding maternity and parental leave) and to attract young talents, also from other countries are the following:

- **Recruitment methods that pursue the goal of youth employment tenders and access policies to the research community**: through Age-It and Age-It partners communication channels calls for interest in English will be published to recruit the planned additional research personnel for the execution of the projects of the research programme. Calls will be reserved for scholars who have obtained their research doctorate in the last 10 years (excluding maternity, parental or other leave). Specific attention will be dedicated to target young, promising researchers from EU and non-EU countries, in order to attract valuable personnel, foster an internationally-friendly research environment in Italian academia, and combat and reverse the so-called ‘brain drain’ that negatively impacted Italy in the last decades. In these calls, within the boundaries of the Spokes’ themes, young researchers will be invited to propose their own research agendas and ideas, giving them a high degree of intellectual freedom.

- **Recruitment management**: an online platform will manage the application process submission. The selection committees will be created according to the principle of gender balance and will be made aware (with videos and information material created ad hoc) on the presence of unconscious bias which can affect recruitment and strategies to avoid them. In order to simplify the procedures for participating in the calls, standard parameters will be established for doctorate recognition (e.g., duration of PhD course, selection methods, activities envisaged by PhD curriculum, methods of presentation of the final research work). As regards the selection, international standards of transparency will be promoted in the selection criteria and methods such as those provided for research staff by the EU actions. Successful candidates will be integrated in the research community getting to know the hub governing bodies, research objectives, partners research profiles. A short course will be offered to new hires on issues of inclusion and diversity and the impact they may have on working efficiency. Learning of the Italian language may be facilitated through agreements with Italian language schools for foreigners.

- **Monitoring of recruitment policies for young talents**: the Age-It hub intends to carry out annual monitoring of the generational variable by collecting data on the average age of the new hires and their subsequent career progress. On the basis of this monitoring, indicators will be studied that measure the progress of recruitment policies over time in a qualitative and quantitative manner in order to devise possible strategies to improve young talents’ attraction.

- **Risk assessment**: the first recruitments will be conducted immediately after Age-It partners receive the funding decision. The salaries will be computed according to the standard salary levels of the host institutions in equivalent jobs. We are aware that some unexpected events, delays or risks may occur during the realisation of the project. For instance, some of the recruited young researchers may unexpectedly become unable to work in the project. We believe, however, that it will be easy to attract another qualified researchers from EU and non-EU countries to be involved in the project because we aim to conduct systematic recruitments and promote vacancies in the international job market.
**Table B.5. Age-It evidence-based research: Dataset by Spoke and WP**

<table>
<thead>
<tr>
<th>Spoke</th>
<th>WP1</th>
<th>WP2</th>
<th>WP3</th>
<th>WP4</th>
<th>WP5</th>
<th>WP6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Census; LFS; GloPenStat; EHLEIS; SHARE; ESENER; EU-SILC</td>
<td>FSS; GGS; LFS; AspVitQuo; SHARE; EQLS; Moli-Sani CondSalRicSerSan; EGIS</td>
<td>CondIntSoCtStr; IndIntegrSecn; FamSogSocCondInt; EGIS</td>
<td>Moli-Sani; FSS; ESS; EGIS; PASSI</td>
<td>Various Italian social and health surveys</td>
<td>Census; National statistics produced by ISTAT; Ad hoc registers-surveys linkages</td>
</tr>
<tr>
<td>2</td>
<td>GENOCOR; New data will be generated within the WP, such as the Database of Cell Senescence Genes (CellAge)</td>
<td>New data of biomarkers of neuromuscular ageing in humans will be produced</td>
<td>New generated database including data of different aspects of cell senescence (measured in the different systems)</td>
<td>Production of database with epigenetic, proteomic, metabolomic and lipidomic profiles connected with existing databases (e.g., EPIC-Turin)</td>
<td>A database including the different animal models developed within this WP will be created</td>
<td>New generated database including data of the effects of the different systems (measured in the different systems analysed within the WP)</td>
</tr>
<tr>
<td>3</td>
<td>Reportage, SCOPE, CAROMIRNA, MYOAGE, 100+%, Moli-sani, Epile, MEDCLI, TRACK-PD, PROMETEO, CHRONO-IMAGE, IDES 2, SWEETBONE, SAMBA, EXTRA-D, fr-AGILE, Disautonoma, Lookup 7+, SPRINTT, CAROMIRNA</td>
<td>EPIC, MEDCLI, “Frailty and atrial fibrillation, structural heart disease, syncope, dementia, heart failure and hypertension”, Lookup 7+, SPRINTT, iSIRENTE study</td>
<td>Reportage, SCOPE, MEDCLI, CAROMIRNA, MYOAGE, 100+%, Moli-sani Study, Epile, Study, TRACK-PD, PROMETEO, CHRONO, MEDCLI, IDES 2, SWEETBONE, SAMBA, EXTRA-D, fr-AGILE, Disautonoma, Lookup 7+, SPRINTT, iCAROMIRNA,</td>
<td>MEDCLI, “Frailty and atrial fibrillation, structural heart disease, syncope, dementia, heart failure and hypertension”; Moli-sani Study, Epile, Study, TRACK-PD, fr-AGILE, Osservatorio Geriatrico Campano, Disautonoma, Lookup 7+, Lookup 7+ online project, SPRINTT, iSIRENTE</td>
<td>Reportage, SCOPE, SHARE, MEDCLI, “Frailty and atrial fibrillation, structural heart disease, syncope, dementia, heart failure and hypertension”; PROMETEO, CHRONO-IMAGE, IDES 2, SAMBA, EXTRA-D, fr-AGILE, Osservatorio Geriatrico Campano, Disautonoma</td>
<td>Epilepto Study, Reportage, Reportage COVID, SCOPE, TRACK-PD, Lookup 7+; Lookup 7+ online project, SPRINTT, Moli-sani Study, iSIRENTE</td>
</tr>
<tr>
<td>4</td>
<td>SHARE</td>
<td>Administrative data on Hospital Discharge Files, Emergency Admissions, Hospital Pharmaceutical Assistance</td>
<td>Administrative data on Specialist outpatient care, Direct Delivery Drugs, Territorial Pharmaceutical Assistance</td>
<td>Administrative data on Residential and semi-residential care for the elderly, Intermediate care community hospitals, Integrated Home Care</td>
<td>Administrative data on diseases and chronic patients</td>
<td>Publication archives: PubMed, PNIIG, Noce</td>
</tr>
<tr>
<td>5</td>
<td>FSS; AspVitQuo; EQLS; Eurobarometer; ISSP; EHLEIS; SHARE; CondSalRicSerSan; EGIS; EU-SILC; Ad hoc registers-surveys linkages</td>
<td>WP2 will collect data on patients and their caregivers through a web app</td>
<td>WP3 will collect data on patients with heart and respiratory failure and match them with caregiver support</td>
<td>National statistics produced by ISTAT; Ad hoc registers-surveys linkages developed within Age-I. FSS; AspVitQuo</td>
<td>New data will be generated</td>
<td>New data will be generated</td>
</tr>
<tr>
<td>6</td>
<td>SHARE, GGS, INPSOssSta; SHIW; IndStrFamIta; EU/CT; PLUS; EWCs; SES; LoSta; CICO</td>
<td>SHARE; WHIP-Salute; INPSOssSta; INPSDisBen; INAILinf; INAILMalPro; EWCs; ESENER; EGIS; IndCampProf; AuditFabbProf</td>
<td>SHARE; AuditFabbProf; IndCampProf; PLUS; ESS; FSS; IndSpsesFam; IndConsFam; Eurobarometer; AspVitQuo</td>
<td>SHIW; EU-SILC; SHARE; INPSDisBen; INAILInf; INAILMalPro; AlfFinAdula; HeaForAll_Ita; WHOData; CondSalRicSerSan</td>
<td>GloPenStat; SHIW; SHARE; AlfFinAdula; IndStrFamIta; EU-SILC; ASIA; AIDA</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>EGIS; HeaForAll_Ita; INPSOssSta; WHOData; CondSalRicSerSan; AnzianiStat; SHARE; ILSA; ILQA-19; FRASenImpaInStOldPopSuc</td>
<td>GlobPenStat; ESS; LFS; GGS</td>
<td>ESS; SHARE</td>
<td>CAUCP; Census; ELSA; GatGloAgiDat; SHARE; SHIW; ESS; ISSP; EU-SILC; Eurobarometer</td>
<td>Analysis of existing documents and library resources</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ELSA; TILDA; SHARE; ILSA; Pro.V.A.; InCHIANTI; Italian MULTIPLAT_AGE study; NeuroGate; New data will be generated</td>
<td>ELISA; TILDA; SHARE; ILSA; Pro.V.A.; InCHIANTI; Italian MULTIPLAT_AGE study; NeuroGate; FRASenImpaInStOldPopSuc; New data will be generated</td>
<td>ELISA; TILDA; SHARE; ILSA; Pro.V.A.; InCHIANTI; Italian MULTIPLAT_AGE study; NeuroGate; FRASenImpaInStOldPopSuc; New data will be generated</td>
<td>New data will be generated</td>
<td>New data will be generated</td>
<td>New data will be generated</td>
</tr>
<tr>
<td>9</td>
<td>Experimental data</td>
<td>Experimental data</td>
<td>Experimental data</td>
<td>Experimental data</td>
<td>Experimental data</td>
<td>Experimental data</td>
</tr>
<tr>
<td>10</td>
<td>Analysis of existing documents and library resources. Various Italian social and health surveys (SHARE, CondSalRicSerSan); Census; ILQA-19</td>
<td>GBD; PASSI; PASSIArgento; HMD; Administrative data from hospital records</td>
<td>EPIC-Turin; New data will be also generated within the WP</td>
<td>Analysis of existing documents and library resources. Various Italian social and health surveys (SHARE, CondSalRicSerSan); Census; ILQA-19</td>
<td>SHARE; CondSalRicSerSan; Census; ILQA-19. New data will be generated</td>
<td>Administrative data; IndSpsesFam; IndConsFam; Statistics by ISTAT; Statistics by Agenzia Entrate; New data will be generated</td>
</tr>
</tbody>
</table>
B7) SMES, START-UPS AND SPIN-OFFS INVOLVEMENT

Research on ageing contributes to the economic and social progress of the countries, not only by providing new solutions and policy options for the public sector (e.g., pension, health care, social care, labour policies and transport), but also by designing, prototyping and marketing new products and services for the silver market. By doing so, it contributes to the competitiveness of the Italian industry, boosting the ability of private companies to be competing in the global markets and exporting new solutions for the silver market. Age-It ambition is to promote the exploitation of research results, novel ideas and technologies addressing ageing individuals and society, to radically increase and support the competitiveness of the Italian industry. This includes the knowledge and technological transfer for creating new opportunities of valorising and exploiting the market potential of research outputs, stimulating and fostering technology transfer, start-ups creation and growth, networking and dissemination initiatives, and targeted public-private partnerships and actions. Accordingly, we devised a detailed strategy for involving private entities in the research programme. This strategy has been designed following three guiding principles:

- need for creating a supportive environment and ecosystem in which the most promising research outputs are promptly identified, protected, sustained and brought forward to the market;
- bringing a market perspective into research activities themselves: we have “contaminated” the research groups with the participation of professionals coming from the private sector, so that their contribution could reduce the risk of “Ivory Tower” research;
- contribution to innovating products and services for an ageing population and society.

To achieve these objectives, we have included five private entities (Generali, Beta 80 Group, Municipia, HealthWare, Tech4Care) in the partnership (affiliates to Spokes), we have two additional entities (Sanofi, and Confooperative) as co-founders of the Hub, and we have several stakeholders endorsing and supporting in-kind the project activities.

**Umbrella support and cherry-picking: the role of start-up accelerators, innovation consultants and clusters**

The Age-It partnership will greatly benefit from the endorsement by AC75 and SMILE cluster as well as by the direct commitment HealthWare Group.

- **AC75** is the first start-up incubator specifically working in the Silver Economy field. AC75 is a public-private partnership established by Cassa Depositi Prestiti, several private Bank Foundations, public universities. AC75 mission is to scout the Italian Start-ups and SMEs landscape to find the most promising innovations and support their market exploitation.
- The **SMILE cluster** will provide its contribution to develop knowledge, technological solutions, projects, constructions and very high-quality products in the field of Ambient Intelligence and in Ambient Assisted Living. The cluster involves five different regions, Marche, Lombardia, Puglia, Toscana and Friuli Venezia Giulia, as well as the autonomous province of Trento. They participate with more than 100 subjects between universities, research institutes and enterprises. SMILE will facilitate the involvement of SMEs, Start-Ups and Spin-offs directly in the research activities of the Programme.
- **HealthWare Group** – based in Southern Italy – is a global health innovation and technology leader providing transformational advisory and technology services for commercial, medical, and R&D operations of life-sciences and digital health companies, combined with design and development of digital medicines and digital therapeutics products.

HealthWare, AC75 and SMILE will collaborate under the Hub’s coordination for providing cross-Spoke initiatives aimed at supporting technology transfer, start-up creation, scale-up. They have also strong experience in supporting entrepreneurship and scaling in Southern Italy (HealthWare Group is based in Campania). These initiatives include: a) entrepreneurship courses specific for the life sciences sector; b) advice and monitoring of the development of novel research; c) identification of the most promising ideas, solutions and technologies for discussing possible ways forward for research, R&D and market, including IPR strategy for research results valorisation; d) support in drafting licensing agreements; e) start-ups and business ideas competitions and support in possible translation into start-ups creation.

**Growing from the ground: the role of research and technology transfer of research partners**

All the academic and research partners have consolidated experience in technology transfer, research valorisation, and spin-off support. For example, UNIFI has its own incubator, with preincubation and incubation services to support business ideas development and first steps of its spin-off. More in general, entrepreneurial training programmes, dedicated not just to spin-off but also to researchers and students, will be organised as joint initiatives by the partners, to stimulate venture building spirit and business idea identification, as part of the support to academic spin-off. This experience will be applied also during the Age-It project.

