

# Longevity Exchange Concept

DOCUMENT INTENDED EXCLUSIVELY FOR QUALIFIED PROFESSIONAL COUNTERPARTIES

October 2022

***Strictly Confidential***

# About Deep Knowledge Group

**Deep Knowledge Group** is a consortium of commercial and non-profit organisations active on multiple fronts in the realm of DeepTech and Frontier Technologies (AI, Longevity, FinTech, GovTech, InvestTech), ranging from scientific research to investment, entrepreneurship, analytics, media, philanthropy and more.

Deep Knowledge Group runs several data-driven **investments and financial vehicles**



Deep Knowledge Group's **analytical subsidiaries** are world leaders in analytics for DeepTech and Longevity industries



Deep Knowledge Philanthropy pioneers several infrastructural **social impact projects**



Longevity Financial Advisors Ltd is a niche advisory boutique focused on the Longevity Industry. It is part of Deep Knowledge Group.

Longevity Financial Advisors is a trading name of Privium Fund Management (UK) Limited, authorised and regulated by the Financial Conduct Authority ("FCA") in the United Kingdom.

We are a team of finance professionals working to make a difference. We use our advanced analytical systems built on proprietary data sets and powered by artificial intelligence to launch financial instruments, as well as the structure and fundraise for investment vehicles.

Outside these activities, we also provide a wide range of services including advising on acquiring, selling, partnering with or funding a business, management and strategic advice, scientific and technological due diligence.

## LFA Scope of Activities

<b>Market Research</b>	<b>De-Risking Investments</b>	<b>Big Data Investment Analytics</b>	<b>Portfolio Construction</b>
<b>Ergonomic IT-Platform</b>	<b>Longevity WealthTech</b>	<b>M&amp;A Advisory</b>	<b>InvestTech</b>
<b>Private Placement Advisory</b>	<b>Portfolio Performance Metrics</b>	<b>Investment Target Selection</b>	<b>Structured Financial Products</b>
<b>Longevity Thematic Derivatives</b>	<b>Technological &amp; Scientific Due Diligence</b>	<b>Automized Multiparametric SWOT Analysis</b>	<b>Comparative &amp; Competitive Analysis</b>

# Executive Summary

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- The Longevity industry is estimated at \$27 trillion as of 2022 and is expected to grow to \$33 trillion by 2026
- This rapidly growing industry currently comprises 60,000 companies in total, with 900 of them listed and **4,000 companies in growth and late stage - this is the target group**
- The sector is confronted by structural complexity, low liquidity, long capital lock-up and opaque scientific due-diligence
- A well-functioning Longevity Exchange can help alleviate those issues by bringing more private companies public, allowing price discovery, and providing public capital inflow to advance a growing sector with monumental societal impact
- With an advanced platform of AI-driven analytics, the largest proprietary industry database, and our long-standing relationship with stakeholders, Deep Knowledge Group is the ideal partner to help to respond to the growing institutional interest

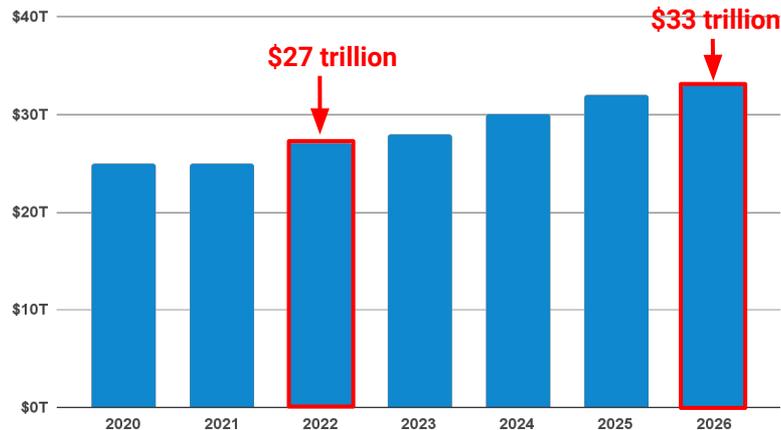
# The Longevity Industry

## Key Aspects of the Longevity Industry:

- The Longevity market is not just limited to anti-ageing applications of life sciences; it also includes new sectors in the financial industry, as well as government projects; hence, its overall size potentially exceeds \$27T.
- The undisputed leader in the Longevity sector is the USA which has a total of \$629B invested in 26,654 companies, followed by China, with \$164B invested in 2,158 companies.
- Among the 300 Longevity-focused financial institutions, the UK took first place with 32%, followed by the USA with 29%.
- PharmTech and P4 Medicine are the Longevity sub-sectors with the largest number of companies receiving the highest volume of investments with total investments of \$311.5B and \$138.9B, respectively.

**Among 900 Longevity-focused public companies, PharmTech, P4 Medicine and Deep Diagnostics are the most represented sectors in terms of companies.**

## Longevity Economy Growth Prediction\*

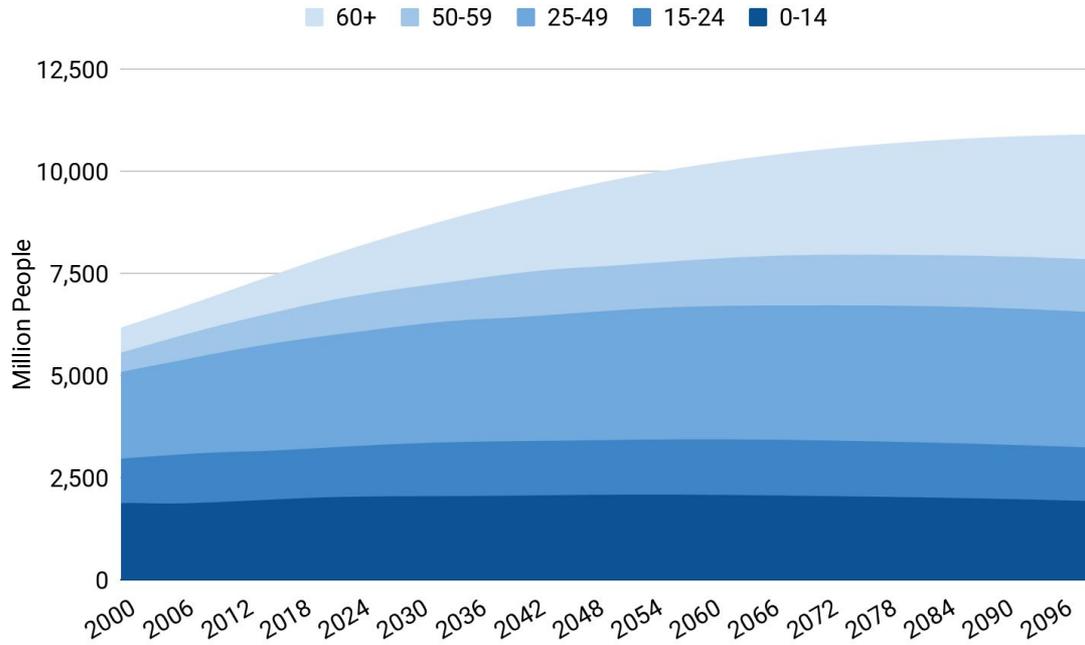


## Longevity Public Market Capitalization Dynamics\*\*



# Macro Trends on Ageing Population

World Population by Age, 2000-2100, Million People

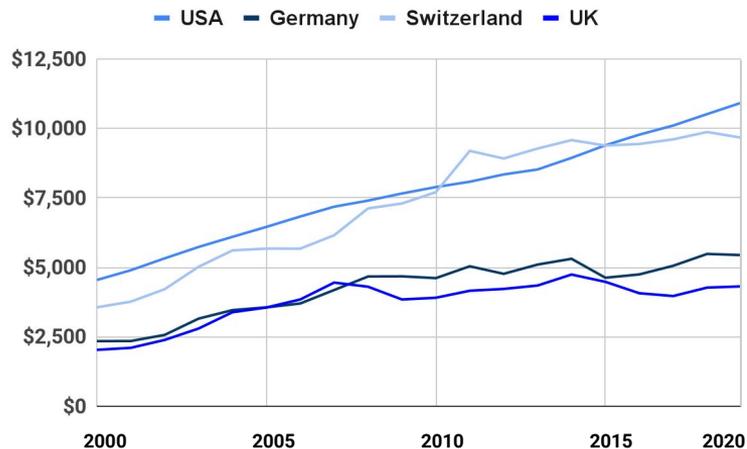


According to the UNISTAD population growth projection, the increase in the world population in the next 25-30 years will be primarily **due to a gradual increase of young, working-age population (25-49)** and **rapid growth of seniors (60+)**. By 2050, approximately every 3rd of 10 will be 50+ y.o. (share of 50+ population will be 32% of the population), while youth and middle-aged together will constitute around 46%. By 2100, shares will almost align: 40% of 50+ aged and 42% of 15-49 y.o. population.

