Aging Analytics Agency's response to the World Health Organization's Draft Zero proposal for the Decade of Healthy Ageing

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The following text is the basis of online form content for the World Health Organization's Draft Zero proposal for the Decade of Healthy Ageing. It contains within it constructive suggestions for further developing the proposal.

Aging Analytics Agency commends the World Health Organization for their recognition of the global demographic challenge and their identification of possible areas of intervention.

This consultation comes at a critical time for the technology sectors capable of addressing these concerns, and having reviewed the WHO's Decade of Healthy Aging - Draft Zero draft proposal, is Aging Analytics Agency's position that greater emphasis should be placed on the biotechnology sectors in seeking solutions.

We have therefore commented below on those sections of the draft proposal that require further attention.

A NEW CONTEXT NEEDS CONCERTED, SUSTAINED ACTION

In their Zero Draft document Decade of Health Aging 2020-2030, the WHO was correct to identify two aging-related global problems with economic and social consequences:

- A lack of productivity among the elderly working population.

- A lack of access to the basic resources necessary for a life of meaning and of dignity, with many others confront multiple barriers that prevent their full participation in society.

Here the WHO has identified what is frequently referred to by financial publications globally as "the silver tsunami" or "grey tsunami" : the economic and social devastation soon to be inflicted by a global aging demographic.

Furthermore the WHO is correct to identify the need for globally concerted action at a government level as the next step.

In the next section, Aging Analytics Agency describes a set of solutions to the silver tsunami, for which there already exist the components of a solution. What remains is their optimal assemblage, which requires some government coordination.

An assortment of national programs already exists across the globe for which explicitly seek to address the above-mentioned problem at various points in their development, ranging from investment in disruptive biotechnological innovations to urban planning solutions. Different governments offer a myriad of ad hoc initiatives for adapting to the demographic crisis, ranging in complexity from from local or municipal government plans, to national master plans, to industrial strategies.

They include:

- Lifestyle and Fitness Programs such as Japan's plans for an Ageless Society, whereby people aged 65 or older will not be automatically regarded as seniors but will be encouraged to stay healthy and work, remaining economically active.

- AgeTech programs, such as the Singapore Government's initiatives focused on smart-homes to improve elderly quality of life and wellbeing, and increasing their digital literacy.

- Residential master plans, such as the Seoul metropolitan government's "2020 Master Plan for the Aged Society" embracing the vision of Seoul as "a city whose citizens enjoy healthy and active lives of up to 100 years" under the banner of an "age-friendly city".

- Initiatives for a preventive medicine approaches to ageing, such as the UK's genomic medicine service and Swiss Personalised Health Network.

- Continued investments in biotechnology basic research, gene therapy regenerative medicine.

These initiatives have been documented and compared extensively in Aging Analytics Agency's report *National Longevity Development Plans: Global Overview 2019 (First Edition)*, published online and first presented at the UK All-Party Parliamentary Group for Longevity in the UK in March.

This discoordinated scramble to react to the looming crisis demonstrates an encouraging degree of political recognition of the problem, the willingness to do something about it, and, to some extent, the means. Aging Analytics Agency does does indeed see a use for every type of solution covered by the report, but without proper coordination, none of it is sufficient to avert the impending crisis.

VISION, ADDED VALUE AND PRINCIPLES

Increased global longevity per se is a "problem of success", an inevitable consequence of sharp increases in sanitation, diet, health care, elderly care, and geriatric medicine, a set of changes which have occurred suddenly within the lifetimes of today's elderly.

We will not relinquish these gains, so what does the only logical alternative to the silver tsunami look like? In order to float rather than sink, Longevity must become an asset. And this means altering the nature of aging entirely, reducing the period of financially and socially inactive decrepitude at the end of life.

Specifically, it means utilizing technology to ensure that these longer lives are also healthy, productive, financially active lives, and creating a system of government frameworks and financial incentives to create and sustain this case of affairs.

Aging Analytics Agency foresees a future in which people alive today benefit from "low-hanging fruit" digital and biomedical technologies for facilitating longer, healthier working lives, which subsequently enable them to live to benefit from yet more advanced biotechnologies (such as those detailed below). The earlier biomedical innovations would consist of P4 medicine supported by data aggregated from advanced data infrastructures which include wearable devices. These would then give way to products of advanced geroscience such as effective geroprotector drugs, and eventually advanced rejuvenation biotechnologies (see "SENS Research Foundation"). This progression would be financed by continuous investment in a continuously reinvigorated aging workforce, themselves equipped with access to advanced financial technologies ("fintech for the elderly"), operating via proposed novel financial systems (specified in detail in *"Advancing Financial Longevity Industry"*).

The overall vision here is of a "longevity economy" powered by a longevity industry, run partly by and partly for the reinvigorated and rejuvenated eldery. In such a future, longevity becomes a source of economic dividends, **and the tsunami is averted**.

In all, the industry described above would specifically be comprised of four main sectors specified in our report series: Geroscience R & D, AgeTech (healthTech for the elderly), P4 medicine, and Novel Financial Systems.

