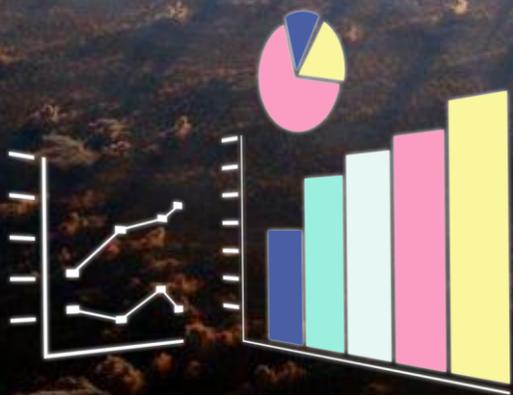


# Longevity Industry Landscape Overview 2019



**200+ Page  
Infographic Summary**





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Aging Analytics Agency: History, Scope of Activities and Agenda for 2019 - 2020

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Introduction: Landscaping the Global Longevity Industry by Region, Domain, Subsector and Application

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Longevity Journalism & Media Landscape

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Investing in Longevity: Series of Thematic Specialized Conferences

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Top Longevity Influencers, Conferences, Books, Journals, Etc.

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Intersection of AI in Drug Discovery and Longevity

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Longevity and Convergence of Technological Megatrends

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Advancing Financial Industry - Longevity / AgeTech / WealthTech

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Precision Medicine Clinics Landscape Overview 2019: Most Advanced Clinics, Technologies, Methods

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National Longevity Development Plans: Global Overview 2019 (First Edition)

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**Aging Analytics Agency:  
Scope, History and  
Agenda 2019 - 2020**

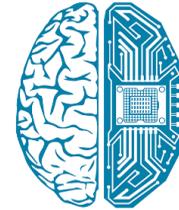
The background of the slide features a central hourglass, symbolizing the passage of time. Surrounding the hourglass are various data visualization elements: a brain with circuitry in the top left, a line graph with multiple colored lines on the left, a pie chart and a bar chart in the bottom left, and a 3D DNA helix on the right. The entire scene is set against a dark blue gradient background with a white border framing the central text.

# Deep Knowledge Group



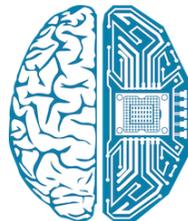
**AGING  
ANALYTICS  
AGENCY**

**Aging Analytics Agency** - the world's premier Longevity Analytics provider, dedicated to the production of analytical reports on the topics of Longevity, Precision Preventive medicine and AgeTech. Operating for over five years, it began producing in-depth reports on Longevity long before it emerged as an industry. The company also provides strategic consulting in the fields of Longevity and Economics of Aging.



**DEEP  
KNOWLEDGE  
ANALYTICS**

**Deep Knowledge Analytics** - the analytical arm of Deep Knowledge Ventures, specialising in forecasting on the convergence of technological megatrends, conducting special case studies and producing advanced industry analytical reports on the topics of Artificial Intelligence, DeepTech, GovTech, Blockchain, FinTech and Invest Tech.



**DEEP  
KNOWLEDGE  
VENTURES**

**Deep Knowledge Ventures** - A data-science driven investment fund focused on the synergetic convergence of specific DeepTech verticals. Investment sectors include AI, Precision Medicine, Longevity, Blockchain and Invest Tech.

## Aging Analytics Agency Scope, History, Agenda

**Aging Analytics Agency** has been developing enhanced iterations of its proprietary methodology and analytics system since 2015, and serve as the main source of market intelligence for the specialized hybrid index hedge fund **Longevity.Capital**, helping to establish pragmatic portfolio company valuation and efficient due-diligence procedures, and to structure advanced investment strategy in the overly-complex Longevity industry. The agency's ongoing proprietary analytics have consistently been accompanied by the production of dozens of vast open-access landscape overview reports on the Longevity industry of particular geographic regions, and on specific technological domains, that are tens of thousands of pages in combined length.

Today, these analytical methodologies have evolved to the level of 3-D and 6-D frameworks where metrics and submetrics can be visualized simultaneously, as well as the implementation of "timeline machines" that allow to analyze the changing state of industry players' strengths in specific areas ranging from scientific validation to business development, R&D, technological prowess, IP, etc. to be visualized over time, and projected into the future based on the statistical properties of its past behaviour based on machine learning, big data analysis and other advanced statistical tools. **Aging Analytics Agency** is a subsidiary of **Deep Knowledge Ventures**. It works closely with a consortium of non-profit and for-profit organizations including **Longevity.Capital**, **Longevity.International** and **Deep Knowledge Analytics**.

### Major Topics of Reports

Science of Ageing | Precision Health | Artificial Intelligence  
Advanced Biomedicine | Preventive Medicine | Data Driven Medicine

### Types of Analytics

Open Source Analytics | Special Case Studies | Proprietary Analytical Reports

**Aging Analytics Agency is the only analytical company focused exclusively on Longevity, Ageing, Geroscience, Preventive Medicine and AgeTech. Operating for over five years, it began producing reports on Longevity long before it emerged as an industry. The company provides strategic consulting in the fields of Longevity and the Economics of Ageing.**

## Aging Analytics Agency Predicted the Rise of the Longevity Industry 3 Years in Advance

Aging Analytics Agency is the only specialized analytics agency in the world that focuses exclusively on the emerging Longevity Industry. They are recognized internationally as the premier analytics agency for advanced data analysis, industry reports and next-generation infographics on the topics of Aging and Longevity.

*Now in its 5th year, Aging Analytics Agency has been on the frontlines of Longevity Analytics since the inception of the industry.*



Dmitry Kaminskiy, co-founder of Aging Analytics Agency, boldly predicted in 2014 that the Longevity Industry would see an inflection point in its development in 2017, becoming a recognized industry in the eyes of conservative investors, business analysts and top business media. This was at a time when investors and geroscientists alike were highly skeptical of the industry's emergence within the next decade.

This prediction turned out to be true. 2017 witnessed an unprecedented rise in the number of Longevity-focused companies and investment deals, the emergence of half a dozen of geroscience-focused VC firms, coupled with widespread coverage of Longevity as a topic by mainstream media including The Economist, Financial Times and Bloomberg.

## Uniquely Positioned to Provide World-Class Longevity Analytics Reports and Services

Aging Analytics Agency not only forecast the true dawn of the Longevity Industry years before its mainstream recognition, but was willing to put its reputation at stake with a bold yet precise prediction when no one else saw it coming. Their confidence stems from their reliance on tangible and quantitative predictive metrics, including the use of cross-disciplinary and synergetic analytical tools and frameworks to map the enormous diversity and complexity of the Longevity Industry.

Today, the fruits of their labor significantly contributed to the exponential growth of Longevity as a topic in the mainstream, including its acceptance by business experts, media and even governments. The UK, for example, has listed Aging Population as one of its four grand challenges and launched a government-backed Healthy Aging Industrial Strategy Challenge Fund. Other governments have also launched similar strategic national development plans devoted to Longevity. Leading media brands, including TIME, Forbes, Bloomberg and others regularly publish Longevity-oriented cover stories. High-profile conferences on the subject of Longevity are more numerous than ever before.

Aging Analytics Agency has been involved in charting the rise of the Longevity sphere since its inception and remained at the forefront throughout the past half decade. Thus, they are uniquely positioned to produce both broadly-accessible reports and specialized case studies for specialized clientele including companies, investment firms, family offices and government agencies.

# EXECUTIVE TEAM

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**Eric Kihlstrom**  
Director

Eric Kihlstrom is the Director of Aging Analytics Agency and the former Interim Director of the £98 million Healthy Ageing Industrial Strategy Challenge Fund.



**Dmitry Kaminskiy**  
Founder

Dmitry Kaminskiy is the Founder of Aging Analytics Agency, Managing Partner of Deep Knowledge Ventures, and a prominent Longevity Investor and Thought-Leader.



**Franco Cortese**  
Deputy Director

Franco Cortese is the Deputy Director of Aging Analytics Agency. Having joined the team in 2015, he has overseen the production of the majority of the agency's Longevity Industry Reports.



**Kate Batz**  
Business Development  
Director

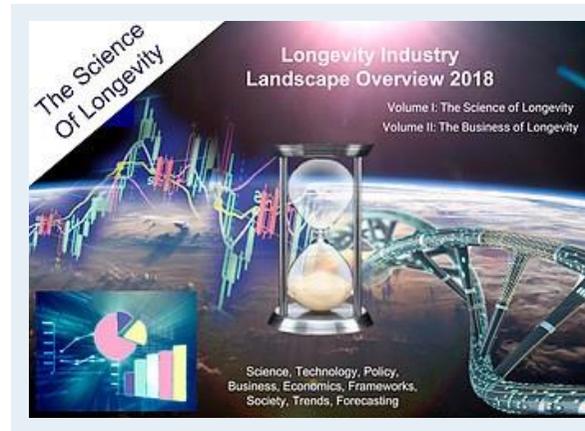
Kate Batz is Vice President of Business Development of Aging Analytics Agency. She is a corporate attorney by background with extensive sales and marketing experience.

In order to accommodate its significantly expanded scope of activities planned throughout 2019-2020, Aging Analytics Agency has also enhanced its executive management team with the addition of several experienced Longevity Industry experts and influencers, including the appointment of Eric Kihlstrom (former Interim Director of the UK Government-led £98-million Healthy Ageing Industrial Strategy Challenge Fund) as the new Director of Aging Analytics Agency.

# 2017 - 2018



**Longevity Industry Landscape Overview 2018**



**Longevity Industry Landscape Overview 2018 Volume I**



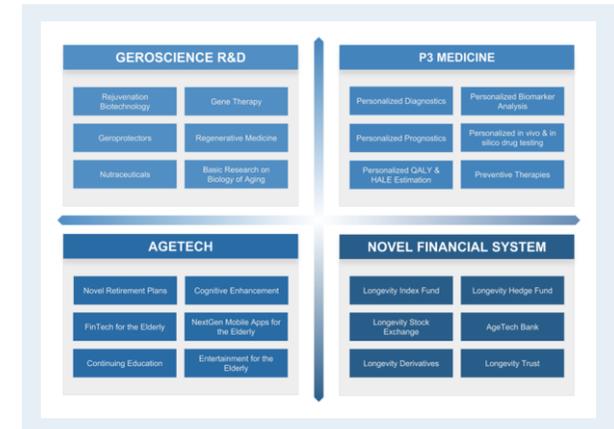
**Longevity Industry Landscape Overview 2018 Volume II**



**Longevity Industry in UK Landscape Overview 2018**



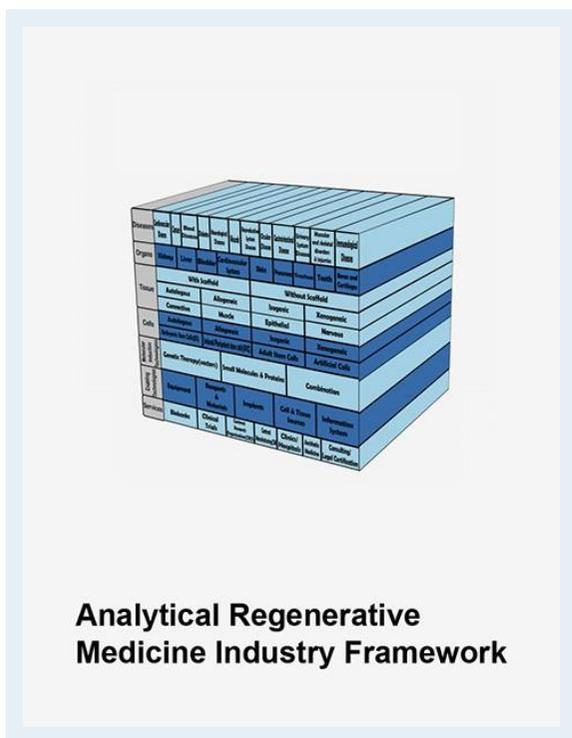
**AI for Drug Discovery Landscape Overview Q2/2018**



**Longevity Industry Classification Framework**

# 2013 - 2015

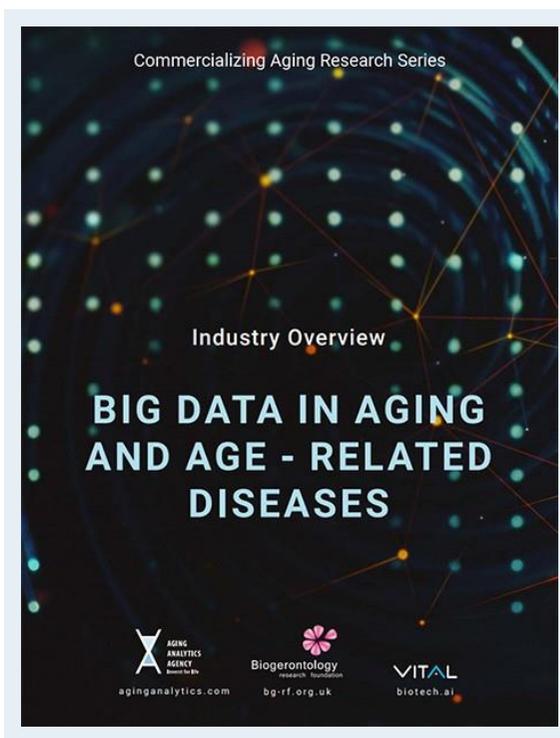
## SPECIALIZED LONGEVITY INDUSTRY REPORTS



2013



2014



2015

# Applying Technology Readiness Levels for Tangible Quantitative Industry Forecasting in the BioTech and BioMedicine Industries

The unique value proposition offered by Aging Analytics Agency is deeply connected to our use of tangible and quantifiable metrics to perform near-future industry forecasting, giving weight and substance to the projections, insights and conclusions derived from our analytical reports.

We took the most proven quantifiable framework for estimating how close a given technology is to market-readiness, namely the use of TRL's (Technology Readiness Levels), which is a method commonly used in the technology industry generally and in the aerospace industry in particular, and applied it for the first time to the life sciences industry in order to create a framework through which we can more quantifiably project when certain technologies relating to Longevity, Personalized and Preventive Medicine, and Advanced Biomedicine can expect to reach the level of maturity required to enable its practical application in the clinic.

Technology Readiness Levels (TRLs) enable the gauging of the maturity of Critical Technology Elements (CTEs) determined during a Technology Readiness Assessment (TRA) that examines program concepts, technology requirements, and demonstrated technology capabilities. TRL use a ranking 1 - 9, with 9 being the most mature technology, with specific TRL levels being assigned to specific technologies by a group of scientific experts familiar with each specific technology. The use of TRLs enables consistent, uniform discussions of technical maturity across different types of technology. Therefore, TRLs enable the prediction of the right timing and focus to ensure that each emerging technology accomplishes its specific endpoints, highlighting possible interactions between technologies.

## Technology Readiness Level (TRL)

9	Commercialized
8	Pre-Production
7	Filed-Production
6	Prototype
5	Bench/Lab Testing
4	Detailed Design



Pipeline for the Progressive Model of P3 Medicine Platform

The unique value of Aging Analytics Agency is deeply connected to their use of tangible and quantifiable metrics to perform near-future industry forecasting, giving weight and substance to the projections, insights and conclusions presented in their analytical reports.

Specifically, they employ Technology Readiness Levels (TRLs), a proven quantifiable framework used in aerospace and other technological industries, to estimate the market readiness of a given technology in the Longevity, Personalized and Preventive Medicine as well as Advanced Biomedicine fields.

For the first time, they have established the use of TRL in the life sciences industry, creating a scientific framework that allows us to quantifiably project when a given technology will mature for practical application in the clinic.

# What are TRLs, and Why are They Important?

TRLs indicate whether a given technology is ready for practical implementation in real-world products and services. In the context of the Longevity Industry, a TRL ranking measures how close a therapy, diagnostic, prognostic technology or other product is from reaching the hands of actual patients in the clinic.

The use of TRLs creates a uniform metric, enabling consistent discussions on maturity assessment across different types of technologies. In the coming years, TRLs can underpin efforts to shed light on the most important technologies and reveal those currently furthest away from practical applications.

Therefore, TRLs enable identification of the right timing and focus to ensure that each emerging technology accomplishes its specific endpoints, highlighting possible interactions between technologies.

**Aging Analytics Agency envisions using TRLs to expedite progress by providing an objective lens through which various technologies are judged. Similar to how TRLs have benefited the aerospace industry, they can bolster the efforts of the life sciences industry in the coming five years.**

## Sophisticated Multi-Dimensional Analytical Frameworks

Aging Analytics Agency has, since its inception in 2013, been applying systematic methodologies to create different types of analytical frameworks that define and classify distinct scientific domains, technologies and applications very clearly, in a way that allows them to be quantitatively compared, and continually refining them to maintain their relevance against the changing dynamics of the industries they are applied to.

The company's first efforts in this ongoing mission was the formulation of the ARMIF (Analytical Regenerative Medicine Industry Framework) classification system in 2013, which allowed companies active in the regenerative medicine industry to be clearly segregated and compared in terms of the scientific and technological strength of their product pipelines and R&D activities.

Since then, the company has continued to refine these comparative analysis systems, both in terms of the specific metrics used to conduct its market studies, as well as the mathematical formulas used to combine them, and the advanced visualization techniques used to make their forecasts, ranking and determinations maximally understandable.

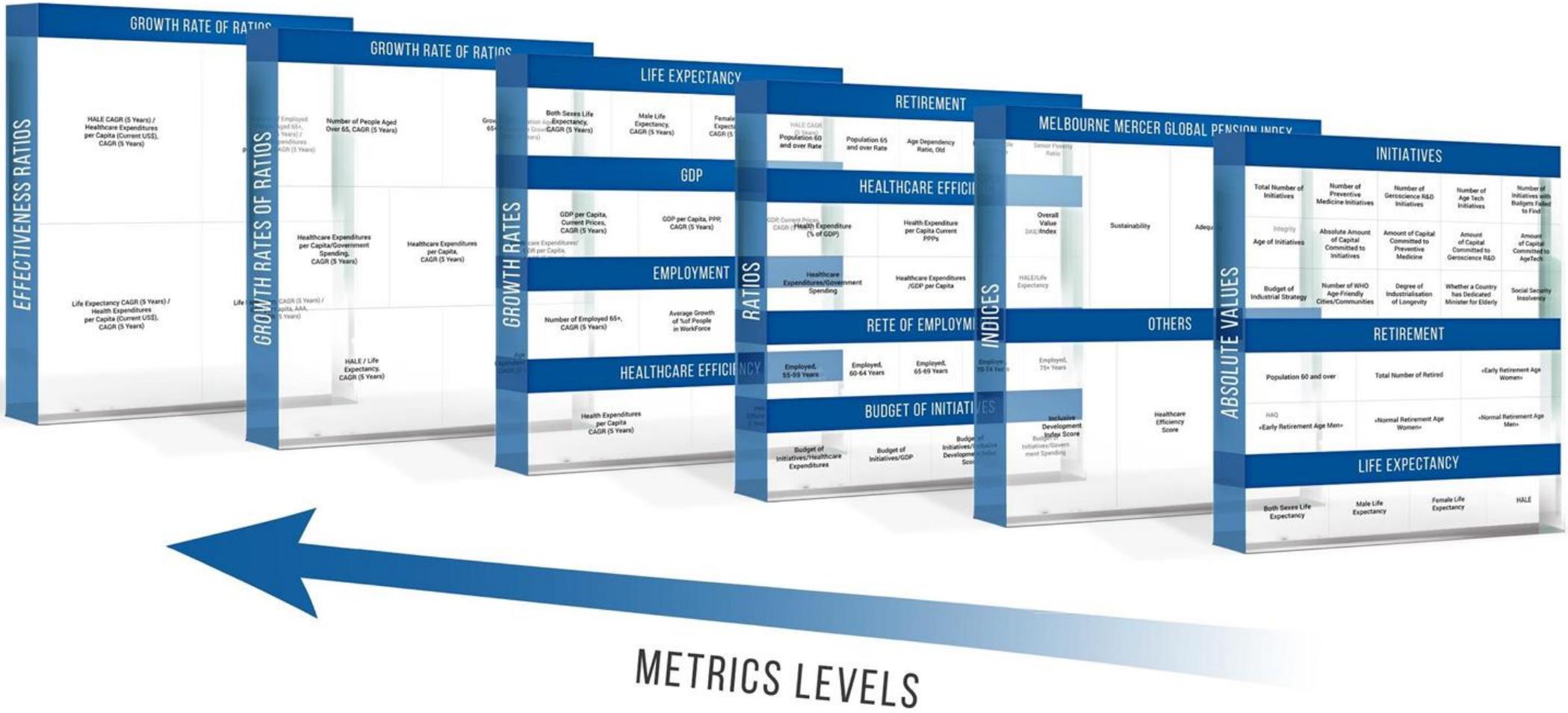
These ongoing proprietary analytics have consistently been accompanied by the production of vast open-access landscape overview reports on the Longevity industry of particular geographic regions, and on specific technological domains, in some cases more than 10,000 pages in length.

The purpose of producing these broad landscape overviews is to serve as a kind of analogue of Wikipedia and the Encyclopedia Britannica for the Longevity industry (often including one-page profiles of many hundreds of active companies, investors, non-profits, R&D hubs, research labs, conferences, and key industry players), widely disseminating ongoing developments in the global Longevity Industry in order to promote its continued growth, expansion and refinement.

But, they also serve an important secondary purpose as well: laying the groundwork for a comprehensive understanding of the entire scope of the industry across the globe, and facilitating a greater comprehension of the specific industry players, their specific activities, and their specific interconnections. In other words, these reports establish the necessary foundation upon which more targeted, relevant and complex analyses can be executed.

Today, these analytical methodologies have evolved to incorporate 3-D frameworks where metrics and submetrics can be visualized simultaneously, as well as the development of "timeline machines" that allow the changing state of a company's strength in specific areas ranging from scientific validation to business development, R&D, etc. to be visualized over time, and projected into the future based on the statistical properties of its past behaviour.

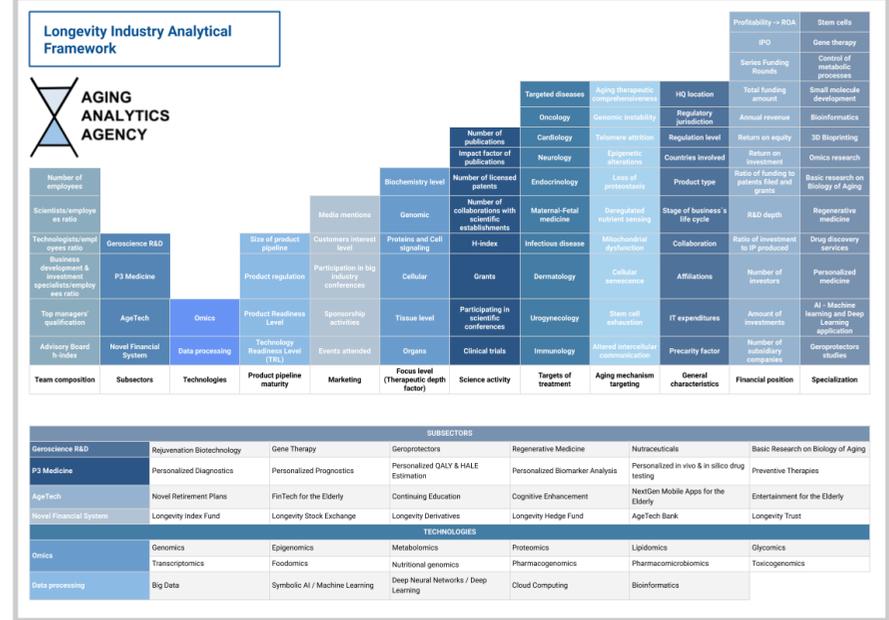
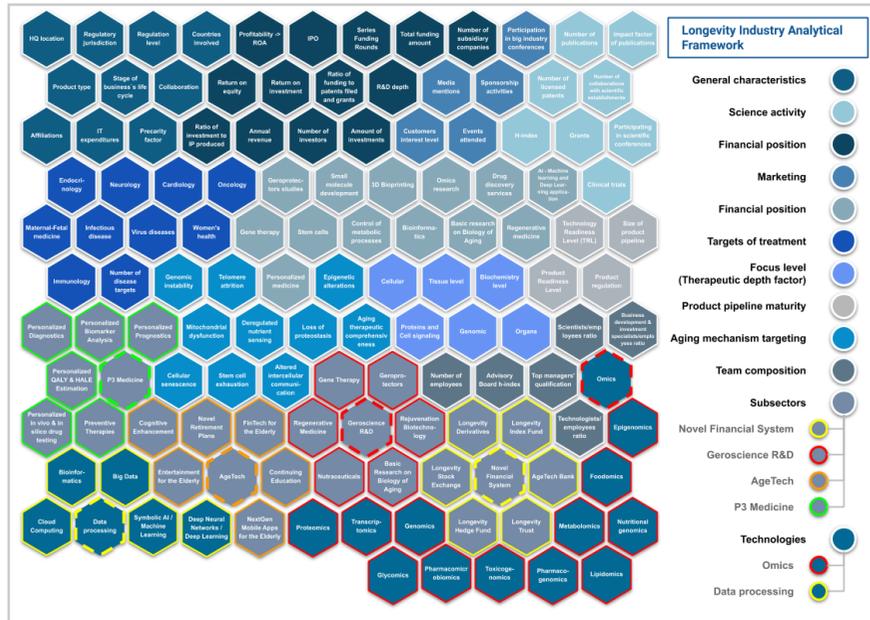
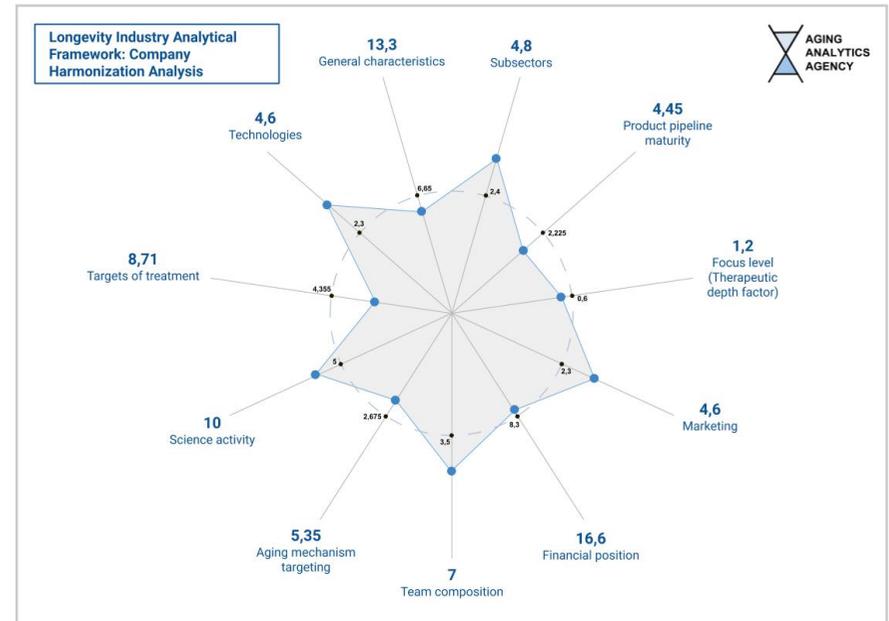
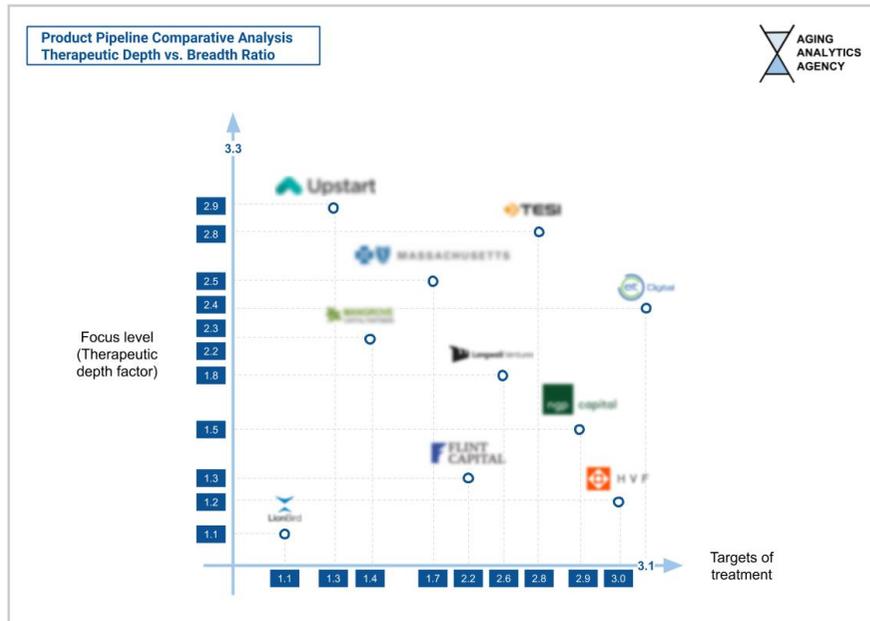
# Sophisticated Multi-Dimensional Analytical Frameworks



# Sophisticated Multi-Dimensional Analytical Frameworks

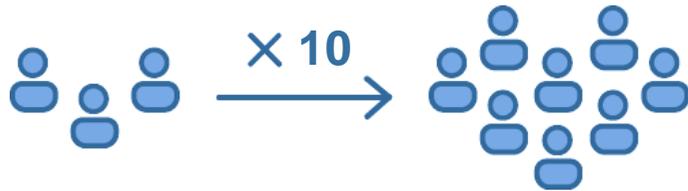


# Specifically-Designed Comparative Industry Analytics



# Aging Analytics Agency Produced Longevity Reports 10x Faster in 2018

In 2018, Deep Knowledge Ventures injected additional financing to support Aging Analytics Agency's ongoing and future projects. This enabled Aging Analytics Agency to extend the size of its analytics team by 10-fold.



This growth in brain power allowed us to proportionally increase the rate of production of their reports. Just in the past year, Aging Analytics Agency have doubled the number of high-quality reports compared to previous years, which include:

- Global Longevity Industry Overview, totaling over 1200 pages, which offers in-depth profiles of the top 100 companies, investors, non-profits and research labs active in the sphere;
- 850-page specialized case study on the Longevity Industry Landscape in the United Kingdom.

In line with this expansion, they are on track for publishing a greater number of diverse and in-depth reports in the coming year, with some reports expanding further in their prior scope whereas others will be targeting particular topics and niches within the Longevity Industry.



Longevity Industry in Singapore 2018



Longevity Industry in the UK Q4 2018



Longevity Industry in Israel 2018



Longevity Industry in California 2019

# Multiple Special Regional Case Studies Planned for 2019

Following the success of their *Longevity Industry in UK 2018 Landscape Overview* report, they are planning to publish a number of additional regional case studies aimed at countries where the topic of Longevity is experiencing a particularly rapid development.

Such region-specific focus is present due to a number of factors, including the emergence of new Longevity sectors in specific countries, the rise of particularly powerful geroscience tech hubs and R&D nexuses as well as the launch of strategic national development plans proposed by progressive governments.



Longevity Industry in UK Q4 2018



Longevity Industry in Israel 2019



Longevity Industry in Singapore 2019



Longevity Industry in Switzerland



Longevity Industry in Japan



Longevity Industry in Hong Kong



Longevity Industry in Taiwan

# Reports Published in Q1 2019 by Aging Analytics Agency



Longevity Industry in UK Q4 2018



FemTech Longevity Landscape Overview

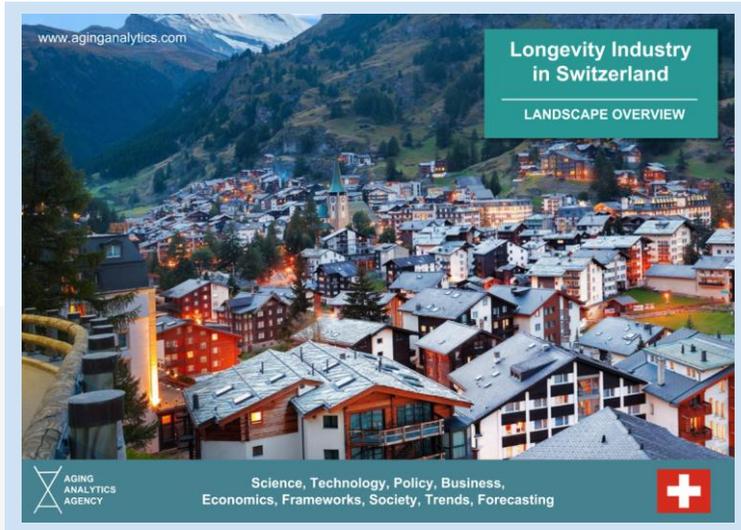


Longevity Industry in Israel 2019



Longevity Industry in Singapore 2019

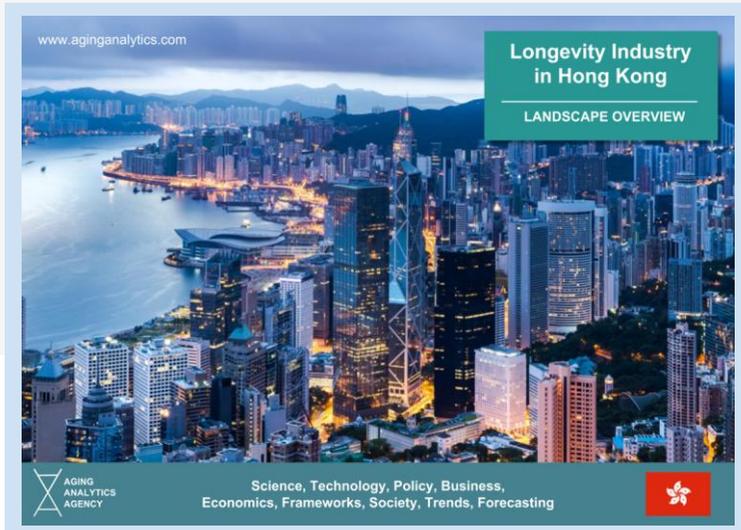
## Upcoming Reports Q2 2019



Longevity Industry in Switzerland



Longevity Industry in Japan



Longevity Industry in Hong Kong



Longevity Industry in California

# Upcoming Reports Q2-Q3 2019



Longevity and Advanced Cosmetics Industry 2019



Precision Medicine Clinics Landscape Overview 2019



Advancing Financial Industry AgeTech / WealthTech / Longevity



Longevity Industry and Microbiome 2019



Global Longevity Industry Landscape Overview 2019

GEROSCIENCE R&D		P3 MEDICINE	
Rejuvenation Biotechnology	Gene Therapy	Personalized Diagnostics	Personalized Biomarker Analysis
Geroprotectors	Regenerative Medicine	Personalized Prognostics	Personalized in vivo & in silico drug testing
Nutraceuticals	Basic Research on Biology of Aging	Personalized QALY & HALE Estimation	Preventive Therapies
AGETECH		NOVEL FINANCIAL SYSTEM	
Novel Retirement Plans	Cognitive Enhancement	Longevity Index Fund	Longevity Hedge Fund
FinTech for the Elderly	NextGen Mobile Apps for the Elderly	Longevity Stock Exchange	AgeTech Bank
Continuing Education	Entertainment for the Elderly	Longevity Derivatives	Longevity Trust

Proprietary Longevity Industry Analytics: Comparative Classification Framework

# Proprietary Report: Advancing Financial Industry - Longevity / AgeTech / WealthTech

Aging Analytics Agency is currently producing a new proprietary report on the Longevity Financial Industry, titled **Advancing Financial Industry - Longevity / AgeTech / WealthTech**, which will offer key strategic insights on how large financial corporations can tap into the multi-trillion market of people in retirement, and retune their existing business models avoid stagnation under the economic pressures of a rapidly ageing population, transforming Ageing from a challenge to an opportunity.

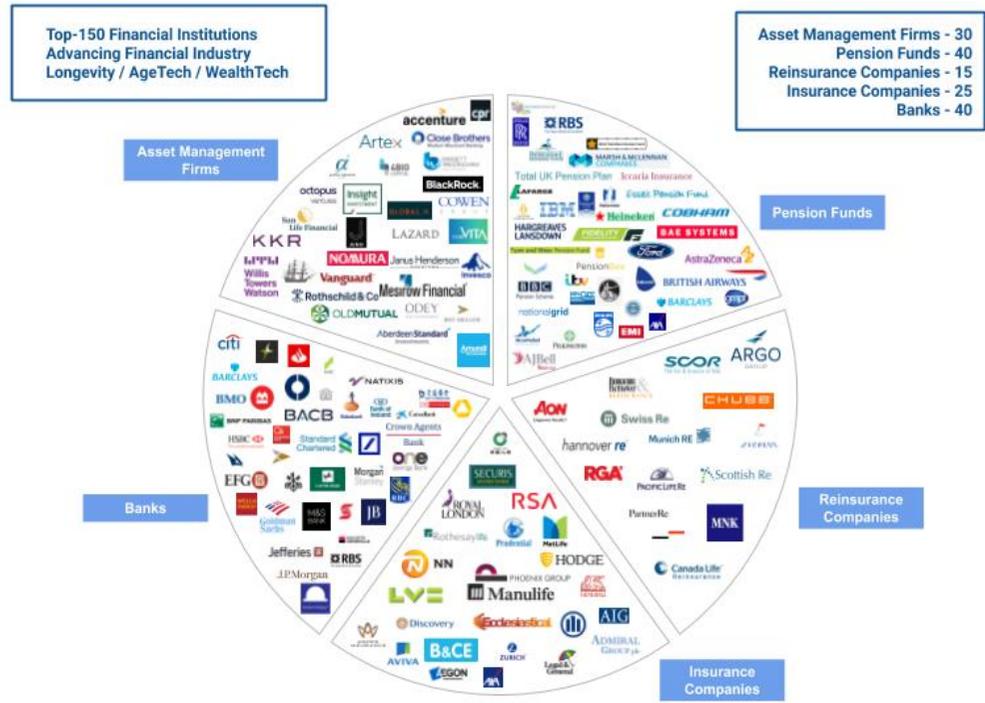
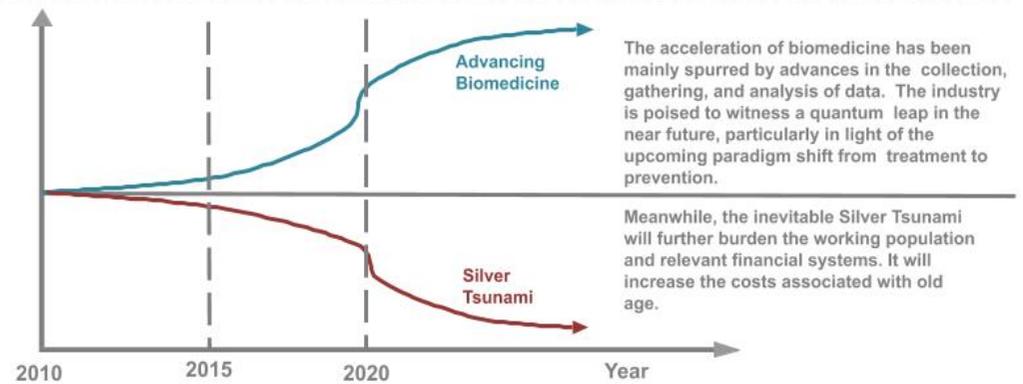
The parties who gain early access to this report will acquire deep expertise on how their strategic agendas can be optimized and stabilized in order to manage and hedge Longevity risks, to surpass the challenges and to utilize the opportunities related to progressive biomedicine, ageing population and advancing financial technologies.



## 1 Billion People in Retirement Globally - a New Multi-Trillion Opportunity



The one billion retired people globally are a multi-trillion dollar opportunity for business  
 ~ Dmitry Kaminskiy interview in the Financial Times.



Top-150 Financial Institutions Advancing Financial Industry Longevity / AgeTech / WealthTech

Asset Management Firms - 30  
 Pension Funds - 40  
 Reinsurance Companies - 15  
 Insurance Companies - 25  
 Banks - 40

# Proprietary Report: Precision Medicine Clinics Landscape Overview 2019: Most Advanced Clinics, Technologies and Methods

Aging Analytics Agency is producing a 1000+ page report, [Precision Medicine Landscape Overview 2019: Most Advanced Clinics, Technologies and Methods](#), which will feature a list of the Top-100 precision (personalised and preventive) medicine clinics globally, as chosen according to a multidimensional analytical framework that uses tangible, quantitative metrics to rank the level of clinics' scientific validation and technological sophistication. The report will also contain pragmatic, strategy-focused materials on the optimal configuration of integrated preventive and precision medicine service pipelines, as well as a better understanding of industry benchmarking and competitive landscape, targeted towards investors and business development executives, answering several key questions including The parties who will have early access to this report will gain deep expertise on how they can optimize their clinics' strategic, technological and scientific prospects in order to deliver the most sophisticated and comprehensive precision health products and services for their clients.



## Precision Medicine Clinics Landscape Overview 2019 Most Advanced Clinics Technologies and Methods

[www.aginganalytics.com](http://www.aginganalytics.com)



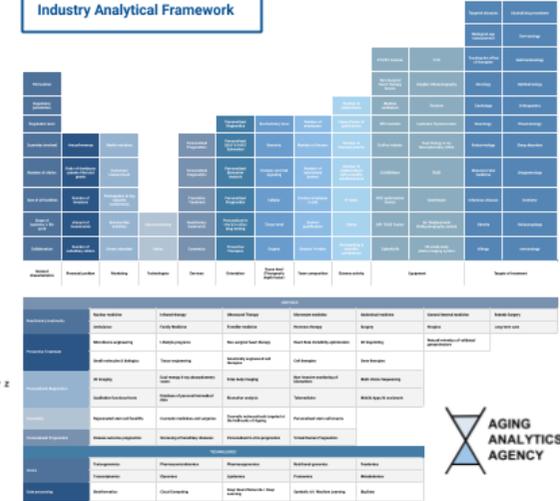
## Sophisticated Comparative Analytical Framework for Precision Medicine Clinics Ranking and Assessing the Breadth, Depth and Optimal Integration of Precision Health Pipelines

*Aging Analytics Agency believes that the effective analysis of as complex and multidimensional an industry as Precision Medicine Clinics requires the application of an equally multidimensional analytical framework. This analytical framework presented in the present white paper includes metrics for identifying the breadth of the industry, identifying the degree of technological development, staff professionalism, range of provided services, financial position and scientific activity.*

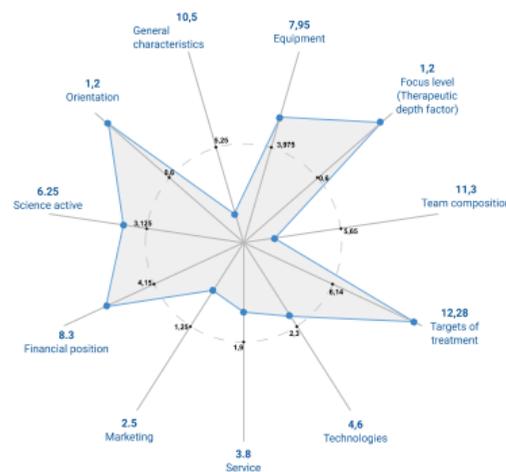
Precision Medicine Clinics 3D Analytical Framework



Precision Medicine Clinics Industry Analytical Framework

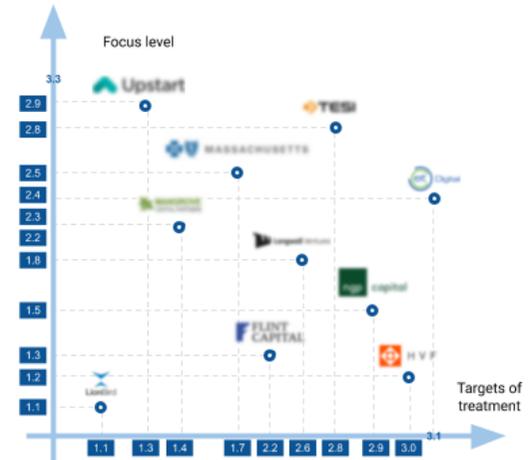


Precision Medicine Clinics Analytical Framework: Clinic Harmonization Analysis



[www.aginganalytics.com](http://www.aginganalytics.com)

Precision Medicine Clinics Product and Service Pipeline Therapeutic Depth vs. Breadth Analysis

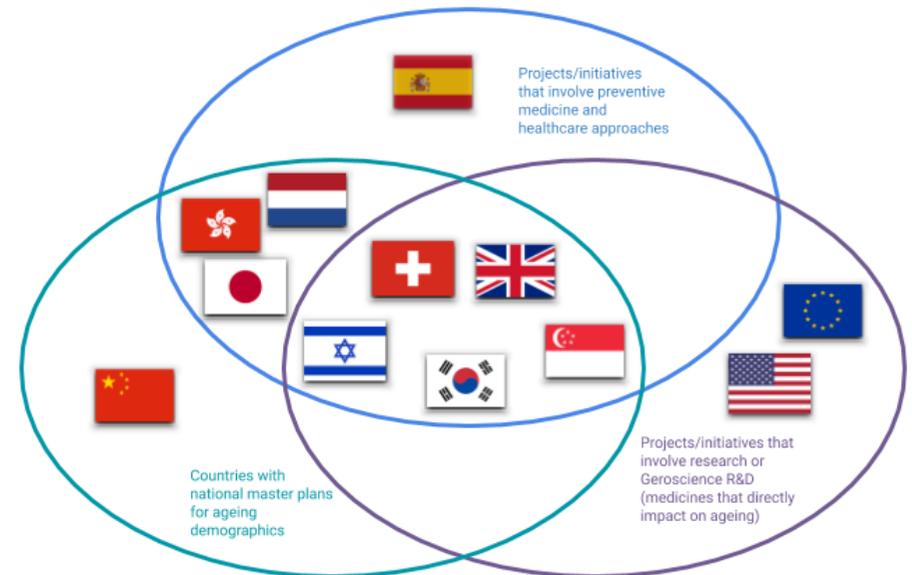
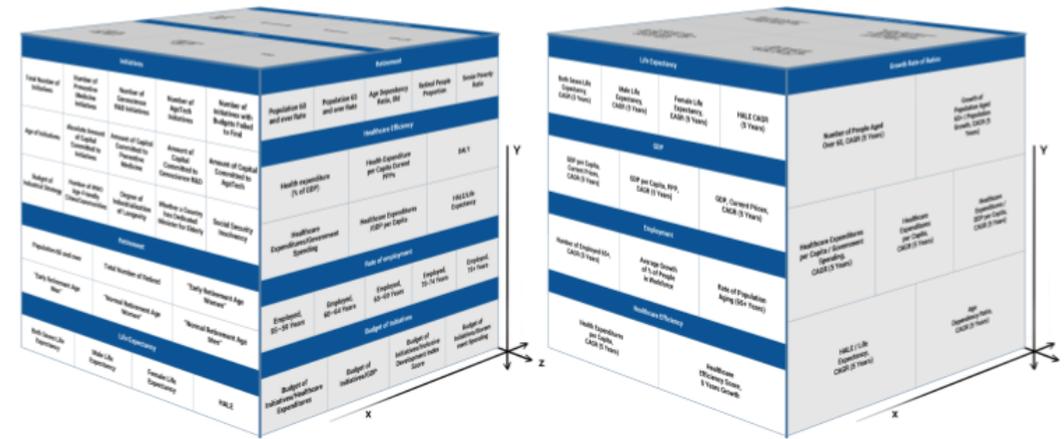


[info@aginganalytics.com](mailto:info@aginganalytics.com)

# National Government Development Plans Report Presented in UK Parliament

Because Aging Analytics Agency is the main source of Longevity industry data and analytics for the recently-established **All-Party Parliamentary Group for Longevity**, representatives of the agency presented some of the major conclusions of its recent **“National Longevity Development Plans Global Landscape Overview 2019”** report at the All-Party Parliamentary Group for Longevity **Strategic Advisory Board** meeting in **UK Parliament** on April 30th, arguing that the UK Government needs to extend existing efforts and create a framework to change the **deficit model** of the ‘Ageing Society’ to an **asset model** around ‘Longevity’ and be bold with a national strategy to harness the ‘Longevity Dividend’ to benefit all people in society.

National Government Longevity Development Plans: Country Scoring					
POSITION	COUNTRY	COUNTRY SCORE	POSITION	COUNTRY	COUNTRY SCORE
1	United Kingdom	5.29	7	Hong Kong	3.41
2	Netherlands	4.36	8	Japan	3.10
3	Singapore	4.15	9	USA	3.07
4	South Korea	4.00	10	Spain	1.94
5	Israel	3.94	11	European Union	1.88
6	Switzerland	3.93	12	China	1.85



# Aging Analytics Agency is Now the Main Source of Longevity Industry and Economics of Ageing Data and Analytics for the UK All-Party Parliamentary Group on Longevity

## All Party Parliamentary Group for Longevity



Preventive Medicine  
Innovations in Healthcare  
Problem of Ageing Population  
Financial Reform for Pension System



## Supporting Partners



## APPG for Longevity Officers



Rt Hon Damian Green MP  
Chair



Rt Hon Norman Lamb MP  
Vice-Chair



Sir Peter Bottomley MP  
Vice-Chair



Jonathan Lord MP  
Vice-Chair



Kevin Foster MP  
Vice-Chair



Lord Andrew Stone  
Secretary



Baroness Sally Greengross  
Treasurer



Lord Geoffrey Filkin

## Executive Team Longevity International UK APPG for Longevity



Eric Kihlstrom  
Head of Industry  
Collaboration



Tina Woods  
CEO & Co-Founder  
Secretariat Director

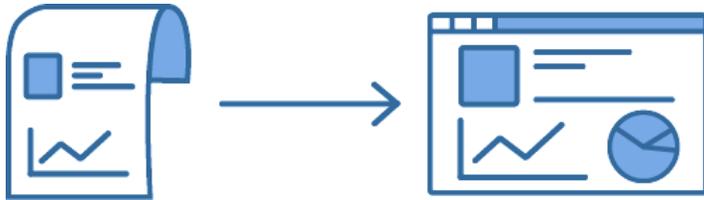


Dmitry Kaminskiy  
Head of International  
Cooperation Division



# Online Longevity Analytics Platform to Enable a Framework for Cross-Industry Stakeholder Dialogue and Industry Optimization

In 2019, to compliment these reports, Aging Analytics Agency is releasing an advanced online Longevity Analytics Platform and database featuring interactive visuals which can transform static analytical reports into dynamic infographics updated in real-time. This platform will enable complex interactions between industry entities and stakeholders to be visualized, filtered, searched and thus more easily understood.



Once created, this platform will be continuously updated with real-time industry developments and will be significantly upgraded with the integration of elements including:

- A stakeholder smart-matching engine
- Supply chain analysis
- Tools for the syndication of investment rounds
- Customized report production
- Peer-to-peer, distributed stakeholder ranking systems
- Big data analytics and other advanced tools and techniques

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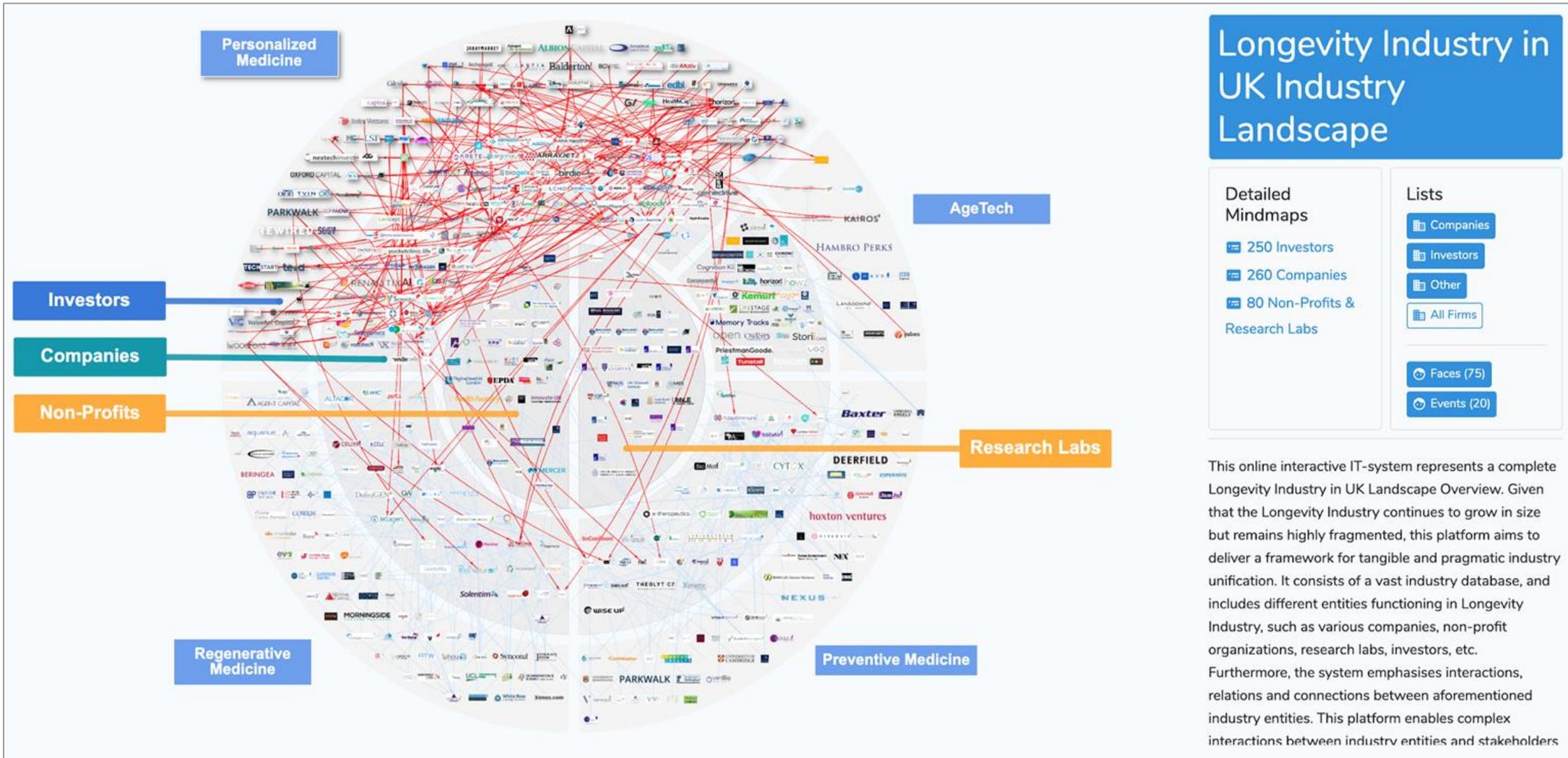
## IT-Platform as the Investment Knowledge Nexus for Longevity.Capital

The platform will be open to qualified stakeholders, and will serve as the framework for industry optimization and cross-disciplinary dialogue and collaboration between companies, investors, entrepreneurs, scientists and government officials. The overarching aim of the platform is to promote the synergistic and integrated development of the Longevity Industry to maximize the benefits of all industry stakeholders.