While some countries experience a mild increase in life expectancy together with decreasing birth rate and as a result of growth of the working-age population, other countries will face the problem of the ageing population. However, **by the end of the 21st century, 60+ aged people will be almost a third (28%)** of the world population.

# Healthcare Industry

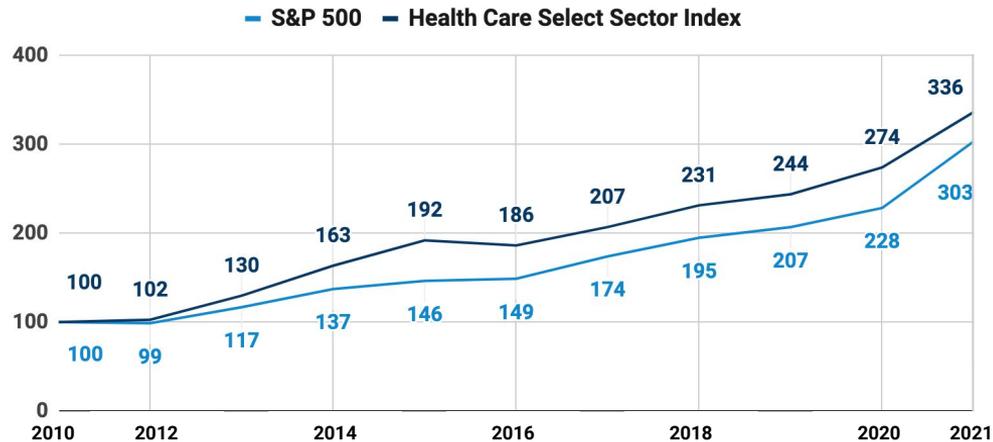
## Healthcare Spending per Capita\*



Source: [The World Bank](#)

Over the last decade, the main leaders in healthcare expenditure as a percentage of GDP are the USA, Switzerland and Germany at 17%, 12% and 11%, respectively, and healthcare spending per capita has increased dramatically over the last two decades.

## Comparison of Healthcare Sector Index and S&P Index Dynamics



Source: [Yahoo Finance](#)

Judging from the key benchmarks of public markets, healthcare sector has been demonstrating a lasting growth trend over the past decade. Given the outcomes of the COVID-19 pandemic, the healthcare industry is set to see further development in upcoming years. Moreover, investments in the healthcare sector will play a pivotal role in easing the burden of the ageing population and securing the optimisation of healthcare policies.

# Macro Trends on Longevity Risk Market

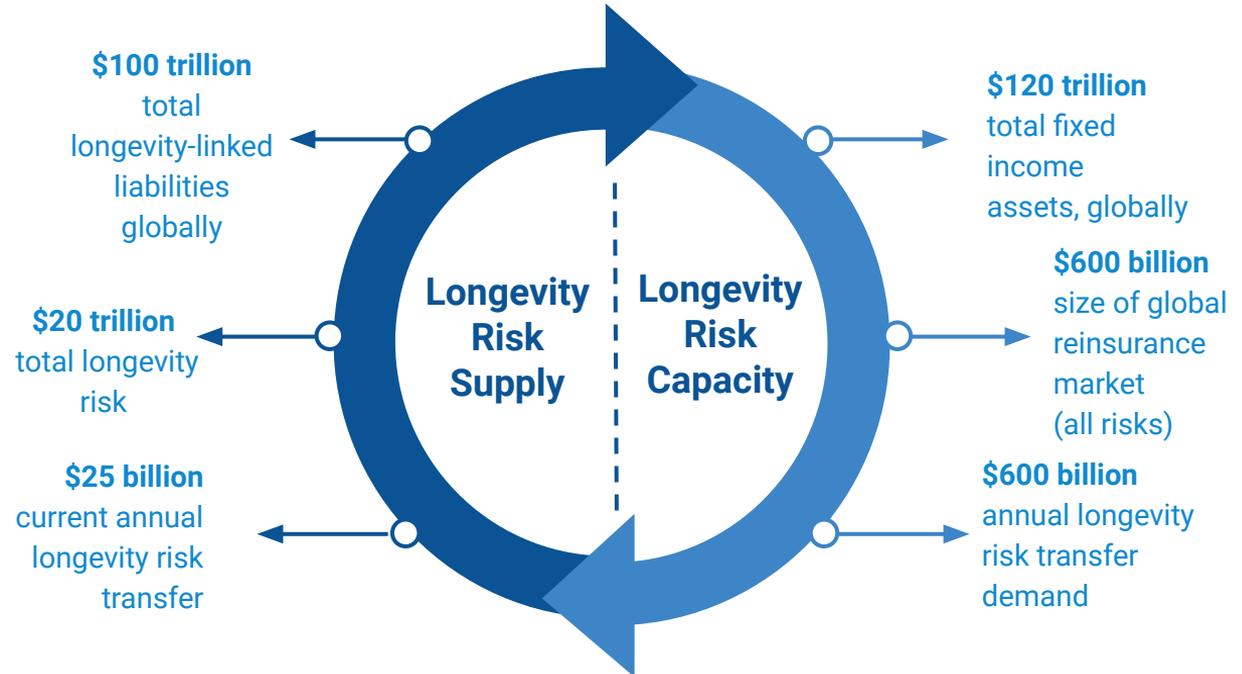
Globally, pension funds hold a massive volume of longevity risk from retirement obligations. Fortunately, a more developed value chain is already emerging for transferring longevity risk from traditional holders of such risk, public and private pension funds, to a broader set of risk takers, including the capital markets.

## ○ Pensions risk transfer market sees significant growth in recent years

USA pension risk market alone, involving predominantly the operations of pension buy-ins and buy-outs and longevity swaps, had a record-breaking year in 2021, with an estimated total volume of between \$38 billion and \$40 billion.

## ○ Longevity risk is very capital intensive, and, therefore, the amount of longevity-related liabilities that can be transferred is restricted by the quantity of capital currently dedicated by the existing risk-taker universe.