The nine public Spokes will activate **37.3 million EUR for 101 cascade calls** during the project, of which it is estimated that at least 40% (14.9 million EUR) will support private external entities in conducting basic research
and R&D activities in line with Age-It scope, objectives and Spokes research lines. At least 10% of resources allocated to cascade calls (3.7 million EUR) are estimated to be destined to new or recently founded (≤5 years) start-up and spin-off companies, in order to sustain the protection and exploitation of innovations with the best potential (developed within the Age-It partnership or externally). In this respect, we will allocate ca. 60% of resources for companies, start-ups and spin-offs based or operating in South Italy, so to contribute to develop and improve local research and industrial ecosystems. This huge investment in cascade funding will boost research and innovation in the national ecosystem of the silver economy, along the ten key challenges identified by Age-It.

Finally, the Hub will functionally connect with relevant innovation/IPR offices of the academic and research partners in coordinating research exploitation and technological transfer along the project. This activity will be particularly supported by AC75 (key endorsing stakeholder) and HealthWare Group (Age-It partner) that will support all partners to seek for IPR protection and exploitation (see also paragraph below). Where needed, technology transfer/innovation specialists, market analysts, IPR managers, marketing and communication managers in the stakeholders’ networks will be involved for supporting researchers in such valorisation and exploitation efforts. Training and guidance will be provided, also aiming to get innovative “hybrid” profiles with mixed skills ranging from research exploitation to market analysis to project management. External consultants (e.g., legal, regulatory, certified pilot production, start-up experts etc.) will be involved for very specific matters on a case-by-case basis. These experts will operate to support all Hub partners.

Inside job by specialised companies: the role of private entities in the partnership

The research activities at low TRL (1-4) conducted in the Age-It project will be contaminated by ideas, needs, perspectives, technologies and business models provided by the five private partners affiliated to Spokes 1, 4, 5, 6, 7, 8 and 9. These five private partners (ranging from multinational and large companies to SMEs with direct interests and expertise on ageing individuals and populations) will conduct basic research and R&D activities in line with own profile, seeking to innovate, improve and extend the current provision of products and services. The total investments of these five companies in the Age-It project is valued 1.8 million EUR, of which 13% (0.2 million EUR) is constituted by their co-funding (in-kind contribution of personnel, materials/equipment and other costs). Below we provide a brief sketch of these entities (except HealthWare Group, already described above) and their added value:

- **Generali** (large company): Generali is one of the largest global insurance and asset management providers. It is present in 50 countries in the world, serving 67 million customers; the Group has a leading position in Europe and Italy, and a growing presence in Asia and Latin America. At the heart of Generali’s strategy is its Lifetime Partner commitment to customers, achieved through innovative and personalised solutions, best-in-class customer experience and its digitalised global distribution capabilities. Generali will contribute by providing solutions to contrast the ageing in particular through estimates and future projections of the sustainability of a Long-Term care system in relation to the public/private mix using simulation and providing technical solutions in different risk-environments that satisfy the demand for LTC also in relation to the financial and health literacy.

- **Municipia** (large company): Municipia is a member company of the Engineering Group (ENG), the Italian largest Digital Transformation company, and it is Group’s division focused on the public administration market segment. Municipia is the cities’ partner for which it creates innovative services collaborating with the ENG’ R&D division that comprises over 450 researchers and data scientists (and a global innovation network of universities, start-ups, and research firms). Municipia is involved in different tasks in the Public Administration market segment, through ENG’s R&I division, within the international research community, including technical and overall co-ordination of research projects and consortia.

- **Beta 80 Group** (large company): Beta 80 Group is a provider of innovative technologies to empower companies and agencies in their digital transformation journey. Their products come from our 30-year presence in the market and our close relationship with partners and customers. They operate in the Public Administration, Health and social care sector, being the market leaders in the provision of digital solutions for emergency management.

- **Tech4Care** (small company/start-up): founded in 2015, Tech4Care is an innovative SME and spin-off company of the Politechnic University of Marche (Italy). Tech4Care provides digital care solutions under Software-as-a-Service (Saas) license, based on the MainFrame proprietary platform. Its staff has extensive experience in national and European projects (over 5 million EUR of research and R&D funds raised in the last 4 years), with longstanding partnerships with public institutions, non-profit organisations and industries. The company keeps a solid focus on exploiting and translating best research into actual products and services for vulnerable groups. Tech4Care staff is currently composed by 20 members, including software developers, engineers, economists, epidemiologists, project managers, and nurses.
Transferring innovation in pharmaceutical, health and social care markets: Role of private stakeholders for advancing health and wellbeing

One of major market areas of the Silver Economy is constituted by products and services for health and wellbeing. In this respect, Age-It will coordinate and valorise research conducted by different Spokes taking into account actual needs and preferences of the older population for transferring innovation in pharma, health and social care markets. This will be enabled by the involvement of two pivotal Age-It funding members (but not partners) and one large stakeholder that put at disposal their infrastructure, as well as networks and possible member organisations, for further advancement:

- **Sanofi** manufactures and distributes medical products. Sanofi offers a wide range of specialised drugs for therapeutic, diagnostic, oncology, vaccines, genetic drugs, and animals healthcare products. Sanofi is a global pharmaceutical company based out of Paris (France), with local headquarters in Milan (Italy). As of 2021, the company had a total of about 95,442 employees globally. In Italy, Sanofi has a Clinical Study Unit (CSU) which participates in major international clinical trials.

- **Confcooperative** was established in the first half of XX Century and have been acknowledged as a primary national association representing, assisting, protecting and auditing the co-operative movement. Over the years Confcooperative has implemented a policy sensitive to the needs and changes of the social, civil and economic world. Today, Confcooperative is the largest part of the Italian co-operative movement, with 22 regional networks and 8 sectorial federations, representing 17,400 cooperatives, 527,000 workers and 81 billion EUR turnover;

- **Legacoop Sociali** was founded in 2005 and is linked to Legacoop, whose history is over 100 years long (which represents more than 10,000 cooperatives in all Italian regions and across various sectors). Legacoop Sociali represents, support and coordinate social cooperatives for care, education and other social purposes. Legacoop Sociali represents over 2,400 cooperatives, 120,000 workers and 4.5 billion EUR turnover.

### B8) KEY PERFORMANCE INDICATORS

Key Performance Indicators (KPI) are included for the monitoring project activities and final evaluation. KPI will assess the impact of the projects on competitiveness of the sector on sustainability of results and it will be a tool for monitoring the development of the full programs. Qualitative-quantitative indicators to monitor the activities and outcomes of the Spoke activities are presented below in Table B.6.

<table>
<thead>
<tr>
<th>Spoke</th>
<th>KPI</th>
<th>Activity type</th>
<th>Target value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>n. of published scientific papers</td>
<td>Project realization</td>
<td>At least 170 in 3 y</td>
</tr>
<tr>
<td>All</td>
<td>n. of new training initiatives for the professionals and clinicians</td>
<td>Training activity</td>
<td>At least 50</td>
</tr>
<tr>
<td>All</td>
<td>n. of patents</td>
<td>IPR management</td>
<td>At least 6</td>
</tr>
<tr>
<td>All</td>
<td>n. of PhD grants funded by the project</td>
<td>Project realization</td>
<td>At least 60</td>
</tr>
<tr>
<td>All</td>
<td>% of young researchers hired on the total planned (n=139)</td>
<td>Project realization</td>
<td>90% within 1st year</td>
</tr>
<tr>
<td>All</td>
<td>n. of cascade calls for industry and academia</td>
<td>Project realization</td>
<td>At least 8 at M12</td>
</tr>
<tr>
<td>All</td>
<td>Share of women hired within the project</td>
<td>Project realization</td>
<td>At least 40%</td>
</tr>
<tr>
<td>All</td>
<td>Share of women in charge of tasks and work packages</td>
<td>Project realization</td>
<td>At least 40%</td>
</tr>
<tr>
<td>All</td>
<td>Participation in thematic congresses and workshops</td>
<td>Dissemination</td>
<td>At least 10 per Spoke at M36 (total 100)</td>
</tr>
<tr>
<td>All</td>
<td>Conference to present the blue-print for the creation of the Italian Institute of Ageing (IIA)</td>
<td>Project realization</td>
<td>y3</td>
</tr>
<tr>
<td>1</td>
<td>Participation in thematic congresses and workshops</td>
<td>Project realization</td>
<td>10 events at M36</td>
</tr>
<tr>
<td>1</td>
<td>n. of local policy makers and professionals involved by the promotion activities of the smart-indicator dashboard</td>
<td>Stakeholders’ involvement</td>
<td>1,000 policy-makers/professionals at M24</td>
</tr>
<tr>
<td>1</td>
<td>n. of users of the open web-app for population monitoring and forecasts openly accessible to policy makers, professionals and citizens</td>
<td>Stakeholders’ involvement</td>
<td>10,000 users at M36</td>
</tr>
<tr>
<td>1</td>
<td>n. of immigrants monitored by the project activity to assess their integration (considering both adult, old immigrants and their direct descendants)</td>
<td>Stakeholders’ involvement</td>
<td>1,000 at M36</td>
</tr>
<tr>
<td>2</td>
<td>n. of dataset with new data on main genes/molecules involved in ageing process fully assessed</td>
<td>Project realization</td>
<td>12 at M36</td>
</tr>
<tr>
<td>2</td>
<td>n. of improved understanding of SASP process; genes expression alteration in senescence</td>
<td>Project realization</td>
<td>100 gene alterations in at least three cell models in 3 years</td>
</tr>
<tr>
<td>2</td>
<td>n. of animal models developed to better understand ageing processes</td>
<td>Project realization</td>
<td>3 at M36</td>
</tr>
<tr>
<td>2</td>
<td>n. of “omic” profiles associated to ageing</td>
<td>Project realization</td>
<td>16 at M36</td>
</tr>
<tr>
<td>2</td>
<td>n. of toxin protein oligomers pacificated and with studied structure</td>
<td>Project realization</td>
<td>3 at M36</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project realization</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------</td>
<td>---------------------</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td>n. of epigenetics marks changes associated to ageing</td>
<td>1.000 at M36</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>n. of ageing diseases setting approached through development of</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>innovative treatments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n. of new longitudinal data collections designed and launched</td>
<td>3 at M12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n. of subjects analyzed to validate risk stratification tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and management strategies for age-related conditions,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>multimorbidity and frailty</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n. of datasets on environmental factors associated to</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>unhealthy ageing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n. of Health Literacy programs for adult and older people,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>caregiver, health professionals and enterprises implemented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>n. of subjects included into innovative interventions</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>supporting active and healthy ageing ready to be tested in a</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>n. of ICT prototypes tested in a relevant environment</td>
<td>4 at M36</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>n. of subjects identified at risk of frailty using the new</td>
<td>10.000 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>developed tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n. of prototype new monitoring platform to be tested in a</td>
<td>1 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>pilot</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n. of older subject with respiratory syndromes recruited for</td>
<td>1.000 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>telemedicine prototypes testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n. of Thematic Policy Briefs presented to the relevant</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>audience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n. of census of existing population surveys to study care</td>
<td>1 at M12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>needs/resource</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n. of reports on of age friendly environments</td>
<td>1 at M24</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>n. of prototype of modules for data collection on objective</td>
<td>2 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and subjective experience of older workers at work (to be</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>used in the SHARE survey)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>n. of KPIs dataset relating work impact on well-being ageing</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>n. of dataset for “risky retirement” indicators</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>n. of datasets of unbalanced intergenerational relations and</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>prejudices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Innovative software for monitoring domestic violence against</td>
<td>1 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>older women</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>n. of people surveyed on determinants of prejudices towards</td>
<td>10.000 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>older population</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>n. of policy briefs on age-based discrimination and human</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>resource activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>n. of prototype data lakehouse to analyze ageing during</td>
<td>1 at M24</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COVID-19 pandemic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n. of subjects analysed with ageing predictive AI models</td>
<td>10.000 at M36</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n. of clinicians testing the new ICT system for hospital</td>
<td>100 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>data analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n. of technological prototype for older people helping in</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>routine activities evaluating possible physical and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cognitive decline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n. of older subjects recruited with multicomponent</td>
<td>10.000 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>interventions protocol aimed on stratifying to promote</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>healthy ageing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>n. of web app for management of smart environments</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>n. of start-up and innovative SMEs receiving cascade funding</td>
<td>20 at M36</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1 prototype of a ultrasound echography system tested in</td>
<td>1 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>relevant environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>n. dataset of administrative sources on the consumption of</td>
<td>4 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>healthcare services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>n. of joint document incorporating emerging policy</td>
<td>3 at M36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>recommendations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. PROGRAM IMPACT

C1) IMPACT

The potential impact of Age-It program on the economic, social and cultural system of Italy will be guaranteed by a holist and problem-solving, evidence-based approach which shapes the overall workplan and infrastructure of the proposed Age-It Research Programme. In the following pages, we describe:

1. The dissemination and communication strategies that will be put in place to guarantee the highest diffusion of the research findings of the program across relevant stakeholders (Policy makers, professionals, older people and their families, scientists, and general audience);
2. The four so-called outreaching activities, designed to maximise the chances of transferring the research outputs of the programme from lab to real world and society;
3. The relationship between the research outputs and impacts, proposing also indicators for making evaluation of Age-It possible;
4. The contribution of the programme to the positioning and international image of Italy;
5. The contribution of Age-It in bridging the gaps defined by the NRRP.

C1.1 AGE-IT DISSEMINATION AND COMMUNICATION STRATEGY

We designed a detailed Plan for the Exploitation and Dissemination of Results (PEDR) to strengthen the Age-It impact as well as Italy’s position and international image. Age-It policy dialogue and dissemination activities will strongly benefit from the broad thematic and methodical scope of the interdisciplinary consortium, making possible to address the theme of the call from a holistic instead of a discipline-fragmented perspective; the co-creation model as a structured process of mutual learning and creation of new knowledge instead of the classical one-way communication tools; and the ample experience of the consortium partners in dissemination activities.