The Longevity Industry continues to grow in size but remains highly fragmented, with different stakeholders displaying disparate opinions on where it is headed and how long it will take to get there. their platform aims to deliver a framework for proper industry unification. In prototype development for over a year, this interactive platform will ultimately serve as the investment knowledge epicenter of Longevity.Capital.

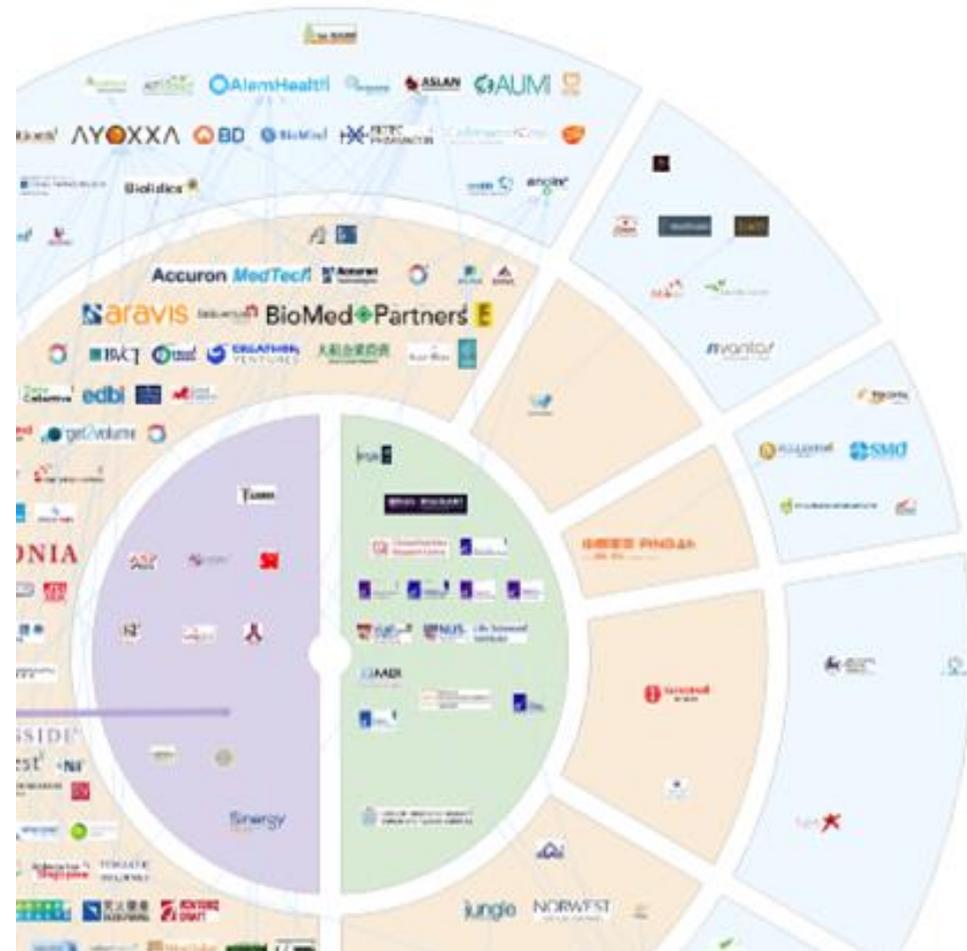
Moving forward, Aging Analytics Agency will serve as the main source of expertise behind Longevity.Capital, providing sophisticated Longevity Industry analytics in order to develop and de-risk the fund's investment strategies. Meanwhile, Longevity.Capital will follow through on and execute the strategy, and provide financial products similar to hedge funds.

# Longevity in UK Industry Landscape 600 Elements



# Multi-Colors Sectors

- Color coding
- Layered Pie Charts
- Grouping



# Embedded Report Data

- Filter List of Companies and Investors
- Faces and Personalities related to the Report
- Upcoming Relevant Conferences and Events

**Lists**

- Companies
- Investors
- Other
- All Firms

---

- Faces (75)
- Events (20)

75 Faces of  Longevity Industry in UK Industry Landscape

**Faces**

Aisling Burnand

Anders Sandberg

Andrew Jack

Andrew Krentz

Andrew Scott

Anne McArdle

Aubrey de Grey

**Aubrey de Grey**

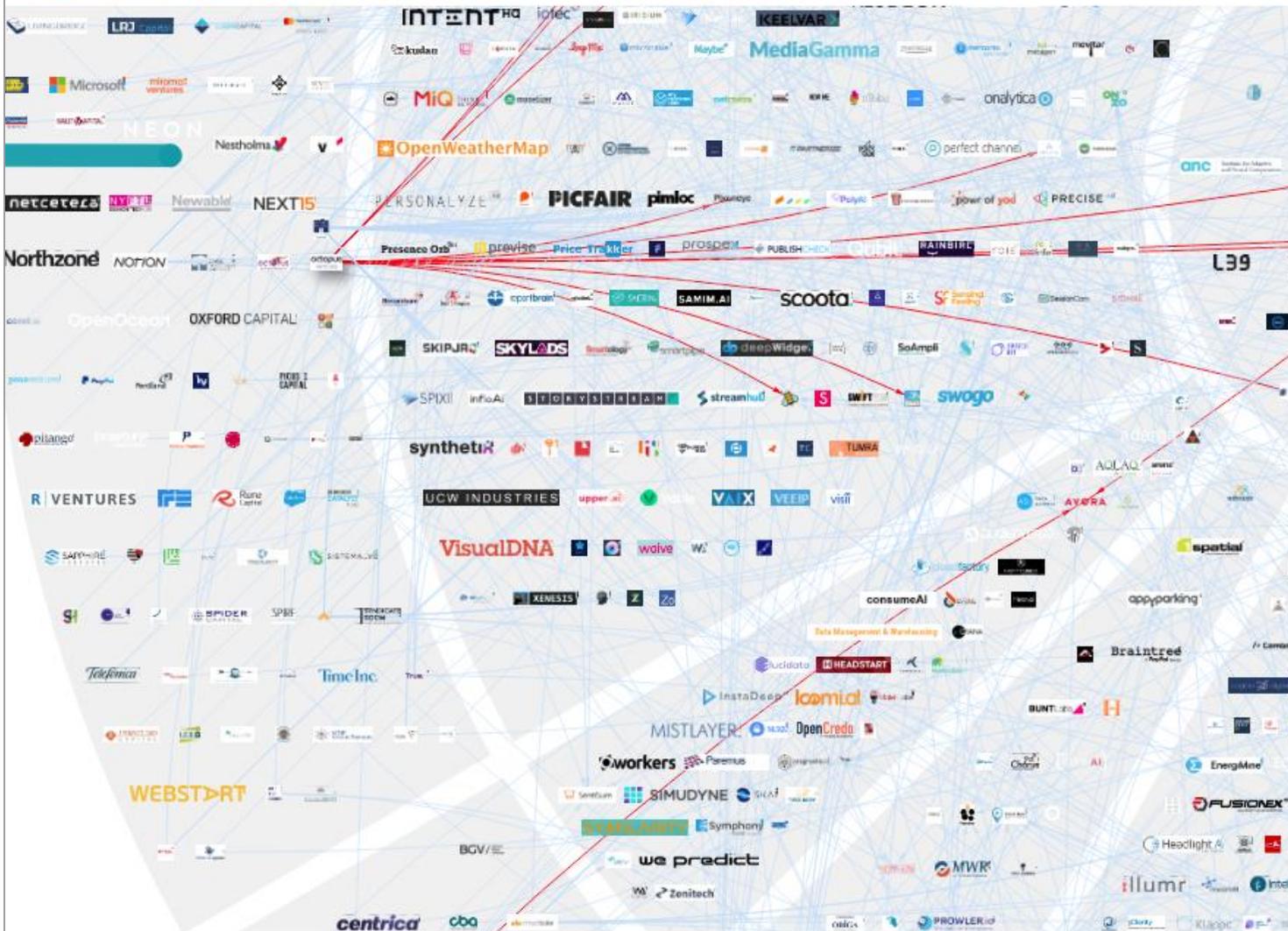
Dr. de Grey is the biomedical gerontologist who researched the idea for and founded SENS Research Foundation. Dr. de Grey is Editor-in-Chief of Rejuvenation Research, is a Fellow of both the Gerontological Society of America and the American Aging Association, and sits on the editorial and scientific advisory boards of numerous journals and organizations. He has also pioneered new privacy, biosafety, ELSI, environmental and biosecurity policies. He is director of an IARPA BRAIN Project and NIH Center for Excellence in Genomic Science. He has co-authored 425 papers, 95 patent publications and one book (Regenesis). He is known for his view that medical technology may enable human beings alive today to live indefinitely. De Grey's research focuses on whether regenerative medicine can prevent the aging process. He works on the development of what he calls "Strategies for Engineered Negligible Senescence" (SENS), a collection of proposed techniques to rejuvenate the human body and stop aging. To this end, he has identified seven types of molecular and cellular damage caused by essential metabolic processes. SENS is a proposed panel of therapies designed to repair this damage. He is also a member of Flooved advisory board.

Source: US

## Interaction instead of static content

Zoom in, pan, visualize investments, get details on the Report Mindmap

### UK Artificial Intelligence Industry Landscape



[← Back to report](#)

## Octopus Ventures



Industry: Marketing & Advertising

Headquarters: London, England, United Kingdom

Founded Date: 2000

Employees Number: 11-50

Funding Status: Undisclosed

Investor Type: Venture Capital

Investment Stage: Early Stage Venture, Seed

Number Of Exits: 27

Octopus Ventures is a London and New York based venture capital firm, focused on backing unusually talented entrepreneurs. Octopus Ventures has been fortunate enough to work with the founding teams of over 60 companies, including Conversocial, graze.com, LoveFiLM, Property Partner, Secret Escapes, Sofar Sounds, SwiftKey, Swoon Editions, Uniplaces, tails.com, Zoopla Property Group and Zynstra.

Invests into

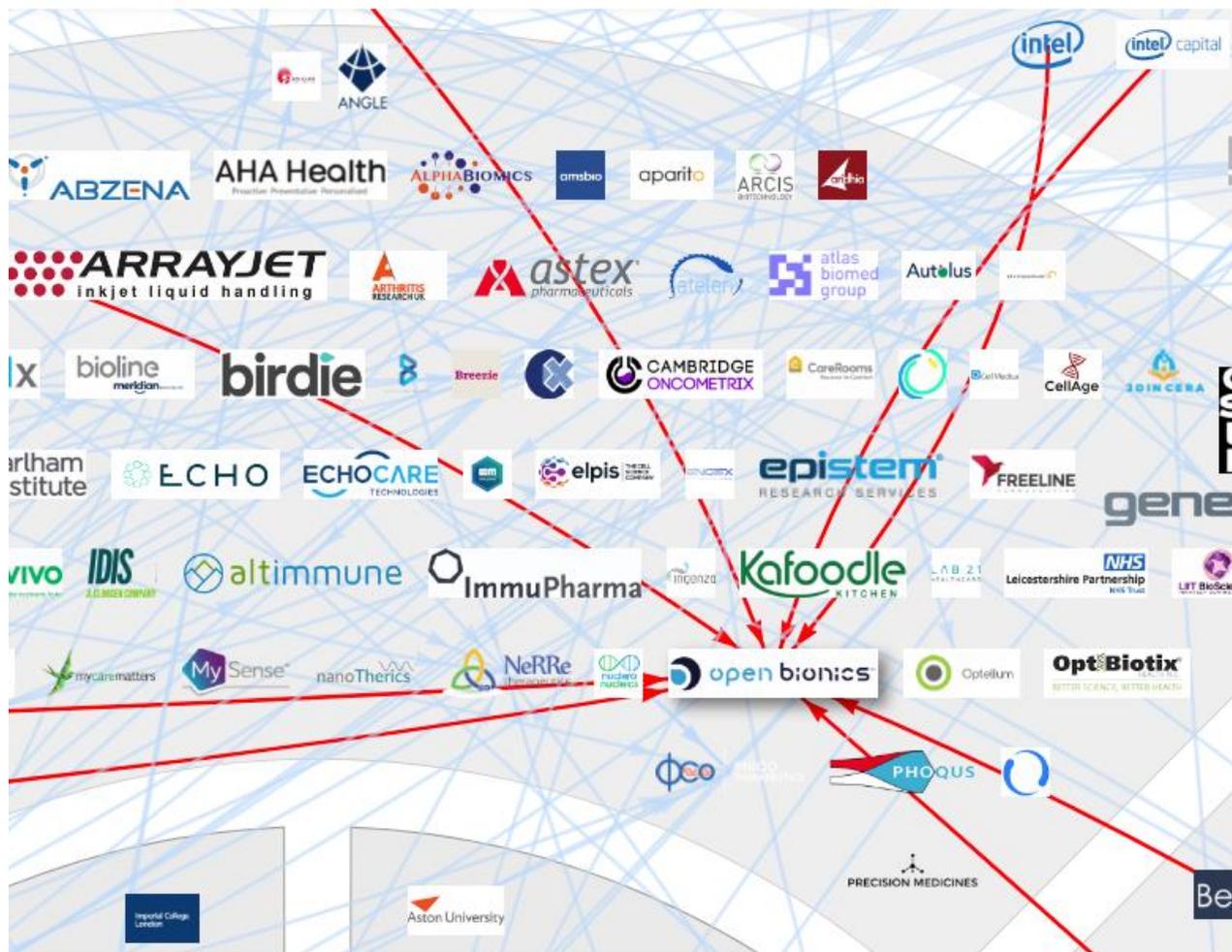
BridgeU

Fluidly

## Investments as Arrows

- Our team puts efforts to keep facts of investments to be up to date
- Any new investments will be instantly visible on our reports

### Longevity Industry in UK Industry Landscape



[← Back to report](#)

## Open Bionics

Technology: Prosthetics

Industry: Personalized Medicine

Headquarters: Bristol, Bristol, City of, United Kingdom

Founded Date: 2014

Employees Number: 11-50

Funding Status: Early Stage Venture

They use 3D printing to make their devices customized for each customer and accessible by anyone. They're developing the perfect medical grade materials to give their hands the right strength and grip and to make them last.

### Investors

Disney Accelerator

Downing Ventures

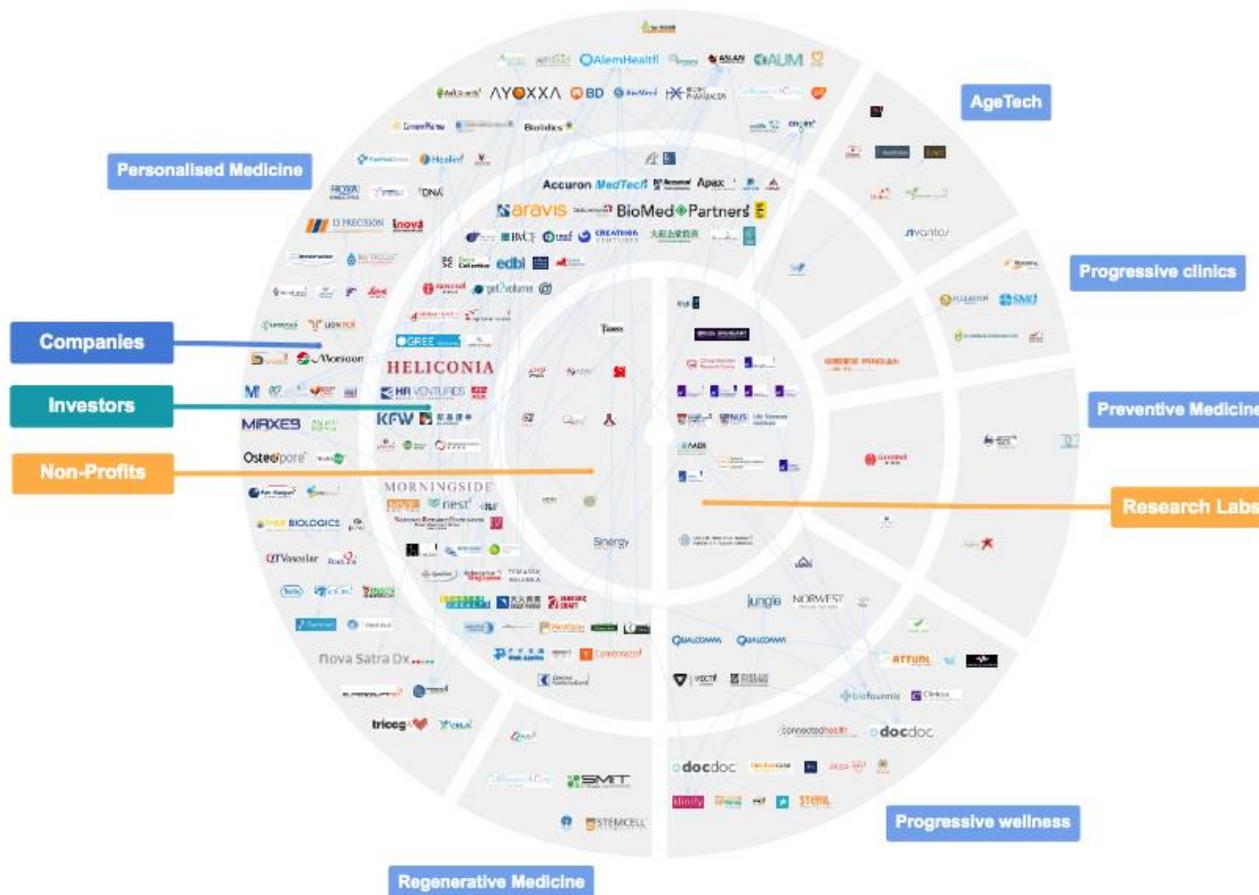
Intel

Intel Capital

# Automated Mindmaps Generation

An analyst inputs just specifies looks and colors.  
The rest is done by our engine.

## Longevity Industry in Singapore Industry Landscape



## Longevity Industry in Singapore Industry Landscape

### Detailed Mindmaps

- 100 Companies
- 73 Investors
- 25 Other

### Lists

- Companies
- Investors
- Other
- All Firms

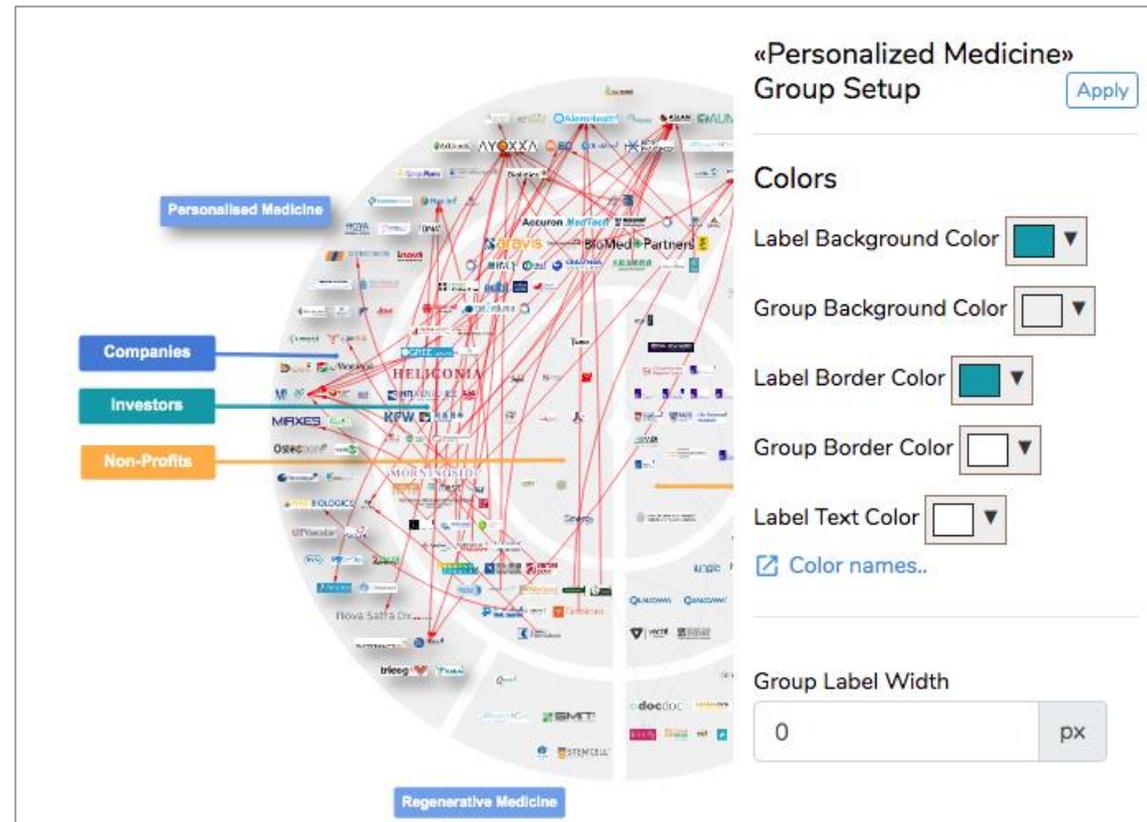
This online interactive IT-system represents a complete Longevity Industry in Singapore Landscape Overview. Given that the Longevity Industry continues to grow in size but remains highly fragmented, this platform aims to deliver a framework for tangible and pragmatic industry unification. It consists of a vast industry database and includes different entities functioning in Longevity Industry, such as various companies, non-profit organizations, research labs, investors, etc. These entities are further subdivided into distinct industry

# Backend for Analysts, Automated Mindmaps Generation

Analyst can see statistics and technical hints, which allows easier to decide on the visual distribution of data for a mindmap report.

An analyst inputs just specifies looks and colors.  
The rest is done by our engine.

ID#	Sector Name	Order	
3	Other	1 center	<b>Has 25 Firms in 2 Groups:</b> Non-Profits — 10 — 40% or 144° Research Labs — 15 — 60% or 216°
2	Investors	2	<b>Has 73 Firms in 5 Groups:</b> Personalized Medicine — 61 — 84% or 301° AgeTech — 1 — 1.4% or 5° Progressive clinics — 1 — 1.4% or 5° Preventive Medicine — 2 — 2.7% or 10° Progressive wellness — 8 — 11% or 39°
1	Companies	3	<b>Has 100 Firms in 6 Groups:</b> Regenerative Medicine — 5 — 5% or 18° Personalised Medicine — 62 — 62% or 223° AgeTech — 7 — 7% or 25° Progressive clinics — 5 — 5% or 18° Preventive Medicine — 3 — 3% or 11° Progressive wellness — 18 — 18% or 65°



# Specific Sectors' Detailed Mindmaps

- Alternative zoom in view to the single sector of the circular mindmap
- Flat Detailed Mindmap

## UK Artificial Intelligence Industry Landscape

### Detailed Mindmaps

- 100 Companies
- 73 Investors
- 25 Other

### Lists

- Companies
- Investors
- Other
- All Firms
- Faces (7)
- Events (1)

## Longevity Industry in Singapore Industry Landscape → Investors Sector

### Personalized Medicine

Accuron MedTech, Accuron Technologies, Apax PARTNERS, AVIVA, aravis, Baidu.ventures, BioVeda Capital, BVCF, CREATHOR VENTURES, DARK HORSE, TAYA, 大和企業投資, Data Collective, edbi, eden strategy institute, GREE Ventures, GENTING BERHAD, get2volume, GLOBAL HEALTH INVESTMENT FUND, Great Eastern, JAFCO ASIA, HR VENTURES CAPITAL FOR INNOVATORS, HELICONIA, JFDI ASIA, LACUNA CANADA, High-Tech Gründerfonds, 凱基證券 KGI SECURITIES, KFW, Medical, MVP CAPITAL, NF, MORNINGSIDE, NRW.BANK, nest.bio, NATIONAL RESEARCH FOUNDATION PRIME MINISTER'S OFFICE SINGAPORE, nest, RED DOT, Shinryoku 新綠, WI Hainan Group, SpesNet, Enterprise Singapore, STARTUP + HEALTH, TEMASEK HOLDINGS, 天大藥業 TIANDA PHARMA, b to v, VENTURE CRAFT, WALDEN, wellingtonpartners, Westlake VENTURE PARTNERS, Women's, 药明康德 Wuxi AppTec, XERAYA CAPITAL, Y Combinator, Zürcher Kantonalbank

### Preventive Medicine

GENTING BERHAD, WILSON VENTURE PARTNERS

### AgeTech

wavemaker

### Progressive clinics

中国平安 PINGAN 金融 · 科技

### Progressive wellness

ADAMAS FINANCE ASIA, jungle ventures, NORWEST VENTURE PARTNERS, QUALCOMM, QUALCOMM, ZUELLIG PHARMA making medicine more accessible, VECTR VENTURES

← Back to report  
Zürcher Kantonalbank

Technology: N/A  
Industry: Personalize  
Headquarters: Zürich  
Founded Date: 1870

Zürcher Kantonalbank – incorporated public-law by the canton of Zurich activity is its public serv governs the bank's eco commitment.

Invests into  
Merlion Phar

<https://www.zkb.>  
socialmedia@zkb

Zürche

# Embedded Report Data

- Filter List of Companies and Investors
- Faces and Personalities related to the Report
- Upcoming Relevant Conferences and Events

**Lists**

- Companies
- Investors
- Other
- All Firms

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- Faces (75)
- Events (20)

75 Faces of  Longevity Industry in UK Industry Landscape

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Anders Sandberg

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Anne McArdle

Aubrey de Grey

**Aubrey de Grey**

Dr. de Grey is the biomedical gerontologist who researched the idea for and founded SENS Research Foundation. Dr. de Grey is Editor-in-Chief of Rejuvenation Research, is a Fellow of both the Gerontological Society of America and the American Aging Association, and sits on the editorial and scientific advisory boards of numerous journals and organizations. He has also pioneered new privacy, biosafety, ELSI, environmental and biosecurity policies. He is director of an IARPA BRAIN Project and NIH Center for Excellence in Genomic Science. He has co-authored 425 papers, 95 patent publications and one book (Regenesis). He is known for his view that medical technology may enable human beings alive today to live indefinitely. De Grey's research focuses on whether regenerative medicine can prevent the aging process. He works on the development of what he calls "Strategies for Engineered Negligible Senescence" (SENS), a collection of proposed techniques to rejuvenate the human body and stop aging. To this end, he has identified seven types of molecular and cellular damage caused by essential metabolic processes. SENS is a proposed panel of therapies designed to repair this damage. He is also a member of Flooved advisory board.

Source: US

# Companies Profiles View

«Bio3D Technologies»

Progressive clinics

HC SURGICAL SPECIALISTS LTD  
Hocoma a DB-Brand

AgeTech

bio 3D  
Cornea BioSciences  
SENESCENCE LIFE SCIENCES

Preventive Medicine

INSTITUTE of MENTAL HEALTH  
LAB

Regenerative Medicine

CellResearch  
GROUP OF COMPANIES

**Company**

## Bio3D Technologies



Bio3D Technologies have created world's first and Singapore's first true scientific and biological 3D printer with multiple print heads, modular design, nozzle-to-platform auto-alignment, remote viewing and control etc. They are also the first to integrate an anti-vibration levitating platform into a 3D printer. With the introduction of Bio3D Explorer, they made 3D bioprinting even more affordable and accessible. Once again, they created the world's first portable, foldable bioprinter.

Technology: AgeTech  
Industry: AgeTech  
Headquarters: Singapore, Central Region, Singapore  
Funding Status: N/A

<https://www.bio3d.asia/>  
✉ [sales@bio3d.asia](mailto:sales@bio3d.asia)

# Automated Mind Maps - Admin Editor

Interactive IT Platform Logout

Dashboard  
Interactive Reports  
Firms  
Logos Upload  
Help & Glossary  
Open Website Frontend

«Longevity Industry in Singapore-Interactive Report / «Companies» Sector

## Flat Map of «Companies» Sector

[Public](#) [Save Positions](#) [Reset Positions](#)

**Progressive clinics**



**AgeTech**



**Preventive Medicine**



**Regenerative Medicine**



**Personalised Medicine**



**GlaxoSmithKline** 

Technology: **Drug Discovery**  
Industry: **Personalized Medicine**  
Headquarters: **UK, Singapore**  
Funding Status: **N/A**

GlaxoSmithKline had 3 global businesses that research, develop and manufacture innovative pharmaceutical medicines, vaccines and consumer healthcare products. Their goal is to be one of the world's most innovative, best performing and trusted healthcare companies.

<https://www.gsk.com/>  
[@GSK](#)



# Reports are not about companies only

Interactive IT Platform Logout

20 Events of — «Longevity Inc» x +

https://mindmaps.aginganalytics.com/reports/11/events

## 20 Events of Longevity Industry in UK Industry Landscape

Flat Map Edit Sector

Edit

### The Economist Ageing Societies 2016



**AGEING SOCIETIES**  
Reaping the longevity dividend  
November 29th-30th 2016  
St. Pancras Renaissance Hotel  
London

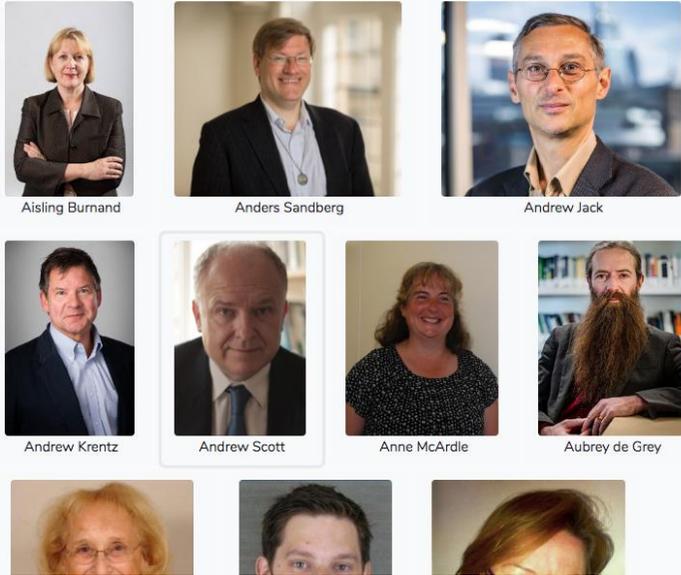
Tue, Nov 29, 2016 8:00 AM — Wed, Nov 30, 2016 5:00 PM  
<http://events.economist.com>

Key figures across politics and finance discussed the challenges and opportunities of an ageing population. The event's Ageing Societies speakers from the Health Organisation, Blackrock, Pensions discussed the implications for future generations.

### 75 Faces of Longevity Industry in UK Industry Landscape

75 Faces of Longevity Industry in UK Industry Landscape

#### Faces

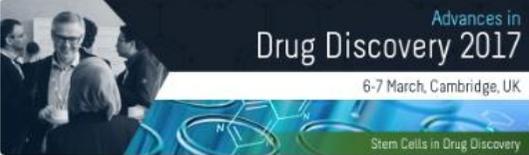


**Andrew Scott**

Andrew Scott is Professor of Economics at London Business School and a Fellow of All Souls, Oxford University and the Centre for Economic Policy Research. He has previously held posts at Harvard University, London School of Economics and Oxford University. His research and advisory work focuses on the short and long run forces that affect governments and business. He has been an advisor to HM Treasury, Bank of England, the House of Commons, a Non Executive Director at the Financial Services Authority and Economic Advisor to the Prime Minister of Mauritius. He has published widely in leading international academic journals and was Managing Editor of the Royal Economic Society's The Economic Journal and Scientific Chair of the Euro Area Business Cycle Network. He has received prizes and research grants for his published work and is a sought after public speaker on future trends. He has won the General Teaching Excellence prize at London Business School and is a co-author of a textbook, Macroeconomics: Understanding the Global Economy, which has been translated into four languages and soon will appear in its Fourth Edition.

Country: UK  
<https://www.andrewscott.global/>  
[ascott@london.edu](mailto:ascott@london.edu)

### Stem Cells in Drug Discovery



**Drug Discovery 2017**  
Advances in  
6-7 March, Cambridge, UK  
Stem Cells in Drug Discovery

Mon, Mar 6, 2017 8:00 AM — Tue, Mar 7, 2017 5:00 PM  
[website](#)

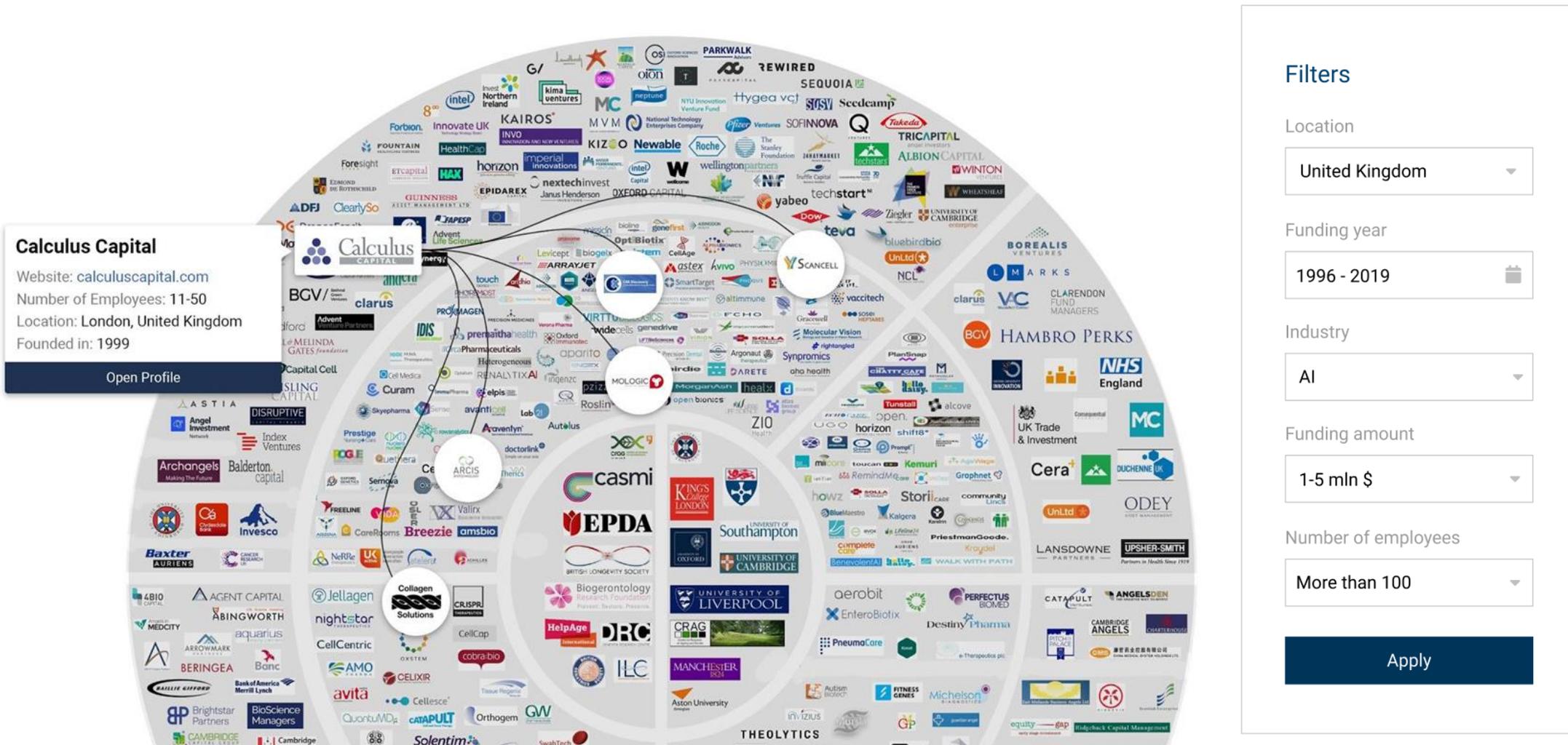
This meeting was a Campus Conference on 6-7 March 2017. It provided unrestricted access to the latest developmental and clinical testing. So much so that the FDA is looking into replacing previous models as a matter of urgency.



# Longevity Analytics Platform Development Q3 2019

## Bottom-Up Smart Matching & Syndication of Investment Rounds

- Automatically connects and provides network suggestions
- Smart-matching between relevant entities and stakeholders
- Accelerates the adoption and deployment of new technological solutions



Aging Analytics Agency's beta prototype Longevity Industry Analytics Platform is live and available at [mindmaps.aginganalytics.com](http://mindmaps.aginganalytics.com). The official version will launch in **Q3 2019**, featuring **10,000 entities** classified into the four key sub-sectors. Built to serve as the next-generation solution for industry optimization, it will equip all participants with tangible tools for stakeholder smart-matching, with a strong focus on cross-discipline dialogue and synergetic cooperation.

«Bio3D Technologies»

**Bio3D Technologies** Company



Bio3D Technologies have created world's first and Singapore's first true scientific and biological 3D printer with multiple print heads, modular design, nozzle-to-platform auto-alignment, remote viewing and control etc. They are also the first to integrate an anti-vibration levitating platform into a 3D printer. With the introduction of Bio3D Explorer, they made 3D bioprinting even more affordable and accessible. Once again, they created the world's first portable, foldable bioprinter.

Technology: AgeTech  
 Industry: AgeTech  
 Headquarters: Singapore, Central Region, Singapore  
 Funding Status: N/A

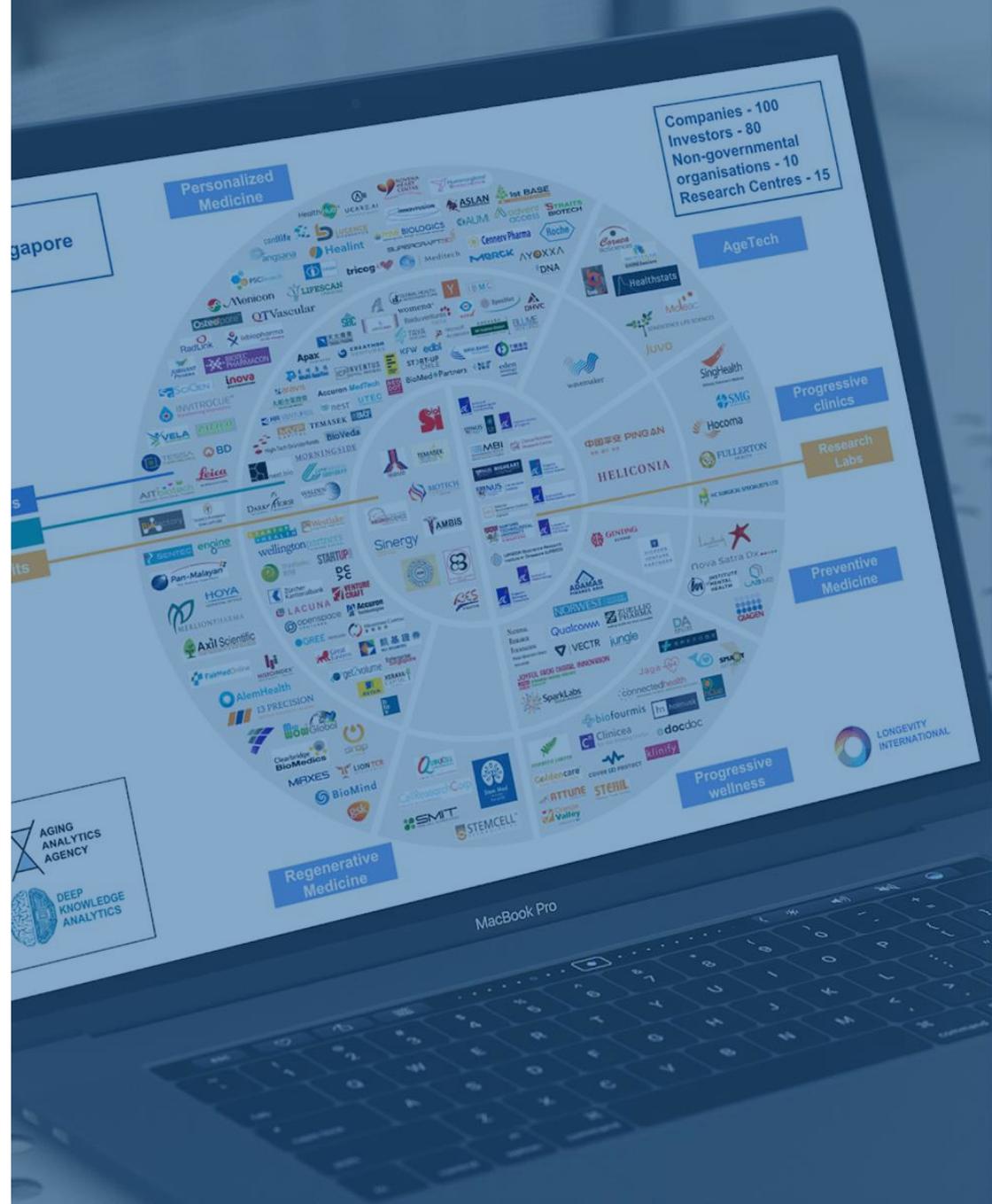
<https://www.bio3d.asia/>  
 sales@bio3d.asia

Progressive clinics: HC SURGICAL SPECIALISTS LTD, Hocoma, S...

AgeTech: Cornea Biosciences, Mole...

Preventive Medicine: INSTITUTE MENTAL HEALTH, LAB...

Regenerative Medicine: CellResearch GROUP OF COMPANIES



# Next Multi-Trillion Underdeveloped Market for Financial Institutions

## AgeTech Market

```
graph TD; A[AgeTech Market] --> B[Globally  
1 Billion in Retirement]; A --> C[In the UK  
10 Million in Retirement];
```

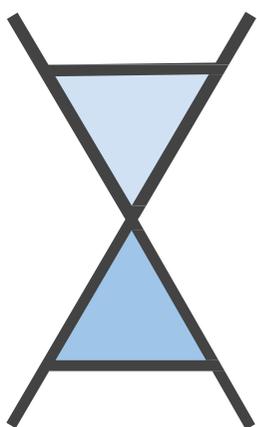
**Globally**  
1 Billion in Retirement

**In the UK**  
10 Million in Retirement

“ The one billion retired people globally are a multi-trillion dollar opportunity for business ”

— *Dmitry Kaminskiy interview in the Financial Times.*

Ageing represents not only one of the most pressing problems of our time, but also one of the most promising opportunities. Financial institutions such as investment banks, pension funds and insurance companies can either sink or swim when hit by the oncoming Silver Tsunami. Whether they succeed to ride the wave or drown under it will depend not only on their willingness to deploy new business models adapted to an ageing population and the emerging industries of AgeTech, WealthTech and Longevity Finance, but also on the quality of Longevity Analytics that they use to formulate such business models.



# AGING ANALYTICS AGENCY

**Aging Analytics Agency** is primarily interested in strategic collaboration with international corporations, organisations and governments of progressive countries on projects and initiatives related to Longevity.

**Aging Analytics Agency** is open to engage with strategic clients via a variety of approaches, including:

- Conducting customised case studies, research and analytics for internal (organizational) use, tailored to the precise needs of specific clients;
- Producing open-access analytical reports;
- Offering customised analysis using specialised interactive industry and technology databases and IT-platforms.

In certain specific cases, if it fits our interests, Aging Analytics Agency is open to co-sponsoring research and analytics for the production of both internal and openly-access industry reports and special case studies on the topics of Longevity, Precision Health, Personalized Medicine, Digital Health, Blockchain in Healthcare as well as other advanced topics.

[www.aginganalytics.com](http://www.aginganalytics.com)

[info@aginganalytics.com](mailto:info@aginganalytics.com)



**Introduction:  
Landscaping the  
Global Longevity Industry  
by Region, Domain,  
Subsector and Application**



# Introduction

*“With some longer term, moonshot thinking around healthcare and biotechnology, I believe we can improve millions of lives” – Larry Page, CEO of Google.*

*“Death never made any sense to me.” – Larry Ellison, Founder of Oracle.*

*“There will come an age when our average life expectancy will reach 200 years.” – Masayoshi Son, CEO of SoftBank and Vision Fund.*

*“Aging is the ultimate evil. To invest in Anti-Aging technologies is the most ethical business, and to donate to longevity research is the most effective form of altruism.” – Dmitry Kaminskiy, Deep Knowledge Ventures.*

*“Longevity is a blessing. And as an investor, it provides you opportunities to benefit from compounding and to have a longer investment horizon. But if you don't prepare for it, you are left with two options: Work longer in life, perhaps much longer than you'd like, or hope you've been good to your children and that they'll be willing to care for you in your old age. And, second, I hope you'll speak out. Longevity is an issue of social justice that will have a more profound impact on your generation than on any generation before. If we don't start to address it – not just in this country but globally – we're going to see fewer job prospects for young people, higher unemployment, lower growth and many older people – maybe your parents – left without the means to support themselves.” – Larry Fink, Chairman of Blackrock Capital.*

*“The way we prioritize projects at Insilico Medicine is by looking at the number of quality-adjusted life years (QALY) each project can generate. It is the most altruistic cause and the most effective investment. If you add just one year of life to everyone on the planet, you generate over 7 billion QALY.” – Alex Zhavoronkov, Chief Science Officer of the Biogerontology Research Foundation.*

*“The future of the longevity industry not only has the logical potential to become the wealthiest industry in all of history, but also represents the most ethical way of doing business.” – Dmitry Kaminskiy, Deep Knowledge Ventures.*



# Introduction

## Establishing a Framework for the Longevity industry

At present, there is no consensus on which of the various technologies touched upon in these documents falls under the umbrella of 'gerontology', and the more clearly defined terms such as 'P3 medicine' have not been traditionally been associated with geroscience in general. We propose that they should be classified together, given their increasing relevance to extending healthy longevity. The 4 subdivisions of the industry that we propose are **Geroscience**, **P3 medicine**, **AgeTech** and **Novel Financial System**.

**Geroscience** (the science of aging) describes all areas of research and technology that directly recognize and address the issues of the ageing process. This includes both basic research into the biology of aging, as well as interventions designed to directly address the hallmarks of aging, and by virtue thereof the majority of chronic diseases that stem from the root causes of aging. **P3 medicine** describes the shift in medicine towards precision, personalisation and preventive rather than reactionary treatment. This report argues that it should be classified as cornerstone of the Longevity industry due to its focus on preventive treatment and maintenance of health via early diagnostics and the application of interventions as early as possible. **AgeTech** includes all non-biomedical technologies which help to preserve the quality of life, wellbeing and functional capacities of elderly demographics. While not traditionally considered as a part of the Longevity industry, this report argues that it is one of the industry's main four pillars because it can help preserve function and wellbeing up to the point where more advanced therapies reach practical application in the clinic. Chapter 7 of the report considers the creation of a **Novel Financial System** to simultaneously avoid economic stagnation in the face of demographic aging, while creating an infrastructure whereby governments and financial institutions can reap gains from maximizing not just population lifespan, but healthspan as well. Given the significant impact that societal ageing and Longevity have upon economies, pension funds and insurance companies have the potential to tie financial performance to quantitative measures of healthy longevity like HALY (health-adjusted life years) and QALY (quality-adjusted life years) in order to help economies thrive due to an increase in its citizens healthy longevity.

The Longevity report, the first of its kind, outlines the vast and multifarious Longevity industry, and formulates a preliminary foundation for classifying and systematizing the various strands of the industry into one coherent landscape, and establishing a standardized framework to unite the fragmented stakeholders of the industry, and to provide better tools and leverages for analyzing the vast and complex landscape of this emerging Longevity mega-industry.

## GEROSCIENCE R&D

Rejuvenation  
Biotechnology

Gene Therapy

Geroprotectors

Regenerative Medicine

Nutraceuticals

Basic Research on  
Biology of Aging

## P3 MEDICINE

Personalized Diagnostics

Personalized Biomarker  
Analysis

Personalized Prognostics

Personalized in vivo & in  
silico drug testing

Personalized QALY &  
HALE Estimation

Preventive Therapies

## AGETECH

Novel Retirement Plans

Cognitive Enhancement

FinTech for the Elderly

NextGen Mobile Apps for  
the Elderly

Continuing Education

Entertainment for the  
Elderly

## NOVEL FINANCIAL SYSTEM

Longevity Index Fund

Longevity Hedge Fund

Longevity Stock  
Exchange

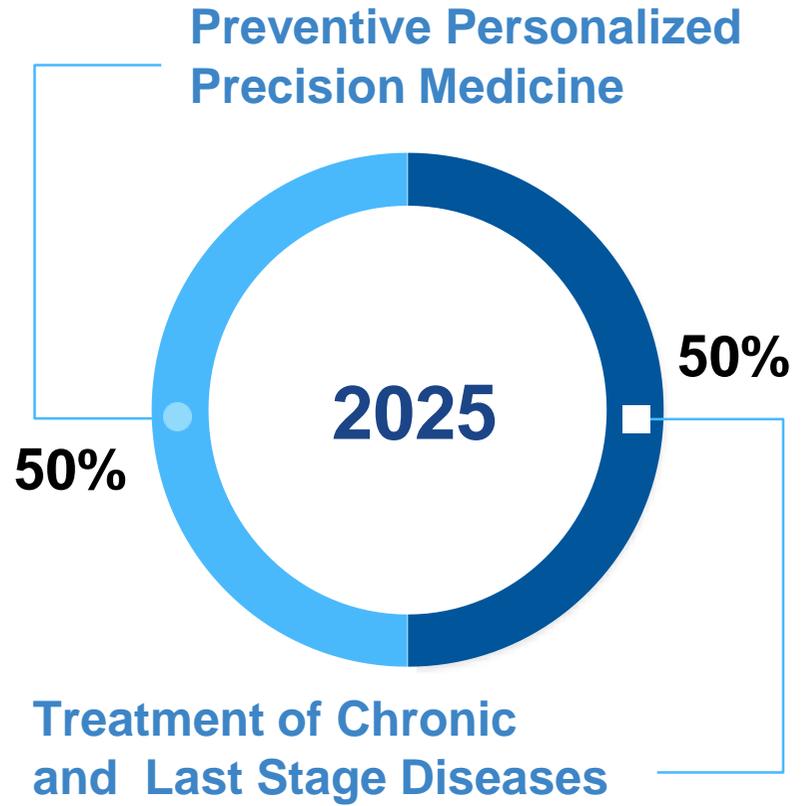
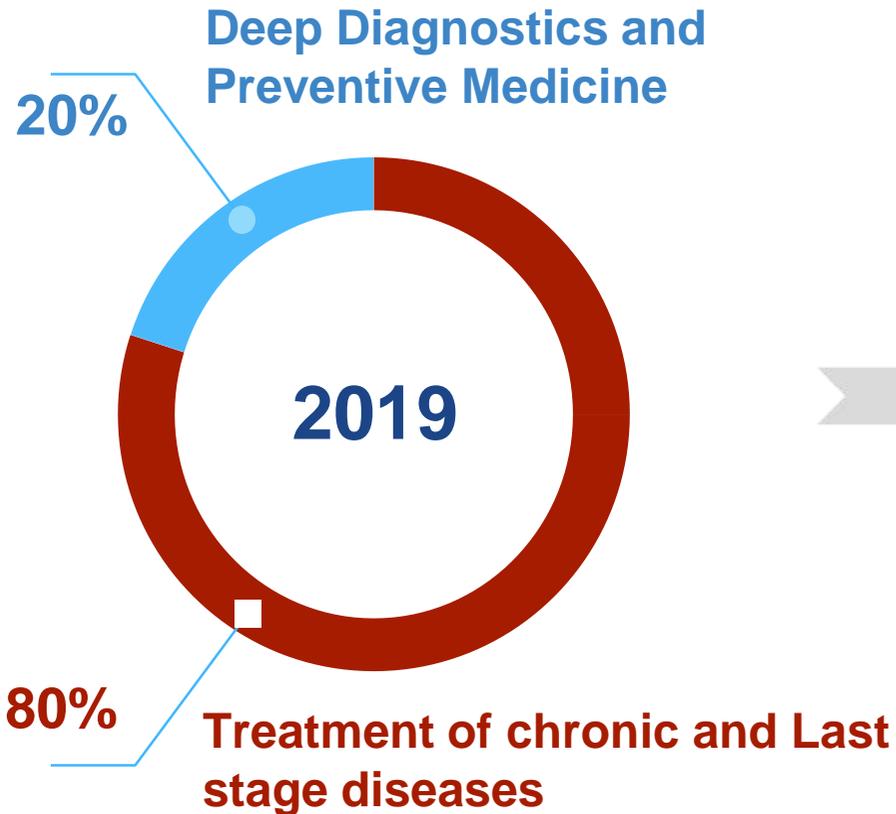
AgeTech Bank

Longevity Derivatives

Longevity Trust

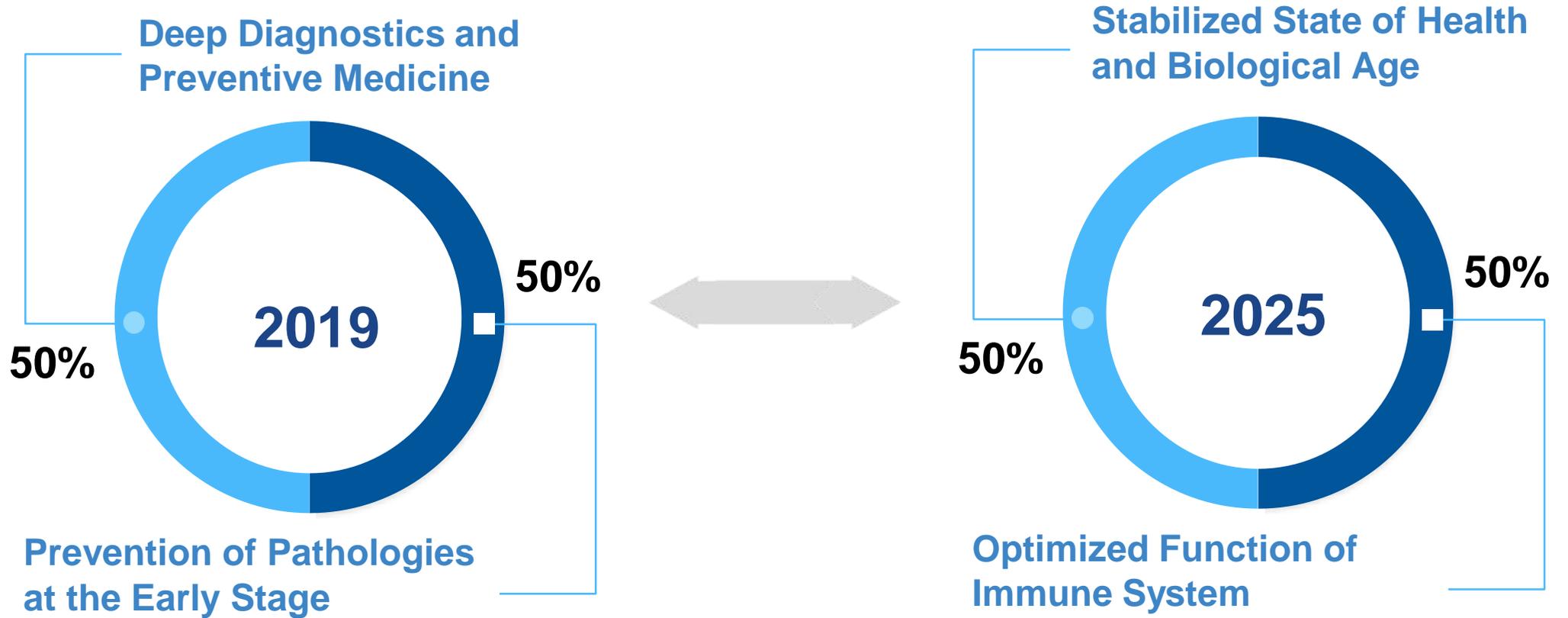


# Paradigm Shift from Treatment to Prevention





# The New Frontier - from Precision Medicine to Precision Health





# Accelerating the Development of Precision Health through AI

## AI-Driven Precision Diagnostics



- Multi-Omic Sequencing
- Continuous monitoring powered by Big Data Analytics
- Continuous monitoring of health state based on changes in biomarkers of aging

## AI-Driven Advanced Prognostics



- AI-driven prognostics
- Advanced biomarker-based prognostics
- AI-driven predictive prognostics based on personalized multi-omics

## Personalised Treatment Optimization



- AI-driven *in silico* personalised treatment optimization
- AI-driven personalised *in vivo* drug optimization
- Treatment optimization based on patient genetics

## AI-Driven Preventative Treatment



- Maintenance state of precision health through preventive medicine
- AI-based predictions of optimal drug combination

# THE BUSINESS of LONGEVITY GLOBAL INDUSTRY LANDSCAPE 2018

# THE BUSINESS OF LONGEVITY

## Geroscience

## P3 Medicine

## Top 10 Longevity Companies

- COMPANIES
- INVESTORS
- SCIENCE HUBS



## Top 10 Longevity Investors

## Top 5 Countries

AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

UK

Switzerland

US

Kazakhstan

Israel

## Regenerative Medicine

## Gene Therapy

# THE SCIENCE of LONGEVITY GLOBAL LANDSCAPE 2018

# THE SCIENCE OF LONGEVITY

USA

- Science Labs
- Non-Profit
- Geroscience Hubs



## Top 10 Geroscience Books

## Top 10 Geroscience Journals

AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

## Top 10 Online Resources

DrugAge

LONGEVITY INTERNATIONAL

JENAGE

AgefactDB

DAA

CellAge

AgingPartners.org

Fight Aging!