## ○ Q1 2022 demonstrated record volume of pension risk operations: in the USA alone it reached \$5.4 billion.



# Global Longevity Ecosystem - 60,000 Companies by 20 Segments

## Longevity Science



## Longevity WealthTech



## Space Medicine



## Deep Diagnostics



## Longevity Biomarkers



## Longevity FinTech



## Longevity FemTech



## Regenerative Medicine



## AI for Longevity



## Healthcare InsurTech



## Advanced Cosmetics



## P4 Medicine



## NeuroTech



## AgeTech



## Clinical Data Management



## Longevity Gene Therapy



## PharmTech



## Wellness & Fitness



## Mental Health



## Telemedicine



# Deep Knowledge Group Longevity Industry Database (*The Largest in the World*)

60,000 Companies

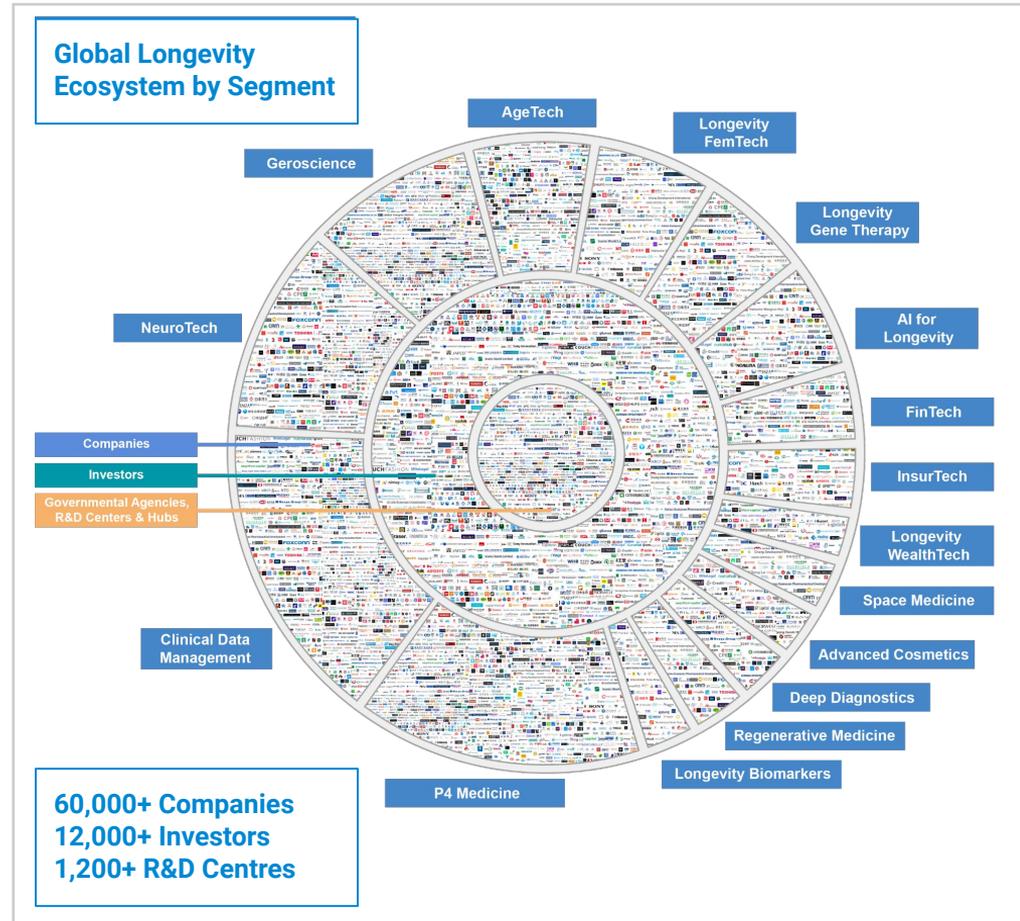
1,200 Hubs

20 Segments

14,000 Investors

Deep Knowledge Group's first-of-its-kind **Longevity Industry Ecosystem IT-Platform** constitutes the **world's largest** Longevity industry database in the world, encompassing **60,000+ companies**, 14,000+ investors, and 1,200+ R&D hubs across **20 segments** and **160 subsegments**, covering over **18 million data points in total**.

Deep Knowledge Group aims to create a **full-scope database and frameworks for the analysing of the DeepTech Industry** with a similar-like approach used for the Longevity Industry. This goal is planned to be delivered within 3-6 months.



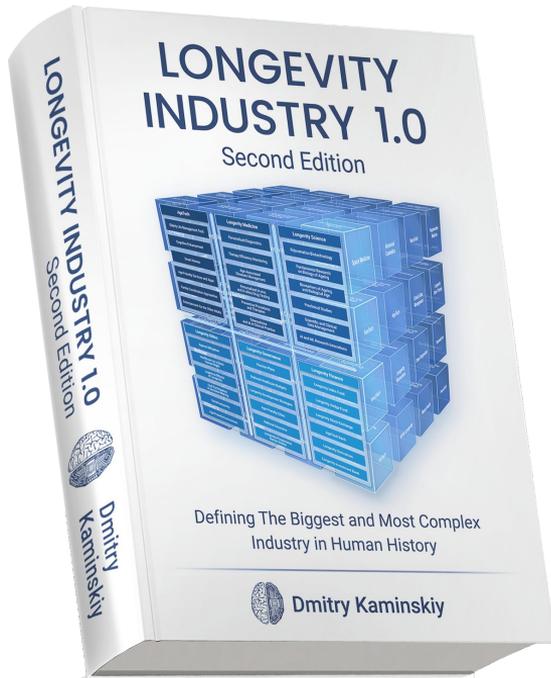


# LONGEVITY INDUSTRY 1.0

Second Edition

Defining the Biggest and Most Complex Industry in Human History

[www.longevity-book.com](http://www.longevity-book.com)

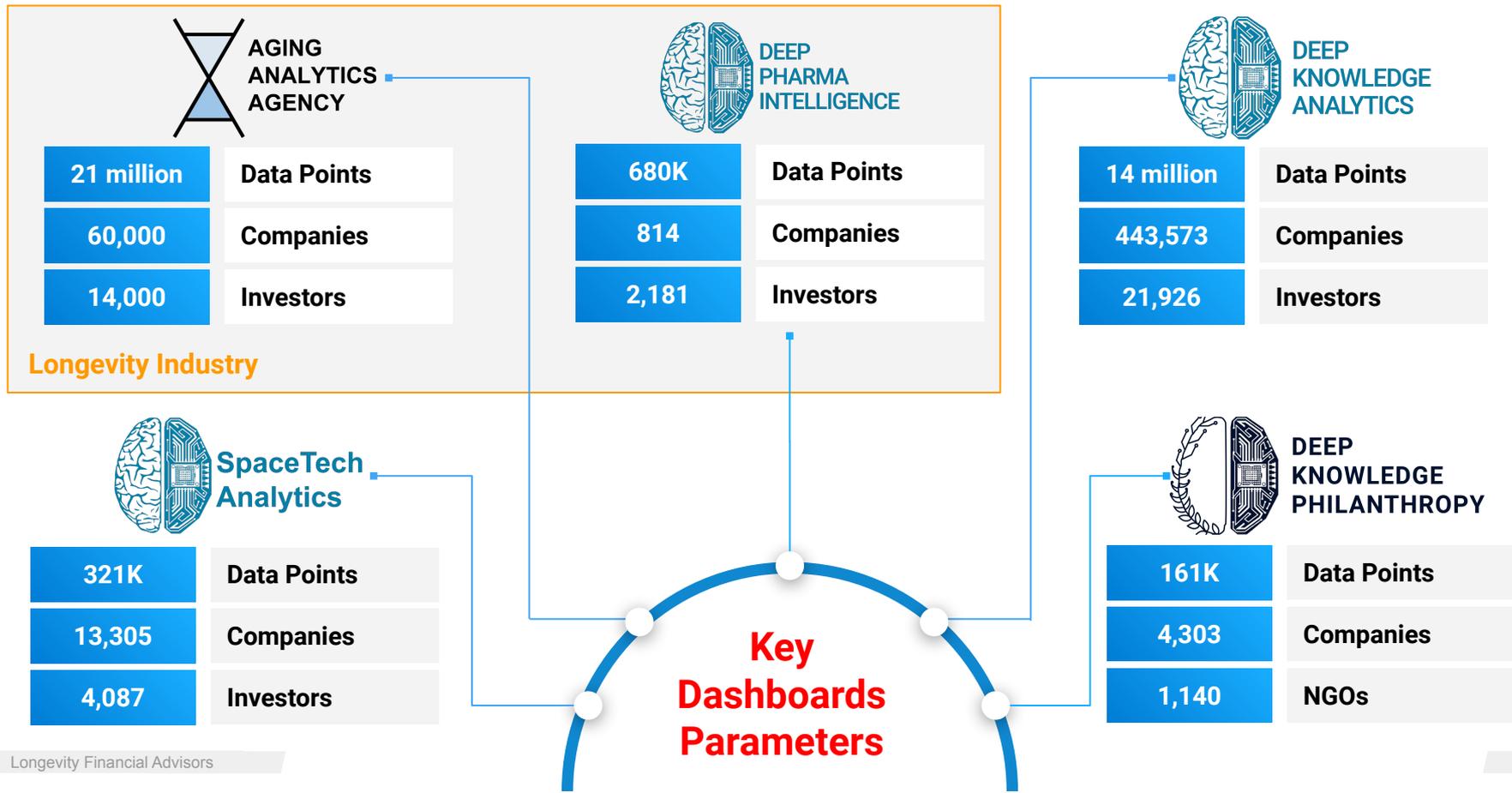


Longevity Industry 2022 Journal is designed to serve as the first dedicated industry journal for the exponentially expanding Global Longevity Industry and the first in a series of journals updated and released every financial quarter.