The PEDR is tailored to three major target groups:

1. Research experts and analysts will be approached mainly through scientific publications in peer-reviewed journals and working papers, as well as presentations at international scientific conferences and workshops. All consortium members have already published widely in top journals, chaired sessions and presented regularly at international conferences, also beyond disciplinary boundaries (scientific audience).
2. Experts from several fields such as research, governmental bodies, civil society organisations, the economy and journalism will be invited to the annual series of consecutive stakeholder events and face-to-face knowledge exchange meetings. These events are organised to effectively compile scientific evidence, as well as practitioner experience into a process of co-creation of new knowledge. Results will be disseminated through policy briefs and digests, i.e., short and comprehensive communication formats, specifically tailored to the information needs of non-scientific users (policy audience).
3. Online dissemination, particularly through open access online publications, newsletters and social media channels, as well as press activities will serve to inform interested audiences directly or through media coverage (broader public).

The PEDR can particularly build on the broad experience of all program partners in policy dialogue and dissemination activities. They took part in policy hearings, stakeholder workshops, interviews and other media activities at the local, national as well as European level. They are supported by their institutional communication departments and press officers. For instance, the Italian Association for Population Studies (AISP) – represented within the Age-It consortium by the former, actual, and future presidents, Prof. Francesco Billari, Prof. Cecilia Tomassini, and Prof. Daniele Vignoli, respectively – has strong links with the Vice-President of the European Commission for Democracy and Demography, Dubravka Šuica, who contributed to the 2021 AISP Report on Italian Population and participated in its public presentation stressing how the European Commission is particularly focused on population ageing and territorial inclusion that are both topical issues in our proposal. With regard to policy dialogue, the program will particularly benefit from the collaboration of many programs’ participants and Spoke leaders with Population Europe, a network of currently 35 of Europe’s leading research centres and 12 international collaboration partners from policy, business and civil society. This unique knowledge pool disseminates the most relevant research findings to policy audiences and the public, for example through policy dialogue events, stakeholder workshops, policy briefs, short summaries of research findings, social media channels and other online activities. The collaboration with Population Europe will be formally strengthened and established in case Age-It will be funded.
Thus, the program does not have to start from scratch but can be built on the basis of existing dissemination infrastructures and collaboration networks, which ensures that the measures are feasible, cost-effective and appropriate.

The consortium will also ensure that the program results will remain available after program ending and can also be used by complementary programs in the future. If feasible and depending on available budget, “Golden Open Access” will be granted. Dissemination publications, such as the digests, webinars and policy briefs, will be accessible to the public on the program website, as well as the websites of consortium partners and Population Europe. Open access will be granted to the program’s scientific publications, and in particular to scientific peer reviewed articles according to the ‘Green Open Access’.

This particularly applies to the exploitation of new data that has been collected and surveyed in the course of the program and will be made available as much as possible considering privacy protection, the intellectual property rights of data providers, as well as the General Data Protection Regulation. Partners have a vast experience as users and collaborators of major EU data infrastructures such as the European Social Survey (ESS), the Generations and Gender Survey (GGS), and the Survey of Health, Ageing and Retirement in Europe (SHARE). The data collected within the framework of Age-It will complement what can be known by these data and will be available, also to non-scientific audiences, in line with the principles of the Open Research Data Pilot.

According to the interdisciplinary scope of the consortium and its long-standing experience in dissemination and policy dialogue activities, the program has access to a large stakeholder network, based on contacts the partners of the consortiums have established in previous years (see next point on the Stakeholder Board).

As what regards communication, the PEDR will be translated into activities and tools which have been proven to be the most appropriate and cost-effective for reaching the target audiences mentioned above. The consortium members are highly experienced with these tools, which guarantees the feasibility of the PEDR activities.

This includes activities on a regular basis, such as,

a. publications in scientific journals and papers presented at international conferences;
b. interviews, press releases and other media activities;
c. online communication, mainly through websites, newsletters, and social media activities;
d. summaries (digests) of results;
e. data collections.

In addition, the program will be built on a series of interlinked activities with regard to the co-creation of new knowledge, integrating the perspective of various stakeholder audiences:

- Each year, an annual event series will start with an outline meeting, composed of 15-20 experts from research, policy, the economy and civil society organisations. In the beginning, all participants have to take an active role and provide one or two short key points about what they see as the utmost important policy challenge in regard to the topic. Researchers from the Age-It consortium will then give a presentation to start the debate, which is structured on questions the participants will receive in advance.
- This conversation will be documented in a perspective paper, which summarises the results of the outline meeting, applying the Chatham House rules.
- The perspective paper will serve as a basis for a webinar that will be open to all interested participants, and where the output of the outline meeting will be presented and discussed with a wider expert audience. Previous Population Europe’s webinar series has attracted audiences from all over the world, who were able to contribute to the debate through the webinar chat box.
- Relevant insights will be incorporated into a revised version of the perspective paper, which will then constitute the foundational document for a final policy meeting. This policy meeting will draw concrete policy recommendations from the program results and the previous discussions. Journalists will be invited to join the third seminar when results are presented.
- The conclusions of these series will be presented in a policy brief, making it possible to disseminate results to a wider audience. This guarantees that evidence-informed policy information reaches a wider audience.

C1.2 FOUR OUT-REACHING TRANSVERSAL ACTIVITIES

The 10 Spokes will generate a significant economic, social and cultural system of the Country by delivering high-quality problem-oriented research. We have designed a proactive framework which incorporates four “out-reaching” transversal activities ensuring the synergy among Spokes and Affiliates. The framework is designed with the ambition of providing high-quality technology transfer services to the participating researchers and of involving the most relevant and motivated stakeholders (e.g. start-ups, NGOs, SMEs) through targeted cascade
funding calls using an open innovation approach (Piller, Hilgers, Ihl, & Schmidthuber, 2021). All the activities are designed according to the principles focused on ageing of the ‘knowledge and innovation communities’ (KICs) of the European Institute of Innovation and Technology (EIT).

- **Activity 1 – Education and knowledge sharing:** A critical success factor for the development, implementation and adoption of sustainable innovative solutions to approach ageing relies heavily on education at different levels. Age-It will provide a portfolio of educational programmes (e.g., MOOC, Master, Ph.D., Thematic Courses, Ageing Academia, Digital Health Literacy programme) targeted not only on students, innovators and entrepreneurs, but also on those who will be directly affected and other stakeholders. In particular, Age-It will develop interdisciplinary educational program to apply Artificial Intelligence in developing diverse effective solutions for an ageing society. From students, to healthcare professionals and policy makers, to patients, caregivers and citizens, Age-It offers an environment of dynamic learning to support an inventive, empowering, and adaptive ecosystem for innovation to thrive. Two Ph.D. programs have been already discussed and developed while preparing the program; one related to the activities of Spoke1: national Ph.D. programme on population ageing and the life course (Ph.D. Population Studies – PopS), and one related to the activities of Spoke 3: Ph.D. Ageing School: Pathophysiology of ageing and prevention of frailty and disability among older adults – AgingPath).

- **Activity 2 – Co-creation, innovation and technology transfer:** Age-It will be a catalyst for new business growth to deliver transformative products and services according to EU climate change objective. The Programme will involve entrepreneurs, start-ups and SMEs to shorten the time-to-market for life-changing products and services, while creating new jobs and contributing to a thriving ageing economy in Italy and also across Europe. Moreover, Age-It will actively involve older people in the participatory design of innovative and effective solutions for health and well-being of the ageing society to ensure the highest level of accessibility, acceptability, inclusion, and usability. Age-It will prepare the ground for life-changing innovation and maximise opportunities for a step-change on how healthcare for older people is delivered through the creation of various Innovation Programmes, involving young students and post-docs, such as Ageing Think Tank, Ageing Innovation Bootcamp, Ageing Hackathon, Mentoring and Coaching Network, Women Entrepreneurship Bootcamp, MedTech Bootcamp, Start-Ups Meet Healthcare Providers, Start-ups Meet Older People, Start-ups Meet Pharma, InnoAgeing Awards, and so forth.

- **Activity 3 – Research Framework:** Different Spokes are responsible for preparing different types of data, which will be then analysed to create research outputs in close collaboration. Age-It will bring together leading groups of scholars from different scientific fields and will establish new collaborations both within and between the Spokes and affiliates. This activity covers the following topics: data management plan, data organization, data documentation, legal and ethical aspects, privacy, data preservation, data access and publication, reuse of research data. This Activity will be carried out with the Ethical Committee established in the Age-It governance. Moreover, Age-It will build a research infrastructure where the different products of the involved researchers could be continuously discussed, validated, and integrated in a multidisciplinary context.

- **Activity 4 – Valorisation and exploitation of results:** Ensuring that advances in science and technology are as open as possible is vital in our knowledge-driven world. Age-It will capitalize on the EU tools designed to increase the impact of Research and Innovation Programme investment, valorisation policy to ensure that data, research results and innovations are turned into sustainable solutions with economic value and societal benefits. Age-It will provide valuable insights for future policies that will remove barriers to innovation and will allow Italy’s industry leaders, entrepreneurs, and SMEs, in collaboration with healthcare providers and citizens, to effectively turn knowledge and ideas into new products and services that improve health and quality of life and drive economic growth.

C1.3 RELATION BETWEEN RESEARCH OUTPUT AND EXPECTED IMPACT

The ten Spokes are bond to generate a set of high-quality and accessible outputs that will directly impact the national and international ecosystem of stakeholders. We have identified the following potential outputs of Age-It, each addressing specific types of stakeholders. As described in section B3, each Spoke, according to its specificity, will generate several of these outputs which will contribute to the overall impact of the Research Programme on the society. We provide a summary of target audiences and related outputs for impact in the Table C.1 below.
### Table C.1. Age-It Target Audience and related outputs for impact

<table>
<thead>
<tr>
<th>Target</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy-makers</strong>&lt;br&gt; This group of outputs will be useful for orienting policy in Italy and beyond. It includes tools such as: a) Policy briefs; b) statistical reports; c) set of key indicators to monitor main demographic, socioeconomic, environmental and health issues, and related policy options/measures; d) Policy recommendations (in most cases validated with the involvement of main stakeholders in the area)</td>
<td></td>
</tr>
<tr>
<td><strong>Industry</strong>&lt;br&gt; This group of outputs will be of relevance for the industry and encompasses:&lt;br&gt;- documentation, such as reports, market analysis, use cases and scenarios, specification on standards and new technologies&lt;br&gt;- prototypes of new technologies (up to TRL4)&lt;br&gt;- intangible assets, such as licenses, patents and databases&lt;br&gt;- creation of new Start-ups/Spin-offs&lt;br&gt;- services provided for/in collaboration with private companies</td>
<td></td>
</tr>
<tr>
<td><strong>Professionals</strong>&lt;br&gt;(clinicians, social workers, public servants, other private workers)&lt;br&gt;Research outputs in this group might consist in a) guidelines and protocols to be used in clinical organizations; b) creation of new training modules for practitioners (including PhD courses); c) creation of new modules for data collections, assessment and self-assessment</td>
<td></td>
</tr>
<tr>
<td><strong>Scientific audience</strong>&lt;br&gt;Given the nature of the research programme and the addressed TRL, many research outputs will be genuinely addressed to the scientific community.&lt;br&gt;These will be mainly constituted by: reports, publications in public archives (open access journal submission); proceedings of Workshops and Conferences; novel dataset, source codes open for sharing and research on GitHub and Slack, Web App and other Software for research purposes; patents (relevant also for industry)</td>
<td></td>
</tr>
<tr>
<td><strong>General audience</strong>&lt;br&gt;(older people, informal caregivers and volunteers)&lt;br&gt;Age-It will be committed to produce a sufficient amount of output for the direct benefit of the general audience. These will be mainly of two kinds:&lt;br&gt;- Documentation for self-care and self-management, accessible for older users and their families, covering a wide range of topics, from health to financial literacy, retirement strategies etc.&lt;br&gt;- Documentation to increase the knowledge and awareness of the general public on the topics covered by the research plan. Laymen summaries and social media contents will be continuously produced to communicate the most relevant age-related topics and to convey the main messages coming from the PE8 research outputs</td>
<td></td>
</tr>
</tbody>
</table>

Age-It activities will have an impact, in the short term, by creating internationally available data, results and knowledge arising from the scientific activities as well as by the creation of a network of cooperating scientists from different disciplines, who will acquire multidisciplinary knowledge on specific issues at local, regional or national level. The efforts towards the engagement of different stakeholders will contribute to overcome the stereotypes rooted in local socio-cultural elements, that hinder the paradigmatic shift towards smart, health, age-friendly environments, where citizens are empowered. The impact of the proposed programme on the economic, social and cultural system will be directly measured with a set of key performance indicators (KPIs), such as: a) scientific excellence (number of ISI publications; number of conference presentations); b) industrial impact (number of prototypes and patents); c) economic impact of systems/services and d) the creation of a consolidated network of spin-off and start-up that will be funded by the open calls. Additionally, a training program will be also developed to spread the culture of technology for active and healthy ageing that will reduce the digital divide and that will also create an employment future for the new generations.