## Top 10 Geroscience Conferences

Symposium on Aging

The Aging Cell

Rejuvenation Biotechnology

BAAM

GENETICS OF AGING AND LONGEVITY

Disease Drivers of Aging

2017 Barshop Symposium on Aging

# Longevity Industry in UK Landscape Q4 2018

Companies - 260  
Investors - 250  
Non-Profits - 10  
Research Labs - 10

Personalized Medicine

AgeTech

Investors  
Companies  
Non-Profits

Research Labs



**AGING ANALYTICS AGENCY**

**DEEP KNOWLEDGE ANALYTICS**

**Longevityuk**

**Biogerontology Research Foundation**  
Prevent. Restore. Preserve.

# Longevity Industry in Singapore Landscape 2019

Companies - 100  
 Investors - 80  
 Non-governmental organisations - 10  
 Research Centres - 15

## Personalized Medicine

## AgeTech

## Progressive clinics

## Research Labs

## Preventive Medicine

## Progressive wellness

## Regenerative Medicine

### Companies

### Investors

### Non-Profits



AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

100  
Companies

### Drug Discovery



### AgeTech



### Other



### Progressive Wellness



## Longevity Industry in Singapore 2019

### Stem cells/ Regenerative



### Progressive Clinics



### Neurological



### Diagnostics



AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

# Longevity Industry in Israel Landscape 2019

Companies - 160  
 Investors - 180  
 Non-Profits - 10  
 R&D Centers - 10

## Personalized Medicine

## Progressive Wellness

### Investors

### Companies

### Non-Profits

## R&D Centers



## Preventive Medicine

## Regenerative Medicine

## AgeTech

**AGING ANALYTICS AGENCY**

**ISRAELI LONGEVITY ALLIANCE**  
 ותק - התנועה לאיכות ואריכות חיים (ע"מ)  
 Yetek (Seniority) - the Movement for Longevity and Quality of Life

**DEEP KNOWLEDGE ANALYTICS**

**LONGEVITY INTERNATIONAL**

# Longevity Industry in Israel 2019 - 160 COMPANIES



AGING ANALYTICS AGENCY



ISRAELI LONGEVITY ALLIANCE



Vetok (Seniority) - the Movement for Longevity and Quality of Life

## Drug Development



## Progressive wellness



## Gene therapies



## AgeTech



## Neurotech



## Others



## Progressive R&D



## Implant & Prosthetics



## Cell therapy



## Diagnostic



## Scientifically-Validated Lifestyle Recommendation



## Prosthetics



## Nutraceuticals



## Biomarkers



## Progressive Wellness



## Gene therapy



## Research



## Regenerative Medicine



## AgeTech



## Other



260 Companies

## Microbiome



## Neurotech



# Longevity Industry in UK Q4 2018

## Personalised Medicine



## Preventive medicine



## Diagnostics



## Drug Discovery



## Geroprotectors



## Cell Therapies



**Non-Profits - 50**  
**Journals - 25**  
**Research Labs - 25**  
**Conferences - 20**  
**Media entities - 10**

**JOURNALS**



**RESEARCH LABS**



**MEDIA ENTITIES**



**The Science of Longevity in UK Landscape Overview Q4 2018**

**CONFERENCES**



**NON-PROFITS**







Media Entities  
Covering Longevity and  
Advanced Biomedicine

AI

Finance

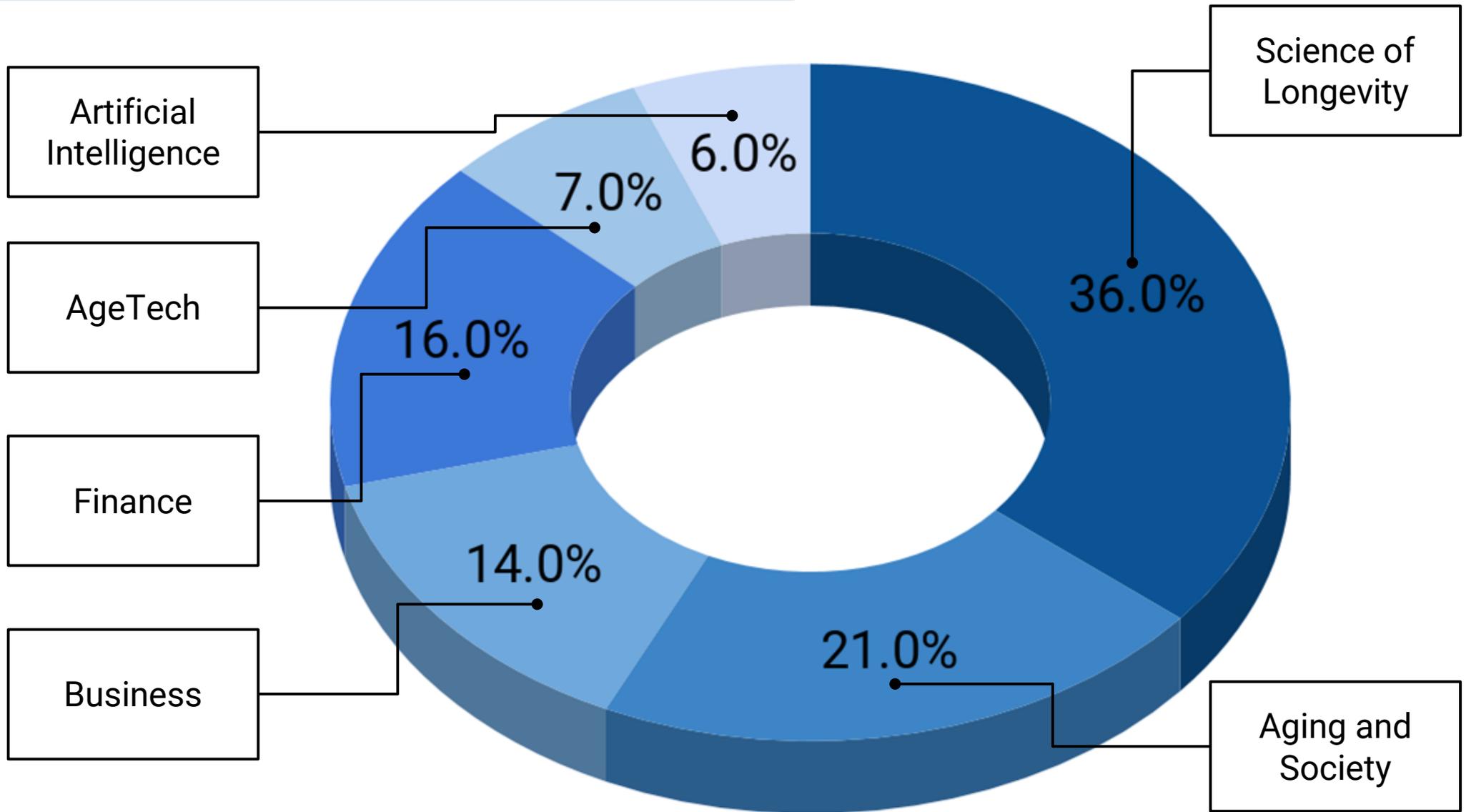
Media Entities - 60



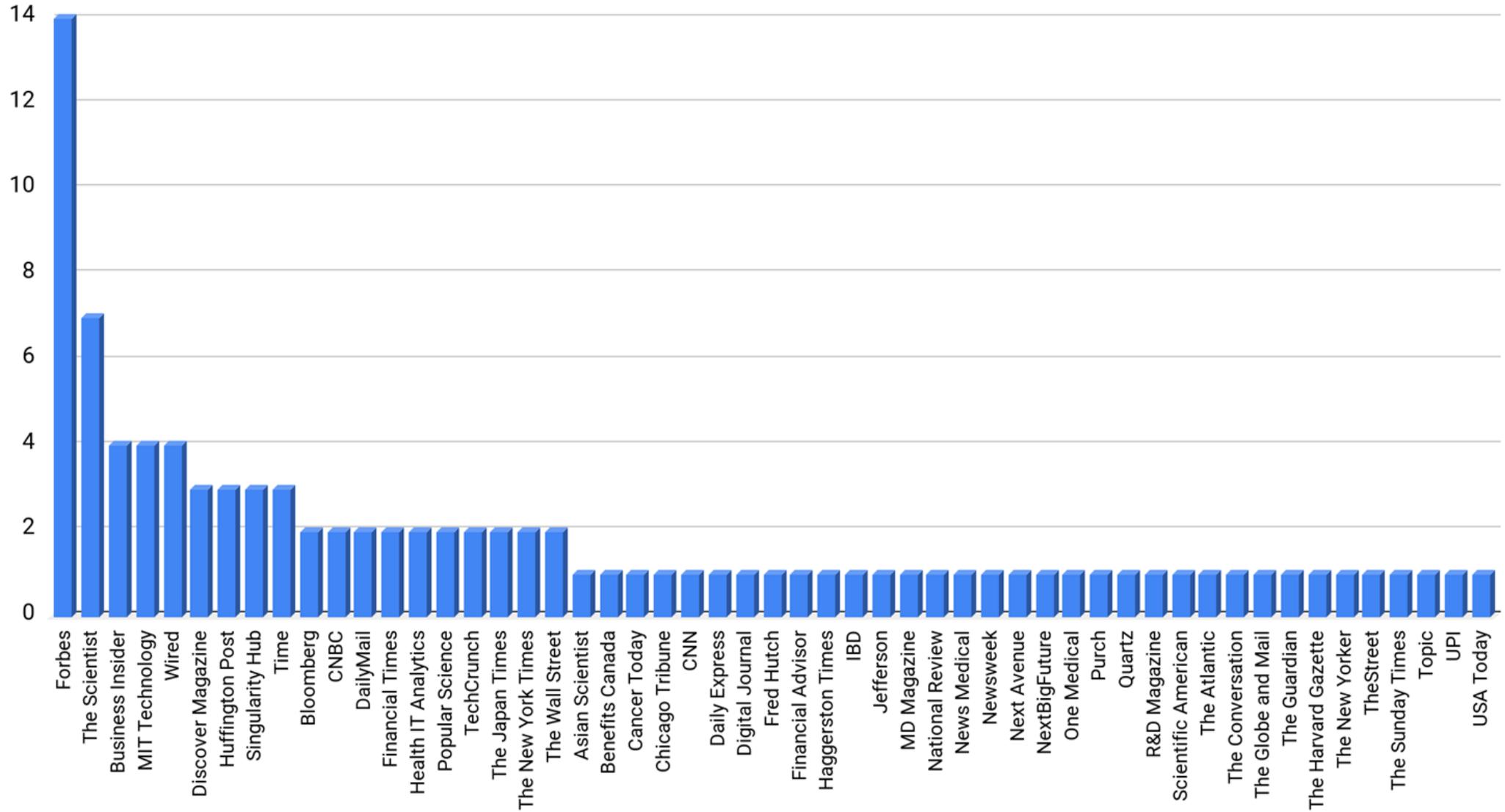
Aging & Society

AGING ANALYTICS AGENCY  
DEEP KNOWLEDGE ANALYTICS  
LONGEVITY INTERNATIONAL

# 100 Journalists Covering Longevity Breakdown of Subtopic Specialization



# 100 Journalists Covering Longevity Breakdown by Media Entities



# FemTech Healthcare Landscape Overview Q1 2019

Companies - 120  
Investors - 335

Preventive  
Medicine

FemTech  
Healthcare

Investors

Companies

FemTech  
Healthcare  
Landscape  
Overview  
Q1 2019

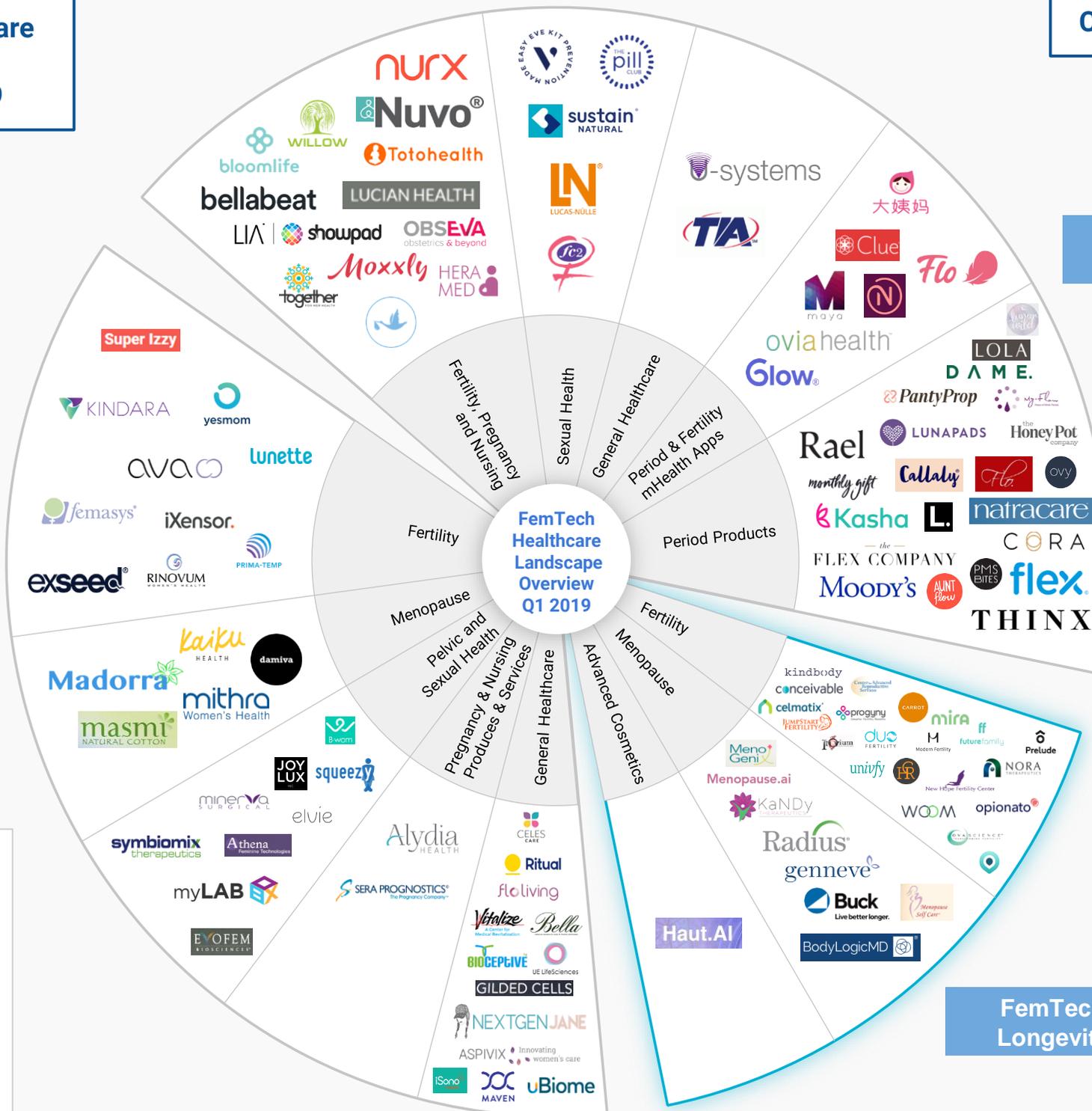


FemTech  
Longevity



**FemTech Healthcare  
Landscape  
Overview Q1 2019**

**Companies - 120**



**FemTech  
Healthcare**

**Preventive  
Medicine**

**FemTech  
Longevity**

**AGING ANALYTICS AGENCY**

**DEEP KNOWLEDGE ANALYTICS**

**LONGEVITY INTERNATIONAL**

# Longevity Industry in California 2019

## AgeTech

Companies - 200  
 Investors - 270  
 Research Labs - 25  
 Non-Profits - 35  
 Governmental Organizations - 15

Investors  
 Companies  
 Non-Profits

Governmental Organizations

Research Labs

## Regenerative Medicine

## Precision Medicine

AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

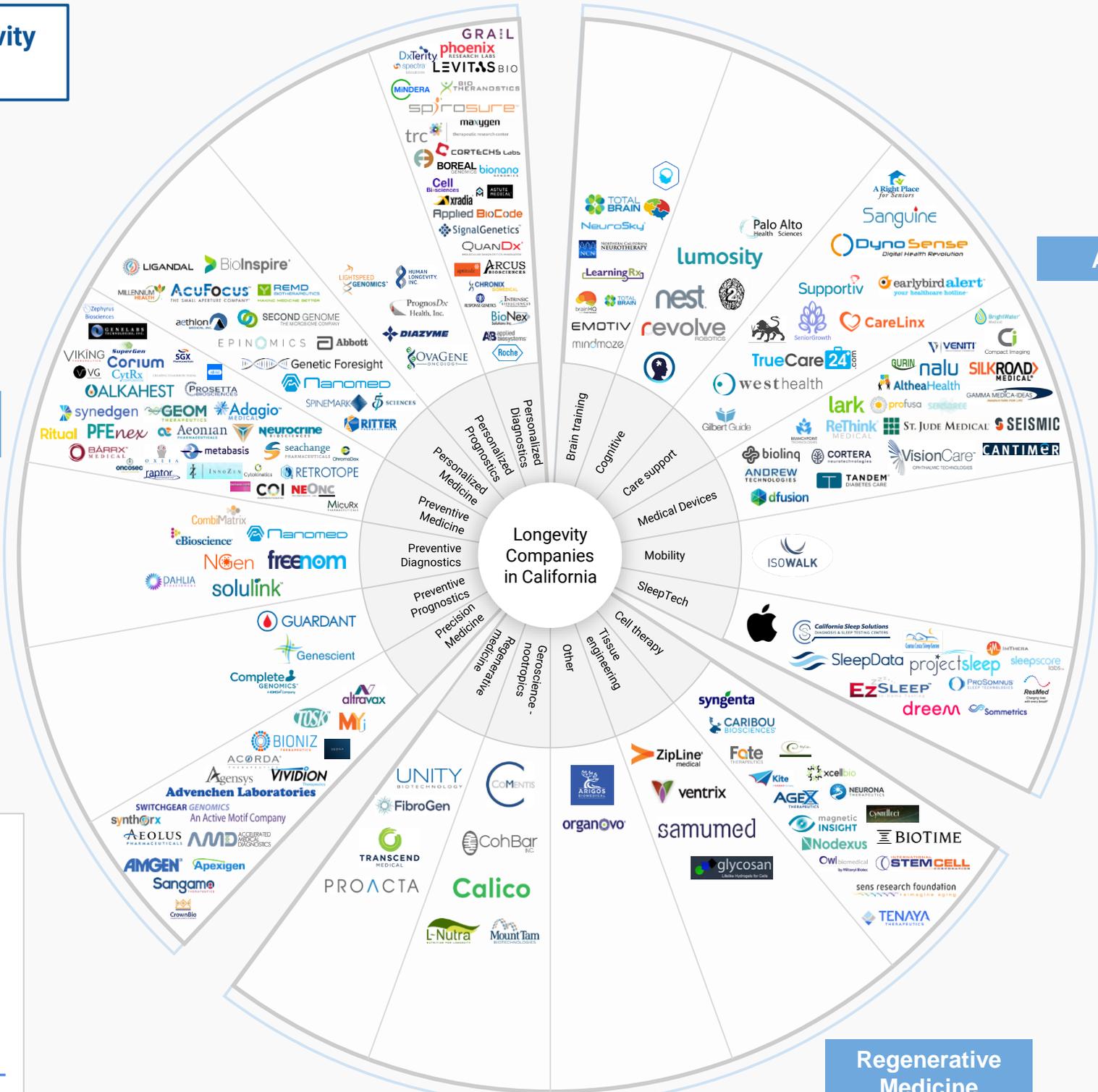


# California Longevity Companies - 200

## Precision Medicine

## AgeTech

## Regenerative Medicine



AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

# Companies - 200

## AgeTech

### Medical Devices



### Brain training



### Care support



### Mobility



### Cognitive



### SleepTech



## Precision Medicine

### Personalized Diagnostics



### Preventive Medicine



### Personalized Medicine



### Precision Medicine



### Personalized Prognostics



### Preventive Diagnostics



### Preventive Prognostics



## Regenerative Medicine

### Tissue engineering



### Geroscience - nootropics



### Regenerative medicine



### Other



### Cell therapy



# Longevity Databases By Category

## Metadata

The Silver Book  
From the Alliance for Aging Research

OMIC TOOLS

ALZFORUM  
NETWORKING FOR A CURE

THE MICHAEL J. FOX FOUNDATION  
FOR PARKINSON'S RESEARCH

IADRP International Alzheimer's  
Disease Research Portfolio

Atlas  
Genetics - Cytogenetics  
Oncology - Haematology

## Biological Data

TMIG-2DPAGE  
Age-related Proteome Database  
TMIG Proteomics Collaboration Center  
Tokyo Metropolitan Institute of Gerontology

PhenomicDB

NIA KOBIO JENAGE  
AgeFactDB

FOSWIKI

PRID

GEROPROTECTORS

Mouse Phenome Database  
at The Jackson Laboratory

DrugAge

CISBAN  
in silico

iPAD SYSTEM  
INTERNET PRIMATE AGING DATABASE

DAA  
Digital Ageing Atlas

GenAge: The Ageing Gene  
Database

GenDR

INTERNATIONAL INSTITUTE OF MOLECULAR AND CELL BIOLOGY

CTAGTCTATTGA  
CTAGTCGATTGA

## Demographic Data

DZA German Centre of Gerontology

GGP HFD

IDL

NIA NATIONAL INSTITUTE ON AGEING

United States<sup>TM</sup>  
Census Bureau

NATIONAL ARCHIVE OF  
COMPUTERIZED  
DATA ON  
AGING

World Health Organization EMBL-EBI

ACL Administration for Community Living  
Ageing Integrated Database (AGID)

## Diseases

EBSCO Health  
NDAR

CDC AGE info  
CENTERS FOR DISEASE  
CONTROL AND PREVENTION

AARP<sup>®</sup>

ERA AGE 2  
European  
Research  
Area in  
Ageing

MRC Medical  
Research  
Council

AgingPortfolio.org  
Tracking International Progress in Aging Research

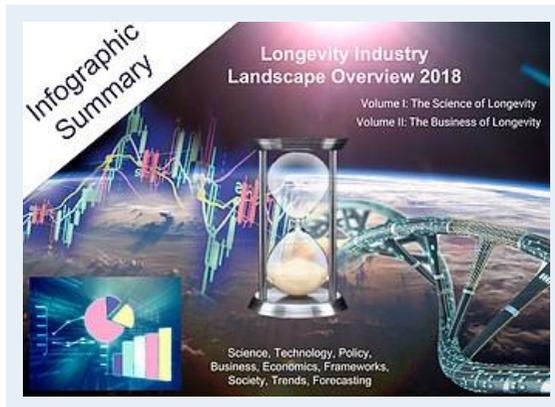
AGING  
ANALYTICS  
AGENCY

DEEP  
KNOWLEDGE  
ANALYTICS

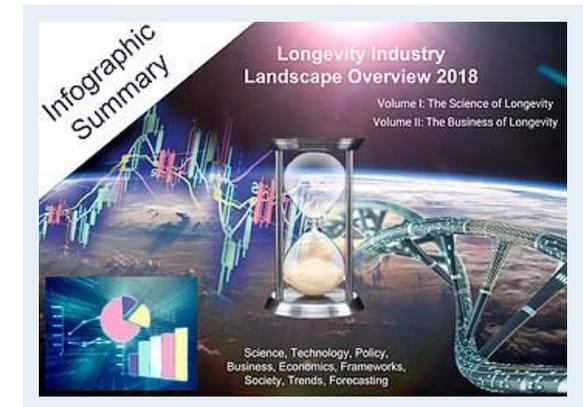
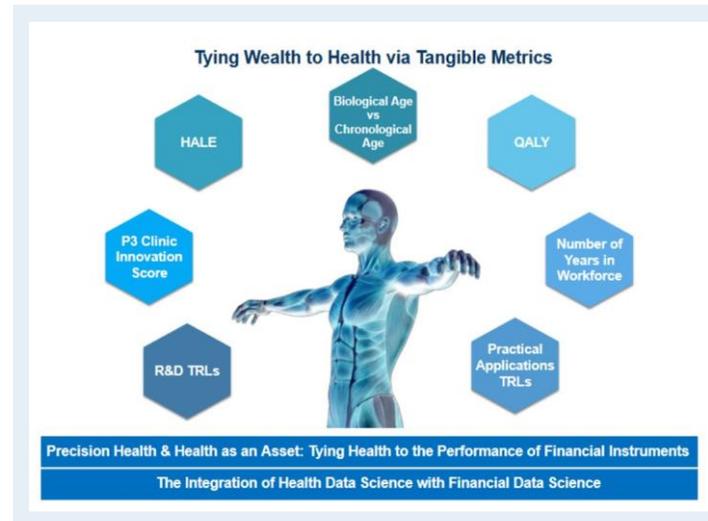
LONGEVITY  
INTERNATIONAL

# Technology Readiness Levels for Tangible & Quantitative Industry Forecasting

## Applying Technology Readiness Levels for Forecasting the BioTech and BioMedicine Industries



Pipeline for the Progressive Model of P3 Medicine Platform

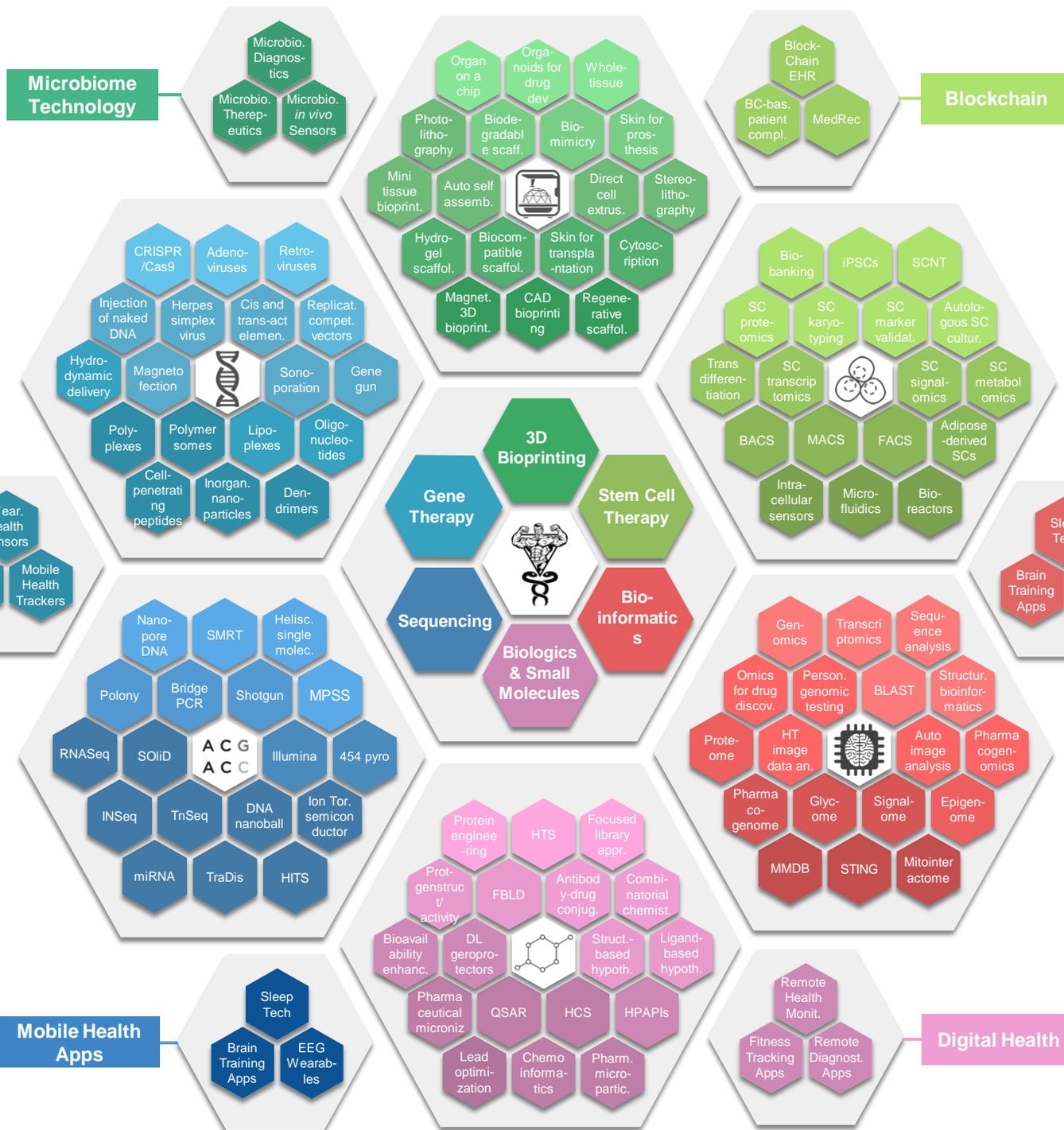


Pipeline for the Progressive Model of P3 Medicine Platform

TRL use a ranking of 1-9, with 9 being the most mature technology. Specific levels are assigned to specific technologies by a group of relevant scientific experts. The use of TRLs provides a uniform metric, enabling consistent discussions of maturity across different types of technologies. In the coming years, TRLs can underpin efforts to shed light on the most important technologies and reveal those currently furthest away from practical applications. Therefore, TRLs enable the right timing and focus to ensure each emerging technology accomplishes its specific endpoints, and highlights the interactions that are possible between technologies.

# THE BUSINESS OF PROGRESSIVE MEDICINE 2018 PRACTICAL APPLICATIONS

Top 120+ Technologies & Therapeutics TRL 8-9



## Technology Readiness Level (TRL)

9	Commercialized
8	Pre-Production
7	Field Test
6	Prototype
5	Bench/Lab Testing
4	Detailed Design

Technology Readiness Levels (TRL) are a common measure of how close a technology is for practical use, used in many engineering disciplines.

By applying it to progressive medicine, we can forecast how long it will take a given therapeutic or technology to witness practical applications in the clinic or home. The darkness of each hexagon represents its TRL, with darker colors indicating a low TRL and brighter colors indicating a high TRL.

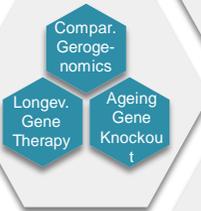
All technologies and therapeutics shown here have a TRL between 8-9.



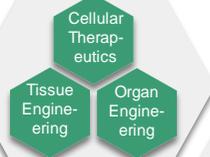
# THE SCIENCE OF PROGRESSIVE MEDICINE 2018 LANDSCAPE

Top 120+ R&D Topics TRL 4-7

## Translational Geroscience



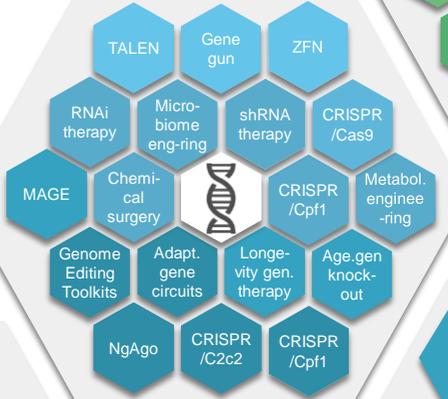
## Regenerative Medicine



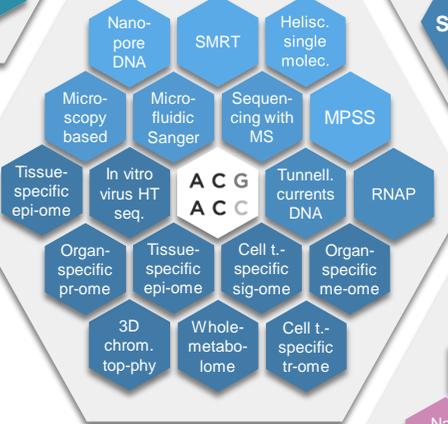
## Gerocuticals



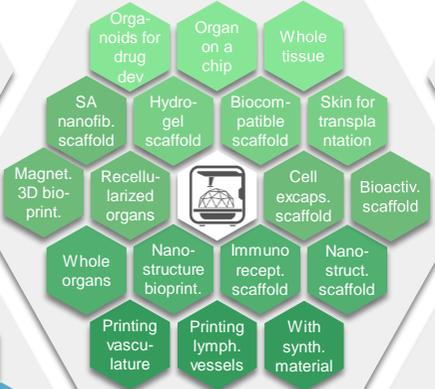
## Gene Therapy



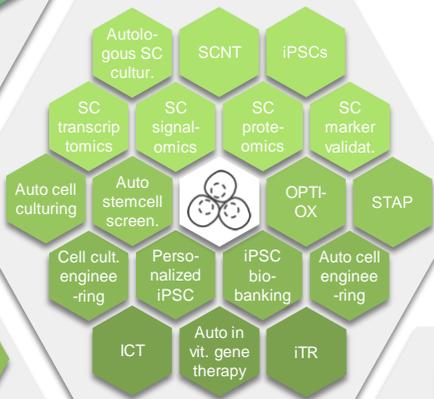
## Sequencing



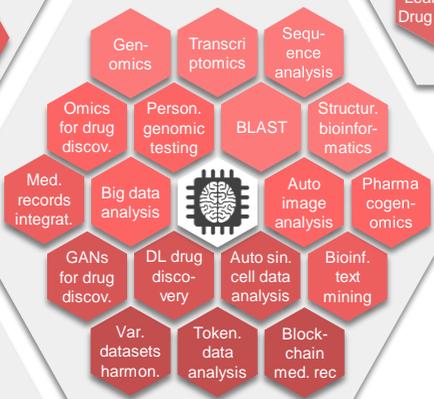
## 3D Bioprinting



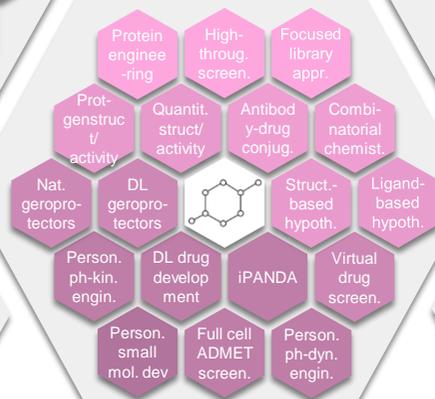
## Stem Cell Therapy



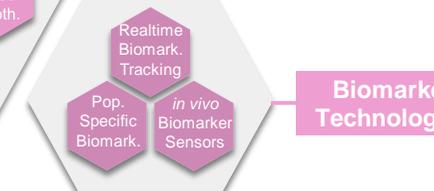
## Bioinformatics



## Biologics & Small Molecules



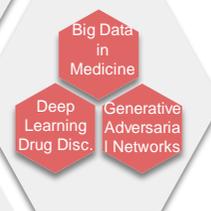
## Bio-informatics



## Blockchain



## Artificial Intelligence



## Biomarker Technologies

### Technology Readiness Level (TRL)

9	Commercialized
8	Pre-Production
7	Field Test
6	Prototype
5	Bench/Lab Testing
4	Detailed Design

Technology Readiness Levels (TRL) are a common measure of how close a technology is for practical use, used in many engineering disciplines.

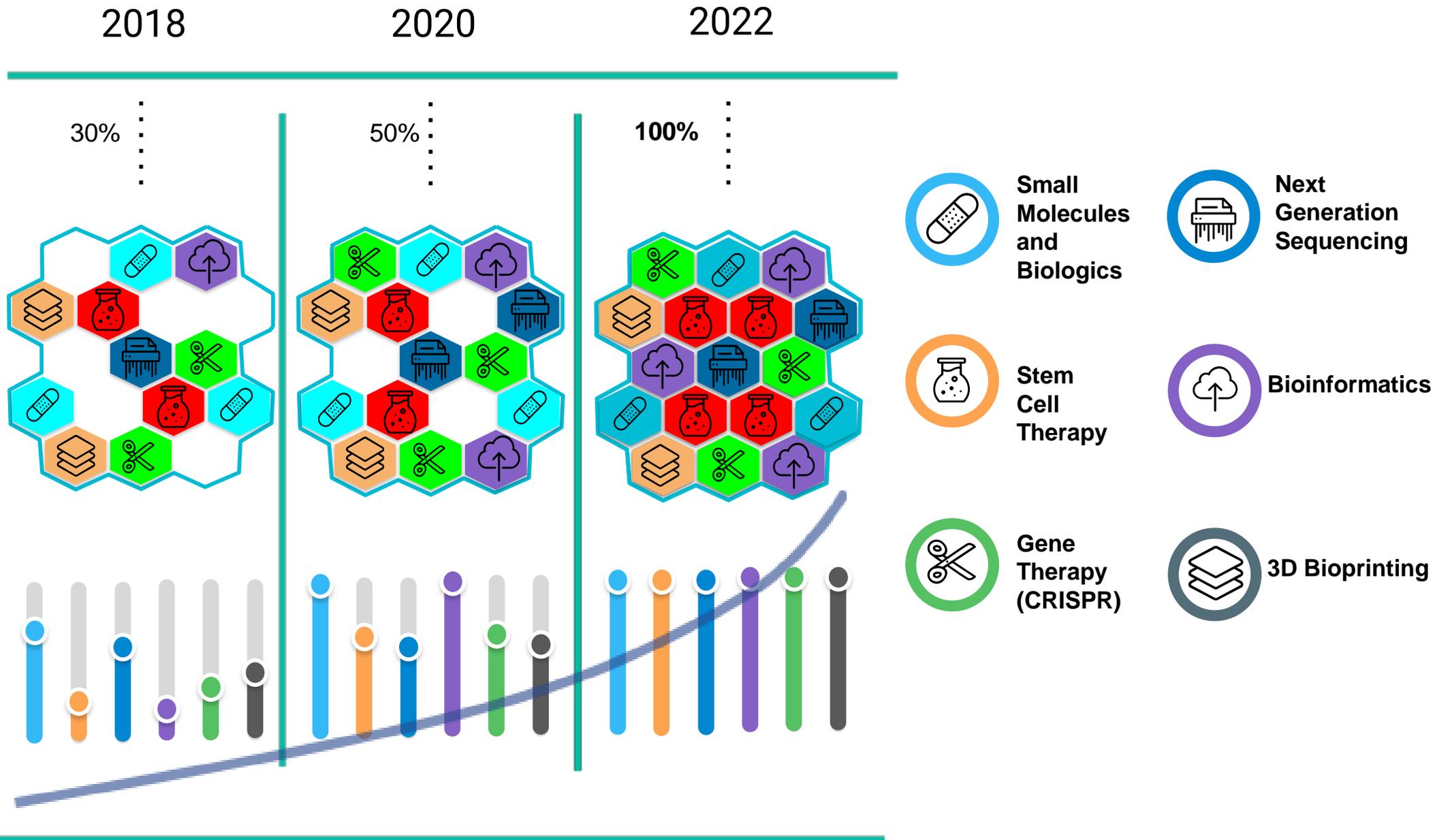
By applying it to progressive medicine, we can forecast how long it will take a given therapeutic or technology to witness practical applications in the clinic or home. The darkness of each hexagon represents its TRL, with darker colors indicating a low TRL and brighter colors indicating a high TRL.

All technologies and therapeutics shown here have a TRL between 4 - 7. Technologies surpassing a TRL of 8 are transferred to the practical applications of progressive medicine landscape overview.





# Timeline for Completion of Technologies for P3 Medicine Clinic Technology Readiness Level (TRL)

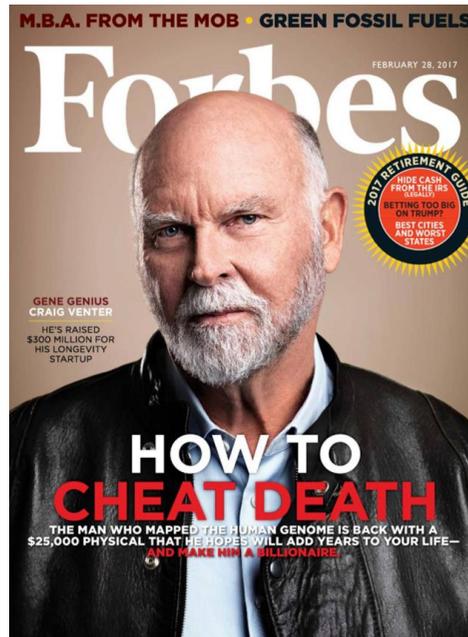
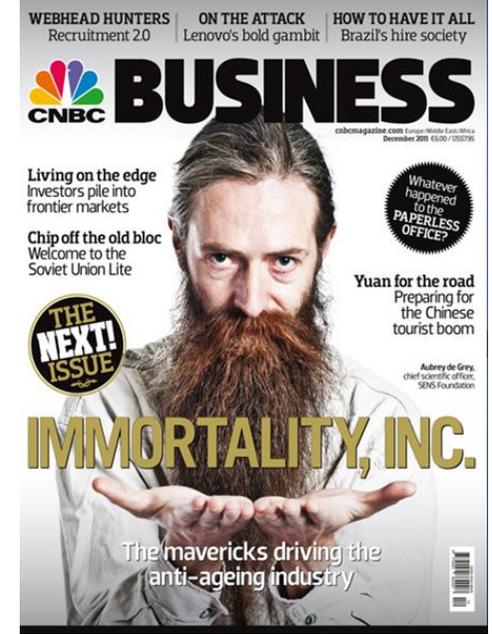
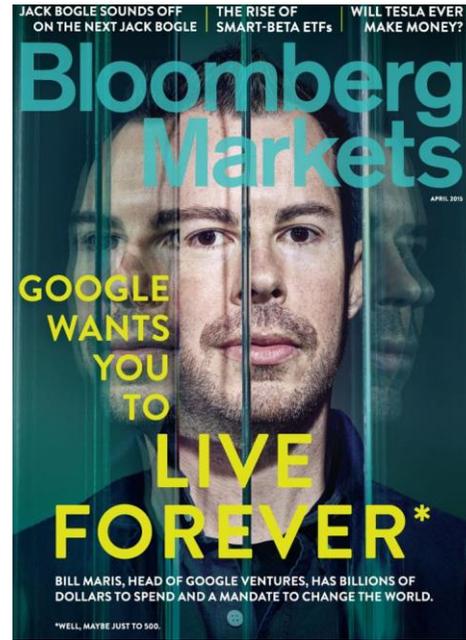




# Longevity Journalism & Media Landscape



# Top Media in Support of Longevity





# Rising Longevity Industry Megatrend

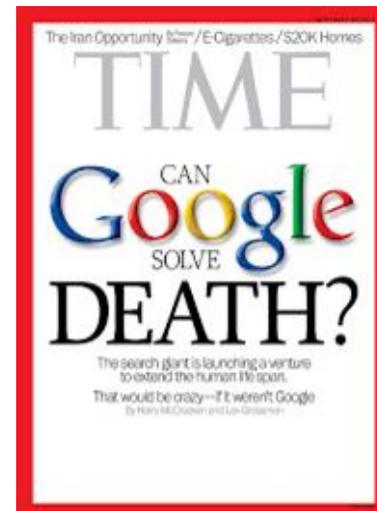
## Anti-Aging Therapies and Longevity Market: Industry Trends and Growth Opportunities Forecast 2022

The past five years witnessed a surge of interest in the topic of Longevity. In 2013 the idea of increasing the average life expectancy in developed nations to over 100 years and beyond hardly touched the mainstream zeitgeist. Today the same idea—though still exciting—has become commonplace in the eyes of the general public.

Investors, business analysts, and reputable, conservative business media brands are among those who have come to understand the credibility and feasibility of extending healthy longevity. Longevity is recognized and regularly discussed by financial entities and investment funds.

Back in 2013 TIME magazine presciently featured several cover stories highlighting Longevity at a time when it was still rather controversial. Their efforts, along those from other leading media brands, gradually created an ecosystem in which other media players felt safe to explore Longevity as a legitimate topic. As a result, advanced biomedicine and longevity is now regularly discussed in the mainstream press.

These advancements have made the topic of Longevity an obvious megatrend gaining widespread acceptance at a rapid pace.



# Leading Media Brands Publishing Articles and Launching Systematic Conferences on Longevity



Longevity and the challenges posed by an aging population are becoming increasingly **prevalent themes** at a growing number of **economic, financial and technological conferences** worldwide. These themes are also gaining increasing interest among multiple financial and governmental organizations and their clients.

Recognising a blossoming need for Longevity-oriented education, the Deep Knowledge consortium is **initiating discussions** with a number of **leading financial institutions** to foster quality **networking opportunities** between **investors** and **HNWIs** by providing optimal **format** and **agendas**, and guaranteeing **expertise** at every juncture. Our efforts at cultivating a long-term conference tradition will hopefully build a space in which a true international **Longevity business community** takes root.



Leading business media brands have embraced Longevity. **The Economist** has held several prominent events on the topic, including its 2016 Aging Societies conference in London (in which Longevity.Capital founder Dmitry Kaminskiy presented), 2017 Business of Longevity conference in Hong Kong, and 2018 Business of Longevity conference in Singapore. Longevity was further featured at the 2016 **World Economic Forum** Davos Summit, and the most recent **Financial Times** BioTech conference held a panel titled “The Business of Longevity.”

Other leading financial players, including **Julius Baer**, **Credit Suisse** and **UBC**, have recently followed suite, organising Longevity-focused conferences, forums and summits for their executives and clientele. With the Longevity sector booming we can expect this trend to grow in the near future.



# Longevity at the Landmark Conferences

## The Economist: *The Business of Longevity and Ageing Societies*



## World Economic Forum





# Leading Longevity Conferences

## Basel Life Sciences Week Aging Forum AI and Blockchain for Healthcare



## Master Investor Conference 2017 Organized by Jim Mellon & Mann Bioinvest in London



**AGEING IS VERY COMPLEX**

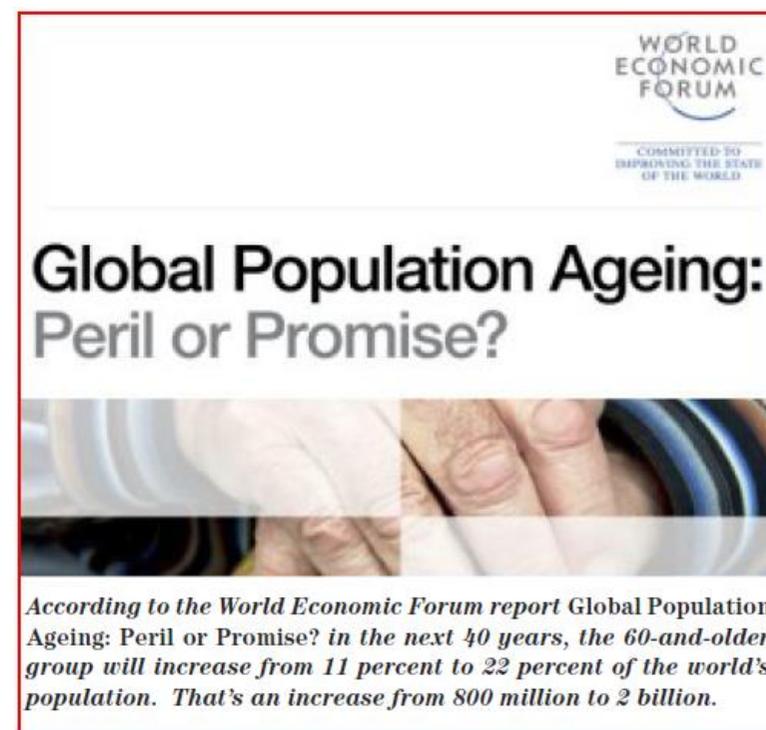
The diagram illustrates the molecular mechanisms of Metformin's effects on aging. Metformin influences the Microbiome, which in turn affects signaling pathways involving IGF-1, IGF-1R, and Akt. Metformin also directly impacts the IIS/IISR pathway, leading to SIRT1 activation. SIRT1, along with Akt and mTOR, regulates cellular processes such as oxidative stress, senescent cell removal, and mitochondrial function (mtDNA, mtORC, mtRNA, mtRIB). These pathways ultimately contribute to increased Healthspan and Longevity. The diagram also shows the role of PAH-1, TRPS, IL-6, and Adiponectin in this network.

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*"We must develop a comprehensive and globally shared view of how technology is affecting our lives and reshaping our economic, social, cultural, and human environments. There has never been a time of greater promise, or greater peril."*

– Klaus Schwab, Founder and Executive Chairman, World Economic Forum



Here the history of the longevity industry is described as consisting of increasingly frequent paradigm shifts, each as disruptive as the last.

The overall direction of travel for longevity industry has been from techniques for treatment toward technologies for prevention. A set of contingencies is described: cards that must fall in order for the next shift toward greater prevention to take place.