[www.longevity-journal.info](http://www.longevity-journal.info)

# Deep Knowledge Group's Big Data Analytical System and Dashboards



# Longevity Investment Big Data Analytical System and Dashboard Platform

Deep Knowledge Group **dashboard platform** analyses **millions of data points** on **investors, public and private companies**, including **startups**, sectors & subsectors and provides **tools of SWOT analysis**, competitors, comparative analysis, portfolio construction, mindmaps, statistics to help you analyse **opportunities**.

60,000+  
Companies

14,000+  
Investors

160+  
Subsegments

## Dashboard Tools

Portfolio Constructor

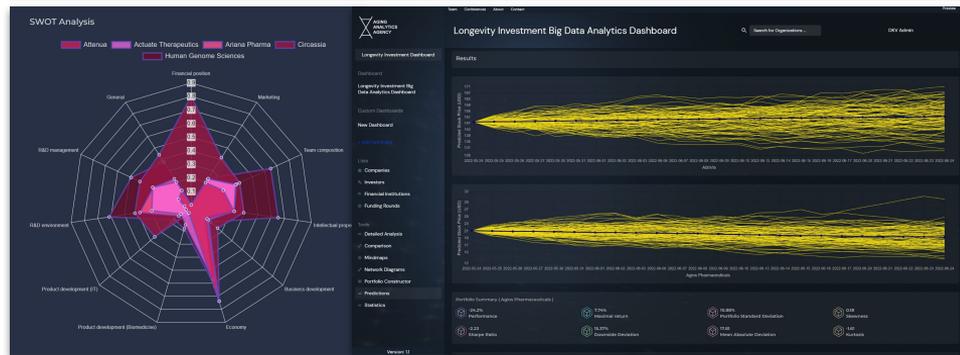
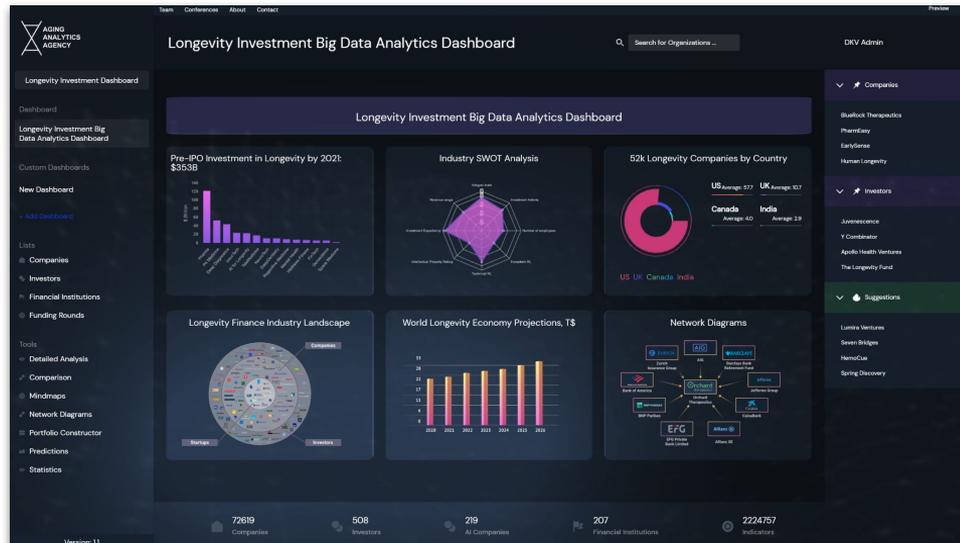
Competitors

Comparative Analysis

Network Diagrams

Mindmaps

Automated SWOTs



# AI-driven System Big Data Supplement



Access to the Dashboard Tools

Data on Financial Instruments



## Dashboard Features

Instruments Listing

Interactive Analytical Data on Financial Instruments

Financial Insights Generation

## Exchange Features

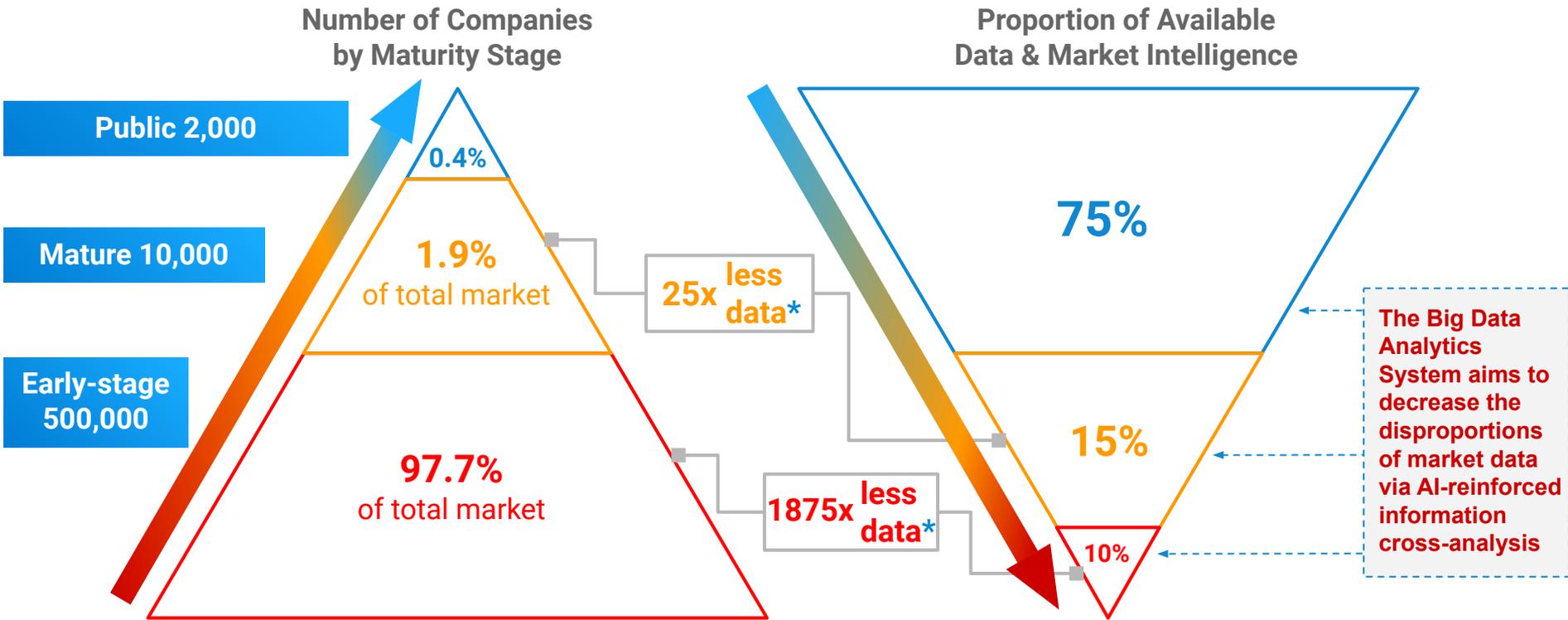
Multimetric Stock Exchange Comparison

Real-time Financial Instrument Price Monitoring

Creation of the User-Broker Interface

Deep Knowledge Group's **Longevity Industry Big Data Analytical System** represents the most sophisticated and technologically robust tool for market intelligence and industry monitoring which, when integrated into the thematic exchange, will provide a unique feature and strategic advantage for attracting additional players into the exchange.