The component of this industry which is conspicuously absent from Draft Zero, is any consideration of the prospects and benefits of the emerging biotechnologies covered by geroscience R & D, the following two in particular:

1) P4 (Personalized, Precision, Preventive, Participatory) medicine. This represents the ongoing shift away from treatment-based one-size-fits-all blockbuster drugs and towards increasingly personalized, precise, preventive, participatory treatments tailored to individual patient cases. It consists of leading-edge advanced biomedicine already at the level of practical, real-world implementation and use, but P4 is a manner of application that is the product of a clear history of paradigm shifts toward greater precision, personalization, prevention and patient participation, driven forward and enabled by advances in biomedicine, data science and AI. For example, as AI for R&D in drug discovery becomes more sophisticated, drugs will become more customized to specific diseases and even specific patients. Drug development companies will transition from the current form of blockbuster drugs (standard drug formulations applicable to many millions of patients) to P4 medicine, tailoring drugs to specific patient cases based on age, gender, ethnicity, state of health and genetics.

The first and second "P" in P4 Medicine stand for personalized and precision, which refers to the drugs and treatments that will be designed and applied using precise, individually-tailored methods of dosing, cocktail compositions of micro-dosages, and efficient methods of delivery, maintaining optimal states of health via continuous monitoring of disease-associated biomarkers, and micro-adjustments in therapeutic, lifestyle and behavioral regimes to normalize those biomarkers. Such advances also represent a move toward greater prevention (the third "P" in P4 Medicine), and a shift away from reactive treatment and towards optimized disease prevention applying micro-dosages of drugs, long before the underlying pathology develops into actual chronic disease. The fourth "P" in P4 Medicine stands for participatory, which refers to the increasingly active role that patients are taking in managing their own health, culminating in a

situation where citizens are empowered with the tools, approaches and services capable of enabling continual micro-adjustments to their behavioral, lifestyle and therapeutic regimens in response to continuous AI-empowered monitoring of micro-changes in biomarkers that measure state of health and predict risk of diseases long before their actual onset and progression.

These changes are already being embraced by the medical communities and healthcare systems of progressive countries. In coming years, as P4 becomes the new norm, the new definition of failure will be when patients are forced to get doctors involved. In a world in which P4 medicine triumphs, citizens will have no need to engage with doctors until the very end of life. Advances in P4 Medicine will converge and culminate in a new paradigm of Precision Health which denotes the continuous stabilization of health and the maximum-obtainable maintenance of a young biological age via the routine application of P4 medicine in response to ongoing fluctuations in biomarkers of aging and health.

The potential of P4 medicine is frequently underestimated or overlooked by governments precisely because P4 currently awaits government initiative in order to approach its full potential. The high degree of complexity involved with P4 necessitates innovative frameworks for general benchmarking and forecasting, to assess its technologies' and therapies' basic safety and efficacy. What is now needed therefore is big data analytics to develop optimal panels of biomarkers of aging and to determine what preventive medicine technologies are effective. Progress hereafter is less of a biotechnology problem (which requires us to wait on biotech breakthroughs), and more of a data mining, analysis and management problem. This, in turn, makes it a government problem to some extent, as only government-led initiatives would be capable of providing the necessary infrastructure for such a project on a national level. The use of AI in this area is already remarkably apparent, especially in places such as the UK, and Switzerland.

2) Regenerative medicine for aging, sometimes referred to with the neologism "rejuvenation biotechnology". This is the "repair approach" to aging which involves using regenerative medicine (the toolkit of technologies for repairing damaged tissues and organs) to repair what are already observed to be the manifest differences between old and young tissues (thus dealing directly with a well understood state of disrepair rather than the traditional approach of dealing with poorly understood metabolic processes). The technology of regenerative medicine, and the long-established science of biogerontology (research into the complex processes of aging, often with a view to eventually intervening in the processes themselves) are two small, disparate fields that had had no routine contact with one another until the mid 2000s. Until then there had been nothing to prompt discussion of a comprehensive strategy for restoring aged tissue using regenerative medicine, and the early proposals for such a strategy produced a great deal of awkward, oil-and-water debate among experts from each field. And because there are no theoretical limits on continuous repair, certain theoretical limits on human life extension no longer applied, and forecasters were placed in uncharted waters regarding predictions of healthy lifespans. This produced and mixed messages (some hype, some derision) in the media.

Governments underestimate the potential impact of regenerative medicine for aging because the approach itself remains poorly identified, and its rate of progress is itself largely a question of government willingness to launch a concerted effort to direct the world's scant regenerative medical resources toward tackling aging.

ACTION AREAS

But what precisely is the role of government in moving Longevity forward?