# Investing in Longevity: Series of Thematic Specialized Conferences



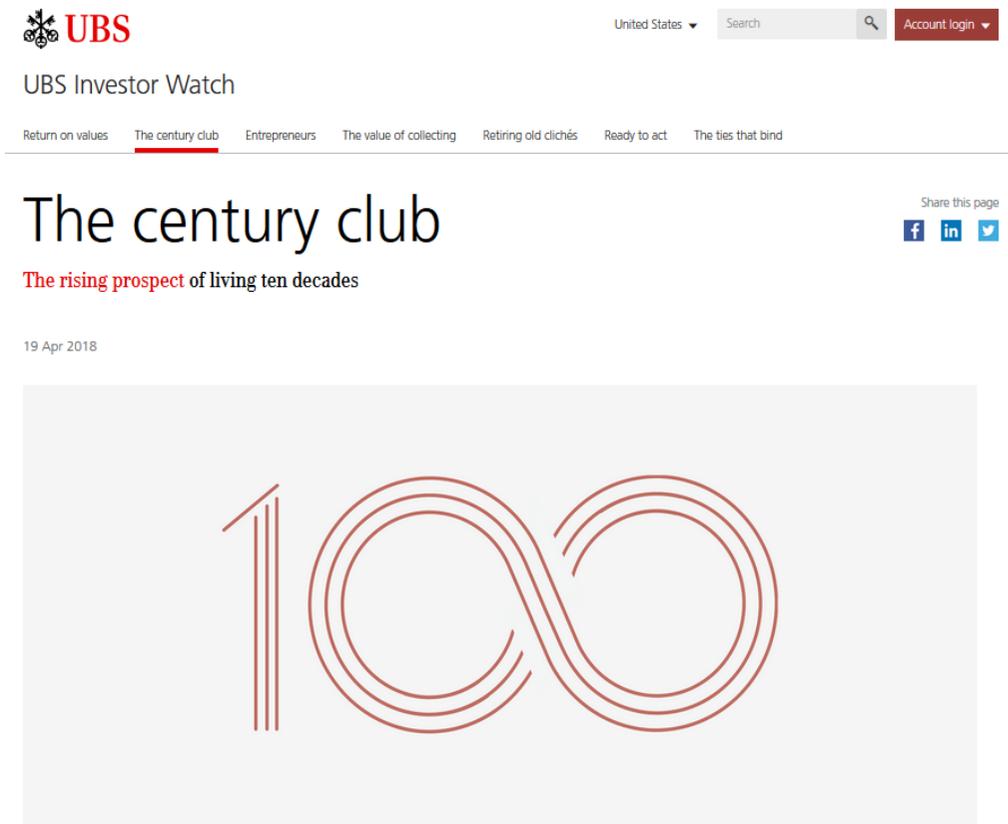
# Leading Investment Banks Starting to Regularly Publish Analytical Reports on Longevity

- Longevity is a recurring topic of analytical market reports from leading financial/analytical institutions such as CitiBank, Frost and Sullivan & UBS Group.
- Many of these documents offer “landscape overviews,” which attempts to illustrate and systematise the industries in their present state of development and determine the key components.
- They describe the coming demographic crisis, outline certain solutions, and finally lead to the dividends that can be enjoyed by a society with an increased healthspan.
- This signals the initiation of Longevity as a mainstream topic, and particularly illustrates its increasing acceptance among the world’s leading business, finance, economic and investment thought leaders.





# UBS Centenarians Club Expect to Live Past 100



In April 2018, UBS Investor Watch, the world’s largest surveyor of wealthy investors, documented the general state of individual investor optimism regarding longevity globally. It found that:

- Nine out of 10 believe their health to be more important than their wealth;
- Many investors are anxious about the financial implications of old age, with healthcare costs being a top concern;
- Investors also worry about having less wealth to pass on to successors.

UBS Investor Watch concludes:

**“Don’t let skepticism about living to 100 keep you from planning for it. Life expectancies are rising, and it’s a real possibility. In fact globally, nine in 10 investors are already adjusting how they are planning for their life and their legacy.”**

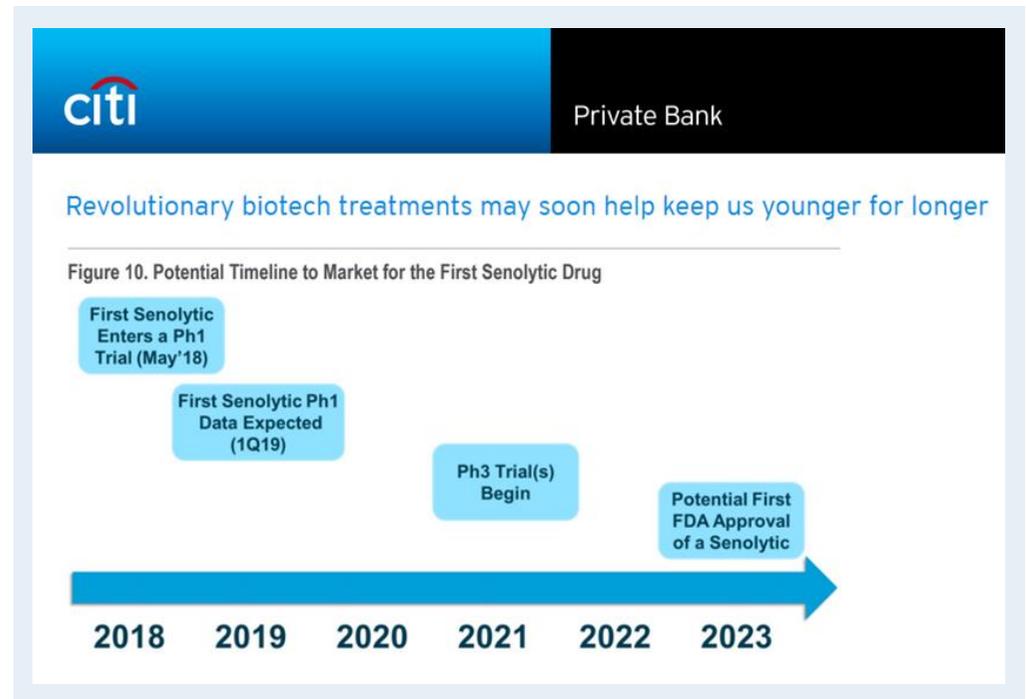


# CitiBank Features a Chapter on Longevity in their 2018 Annual Report

CitiBank cited anti-aging drugs as one of 10 disruptive innovations in a recent report that listed for their clients investible technologies to reap long-term economic gains.

The chapter's main author noted that recent advancements in rapidly-maturing longevity science “could spawn FDA-approved therapeutics potentially in the next decade, with the primary goal of keeping us younger and alive for longer. With scientific breakthroughs emerging this decade on the cellular origins of why the tissues in our bodies age, novel anti-aging medicines may become one of the next big disruptions in the healthcare market.”

Senolytics was the most prominent Longevity technology highlighted in the report, which projects that the first drug of this class could enter the market as early as 2023.



# Frost & Sullivan Releases Longevity Reports and Webinars

Perhaps most illustrative of this new wave of Longevity-themed reports from leading analytical firms, the Frost & Sullivan industry reports have been using a unique style of stark, eye-catching diagrams and illustrations offering at-a-glance overviews of key future trends, forecasts and opportunities.

They recently prominently covered Longevity through their “*Anti-Aging Therapies and Service Market*” analytical report, with simple illustrations that made the demographic challenges and opportunities for industry growth abundantly clear.

Longevity was also spotlighted in Frost & Sullivan’s “*Conquering Aging: Novel Technology Disruptions in the Anti-Aging Industry*” webinar, featuring an overview of recent developments from Longevity companies Insilico Medicine, ChromaDex and Dthera Sciences.

**ANTI-AGING THERAPIES AND SERVICES MARKET**  
-TRENDS AND GROWTH OPPORTUNITIES, FORECAST TO 2022

**INSTANT DOWNLOAD**

FROST & SULLIVAN Market Engineering

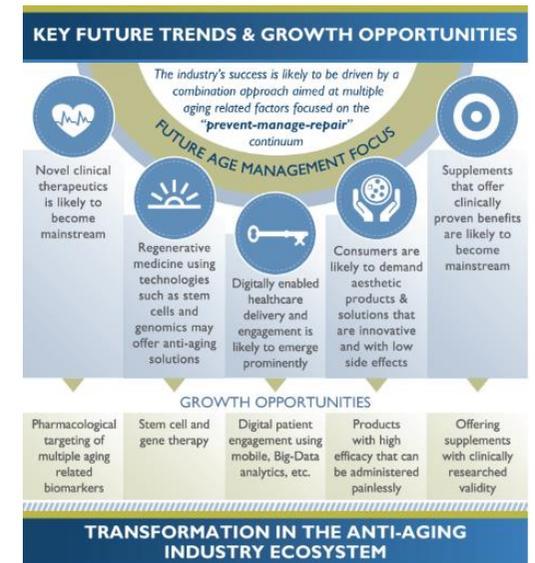
**Anti-Aging Therapies and Services Market—Trends and Growth Opportunities, Forecast to 2022**  
Focus on Integrative Solutions Combining Dietary Supplements and Aesthetic Solutions with Clinical Therapeutics as the Market Moves Toward a "Prevent-Manage-Repair" Continuum

Global Transformational Health Research Team at Frost & Sullivan

Research in Collaboration with A4M

AM MMI REDEFINING MEDICINE

MDB7-52 June 2018



Frost & Sullivan use striking artwork to map the Longevity industry.



# Leading Private Wealth Banks Beginning to Organize Conferences on Longevity and Anti-Aging

2016 - 2018 saw a number of prominent business and financial media brands embrace the topic of Longevity by organizing a series of landmark conferences.

In 2018, leading financial players including **Julius Baer**, **UBC** and **Credit Suisse** followed suit, holding a series of summits and forums focusing on Longevity investment and finance for their executives and clientele.

This trend will not only continue but accelerate in the future, with an increasing number of investment and financial institutions holding similarly themed events for their professional networks and high net-worth clients. These heavily-networked events will no doubt serve as an ideal space for both experts and investors, coalescing into a mutual community that will allow the Longevity business to take root and grow.



As published in  
*Your Wealth & Life: Navigating longevity*

## Longevity planning

for retirees

CREDIT SUISSE

### How Increasing Longevity Affects Us All?: Market, Economic & Social Implications

Global Demographics and Pensions Research

## Julius Bär

### EXTENDED LONGEVITY



SHIFTING LIFESTYLES

4 min

Do we really want to live forever?



SHIFTING LIFESTYLES

3 min

Longevity: How to make the most of the extra years



# Health and Aging Featured as Key Topic at Credit Suisse Global Megatrends Conference



## Credit Suisse Global Megatrends Conference

April 18, 2018, Fairmont Singapore

The Global Megatrends Conference, hosted by Credit Suisse, brings together experts and thought leaders in business and politics to meet and share their insights into the latest megatrends poised to shape the future of investments, which includes demographic challenges. This was broken down into:

- Urbanization
- **Health and aging**
- Knowledge economy
- Crowded world

In his keynote speech, Dr. Alex Zhavoronkov, co-founder of Insilico Medicine, which brings genomics, big data analysis, and deep learning to drug discovery, described the impact of technology on healthcare to answer the “health and aging” aspect of the challenge.

**Date:** Thursday, 30 October, 2018

**Venue:** Soho Hotel, 4 Richmond Mews, London W1D 3DH

**17:30 Guest Registration Welcome**

**18:00** Christian Berchem, CEO Credit Suisse (UK) Ltd

**Keynote**

**18:10** Pierre Bose, Head of European Strategy, Credit Suisse

**How technology is revolutionizing health care**

Dr Alex Zhavoronkov, CEO

**18:30** Insilico Medicine

Jason C. Foster, Managing Director, Health Equity Consulting Pascal Mercier, Product Specialist Thematic Equity Funds, Credit Suisse

**19:00** Q&A

**19:30** Drinks reception



# Several Keynote Presentations on Longevity Featured at 2018 UBS Healthcare Summit Singapore



Key themes including transformative trends and enabling innovations in the healthcare industry took center stage at last year's UBS Healthcare Summit. By providing an exceptional platform to deepen networks in the industry, the summit brought together forward-thinking leaders, industry captains and renowned speakers at the forefront of transformative trends in healthcare, life science and technologies.

Thematic topics included:

- The future of healthcare
- Singapore's biotech inflexion
- Living to 150
- Big data and AI
- Disruptive healthcare business models
- Investment opportunities in healthcare

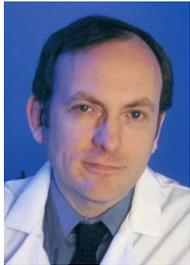
Dr. Alex Zhavoronkov, CEO of Deep Knowledge Ventures' portfolio company Insilico Medicine, delivered a keynote presentation on the topic of "Living to 150" at the summit.

14:10-14:30	<b>Living to 150</b> <b>Dr. Alex Zhavoronkov</b> , Founder and Chief Executive Officer, Insilico Medicine Inc.
14:30-14:50	<b>Managing digitized life</b> <b>Ying Rui LI</b> , Co-founder and Chief Scientist, iCarbonX

# Key Longevity Industry Influencers



## Longevity Scientists



Michael West



Eric Verdin



Cynthia Kenyon



Aubrey de Grey



Steve Horvath



Joao Pedro de Magalhães



David Sinclair



Nir Barzilai



George Church



Brian Kennedy

## Longevity Influencers



J. Craig Venter



Larry Page



Sergey Brin



Ray Kurzweil



Alex Zhavoronkov



Nathaniel David



Larry Ellison



Martine Rothblatt

## Longevity Investors



Dmitry Kaminskiy



Bryan Johnson



Finian Tan



Jeff Bezos



Jim Mellon



Peter Thiel



Sam Altman



Sergey Young



James Peyer



# Julius Baer Bank Holds “Investing in Longevity” Forum in London

**Program of the Forum “Investing in Longevity”**

Julius Bär

**KEY SPEAKER:**  
Mark Winterburn, Senior Investment Adviser, Julius Baer International Limited

Julius Bär

**Guest speaker:** “5 myths of longevity interventions”  
by James Peyer, PhD, Apollo Ventures, Hamburg, Germany

**The Business of Longevity: Landscape, Investment and Financial Projections\***  
by Dmitry Kaminskiy, Deep Knowledge Ventures

**Julius Baer Bank Forum  
“Investing in Longevity”**

**The Business of Longevity:  
Industry Landscape  
Investment and Financial Projections**

**Dmitry Kaminskiy**  
**Deep Knowledge Ventures  
Aging Analytics Agency**

**6th December 2018, London**




Julius Baer, the Swiss multinational private bank headquartered in Zürich, recently held a forum entitled “Investing in Longevity”. At the forum, Dmitry Kaminskiy participated in the investor’s panel and delivered a keynote presentation on “The Business of Longevity: Landscape and Financial Projections” on behalf of Deep Knowledge Ventures and Aging Analytics Agency.

During the presentation, he spoke about the current Longevity Industry landscape, projections for the next several years, and gave an overview of Aging Analytics Agency’s classification framework. This proprietary framework categorizes Longevity companies and formulates optimal investment targets by identifying over- under-evaluated companies, and thus helps avoid common mistakes made by traditional VC funds operating in this sphere.

He also spoke on the rising sub-sector of Longevity Finance, describing how institutions in the finance sector, from pension funds to insurance companies and investment banks, are taking an interest in Longevity.



**Top Longevity Influencers,  
Conferences, Books,  
Journals, Etc.**

# Top 10 Lists

## Top 10 Longevity Scientists



Michael West Dr. Felipe Sierra Cynthia Kenyon Aubrey de Grey Alex Zhavoronkov



Joao Pedro de Magalhaeres David Sinclair Nir Barzilai George Church Brian Kennedy

## Top Longevity Investors



Dmitry Kaminskiy Bryan Johnson Finian Tan Jeff Bezos Peter Thiel Jim Mellon



## Top 10 Longevity Companies



## Top 10 Longevity Venture Funds



## Top 10 Research Institutions



# Top 10 Lists

## Top 10 Reg Med Companies



## Top Gene 10 Therapy Companies



## Top 10 P3 Medicine Companies



## Top Longevity Influencers



Larry Page



Sergey Brin



Ray Kurzweil



Martine Rothblatt



Larry Ellison



Nathaniel David



Bill Maris



J. Craig Venter



Alex Zhavoronkov



# Academic Writings & Meetings

## Top Scientific Journals in Geroscience



## Top Longevity Conferences



## Top Academic Books in Geroscience



## Top Longevity Books



## Top Scientific Meetings & Symposia



## Top Longevity Online Resources



# Company Landscape

## Regenerative Medicine



## P3 Medicine



## Gene Therapy



## Geroscience



# Venture Firm Landscape

## Regenerative Medicine



## Geroscience



## P3 Medicine



# Geroscience Institutes by Region

## USA



## UK



## EU

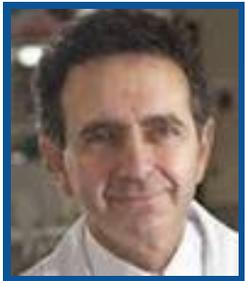


## Other



# Longevity Influencers

Top Longevity Scientists and Influencers



**Anthony Atala**



**Joon Yun**



**Adam Antebi**



**Elizabeth  
Blackburn**



**Nursultan  
Nazarbayev**



**Bill Faloon**



**Peter Diamandis**



**Sally Greengross**



**Michael Kope**



**Stephen  
Johnson**



**Maria Blasco**



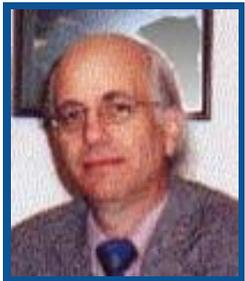
**Andy Conrad**



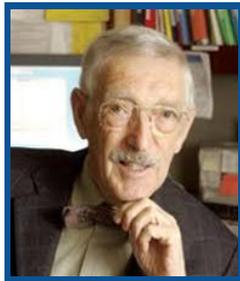
**David  
Finkelstein**



**David Botstein**



**John D. Furber**



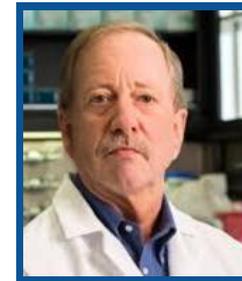
**Bruce Ames**



**David Gems**



**Tina Woods**



**Steven Austad**



**Finian Tan**



**Eric Kihlstrom**

# Longevity Influencers

Top Longevity Scientists and Influencers



**Vitalik Buterin**



**Alexey Moskalev**



**Ilia Stambler**



**Edwina Rogers**



**Robin Farmanfarmaian**



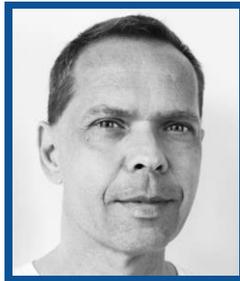
**Christine Peterson**



**Linda Partridge**



**Bill Maris**



**Michael Greve**



**Maria Konovalenko**



**Calvin Harley**



**Leonard Guarente**



**Thomas Langer**



**Nils-Göran Larsson**



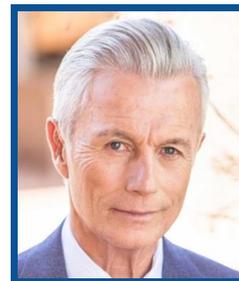
**Jose Cordeiro**



**Dmitry Itskov**



**Zoltan Istvan**



**James Strole**



**Bernadeane**



**Robert Young**



**Kevin Perrott**

# Longevity Influencers

Top Longevity Scientists and Influencers



**Arthur Bilger**



**Laura Carstensen**



**Henry Cisneros**



**Pinchas Cohen**



**Catherine  
Collinson**



**Joseph Coughlin**



**Fernando Torres-Gil**



**William Dow**



**Ken Dychtwald**



**Marc Freedman**



**Linda Fried**



**Lynn Goldman**



**Christopher  
Herbert**



**Michael Hodin**



**Jo Ann Jenkins**



**Yves Joannette**



**Becca Levy**



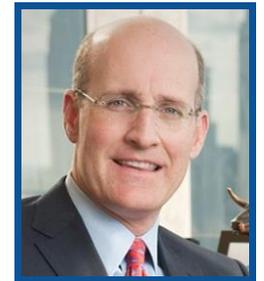
**Freda Lewis-Hall**



**Robin Mockenhaupt**



**Philip Pizzo**



**Andy Sieg**

# Longevity Influencers

Top Longevity Scientists and Influencers



**Youngsook Park**



**Keith Comito**



**Alexey Turchin**



**David Wood**



**Arielle Burstein**



**Rita Beamish**



**Paul Irving**



**Rodney Slater**



**Trent Stamp**



**Dana Ardi**



**Errol Barnett**



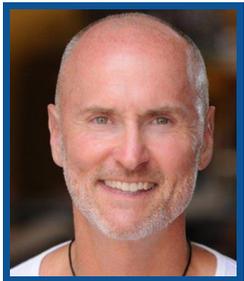
**Arthur Bilger**



**Fred Jonske**



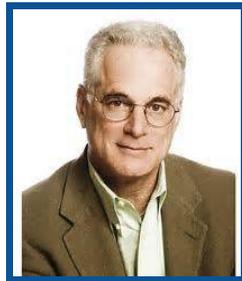
**Alexander Klabin**



**Chip Conley**



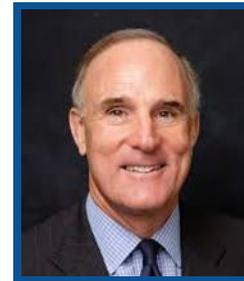
**Richard Eisenberg**



**Chris Farrell**



**Sherry Lansing**



**Campbell Gerrish**



**Taimur Hyat**



**Robert Johnson**

# United Kingdom Longevity Influencers



## Top Longevity Scientists and Influencers



David Sinclair



Baroness Sally Greengross OBE



Eric Kihlstrom



Helen Whately



John Bell



Matt Hancock



Charles Alessi



Aubrey de Grey



Jim Mellon



Tina Woods



Dmitry Kaminskiy



Narendra Patel



Malcolm Jackson



Tom Kirkwood



George P. Willis



Helen R. Griffiths



Martin Green



Anders Sandberg



Tim Spector



Ben Franklin



Andrew Scott



Qing-Jun Meng



Ilora Gillian Finlay



Leslie Arnold Turnberg



Dame Denise Platt



Philippa Whitford



Linda Partridge



David Kipling



Paul Keith Potter



Julia Neuberger



John Speakman



Suzanne Wait



Jon Date



Paul Thornalley



Janet Thornton



Manlio Vinciguerra



Thomas von Zglinicki



William Bains



Richard Barker



Richard Faragher



Robert Freitas



David Gems



Andrew Krentz



Aisling Burnand



J. P. de Magalhaes



Anne McArdle



Cleo Bishop



Dr Richard Siow



John Pattison



Maggie Throup



Peter Adams



Janet M. Lord



Colin Blakemore



Sally-Marie Bamford



David Amess

# Israel Longevity Influencers



## Top Longevity Scientists and Influencers



Aaron Ciechanover



Alex Friedman



Anat Ben-Zvi



Assaf Sella



Benjamin Sredni



Boaz Misholi



Dan Peer



Doron Garfinkel



Doron Melamed



Dov Chernichovsky



Dov Shmotkin



Ehud Cohen



Eitan Okun



Eldad Tzahor



Eli Mizrahi



Eyal Banin



Gabriel Barbash



Gil Atzmon



Hadas Lewy



Haim Cohen



Hanan Tal



Howard Litwin



Idan Papier



Idan Segev



Ilia Stambler



Israel Doron



Itamar Harel



Itamar Raz



Joe van Zwaren



Jonathan Mandelbaum-Shor



Michal Neeman



Michal Schwartz



Mooly Eden



Natalie Yivgi Ohana



Nir Barzilai



Nirit Lev



Rafi Eitan



Ran Balicer



Raphael Gorodetsky



Ruth Arnon



Sami Sagol



Sara Carmel



Shai Brill



Shai Efrati



Shai Shen-Orr



Sivan Henis-Korenblit



Sol Efroni



Tal Dvir



Tzvi Dwolatzky



Uri Alon



Valery Krizhanovsky



Yael Benvenisti



Yakir Kaufman



Yaky Yanay



Yechezkel Barenholz



Yitzhak Brick



Yosef Gruenbaum



Yossi Heymann



Zorian Radomyslsky



Zvi Lanir

# Singapore Longevity Influencers



## Top Longevity Scientists and Influencers



Finian Tan



Danny Soon



Gary Khoo



Bussarawan (Puk)  
Teerawichitchainan



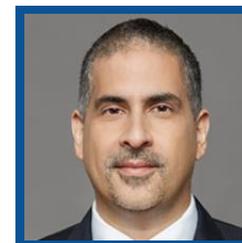
Chong Hock Sia



Janice Chia



Jeffrey Lu



Carl Firth



Kanwaljit Soin



Christiani  
Jeyakumar Henry



Colin Stewart



Birgit Lane



Brian Kennedy



Hwee-Pink  
Tan



Kenneth  
Noonan



Lim Chwee  
Teck



Lok Shee-Mei



Melis Tay



Neo Kah Yean



Ng Huck Hui



Paolo  
Rampichini



Paul Si



Penny Wan



Judith Swain



Vishal Doshi



Wallace I.  
Torres



Wanjin Hong



Wilf Blackburn



Yu Cai



Lim Xinhong

# The Science of Longevity Specialization



**UPI**

Allen Cone



**POPULAR SCIENCE**

Alexandra Ossola



**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Anna Azvolinsky



**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Bob Grant



**WIRED**

Brandon Keim



**Discover**  
MAGAZINE

Carl Engelking



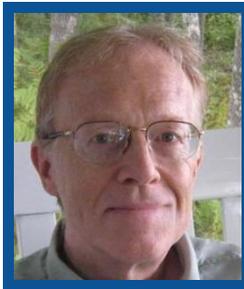
**BUSINESS INSIDER**

Charlotte Hu



**MIT Technology Review**

David Ewing Duncan



**SCIENTIFIC AMERICAN**

David Stipp



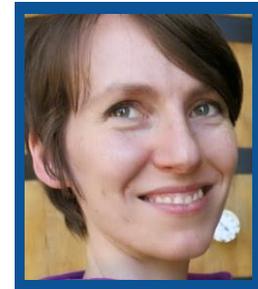
**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Diana Kwon



**SingularityHub**

Edd Gent



**Jefferson**  
Philadelphia University • Thomas Jefferson University

Edyta Zielinska



**SIMONS FOUNDATION**

Emily Singer



**NEWS MEDICAL LIFE SCIENCES**

James Ives



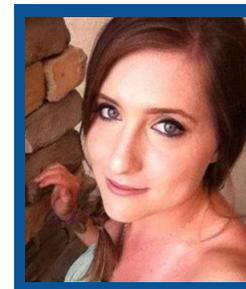
**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Jef Akst



**ASIANSCIENTIST**

Jeremy Chan



**MIT Technology Review**

Jocelyn Rice



**Daily Mail**

Kat Arney

# The Science of Longevity Specialization



**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Katarina Zimmer



**cancer today**

Kate Yandell



**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Kerry Grens



**Discover**  
MAGAZINE

Kyle Munkittrick



**Discover**  
MAGAZINE

Mark Barna



**Discover**  
MAGAZINE

Nathaniel Scharping



**The New York Times**

Pagan Kennedy



**BUSINESS INSIDER**

Rafi Letzter



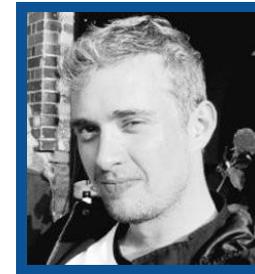
**TheScientist**  
EXPLORING LIFE, INSPIRING INNOVATION

Ruth Williams



**FRED HUTCH**  
CURES START HERE

Sabrina Richards



**DAILY EXPRESS**

Sean Martin



**SingularityHub**

Shelley Fan



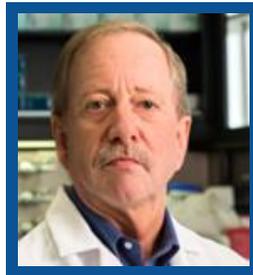
**Daily Mail**

Stephen Matthews



**LIFE EXTENSION ADVOCACY FOUNDATION**

Steve Hill



**THE HUFFINGTON POST**

Steven N Austad



**Purch**

Tia Ghose



**DIGITAL JOURNAL**

Tim Sandle



**Forbes**  
com

Tina Woods

# Finance Specialization



**Bloomberg**  
Ben Steverman



**Forbes**  
David Rae



**Forbes**  
Howard Gleckman



**THE GLOBE AND MAIL+**  
Ian McGugan



**FA** FINANCIAL  
ADVISOR  
MAGAZINE  
Karen Demasters



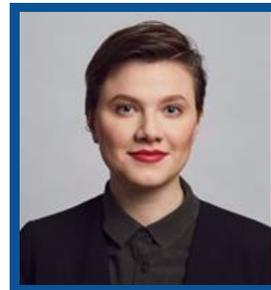
**MD**  
Ken Nuss



**thejapan times**  
Kiyoshi Takenaka



**FT** FINANCIAL  
TIMES  
Lindsay Cook



**Benefits**  
CANADA  
Martha Porado



**IBD**  
Morey Stettner



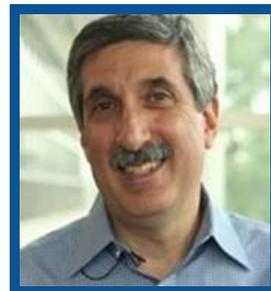
**Forbes**  
Neil Howe



**Forbes**  
Olivia Mitchell



**WSJ**  
THE WALL STREET JOURNAL  
Paul H. Irving



**The Boston Globe**  
Robert Weisman



**Bloomberg**  
Suzanne Wooley



**Forbes**  
Wade Pfau

# Business Specialization



**Forbes**  
Alison Coleman



**The Harvard Gazette**  
Alvin Powell



**MIT Technology Review**  
Antonio Regalado



**nextBIG**  
Brian Wang



**CNBC**  
Christina Farr



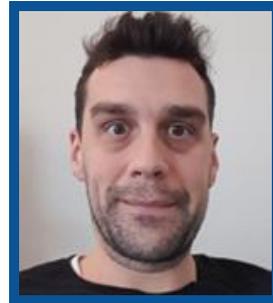
**Forbes**  
Chunka Mui



**FT FINANCIAL TIMES**  
Clive Cookson



**TC TechCrunch**  
Connie Loizos



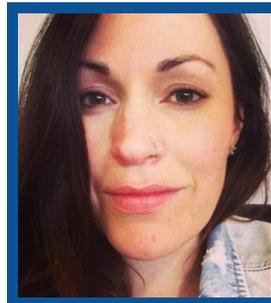
Haggerston Times  
Edmund Ingham



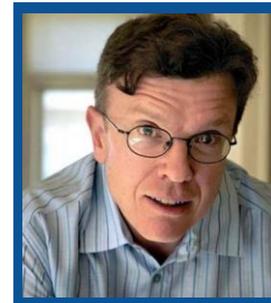
**BUSINESS INSIDER**  
Erin Brodwin



**thejapantimes**  
Maiko Takahashi



**TC TechCrunch**  
Sarah Buhr



**THE NEW YORKER**  
Tad Friend



**QUARTZ**  
W Harry Fortuna

# Aging and Society Specialization



**TIME**

Alexandra Sifferlin



**TIME**

Alice Park



**HUFFPOST**

Carol Marak



**Forbes**

Carolyn  
Rosenblatt



**WSJ**

Clare Ansberry



**TOPIC**

Elmo Keep



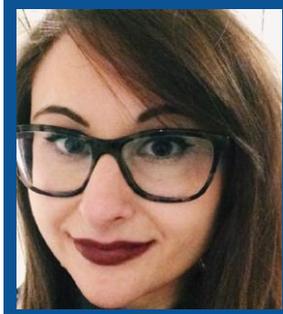
**The  
Guardian**

Hannah Devlin



**THE STRAITS TIMES**

Janice Tai



**Newsweek**

Kashmira Gander



**THE TIMES  
THE SUNDAY TIMES**

Kat Lay



**HUFFPOST**

Ken Dychtwald



**BUSINESS  
INSIDER**

Lydia Ramsey



**HUFFPOST**

Maria Rodale



**THE CONVERSATION**

Matt Flynn



**WIRED**

Matt Reynolds



**CNN**

Meera  
Senthilingam



**WIRED**

Megan Molteni



**nextavenue.**  
where grown-ups keep growing

Patricia  
Corrigan



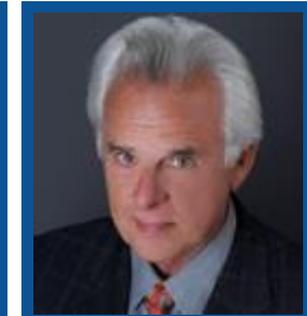
**MIT  
Technology  
Review**

Peter Dizikes



**TheStreet**

Robert Powell



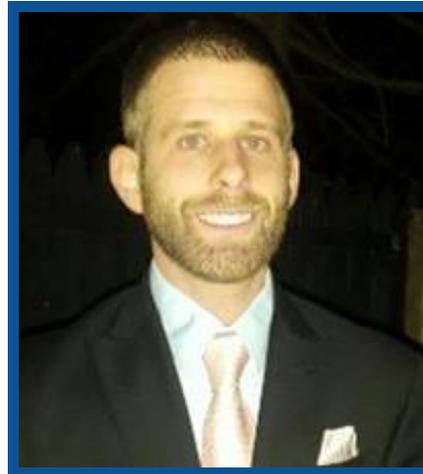
**NATIONAL REVIEW**

Wesley J Smith

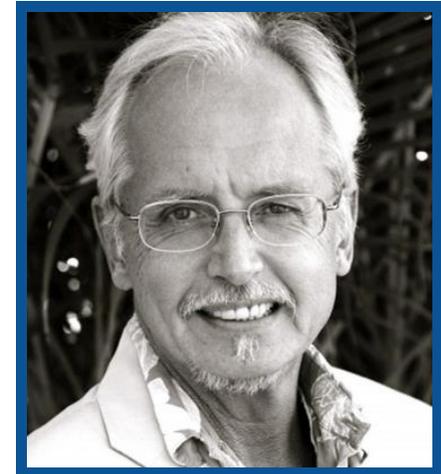
# Artificial Intelligence Specialization



**Forbes**  
Joseph Coughlin



**R&D**  
Kenny Walter



**Forbes**  
Patrick Cox



**SingularityHub**  
Peter Rejcek



**Forbes**  
Robin Seaton Jefferson



**Forbes**  
Sarah Hedgecock

# AgeTech Specialization



**POPULAR  
SCIENCE**

Andrew Zaleski



mHealthIntelligence

Eric Wicklund



mHealthIntelligence

Jennifer Bresnick



**WIRED**

Liat Clark



**Chicago Tribune**

Mary Wisniewski



**Forbes**

Matthew Herper



mHealthIntelligence

Vera Gruessner

# 30 FemTech Healthcare Influencers



Jill Angelo  
**Genneve**



Elina Berglund  
**Natural Cycles**



Anne Boden  
**Starlingbank**



Tania Boler  
**Elvie**



Kate Bolton  
**CommsForGood**



Ghela Boskovich  
**FemTech Global**



Marija Butkovic  
**Women of Wearables**



Judith Campisi  
**Buck Institute for Research on Aging**



Lina Chan  
**Adia Health**



Nicole Dahlstrom  
**FemTech Collective**



Alexandra Fine  
**Dame Products**



Elizabeth Gazda  
**Embr**



Robin Farmanfarmaian  
**RF**



Molly Hayward  
**Cora**



Angie Lee  
**The Angie Lee Show**



Janet Lieberman  
**Dame Products**



Liz Lumley  
**Rainmaking**



Elena Medo  
**Medolac**



Devie Mohan  
**Burnmark**



Kate Moyle  
**Pillow**



Nuala Murphy  
**Moment Health**



Elena Mustatea  
**Bold Health**



Anastasia Georgievskaya  
**Haut.AI**



Katherine Ryder  
**Maven Clinic**



Maria Molland Selby  
**ThinX**



Nicole Shanahan  
**ClearAccessIP**



Tammy Sun  
**Carrot**



Ida Tin  
**Clue**



Jennifer Tye  
**Glow**



Adriana Vazquez  
**Lilu**

# 10 FemTech Healthcare Journalists



**Forbes**

**NewScientist**

**Forbes**

**STRICTLY** | VC

Nicole Dahlstrom

Reenita Das

Jessica Hamzelou

Tanya Klich

Connie Loizos



**Forbes**



Mary Loritz

Bérénice Magistretti

Molly McHugh

Sarah Dubow

Jonathan Symcox

# Leading Publications & Conferences



## Top Scientific Journals in Geroscience



## Top Longevity Conferences



## Top Academic Books in Geroscience



## Top Longevity Books



## Top Scientific Meetings & Symposia



## Top Longevity Online Resources



# Leading Publications & Conferences



## Europe

	Palliative & Policy	Advanced Solutions	Basic Research
Europe	<p>AMERICAN GERIATRICS SOCIETY 2017 ANNUAL SCIENTIFIC MEETING MAY 18-20 SAN ANTONIO, TEXAS</p> <p>23<sup>rd</sup> Clinical Applications for Age Management Medicine November 2-5, 2017 JW Marriott Star Plaza Resort &amp; Spa, Tucson, Arizona</p> <p>55<sup>th</sup> COMMISSION FOR SOCIAL DEVELOPMENT</p> <p>AGINGINAMERICA SAN FRANCISCO MARCH 26-29, 2018</p> <p>4th International Conference on Ageing in a Foreign Land 21-22 June 2017, Adelaide, Australia</p> <p>Aging &amp; Society: Seventh Interdisciplinary Conference 2017 November 3-4, 2017 University of California, Berkeley, Berkeley, CA, United States (Past)</p>	<p>Targeting Tau in Alzheimer's Disease and Related Disorders 12 March 2017 New York, United States</p> <p>Eukaryotic DNA Replication &amp; Genome Maintenance September 8 - 9, 2017 Abstract Deadline: June 14, 2017</p> <p>GENE THERAPY SYMPOSIUM FOR HEART, LUNG, AND BLOOD DISEASES</p> <p>Genome Engineering: The CRISPR-Cas Revolution July 21 - 24, 2017 Abstract Deadline: May 25, 2017</p> <p>KEYSTONE SYMPOSIA</p> <p>Telomeres &amp; Telomerase May 2 - 6, 2017 Abstract Deadline: February 27, 2017</p> <p>WORKSHOP ON LILTON HEAD</p> <p>SEE YOU IN WASHINGTON, DC SEPTEMBER 2017</p>	<p>Mitochondria in Health and Disease</p> <p>Cell Growth and Proliferation Gordon Research Conference Mechanisms of Cell Division with Special Emphasis on Cancer July 9 - 14, 2017</p> <p>Gordon Research Conferences Promoting discussions and the free exchange of ideas among members of the biological, chemical, and physical sciences.</p> <p>Annual UCLA Research Conference On Aging Geronet 7 - Geronet 8 Annual UCLA Research Conference On Aging Los Angeles Tuesday, May 2, 2017 Start: 08:00 End: 12:00</p> <p>AGE American Aging Association</p> <p>IAGG 2017</p>
USA	<p>AMERICAN GERIATRICS SOCIETY 2017 ANNUAL SCIENTIFIC MEETING MAY 18-20 SAN ANTONIO, TEXAS</p> <p>2<sup>nd</sup> Congress of Geriatricians in the Middle East and Africa 2017 14-16 November, Amman, Jordan</p> <p>ICT4AWE 2017 3<sup>rd</sup> International Conference on Information and Communication Technologies for Ageing Well and e-Health</p> <p>AGING &amp; COGNITION 2017</p> <p>IFA INTERNATIONAL FEDERATION ON AGEING Global Connections</p> <p>5<sup>th</sup> Helmholtz-Nature Medicine Diabetes Conference</p>	<p>Ring Discovery 2017</p> <p>Stem Cells and Cancer: From Basic Research to Clinical Progression February 12 - 13, 2017</p> <p>4<sup>th</sup> International Symposium on Peripheral Nerve Regeneration July 06<sup>th</sup> - 08<sup>th</sup>, 2017 - Barcelona, Spain</p> <p>3<sup>rd</sup> Annual Cell &amp; Gene Therapy Congress</p> <p>IBIMA</p> <p>2<sup>nd</sup> Zing Genomic Integrity Conference</p> <p>Big Data in Biology and Health</p> <p>FUTURE INVESTIGATORS OF REGENERATIVE MEDICINE</p> <p>2<sup>nd</sup> Annual Cell &amp; Gene Therapy Congress</p>	<p>The 12<sup>th</sup> International Conference on Alzheimer's and Parkinson's Diseases</p> <p>1<sup>st</sup> IASG World Congress of Geriatricians &amp; Gerontologists 2017</p> <p>AAIC 2017</p> <p>Neuro-Immune Axis: Reciprocal Regulation in Development, Health, and Disease September 17-19, 2017 - Ojales, Spain</p> <p>EMBO</p> <p>Modulating Ageing / Antiaageing: from Molecular Biology to Clinical Perspectives</p> <p>2017</p> <p>BIO-BUSINESS</p> <p>The Ageing Cell</p>
Other	<p>2<sup>nd</sup> Interventions in Aging Conference Understanding Mechanisms &amp; Compressing Morbidity in Aging Humans</p> <p>11<sup>th</sup> Annual ASM Conference GUT HEALTH: THE CORNERSTONE OF WELLBEING</p> <p>ACNM17 Aged Care Nurse Managers Conference</p> <p>MENA GERIATRICS SUMMIT</p> <p>Stress Proteins in Growth, Development and Disease</p> <p>From Protein Folding to Misfolding Disorders: The Importance of Maintaining Proteostasis over a Lifetime</p> <p>AGINGABIA FUTURE OF ELDERCARE OPERATIONS SEMINAR 2017</p>	<p>PRECISION CANCER BIOLOGY FROM TARGETED TO PERSONAL THERAPIES</p> <p>CIRA 2017 International Symposium Nov 6-8, Kyoto</p> <p>SYMPOSIUM ON REGENERATIVE MEDICINE</p> <p>CSH Asia</p> <p>JSGCT Japan Society of Gene and Cell Therapy</p> <p>Mitochondrial quality control</p>	<p>ERA Emerging Researchers in Ageing/Anti-Ageing Australia</p> <p>23<sup>rd</sup> World Congress of Gerontology</p> <p>Genetics and Gerontology 2017</p> <p>FUSION</p> <p>AGING: THE GOLDEN OPPORTUNITY</p> <p>ABAC AUSTRALIAN BIOLOGY OF AGEING CONFERENCE</p> <p>NEW MEXICO CONSORTIUM</p> <p>KEYSTONE SYMPOSIA</p>

# Top Longevity Journals



## Palliative & Policy

## Advanced Solutions

## Basic Research

Europe



USA



Other



# Longevity Scientific Articles



The diagnosis of mild cognitive impairment due to Alzheimer's disease



The age distribution of cancer and a multi-stage theory of carcinogenesis



The role of oxidative stress



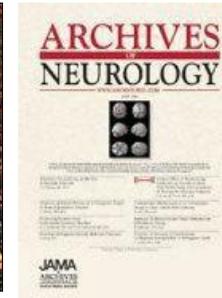
The association between quantitative measures



Interactions between glutamatergic and monoaminergic systems



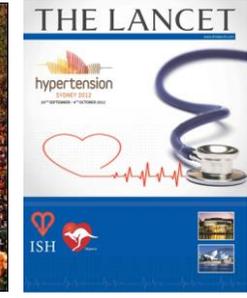
Early-onset Alzheimer's disease



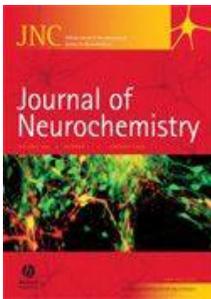
Folate, vitamin B12, and serum total homocysteine levels



A DNA damage checkpoint response in telomere-initiated senescence



Selective loss of central cholinergic neurons in Alzheimer's disease



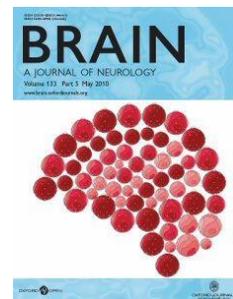
Basal lipid peroxidation in substantia nigra is increased in Parkinson's disease



Research criteria for the diagnosis of Alzheimer's disease



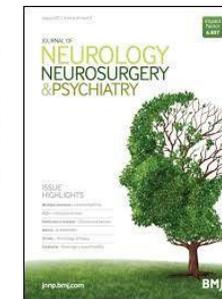
Body fat assessed from total body density and its estimation from skinfold thickness



Ageing and Parkinson's disease



Global prevalence of dementia



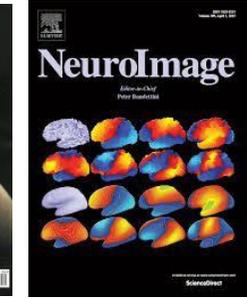
The relevance of the Lewy body



Segregation of a missense mutation



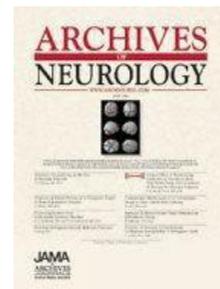
Multiple isoforms of human microtubule-associated protein tau



A voxel-based morphometric study of ageing in 465 normal adult human brains



Effect of age and high blood pressure on baroreflex sensitivity in man



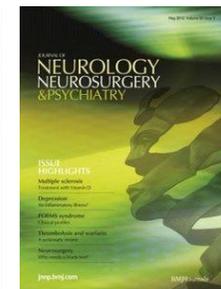
Cerebral blood flow in dementia



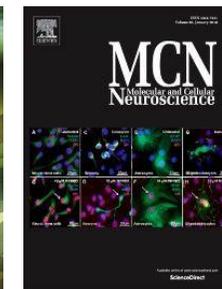
The moulding of senescence by natural selection



Telomere reduction in human colorectal carcinoma and with ageing



Accuracy of clinical diagnosis of idiopathic Parkinson's disease



Identification of a novel aspartic protease (Asp 2) as beta-secretase



Oxidative stress in Parkinson's disease

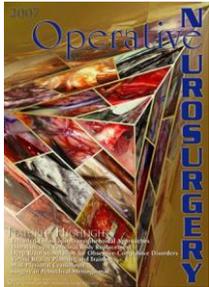


Why do we age?



Age-specific relevance of usual blood pressure to vascular mortality

# Longevity Scientific Articles



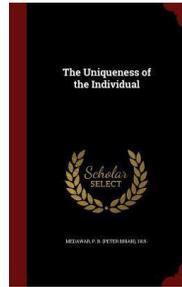
Electrical stimulation of the subthalamic nucleus in advanced Parkinson's disease.



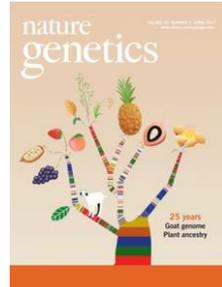
Instability and decay of the primary structure of DNA



Consensus guidelines for the clinical and pathologic diagnosis



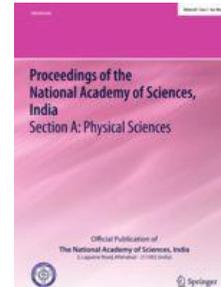
An unsolved problem of biology



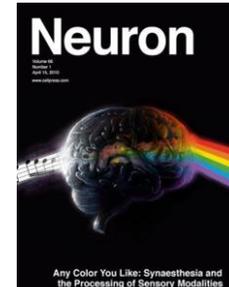
A pathogenic mutation for probable Alzheimer's disease



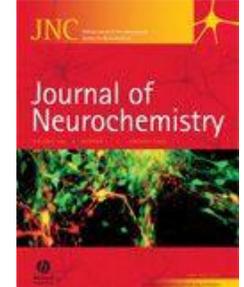
Neuropathology of human Alzheimer disease



The maintenance of the accuracy of protein synthesis and its relevance to ageing



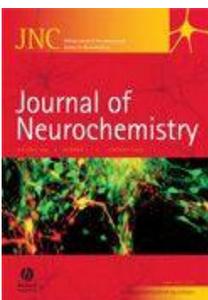
Cloning of the gene containing mutations



Selective loss of central cholinergic neurons in Alzheimer's disease



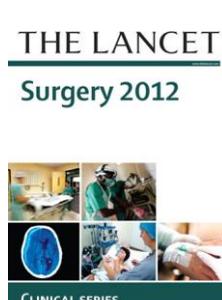
Macrophage phagocytosis of aging neutrophils in inflammation



Mitochondrial complex I deficiency in Parkinson's disease



Increased amyloid beta-peptide deposition



Pravastatin in elderly individuals at risk of vascular disease



alpha-Synuclein in filamentous inclusions



Alpha-synuclein in Lewy bodies



Binding of human apolipoprotein E to synthetic amyloid beta peptide



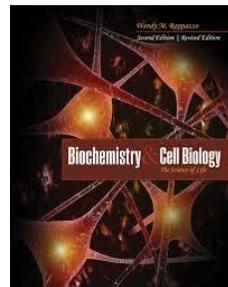
Observations on the brains of demented old people



p53 mutant mice that display early ageing-associated phenotypes



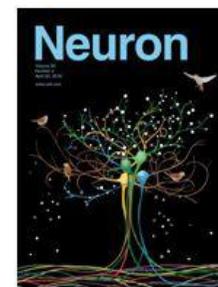
Hereditary early-onset Parkinson's disease caused by mutations in PINK1



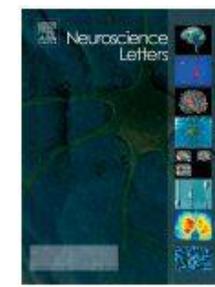
Free radicals and antioxidants in normal physiological functions and human disease



Questioning Macular Pigment Measurement Methods and Genetic Risk of Age-Related Macular Degeneration.

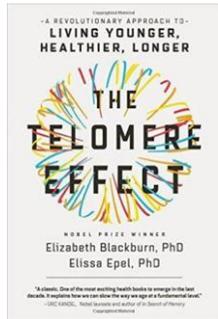


Tau proteins of Alzheimer paired helical filaments: abnormal phosphorylation of all six brain isoforms

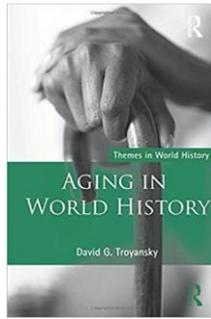


Sequencing of exons 16 and 17 of the beta-amyloid precursor protein gene in 14 families with early onset Alzheimer's disease fails to reveal mutations in the beta-amyloid sequence.