# Significant Disproportions in Number of Companies and Data Available



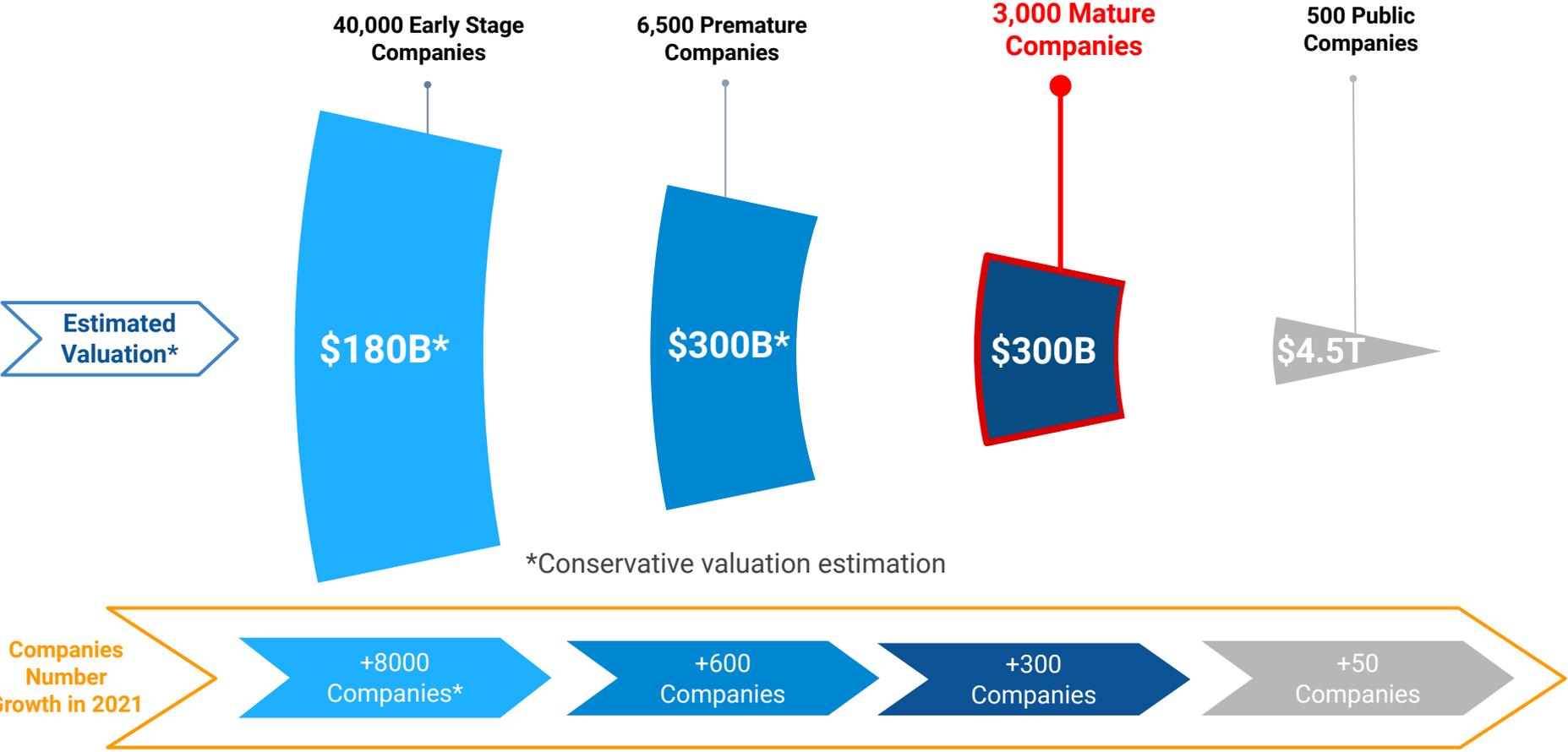
\* disproportion accounts for the difference between the number of public and private companies and the amount of available relevant market intelligence

○ Patterns recognition

○ Eliminating the disproportions

○ AI-driven cross-analysis

# Significant Business Opportunity and Market Capacity



# Opportunities Specific to the Longevity Industry

The enormous growing Longevity market is not effectively serviced by current private capital means, creating a massive symbiotic opportunity for parties ready to bridge this existing gap and leverage these untapped potentials.



□ The Longevity Industry displays extreme levels of technological intersectionality, operating at the forefront of sophistication and complexity



□ The lasting growth of the Longevity market has the potential to mature into one of the biggest industries in human history



□ **However**, the industry does not yet have the capital markets capability and the financial and investment infrastructure to accelerate its growth and realise its value



□ Longevity startups are mostly R&D-based, forced to seek additional funding at public and private capital markets

**Bringing more validated Longevity companies to the market will contribute to:**

**Accelerating the industry's growth**

**Reducing the overall cost of capital**

**Enabling more effective fundraising**

**Creating publicity and marketing opportunities**

**Providing stock as a means of payment**

**Enabling a constant stream of investment and exits**

# Commoditization of Longevity Industry

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## Emerging New Asset Class

The Longevity Industry is a highly dynamic sector developing from the synergetic intersection of preventive medicine, AI, wellbeing and the financial industry (including insurance, pension funds and even national healthcare systems), which even by itself is already considered a multi-trillion industry even by conservative estimates.

This rapidly growing industry currently comprises 60,000 companies in total, with 900 of them publicly listed and 4,000 in growth and late stage - this is the target group for the thematic Longevity Stock Exchange.

There are at least 14,000 investment funds focused on BioTech and HealthTech markets.

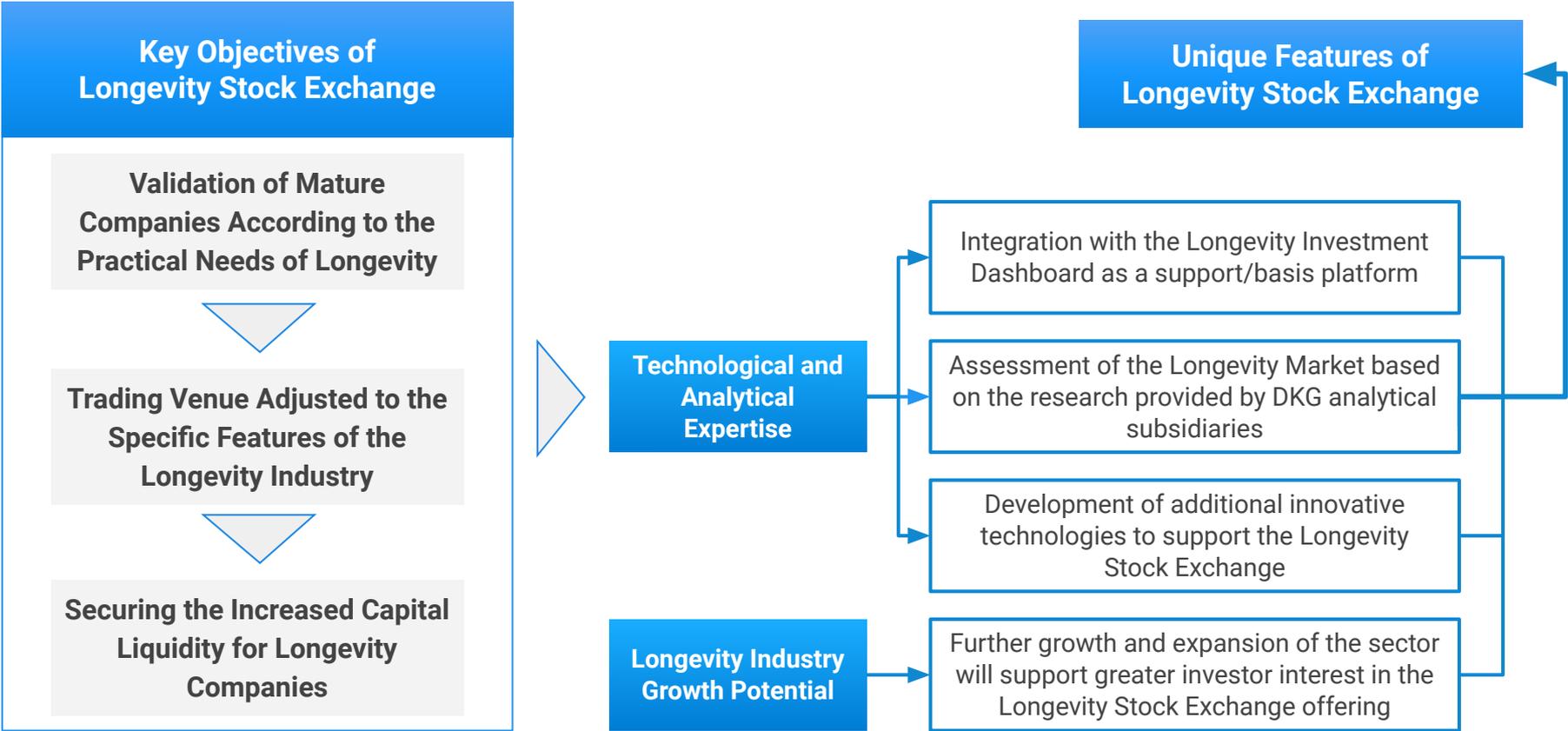
## The Need for Specialised Exchange

There is no one existing specialised thematic financial marketplace for the Longevity industry.