In Table C.2 below, we detail the impact of each specific Spoke.
**Table C.2. Outputs and impacts per Spoke**

<table>
<thead>
<tr>
<th>Spoke 1 will offer unprecedented advances on official statistics on population ageing, as it will:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Develop a <strong>large multi-site Life Course Statistical Register</strong> by operating linkages between the data of social and health surveys and the Statistical Register Systems. The Register will ensure methodological and scientific innovation, and to develop evidence-based policies.</td>
</tr>
<tr>
<td>- Develop a <strong>working prototype that produces dashboards</strong> of constantly updated readily available and easy-to-interpret indicators of the ageing process at various geographic levels.</td>
</tr>
<tr>
<td>- Offer a <strong>set of demographic and derived forecasts</strong> (e.g., labour force participation and health needs), both at the national and local level, as a basis for policy-informed solutions.</td>
</tr>
<tr>
<td>- Develop a <strong>set of proposals to face population ageing</strong>, with two targets: a) to slow down it (e.g., encouraging fertility) and b) be prepared to face its consequences (e.g., life-long learning; re-thinking the length of various stages of employment and family life; improving the health of immigrants, their integration and the education performance of their children).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spoke 2 will contribute to the development of research on the genetic, epigenetic, biochemical, biological, physiological, and “omic” aspects of ageing. Main research outputs will consist of:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- New datasets on main genes/molecules involved in ageing process;</td>
</tr>
<tr>
<td>- Publications and conference proceedings;</td>
</tr>
<tr>
<td>- Animal in vitro models for biogerontological research;</td>
</tr>
<tr>
<td>- Development of innovative treatments;</td>
</tr>
<tr>
<td>- Patents.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spoke 3 will adopt a multidimensional approach to the individual’s life course clinical and functional trajectories to deliver:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Availability of real time ageing indicators a local, regional and national level</td>
</tr>
<tr>
<td>- Evidence-based structural interventions to face ageing changes and better policy making</td>
</tr>
<tr>
<td>- Policies for health care, social care, long-term care, housing, and transport planning, by contributing to inform policy makers and develop public discourse</td>
</tr>
<tr>
<td>- Demographic (e.g., fertility, migration), labour (e.g., working age), life-long learning, and health conditions of Italian population, by supporting policy makers and stakeholders</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output</th>
<th>Impact (given TRL1-4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spoke 1</strong></td>
<td><strong>(Short-term) Increase of:</strong></td>
</tr>
<tr>
<td>- Develop a <strong>large multi-site Life Course Statistical Register</strong> by operating linkages between the data of social and health surveys and the Statistical Register Systems. The Register will ensure methodological and scientific innovation, and to develop evidence-based policies.</td>
<td></td>
</tr>
<tr>
<td>- Develop a <strong>working prototype that produces dashboards</strong> of constantly updated readily available and easy-to-interpret indicators of the ageing process at various geographic levels.</td>
<td></td>
</tr>
<tr>
<td>- Offer a <strong>set of demographic and derived forecasts</strong> (e.g., labour force participation and health needs), both at the national and local level, as a basis for policy-informed solutions.</td>
<td></td>
</tr>
<tr>
<td>- Develop a <strong>set of proposals to face population ageing</strong>, with two targets: a) to slow down it (e.g., encouraging fertility) and b) be prepared to face its consequences (e.g., life-long learning; re-thinking the length of various stages of employment and family life; improving the health of immigrants, their integration and the education performance of their children).</td>
<td></td>
</tr>
</tbody>
</table>

| **Spoke 2** | **(Short-term) Increase of:** |
| - Competitiveness of the Italian research area on biomarkers of ageing and anti-ageing research |
| - Capacity to develop “novel drug-design”, through a cascade strategy based on *in vitro, ex vivo* and *in vivo* tests for more effective therapies |
| - Business opportunities for companies in the pharma and biotech industries |

| **Spoke 3** | **(Short-term) Increase of:** |
| - The impact of degenerative diseases |
| - Healthcare expenditure associated to suboptimal chronic disease management |

| **Spoke 1** | **(Short-term) Increase of:** |
| - Availability of real time ageing indicators a local, regional and national level |
| - Evidence-based structural interventions to face ageing changes and better policy making |

| **Spoke 2** | **(Mid-term) Improvement in:** |
| - Availability of solutions for better health of older people and their homeostatic capacity |
| - Effectiveness of existing therapies by disease early detection |
| - Identification of biomarkers of risk status and early diagnosis |
| - Personalised medicine protocols through genetics and molecular systems characterization of specific diagnostic and pharmacological molecules |

| **Spoke 3** | **(Long-term) Reduction of:** |
| - Training and education of the next generation of ageing scientists |
### Output

- A clear methodological framework to evaluate clinical and functional status in age-related diseases, multimorbidity and frailty;
- A definition of the role of biomarkers in age-related disease, multimorbidity and frailty;
- A set of effective and evidence-based management strategy to approach ageing, multimorbidity and frailty;
- A comprehensive assessment of the impact of climate change and pollution on ageing;
- A new PhD programme on Ageing.

Publications, new databases, clinical protocols and innovative screening and evaluation tools will be the main outputs of the Spoke.

**Spoke 4** will advance the understanding of age-related changes in cognition, motivation, emotions, and behaviours as people progress into older age, focusing both on the normal ageing process and on pathological cases associated with behavioural or cognitive disorders. Specific outputs include:

- Defining the most suited quality/quantity of physical exercise and macro- and micro-nutrients may enhance specific interventions and increase the disease-free period during ageing.
- Breaking down stereotypes and beliefs about changes in cognitive domains with ageing, developing motivational (ICT) interventions will prompt functional attitudes and motivational changes, to sustain older adults’ everyday functioning.
- Defining a web multimedia repository of strategies and good practices to create age-friendly environments and communities, easily consultable by municipalities, may promote the mobility and the independence of older adults, enhancing their quality of life.

Publications, clinical protocols and recommendations, new databases, innovative ICT tools will be the main outputs of the Spoke.

### Impact (given TRL1-4)

- Effectiveness, efficiency, cost-effectiveness and quality of health care services for older people

**Mid-term** Improvement of:
- Prevention and therapies for the older people
- Management strategies for multimorbidity and polypharmacy

**Long-term** Improvement of
- Disability-free life expectancy
- Quality of life of older people with physical and cognitive impairments

**Short-term** Increase of the availability of:
- Therapeutic strategies for active and healthy ageing (e.g., tailored nutritional program for older people, specific training program

**Mid-term** Improvement in:
- Management of environment, architectonic infrastructures, transport in an age friendly approach
- Participation of older subjects to health education programmes

**Long-term** Increase of:
- Healthy life expectancy of ageing people

### Spoke 5 will deliver several outputs including:

1. A comprehensive review of different aspects of care (legal and sociological aspects);
2. An innovative design to deal with patients and their caregivers, developing the first platform for e-health provision for patients and their caregivers;
3. Providing solutions for care in different territorial contexts with constant involvement of a set of relevant stakeholders;
4. Development of an e-learning platform for the training of professional, formal and informal carers tested and discussed with selected groups;
5. A policy suggestions package regarding the efficient, effective and socially sustainable solutions for the integration of formal and informal care, discussed with relevant stakeholders.

**Short-term** Increase of:
- Internet use by older people and their caregivers
- Quality of long-term care
- Increasing training opportunities for older people, caregivers, and professionals in Long-Term Care

**Mid-term** Increased availability of:
- Improvement of caring skills of professional and caregivers in the Long-Term Care sector
- Policies for long-term care by contributing to inform policy makers and develop public discourse
<table>
<thead>
<tr>
<th>Output</th>
<th>Impact (given TRL1-4)</th>
</tr>
</thead>
</table>
| Publications, policy briefs, training modules, programmes, recommendations, new databases, innovative ICT tools will be the main outputs of the Spoke. | **(Long-term) Increase of:**  
- Quality of life of older people with physical and cognitive impairments |
| **Spoke 6 will:**  
- Explore possible state interventions that go beyond simple redistribution and transfers, to provide new services to 'empower' older workers to be actors of their own ageing process.  
- Assess ways to improve individuals’ awareness of ageing processes in order to favour a cultural transition from a country that saves to a country that invests.  
- Address the financial literacy of young and old individuals as well as the health literacy at older ages. | **(Short-term) Increase of:**  
- Digital active older subjects  
- Availability of policy tools and indicators to deal with an ageing workforce.  
**Mid-term Increased availability of:**  
- Extension of older workers participation to the labour market  
- Health and well-being of older individuals at the workplace  
**(Long-term) Increase of:**  
- Equality across generations, with positive spill overs on the social integration of older people.  
- Sustainability of the pension system  
- Labour supply of older workers compared of the industry demand  
- Positive contribution to the digital transition and the green transition on older workers and on the life of older people (silver economy, chain supply) |
| **Spoke 7 will address several aspects related to the ageing process:**  
- Issues of intergenerational justice, involving not only fair distribution of social cooperation across individuals of different age, but also fair treatments, equal respect and status among citizens of any age;  
- Contribute to designing and evaluating policies for a more gender-balanced and equal ageing society.  
- Address political and legal issues related to ageing, and plans to outline actions promoting generational justice and contrasting age discrimination.  
- Templates for future codes of conduct and guidelines to prevent frauds and discrimination. | **(Short-term) Increase of:**  
- Public offices and staff dealing with preventive discrimination activities  
- Shared mansions on workplace among different ages and genders  
- Salaries budgets on workplaces  
- Number of frauds and discrimination episodes to ageing people detected  
**Mid-term Increased availability of:**  
- Improved support to people facing discrimination based on age and gender  
- Institutional support to the fight of ageism  
- Number of older subjects actively participating in the political and social context  
**Long-term Increase of:**  
- Equality across generations, which will in turn have positive spill overs on the social integration of older people, also reducing unequal ageing. |
| **Spoke 8 will:**  
- Support the needs and strengthen abilities to foster the health of older patients;  
- Design and adopt innovative technologies in different life domains – mobility, cognitive functioning, communication – and environments, like hospital and home; | **(Short-term) Increase of:**  
- Polypharmacy adherence  
- Increased age friendly technological devices in hospital environments age friendly: robots, smart tv, smart-beds, smart communication devices |

69
<table>
<thead>
<tr>
<th>Output</th>
<th>Impact (given TRL1-4)</th>
</tr>
</thead>
</table>
| - Create a large dataset that can be exploited to develop personalized intervention, and articulate multisectoral policies, which enhance social participation and good practices of social innovation among older people. Publications, clinical protocols and recommendations, new databases, innovative ICT tools will be the main outputs of the Spoke. | (Mid-term) Increased number of:  
- Shared and open spaces in the hospitals, facilitating contact between older patients and their families  
- Standardised data on the needs and impact of interventions, more innovation in collecting, analysing and using information, more interoperability of data-sharing. |

**Spoke 9 will:**
- Develop an integrated technology for active and healthy ageing that goes beyond the classic linear research-development-adoption model towards a circular approach that can combine multiple domains from the idea conceptualization.  
- Implement new disruptive and personalized tools based on the Internet of Robotic Things paradigm  
- Merge domains of design, health, artificial intelligence, and cybersecurity to generate new intelligent and personalized devices that can significantly improve the prevention and management of the disease, as well as the independent living. Publications, prototypes, market analysis, new databases, patents and new businesses (e.g., start-ups) will be the main outputs of the Spoke.

| (Short-term) Increase of  
- Human-centred AI technologies usable by older people  
- Technological wearable devices available for older people: wearable robots, virtual glasses, wearable biological sensors  
- Increase of age-friendliness of private and public environments |
| (Mid-term) Increased positive impact of:  
- Technologies for independent living  
- Age-supportive environments for independent living of older people |
| (Long-term) Increase of:  
- Quality of life of older people with physical and cognitive impairments but also for older people in general |

| Spoke 10 will:  
- Contribute to development and implementation of policies to radically change the Italian management of ageing.  
- Impact on the organization of institutional aspects of the Italian health districts to ensure sustainability, efficacy and efficiency of services for the ageing population. The following aspects related to healthy ageing, frailty and integrated care will be addressed:  
  i. to align policies and strategies;  
  ii. to clarify the mechanisms underlying the generation of health-inequalities in longevity and healthy ageing;  
  iii. to setup a personalized prevention of such inequalities providing a risk-based strategy;  
  iv. to improve organizational and clinical guidelines in programs of health promotion;  
  v. to align new health and social care policies to emerging needs;  
  vi. to investigate the gap between the needs of the ageing population and the institutional response. Publications, policy briefs, clinical protocols and recommendations, new databases, innovative tools for data collection and analysis will be the main outputs of the Spoke. |

| (Short-term) Increase of:  
- Professional figures for creation, management and application of ageing changing policies  
- Number of final personalized preventive intervention to avoid inequalities  
- Revised Guidelines for disease management in complex older people  
- Local health districts and municipal social services with resources and specific tools oriented to ageing people |
| (Mid-term) Positive impact in terms of:  
- Reduction of age-related inequalities |
| (Long-term) Positive impact on:  
- Economic, social and cultural system of the Country |
The potential impact of the results of this Research and Innovation Programme is large. Italy, together with Japan, is currently one of the oldest countries in the world, because of its long history of low mortality and very low fertility. Italy did experience important migration inflows in the last three decades, but they could only slightly slow down the ageing process, not being strong enough to halt or revert it. As population ageing is here to stay (and will even accentuate in the next 20 to 30 years) there is the need to analyse it in full, understand its implications, and adapt society accordingly.

The international image of the country will benefit from the outcomes of the Age-It and will locate it at the forefront of the social, policy, medical and technological innovations that will transform the challenge of care provision in an ageing society into an opportunity for significant economic and technological development, transforming communities and introducing solutions that makes care provision environmentally, socially and economically sustainable.

Age-It ambition is to strengthen the capacity of our researchers to drive Research and Innovation Programme at international level, and impact on policy and funding strategies towards broader adoption of innovative solutions. The massive increases in the quality-of-care providers’ and care receivers’ well-being, in the productivity and effectiveness of care provision and organization will pave the way for the creation of technological, medical and organizational solutions that will likely to be adopted by other rapidly ageing societies – not only in Europe but also in other contexts, such as Asian countries. The strong connections between the Spoke partners and major European and international organisations in the field of elder care will facilitate the translation of the achieved results into a quick improvement of our country’s image and positioning within the international context.

### C1.5 CONTRIBUTION IN BRIDGING THE GAPS DEFINED BY THE NRRP

Our Spokes contributes in bridging the gaps defined by the NRRP in several ways.

**Spoke 1** is fully consistent with several missions of the NRRP, for instance: Mission 1 (digitalisation, innovation, competitiveness, culture: if successful, the impact of this Spoke is going to be of great help to an ageing population, exposed to potential isolation risks); Mission 4 (education and research: research on ageing needs to be more systematically pursued in Italy); Mission 5 (cohesion and inclusion): older adults represent a population segment at risk of social exclusion. Analysing housing needs of older people and contextual pre-conditions for ageing well in place is also crucial to prevent institutionalization in line with Mission 5.2.1.