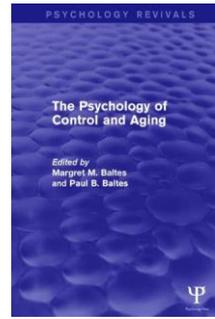
# Longevity Books



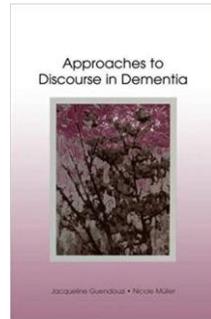
The Telomere Effect



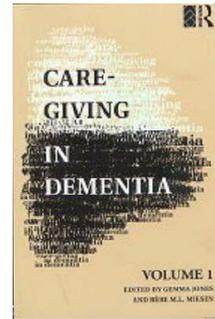
Aging in World History



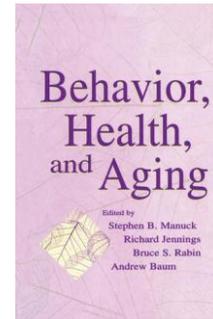
The Psychology of Control and Aging



Approaches to Discourse in Dementia



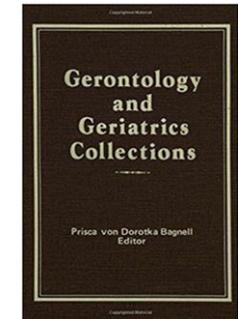
Care-Giving in Dementia



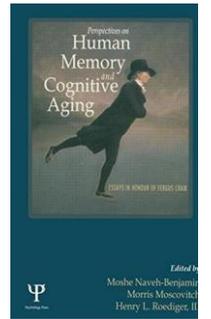
Behavior, Health, and Aging



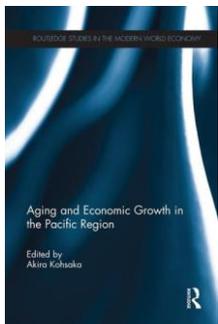
Ageing Populations in Post-Industrial Democracies



Gerontology and Geriatrics Collections



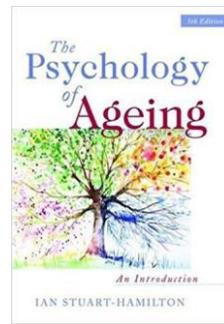
Perspectives on Human Memory and Cognitive Aging



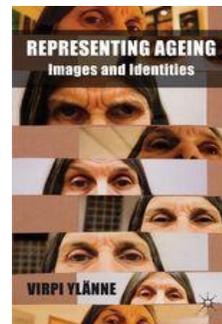
Aging and economic growth in the pacific region



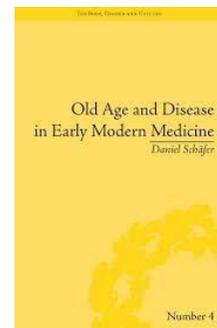
Researching later life and ageing



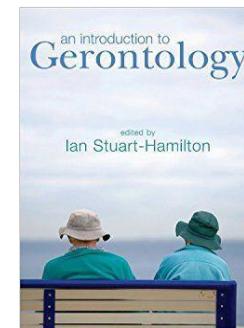
The psychology of ageing: an introduction



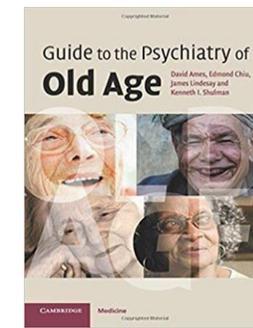
Representing ageing: images and identities



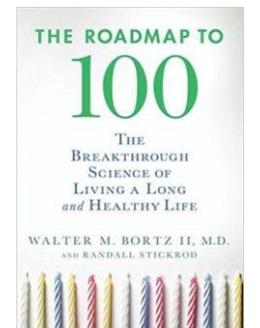
Old age and disease in early modern medicine



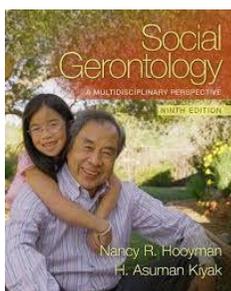
An introduction to gerontology



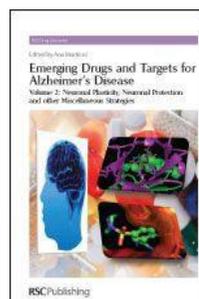
Guide to the psychiatry of old age



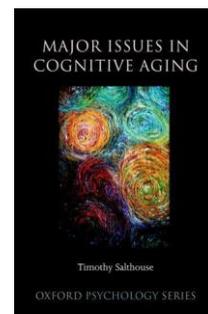
The roadmap to 100



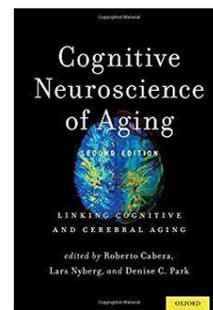
Social Gerontology



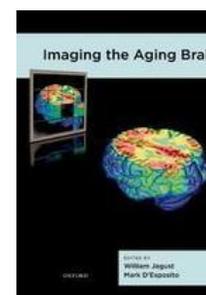
Emerging drugs and targets for Alzheimer's disease



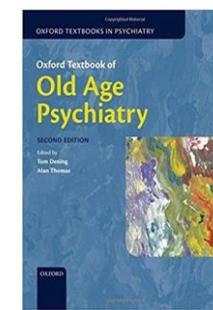
Major issues in cognitive aging



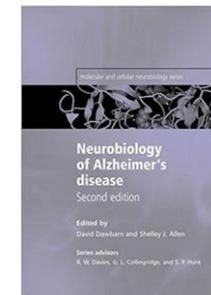
Cognitive Neuroscience of Aging



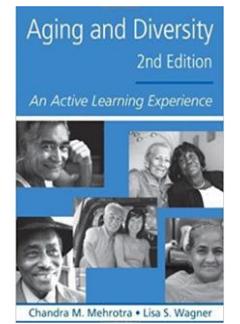
Imaging the Aging Brain



Oxford textbook of old age psychiatry

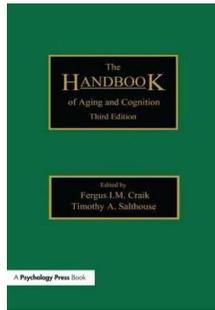


Neurobiology of Alzheimer's disease



Aging and Diversity

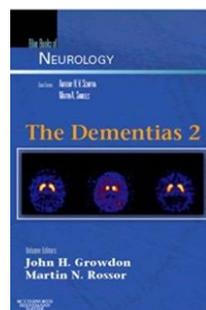
# Longevity Books



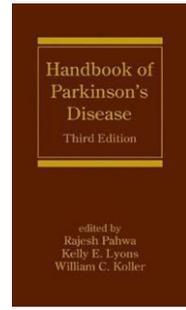
**The Handbook of Aging and Cognition**



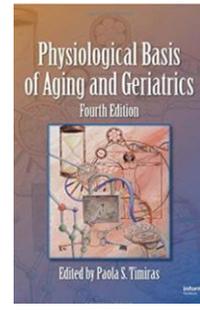
**Ageing in Asia**



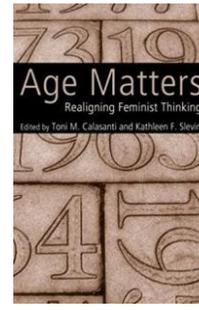
**Blue Books of Neurology Series**



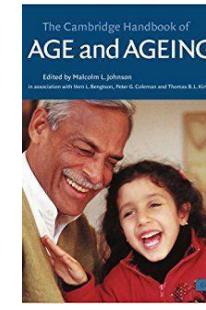
**Handbook of Parkinson's disease**



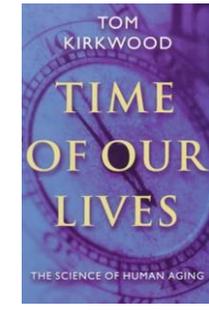
**Physiological basis of aging and geriatrics**



**Re-Aligning Feminist Thinking**



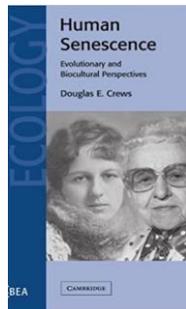
**The Cambridge handbook of age and ageing**



**Time of our lives: the science of human aging**



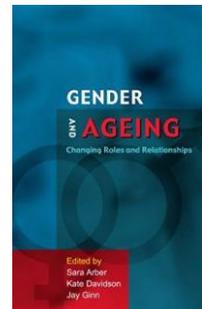
**Successful Aging**



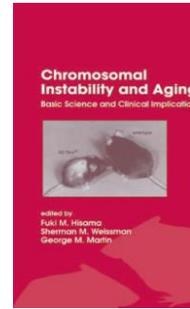
**Human senescence**



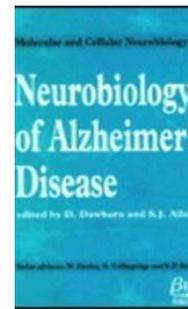
**The fountain of youth**



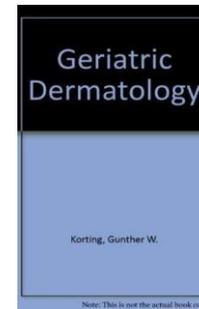
**Gender and Ageing**



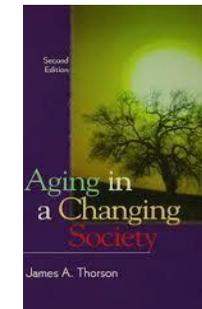
**Chromosomal instability and aging**



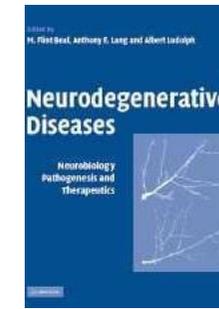
**Neurobiology of Alzheimer's disease**



**Geriatric dermatology**



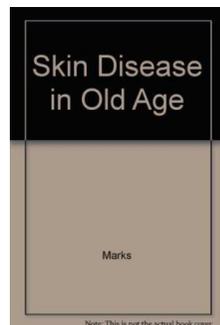
**Aging in a Changing Society**



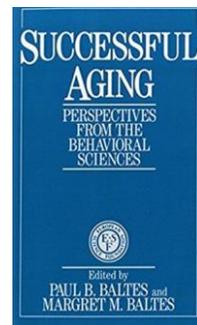
**Neurodegenerative diseases**



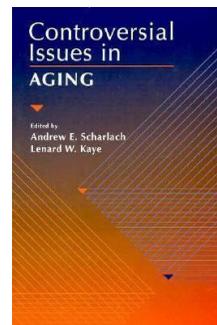
**Cognitive Aging: A Primer**



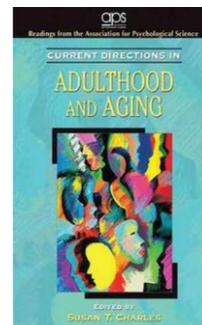
**Skin disease in old age**



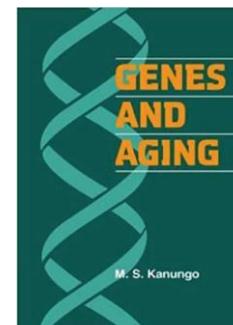
**Successful Aging**



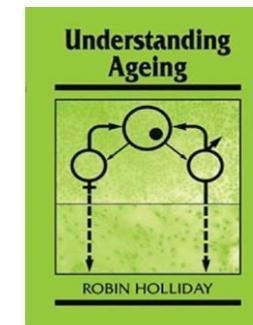
**Controversial issues in Aging**



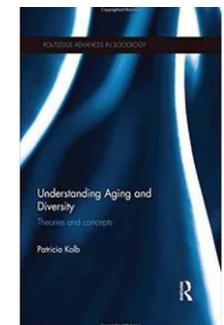
**Current Directions in Adulthood and Aging**



**Genes and aging**



**Understanding ageing**



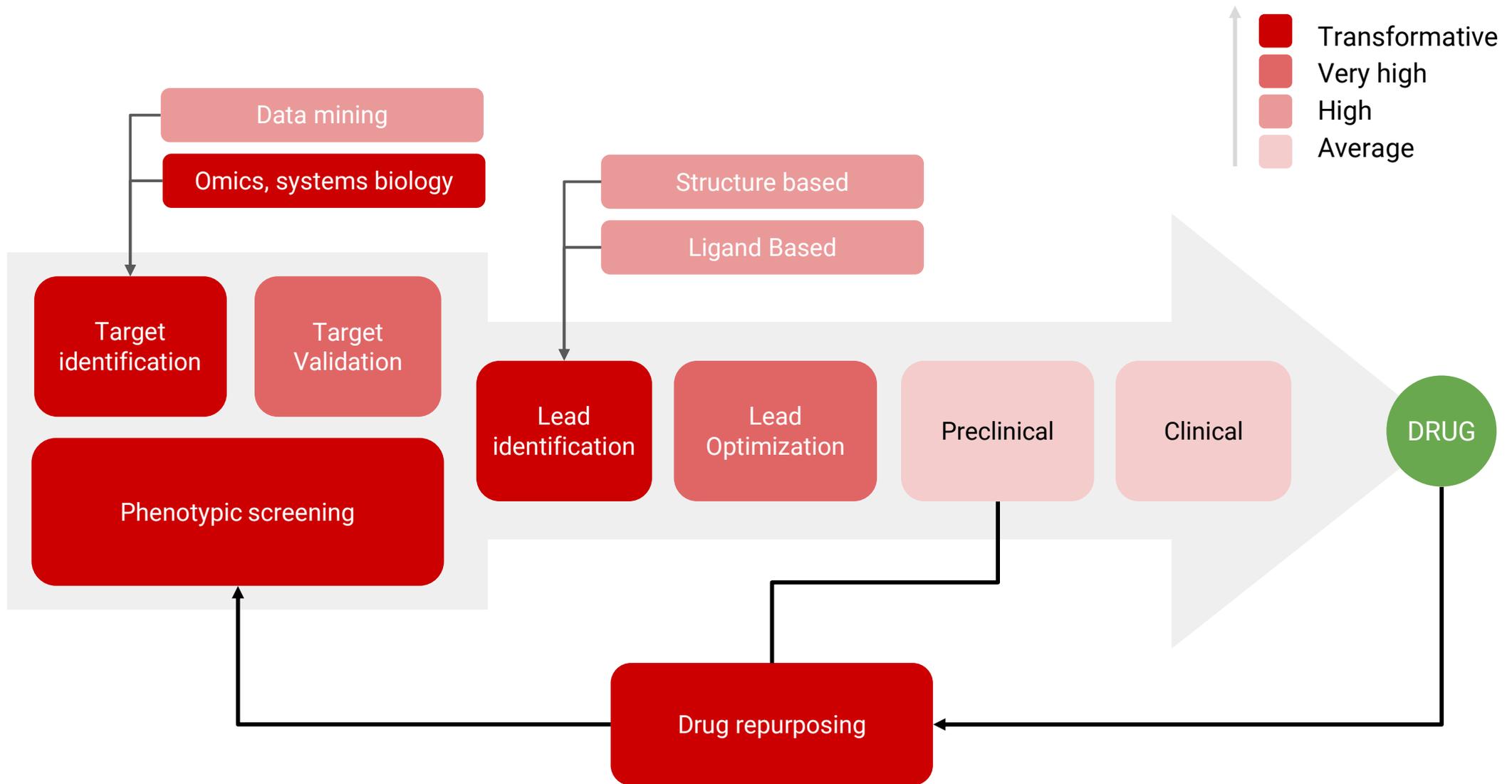
**Understanding aging and diversity**



# Intersection of AI in Drug Discovery and Longevity



# The "heat map" of AI potential value for various R&D areas



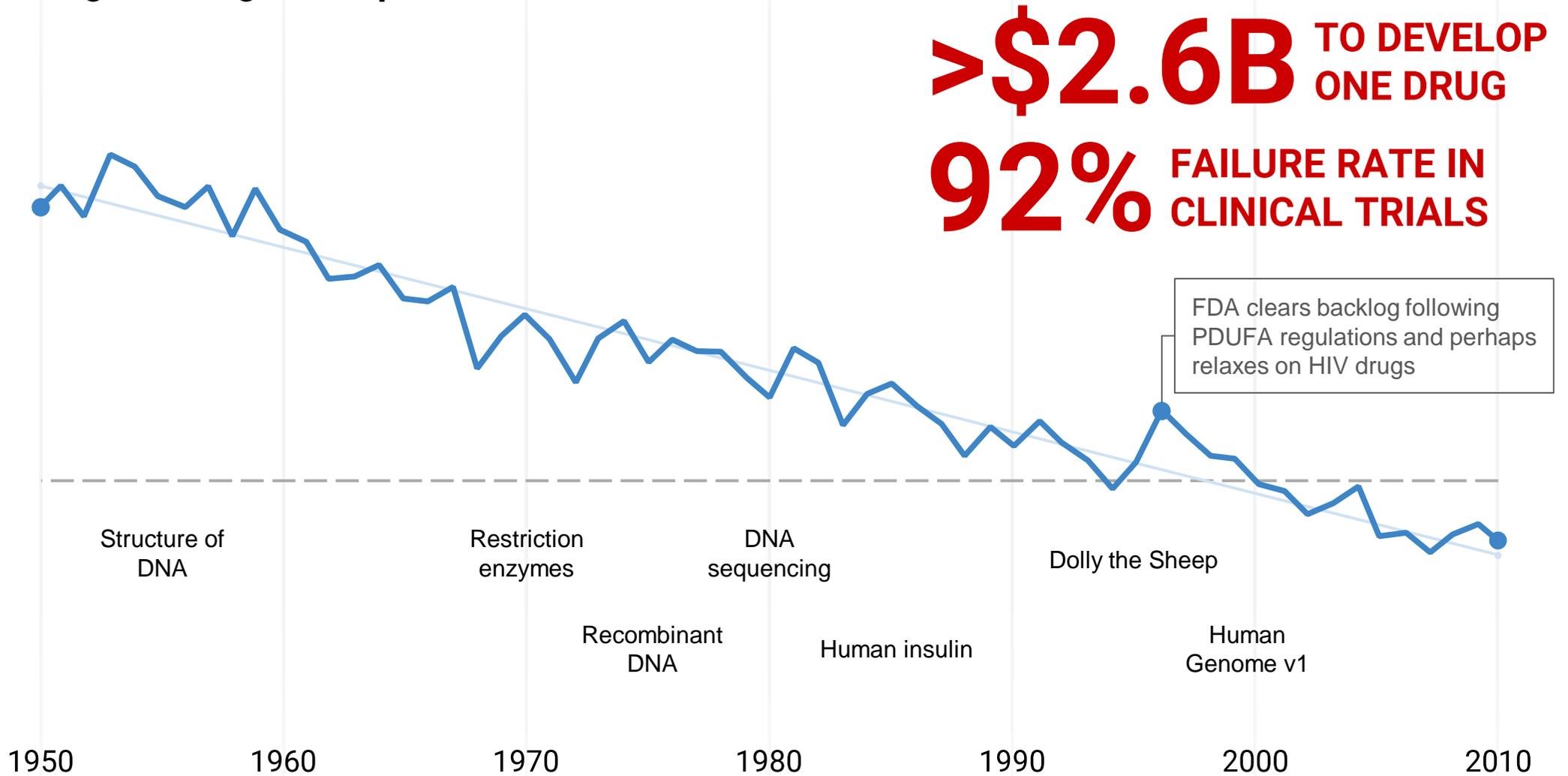


# Pharma Efficiency is Declining Steadily

NMEs per \$B R&D spent (inflation adjusted)

**FDA tightens regulation post thalidomide**

**>\$2.6B TO DEVELOP ONE DRUG**  
**92% FAILURE RATE IN CLINICAL TRIALS**



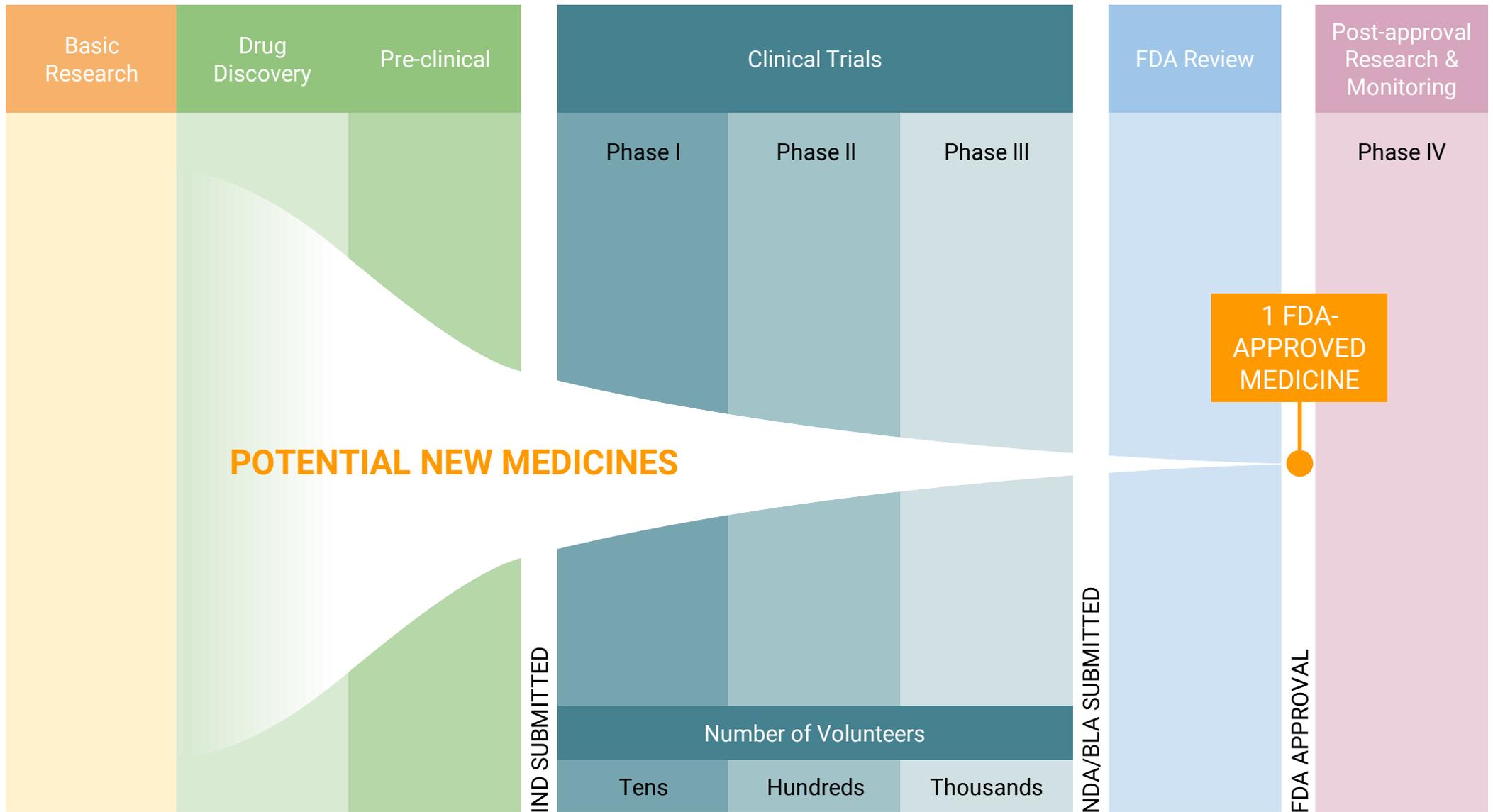
FDA clears backlog following PDUFA regulations and perhaps relaxes on HIV drugs

Bernstein Research: The Long View - R&D Productivity, 2010

**46 NEW DRUGS** launched in 2014



# Biopharmaceutical R&D Process / Low efficiency



Sources      Biopharmaceutical Research & Development, PRMA

[phrma-docs.phrma.org](http://phrma-docs.phrma.org) pdf

# AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape / 2018 Q4

Companies - 130  
Investors - 320  
Corporations - 30

## Drug Discovery

## Advanced R&D

- Investors
- AI Companies
- Corporations



AGING ANALYTICS AGENCY

DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

## Biomarker Development

# AI for Drug Discovery, Biomarker Development and Advanced R&D Landscape / 2018 Q4

Companies - 130  
Investors - 320  
Corporations - 30

## Regional Position

- Investors
- AI Companies
- Corporations



Canada

UK

Other Regions

EU

Asia

AGING ANALYTICS AGENCY

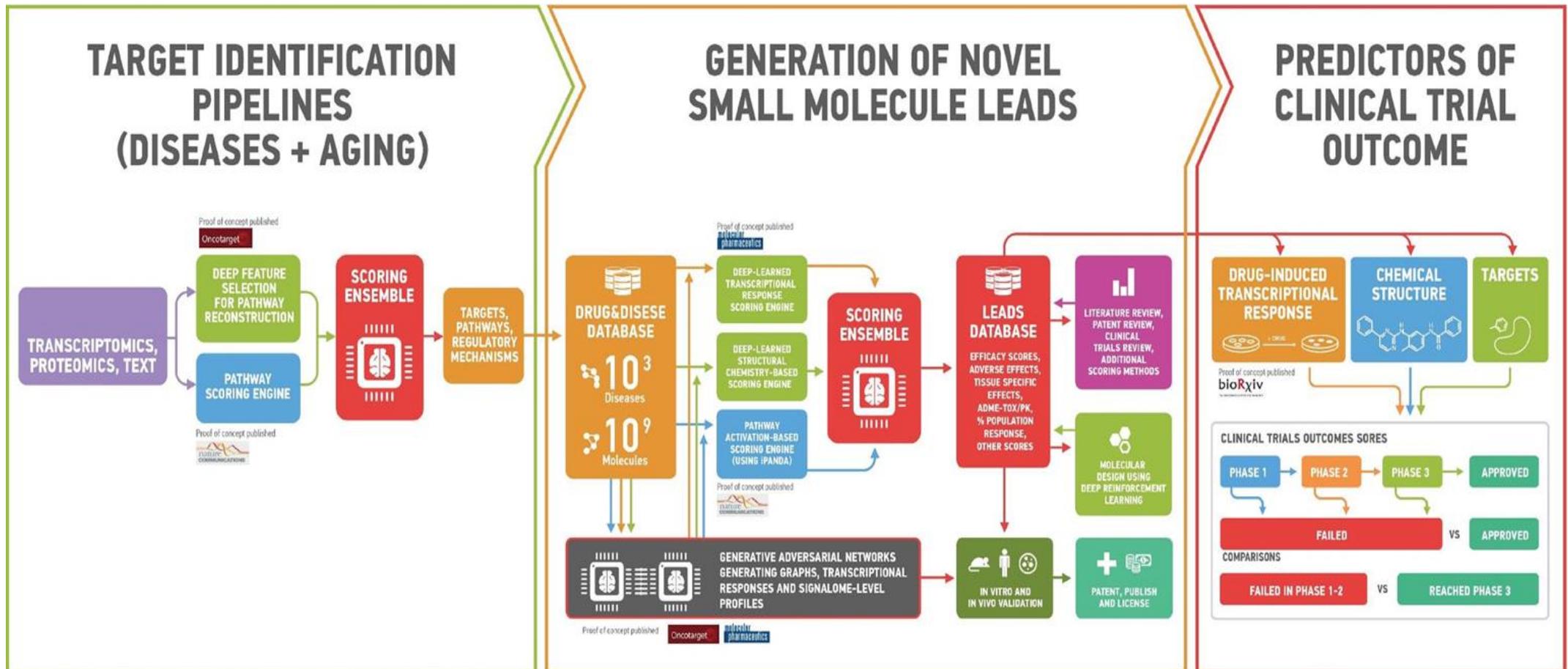
DEEP KNOWLEDGE ANALYTICS

LONGEVITY INTERNATIONAL

# End-to-end drug discovery pipeline in the industry utilizing next-generation artificial intelligence



英科智能  
Insilico Medicine



# INSILICO MEDICINE / DRUG DISCOVERY ENGINE

## DRUG & DISEASE DATABASE



PROOF OF CONCEPT  
PUBLISHED

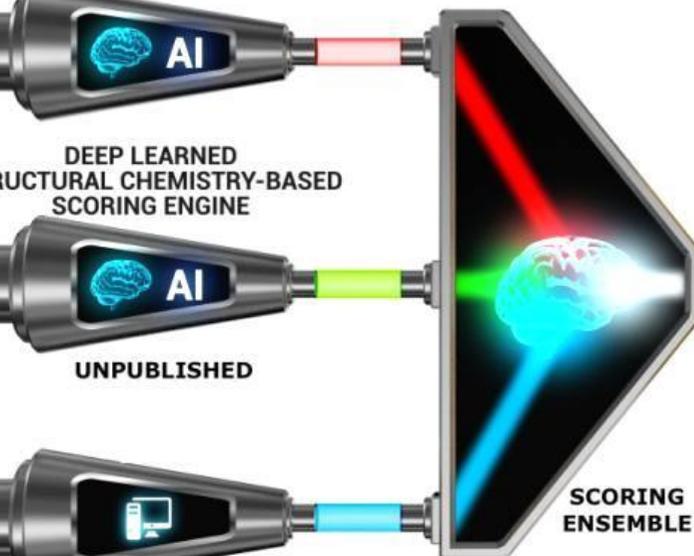
DEEP LEARNED  
STRUCTURAL CHEMISTRY-BASED  
SCORING ENGINE

UNPUBLISHED

PATHWAY SCORING ENGINE  
PROOF OF CONCEPT PUBLISHED

## Generative Adversarial Networks

Generating graphs,  
transcriptional response  
and signalome-level profiles



## LEADS DATABASE

EFFICACY SCORES  
ADVERSE EFFECTS  
TISSUE-SPECIFIC  
EFFECTS  
BIOAVAILABILITY  
IC50  
% POPULATION  
RESPONSE  
OTHER SCORES

A vertical stack of five golden cylindrical containers representing a leads database. Arrows point from these containers to various external review and design blocks.

Literature Review,  
Patent Review,  
Clinical Trials Review,  
Additional Scoring Methods

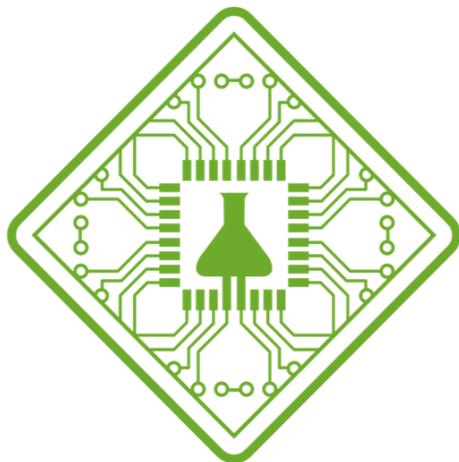
Molecular Design Using  
Deep Reinforcement  
Learning

In Vivo and In Vitro  
VALIDATION

Patent, Publish  
and License



# AI Companies in Longevity



英科智能  
Insilico Medicine

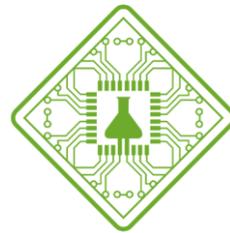


Atomwise  
Better medicines faster.





# Insilico Medicine Aging.AI 2.0



英科智能  
Insilico Medicine



Track your age  
at every level!



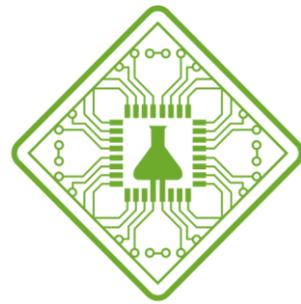
See what makes you  
younger or older!



Stay young!

# Insilico Medicine Earns Accolades from Frost & Sullivan

F R O S T & S U L L I V A N



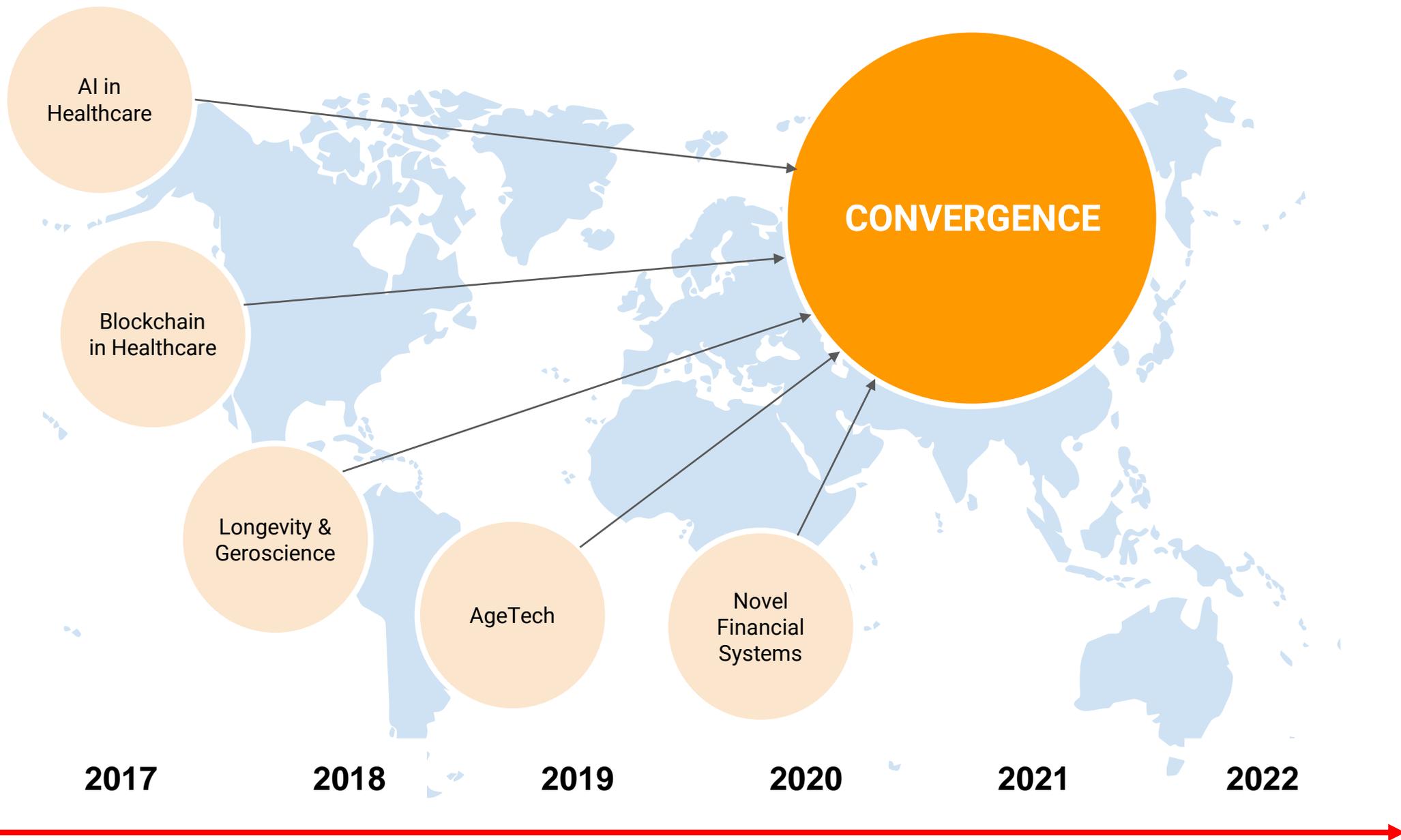
英科智能  
Insilico Medicine

2018 North American Artificial Intelligence for Aging Research  
and Drug Development Technology Innovation Award



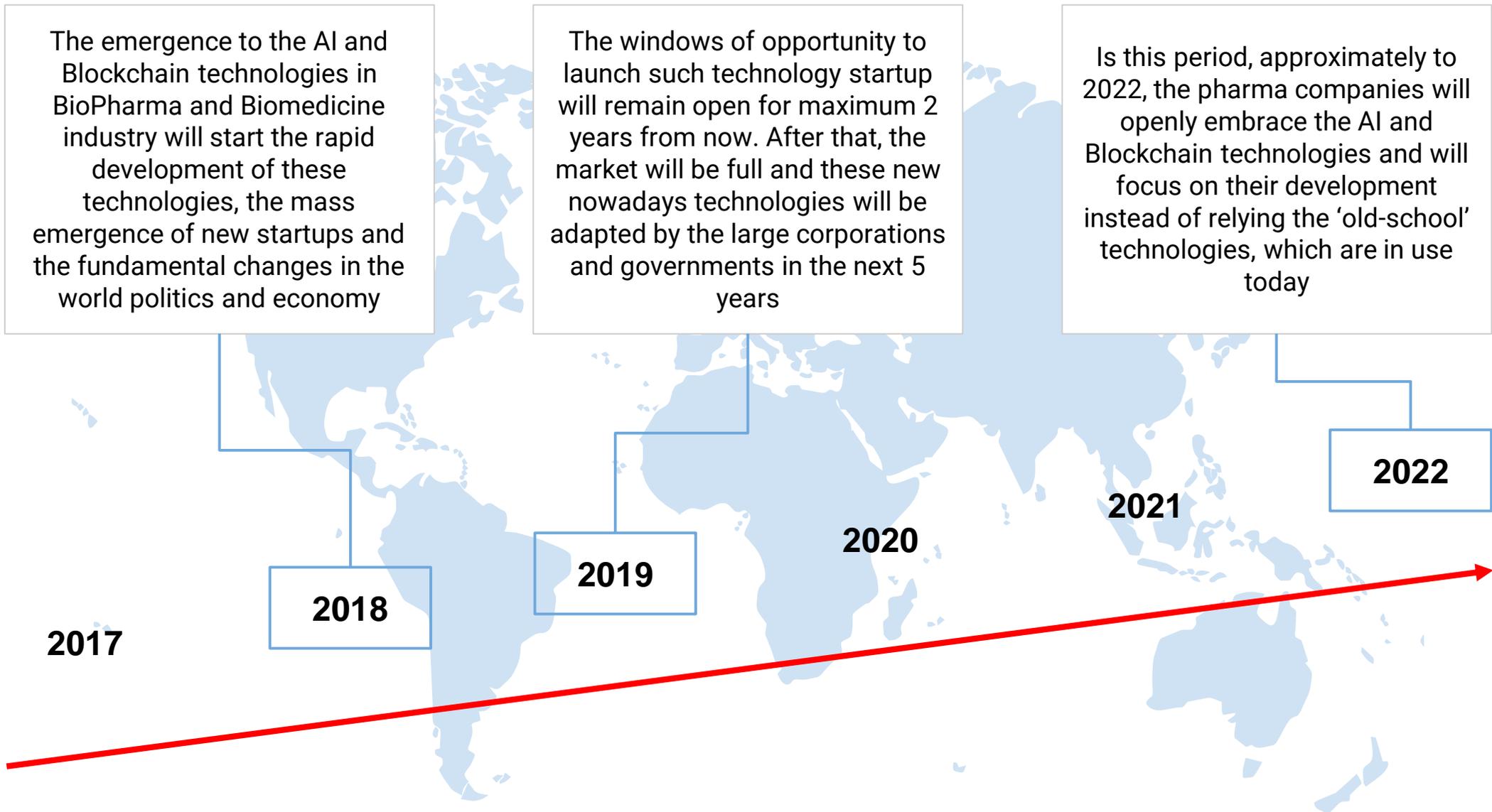
# Longevity and Convergence of Technological Megatrends

# Convergence of 5 Mega Trends in the BioTech and BioMedicine Industries





# Consequence: The Major Shift in the BioMedicine Industry





# Advancing Financial Industry Longevity / AgeTech / WealthTech



# 1 Billion People in Retirement Globally - a New Multi-Trillion Opportunity

Longevity, AgeTech & WealthTech Market

Globally

1 Billion in Retirement

In the UK

10 Million in Retirement

**“ The one billion retired people globally are a multi-trillion dollar opportunity for business ”**

*~ Dmitry Kaminskiy interview in the Financial Times.*

**“ The global spending power of those age 60 and over will reach \$15 trillion annually by 2020 ”**

*~ Bank of America Merrill Lynch.*

Top-150 Financial Institutions  
 Advancing Financial Industry  
 Longevity / AgeTech / WealthTech

Asset Management Firms - 30  
 Pension Funds - 40  
 Reinsurance Companies - 15  
 Insurance Companies - 25  
 Banks - 40

Asset Management Firms

Pension Funds

Banks

Reinsurance Companies

Insurance Companies



# Top-150 Financial Institutions Advancing the Financial Industry Longevity / AgeTech / WealthTech



## 30 Asset Management Firms



## 40 Banks



## 15 Reinsurance Companies



## 25 Insurance Companies

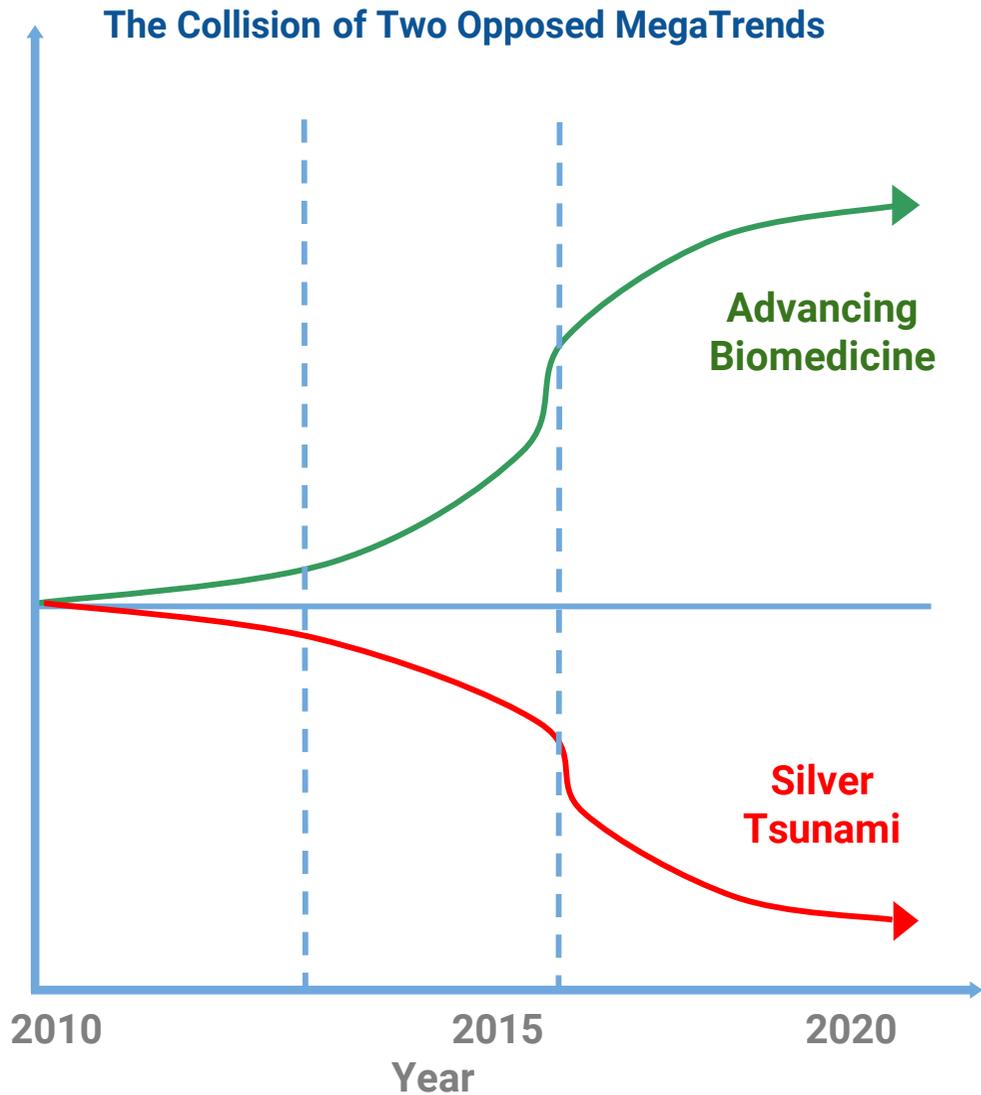


## 40 Pension Funds





# Introduction: Longevity, Aging, and the Advancing Financial Industry: The Collision of Two Opposed MegaTrends



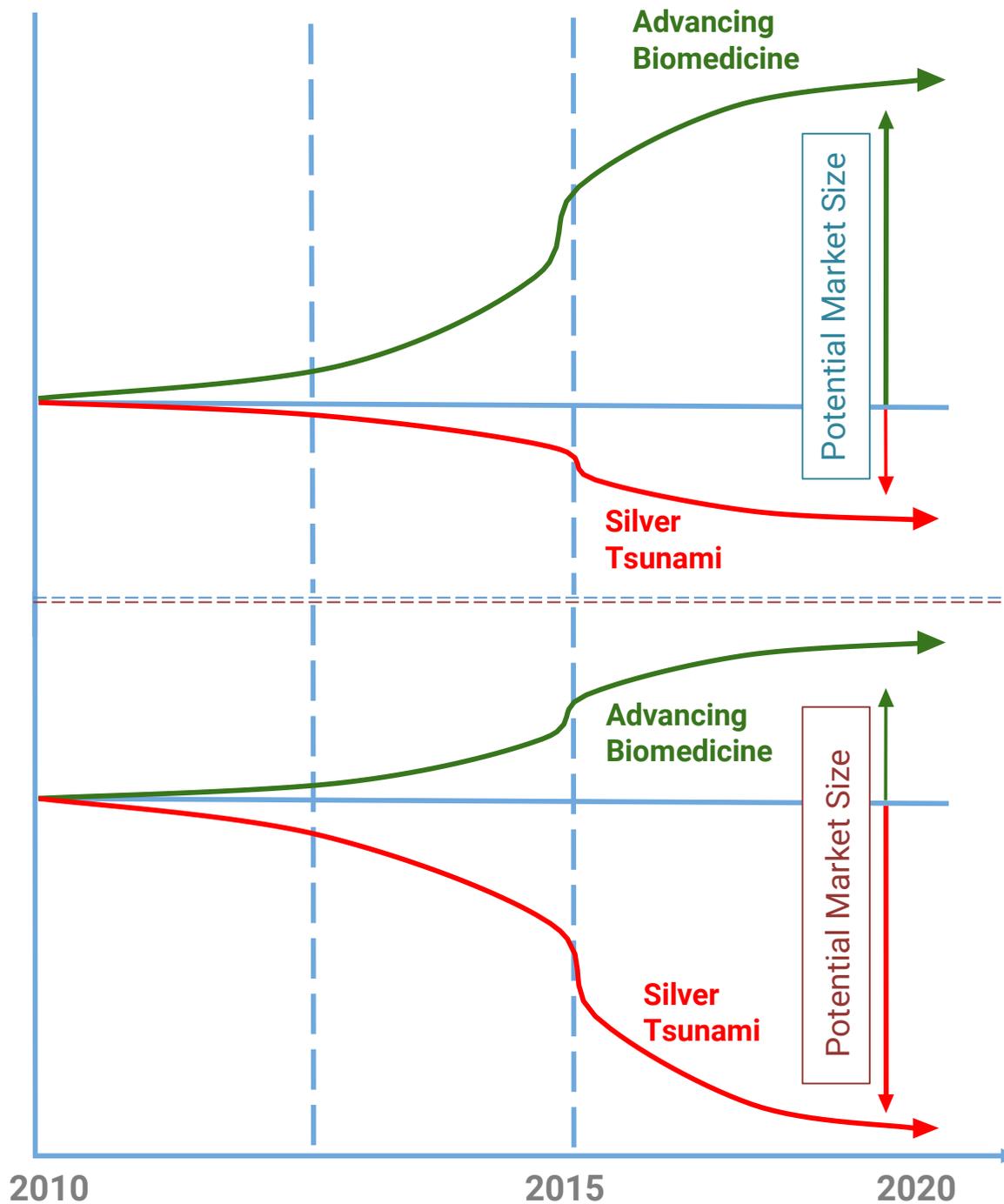
The present moment in history is marked by the impending collision of two opposed megatrends:

- exponential development in advanced biomedicine and the science of aging, which is creating a rapidly growing Longevity Industry capable of expanding healthspan, delaying age-related diseases and compressing age-related loss of function into the last few years of life;
- the oncoming Silver Tsunami (demographic aging), which poses major economic burdens not just for the healthcare systems of developing nations, but also for major financial institutions including pension funds, insurance companies, asset management firms and retail / private wealth banks.

All these classes of financial institutions will either gain or lose from the collision of these two opposed megatrends.

Those institutions that will be able to reinvent their business models to (1) reduce the economic burden caused by demographic aging through specific products and policies, and (2) tap into the rising AgeTech, WealthTech and Longevity Finance markets that are emerging as a result of the 1 billion people on retirement globally that can not only survive the oncoming collision of these megatrends, but can actually thrive and prosper as a result, maintaining their existing sources of revenue, while opening doors to an untapped ocean of the new ones. Those institutions that fail to recognize the oncoming collision of these two opposed megatrends and to reinvent their business models accordingly, will stagnate and be washed away.

# Two Possible Scenarios of Longevity MegaTrends



## Positive Scenario

Most progressive and technocracy-driven countries will work proactively to address these issues and implement a positive scenario. Financial institutions operating in those regions should have sophisticated long-term forecasting to reformulate their business models in order to minimize the challenges and to maximize the utilization of opportunities associated with these two opposed megatrends.

## Pessimistic Scenario

In reality, most countries will fail to address these challenges in advance due to a lack of will and technological capability, missing their window of opportunity to benefit from the progress in biomedicine, and to neutralize the worst effects of population ageing. Financial institutions operating in those regions should utilize pragmatic forecasting, and to adjust and optimize their business models accordingly.

# Longevity Financial Landscape Framework

## PENSION FUNDS

Population ageing may increase cost

Dependant on policy regulations

Higher mortality uncertainty

## INSURANCE COMPANIES

Leveraging longevity risk on macro and micro level

Intersection with banks and asset management firms

Longevity derivatives as a form of insurance

## ASSET MANAGEMENT FIRMS

Product diversification for different age groups

Advanced trading strategies with longevity derivatives

Population aging may make conservative investment strategies more popular

## RETAIL AND PRIVATE WEALTH BANKS

Providing services to other financial institutions

Savings growth = additional pressure on interest rates

Banks can substitute services of retirement planning



# Top-Tier Finance and Business Media Conferences on Longevity



Longevity is now regularly embraced as a major topic of interest for panel discussions and entire conference series by top-tier finance and business media brands including *The Economist*, *Financial Times* and *Bloomberg*.



FINANCIAL TIMES LIVE	
12:10pm	<b>Aging and Longevity</b>
	Dmitry Kaminsky, Co-Founder and Senior Partner, <i>Deep Knowledge Ventures</i>
	Alex Zhavoronkov, CEO, <i>Insilico Medicine</i>
	Joseph Antoun, Chairman & CEO, <i>L-Nutra</i> ; Chairman, <i>Global Healthspan Policy Institute</i>
	Aubrey de Grey, Vice President of New Technology Discovery, <i>AgeX Therapeutics</i>

A GLOBAL NETWORK OF INNOVATORS

## AGING<sup>2.0</sup>



# Top-Tier Financial Institutions and Business Analytics Firms Show Interest in Longevity Through Conferences and Reports



Credit Suisse featured Health and Aging as one of four main themes in their 2018 Global MegaTrends Conference



Julius Baer held a major forum on the topic of "Investing in Longevity" featuring a keynote presentation by Aging Analytics Agency Founder Dmitry Kaminskiy

**Julius Bär**

EXTENDED LONGEVITY



SHIFTING LIFESTYLES ⏴ 4 min

Do we really want to live forever?



SHIFTING LIFESTYLES ⏴ 3 min

Longevity: How to make the most of the extra years



UBS featured "Living to 150" as one of six major topics in their 2018 Healthcare Summit, featuring a keynote presentation by prominent Longevity entrepreneur Alex Zhavoronkov

**UBS**

UBS Investor Watch

## The century club

The rising prospect of living ten decades

**UBS**

UBS Investor Watch

## 80 is the new 60

Retirement is one word, but **three phases**

UBS also issued a report on the "largest survey of wealth investors in the world to date", concluding: "Don't let skepticism about living to 100 keep you from planning for it. Life expectancies are rising, and it's a real possibility. In fact globally, nine in 10 investors are already adjusting how they are planning for their life and their legacy."

**Citi GPS**



**DISRUPTIVE INNOVATIONS VI**  
Ten More Things to Stop and Think About

**Anti-Aging Medicines**  
Advancing Health by Turning Back Time **citi**

CitiBank released a landmark report detailing the rise of the Longevity Industry, and highlighting it as one of the quickest-rising sectors being driven by disruptive innovation today.

**ANTI-AGING THERAPIES AND SERVICES MARKET**

-TRENDS AND GROWTH OPPORTUNITIES, FORECAST TO 2022



Frost and Sullivan also released two prominent reports on the emerging Longevity Industry, and in 2018 created the "Award for Innovation in Artificial Intelligence for Aging Research and Drug Development"

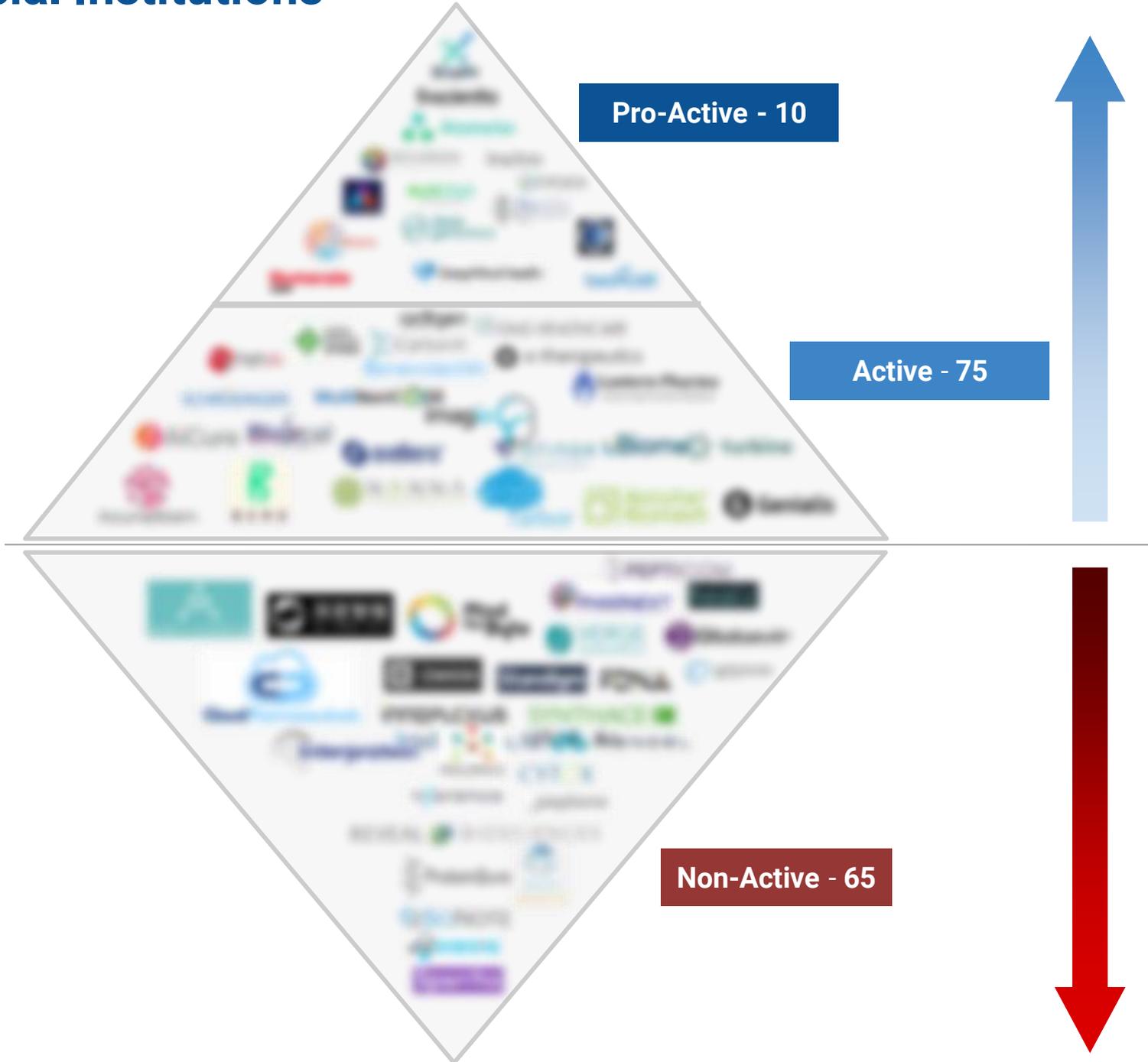


# Level of Longevity Finance Activity and Prospects of 150 Leading Financial Institutions

Aging Analytics Agency's classification framework set up the ranking of 150 leading financial institutions according to their levels of activity in the Advancing Longevity Financial Industry.

Quantitative, tangible metrics are used for the comparative analysis to deliver three tiers: anti-ranking (non-active), medium ranking (active), and positive ranking (proactive).

This three-tiered system allows companies to be quantified not only the activity and future prospects of these companies, but also the lack of activity and assets that could be converted into future prospects.





# Next Multi-Trillion Underdeveloped Market for Financial Institutions

## AgeTech Market

Globally

1 Billion on Retirement

In the UK

10 Million on Retirement

“ The one billion retired people globally are a multi-trillion dollar opportunity for business ”

— *Dmitry Kaminskiy* interview in the *Financial Times*.

The global aging demographic challenge, and the prospect of technological solutions (digital, biomedical and financial), are now recurring talking points at conferences hosted by major investment banks. The previous slides exemplify a sliver of such conferences from the past two years. The **Deep Knowledge Group**, consisting of **Deep Knowledge Ventures**, **Ageing Analytics Agency** and **Deep Knowledge Analytics**, lies at the heart of the emerging Longevity industry and is committed to furthering the conversation via similar events.



*“Longevity is a blessing. And as an investor, it provides you opportunities to benefit from compounding and to have a longer investment horizon. But if you don’t prepare for it, you are left with two options: Work longer in life, perhaps much longer than you’d like, or hope you’ve been good to your children and that they’ll be willing to care for you in your old age. And, second, I hope you’ll speak out. Longevity is an issue of social justice that will have a more profound impact on your generation than on any generation before. If we don’t start to address it – not just in this country but globally – we’re going to see fewer job prospects for young people, higher unemployment, lower growth and many older people – maybe your parents – left without the means to support themselves.”*

**– Larry Fink, Chairman of Blackrock Capital**

*“There will come an age when our average life expectancy will reach 200 years.”*

**– Masayoshi Son, CEO of SoftBank and Vision Fund.**



*“To finance longer life spans, we must convince individuals to start investing now for the long term. But longevity should be an asset that can be leveraged, not a curse.”*

**– Laurence D. Fink, BlackRock Capital, Chairman of the World’s Biggest Investment Fund, with \$6.28 Trillion under management.**

The current financial system was designed 50-100 years ago, at a time when no one could imagine that life expectancy could increase at all, nevermind to the extent with which it has actually increased in the past 50 years. To adjust to the current reality nations will have to endure multiple financial paradigm shifts, and experience of several significant financial crisis cycles. And they will have to enable these shifts fast if they hope to avoid systemic stagnation, within the next 10-15 years.

