

Catalyzing Innovation and Charting the Future of Healthy Longevity: Role of the National Academy of Medicine

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Keio Longevity Cluster Policy Dialogue



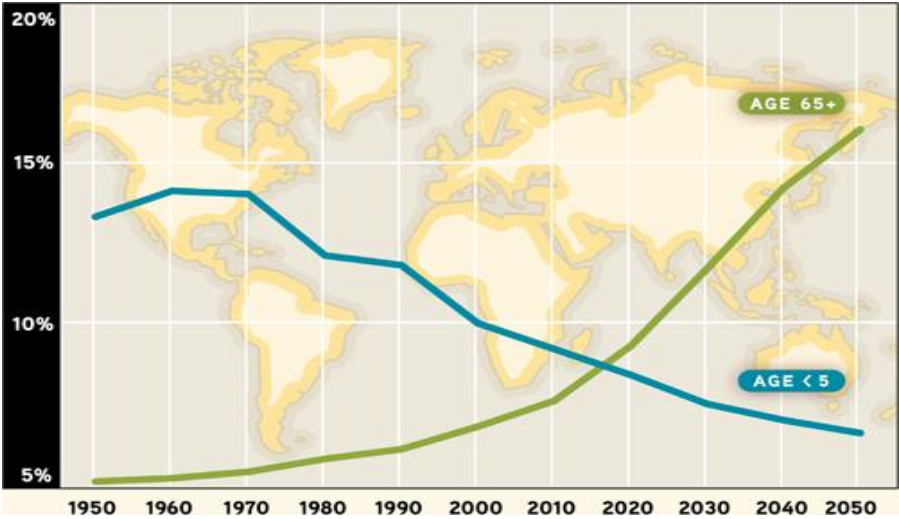
NATIONAL ACADEMY OF MEDICINE

Leadership • Innovation • Impact | *for a healthier future*

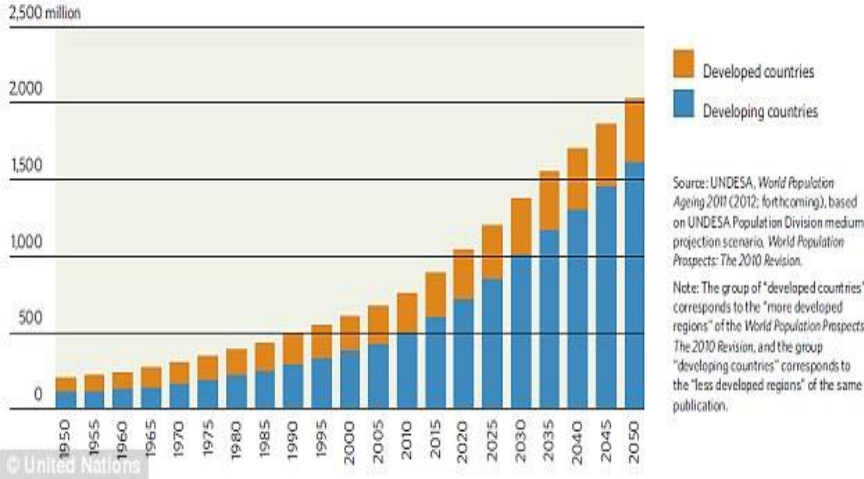
Decrease in global fertility rate

In 2050, ~16-17 % of global population (1.6 B people) will be 65+

In 2050, ~6% of global population will be under 5



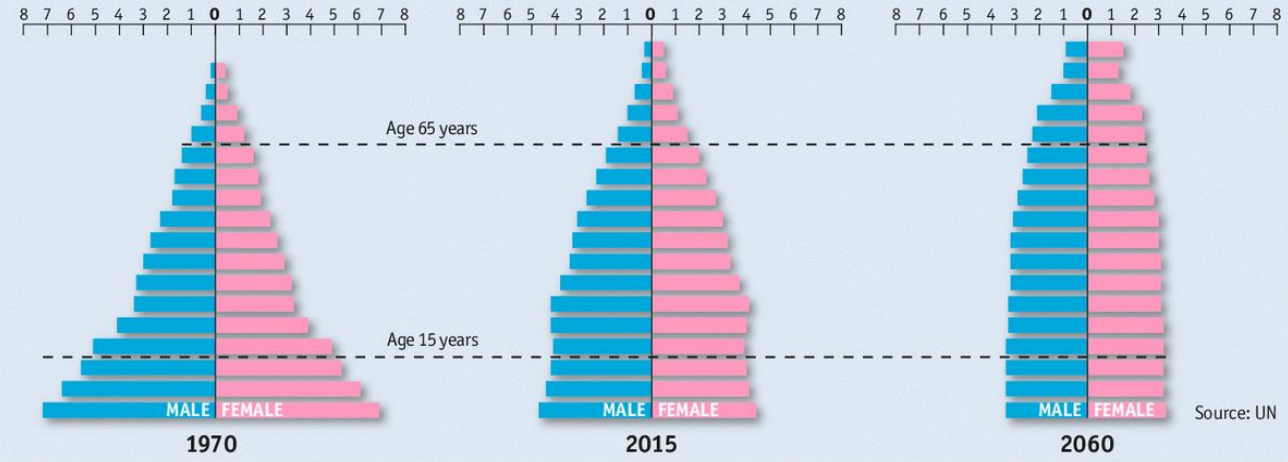
Number of people aged 60 or over:
World, developed and developing countries, 1950-2050



Source: UNDESA, World Population Ageing 2011 (2012, forthcoming), based on UNDESA Population Division medium projection scenario, World Population Prospects: The 2010 Revision.

Note: The group of "developed countries" corresponds to the "more developed regions" of the World Population Prospects: The 2010 Revision, and the group "developing countries" corresponds to the "less developed regions" of the same publication.

Global population, % of total



Source: UN

The “Silver Tsunami”

In both industrialized and developing countries, the rate of population aging stands to fundamentally impact how families, communities, societies, industries and economies function

- Infirmities: patterns and prevalence
- Health care delivery and financing
- Family structure and relationships
- Social infrastructure
- Social insurance and retirement programs
- Workforce size and composition



Aging and Healthy Longevity: A Global Grand Challenge

Global Aging Preparedness Index (CSIS and Global Age Watch) Results:

- Overall, very mixed levels of preparedness globally
- While some countries and governments have begun to act and are starting plan for the long-term, too many have not
- ***Preparing financially, socially, and scientifically for longer lifespans is a global imperative***

Source: Analyses from the Center for Strategic and International Studies and Global Age Watch





Healthy Longevity

Grand Challenge

Awards and Prizes

- **Catalyze breakthrough ideas that will expand the healthspan into later life.**
Convergence of biologic, social, engineering sciences and technologies.
- **Achieve transformative and scalable innovation in healthy aging and longevity.**
- **Build a broad ecosystem of support.**

Global Roadmap for Healthy Longevity

Comprehensive assessment of the challenges and opportunities presented by global aging, as well as the promising solutions and necessary directions for improving, health, productivity, and quality of life



How do we effectively prepare and better equip ourselves for aging and healthy longevity globally?