**Spoke 2** is completely dedicated to mission 6 of the NRRP (health). In fact, all the activities in the Spoke are dedicated to increase the knowledge of the aetiology of unhealthy ageing and to identify markers of early diagnosis and treatment that could increase the health status and well-being of older people. The identification of such broad tools for the preservation of healthy ageing will guarantee fairer access and will promote health equity. Moreover, the large investment on present and future research is in line with Mission 4 (education and research).

**Spoke 3** activities are related to Mission 6 of the NRRP (health). The Spoke, in fact, will consider multimorbidity, frailty, and disability as the most important predictors of negative health outcomes among older people and it will tackle the challenges in terms of defining optimal healthcare strategies for the individual and optimising resource allocation for the healthcare system and the whole society. An intensive research activity on ageing is also a key point of Spoke 3, in line with Mission 4 of NRRP (education and research).

**Spoke 4** points at Mission 1 of NRRP (digitisation, innovation, competitiveness, culture). The Spoke, in fact, will develop age-friendly tools to support well-being and to promote healthy ageing, also helping older people in manage their own health habits. This activity, together with the risk-stratification of population will also contribute to Mission 5 (cohesion and inclusion) and Mission 6 (health).

**Spoke 5** will contribute to several cross-priorities defined by the Italian NRRP, e.g.: i) reducing gender-related inequalities by addressing and improving the well-being of formal and informal care givers (who are in the greatest part women, often with immigrant-origin background) and by improving the effectiveness and pervasiveness of long-term care services reducing the burden of
unpaid family care; (ii) reducing the distance between living and economic conditions between Southern regions and the rest of the country by specifically addressing the organizational and technological aspects of care provision in the inner areas. Moreover, the close integration between the activities of Spoke 5 and the organization of the health and social care services at the local and regional level, the fact that its outcomes will contribute to the promotion of a self-sufficient, autonomous life at older ages and delay in institutionalization, the promotion of digital and technologically-advanced solutions in the field of care provision, telemedicine and health monitoring, the promotion of educational and training programs in the field of care provision are in line with and complement other measures adopted within Missions 1, 2, 4, 5 and 6 of the NRRP.

Spoke 6 activities are related to Mission 1 of the NRRP (digitisation, innovation, competitiveness, culture). They will foster innovation, democracy, (intergenerational fairness, welfare sustainability and collaborative governance) mitigating unequal ageing (e.g., by gender), promoting the digital transition, economic and financial inclusion, and developing new models of consumption for the green transition. More specifically, this Spoke: i) analyses the effects of the digital transition and the green transition on the young-old relative labour demand and estimate the substitution elasticity of young-old employment within the firm; ii) improves, integrates and collects new information on the diffusion and use of Information and Communication Technology (ICT) and robots at the firm level; iii) simulates the impact of the digital and green transitions on working patterns taking into account possible displacement effects on work of new technology and anticipated retirement decisions.

Spoke 7 activities are mainly related to Mission 5 of the NRRP (cohesion and inclusion). The Spoke, in fact, will promote a just society in which all citizens – young and old – are included on fair terms. Moreover, it develops specific actions to promote cohesion and inclusion of women and disadvantaged groups. Finally, the broad research activity developed in the Spoke is in line with Mission 4 of NRRP (education and research).

Spoke 8 impact is of primary relevance for the national goals of the NRRP, and in particular it is consistent with Missions 1, 4, 5 and 6 of the NRRP. The continuity of care for the older population, from home to hospital to long-term care services, needs to be coordinated and not fragmented, as it is currently. Therefore, the personalised assessment of the needs of the older individuals in each of these settings and the implementation of personalised interventions, required to promote their health and well-being, as envisioned in the activities of the Spoke, will try to meet this goal. The evaluation of the cost-effectiveness of personalised multicomponent intervention will foster rational resource allocation. The activities of this Spoke will allow to test the influential role of personalised multicomponent intervention on the utilisation of/access to healthcare services.

Spoke 9 will primarily cover items related to mission 1 of the NRRP (digitisation, innovation, competitiveness, and culture) by exploiting advanced tools considering human-in-the-loop since the conceptualization that will reduce the digital divide by proposing tailored solutions and guidelines for the design and development of solutions for older adults. Following the innovation ecosystem approach, the program proposes that close collaboration with top-end companies and SMEs will foster the immediate translation or the research into the industry. This Spoke will also lead toward the development of integrated services that will promote the prevention and the promotion of active ageing at home, enhancing delocalized access to services reducing the gaps between regions.

Spoke 10 has a transversal nature, integrating results coming from public health, economics, technology, medicine, biology, and sociology in order to provide policies that increase healthy ageing and well-being of older people is, by its nature, synergic with other programs that will be funded by the NRRP. In particular, the activities of the Spoke will enhance the equality in health, including gender equality, and its results will support more vulnerable people – Mission 5 (cohesion and inclusion). The topics developed in each WP are consistent with the Mission 6 (health) of the NRRP. In this regard, Spoke 10 will achieve in the goal of mapping needs, struggles and resources of the ageing population and professionals to align the new policies of health and social care in the NRRP, addressing the challenges entailed by their application, the workings of formal and informal care networks, and offering guidelines for more integrated social and health policies. Spoke 10 will result in knowledge-based good practices for the management of the ageing population.
C2) SINERGIES WITH OTHER PROGRAMMES

C2.1. AGE-IT INTERPLAY WITH OTHER NRRP INITIATIVES

We ensure synergy by design to maximise the outreach of Age-It in terms of actions, activities and outcomes, while avoiding redundancies with other initiatives (Table C.3). Synergies with other programmes will be explicitly considered and addressed, on a regional, national and international basis.

Most of the Universities and others participants of Age-It program are also involved in other consortia under the NRRP, and in programs or activity of technological transfer, under the schemes of IPCEI, Horizon Europe or territorial centers (the list of proposals submitted is available on request). The involvement in other proposals regarding various NRRP M4C2 initiatives will make it easier to establish synergies, in case of funding. The partners will guarantee a truly fruitful exchange in terms of scientific output, technology transfer, training and entrepreneurship efforts and full disclosure of related funding.

Age-It will especially interact with the THE (Tuscany Health Ecosystems) program, that currently is ranked at the fourth position within the overall list of Ecosystems of Innovation and Sustainability, and thus has passed the first evaluation step. THE aims at boosting and supporting the growth and consolidation of the life sciences (LS) ecosystem of Tuscany, a major scientific and economic sector of the region. The connections between THE and Age-It, both based in Florence as coordination entity, are numerous in the field of active and healthy ageing. Hence, they will collaborate and support joint activities to: enhance the impact of the various Spokes through the definition of challenges and actions to be implemented regarding industrial research, innovation, technology transfer and market needs; attract SMEs or large enterprises at national and international level and other relevant actors of interest for the different activities of the Spokes; promote and disseminate the research and innovation initiatives and cascade funding opportunities.

Table C.3. Age-It synergies with NRPP and other national and international programs

| NRPP Missions | • MIC1: digital citizenship, basic digital skills  
|               | • M5C2: support for vulnerable people and persons with disabilities, interventions for non-self-sufficient elderly people, sport and social cohesion  
|               | • M6C1: IT services for prevention and support  
|               | • M6C2: strengthen scientific research in the bio-medical and health fields, data analysis for governance and health planning, person-centred approach |
| NRPP National Centres & Extended Partnerships | • Ecosystem THE (Tuscany Health Ecosystems)  
|                                           | • National Center on the development of gene therapy and drugs with RNA technology  
|                                           | • New Research Infrastructure FOSSR: Italian Open Science Cloud for the Social Sciences  
|                                           | • Other Enlarged Partnerships (Partenariati Estesi):  
|                                           | ➢ Neuroscience and neuroparmacology partnership  
|                                           | ➢ Artificial intelligence: foundational aspects  
|                                           | ➢ Models for sustainable nutrition  
|                                           | ➢ Telecommunications of the future  
|                                           | ➢ Innovative diagnostics and therapies in precision medicine |
| National Programs and Plans | • PRIN (Progetti di Rilevante Interesse Nazionale), various years  
|                              | • FARE (Framework per l’Attrazione dell’Eccellenza della Ricerca in Italia), 2018, 2021  
|                              | • National Prevention Plan (PNP) 2020-2025  
|                              | • National Program for Research (2021 -2027)  
|                              | • National Chronicity Plan (2016) |
| International Programs | • European Research Council (Age-It involves starting, consolidator and advanced ERC grantees)  
|                          | • Health Horizon Europe 2021-2027 |

Specific synergies are envisaged with the proposal “FOSSR” presented for the NPRR under the Action 3.1.1 “Creation of new research infrastructures, strengthening of existing ones and their networking for Scientific Excellence under Horizon Europe”. The aim of FOSSR is the creation of an Italian Open Science Cloud for the Social Sciences, which shall provide innovative tools and services to investigate issues related to the economic and societal change of contemporary societies: demographic analysis and the structure of economy and society, social behaviours, models for social simulation, design, implementation, and assessment of public policies. The applicant is CNR, with the participation of ISTAT – both of them partners of Age-It as well. A key research infrastructure for FOSSR is SHARE-ERIC – Survey of Health, Ageing and Retirement in Europe (SHARE) – European Research
The Italian participation in SHARE-RI is under the Ministry for the University (MUR), through the CNR, with a scientific seat at the University of Padova. SHARE is an interdisciplinary and longitudinal survey on the economic and social conditions, the health status and well-being of individuals aged 50 and over in twenty-seven European countries (plus Israel). A specific synergy is with FOSSR WP3 and WP4, with the collection of complementary data (in terms of spatial and temporal resolution, typology, etc.) with innovative methods compared to those currently used by SHARE. In FOSSR, a completely new tool, the first national online probability panel of Italian and foreign individuals residing in Italy will be developed. The Italian Online Probability Panel (IOPP) will provide a multi-purpose Research Infrastructure enabling the implementation of high-quality data collection at the micro-level in Italy. It will be characterised by the highest scientific standards in social sciences fostering the creation of a sustainable infrastructural research hub for Italian panel studies in social sciences, with a strong innovation imprinting. In FOSSR WP5, computational social science shall provide important new resources to exploit the survey results of SHARE, through data mining (machine learning, natural language processing), agent-based social simulation models, social network analysis and spatial analysis. The multiple linkages between FOSSR and Age-It will offer new advances based on new data about the trajectories of active and healthy ageing, and their social and demographic correlates, over the life course.

Incidentally, Age-It closely links to the Sustainable Development Goals 2030 Agenda objects “Enforce Gender Equality”, “Create Decent Work and Economic Growth”, “Increase Industry, Innovation, and Infrastructure”, “Reduce Inequality”, “Mobilize Sustainable Cities and Communities”, aiming to reduce unequal ageing, and promote social connectedness, active participation in civil society, active ageing, intergenerational relations, and interaction between urban and rural areas – all favouring ageing well in an inclusive ageing society.

The employment of a relevant number of young researchers and scholars will offer the possibility of dramatically reinforcing Italian scientific interdisciplinary research on this topic, further promoting the international standing of our University and Research system. Several Spokes will also introduce innovative PhD positions (or even programs) then responding to the innovation needs of the industry and promoting the recruitment of researchers by companies.

Activities and actions envisaged in all Spokes are consistent with several of the research activities that the scholars involved have pursued in the recent past, are currently pursuing, and intend to pursue in the future, as proved, among other things, by their applications for PRIN and HORIZON funding schemes on related topics (PRIN call has just been closed – list of proposals submitted by Age-It researchers available on request).

With reference to the NRRP missions, Age-It has a strong synergy with the M5C2 mission (social infrastructures, families, communities and third sector), thanks to the development of tools to support vulnerable people towards an active and inclusive ageing, aimed to prevent hospitalization and institutionalization. There is also a strong connection with the M6C2 mission (innovation, research and digitalization of the national health service), as regards the strengthening of scientific research in the biomedical and health sectors. The program is also linked to mission 1 (Digitalization, innovation, competitiveness, culture and tourism), as it aims at training citizens and socio-health operators and at the inclusiveness of the population by intensifying the development of multiple digital tools, based for example on apps and web applications. We provide in the Table C.3 below an overview of Age-It synergies with NRPP and other national and international programs.

C2.2. SPOKE-SPECIFIC SYNERGIES

We detail in this section synergies with other NRRP M4C2 initiatives “From Research to Entrepreneurship” (Dalla Ricerca all’Impresa) for each Age-It Spoke.

Spoke 1: The most important final outputs that this Spoke will generate to the benefit of citizens, and to the Italian economy are: 1) a working prototype producing dashboards of constantly updated, readily available and easy-to-interpret indicators of the ageing process at local level in Italy; 2) a set of demographic and derived forecasts; 3) a set of solutions to face population ageing (e.g., eliminating the obstacles that prevent desired fertility from becoming an effective one, promoting and managing immigration flows and migrants’ integration). The strong focus on Data Science applications for decision-making will ultimately facilitate the creation of new start-up or spin-off to find new applications for key enabling technologies. Overall, Spoke’s activities are in total agreement with the Mission 5 and 6 of the NRPP, respectively “Cohesion and Inclusion” and “Health”. The planned activities are also clearly consistent with other national and
international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027). Activities and actions envisaged in Spoke 1 are consistent with several participants’ applications for PRIN and HORIZON funding schemes. Some of the Spoke’s participants are ERC awardees with extensive European international networks. Spoke 1 and local and regional programs in the field of demography will be extremely relevant thanks to the direct connection of this network with the highest level of policy making (Department of Family Policies, Presidency of the Council of Ministers, working group on “Demography and Covid-19”). Spoke 1 also aims at supporting research activities involving a new generation of young researchers trained in the understanding of population processes and the demography of ageing by starting an interdisciplinary Ph.D. program.