The backbone of today’s global financial system do not possess the resources or infrastructures needed to enable such rapid adaptation and adjustment. This is why this report concludes that the necessary changes required to weather this storm will be deep and fundamental shifts, almost equal to the creation of wholly novel financial system from scratch.

This chapter considers how a preliminary blueprint of the novel financial Longevity economy should be designed, and outlines major topics which will be covered in greater detail in a forthcoming special report later this year titled **“Novel Financial System”**.

*“The future of the longevity industry not only has the logical potential to become the wealthiest industry in all of history, but also represents the most ethical way of doing business.”*

**– Dmitry Kaminskiy, Managing Partner, Deep Knowledge Life Sciences.**



# Financial Futurism

Dictionary.Com defines 'futurism' as:

***"The study or forecasting of trends or developments in science, technology, political or social structure, etc."***

So intertwined are the fates of technology and finance at this juncture in history that predicting them calls for a form of **'financial futurism'**.

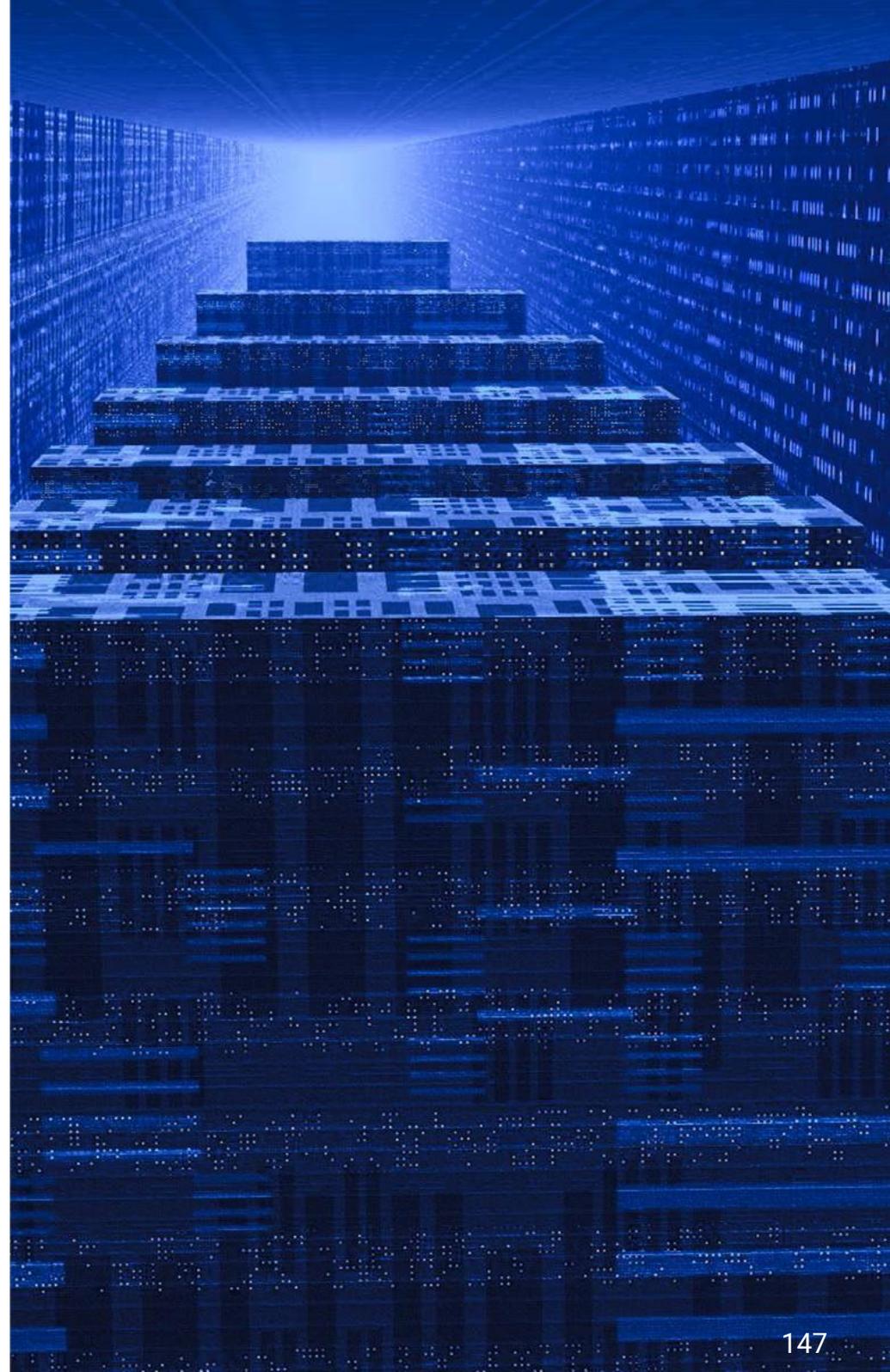
In this chapter we apply forecasting methods to identify possible scenarios and create a roadmap for how financial entities could evolve from scratch in the novel financial realm.

## The Pathway toward Financial Futurism

Looming changes to the global financial system resulting from the convergence of two collapsing megatrends, the Silver Tsunami and advancing Longevity industry, will shake the global financial system.

**Financial institutions that don't adapt will not survive in their present form**

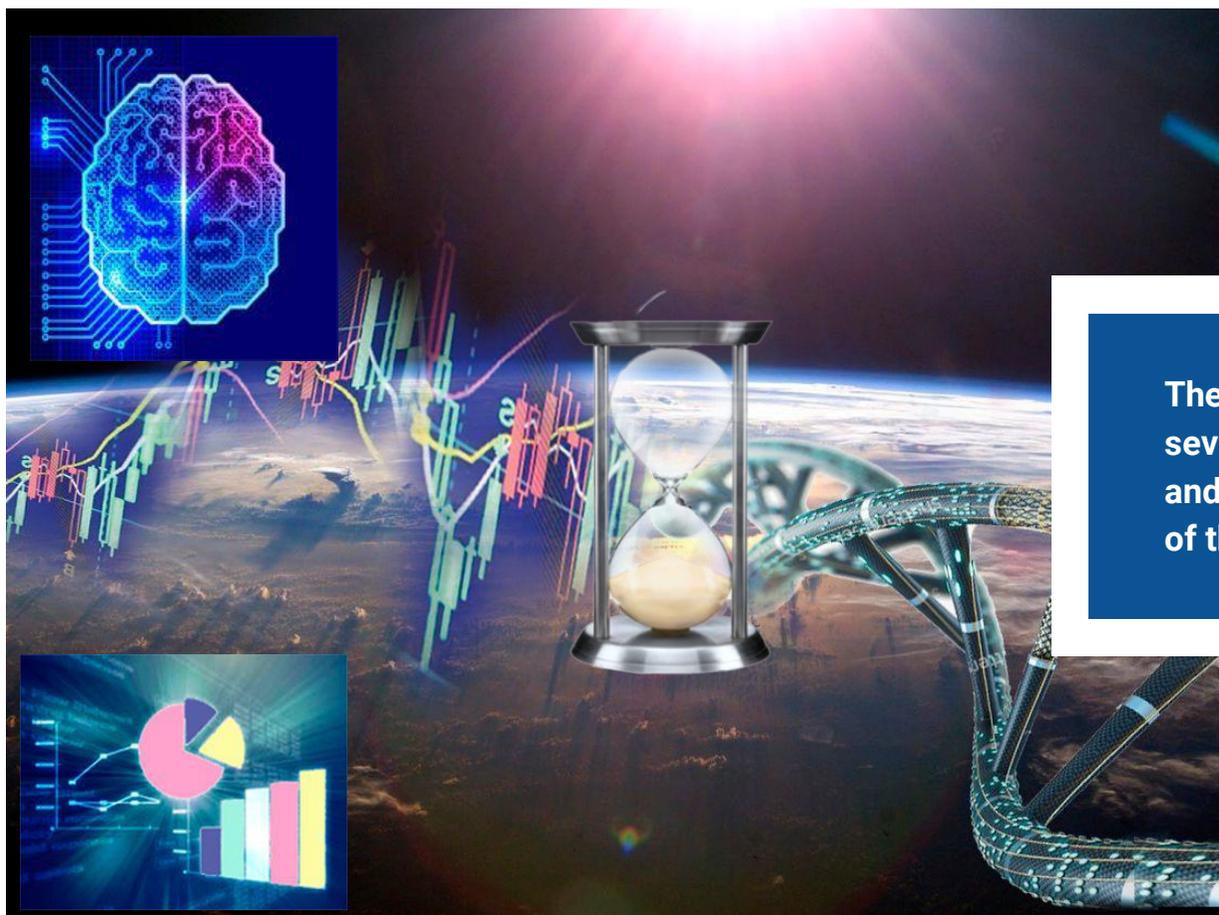
After the tsunami has passed, such economies will have reformed themselves beyond recognition, absorbed by novel financial institutions and systems, or transformed by government initiatives of progressive technocratic countries.



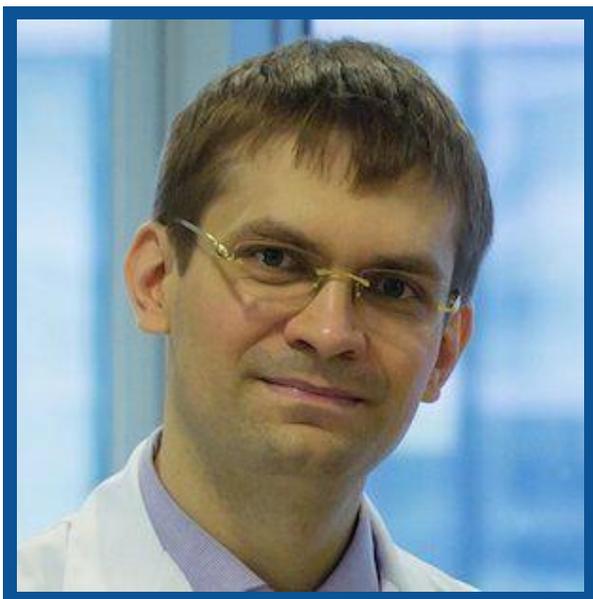


*“There have been many well documented efforts to predict the future of biomedical progress, but is there any good reason why the same logic could not be applied for the financial sphere? Many thought leaders have made reasoned predictions on how some fragments of collapsing financial systems will evolve, adapt and adjust to increasing life expectancy. We should work to assemble the framework of scenarios regarding the evolution of financial system in the next 10 years, and create the pathways that will be able to neutralize collapses and accelerate the dynamic of progress of the longevity industry, with a focus on extension of healthy period of life for the betterment of all of humanity.”*

**– Dmitry Kaminskiy, Managing Partner, Deep Knowledge Ventures**



The following pages give an initial overview on how several potential types of financial institutions could and should operate in the next 5 - 10 years in the face of these changes.



*“The way we prioritize projects at Insilico Medicine is by looking at the number of quality-adjusted life years (QALY) each project can generate. It is the most altruistic cause and the most effective investment. If you add just one year of life to everyone on the planet, you generate over 7 billion QALY.”*

*“The majority of politicians and the general public are unaware of the tremendous potential benefits of regenerative medicine. They fail to grasp the profound implications that extended longevity could have on the global economy, on their respective nation’s economic survival, and on their own lifespan and health.”*

**– Alex Zhavoronkov, Chief Science Officer of the Biogerontology Research Foundation and a scientific advisor on the reports**



*“A mere three years ago the rise of the Longevity Industry was yet unthinkable. Now, a mere few years later, it has become unthinkable to consider biomedicine without healthy longevity. The time has come to establish a framework for the rising Longevity Industry.”*

*“The future of the longevity industry not only has the logical potential to become the wealthiest industry in all of history, but also represents the most ethical way of doing business.”*

*“Aging is the ultimate evil. To invest in Anti-Aging technologies is the most ethical business, and to donate to longevity research is the most effective form of altruism.”*

**– Dmitry Kaminskiy, Managing Partner of Deep Knowledge Ventures**



*"The entire system is now wired toward the short term. Banks and securities firms grow revenue from the velocity of money. So they have a short-term incentive. Media, especially in the online age of the 24/7 news cycle, draw traffic from hyper-focusing on the latest developments... But they should do just the opposite, taking advantage of their longer investment horizon to keep their money working for them. Because let's face it – if you have 25, 30 or 40 years to save for retirement and 20 or 30 years to fund in retirement, you should not be worrying about what's happening this second, today, this week – even this quarter."*

**– Larry Fink, Chairman of Blackrock Capital**

*"People are living longer than ever before, dramatically altering the financial challenges of retirement. Increased longevity is a blessing, but it's an expensive one because that translates into the need for a bigger retirement nest egg and access to secure, retirement-long income. As our survey suggests, many Americans simply won't have the money they need to enjoy their longer lives if they don't start investing differently."*

**– Rob Kapito, President of Blackrock Capital**



*"I'm actually pretty optimistic about the U.S. economy. But Europe's got real challenges. A lot of that is due to the demographics in Europe. China has been the engine of growth for the world for the last 20 years, or the last 10 years in particular, but that's not sustainable. So you're looking at a world where growth is going to be more challenged than it's been, unless you see some really big jumps in productivity."*

**– Bill McNabb, Chair of Vanguard**





# Key Players in the Tech Industry on the Subject of Longevity and Long Term Planning



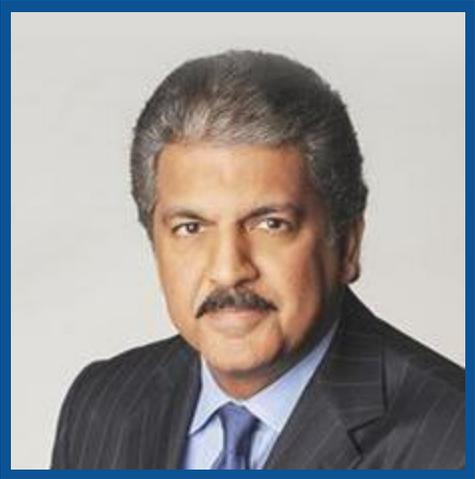
*“Every country needs a Minister for the Future”*

– **Mark R. Benioff, Chairman and CEO of Salesforce**



*“With some longer term, moonshot thinking around healthcare and biotechnology, I believe we can improve millions of lives”*

– **Larry Page, CEO of Google**



*“The opportunity to raise the quality of life is the biggest business opportunity going”*

– **Anand Mahindra, Chairman and Managing Director of Mahindra & Mahindra**



*“Death never made any sense to me”*

– **Larry Ellison, Founder of Oracle**

# Deliverables of the Report

Population aging and advancing biomedicine are two prominent opposed Longevity MegaTrends that will determine the near-future success or stagnation of large financial institutions.

**The key questions on the intersection of Longevity and finance include:**

- **What are the major threats and opportunities facing financial institutions regarding population aging?**
- **What are the tools to deal with Longevity risk? How exactly can and should they be applied?**
- **How can financial institutions benefit from the collision of Longevity megatrends?**

This will be a 100+ page report delivering practical answers to these specific questions in order to optimize the short and long-term strategies of financial institutions, with a new updated edition being released each financial quarter, incrementally increasing the precision, practicality and actionability of its industry analysis. Each new edition will provide a more sophisticated, comprehensive and precise understanding of these challenges and opportunities, as well as what financial institutions such as private wealth and retail banks, pension funds and insurance companies need to do in order to benefit, rather than stagnate, from the oncoming collision of two opposed Longevity MegaTrends: Advancing Biomedicine and Silver Tsunami.

**It will deliver:**

- Concrete deep analysis of the prospects of each sector of financial industry regarding the development of Longevity trends
- Tangible forecasts on the 3-5 years horizon, providing an overview of novel Longevity-related financial products and instruments that will be market-ready by 2022-2025
- Forecasting and scenario-building for the optimized way for assembling best possible tools and solutions to deal with Longevity risk and to gain profits from main Longevity trends
- Analysis and comparison of the key market players in the Longevity financial landscape

**The parties who gain early access to this report will acquire deep expertise on how their strategic agendas can be optimized and stabilized in order to manage and hedge Longevity risks, to surpass the challenges and to utilize the opportunities related to progressive biomedicine, ageing population and advancing financial technologies.**



# Upcoming Analytical Report - Advancing Longevity Financial Industry Longevity / AgeTech / WealthTech

The major analytical deliverables, insights, trends and data from this report will be aggregated and assembled into new, extended and updated editions of the main, industry-wide landscape overview reports, to be re-released every financial quarter, incrementally increasing the precision and actionability of its industry analysis, and the depth of its industry forecasts.

Each new edition will provide a more sophisticated, comprehensive and precise understanding of the challenges and opportunities related to longevity, as well as what financial institutions such as private wealth and retail banks, pension funds and insurance companies need to do in order to benefit, rather than stagnate, from the oncoming collision of two opposed longevity megatrends: advancing biomedicine and silver tsunami.

New editions will include:

- Expanded quantitative metrics of advancing financial industry institutions and its analysis methodology;
- Updated list of advancing financial industry institutions;
- Overview of the most notable events related to the industry that happened in the second quarter of 2019;
- New predictions and possible scenarios analysis;
- Quantitative assessment of concrete market opportunities related to longevity.

These reports will aim to deliver a concrete set of clear deliverables relevant for the strategic interests of leading financial institutions, including:

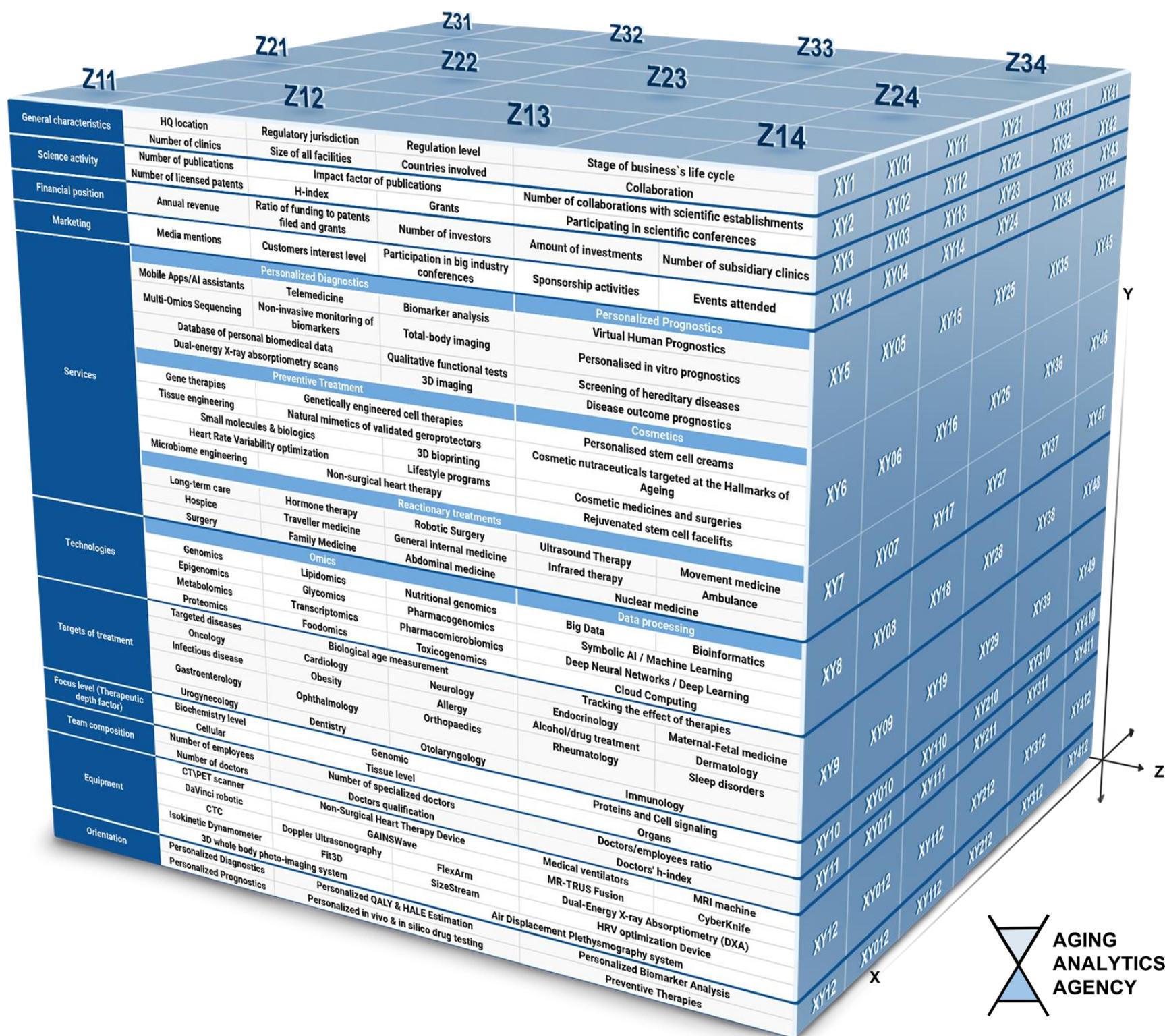
- Concrete deep analysis of the prospects of each sector of financial industry regarding the development of longevity trends and tangible forecasts on the 3-5 years horizon, providing an overview of novel longevity-related financial products and instruments that will be market-ready by 2022-2025.
- Forecasting and scenario-building for the optimized way for assembling best possible tools and solutions to deal with longevity risk and to gain profits from the main longevity trends, and analysis and comparison of the key market players in the longevity financial landscape.



# **Precision Medicine Clinics Landscape Overview 2019: Most Advanced Clinics, Technologies and Methods**

# Precision Medicine Clinics 3D Analytical Framework

*Aging Analytics Agency believes that the effective analysis of as complex and multidimensional an industry as Precision Medicine Clinics requires the application of an equally multidimensional analytical framework. This analytical framework presented in the present white paper includes metrics for identifying the breadth of the industry, identifying the degree of technological development, staff professionalism, range of provided services, financial position and scientific activity.*



# Precision Medicine Clinics Industry Analytical Framework

										Targeted diseases	Alcohol/drug treatment		
										Biological age measurement	Dermatology		
										CT/PET scanner	CTC	Tracking the effect of therapies	Gastroenterology
HQ location										Non-Surgical Heart Therapy Device	Doppler Ultrasonography	Oncology	Ophthalmology
Regulatory jurisdiction										Medical ventilators	FlexArm	Cardiology	Orthopaedics
Regulation level					Personalized Diagnostics	Biochemistry level	Number of employees	Impact factor of publications	MRI machine	Isokinetic Dynamometer	Neurology	Rheumatology	
Countries involved	Annual revenue	Media mentions			Personalized Prognostics	Personalized QALY & HALE Estimation	Genomic	Number of doctors	Number of licensed patents	DaVinci robotic	Dual-Energy X-ray Absorptiometry (DXA)	Endocrinology	Sleep disorders
Number of clinics	Ratio of funding to patents filed and grants	Customers interest level			Personalized Diagnostics	Personalized Biomarker Analysis	Proteins and Cell signaling	Number of specialized doctors	Number of collaborations with scientific establishments	GAINSWave	Fit3D	Maternal-Fetal medicine	Urogynecology
Size of all facilities	Number of investors	Participation in big industry conferences			Preventive Treatment	Personalized Prognostics	Cellular	Doctors/employees ratio	H-index	HRV optimization Device	SizeStream	Infectious disease	Dentistry
Stage of business's life cycle	Amount of investments	Sponsorship activities	Data processing	Reactionary treatments	Personalized in vivo & in silico drug testing	Tissue level	Doctors qualification	Grants	MR-TRUS Fusion	Air Displacement Plethysmography system	Obesity	Otolaryngology	
Collaboration	Number of subsidiary clinics	Events attended	Omics	Cosmetics	Preventive Therapies	Organs	Doctors' h-index	Participating in scientific conferences	CyberKnife	3D whole body photo-imaging system	Allergy	Immunology	
General characteristics	Financial position	Marketing	Technologies	Services	Orientation	Focus level (Therapeutic depth factor)	Team composition	Science activity	Equipment		Targets of treatment		

SERVICES							
Reactionary treatments	Nuclear medicine	Infrared therapy	Ultrasound Therapy	Movement medicine	Abdominal medicine	General internal medicine	Robotic Surgery
	Ambulance	Family Medicine	Traveller medicine	Hormone therapy	Surgery	Hospice	Long-term care
Preventive Treatment	Microbiome engineering	Lifestyle programs	Non-surgical heart therapy	Heart Rate Variability optimization	3D bioprinting	Natural mimetics of validated geroprotectors	
	Small molecules & biologics	Tissue engineering	Genetically engineered cell therapies	Cell therapies	Gene therapies		
Personalized Diagnostics	3D imaging	Dual-energy X-ray absorptiometry scans	Total-body imaging	Non-invasive monitoring of biomarkers	Multi-Omics Sequencing		
	Qualitative functional tests	Database of personal biomedical data	Biomarker analysis	Telemedicine	Mobile Apps/AI assistants		
Cosmetics	Rejuvenated stem cell facelifts	Cosmetic medicines and surgeries	Cosmetic nutraceuticals targeted at the Hallmarks of Ageing	Personalised stem cell creams			
Personalized Prognostics	Disease outcome prognostics	Screening of hereditary diseases	Personalised in vitro prognostics	Virtual Human Prognostics			
TECHNOLOGIES							
Omics	Toxicogenomics	Pharmacomicrobiomics	Pharmacogenomics	Nutritional genomics	Foodomics		
	Transcriptomics	Glycomics	Lipidomics	Proteomics	Metabolomics		
Data processing	Bioinformatics	Cloud Computing	Deep Neural Networks / Deep Learning	Symbolic AI / Machine Learning	Big Data		



# Precision Medicine Clinics Industry Analytical Framework

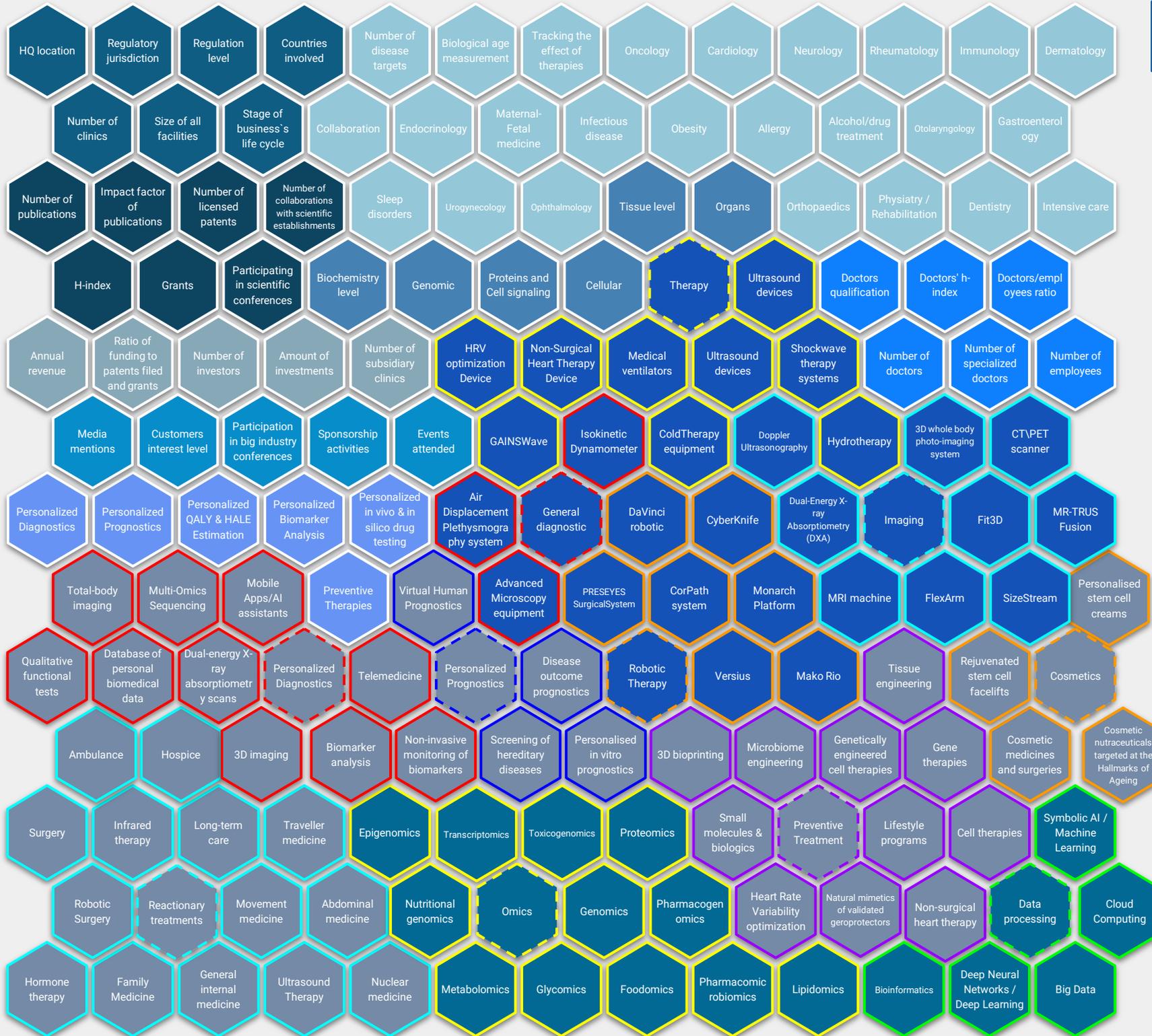
General characteristics	HQ location	Regulatory jurisdiction	Regulation level	Stage of business's life cycle	
	Number of clinics	Size of all facilities	Countries involved	Collaboration	
Science activity	Number of publications	Impact factor of publications		Number of collaborations with scientific establishments	
	Number of licensed patents	H-index	Grants	Participating in scientific conferences	
Financial position	Annual revenue	Ratio of funding to patents filed and grants	Number of investors	Amount of investments	Number of subsidiary clinics
Marketing	Media mentions	Customers interest level	Participation in big industry conferences	Sponsorship activities	Events attended
Services	Personalized Diagnostics			Personalized Prognostics	
	Mobile Apps/AI assistants	Telemedicine	Biomarker analysis	Virtual Human Prognostics	
	Multi-Omics Sequencing	Non-invasive monitoring of biomarkers	Total-body imaging	Personalised in vitro prognostics	
	Database of personal biomedical data		Qualitative functional tests	Screening of hereditary diseases	
	Dual-energy X-ray absorptiometry scans		3D imaging	Disease outcome prognostics	
	Preventive Treatment			Cosmetics	
	Gene therapies	Genetically engineered cell therapies		Personalised stem cell creams	
	Tissue engineering	Natural mimetics of validated geroprotectors		Cosmetic nutraceuticals targeted at the Hallmarks of Ageing	
	Small molecules & biologics		3D bioprinting		
	Heart Rate Variability optimization		Lifestyle programs	Cosmetic medicines and surgeries	
	Microbiome engineering	Non-surgical heart therapy		Rejuvenated stem cell facelifts	
	Reactionary treatments				
	Long-term care	Hormone therapy	Robotic Surgery	Ultrasound Therapy	Movement medicine
	Hospice	Traveller medicine	General internal medicine	Infrared therapy	Ambulance
	Surgery	Family Medicine	Abdominal medicine	Nuclear medicine	
Technologies	Omics			Data processing	
	Genomics	Lipidomics	Nutritional genomics	Big Data	Bioinformatics
	Epigenomics	Glycomics	Pharmacogenomics	Symbolic AI / Machine Learning	
	Metabolomics	Transcriptomics	Pharmacomicrobiomics	Deep Neural Networks / Deep Learning	
	Proteomics	Foodomics	Toxicogenomics	Cloud Computing	
Targets of treatment	Targeted diseases	Biological age measurement		Tracking the effect of therapies	
	Oncology	Cardiology	Neurology	Endocrinology	Maternal-Fetal medicine
	Infectious disease	Obesity	Allergy	Alcohol/drug treatment	Dermatology
	Gastroenterology	Ophthalmology	Orthopaedics	Rheumatology	Sleep disorders
	Urogynecology	Dentistry	Otolaryngology	Immunology	
Focus level (Therapeutic depth factor)	Biochemistry level	Genomic		Proteins and Cell signaling	
	Cellular	Tissue level		Organs	
Team composition	Number of employees	Number of specialized doctors		Doctors/employees ratio	
	Number of doctors	Doctors qualification		Doctors' h-index	
Equipment	CT/PET scanner	Non-Surgical Heart Therapy Device		Medical ventilators	MRI machine
	DaVinci robotic	GAINSWave		MR-TRUS Fusion	CyberKnife
	CTC	Doppler Ultrasonography	FlexArm	Dual-Energy X-ray Absorptiometry (DXA)	
	Isokinetic Dynamometer	Fit3D	SizeStream	HRV optimization Device	
	3D whole body photo-imaging system		Air Displacement Plethysmography system		
Orientation	Personalized Diagnostics	Personalized QALY & HALE Estimation		Personalized Biomarker Analysis	
	Personalized Prognostics	Personalized in vivo & in silico drug testing		Preventive Therapies	



# Precision Medicine Clinics Industry Analytical Framework

General characteristics	HQ location	Regulatory jurisdiction	Regulation level	Stage of business's life cycle	
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Services	Personalized Diagnostics			Personalized Prognostics	
	Preventive Treatment			Cosmetics	
	Reactionary treatments				
Technologies	Omics			Data processing	
Targets of treatment	Targeted diseases	Biological age measurement		Tracking the effect of therapies	
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	Infectious disease	Obesity	Allergy	Alcohol/drug treatment	Dermatology
	Gastroenterology	Ophthalmology	Orthopaedics	Rheumatology	Sleep disorders
	Urogynecology	Dentistry	Otolaryngology	Immunology	
Focus level (Therapeutic depth factor)	Biochemistry level	Genomic		Proteins and Cell signaling	
	Cellular	Tissue level		Organs	
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	DaVinci robotic	GAINSWave		MR-TRUS Fusion	CyberKnife
	CTC	Doppler Ultrasonography	FlexArm	Dual-Energy X-ray Absorptiometry (DXA)	
	Isokinetic Dynamometer	Fit3D	SizeStream	HRV optimization Device	
	3D whole body photo-imaging system		Air Displacement Plethysmography system		
Orientation	Personalized Diagnostics	Personalized QALY & HALE Estimation		Personalized Biomarker Analysis	
	Personalized Prognostics	Personalized in vivo & in silico drug testing		Preventive Therapies	

# Precision Medicine Clinics Analytical Framework



**Focus level (Therapeutic depth factor)**

**Targets of treatment**

**Team composition**

**Orientation**

**Marketing**

**Financial position**

**Science activity**

**General characteristics**

**Services**

**Personalized Diagnostics**

**Personalized Prognostics**

**Preventive Treatment**

**Reactionary treatments**

**Cosmetics**

**Technologies**

**Omics**

**Data processing**

**Equipment**

**Imaging**

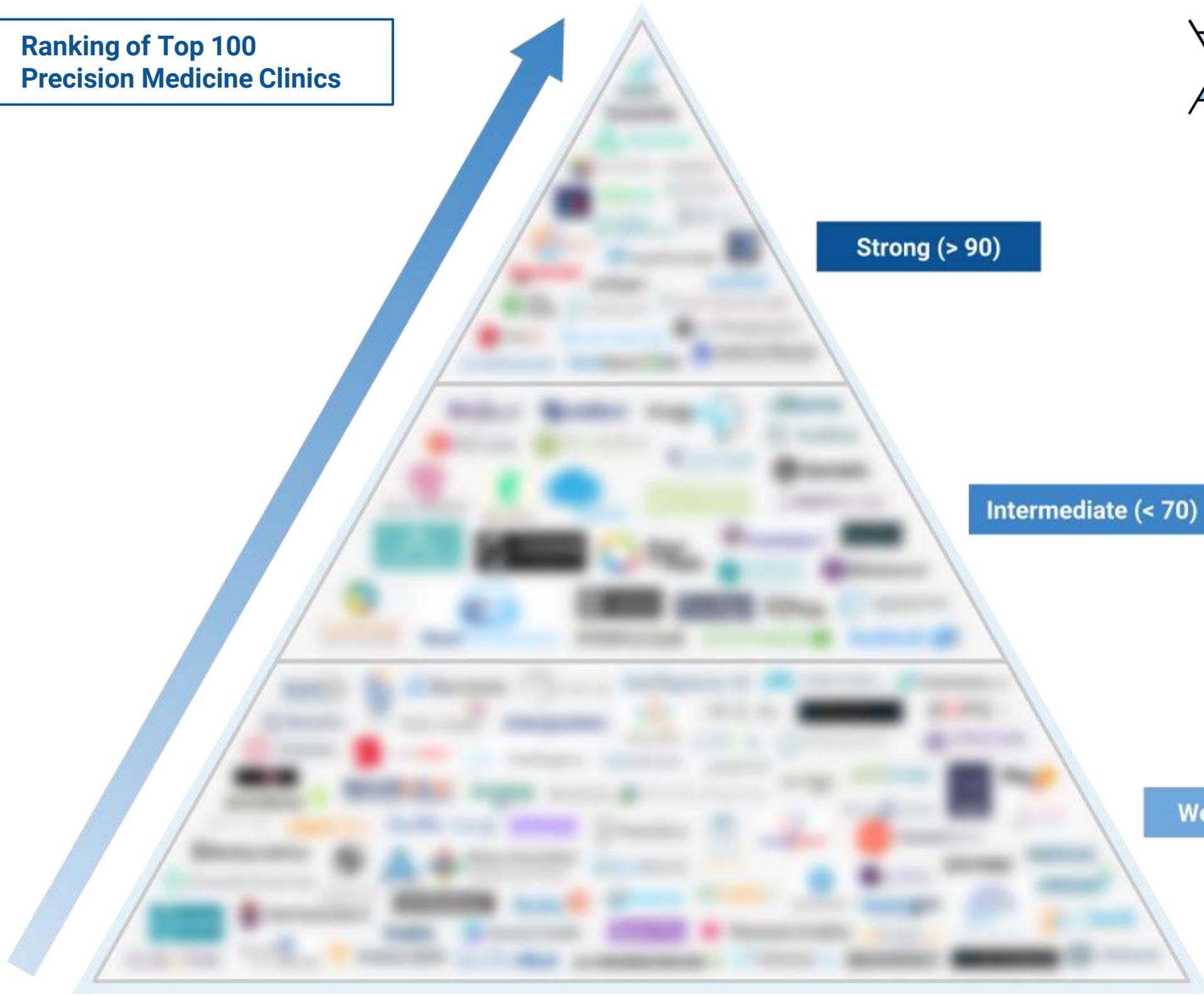
**General diagnostic**

**Therapy**

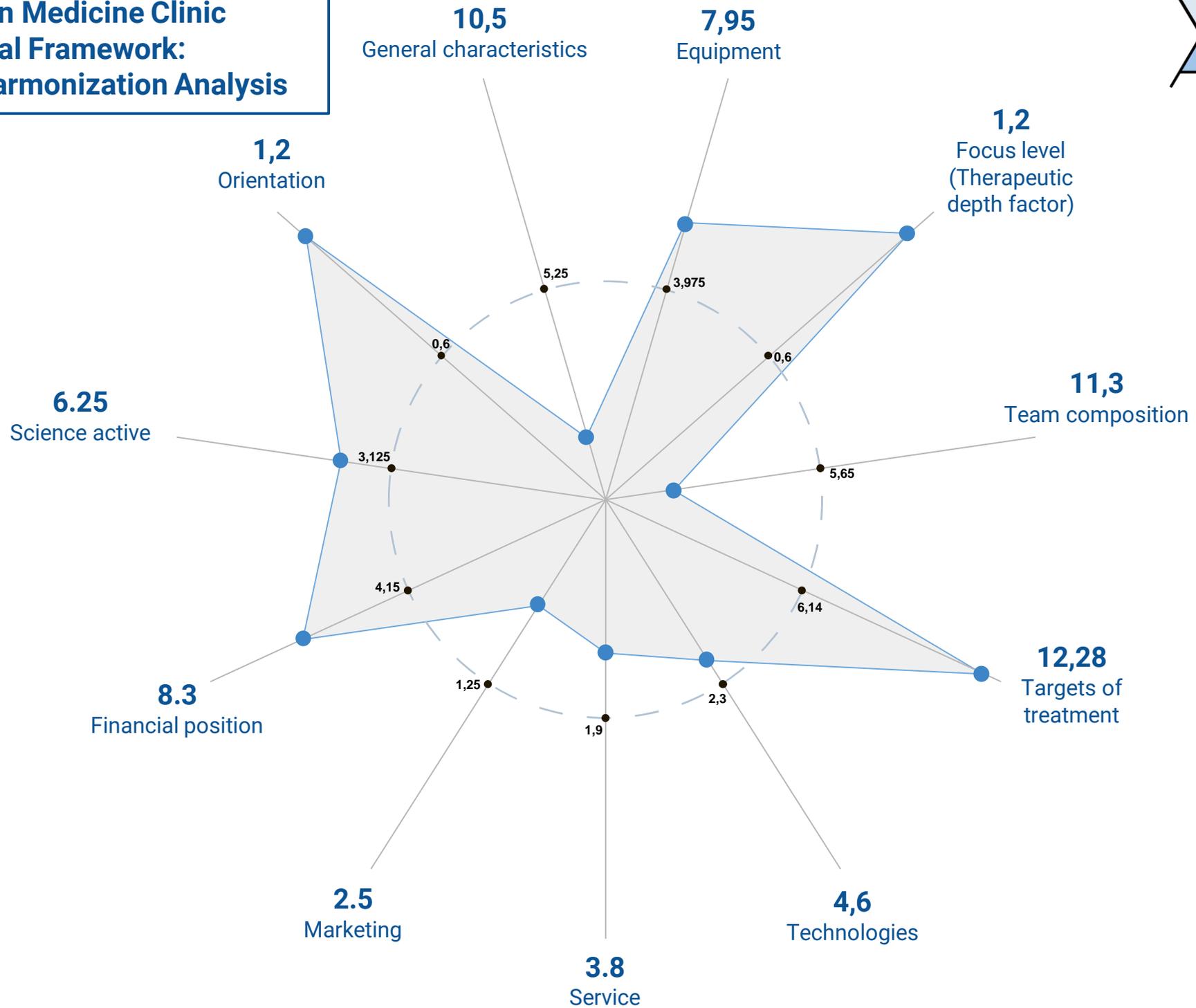
**Robotic Therapy**



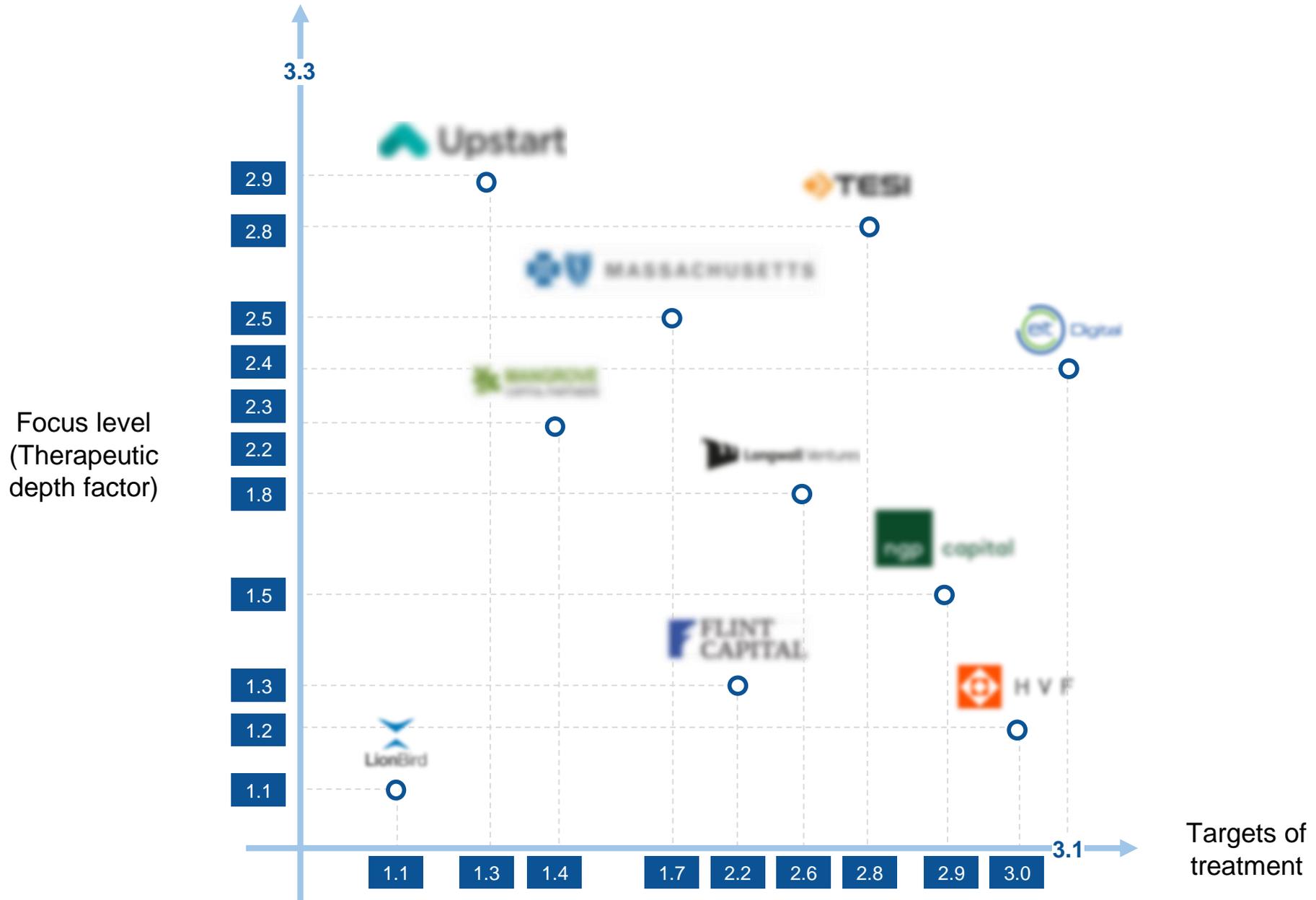
**Ranking of Top 100  
Precision Medicine Clinics**



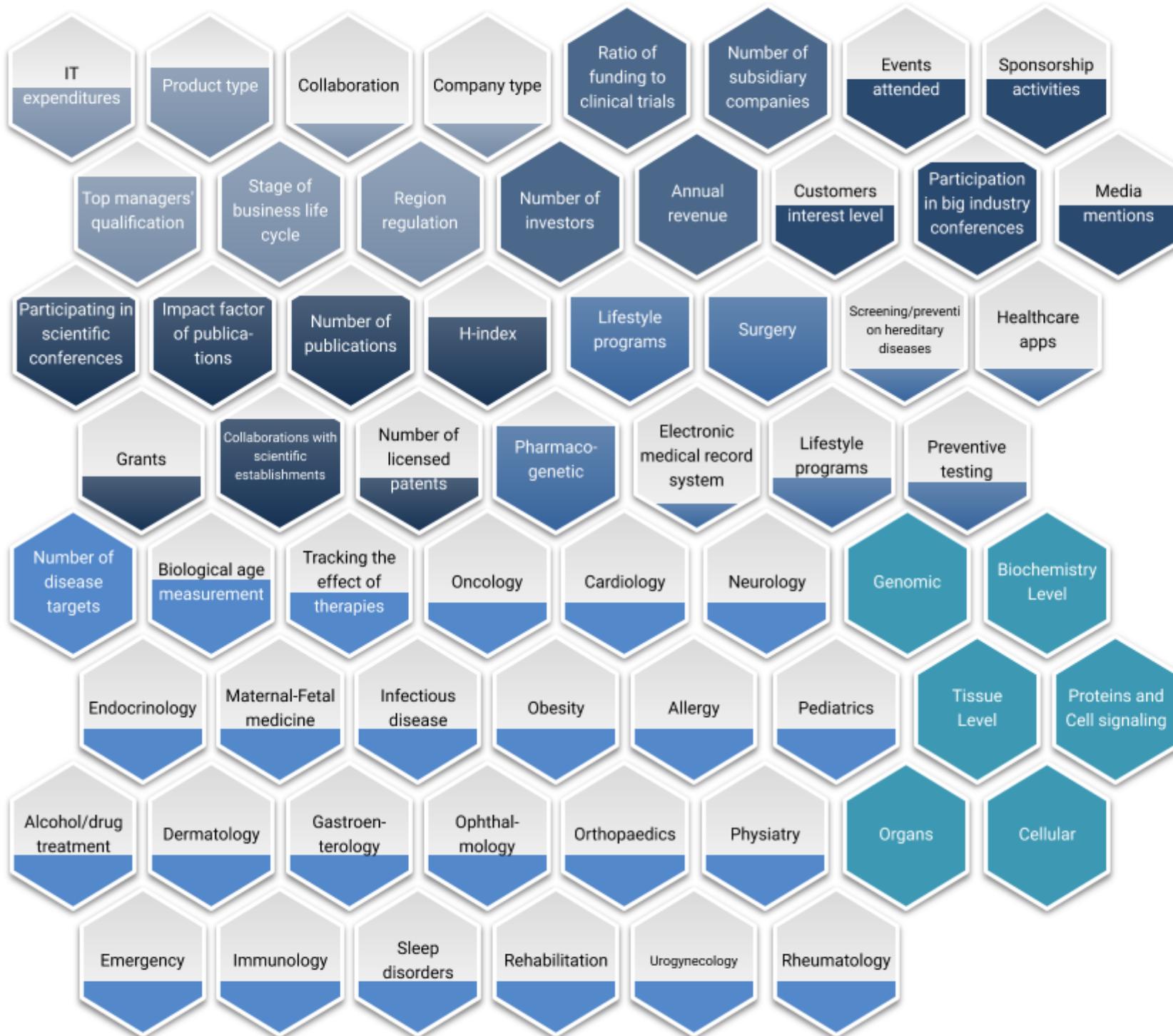
**Precision Medicine Clinic  
Analytical Framework:  
Clinic Harmonization Analysis**



# Precision Medicine Clinic Product and Service Pipeline Therapeutic Depth vs. Breadth Analysis



# Precision Medicine Clinics Industry Analytical Framework



- General characteristics ●
- Science activity ●
- Financial position ●
- Marketing ●
- Services ●
- Targets of treatment ●
- Focus level (depth factor) ●

Technology Readiness Level (TRL)

9	Commercialized
8	Pre-Production
7	Field Test
6	Prototype
5	Bench/Lab Testing
4	Detailed Design

Technology Readiness Levels (TRL) are a common measure of how close a technology is for practical use, used in many engineering disciplines.

By applying it to progressive medicine, we can forecast how long it will take a given therapeutic or technology to witness practical applications in the clinic or home. The darkness of each hexagon represents its TRL, with darker colors indicating a low TRL and brighter colors indicating a high TRL.

All technologies and therapeutics shown here have a TRL between 8-9.