PERSONAL, SOCIAL, ECONOMIC & ENVIRONMENTAL DETERMINANTS



CLINICAL MEDICINE & HEALTH DELIVERY SYSTEMS



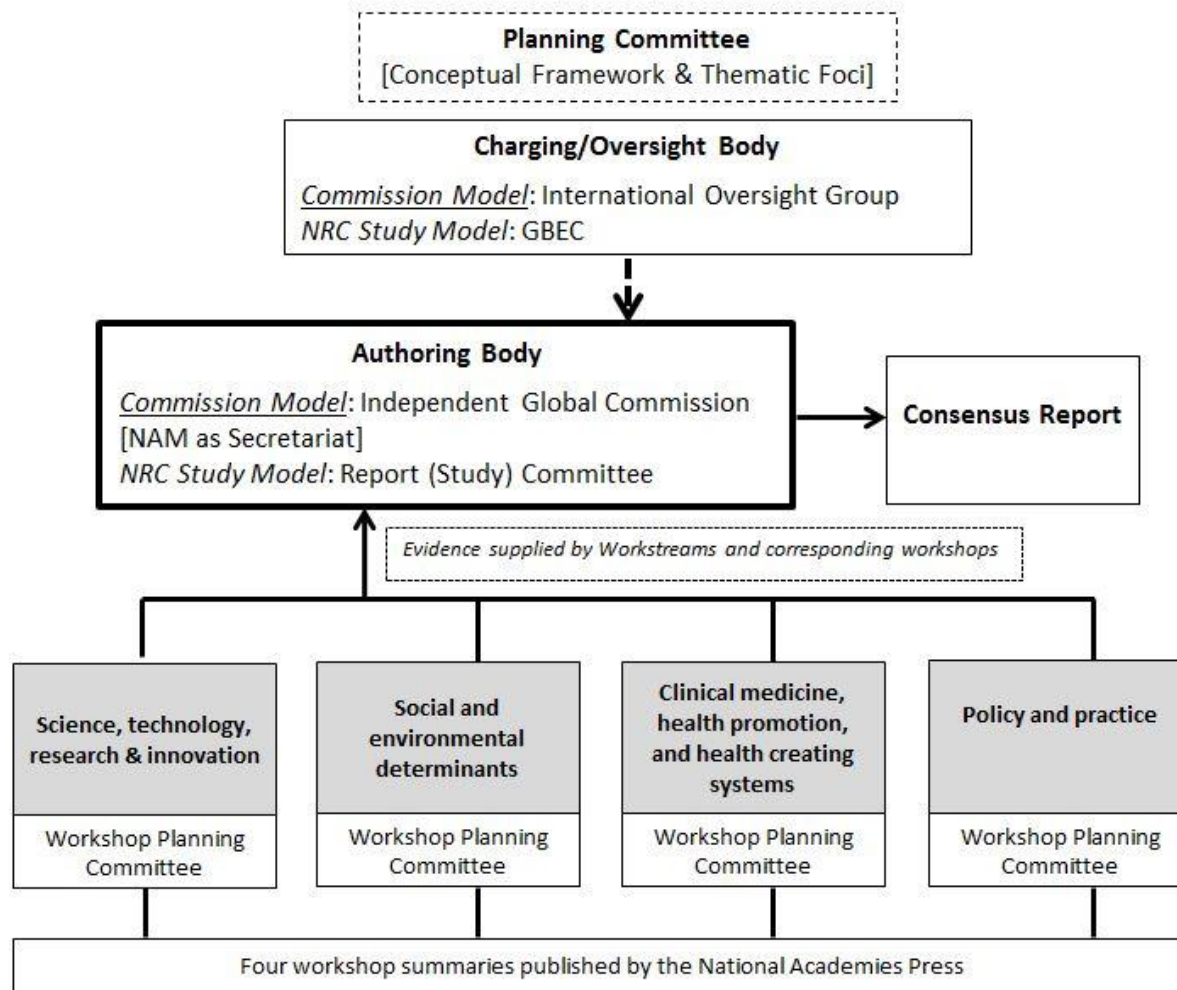
SCIENCE, TECHNOLOGY & INNOVATION



POLICY & PRACTICE



Global Roadmap for Healthy Longevity



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Extending the Healthspan: Opportunities in Science and Technology

- By delaying the biological processes associated with aging, we could prevent debilitating illness and disease, and loss of function
 - Several areas of promising research that have demonstrated that biological aging is, in fact, modifiable—and that, in some cases, health and/or lifespan can be extended
- Using technology to transform the way we age
 - Technology can help ease the activities of daily living and improve the quality and accessibility of healthcare for the elderly



Research and Technology to Transform Aging

Research on longevity and healthspan:

- Senescent cells and telomere dysfunction
- Mitochondrial DNA damage and dysfunction
- Autophagy
- Cellular regeneration
- Longevity genes
- Molecular pathways (mTOR, NAD precursors and sirtuin activators)
- Epigenome / epigenetic clock

Current and future technologies:

- Emergency response pendants
- Telehealth
- Remote patient monitoring
- Robot care givers and companions
- Wearable robotic systems and exoskeletons
- Smart homes
- Autonomous vehicles
- Virtual reality
- Artificial intelligence



Despite Progress, More is Needed

- Aging research is underfunded
 - US: Only 5% of NIH budget in 2017 went to aging research
 - one quarter of that going to support cancer research and a third of funding for heart disease.
- Aging research is focused mainly on
 - Geriatric care
 - Biology of model organisms
- Innovation is targeted toward younger populations
- Need to make aging research cool
- Need to jumpstart the field and bring together different disciplines in convergence
- Huge market



Challenge Prizes and Awards

The art and science of pushing and pulling innovation



BILL & MELINDA
GATES *foundation*



MacArthur Foundation



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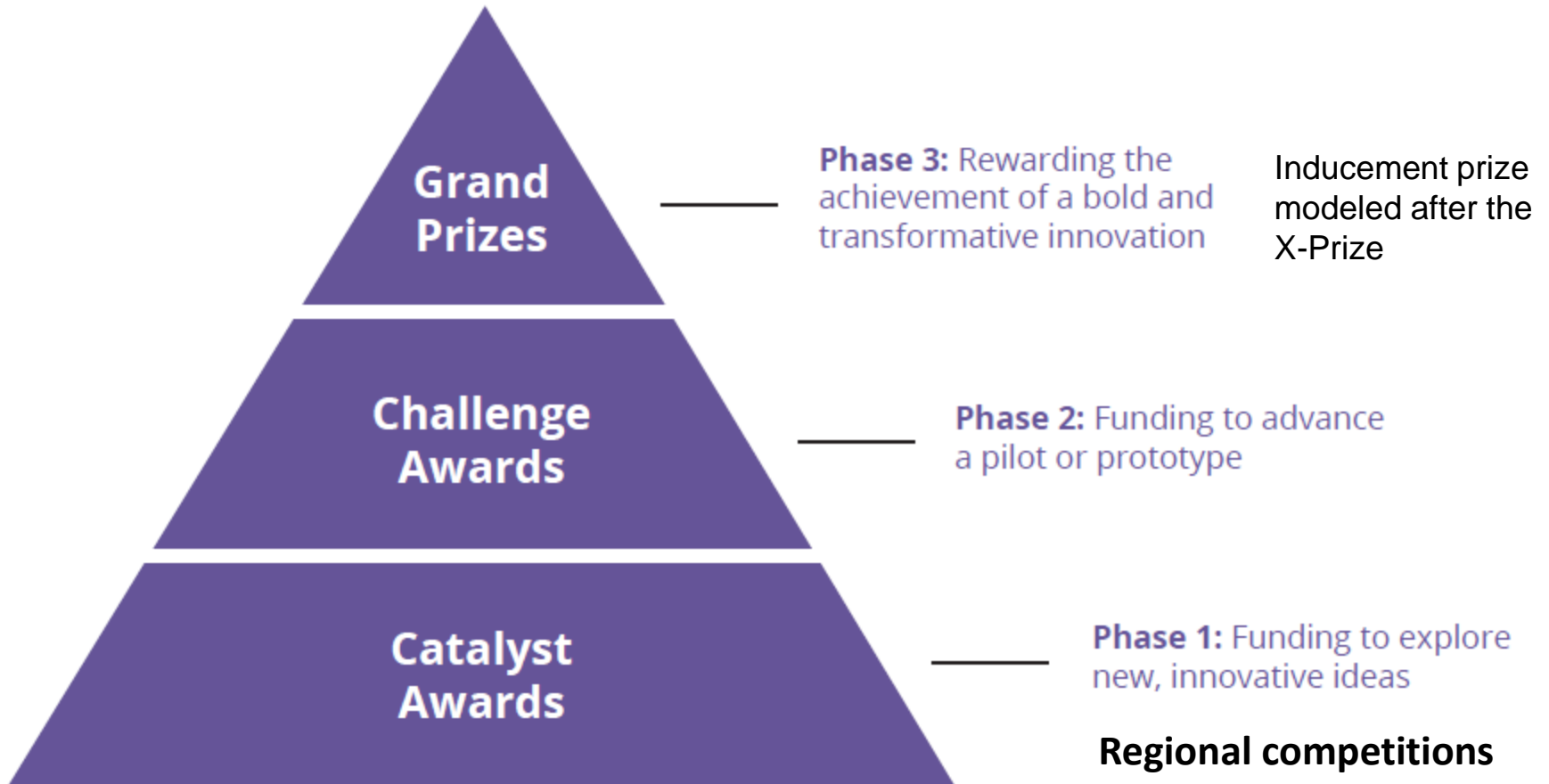