National initiatives: Governments are responsible for driving forward the development of many facets of the Longevity industry ranging from social care to the financial reforms described in this series' previous article, and also in developing and supporting the missing technological synergies, such as the integration of big data and healthcare, that currently serve as roadblocks for further industry growth. As one such example, in Switzerland the heterogeneity of health data infrastructures has delayed the development of a nationwide personalised health ecosystem as compared to countries with more homogenous national health systems. But a government strategy could and should be developed for rectifying this, and government could also intensively develop its geroscience, precision medicine and FinTech to a state so advanced that it propels Switzerland into a central role in the internationally competitive Longevity business ecosystem, where it can rise to become a global leader in the specific field of Longevity finance.

International initiatives: It is necessary for leading Longevity-progressive nations to establish intergovernmental initiatives that would leverage key strengths of different nations in order to launch programs that yield synergistic, multiplicative effects, enabling the sharing of key technologies, resources and experts.

Objectives:

Aging Analytics Agency recommends to the WHO the following initial steps be taken.

Formulate a realistic timeframe for increasing global HALE by 5 years: in a way that is realistic from a medical, technological and scientific viewpoint.

But in so doing they must should not fall into the trap of underestimating both the state of maturity of biotechnology, and the likely exponential rate of coming progress in precision medicine, and the extent to which further progress is largely a question of improving methods of data aggregation, analysis and management. In order to win the confidence and enthusiasm of both the global public and all relevant players, the objectives must be kept commensurate with the real unlocked potential of these technologies as they advance.

Projects for developing AI centres for Longevity utilizing advancements in AI and data mining, analysis and management in order to develop P4 solutions to optimize and strengthen both the health and the wealth of its citizens, giving them not only extra years of healthy life.

Currently, there are only 3 centres in the world actively trying to establish effective "AI Centres for Longevity". These include the US-based Buck Institute for Research on Aging, US-based Y Combinator, and the US-Hawaii AI Precision Health Institute, and while only the latter has actually succeeded in establishing such a centre in practice, other nations nonetheless have set precedents for further expansion. For example UK has already supported the development of 4 Centres for AI in Healthcare. We have proposed that the UK APPG for Longevity support the establishment of the first AI Centre for Longevity (Preventive Medicine and Biomarkers of Aging) at Kings College in 2019, along with its further development in 2020. It is an optimal location for this purpose because it has dedicated divisions and resources both for AI and for Longevity. Furthermore, being located in London, it is in an ideal physical location to engage in cross-sector and industry-academic collaboration. We recommend that the WHO regard this first centre as a case study to quantitatively assess the feasibility and practicality of using it as an example for the later establishment of leading AI Centres for Longevity in key metropolitan, industrial and academic R&D hubs globally.

Aging Analytics Agency's 2019 report "Precision Medicine Clinics Global Landscape Overview: Most Advanced Clinics, Technologies and Methods" can provide key strategic guidance on the establishment of leading AI Centres for Longevity, and assist in the specific structuring of the clinics technologies and methods.

Identification of governments with global leadership potential, and devise a framework and nomenclature for international coordination:

- Aging Analytics Agency has made this a specific area of focus over the past year and can assist with this.

- As demonstrated by Aging Analytic Agency's series of regional reports, and its recent National Longevity Development Plans Global Overview 2019, there is a great diversity of approaches between nations and regions to the global demographic crisis, as nations with vastly differing economies, political systems and scientific bases all converge upon the same problem.

- Not only is the global longevity industry technologically very mixed - each country and region has developed and integrated each of the industry's constituent technologies to varying degrees e.g. between the US, Singapore, and the UK, there is little to compare between the state of their industrial planning.

- Therefore, in order to coordinate global efforts, we expect it will prove necessary to:

- Determine what are the equivalencies between various government departments and ministries. For example, not every government department enti-

tled "Department of Industry", or something similar, has the same function internationally.

- Support the establishment of Longevity APPGs (or their equivalents) in other countries, depending on the political system of each specific country under consideration.

- Normalize the measure of progress globally by applying standardized metrics to the circumstances of each region.

- Minimise duplication of efforts.

- Ensure that each country is playing to its own specific strengths. Aging Analytics Agency can provide key guidance and insights on the specific areas of focus and expertise of each nation being considered.

- In order to achieve this, we believe in each nation it will be necessary to establish a Division for International Longevity Cooperation. This division would be served by a set of ambassadors, one per major region (a 'region' here would represent large relevant industrial sphere of influence, usually a nation-state or large region such as California). These ambassadors would need to have a great deal of insider knowledge, name recognition within the Longevity industry and its community of supporters, and also the resourcefulness to establish relations and cooperation with government officials, and their counterparts in other countries. Aging Analytics Agency has amassed large amounts of data on the Longevity industry's network of influencers and could assist with this selection process.

Aging Analytics Agency expect the United Kingdom in particular, with its detailed industrial strategy which explicitly identifies the "Aging Society" as a grand challenge, to utilize its status as a soft superpower, to gain the prestige of becoming a world leader in longevity strategy and policy.

But of course we would expect every other country to step up to the challenge.

We propose prioritising the establishment of relevant cooperative initiatives with the most Longevity-progressive countries, and with the countries that have the lowest gap between Life Expectancy and Healthy Life Expectancy.