Spoke 2: Central to the dynamic of ageing and closely related to the demographic and socioeconomic trends, this Spoke intends to identify new biomarkers of ageing and ageing-related diseases and proposes new or re-purposed therapeutic approaches for their cure. Clearly, this is line with the Mission 6 of the NRPP (“Health”) and with other national and international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027). Spoke 2 has a strong connection with the NRPP National Center on the development of gene therapy and drugs with RNA technology. Indeed, the study of metabolic diseases linked to ageing and the identification of tissue generation mechanisms constitute the indispensable premise for the development of RNA drugs. UNIPD is co-leader of the Spoke and Hub of the National Center; namely, it has passed the first evaluation step. Many of the researchers of Spoke 2 have programs funded through the PRIN and other national and regional funding schemes, and many young PhD-holder scientist involved in the research group are participating to the NRPP funding scheme termed “funding for young researchers”. Some of team’s researchers are ERC awardees with extensive European international networks. We also propose to create an integrated system of infrastructures for research and innovation and start-up as consequence of the research activity and network created within this Spoke.

Spoke 3: The mission of Spoke 3 is to offer an interdisciplinary knowledge and understanding of the complex process of ageing, both for public institutions in healthcare, and for technological and biomedical industries. In line with NRPP priorities, Spoke 3 will develop cutting-edge science, real-time surveillance, laboratory diagnostics, and collaborative partnerships, also fostering the creation of new start-ups or spin-offs geared to applications for key enabling technologies. Some of the researchers of Spoke 3 have programs funded through the HORIZON. Spoke 3 also aims at supporting research activities involving a new generation of young researchers on ageing, for instance by starting an interdisciplinary Ph.D. program. Thanks to their expertise and research networks, participants to Spoke 3 also have scientific and technical synergies with the other Enlarged Partnerships (i.e., 1, 3, 6, 9, 12). The overall aim of Spoke 3 is to improve health, safety and security of the Italian (older) population and define optimal healthcare strategies, in total agreement with the Mission 5 and 6 of the NRPP (respectively “Cohesion and Inclusion” and “Health”). The approach of this Spoke, centred on multimorbidity, also exploits its connection with neuroscience and neuropharmacology partnerships. Finally, the activities planned within this Spoke are consistent with other national and international research frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027 and its main areas of intervention), fostering synergies and collaborations for research on ageing.

Spoke 4: Activities planned in this Spoke will take advantage both of a joint training between universities and industry, and both of the creation of multi-stakeholders’ environments, where the adaptation of the designed solutions will facilitate the adoption in current service provision, as well as horizontal and vertical scale-up processes. The proposed activities, adopting person-centred participatory approaches, will strengthen basic research and the exploitation of innovative models for applied research conducted in synergy between universities and industry. Clearly, this is again in line with the Mission 5 (“Cohesion and Inclusion”) and 6 (“Health”) of the NRPP, but also with Mission 1 (“Digitisation, innovation, competitiveness, culture”). In addition, the activities planned within this Spoke are connected with other national and international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027). More generally, the whole program, and Spoke 4 in particular, aims to support processes for innovation and technology transfer by promoting the exchange, adaptation and scale-up of good practices and innovative technologies validated
Spoke 5: The activities of this Spoke will significantly reinforce fundamental research across various fields of expertise that are needed in the study of care provision. In addition, the component of Spoke 5 devoted to care-giving in the context of inner areas and age-friendly urban environments, will create important synergies with the activities of the National Center of Sustainable Mobility. This is consistent with the Mission 5 and 6 of the NRPP, the activities planned within this Spoke as well as other national and international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027 and its main areas of intervention). Next, Spoke 5 solution-oriented approach – with highly integrated organizational, technological and medical innovations in the field of health and social care provision – will contribute to reinforce innovative ecosystems, local key innovative actors in the fields of IT and biotechnological solutions and applications in the field of health monitoring and telemedicine, including start-ups and spinoffs. Finally, the potential for complementarity and synergies between the activities of Spoke 6 and local and regional programs in the field of care provision to older population will be extremely relevant thanks to the extensive partnership of national champions from science, civil society and enterprises involved, and to the direct connection of this network with the highest level of policy making (Department for Family Policies, Presidency of the Council of Ministers) and with some of the most relevant national stakeholders in the field of care provision. A good share of the researchers of Spoke 5 have programs funded through the HORIZON, PRIN and other national and regional funding schemes.

Spoke 6: This Spoke builds upon and could benefit from the already existing collaborations/networks of researchers, accumulated knowledge, participation in interconnected data infrastructures, data harmonization and new data collection methodology. UNIVE supports the SHARE ERIC research infrastructure, managing the collection, archiving and distribution of multidisciplinary data on ageing. Collaborations and participation in national and international programmes exploring the most diverse aspects of ageing will allow the Spoke 6 to develop important contacts/networks relevant for this research area (in particular National Institute of Ageing NIA, the IFS – Institute for Fiscal Studies, UK). Participants to this Spoke have also experience in training of young researcher (Summer Institute on Ageing). The program will: allow the strengthening of existing research infrastructures – and the creation of new ones – enlarging the participation to new members; support “key” research projects such as those in the fields of social inclusion, health, welfare and social security; facilitate the creation and development of integrated research and data infrastructures as well as policy design. The activities of Spoke 6 point towards “a national programme to ensure worker employability” and support for vulnerable or frail people (also connected with Mission 5 of the NRPP, “Cohesion and Inclusion”), with important implications for the definition of new training programmes for older adults, to be co-designed and implemented through a public/private partnership. A good share of the researchers of Spoke 6 have programs funded through the HORIZON, PRIN and other national and regional funding schemes, and one of the Spoke’s participants is an ERC awardee.

Spoke 7: This Spoke will provide new knowledge on several aspects of ageing, which will be useful to the society at large, such as intergenerational justice, inequality and diversity at old age, cultural traits, political sustainability of welfare programs, legal protections of older adults. Specific contributions of Spoke 7 to the business environment include: 1) a dashboard with indicators of intergenerational equity and guidelines to achieve a fair treatment of the different generations of workers in the labour market and within firms; 2) legal advisory on age-based discrimination and human resource activities to be provided in private and public organizations; and 3) the development of an organic package of services and activities to promote inclusion of older women, recognize cultural differences and foster intergenerational equity in the workforce of large companies. Therefore, Spoke 7 activity is in line with Mission 5 of the NRPP (“Cohesion and Inclusion”). Some WP leaders have proved experience in being able to translate research outcomes into policy.
guidelines and legal recommendations for the business environment. Many of the researchers of Spoke 7 have programs funded through the HORIZON, PRIN and other national and regional funding schemes. Some of the Spoke’s participants are ERC awardees with extensive European international networks.

**Spoke 8:** The activities proposed in this Spoke respond to the new socioeconomic needs underlined in the Next Generation EU. This Spoke focuses on the most significant areas of intervention to promote healthy ageing, to prevent chronic diseases and to counteract pathways to disability and loss of autonomy. It is strongly based on the interconnection of technological and clinical research, hence providing potential collaborations with other extended partnerships (AI, sustainable nutrition, neuroscience and neuropharmacology, telecommunications) of the NRRP, as well as with the three macro-areas of PRIN funding scheme (life science, information and communication, social sciences). Overall, the objectives and activities are again in line with the Mission 5 (“Cohesion and Inclusion”) and 6 (“Health”) of the NRPP. They also relate to the activities planned within this Spoke and with other national and international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027). Proposals and solutions based on evidence-based interventions in the field of healthy ageing will be made available to all institutions which are currently entrusted with the governance of health and social systems on a local and national basis. They will contribute to the development of the public/private effort towards the adaption of the welfare and health systems to the needs of older adults, in order to provide integrated, person-centred care (also in line with the NRRP M6C1).

**Spoke 9:** Activities and actions proposed within this Spoke are consistent with the main research fields where researchers involved in the program are recognized as international experts, and several proposed activities will benefit trough the synergies coming from linked research projects. For instance, the activities proposed by UNIFI DIEF have already started with grants coming from H2020 EU FP, national PON, and regional (e.g Ricerca Salute) programs and they will continue applying in HE funding calls. Several participants have also applied to PRIN funding scheme, e.g., to develop advanced behavioural models for enhancing human-robot interaction for rehabilitation therapy with children affected by ASD. The activities have already started with grants coming from H2020 EU FP, MSCA RISE, and MAECI funds. In addition, UNIPD researchers also applied to PRIN fundings schemes to investigate the neural correlates of balance in older individuals and how to improve balance thanks to exoskeletons. Finally, participants have an extensive track record in technological transfer, with funding for collaborative projects (i.e., Unimpresa) and a very active public-private enterprise called UNISMArt, fostering technology transfer between UNIPD and the companies in its territory. This Spoke’s activities accord with the Mission 5 (“Cohesion and Inclusion”) and 6 (“Health”) of the NRPP as well as other national and international programmatic frameworks (e.g., the National Prevention Plan (PNP) 2020-2025; the Chronicity Plan (2016); the National Program for Research (2021-2027); the Health Horizon Europe 2021-2027).

**Spoke 10:** This Spoke integrates results coming from public health, economics, technology, medicine, biology, and sociology in order to provide a road-map for the design of policies that increase healthy ageing and well-being of older people. It is synergic with other NRRP programs: several researchers of Spoke 10 are already engaged in various national research projects on ageing, and in the development of strategies for the NRRP health planning at local level. The experience of the team in the dissemination of health policy guidelines will benefit health institutions and the society at large. The activities of this Spoke will promote equality in health, including gender equality, and its results will support more vulnerable people (in line with NRRP Mission 5 “Cohesion and Inclusion” and 6 “Health”). Spoke 10 includes programs funded through the HORIZON, PRIN and other national and regional funding schemes; and other applications are in due course.

Summarising, all the Spokes are designed to represent the foundation of the biomedical, sociodemographic, cultural, political, economic, and legal analysis of ageing to be performed in a newly born Italian Institute of Ageing (IIA), which is currently missing in Italy. IIA will create a proactive research and policy-oriented environment that will serve as a catalyst for future synergies and economies of scale on regional and national research programmes on ageing in Italy.
C3.1 SOCIOECONOMIC, TECHNOLOGICAL, BIOMEDICAL AND CROSS-CUTTING OUTCOMES: TRL AND SRL

The main expected outcomes of Age-It program are provided by 16 Universities and 9 research centres and private companies. **Age-It research outcomes will have a sizable impact, in the medium-long term, on the Technology Readiness Level (TRL), expected to grow from level 1 to level 4, as well as improving the Social Readiness Level (SRL) of a large array of innovative technological solution, interventions and policies.** These outcomes will cover four main areas: (a) socioeconomic outcomes (Spokes 1, 5, 6, 7 and 10), (b) technological outcomes (Spokes 5, 8 and 9), (c) biomedical outcomes (Spokes 2, 3 and 4) and (d) cross-domains outcomes (all Spokes), interconnected in a holistic and interdisciplinary approach. The multi-disciplinarity of the consortium will generate a cross-fertilization of ideas, know-how and skills among partners, creating a capillary network of knowledge. Outcomes will be disseminated with the creation of new initiatives, e.g., start-ups and spin-offs, and by developing innovative technology transfer, applications and methodologies that could be covered by patents with a high business potential. To assure the process of technological transfer, Age-It will rely on the collaboration with one partner (HEALTHWARE) expert in business acceleration and on the collaboration with our key stakeholders, e.g., AC75, a start-up accelerator that supports and invests in the area of Silver Economy.

The description of the starting levels for TRL and SRL, and the expected levels resulting from this research program, are described below, organized in the four main areas. This Section highlights the implications of Age-It achievements in several domains, ranging from the enhancement and dissemination of research results, technology development and transfer, to building a sustainable network of scientists, stakeholders and economic agents. Age-It will prompt significant progress in entrepreneurial initiatives with a high technological content, intelligent and interoperable ICT environments, access to relevant medical and behavioural data development and validation of new solutions in an engaging smart environment. Parallel to these Age-It will foster progress in building human capital and training individuals with specific skills, create infrastructures for personalised solutions and personalised advice. This process will specifically target the Mezzogiorno regions of Italy.

### Socioeconomic outcomes (Spoke 1, 5, 6, 7): from TRL 1 to 4, from SRL 1-3 to 5-8

In the area of sustainable socio-demographic outcomes, related to ageing population, Age-It will stand out for the achievement of multiple and multidimensional results, especially with Spokes 1, 5, 6, 7 and 10. Population ageing is a process that has been characterising the Italian society in the last decades, due to increasing life expectancy and very low fertility levels. Although international migrations partly contrasted these dynamics, inflows reduced substantially starting from the 2008 recession, and were largely insufficient to combat population ageing. Italy sticks out amongst Western countries for the dramatic changes in demographic trends and yet, the adaptation to this process has been mainly based on individuals’ and households’ responses, lacking a coordinated institutional design both at the national and local level. Mitigation actions have taken place at a very different pace, with very heterogeneous institutional settings and policy solutions across different population subgroups and geographical areas – thus exacerbating existing inequalities between educational groups, between inner and larger urban areas, and between North and South. Moreover, these local level responses have been scarcely informed by data-driven solutions and lack an integrated approach involving the social, medical and technological elements that are required to tackle the numerous challenges of population ageing. **The current general SRL at the national level, then, can be estimated being equal or lower than 3.**

Furthermore, in terms of TRL of social and institutional solutions to the challenges of an ageing population, the general level of readiness of the country is low. Data availability, integration and usability is not adequate. Derived demographic projections are also lacking. This scarcity of data availability results in policies, social and technological solutions that are often based on incomplete information. Furthermore, the lack of a holistic approach considering the integration of technical and medical solutions within larger social and institutional responses has hindered the TRL of responses to population ageing. Even within the context of local best practices, it is rare to find that the TRL of the prevailing solutions goes beyond the value of 3.