Existing financial and regulatory frameworks are fragmented, being originally designed for the previous era of BioTech and HealthTech industries, and currently significantly limit access to the liquidity of technologically matured companies, while at the same time failing to protect and de-risk the financial interests of investors to the degree required for their actual participation.

The new specialised thematic stock exchange is required to accommodate and absorb the rising demand of investor exposure to the rapidly growing industry and represents the most decisive composition of tools to neutralize the gaps blocking major investor participation.

# Solution – Specialised Thematic Stock Exchange



# Emerging New Revenue Opportunities

The creation of a Thematic Longevity Stock Exchange opens up opportunities for revenue generation through the development of products aimed to secure access to an additional source of capital for Longevity-focused companies and opportunities for investors.

## Derivative Products

The range of financial instruments, namely futures, swaps, options etc., aimed to mitigate the negative impact of the Longevity risks and bring more liquidity to the market.

## Thematic Indices

Indices consisting of the stocks of the Longevity-focused companies for investors willing to allocate finances to the market and pursue passive index strategies.

## Listing Venue

## Corporate Bond Issuing

The Longevity Stock Exchange has the potential to bridge the liquidity gap for Longevity companies serving as a place for raising additional financial resources.

## Data Generation

The activity of the specialised Longevity Stock Exchange will generate a huge amount of data able to provide a realistic view of the Longevity Industry's traction and market trends.

# Specialised Framework for Validation of Longevity Companies Looking for Listing

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## Legacy Frameworks

The current validation frameworks used for the assessment, valuation and due diligence of BioTech and HealthTech companies have in most cases remained completely unchanged since their establishment at the end of the 20th century, and currently lag very far behind the dynamic of the scientific and technological progress of the industries they are applied to. This severely limits access to the liquidity required for the most advanced companies to grow and achieve profitability.

These legacy frameworks do not protect in any relevant way the modern standards and interests of professional and retail investors and fail to provide the same basic levels of protection, stability and de-risking common in the other industries they are active within.

## Modern Data-Driven Specialised Validation Framework

The modern Longevity Exchange will require a sophisticated data-driven validation framework specifically designed for the unprecedentedly complex specifics of the Longevity industry.

This framework will need to incorporate deep scientific and technological due diligence to ensure that companies seeking to be listed on the exchange have undeniably strong core assets (e.g., underlying R&D, managerial track-record, intellectual property, etc).

Investors (and especially retail investors) should be protected from unvalidated and overhyped companies, and such a framework is the only reliable means of ensuring that this happens.

Deep Knowledge Group is in an entirely unique position to design and deploy sophisticated methodologies for establishing the Modern Data-Driven Specialised Validation Frameworks required for the Longevity Stock Exchange.

# Specialised Validation Framework / Longevity Thematic

Deep Knowledge Group is building the comprehensive framework of the entire Longevity Industry, which would serve as the basis for enhanced validation of mature companies against the public capital market. This Validation Framework is aimed to meet the following specifications:

## Longevity-Focused Framework

The framework covers the broad spectrum of the Longevity Industry, comprising 20 segments, including companies operating in the life sciences market and cross-industrial domains.

## Producing the Deep Analytics

The framework takes into account a variety of analytical approaches, relying on those specifically relevant to the Longevity Industry, and has corresponding adjustments for all the Industry segments.

## Validation Framework

## Prospective IPO Candidates Identification

The framework is intended to point out those Longevity-oriented companies that are mature enough to successfully complete an IPO and bring added value to their future investors.

## Enhanced Due Diligence

Resolving the challenges of in-depth due diligence of thematic IPO candidates (namely R&D, IP, management team etc.). It also allows distinguishing the future leaders within corresponding areas comparing them to the best of their class.

# Modern Data-Driven Specialised Validation Framework

The Longevity market is not only limited to anti-ageing applications of life sciences. The Industry also contains companies that are naturally related to human wellbeing and thus affect its life longevity, as well as companies that provide services for further development of longevity-oriented entities. We divide the Industry into two main groups:

## Life-Sciences Companies

Longevity Science	Longevity Gene Therapy
Longevity Biomarkers	Deep Diagnostics
AI for Longevity	PharmTech
NeuroTech	Regenerative Medicine

## Longevity Services Companies

Clinical Data Management	Longevity FinTech	Advanced Cosmetics
P4 Medicine	Longevity WealthTech	Wellness & Fitness
Telemedicine	Healthcare InsurTech	Space Medicine
Mental Health	AgeTech	Longevity FemTech

Weights for performance parameters in automated SWOT analysis are specifically adjusted to the market segments.

### Most important performance parameters:

R&D Environment and Management, Intellectual Property, Product Development

### Most important performance parameters:

Financial Position, Team Composition, Business Development, IT Development, Marketing

# Automated SWOT Analysis for Market Validation of IPO Candidates

Automated quantifiable AI-driven SWOT Analysis is an analytical tool available for each company in the database of Longevity Big Data Analytics Dashboards. This tool provides the aggregated scoring of companies based on the primary and alternative data and validated with AI engine. Automated SWOT Analysis plays a pivotal role for analysing the maturity of Longevity-related companies and making the aggregated conclusion on the readiness for the public listing of a given company.