NAM Healthy Longevity Prizes and Awards

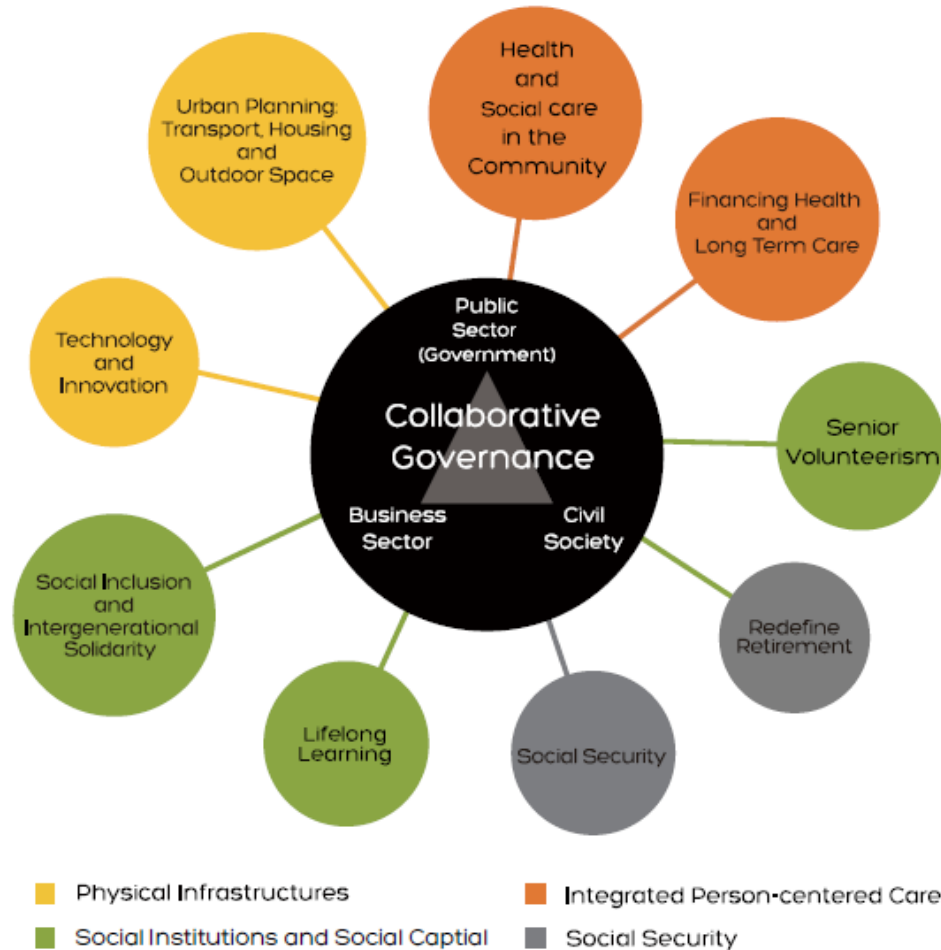
- **Catalyze breakthrough ideas and research that will expand the healthspan into later life.**
- **Achieve transformative and scalable innovation in healthy aging and longevity by translating evidence into action.**
- **Build a broad ecosystem of support.** Globally, engage new minds to enter the field and work together including scientists, engineers, innovators, entrepreneurs, health leaders, policy makers, and the public.



Global Competition: Design Framework



A Vision for Healthy Longevity



Source: Adapted from World Health Organization (2015)

Source: Yeoh, E.K. and L.H.Y. Angel, 2017

Thank you

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