**Age-It will significantly contribute to improve the SRL at the national level and within the local communities, through a series of milestones and activities involved in its Spokes.** First, SRL stage 3 will be reached by the systematic involvement of national and regional key-players and stakeholders. Importantly, Age-It envisages the participation of INPS, the Italian Social Security Institute, surely a prominent Institution with a strong tradition and experience in data management and welfare provision, which has branches all over the Country and can have first-hand validation of the proposed solutions and interoperable systems. It also relies on the collaboration with the National Council for Economics and Labour (CNEL), an institution included in the Italian Constitution, fully
detailed to the design and monitoring of socioeconomic policies including the implementation phase quality of services provided by at the central and local public administration level. CNEL has a potential to strongly contribute to foster Age-It impact (SRL level) because of its advisory role to policy makers and to and the Government. Further important institutional and market-oriented actors and stakeholders are involved in Age-It, such as the Assicurazioni GENERALI, hence creating a powerful network capable of having an impact on the Italian SRL vis-à-vis population ageing (see Section B2 for a complete list of stakeholders; they are also discussed at the end of this Section).

Within Spoke 1, the development of longitudinal socio-demographic databases based on existing administrative and survey data (on births and reproductive histories, residential mobility and migration, and on related information on ageing population), together with the development of an empirically demonstrated proof-of-concept of smart statistics on ageing represent a significant step forward toward a data-driven approach to policy making and institutional design in the field of population ageing. This, in turn, will advance both the TRL from 1 to 3, and the SRL from stages 1-3 to an SRL of 7 (smart statistics) and 8 (registers).

Furthermore, building a working prototype that exploits AI and Big Data techniques to produce real-time analytics and dashboards capable of overcoming the limited availability, integration and usability of data at various NUTS-levels corresponds to an improvement from TRL 1 (the current level) to TRL 4. A similar step forward will be represented by the regular production of both detailed descriptions and derived, geographically detailed, projections on: fertility, population ageing, migration in/out-flows at NUTS2 level (with a special focus on inner areas and southern regions), care needs, and care resources. Again, reaching this objective will represent a significant step forward in the TRL of the program, from TRL 1 to TRL 4. These measures, together with the sharing of these outcomes with relevant stakeholders, will both increase and make more geographically homogeneous the Italian SRL vis-à-vis population ageing, moving from an average overall SRL of 3 to a SRL ranging from 6 (policy solutions and implementation) to 8 (development of instruments to support data-driven policy making) depending on the specific process involved.

After having provided a comprehensive and evaluative picture of care relationships in the country – a necessary tool for the planning of public health policies and interventions capable of countering the persistence of huge inequalities across different geographical settings – Spoke 5 will focus on the role of formal and informal caregivers that are crucial in care provision at home. Providing caregivers with information and knowledge about different diseases and services could be effective in reducing burden and its negative consequences on mental and physical health of older adults. Also building caregivers’ skills and problem-solving strategies is a valid support. To this objective, the development of two e-health platforms prototypes (TRL 4) is aimed at reinforcing engagement and participation of caregivers and older adults and patients together, who are both strictly involved in the clinical pathway (thus moving from an SRL in the range of 3 to 4, depending on local specific experiences, to a general SRL of 7). This goal will be achieved, first, by means of a validated prototype of multi-platform web app, tested in relevant environments, aimed at monitoring and supporting mental and physical health of caregivers of patients with dementia. This infrastructure will deliver a secure anonymous database able to facilitate the due interactions among case managers, caregivers and health professionals. In this way it will be possible to better address the needs of caregivers, enhancing abilities to improve their productivity and the clinical pathway of care receivers. Next, the implementation and testing of a protocol multidisciplinary out-patient clinic for frailty assessment in patients with cardio-respiratory failure will permit to design an appropriate e-health platform, that is an advanced decision support system to help the medical staff in the identification of abnormalities in older adults, and to craft an admission risk index after the hospitalization for heart and respiratory failure (from TRL 1 to TRL 4, with the potential of an after-program development up to the validation and retesting phases, ultimately incorporated in policy solution packages). Patients’ and caregivers’ data collected remotely will be made available to the case manager through a dashboard, co-designed to the purpose, to screen patients and caregiver in order to improve consistently their participation to the program. Overall, these activities will prompt patient and caregiver’s engagement, and continuous education program to care managers. Reaching these objectives will represent a significant step forward in the TRL brought about by Age-It, from TRL 1 to TRL 4, and in the SRL from stages 1-3 to an SRL of 8.

Spoke 6 will focus on the silver economy, institutional and organisational environments and individual incentives to foster the digital and green transition and to mitigate unequal ageing, to eventually empower older people for and independent and active lifestyle. The research agenda of Spoke 6 is strongly evidence-based. The data collection effort by ISTAT, by SHARE and by the Bank of Italy (SHIW) are excellent examples of existing data infrastructures, however an important advancement will be made by integrated administrative data (INPS data) with survey data, e-data and behavioural data. Age-It will produce harmonized data and user-friendly platforms to be used by researchers and stakeholders. As an example, building a “career tracker” and other prototypes of tailor-made platforms will improve the functioning of markets (labour market, commodities market and financial/insurance
markets) by providing timely information on the effects of policies and on relevant socioeconomic changes. Further advances will be made by integrating information on labour supply, saving for retirement, demand for goods taking fully into account health risks and welfare provisions and private saving. In addition, the development of indexes of inequalities and the design and estimation of financial literacy indexes for older people will be used to define a set of feasible solutions able to prevent situations of poverty and financial hardship and increase protection for older age, increasing the TRL of the project from TRL 1 to TRL 4 and the SRL from the current stages 1-3 to an SRL of 5.

In order to understand the cultural determinants of individual and societal decisions and the political sustainability of intergenerational policies, Spoke 7 focuses on the cultural and political issues raising from population ageing. By adopting a holistic, multidisciplinary approach, the Spoke aims at providing guidelines and legal advice to implement policy and technological solutions leading to the creation of an age-friendly future society. A substantial part of this challenge will be dedicated to analyse the political consequences of an ageing population. Machine learning will be used to explore patterns in existing survey data and textual data from parliamentary debates in Italy to evaluate the potential of age-based political conflicts. This will enhance the TRL of scientific research on the topic, taking it from level 1-2 to level 4. In addition, developing an electoral model of intergenerational redistribution with alternative forms of altruism will permit to study the demand for intergenerational redistributive policies. The results obtained will be used to inform policy design, specifically welfare policies, inheritance taxation and pension reforms, increasing the national SRL in these scientific and policy domains from the current stage of 5 to an SRL of 8.

Shifting the focus of the analysis from older adults patients and their relationship with the caregivers to the professionals’ crucial involvement and to the adequate policy interventions, Spoke 10 aims at building a data platform that integrates individual-level databases on healthcare services with supply-side databases on the type of interventions provided by primary care professionals, specialist practitioners and intermediate care structures (home care, community homes, community hospitals, residential care homes). The objective is to provide a pilot study on how supplementing the databases typically used by policy makers with more specific details on the relevant supply-side aspects could positively affect the implementation of prevention programmes, measured in terms of improvement in the adherence to guidelines and in long-run health outcomes. The integrated platform will be also used to analyse the specific problems arising in the management of chronic care programs for multimorbid patients where different specialists may be given the leadership and/or where more than one program is simultaneously implemented. The main aim is to provide guidance to the policy makers on how to regulate the interaction between specialist practitioners, and the interaction between specialist and general practitioners, to avoid discontinuities of care and under/over provision of care. This will significantly enhance the TRL of data and analytic instruments utilized in local and national policy design and implementation and, in the meantime, will also push upgrading of SRL to levels 7-8. In addition, this integrated approach will help driving the development of a new framework for the adaptation and the implementation of clinical and lifestyle guidelines for prevention and health promotion among older adults. The main goal is to design a new model of integrated care pathways that can enable older people to gain access to evidence-based prevention and health promotion interventions, closing the existing gaps in information, autonomy, adherence, and compliance when accessing preventive and health promotion programs. Overall, reaching these objectives will represent a significant step forward in the TRL of the program, from TRL 1 to TRL 4, and in the SRL from stages 1-3 to an SRL of 8.

The technological outcomes of Age-It will be characterised by the definition of radically innovative technologies, methods, and approaches for healthcare and active and healthy ageing based on active user-engagement. Spokes 5, 8 and 9 will be primarily devoted to research and development activities for a smart living environment and independent life. The overall technological objective of Age-It is to develop and enhance the state of the art of solutions based on advanced personalized services, devices, and tools, including IoT, artificial intelligence (AI), robotics, cloud/edge computing, smart wearables, big data, intelligent analytics, virtual reality, etc. Solutions will be developed with a multidisciplinary and user-centred approach, fostering stakeholders’ participation in order to pursue technical feasibility as well as involvement. Solutions will be intelligent, interoperable, but also cost-effective, based on the notion of personalized services and devices. Age-It will devote special efforts to provide integrated smart-environments embedded in a renovated health care system connecting framework in from different living environments, homes, hospitals and long-term care providers, working environments, daily life and outdoor urban spaces.

The outcomes of Spoke 8 will focus applications of biomedical technologies for older patients from a clinical point of view, coupled with the tasks of Spoke 5 which cover technologies for caregivers. Finally, Spoke 9 outcomes will point to the development of novel game-changing human-centred AI technological tools through
The enhancement of TRLs is likely to be substantial — from TRL 1 to TRL 4 — for Spoke 5 thanks to the development of a novel multi-platform web app for monitoring and supporting mental and physical health of caregivers of patients with dementia, taking into account the patient’s health, frailty, behavioural disturbances, and pharmacological as well as non-pharmacological therapies. A similar pattern is expected for this area in terms of SRLs, with an increase from stages 1-2 to 7-8. The same range of improvement, both in terms of TRL and of SRL, is likely to be reached as a consequence of the activities carried out by the Age-It programme with regard to a variety of technological solutions. These include the following elements:

- research and intervention protocols and tools (including multilingual questionnaires, a list of biomedical, social and psychological indicators, combination of monitoring tools and systems, validated and approved legal and ethical protocols) for the monitoring of both caregivers and care receivers during daytime and night-time care, validated in an experimental setting;
- a set of training modules designed in collaboration with key stakeholders to improve the care-provision skills and policy awareness of both formal and informal caregivers, including migrant caregivers;
- a user-friendly multilingual platform aimed at delivering and distributing teaching modules related to the care of older people across different organizations and institutions;
- a multidisciplinary out-patient clinic for frailty assessment in older patients with cardio-respiratory failure, including functional and psychological disability monitoring;
- a personalized e-health-based care plan for older patients with heart and respiratory failure at hospital discharge following acute decompensation;
- a platform for continuous, ubiquitous, and implicit outdoor monitoring of older people through edge (e.g., smartphones, smartwatches) and cloud computing.

In two areas addressed by the activities of Spoke 5 the expected improvements will be from TRL 1 to TRL 3 and from SRL 1-2 to SRL 5-6. They concern, on the one hand, the development of indicators, tools and analytical techniques for the monitoring of care needs and resources specific for inner areas, and the identification of the degree of age-friendliness of urban areas; on the other hand, the development and fine-tuning of a Machine Learning (ML) model for allocating health care funds among heterogeneous regions.

As for Spoke 8, the starting TLR in the area of interventions to improve lifestyles in later life through physical and cognitive activities and nutrition, including the promotion of an appropriate control and effect of polypharmacy and higher adherence to vaccination plans, can be estimated to reach today a level of 1, the most basic ranking. At the end of the research programme, thanks to the innovative technological solutions and improvements pushed by the applications and systems defined and conceptualised by the activities carried out within this Spoke, it is very likely that the final TRL in this area will reach level 2 or above, with SRL concomitantly moving from levels 1-2 to 6-7. A similar development — i.e., from a starting TLR-1 to a final TLR 2, with an SRL increasing from 1-2 to 6-7 — can be foreseen also with regard to the field of technologies to reorganise the hospital environment with solutions that make the hospital stay smarter and more comfortable for the patients, and at the same time pay attention to promoting their cognitive stimulation and mobilisation. An even higher upgrading, from TRL 1 to TRL 4, can be finally expected with regard to the ICT systems aimed at collecting, managing and analysing large number of different types of data (e.g., dedicated clinical assessment tools, clinical data, biomedical, physical, physiological measures and biomarkers, day-life data from wearable sensors, time-series etc.), as collected from different cohorts of older people and/or from different territories. In this area, the increase in the corresponding SRL as a consequence of the actions undertaken within the Age-It research programme is expected to move from stages 2-3 to an SRL of 5-6.

Spoke 9 mainly focuses on fostering healthy and active ageing for older people through the development and promotion of human-centred AI technologies that rely on collaborative and augmentative applications. By using a transdisciplinary approach that involves a high-qualified group of engineers, physicians, neuroscientists, and architects, the Spoke 9 enhances the development and use of novel biomedical technologies for prevention, health monitoring and assistance of older adults. In particular, Spoke 9 focuses on living environments that means both home and working environments (both real and virtual) as well as outdoor urban spaces. The TRL will be increased starting from level 1-2 to level 4, stressing the increasing of human-machine interaction through collaborative tasks, personalised and advanced behavioural model for social robots and manipulators, advanced
sensing and actuating materials for health monitoring and prevention, providing a proper validation in a lab environment.