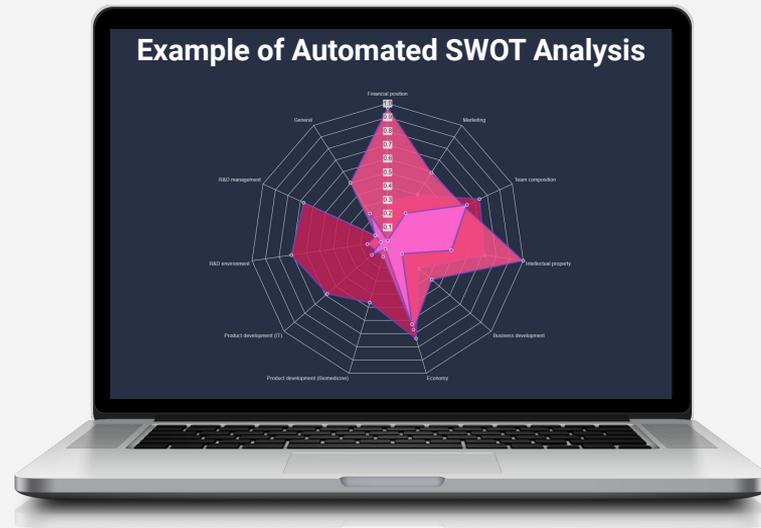
## SWOT Assessment Approach

Investigation of the historical performance of successful IPO companies

Performance threshold determination for validating companies

Assessment based on 170+ unique parameters clustered into 10 groups

SWOTs comparison among public and private companies

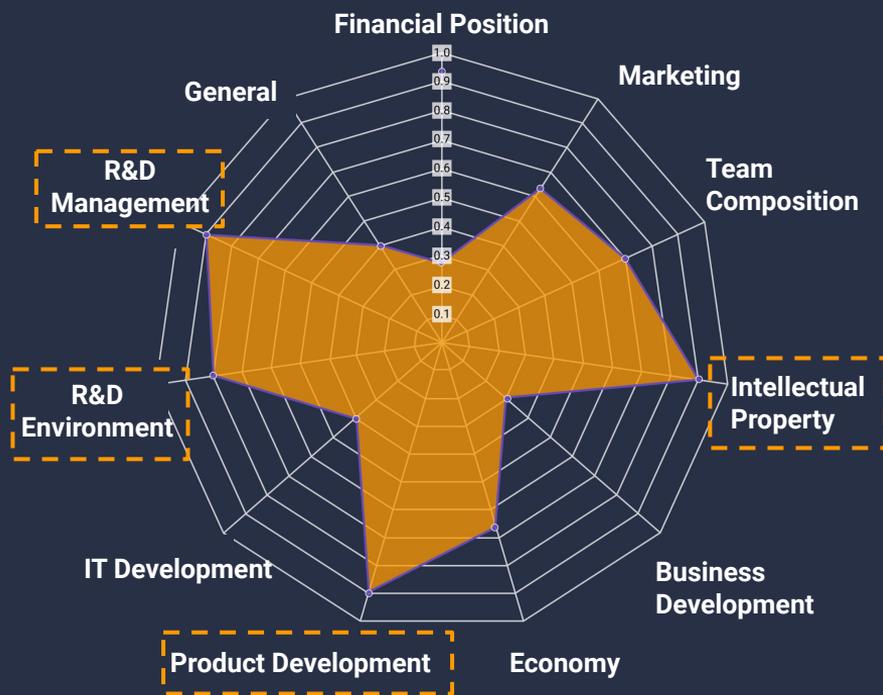


## Parameter Groups

Financial Position	Team Composition	Business Development	Product Development	R&D Environment
Marketing	Intellectual Property	Economy	IT Development	R&D Management

# Accurate Data Science-Based Company Assessment

## Life-Sciences Companies



## Longevity Services Companies



An example of a SWOT analysis of two Longevity companies tailored specifically to market segments.

# Modern Methods of Evading Potential Failing Longevity Clinical Trials

Core players on the Life Sciences market are focused on therapeutics development, which require surpassing clinical trials. Receiving clinical validation of therapies efficacy has crucial effect on such companies performance.

Most of clinical trials follow classic pipeline of preclinical phase focused on animal models and clinical phase to transfer results into human. A lot of risks are associated within transferring results from a model organism to human.

## In silico Modelling

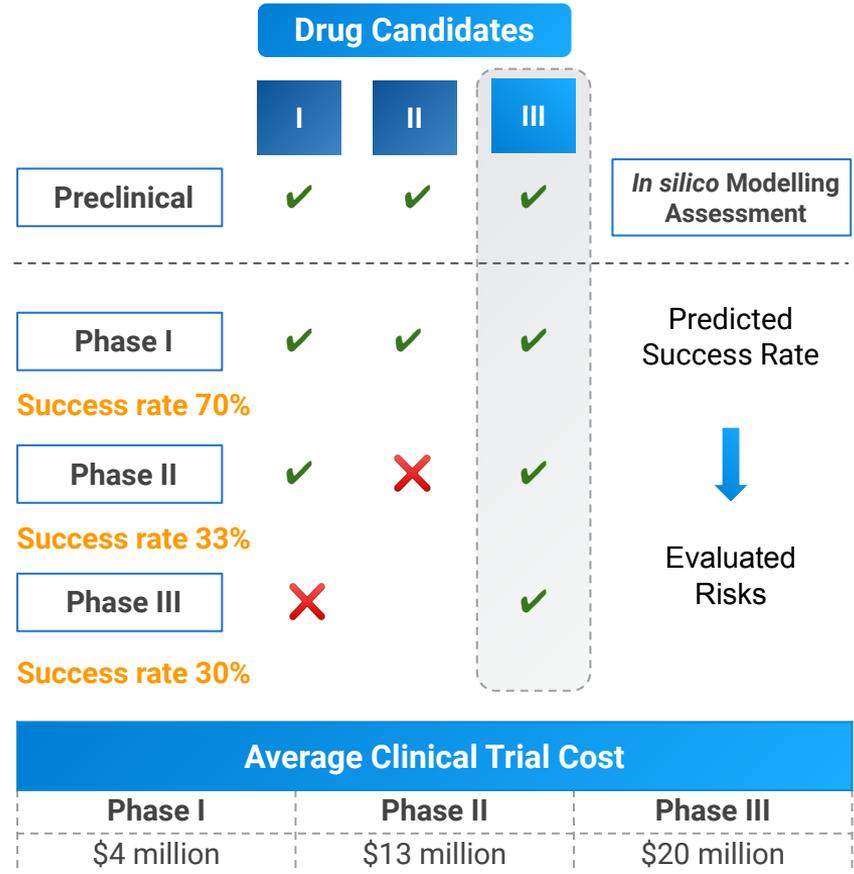
Our modern *in silico modelling* technologies can evaluate the real effects on human from start - which gives possibility to filter out not promising drug candidates from portfolio.

## Analysis of Biomarkers of Human Longevity

Picked biomarkers and their changes indicate a therapeutic target or possible effects of treatment for an individual.

## Digital Avatar

The technique is based on big data analysis and creation of virtual system which replicates health state of real people.



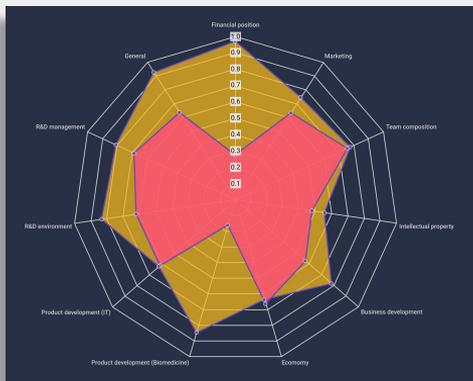
# Automated SWOT Analysis for Market Validation of Candidates for Listing

- Automated SWOT Analysis provides the performance scoring, which allows making decisions on the readiness of an individual Longevity-focused company for the IPO.
- It also helps to compare the scoring of the given private company with the benchmark values, which are calculated based on the statistical data of the companies which went public before.
- Ultimately, the SWOT analysis allows identifying the pre-vetted mature companies able to demonstrate a successful track record in future.