## Overview of the Progressive Model of P3 Medicine Platform

Personalisation and precision of diagnostics, prognostics and treatment for individual patients



Healthy lifespan extension and ageing processes reversal to a young state

01

Access to advanced preventive restorative medicine technologies

- Safe testing of novel therapies on individual's stem cells, skin and other organs

02

Personalized longevity programs

- Personalised diagnostics, prognostics and therapeutics
- Virtual human body for health monitoring

03

Health management by world leading experts

- Continuous health monitoring by the world leading experts



Digital avatar visualizes a combination of biomarkers and other diagnostic results

### Collect your data today:

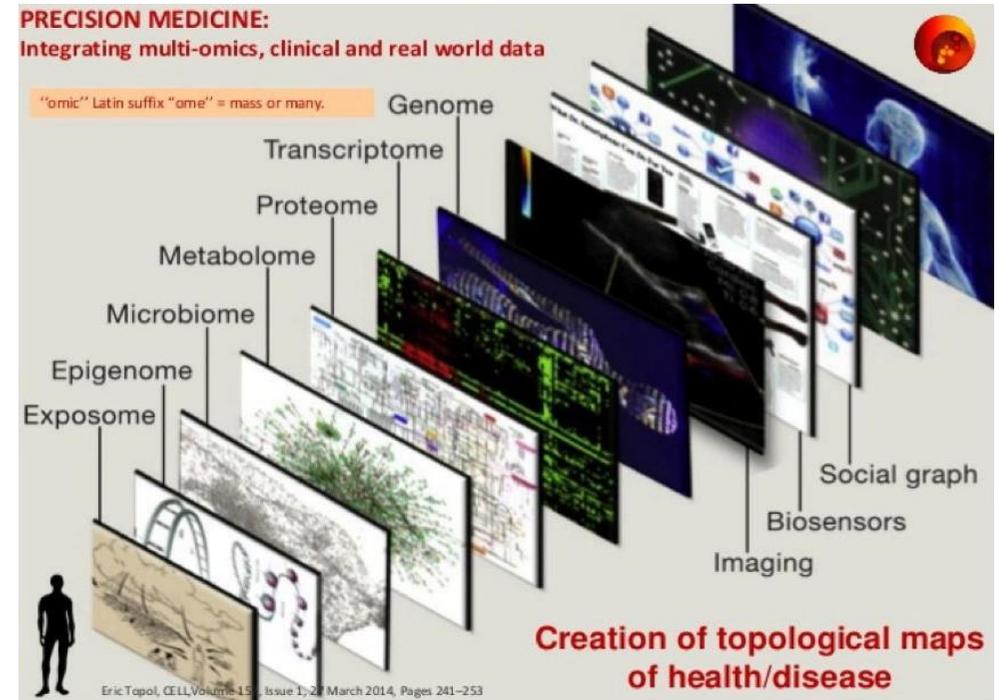
- Blood samples
- Biomarker analysis
- Database of personal biomedical data stored on blockchain

### Future benefits:

- Data driven analysis of biomarkers dynamics over time
- Analyse the changes in your digital avatar
- Personalized interventions

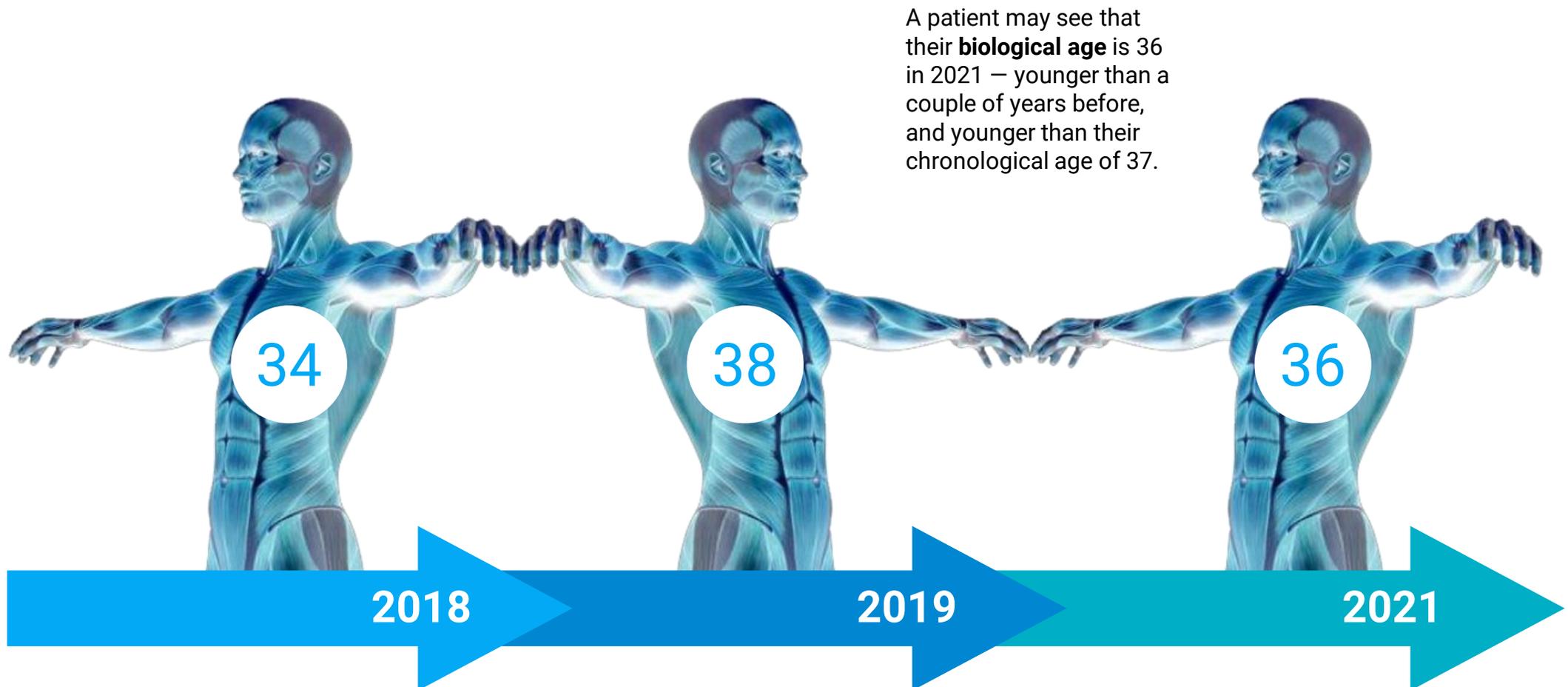


- Multi-Omics Sequencing
- Non-invasive continuous monitoring of biomarkers
- Multi-modal total-body imaging
- Qualitative functional tests
- Whole-body and organ specific biological age calculation based on biomarkers
- 3D integration of cross-sectional tissue and organ imaging

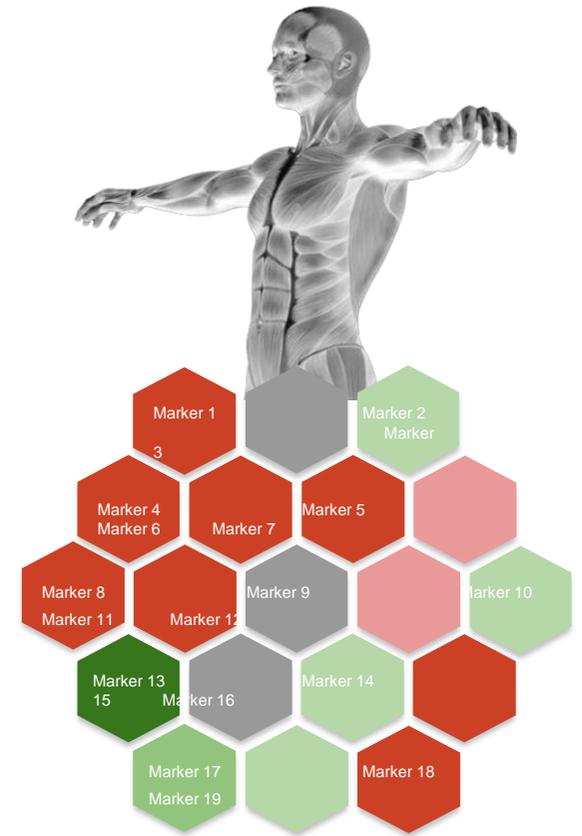
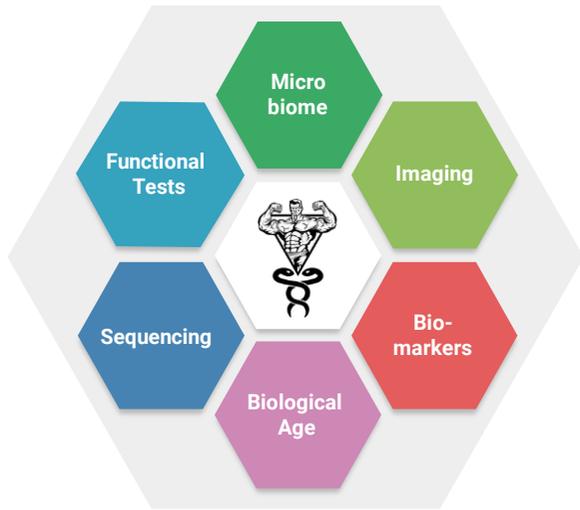


**Young.AI** is one such digital avatar, powered by AI to take biological data and assess patient health and age. The power of taking patient information and plugging into an AI-driven, digital environment is that not only does it enable insights impossible to obtain otherwise, but it allows for a powerful analysis of all these layers of data **over time**.

A truly 3D visualisation of patient health includes time, and follows not only deteriorations but also improvements over custom timeframes that allow interpretation based on personal circumstances including changing lifestyle, trialling treatments, etc. As such, a patient may be able to see how their body has been changing over 5 years in terms of health, function, biological age, etc.



# Diagnostics Panel for Digital Avatar

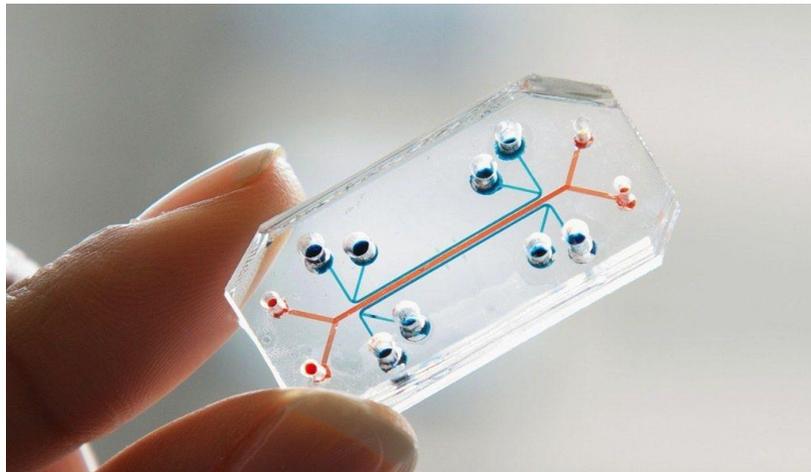


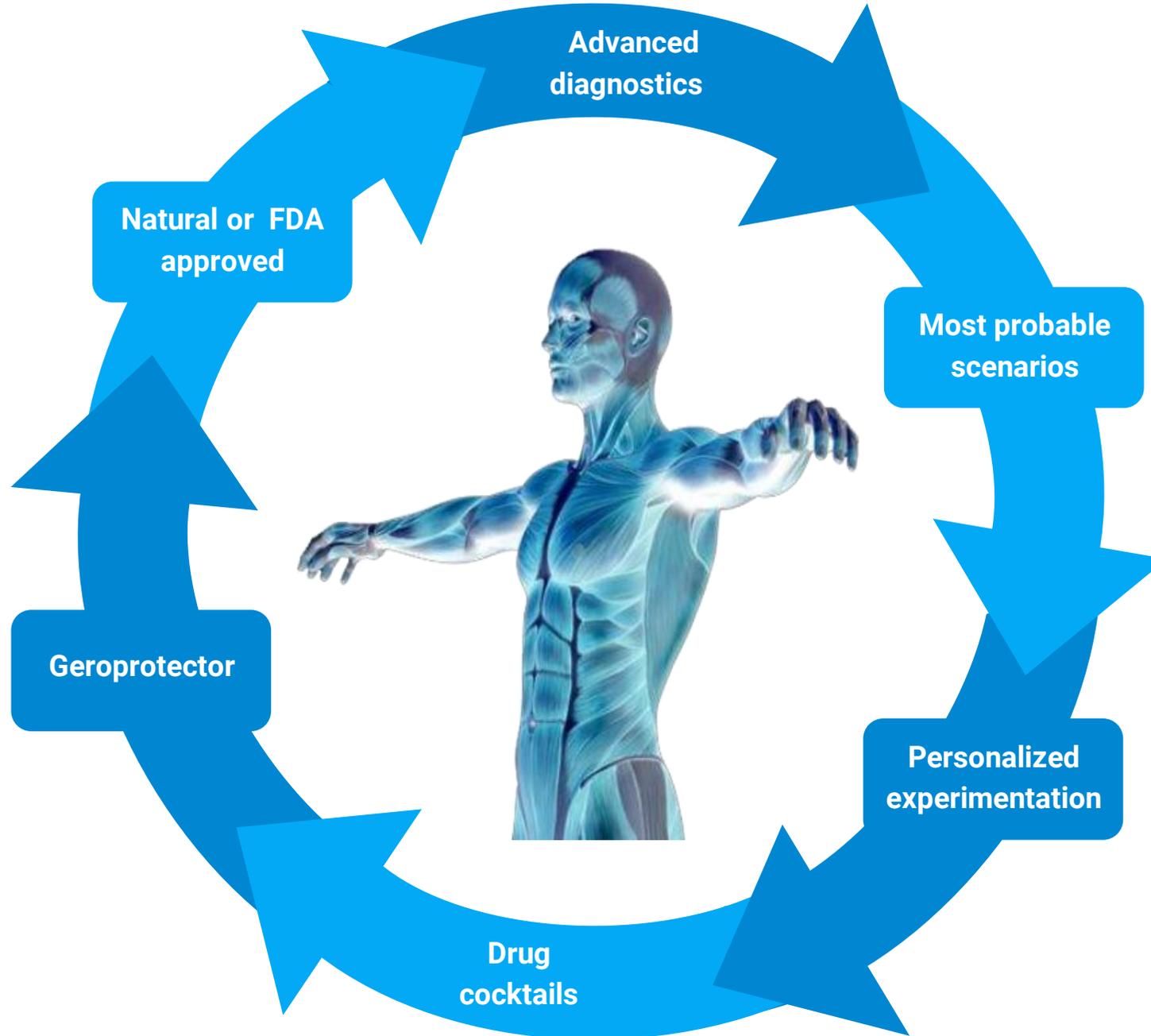
Biomarker panel

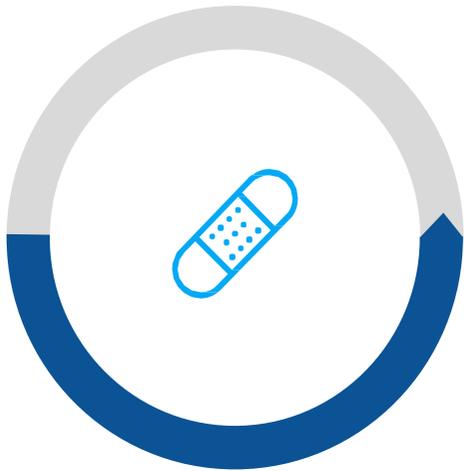




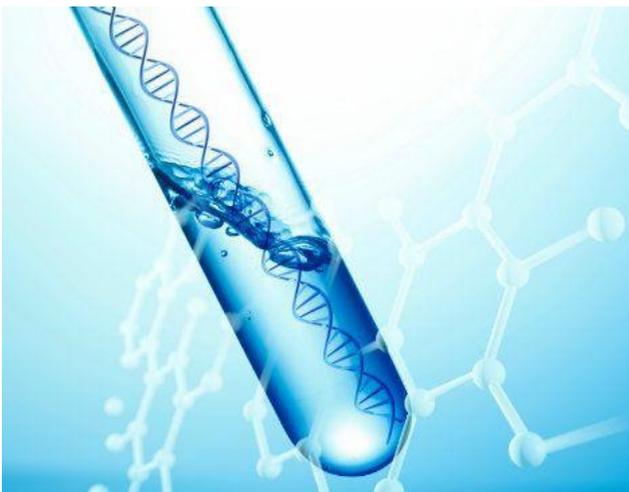
- Intelligent *in silico* experimentation
- Personalised *in vivo* experimentation on human cells
- Organ-on-a-chip systems
- Real time tracking of changes in health and aging biomarkers in response ongoing treatments
- Personalised *ex vivo* experimentation on 3D bioprinted tissues and organs using patient-specific cells
- AI based personalized biomarker development and drug response profiling via Deep Learning and Generative Adversarial Networks







- Gene therapies
- Cell therapies
- Tissue engineering
- Small molecules & biologics
- Natural mimetics of validated geroprotectors (e.g. metformin, rapamycin)
- Genetically engineered cell therapies
- 3D bioprinting
- Microbiome engineering





# Preventive Treatment



- Gene therapies
- Cell therapies
- Tissue engineering
- Small molecules & biologics
- Natural mimetics of validated geroprotectors (e.g. metformin, rapamycin)
- Genetically engineered cell therapies
- 3D bioprinting
- Microbiome engineering



# Chronological versus Biological Age



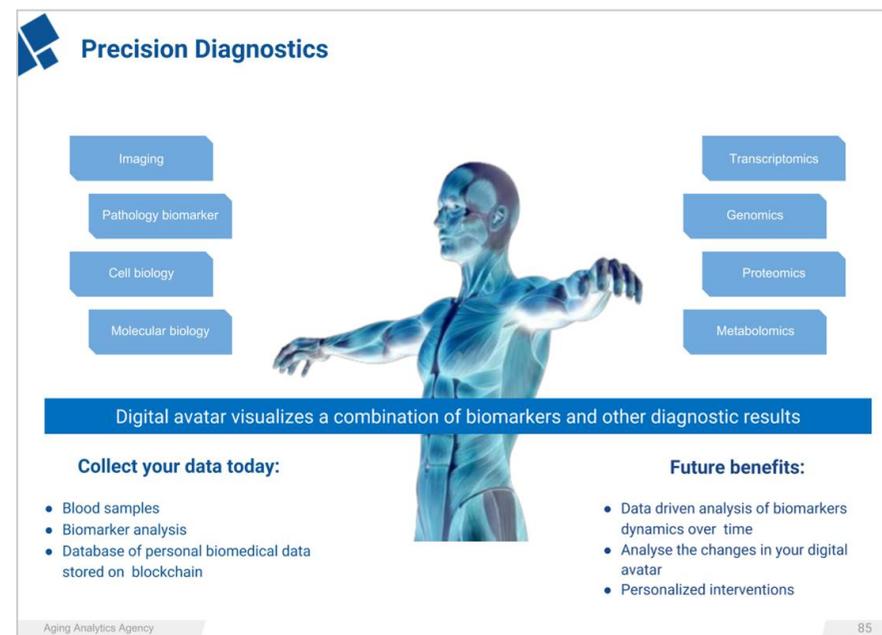
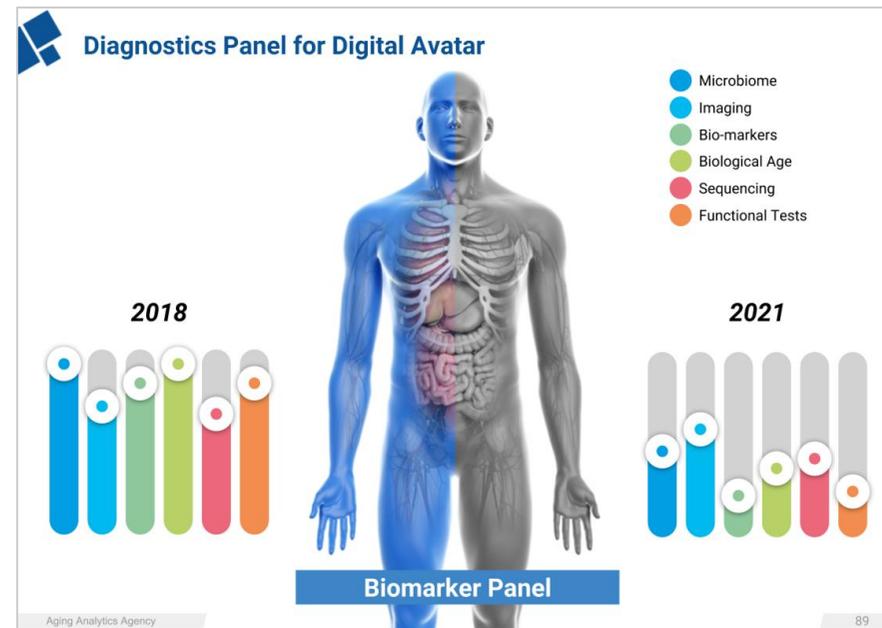
## Chronological Age

- Measure how many times you, in this body, have revolved around the sun
- Cannot be altered by mind/body approaches
- Has little relevance to how you feel and function

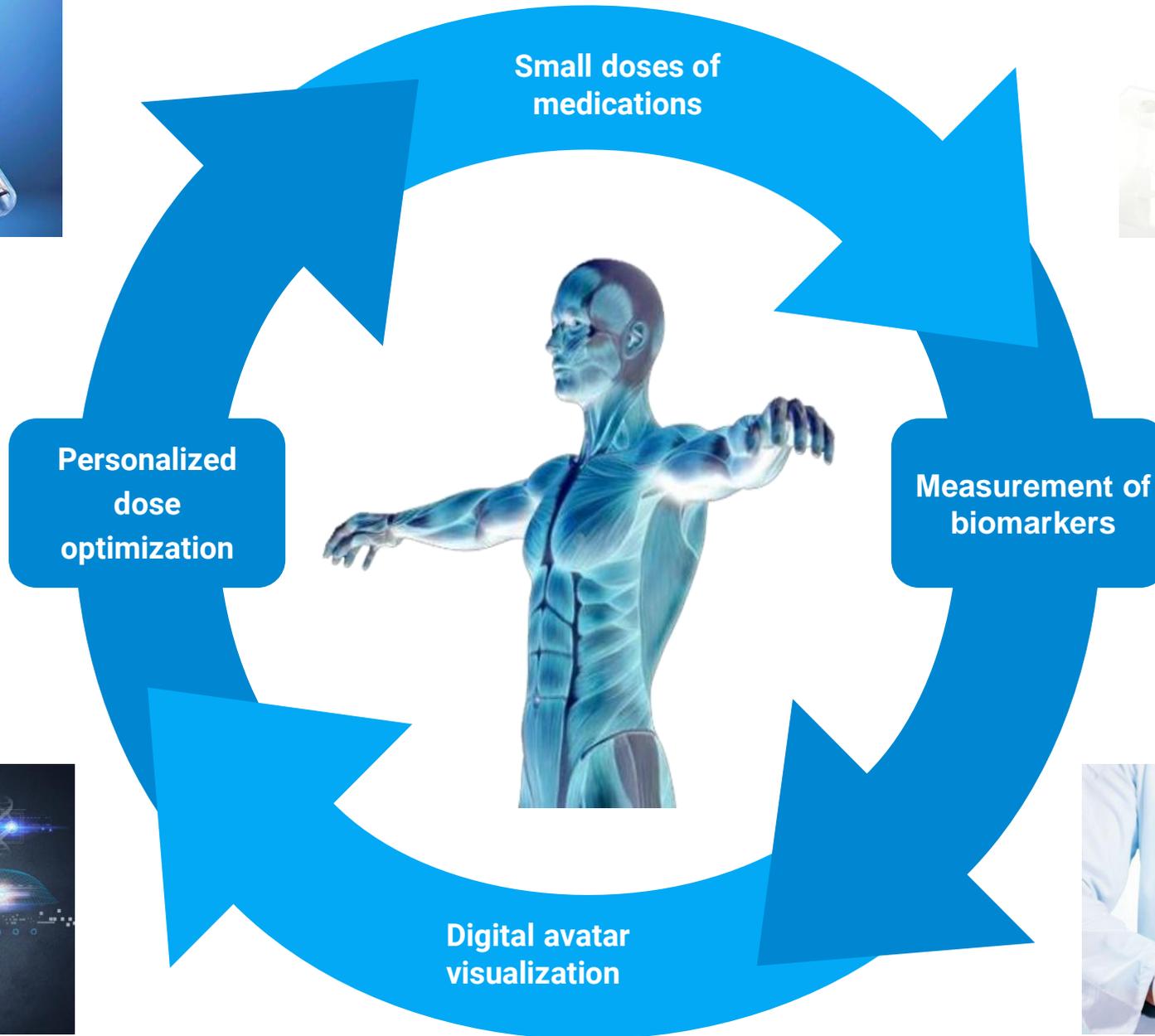


## Biological Age

- Measures how well your physiological systems are functioning
- Can be reversed by attending to your health
- Is the most important component of the aging process



New intervention



# Report Value Proposition

1. **What leading personalised and preventive therapies, diagnostics, prognostics, technologies and techniques can clinics add to their existing pipeline to maximize their competitive advantage?**
2. **What is the optimal assembly of advanced precision health technologies and services, and how can it be integrated into clinics' existing scope of products and services in the most ideal manner?**
3. **What techniques and technologies will become market-ready in the 3-5 year horizon? What technologies should be watched closely for integration into clinics' existing pipelines within the next several years?**

*We feel that our efforts over the course of the past five years have established a solid foundation of knowledge and expertise upon which we intend to begin our biggest project to date: the production of a new report entitled **Precision Medicine Landscape Overview 2019: Most Advanced Clinics, Technologies and Methods**.*

This will be a 1,000 page report aiming to answer these three specific questions, to be produced over the next 3-6 months, with a new edition of this report during each financial quarter, incrementally increasing its breadth and depth as we go along, and with each edition providing a deeper, more comprehensive and more precise understanding of the landscape. It will deliver:

- Concrete deep analysis of which technologies and therapies are available today,
- Tangible estimations of what we can expect in 3-5 years horizon, which new technologies and treatments will be market-ready by 2020-2022,
- Practical guide to the optimized pathway for assembling the best possible combination of technologies and treatments today and tomorrow.

**The parties who will have early access to this report will gain deep expertise on how they can optimize their clinics' strategic, technological and scientific prospects in order to deliver the most sophisticated and comprehensive precision health products and services for their clients.**



# **National Longevity Development Plans: Global Overview 2019 (First Edition)**

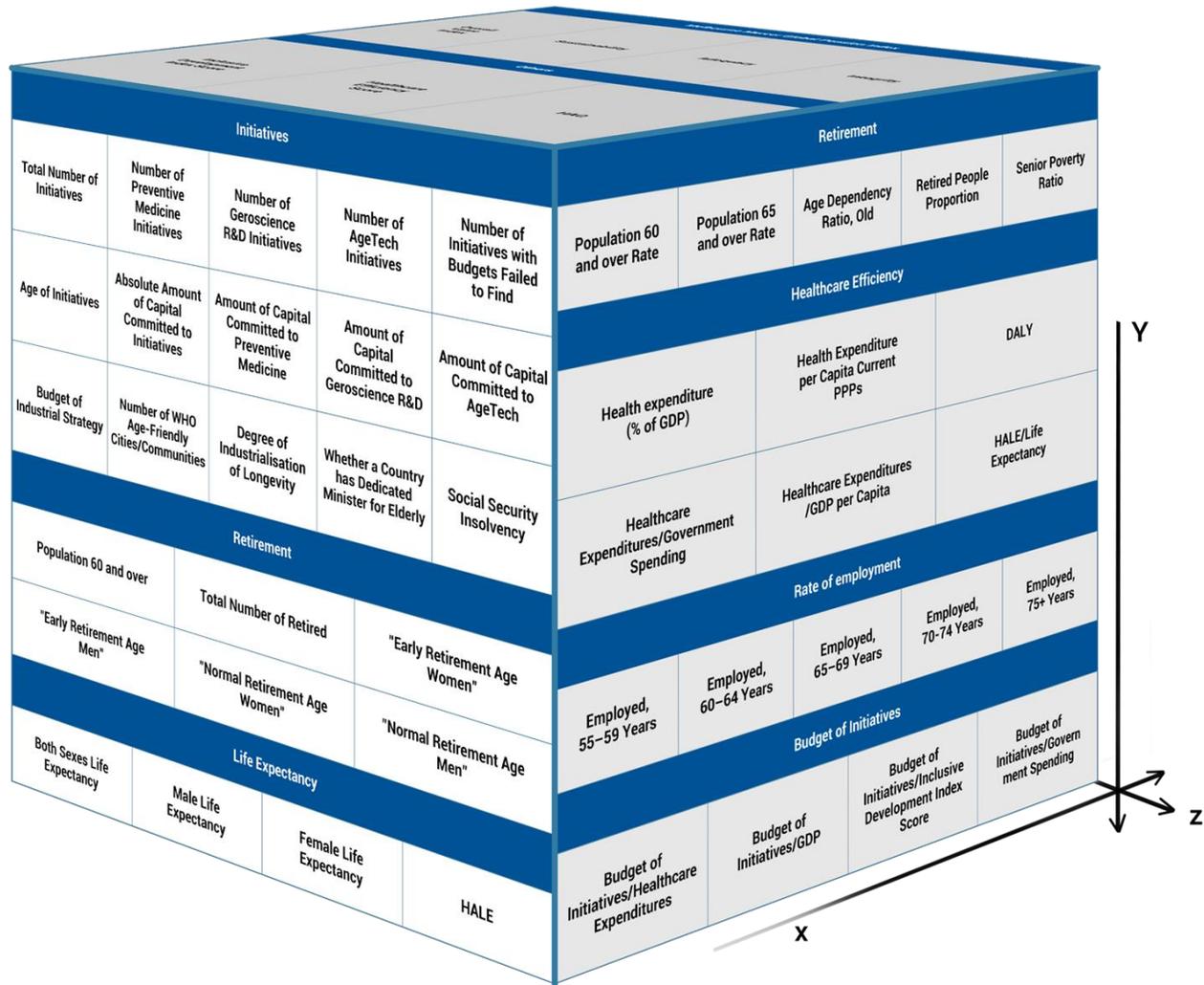


# Ranking Countries on the Strength, Scope and Relevance of their Government Longevity-Related Projects and Initiatives

POSITION	COUNTRY	COUNTRY SCORE
1	United Kingdom	5.29
2	Netherlands	4.36
3	Singapore	4.15
4	South Korea	4.00
5	Israel	3.94
6	Switzerland	3.93
7	Hong Kong	3.41
8	Japan	3.10
9	USA	3.07
10	Spain	1.94
11	European Union	1.88
12	China	1.85



# Government Longevity-Related Projects and Initiatives Analytical Framework



Overall, there are 6 levels of proprietary metrics which differ based on the nature of the parameters they consist of. Indicators, their growth rates and their ratios are calculated separately and then integrated in the final metrics system.

The whole metrics can also be subdivided into 2 categories based on the logic of the parameters, namely:

- Indicators of potential (or lack thereof);
- Indicators of actual success (or lack thereof).

Thus, the ranking system reflects both strengths and opportunities of different countries regarding the development of national longevity strategies. It can be applied for the evaluation of the current state of a country, as well as of its prospects.

Some metrics indicators are directly interconnected, since the ratios are derived from single values which are parameters themselves.



# Government Longevity Related Projects and Initiatives Analytical 3-Dimensional Framework



Absolute values are enhanced by relative ones, and the use of both in combination enables a clearer understanding of interconnections between the parameters and provides the opportunity to investigate the relative roles of different factors in the overall country ranking process.

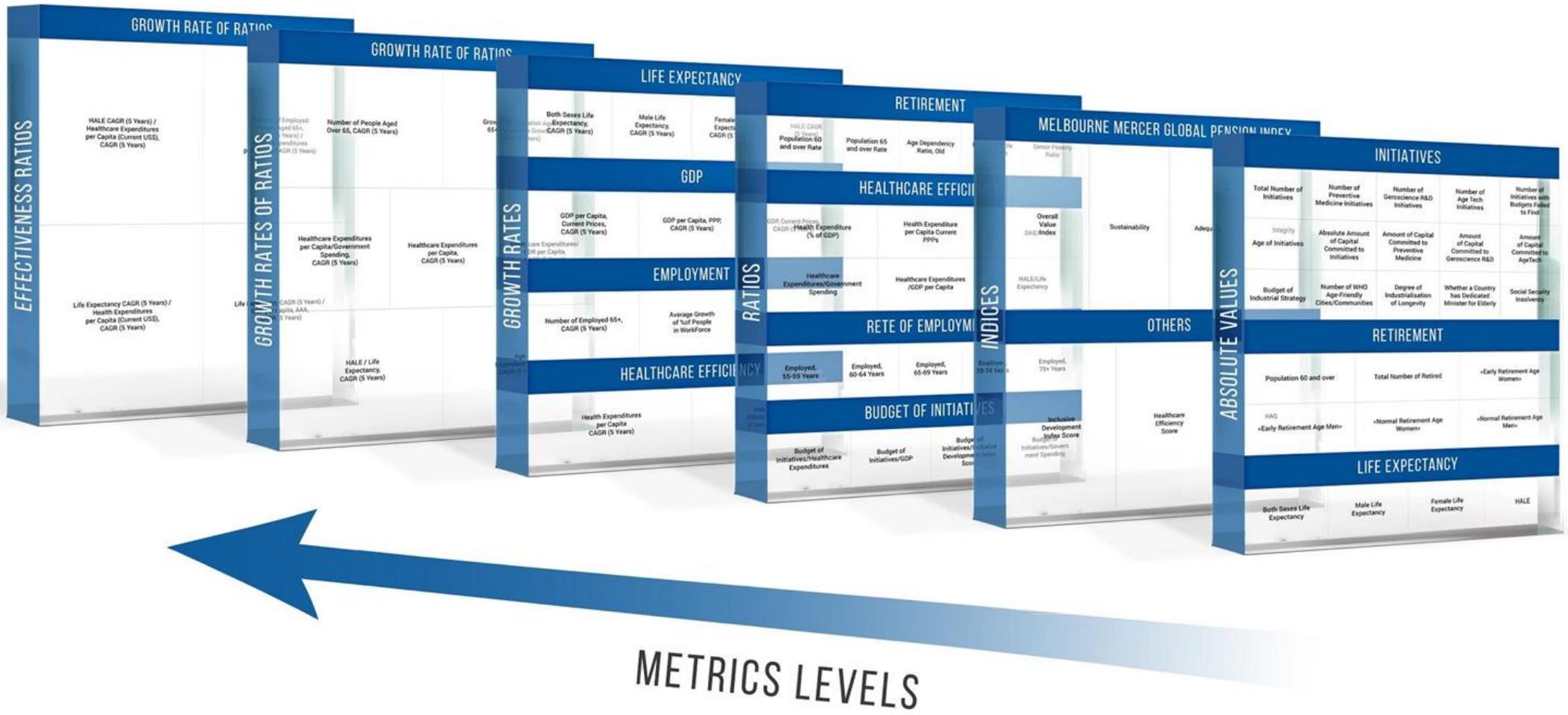
Each level of metrics is based upon the extension, further subdivision or comparative combination of the previous of the metrics in the preceding level, or is derived from insights provided by them.

The research is based on open source data and information given by WHO, OECD, The World Bank, and different institutions of each specific country.

All budget data is compared in US\$ translated by the change rate of the starting year of the initiative without inflation taken into account.



# Government Longevity Related Projects and Initiatives Analytical Framework







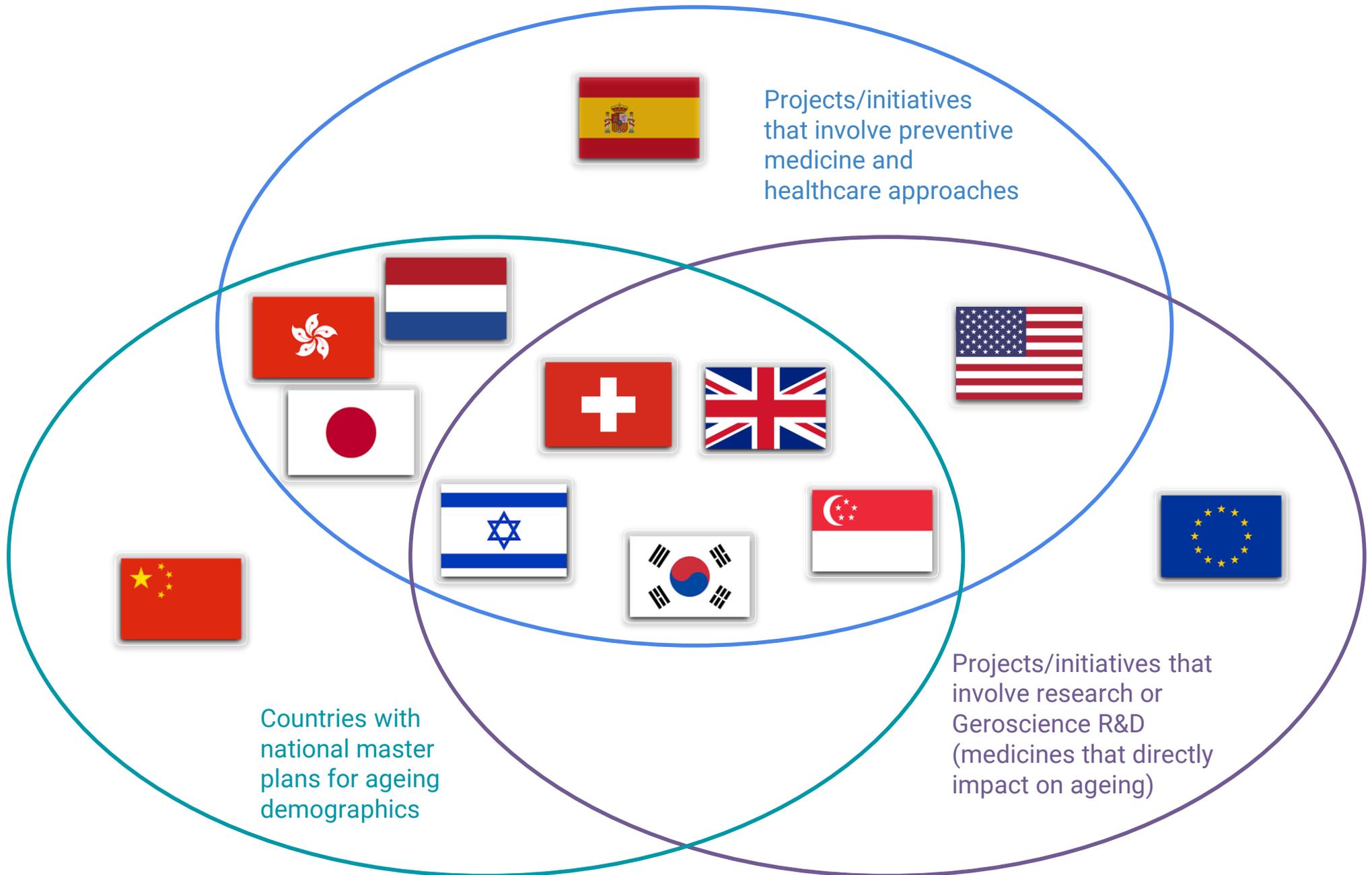
# Scale and Scope of Government Longevity Development Plans

Some government programs are more integrated than others, some showing more leadership than others in the industrialization of longevity. In this respect, the examples in this document fall into 3 main categories: **independent or municipal programs**, one plan per project (ad hoc) or per city, **national or metropolitan master plans** which bring together multiple sectors of government, and **industrial strategies** which include the use of research and development in pursuit of future economic dividends of Longevity. The next step is the **Longevity Industry Strategy**.





# Longevity Initiatives Classification Framework





# Life Expectancy and GDP per Capita

GDP per capita (USD), 2018

Life expectancy, 2019



Sources:

[World Economic Outlook](#)

[Geoba.se - Life Expectancy](#)



# Health Expenditure and Health Care Efficiency Score

Health expenditure (% of GDP), 2017

Health Care Efficiency (Bloomberg), 2018



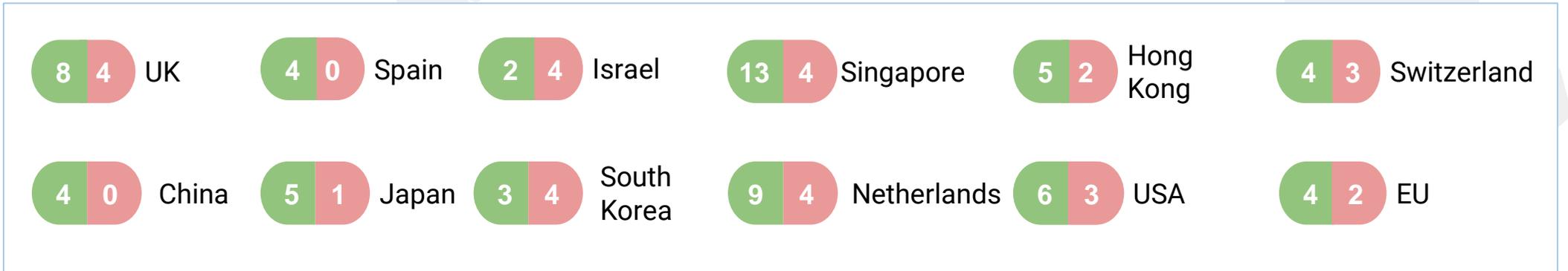
Sources: [OECD.Stat - Health Status](#)

[Bloomberg Health Care Efficiency](#)

# Number of Government Led Longevity Initiatives

 Number of initiatives focused on non-medical approaches that improve the quality of life

 Number of initiatives focused on preventive healthcare, geroscience and AgeTech



# Industrial Strategies, National Master Plans, Independent or Municipal Government Programs

	 BIRAX Ageing
	 Society 5.0
	 SEOL METROPOLITAN GOVERNMENT Seoul Metropolitan Government, South Korea ministry of Health and Welfare
	 China Health and Retirement Longitudinal Study led by Peking University
	 National Population and Talent Division, Modern ageing Incubator, Silver Infocomm Junctions
<b>National Master Plans</b>	
	 UK Research and Innovation, UK Industrial Strategy, Industria; Strategy Challenge Fund
<b>Industrial strategy</b>	

	 Older Americans Act, The Building Our Largest Dementia, Affordable Care Act.
	 Swiss Personalized Health Network
	 Department of Health, Labour Department, The Hong Kong Council of Social Service
	 Durango, Age-Friendly City
	 Groningen Active Ageing Strategy, HANNN, Deltaplan for Dementia.
<b>Independent or Municipal Government Programs</b>	

# Ratio of Population over 65 vs. the Age of Relevant Initiatives

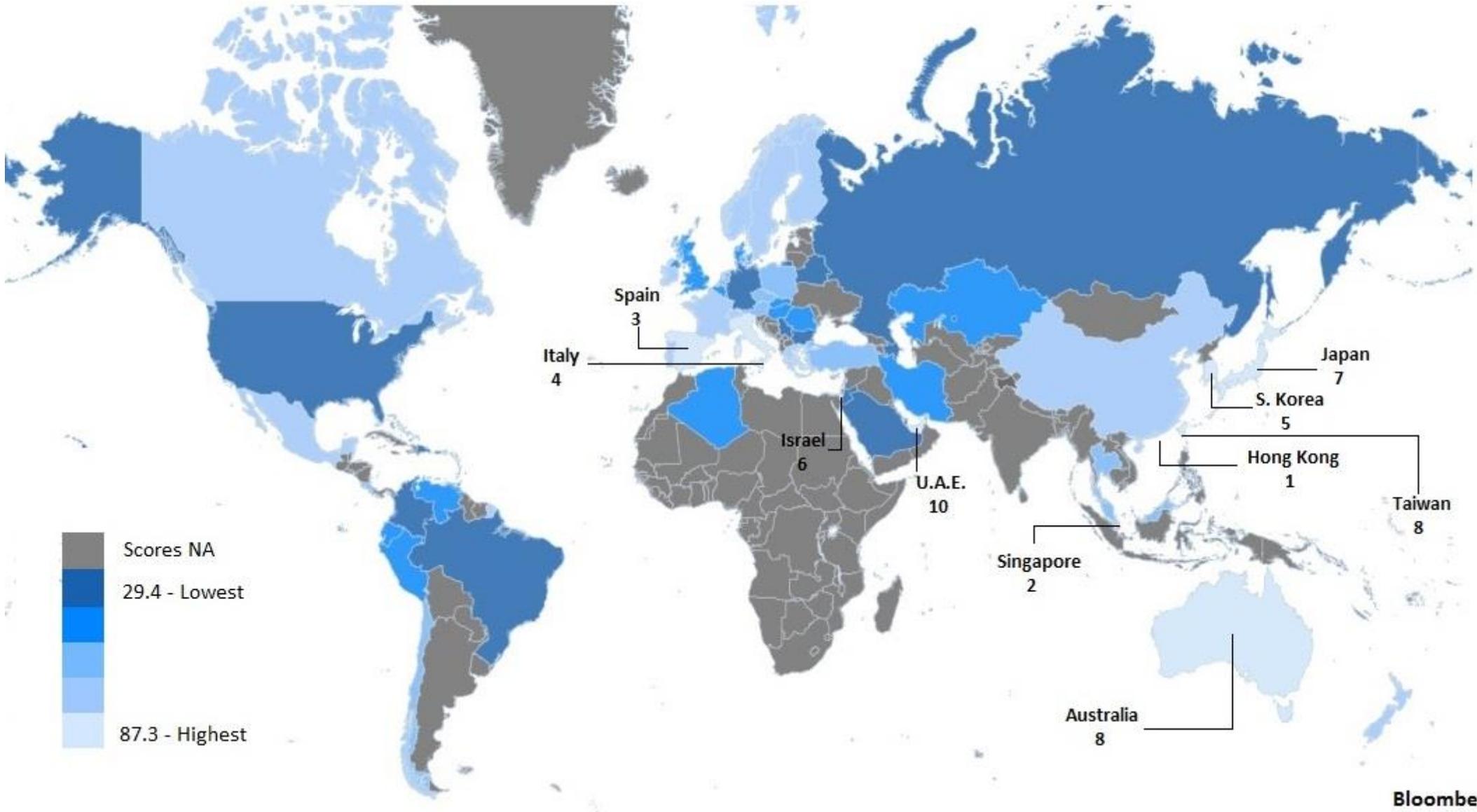
Population over 65, %, 2018

Age of Relevant Initiatives



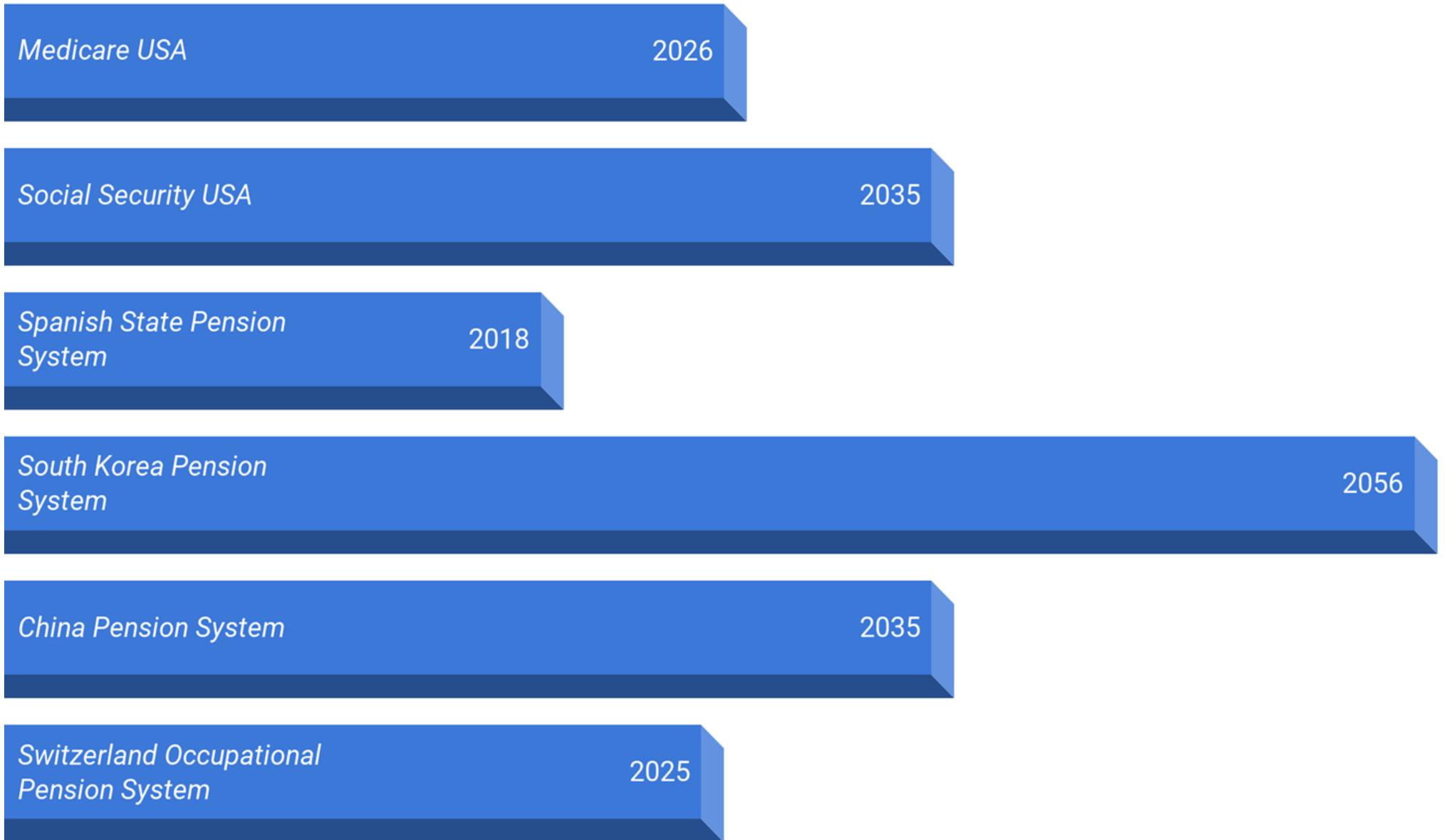


## Health Care Efficiency Scores in 56 Economies





# Insolvency Predictions for Government-Funded Schemes



Sources:

[Bloomberg](#)

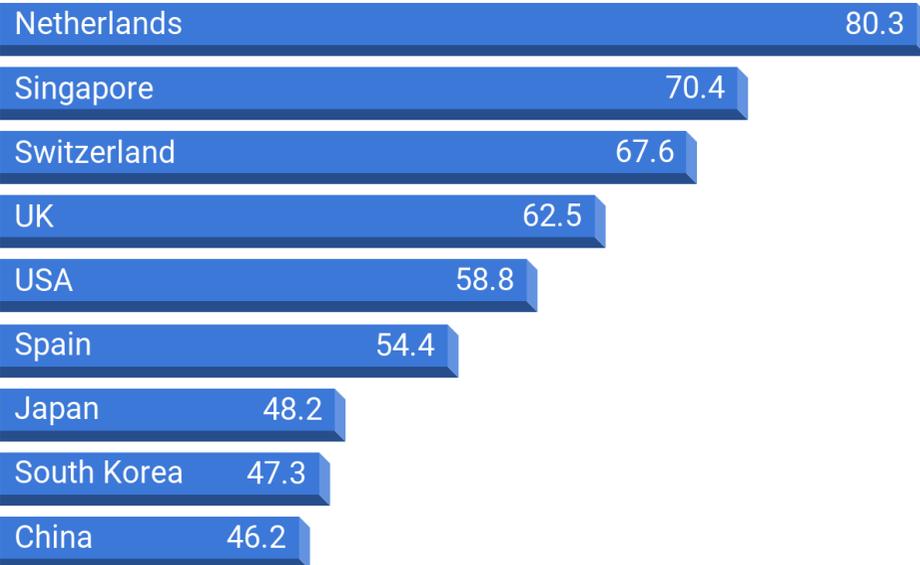
[MishTalk](#)

[Thediplomat](#)

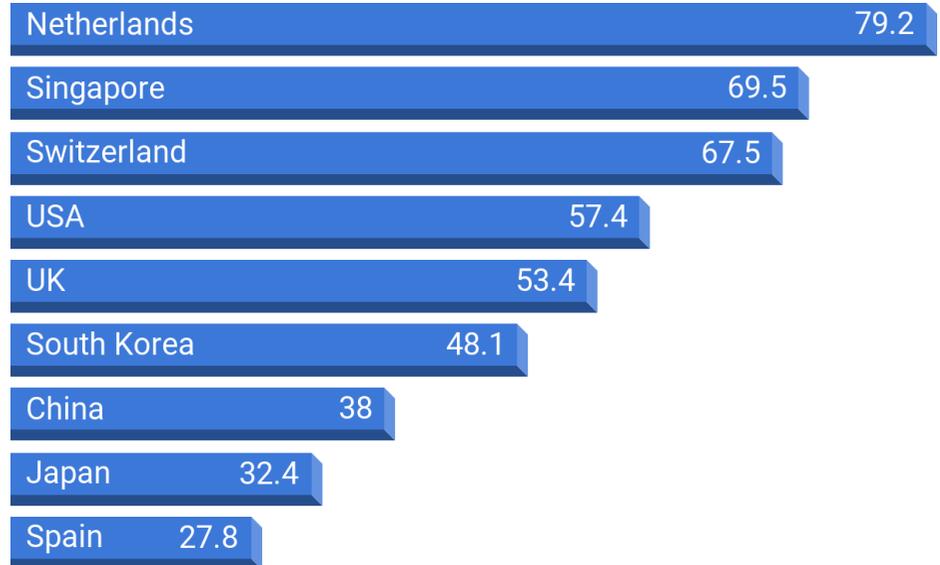
[Reuters](#)

[Financial Times](#)