In details, the most relevant scientific and technological topics and actions included in Spoke 9 are:

- **design and development of “social machines”** based on advanced sensing and materials for haptics and physical interaction, virtual or mixed reality with interaction in the metaverse, personalised and advanced AI-based behavioural models for social robots and manipulators, integrated to interact and communicate with humans by means of social behaviours and rules, i.e., perception capability with voice, emotion, gesture, gaze, etc. recognition integrated with planning and decision making algorithms (from TRL 2 to TRL 4);

- **development and investigation of models of human machine interaction**, able to measure and characterise the way humans react with social machines, generating a number of digital biomarkers of interaction that could be used for early identification of motor and cognitive decline in frailty and dementia (from TRL 3 to TRL 4);

- **design and development of a new generation of innovative symbiotic (wearable) robots** to monitor, assist, and boost motor performance in older people, promoting neural driven (EEG-EMG) wearable assistive devices (WAD) for healthy ageing (from TRL 2 to TRL 4). Collaborations with innovative companies dealing with technologies for smart wearable robots and soft exoskeletons to support disabled older patients are already planned (SRL 2-3 to SRL 5-6). Similar outcomes are going to be achieved in the sector of age-friendly design for Industry 4.0 via ergonomic assessment and assistive technologies, through synergies with enterprises that will contribute to create jobs for highly-skilled knowledge workers, thus preventing qualified personnel from migrating to more developed foreign countries;

- **design and development of new generation of sensing technologies** with defined targets about performances, costs and usability and based on micro- and nanofabrication technologies, including aspects related to wearable and non-invasive sensing techniques for health, psychological, physical, emotional, social and comfort related quantities (from TRL 2 to TRL 4). Planned a systematic cooperation with private manufacturing partners engaged in the development of solutions for the smart monitoring of life and work environments as well as for facilitating daily life for older adults (SRL 2-3 to SRL 5-6);

- **design and development of novel approaches for heterogeneous data sets processing** through the use of data fusion and AI techniques to extract higher level information (from TRL 3 to TRL 4);

- **design and development of hardware and software technologies for prevention and health monitoring** (ultra-portable echography system, microwave and wearable textile sensors for non-invasive biomedical monitoring, integrated by clinically-inspired Artificial Intelligence methods for accurate diagnosis and prediction (from TRL 2 to TRL 4).

Regarding the environmental sustainability, Age-It – within Spoke 9 – will provide a methodology to measure the environmental comfort in living environment for older people. The measurement of comfort, through the monitoring of acoustic, light, temperature comfort and indoor air quality, is already available for adults and in Age-It will be adapted to older people specific needs starting from a TRL of 2 to a TRL of 4. To achieve this level, the environmental sustainability will be considered evaluating procedures for energy saving and cost reduction. To provide a pleasant experience of ageing, environmental quantities and physiological parameters will be analysed through the use of AI to provide a more personalized assessment of comfort, considering a starting SRL of 1-2 to achieve a SRL of 5-6 at the end of the program.

Partners involved in Spoke 9 have a strong track record in exploiting and transferring knowledge into start-ups and spinoffs companies. Synergies with them will create jobs for highly-skilled knowledge workers, prevent qualified personnel from migrating to foreign countries, and showcase the Italian excellence in technologies for active and healthy ageing. Cascade calls will further improve the close collaboration with companies and transfer of the research into the industrial track. Furthermore, following the human-centred design approach and exploiting advanced tools considering human-in-the-loop since the conceptualization, the program aims to reduce the digital divide by proposing tailored solutions and guidelines for the design and development of tools for older adults. Therefore, SRL will increase from the current 1-3 level to SRL 7.

**Biomedical outcomes (Spokes 2, 3, 4): from TRL 1 to 4, from SRL 2-3 to 4-6**

The biomedical outcomes of the Age-It research programme will be characterised by the definition of novel mechanisms of cellular and organelle senescence needed to develop novel preventive strategies. In particular, outcomes of Spoke 2 are focused on basic mechanisms’ evaluation; those concerning Spoke 3 regard novel biomarkers of ageing able to define preventive strategies; those emerging from Spoke 4 concern the development of new technologies to foster patients’ education and self-help.
With regard to Spoke 2, in four of the areas addressed, the expected enhancement of the TRL will be limited to an increase from a starting stage 1 to a final stage 3 at the end of the programme, while SRLs are likely to reach level 4/5, starting from an initial level of 2/3. These areas include the development of following bio-medical solutions:

- **novel senomorphics** based on knowledge advances on the adaptations of secretory pathway(s) in senescent cells;
- synthesis of new therapeutics able to protect the body from ageing and related diseases based on improved understanding of the metabolites and metabolic pathways involved in the biology of ageing;
- **novel combination therapies directed to multiple molecular targets** aiming to boost the endogenous antioxidant capacity and target both cardiomyocyte and non-cardiomyocyte components (endothelial cells and fibroblasts);
- **novel strategies for blocking inflammaging through more efficient brain delivery** (i.e., nanocarriers) of immunomodulatory tools (azithromycin, miRNAs, etc) to reduce histopathological, motor and cognitive impairments caused by stroke.

More prominent – i.e., reaching a final TRL 3 from a starting TRL 1 – is the enhancement expected to be achieved in two areas: the first one focussing on the development and testing of novel methods for monitoring vascular senescence with in-vivo microimaging technology; the second one concerning the identification and validation of new therapeutic targets that can be used to promote anabolic responses in bone and skeletal muscle as anti-ageing agents. In both cases, the associated change in terms of SRLs is likely to be constituted by an increase from stage 2-3 to 5-6.

As for the outcomes of Spoke 3, they are likely to offer to the involved industrial partners a unique competitive advantage over existing state-of-the art solutions, especially in terms of new models, algorithms and care pathways. The huge innovation potential of the research initiatives will be facilitated by specific technology transfer actions, to favour and foster the widest possible interaction between academic and industry. This is an area that traditionally encompasses both fundamental and applied research, addressing crucial aspects of clinical research that have different levels of maturity and that will therefore experience different final TRLs. These include research areas that are currently rather unexplored, where fundamental research will create the basis for later industrial research and reasonably provide new opportunities for future commercial exploitation, and other sectors in which research starts already at a later maturity stage of technology, and that will be therefore boosted to the highest TRL levels.

In particular, in Spoke 3 five main areas can be identified as those whose exploitation could be achieved in the framework of the Age-It research programme, listed moving from those likely to experience the lowest increase in TRLs and SRLs to those with the highest:

- **development of small-molecule epigenetic inhibitors to improve sarcopenia and frailty** (from a starting TRL 1 to a final TRL 2, with SRLs increasing from stage 1-2 to 3-4);
- **implementation of the proof of concept and/or pilot study to assess the feasibility of innovative multidisciplinary stratified care pathways** to manage multimorbidity older persons (moving from TRL 2 to TRL 3 or even TRL 4, with SRLs increasing from 2-3 to 5-6);
- **application of advanced AI techniques to longitudinal databases** in order to stratify the risk of adverse outcomes (starting from a TRL 2 -availability of references highlighting the applications of new technology- to reach a TRL 4 via tests carried out in the laboratory, with SRLs growing from 2-3 to 5-6);
- **identification of biomarkers and the development of multiparametric predictive AI algorithms for age-related diseases, multimorbidity, frailty and disability** (moving from TRL 1 to TRL 4, to demonstrate the proposed system in laboratory, with SRLs increasing from 1-2 to 5-6);
- **impact of climate change and pollution on health in later life** (starting from TRL 1 – review of scientific knowledge – to arrive at TRL 4, with SRLs growing from stage 1-2 to 5-6).

Spoke 4 will deliver two main groups of outcomes, differentiated by the degree of the enhancement expected in terms of TRLs and SRLs. The first group includes areas for which a less remarkable improvement is likely to take place (i.e., from a starting TRL 1 to a final TRL 2, with SRL moving from stage 1-2 to 3-4), and these can be identified in the following three research fields:

- **development of new tools (e.g., wearables, apps) aimed to increase healthy habits compliance** and to measure physiological (hydration, heart rate, etc) and behavioural (steps, sedentary time, etc) daily variations to give tailored suggestions for a proper exercise and correct personalized nutrition in older subjects;
In all, as outlined above, the transdisciplinary, holistic, and problem-solving nature of Age-It guarantees significant outcomes in three interrelated domains: socio-demographic and economic outcomes, technological outcomes, and biomedical results in terms of enhancement of research results, technology transfer, building a cohesive public/private network and beyond. Our results will support needs, elaborate citizen-centred solutions and validate them. We expect that this stimulating environment will foster where stakeholders from research/academia, government, industry and citizens will be engaged to identify unmet needs, elaborate citizen-centred solutions and validate them. We expect that this stimulating environment will foster participative and life course approach to improve older adults’ QoL and healthy behaviours.

The second group refers to outcomes from areas of investigation likely to record a stronger increase (i.e., from TRL 1 to TRL 3, with SRLs moving from stage 1-2 to 4-5 or even 5-6), which include the developments of solutions in the following four sectors:

- **home-based cognitive and physical training** aimed to create expertise in self-managing a healthy lifestyle for older adults;
- **effective ICT-based motivational and cognitive interventions**, grounded on previous evidence-based published approaches, to prompt functional attitudes and motivational changes, and train/enhance cognitive, emotional and everyday functioning of older subjects;
- **novel applications to use High Density Surface EMG** for the evaluation of sarcopenia and frailty;
- **innovative dual cognitive/motor training programmes for healthy older adults in immersive VR**, intended to foster behavioural change, promote general cognitive and physical functioning and social interactions.

In all, as outlined above, the transdisciplinary, holistic, and problem-solving nature of Age-It guarantees significant results in terms of enhancement of research results, technology transfer, building a cohesive public/private network in three interrelated domains: socio-demographic and economic outcomes, technological outcomes, and biomedical outcomes.

Age-It will work towards a higher-level overarching goal – namely, to build an innovation holistic ecosystem where stakeholders from research/academia, government, industry and citizens will be engaged to identify unmet needs, elaborate citizen-centred solutions and validate them. We expect that this stimulating environment will foster entrepreneurial initiatives with a higher technological content (innovative start-ups and spin-offs from research), while providing opportunities for strengthening capacity in terms of technical and scientific skills, attraction of highly qualified human capital, and valorisation of local qualified personnel (with a special focus on the Mezzogiorno). Key institutional actors are already involved in the preparation of this proposal – ISTAT and INPS are Age-It partners. In addition, important national stakeholders have been systematically consulted in the program preparation to assure a participative process: National Council for Economics and Labour (CNEL); the National Institute for the Analysis of Public Policies (INAPP); and the Istituto Superiore di Sanità (ISS). While developing the program, we have also formally consulted: Association of the Italian Municipalities (ANCI); Associazione per l’Invecchiamento Attivo; Associazione per i Diritti degli Anziani; Associazione Nazionale tutte le Età Attive per la Solidarietà; Italia Longeva; Associazione Italiana Ambient Assisted Living (AiAAL), Cluster Tecnologico Nazionale “Smart Living Technologies (SMILE)”, Legacoop Sociali; Network for dependent people; Rete delle Università Italiane per l’Apprendimento Permanente; Ordine degli Assistenti Sociali; Programma Mattone Internazionale Salute; GIOMI CARE; Laboratory on Longevity and Ageing (LOLA). It is foreseen that further stakeholders and players in the different areas of social, technological and social aspects of population ageing will be involved – via consultation, co-optation in advisory boards or open calls – in the activities of the consortium. An active collaboration will be promoted with the national network of IRCCS, specialized and working on gerontology and active and healthy ageing, through the presence of INRCA in the consortium. The additional opportunities of systematic collaboration that will be created among the scientific, civil society and entrepreneurial partners will greatly strengthen their networking and translational activities, with a multiplying effect that will lead to a greatly enhanced, disruptive ability of producing the truly collaborative, ground-breaking research that is badly needed to overcome the silo approach still characterising large sections of elder care research in our country. Our participative and life course approach will foster participation of citizens, while implementing co-creation learning methods with industries, companies, and retail, and providing new business opportunities. Our results will support integration of healthcare provision with social networks and services, built environment and ICT sector, and will outline evaluation frameworks for innovative good practices, towards broader adoption of solutions across Europe and beyond.

**C3.2) BEYOND PE8: SETTING UP THE ITALIAN INSTITUTE OF AGEING**

The inadequacy of a discipline-centred approach, the scattered availability of data, the limited transdisciplinary collaboration, and the difficulty of translating research into policies, are the key bottlenecks for advancing an effective research programme of ageing in Italy. These four limitations are interrelated. Empirical research is
guided by theoretical frameworks and models and data availability: the theoretical approach should be constantly discussed and aligned to the new body of evidence and to emerging trends and needs. However, in the area of research on ageing, both theory and data are often strongly boxed and discipline-specific. Moreover, stakeholders and policy makers rarely rely on evidence-informed policies. **Age-It tackles these limitations – theory, data, collaboration, and translation into policies – by integrating key ideas from the biomedical, technological and socioeconomic into theoretically informed spokes (with related tasks).** We do not rely on overarching theories, but recognize that multiple theoretical frameworks are required to address multiple, heterogeneous, specific needs and propose that the existing frameworks must be complemented one another. Age-It has the potential for scientific breakthroughs in our understanding of ageing process, its challenges and consequences, and it will be critical for its impact not only in Italy, but also in other high- and middle-income nations. **Our program brings together complementary yet distinct knowledge, expertise and resources in a new way.** Age-It offers the bold novel approaches and unique synthesis of ideas of ageing bringing together an internationally recognised group of experts from several disciplines – i.e., demography, economics, sociology, political science, law, statistics, biology, medicine, geriatrics, epidemiology, engineering, computer science. Age-It focuses on challenges of pressing importance, whose answers will have transformative scientific potential. We test an array of hypotheses that focus on fundamental questions about population ageing, and we use them to build policies for active and healthy ageing. The new knowledge gained will be important for characterizing ageing trajectories and policies that maximize social participation for people to remain active, healthy and independent in all. Age-It offers a **uniquely integrative micro-meso-macro perspective to address the challenges and consequences of population ageing** that is neither social or economic or biomedical or technological, but combined central ideas from all. We will combine the diverse findings of the program into a composite picture probing ageing from different perspectives and easily translatable in practical specific actions, problem-solving approaches and useful solutions. **This overall picture will be more insightful than the combined input of its individual elements.**

This new spring of research on ageing in Italy eventually brought about by the Age-It consortium will not end with the programme. As a final product of Age-It, it will be established an **Italian Institute of Ageing (IIA),** which does not yet exist in Italy. This Institute will have a **massive impact on the economic, social, and cultural system of Italy,** as it will deeply modify the national approach to ageing, impinging on the socioeconomical and health policies for older population. Moreover, the IIA will include for the first time together a large group of well-known researchers on this topic coming from prestigious institutions and diverse disciplines. This will help Italy in positioning at top level in the European and Worldwide research on ageing, increasing Italy’s international image.