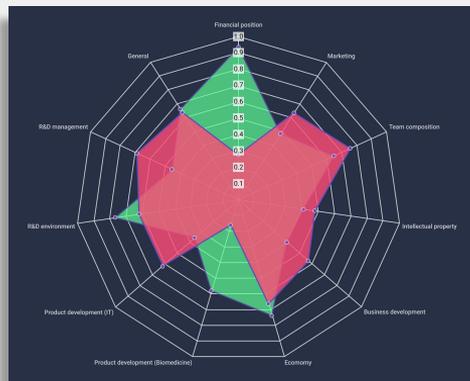
## Benchmark



## Recommended for Stock Exchange



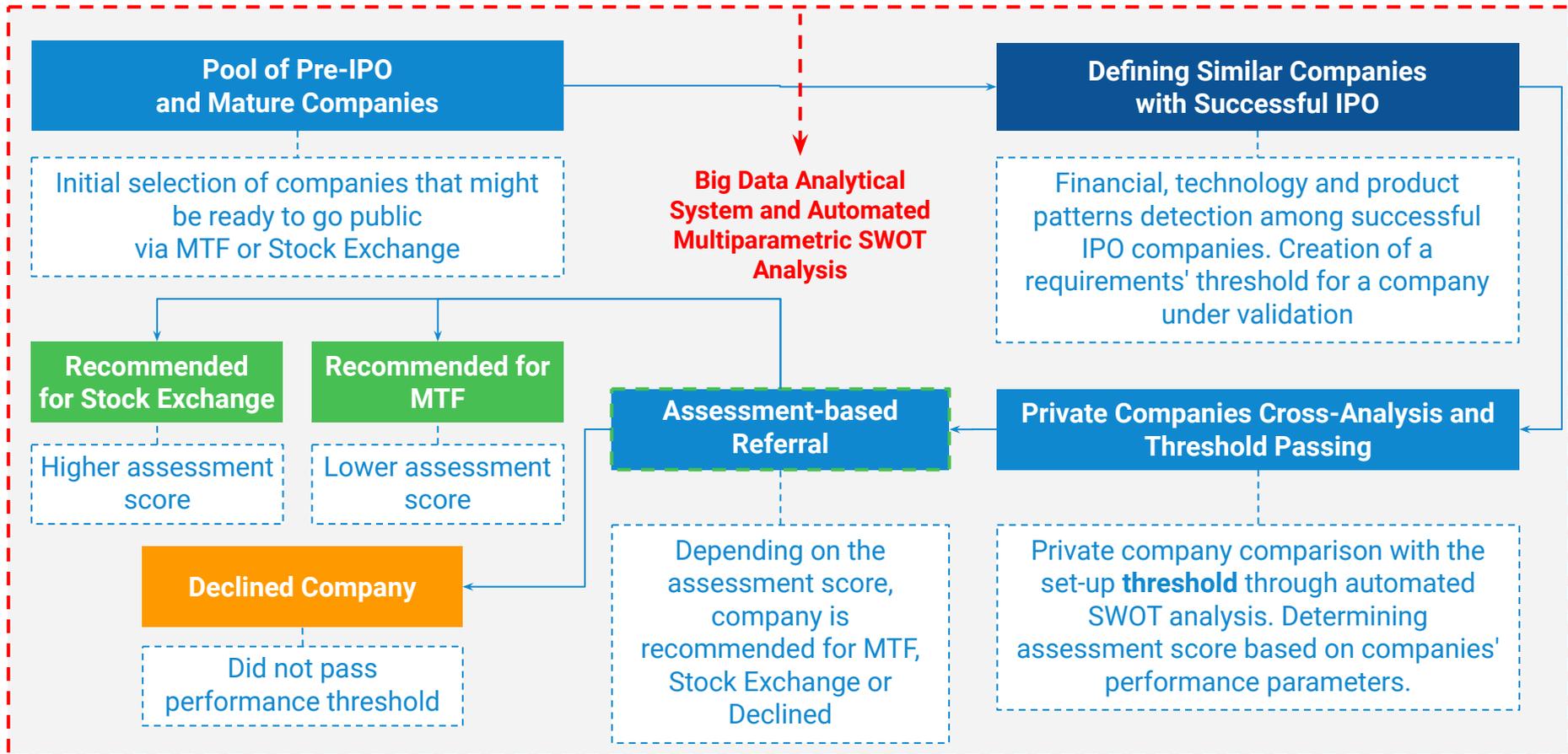
## Recommended for MTF



## Declined

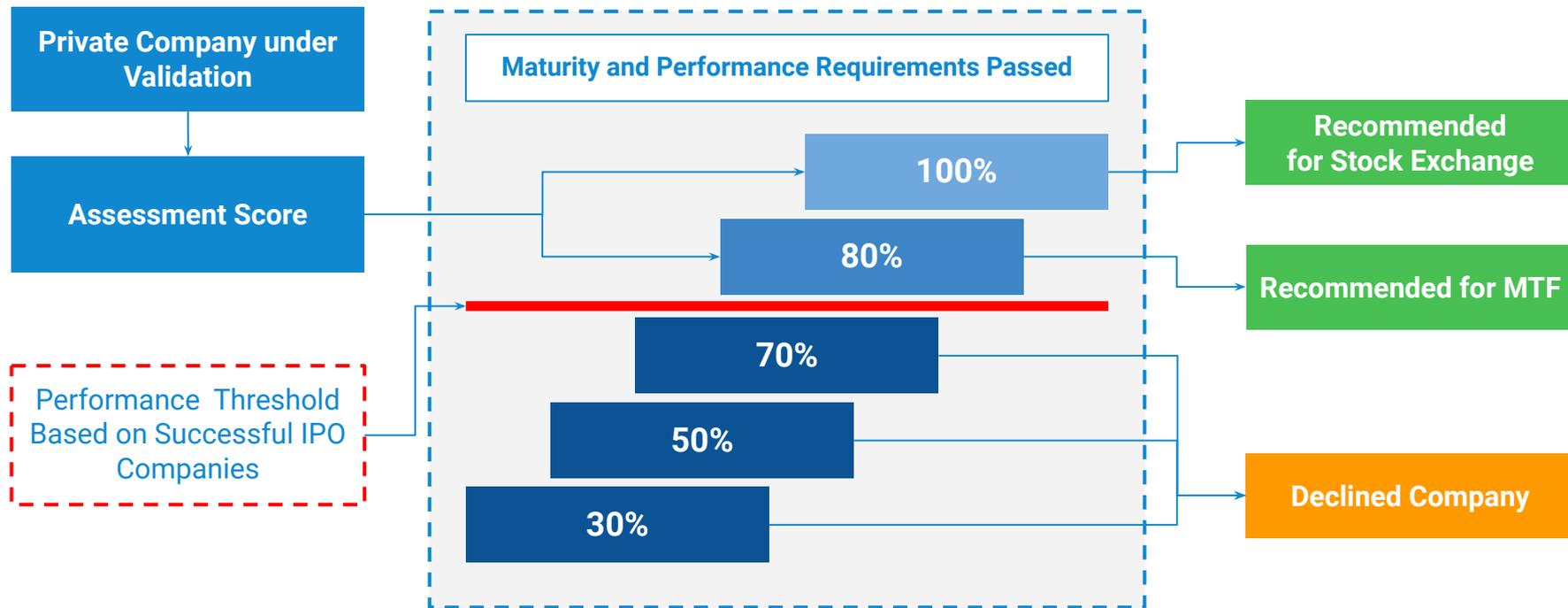


# Sophisticated Multiparametric Algorithm for Evaluating Listing Candidates



# Company Maturity and Performance Scoring for Public Capital Market Readiness

The comprehensive assessment of performance traction of a given mature company allows to provide recommendations on the listing decision and mechanism. The scoring threshold is defined based on the performance metrics of the companies focused on similar market segments having closed the public listing. Thus, such threshold allows making analytics-backed decisions on the proper way of seeking capital at public capital market.



# Longevity Financial Advisors Team



**Dmitry Kaminskiy**   
Head of Strategy



**Stefan Hascoet**   
Head of Swiss Operations



**Dominic Jennings**   
Head of Strategic Partnerships



**Kate Batz**   
Head of US Operations



**Emma Brodina**   
Head of Longevity Finance  
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**Ihor Kendiukhov**   
Head of Data Science



**Nikolay  
Vdovychenko**   
Legal Counsel



**Talgat Takiyev**   
Investor Relations  
UK and EU

# Key Components of the Project

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The successful execution of the Longevity Stock Exchange project requires three fundamental components, and **Deep Knowledge Group is the only entity in the world in possession of all three:**

## 1. Long-Term Industry Expertise

Deep Knowledge Group was the first entity to formulate a comprehensive, full-scope Longevity Industry Framework, to precisely and tangibly define the industry, and to even coin and popularise the term 'Longevity Industry'. The Group is also the owner of the largest Longevity Industry Database in the world (60,000 companies, 14,000 investors and 1,200 R&D hubs across 20 segments and 160 subsegments, covering over 18 million total data points).

## 2. Specialised Validation Framework

Longevity thematic stock exchange will require a very specialised framework for validating candidate companies seeking to be listed on the exchange, to ensure that the exchange is limited to companies with extremely high-quality core assets (underlying R&D, management team track record, intellectual property, etc.).

## 3. Market Intelligence and Big Data Analytical System

Deep Knowledge Groups Longevity Industry Big Data Analytical System represent the most sophisticated and technologically robust tool for market intelligence and industry monitoring which, when integrated into the thematic exchange, will provide a unique feature and strategic advantage for attracting additional players into the exchange.

# What We Are Seeking

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Deep Knowledge Group is looking for established exchanges and strategic partnerships to form a thematic market segment for the HealthTech Longevity industry, leveraging our expertise and network to foster the development and growth of companies in the most innovative and complex frontier sector in the market:

- 1. Operate as a market segment under an established stock exchange**
- 2. Operate under the umbrella of an existing exchange as a separate entity**

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# Longevity Financial Advisors

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