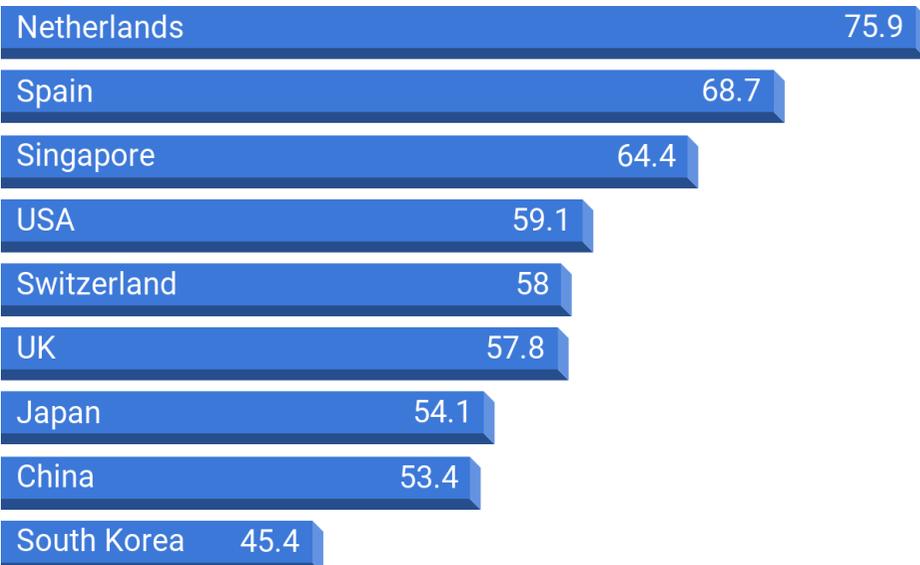
## Overall Value Index



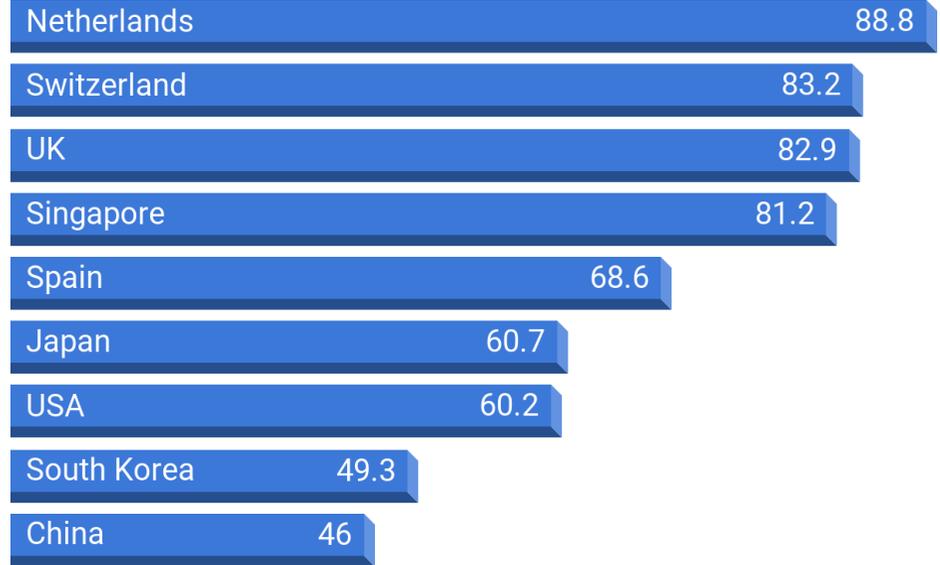
## Sustainability



## Adequacy



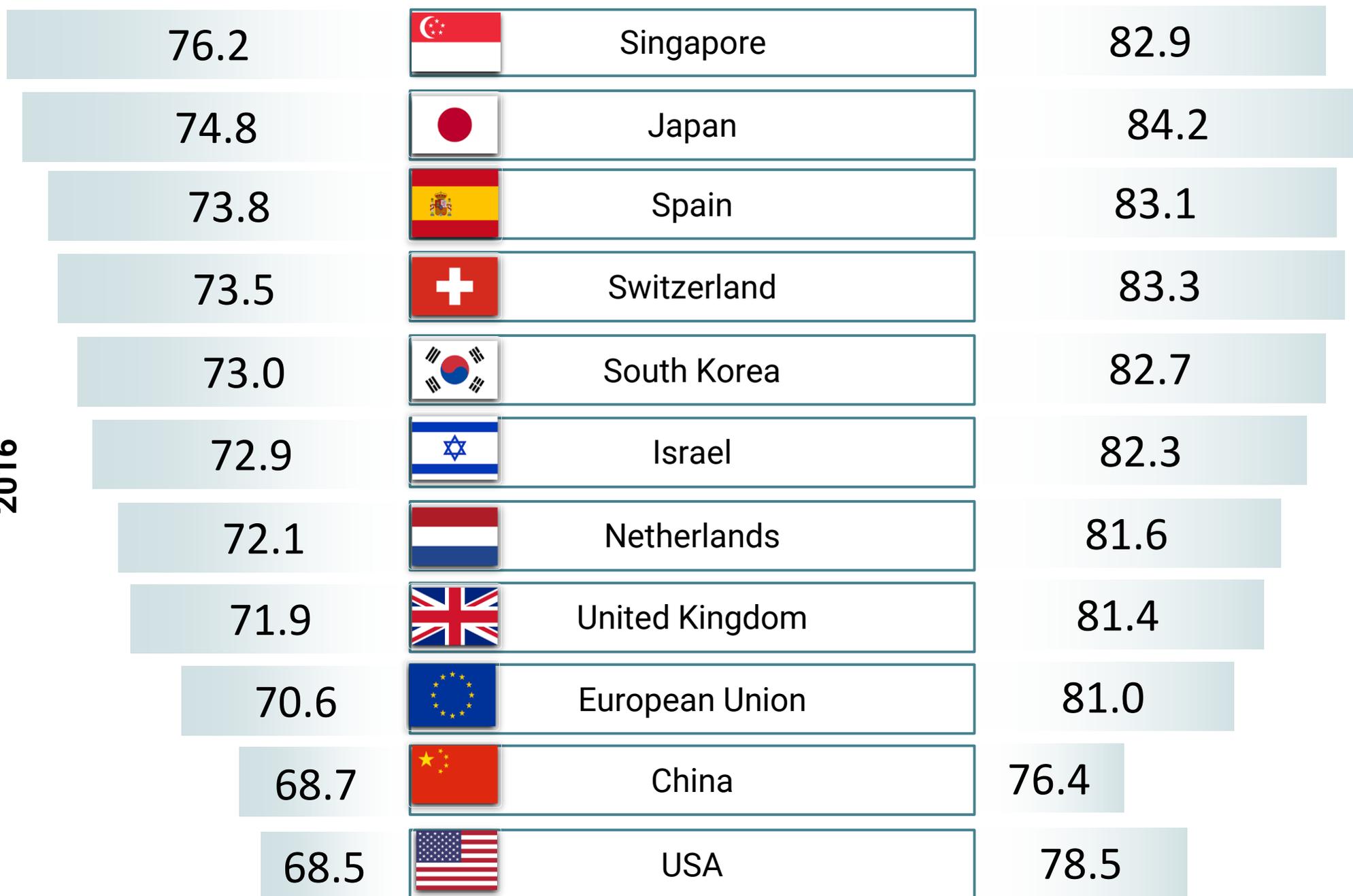
## Integrity



# Health-Adjusted Life Expectancy vs. Life Expectancy

Health-Adjusted Life Expectancy,  
2016

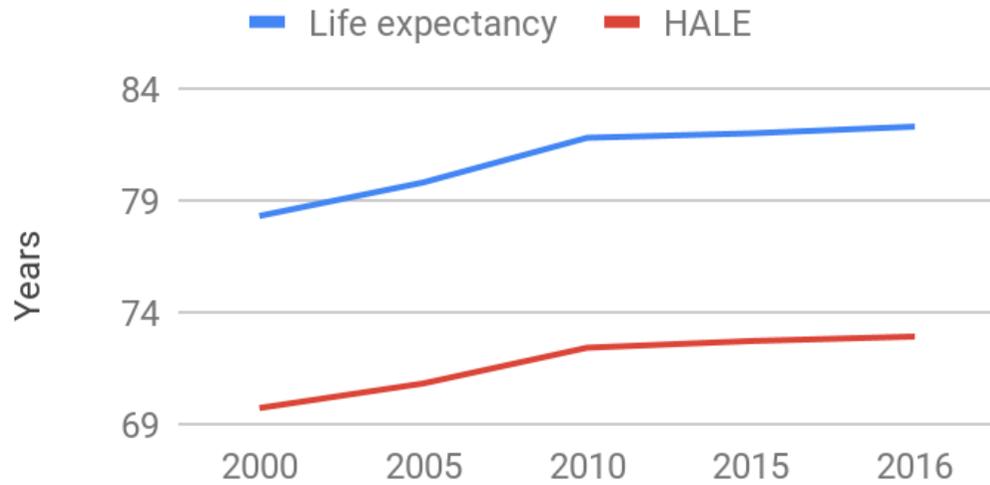
Life Expectancy, 2016



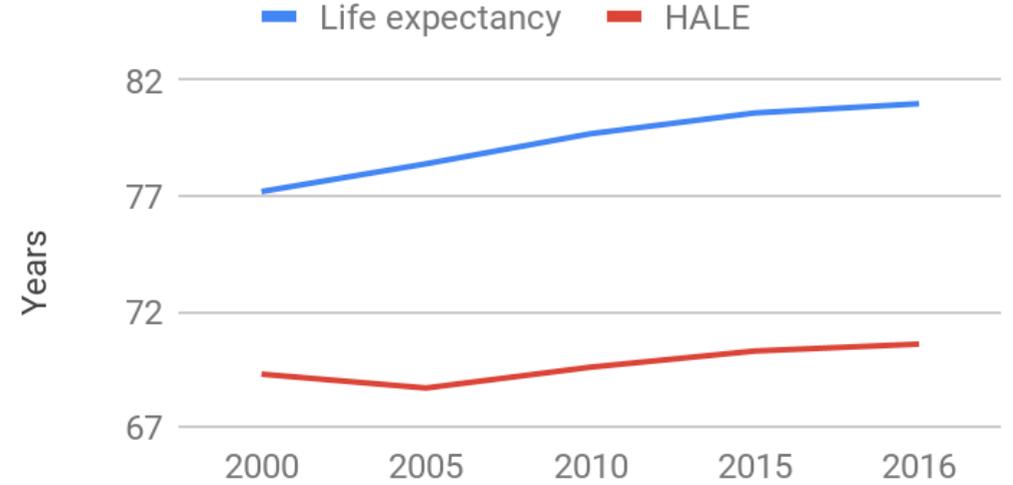


# Health-Adjusted Life Expectancy vs. Life Expectancy Israel, EU, USA and China (2000-2016)

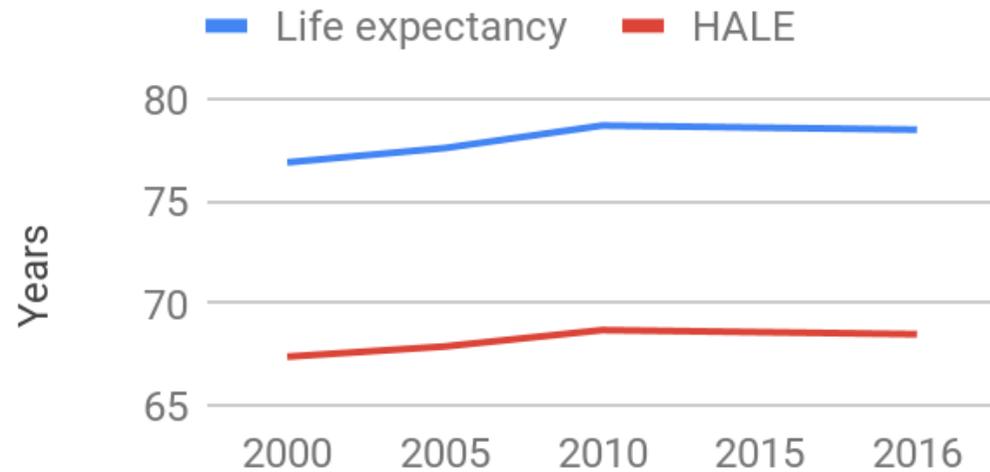
## Israel



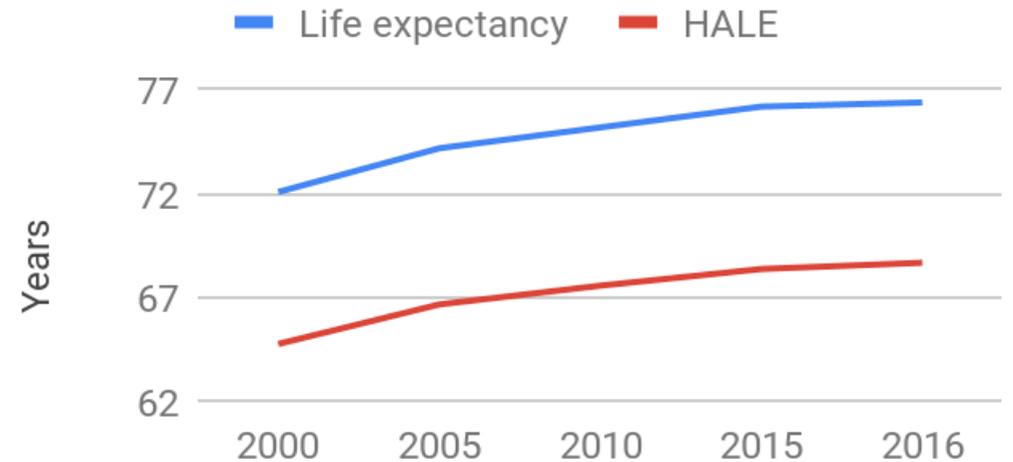
## EU



## USA



## China



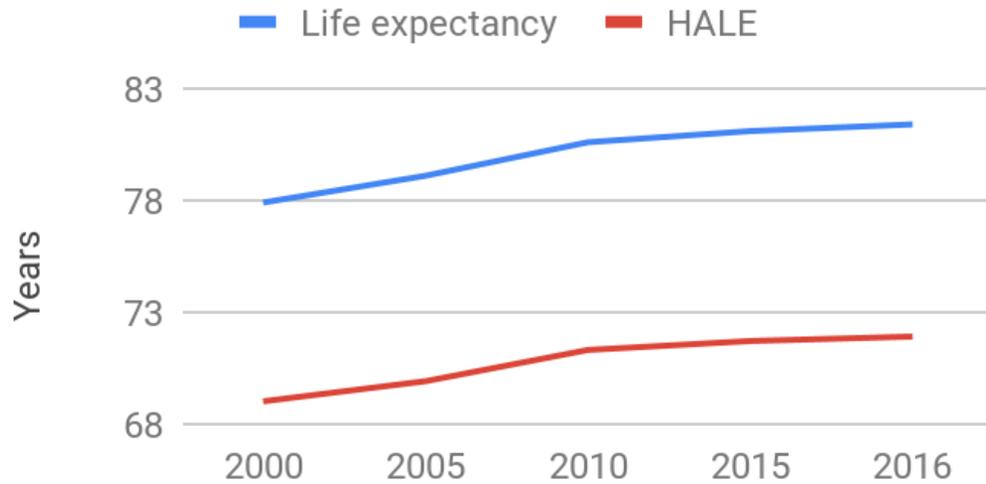
Sources:

[GHO Life expectancy and HALE](#)

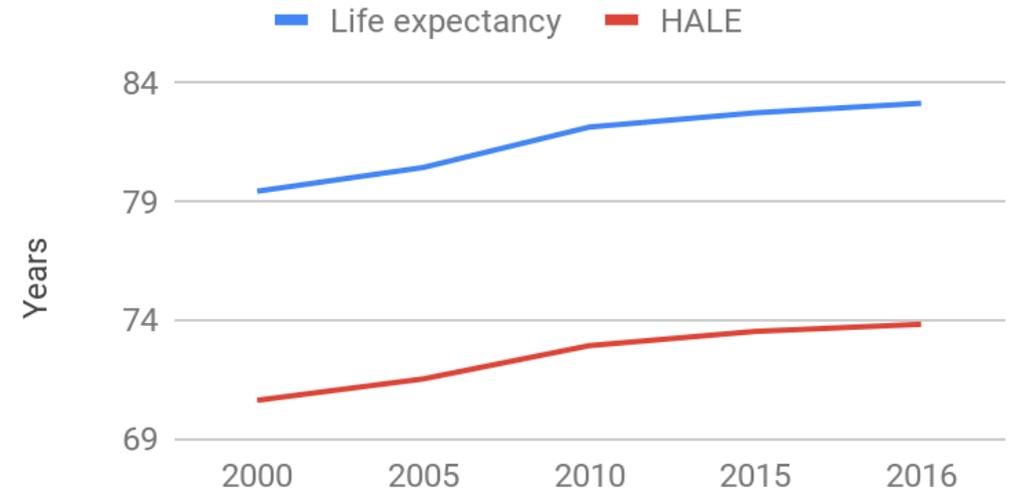
[Life expectancy - WB Data](#)

# Health-Adjusted Life Expectancy vs. Life Expectancy UK, Spain, Switzerland and Netherlands (2000-2016)

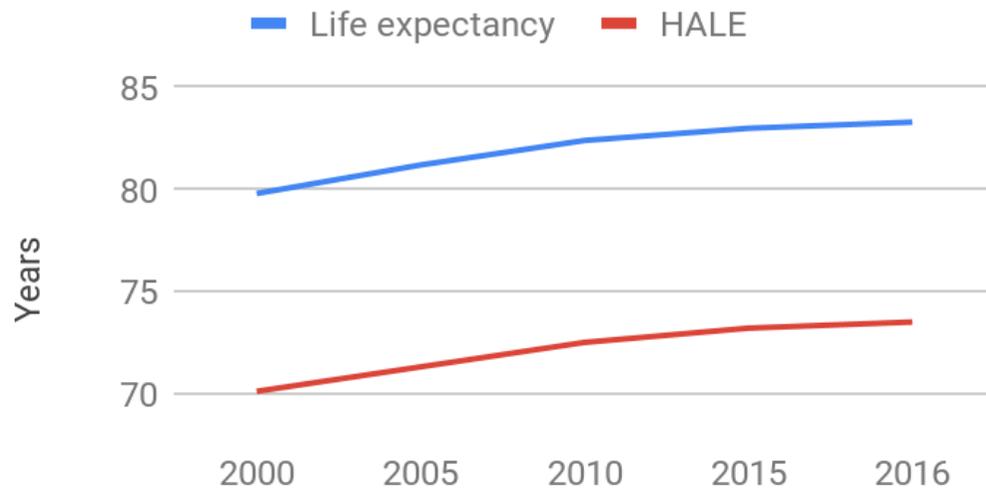
## UK



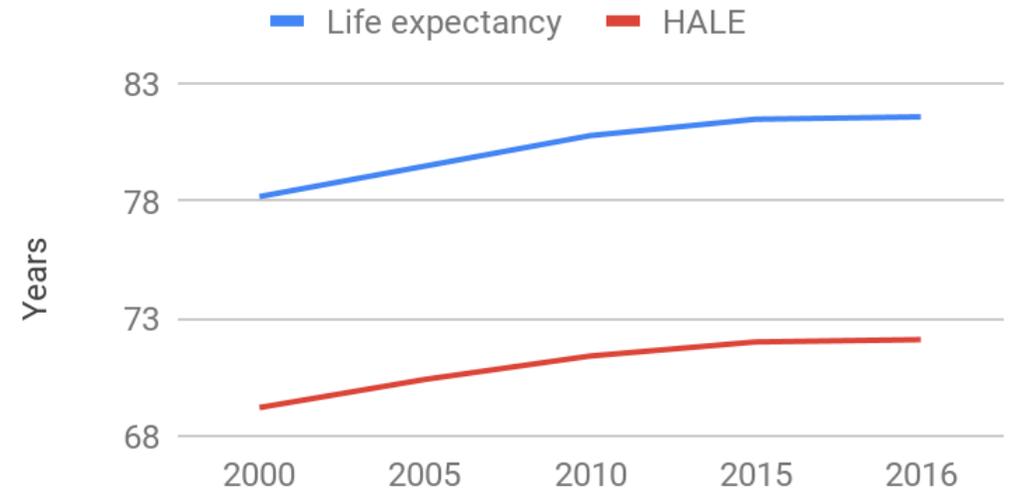
## Spain



## Switzerland



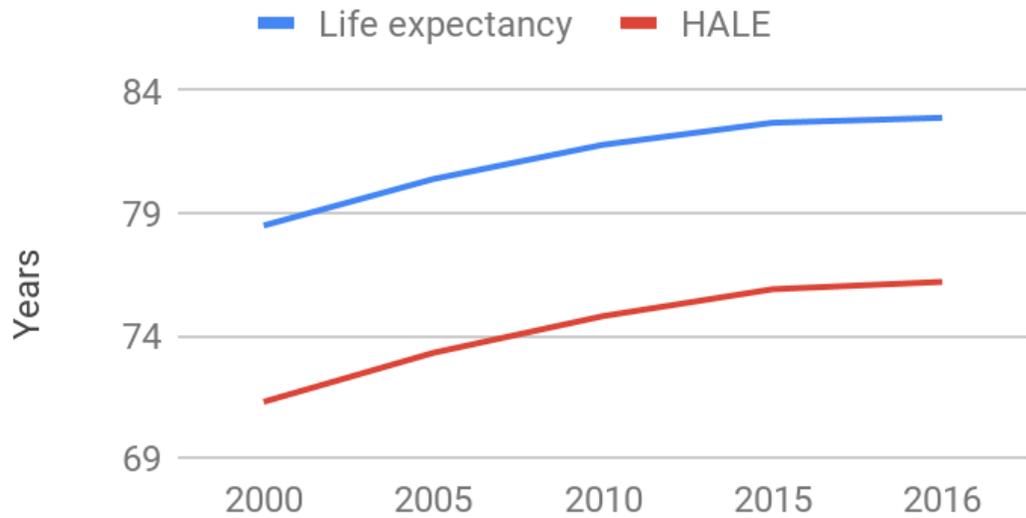
## Netherlands



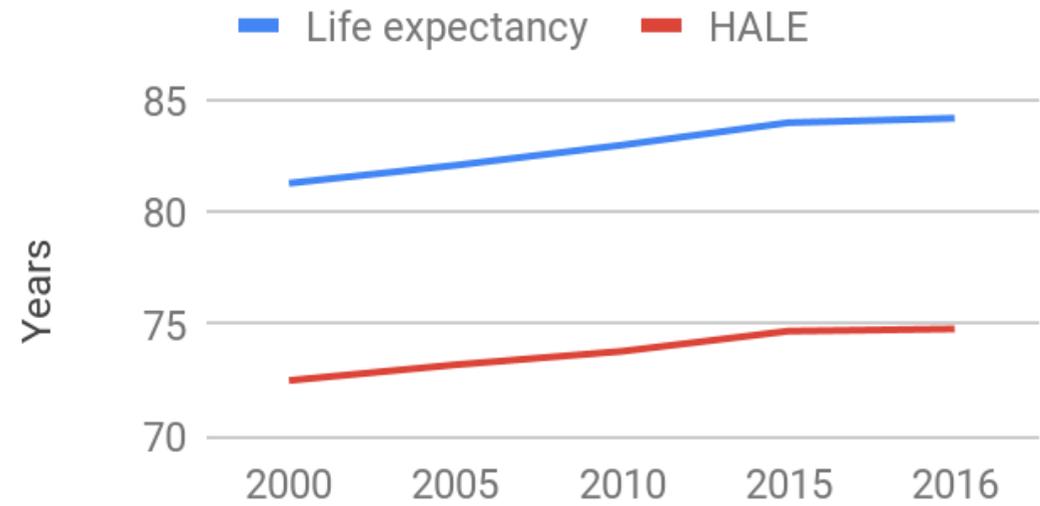


# Health-Adjusted Life Expectancy vs. Life Expectancy Singapore, Japan, and South Korea (2000-2016)

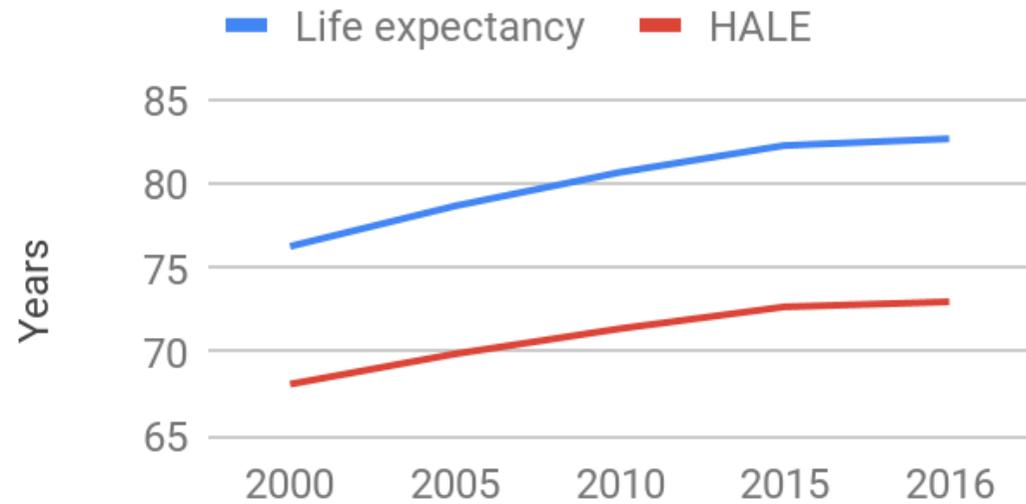
## Singapore



## Japan



## South Korea



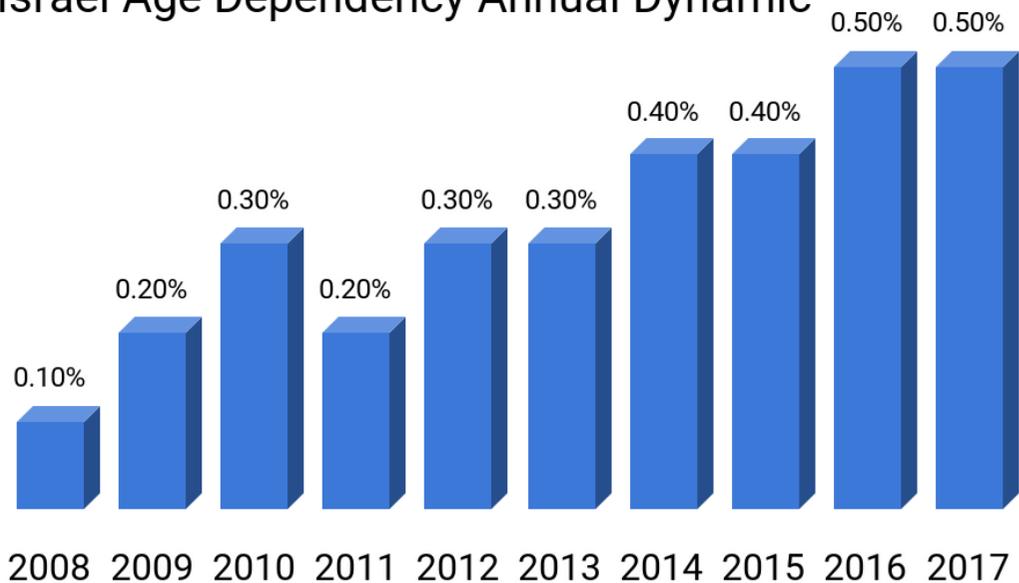
# Males and Females Life Expectancy in 2018



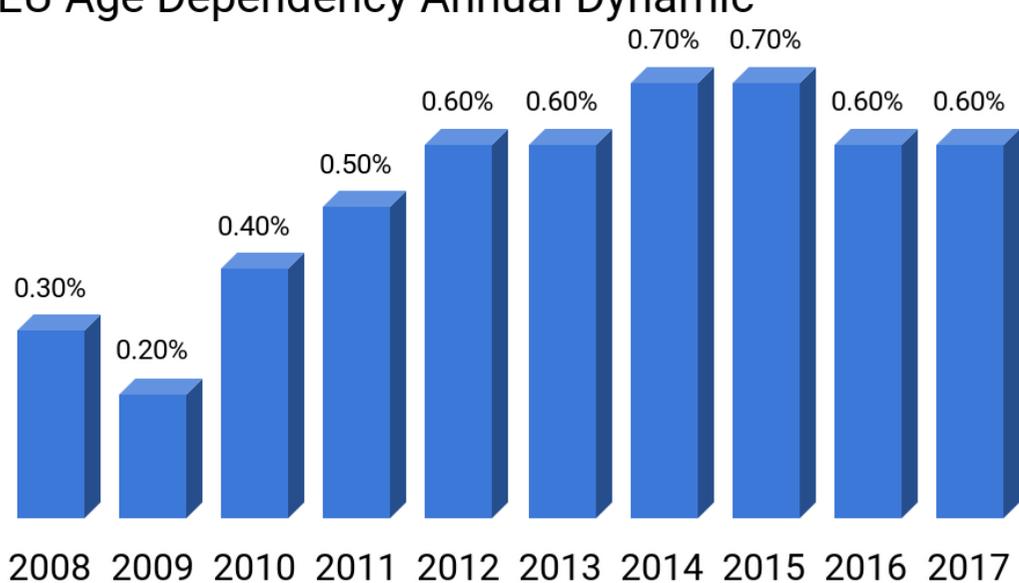


# Israel, EU, USA and China Age Dependency Annual Dynamic (% , 2008-2017)

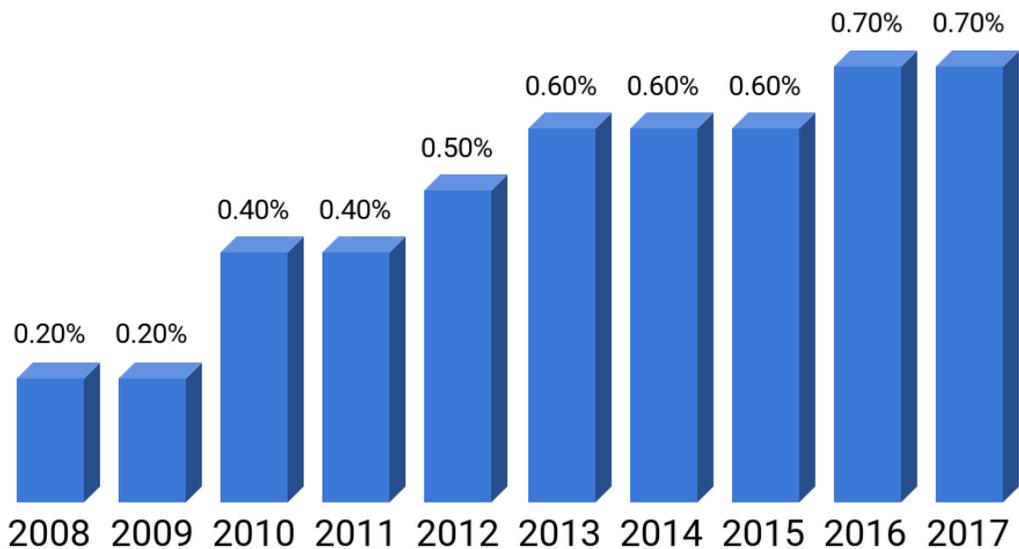
### Israel Age Dependency Annual Dynamic



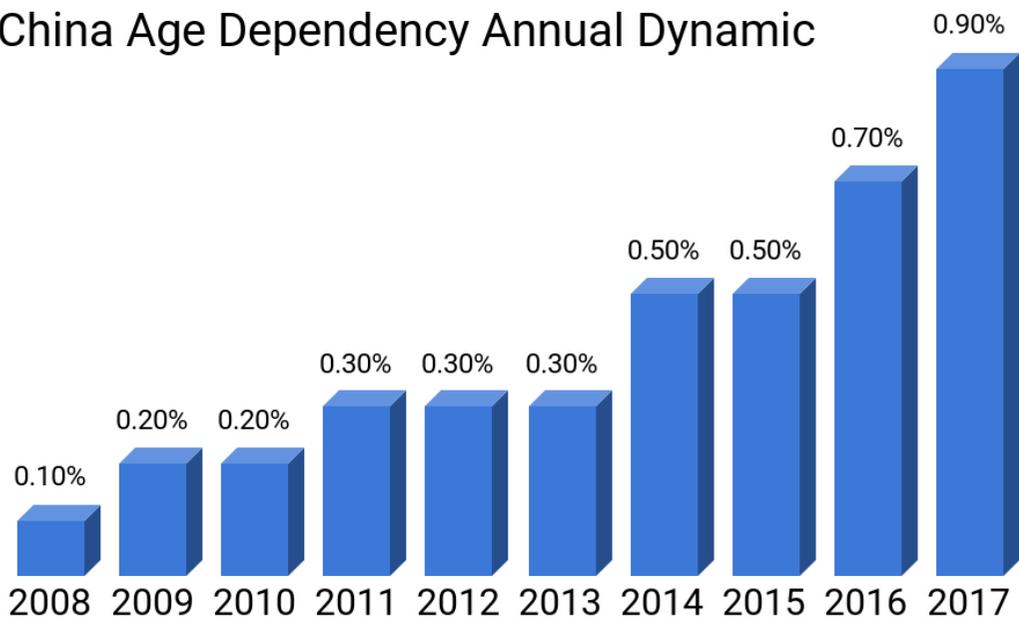
### EU Age Dependency Annual Dynamic



### USA Age Dependency Annual Dynamic



### China Age Dependency Annual Dynamic

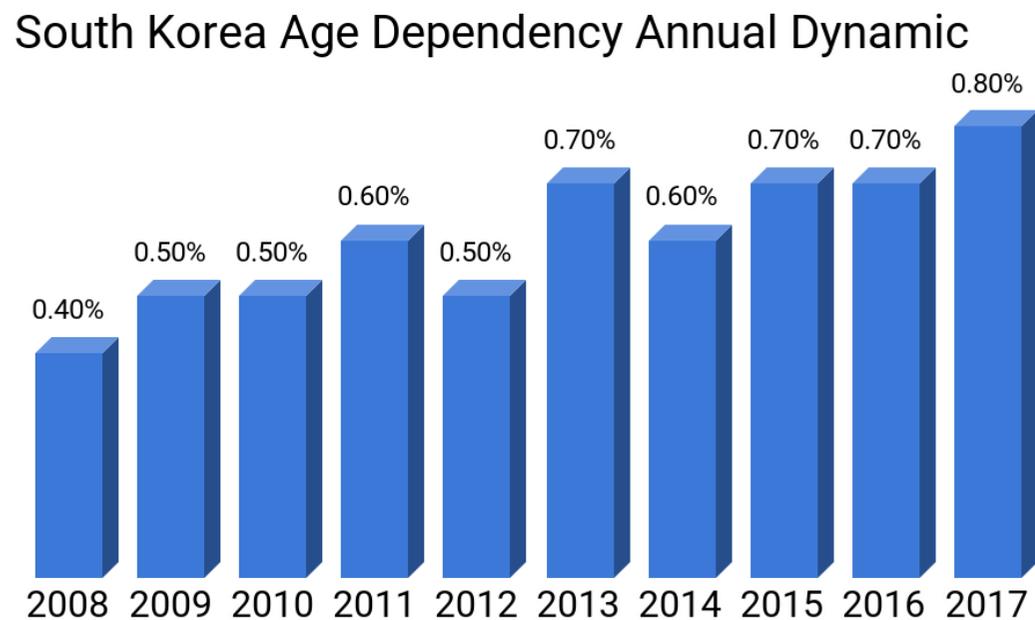
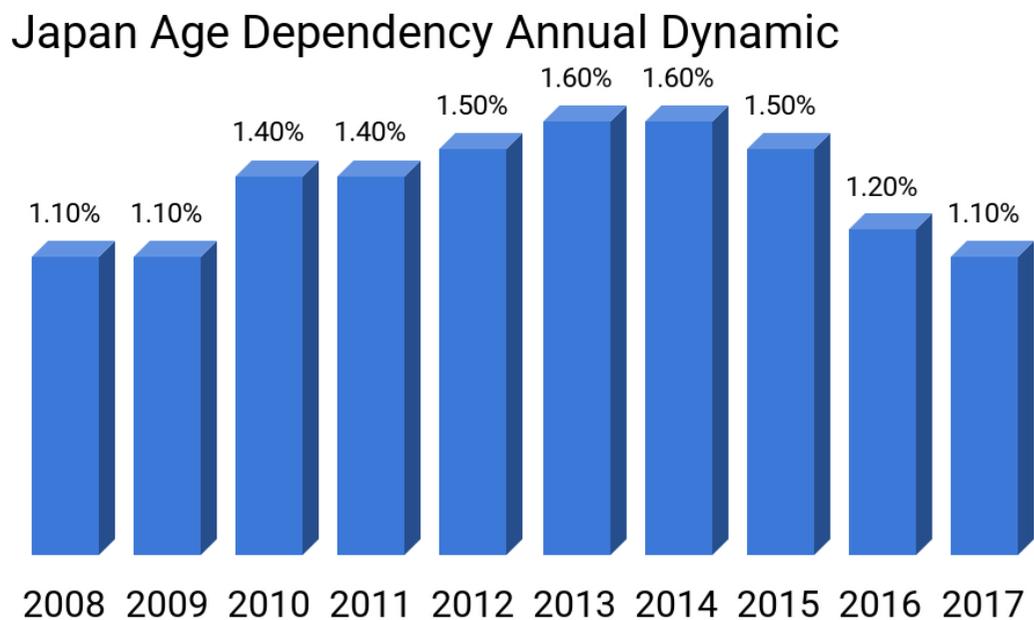
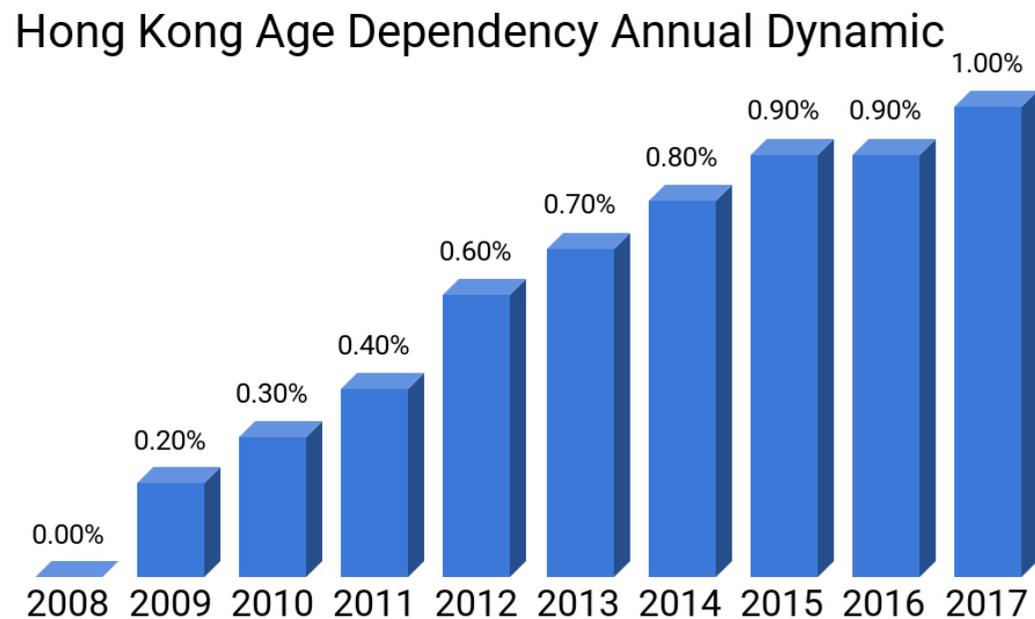
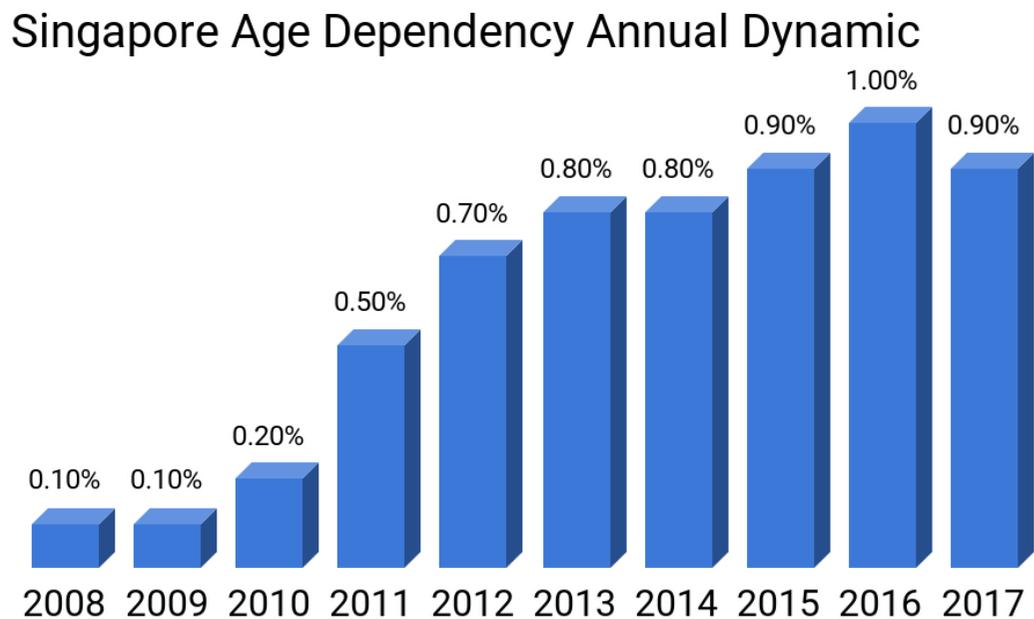


Source:

[World Bank Data](#)



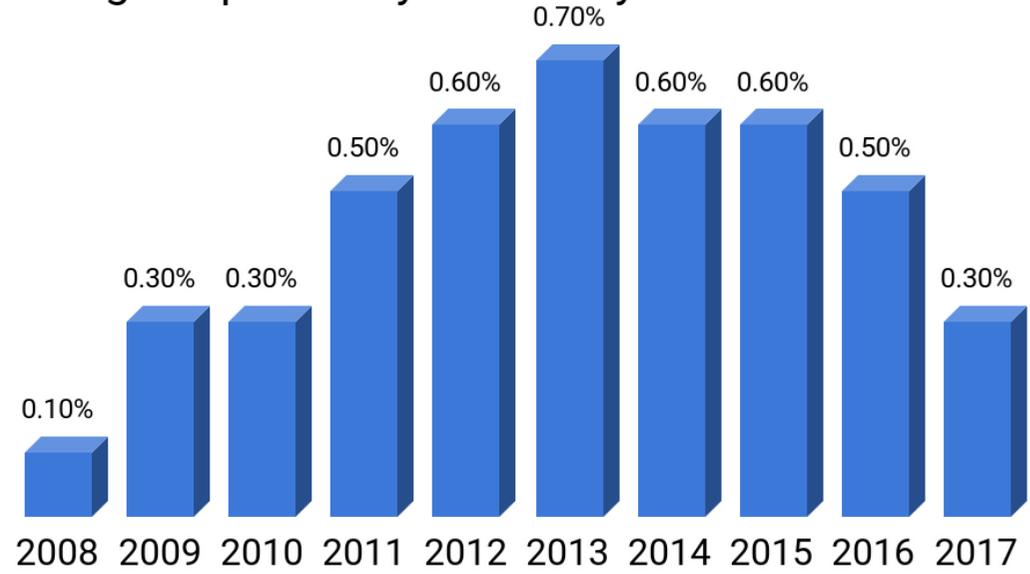
# Singapore, Hong Kong, Japan, and South Korea Age Dependency Annual Dynamic (% , 2008-2017)



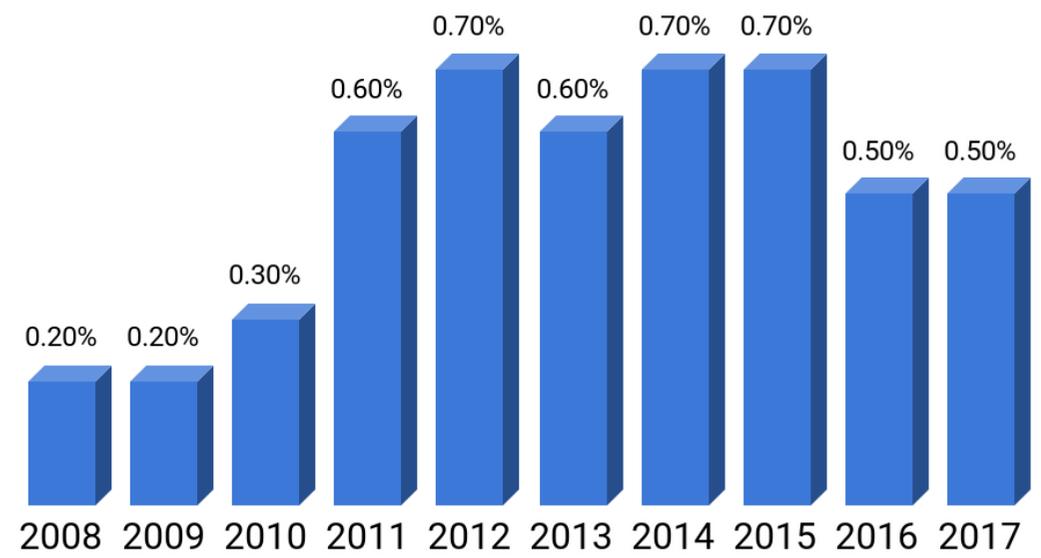


# UK, Spain, Switzerland and Netherlands Age Dependency Annual Dynamic (% , 2008-2017)

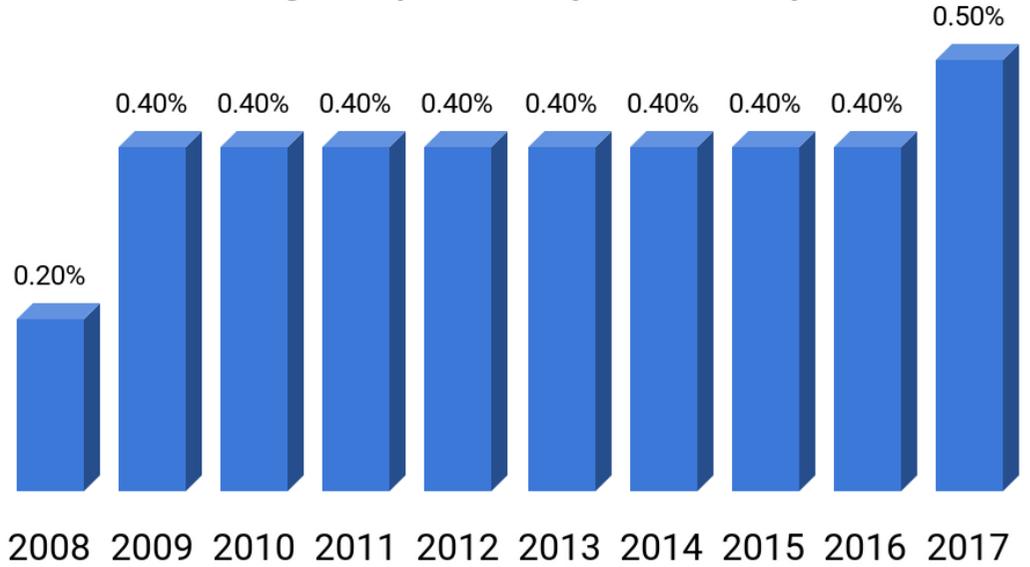
### UK Age Dependency Annual Dynamic



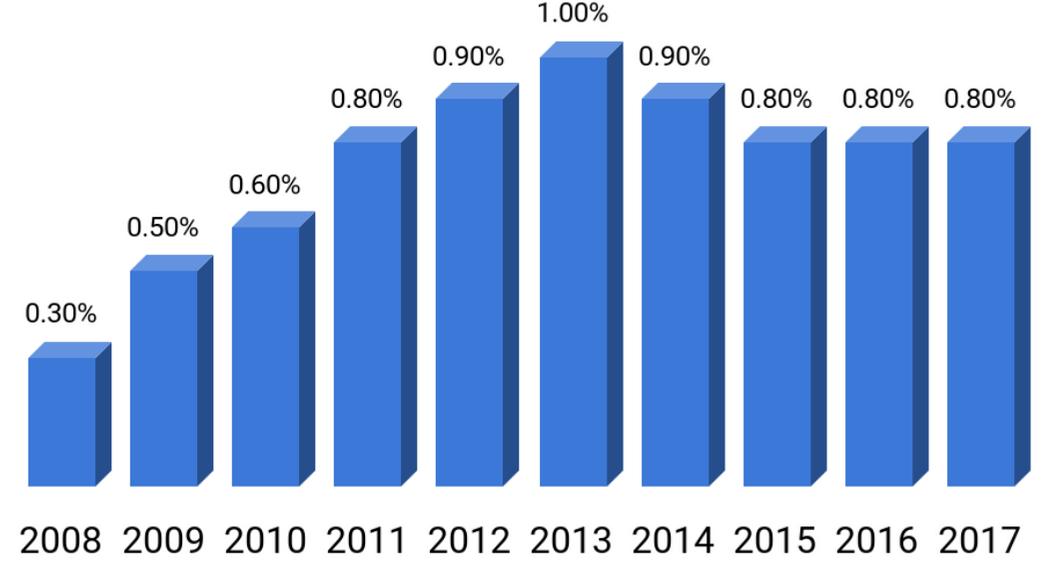
### Spain Age Dependency Annual Dynamic



### Switzerland Age Dependency Annual Dynamic



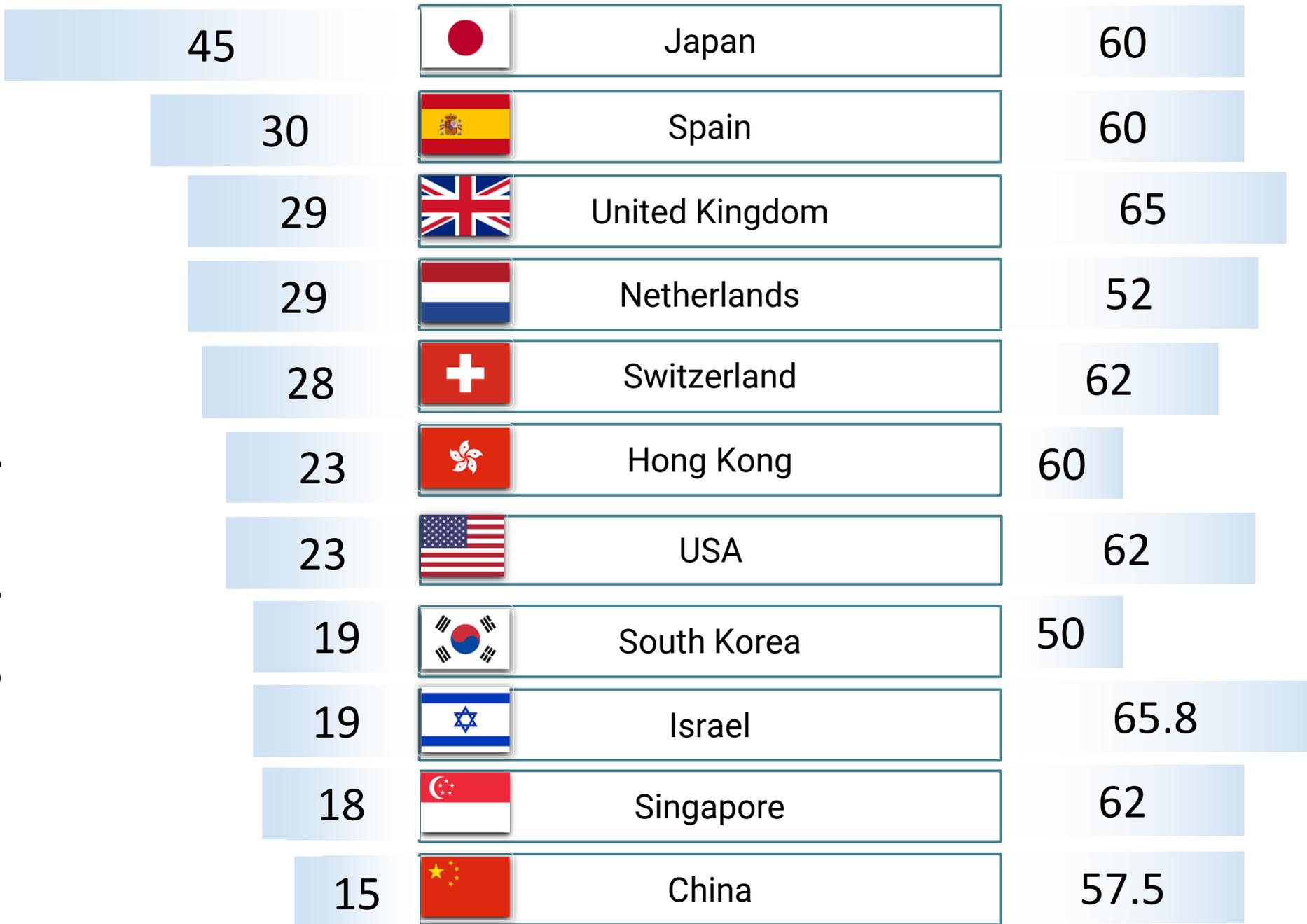
### Netherlands Age Dependency Annual Dynamic



# Age Dependency Ratio and Early Retirement Age

Age Dependency Ratio, 2017

Early Retirement Age, 2017



Source:

[Age dependency ratio - Data](#)



## AGING ANALYTICS AGENCY

[www.aginganalytics.com](http://www.aginganalytics.com) | [info@aginganalytics.com](mailto:info@aginganalytics.com)

**Aging Analytics Agency** is dedicated to the production of industry analytical reports on the topics of Longevity, Personalised and Preventive Medicine. It is the only analytical agency focused exclusively on Ageing, Geroscience and Longevity. Operating for over five years, we began producing in-depth reports on Longevity long before it emerged as an industry. In 2014 we successfully predicted the boom in industry development and financing rounds in 2017, at a time when the vast majority of investors, business analysts, and even geroscientists believed its emergence to be in the next decade. The company also provides strategic consulting in the fields of Longevity, Preventive Medicine and Advanced Biomedicine.



## LONGEVITY INTERNATIONAL

[www.longevity.international](http://www.longevity.international) | [info@longevity.international](mailto:info@longevity.international)

**Longevity.International** is an online interactive database of longevity scientists, companies, and investors. This platform allows different stakeholders in the longevity industry to connect, network, research and analyze.

On the next stage this platform will also employ cutting-edge data visualization software and a networking section where various stakeholders within the longevity industry can connect and collaborate, where longevity companies are matched with the right investors, and where scientists can make contributions.



## LONGEVITY.CAPITAL

[www.longevity.capital](http://www.longevity.capital) | [info@longevity.capital](mailto:info@longevity.capital)

**Longevity.Capital** is a specialised Longevity industry Index Hedge Fund with enhanced liquidity that uses hybrid investment technologies to combine the profitability of venture funds with the liquidity of hedge funds, thus significantly de-risking the interests of LPs and providing the best and most promising Longevity companies with relevant amounts of investment.



## DEEP KNOWLEDGE ANALYTICS

[www.dka.global](http://www.dka.global) | [info@dka.global](mailto:info@dka.global)

**Deep Knowledge Analytics** - the analytical arm of Deep Knowledge Ventures, specialising in forecasting on the convergence of technological megatrends, conducting special case studies and producing advanced industry analytical reports on AI, DeepTech, Blockchain and Invest Tech.



# New Specialized Index Hedge Funds Planned by Deep Knowledge Ventures for 2019

Deep Knowledge Ventures is launching a number of new investment funds in 2019



Aging Analytics Agency and Deep Knowledge Analytics will remain the main sources of expertise behind these funds, providing the necessary analysis to develop and **de-risk investment strategies**. The new funds will provide **financial products** similar to hedge funds.

The incorporation of both organizations' expertise into these new funds allows investors to enjoy the **profitability** of VC funds, but without the usual **liquidity** issues such as lockup periods.

Furthermore, Analytics Agency and Deep Knowledge Analytics are seeking to engage with potentially interested financial institutions to collaborate in promoting Longevity as a **concrete, realistic prospect** in the eyes of investors.

To better link investors with expertise, the Agencies are seeking prestigious venues where **investor relations** can be **cultivated, financial institutions** can **promote their brands** to HNWIs, and expertise can be made readily available and **free of charge**. In other words, we are seeking spaces to establish an **ecosystem of systematic cooperation**.



# Longevity Record

With the aim of getting the ball rolling in the emerging longevity industry, Dmitry Kaminskiy announced a \$1 million prize for the first person to reach the age of 123 - just 6 months longer than the current record holder, Jeanne Calment, who achieved 122 years and 6 months age.

## Life record of 122.5 by Jeanne Calment who died in 1997



**Forbes**

9,115 views | Apr 21, 2015, 12:40 pm

### Venture Capitalist Promises \$1M To First Person To Reach 123rd Birthday

Sarah Hedgecock Forbes Staff  
Pharma & Healthcare

Venture capitalist Dmitry Kaminskiy thinks he has what it takes to lengthen people's life spans: a million-dollar prize, which he will award to the first person to beat the current longevity record and reach his or her 123rd birthday.



**Using P3 medicine technologies, and leveraging the work of Geroscience, why should 122.5 years of age be considered the limit?**