

Lecture of ME567A Gerontechnology, Yuan Ze University

The scope of gerontechnology



Yeh-Liang Hsu, Ph.D

Professor, Department of Mechanical Engineering

Director, Gerontechnology Research Center

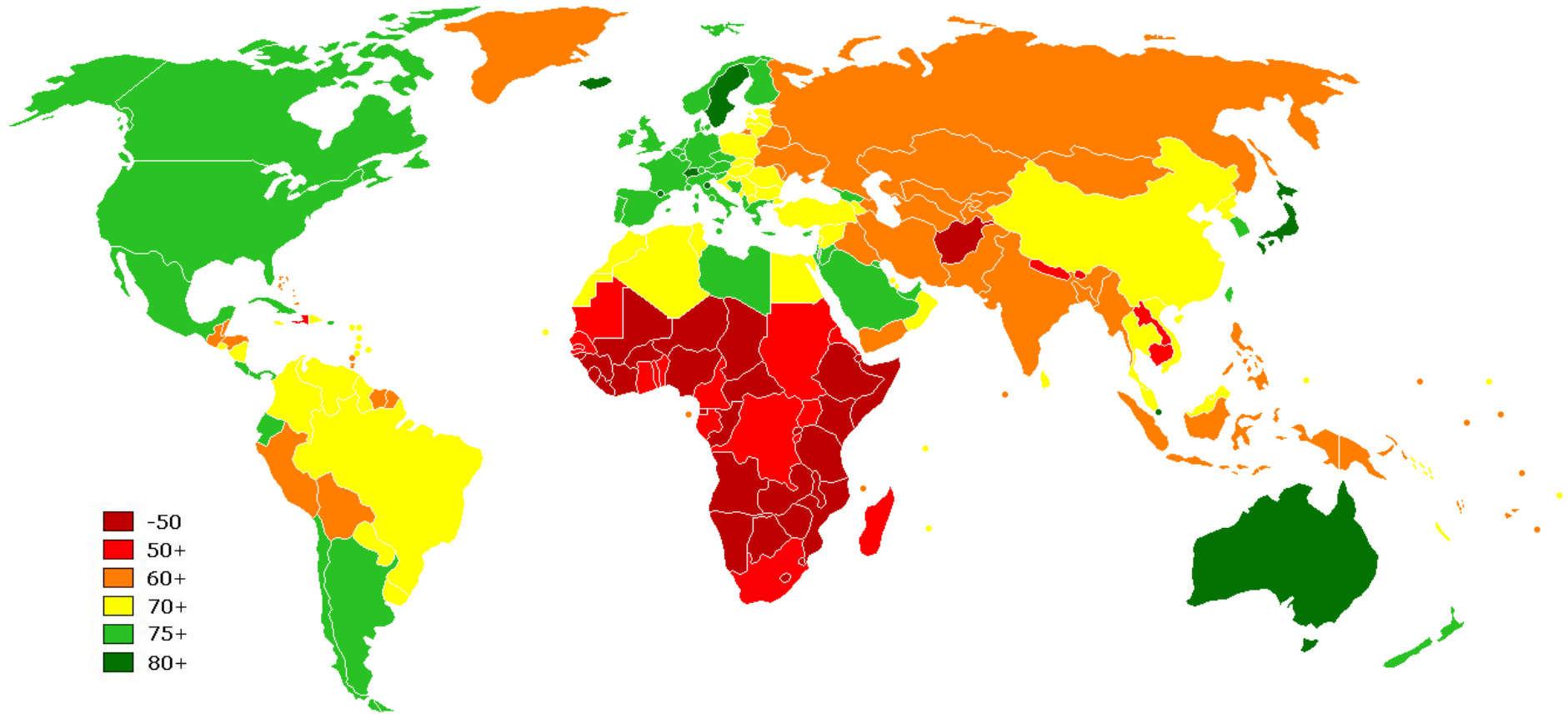
Secretary General, Yuan Ze University

03/15/2010

Demographics

- ✓ **Life expectancy** is the expected (in the statistical sense) number of years of life remaining at a given age.
- ✓ **Life expectancy at birth** in Taiwan
 - 1951: Male 57.4, female 60.3
 - 2008: Male 75.6, female 82.0
- ✓ Life expectancy at 65 in Taiwan: Male 17.41, female 20.45
- ✓ The UN defines an “**aging society**” as a country where 7% or more of the population is aged 65 years or older, an “**aged society**” as a country where 14% or more of the population is aged 65 years or older, and a “**super aging society**” as a country where 20% or more of the population is aged 65 years or older.
- ✓ Taiwan has fit that definition of aging society since 1993, and is projected to become an aged society in 2018, a super aging society in 2026.

Life Expectancy World Map



Percentage of Population 65 Years or Older

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Taiwan	7.9	8.1	8.3	8.5	8.6	8.8	9.0	9.2	9.5	9.7	10.0	10.2
India	4.2	4.2	4.3	4.4	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1
Singapore	6.4	6.5	6.6	6.7	6.8	7.0	7.4	7.7	8.0	8.2	8.5	8.5
Japan	15.1	15.7	16.2	16.7	17.4	18.0	18.5	19.0	19.5	20.2	20.8	21.5
China	6.3	6.4	6.6	6.8	6.9	7.1	7.2	7.4	7.5	7.6	7.7	7.9
S. Africa	4.2	4.3	4.3	4.3	4.4	4.6	4.7	4.8	4.9	5.0	5.1	5.2
USA	12.7	12.6	12.5	12.5	12.4	12.4	12.4	12.4	12.4	12.4	12.5	12.6
Brazil	4.8	4.9	5.0	5.2	5.3	5.4	5.5	5.6	5.8	5.9	6.0	6.1
Sweden	17.4	17.4	17.4	17.3	17.3	17.2	17.2	17.2	17.2	17.3	17.4	17.5
UK	15.7	15.7	15.7	15.6	15.6	15.8	16.1	16.0	16.0	16.0	16.0	16.0
Germany	15.6	15.7	15.9	16.1	16.4	16.9	17.3	18.0	18.6	19.3	19.8	20.1
France	15.1	15.3	15.5	15.7	15.8	15.9	16.0	16.1	16.2	16.2	16.2	16.4
Italy	16.9	17.2	17.5	17.7	18.0	18.7	19.0	19.2	19.5	19.7	19.9	20.0
Australia	12.2	12.2	12.3	12.4	12.4	12.5	12.6	12.7	12.8	13.1	13.0	13.2

Aging Index: 65 and older / 14 and under

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Taiwan	34.0	35.7	37.6	39.4	40.9	42.3	44.2	46.6	49.0	52.1	55.2	58.1
India	12.0	12.3	12.5	12.8	13.1	13.4	13.8	14.1	14.5	15.0	15.4	15.9
Singapore	28.3	29.0	29.9	30.7	32.7	32.3	38.9	36.9	39.8	41.2	43.9	45.1
Japan	96.6	102.0	107.6	113.0	119.1	125.1	130.5	135.8	140.3	145.8	152.6	158.8
China	26.8	28.2	30.6	31.9	27.3	28.7	30.1	31.8	33.6	35.6	37.1	38.5
S. Africa	11.9	12.3	12.2	12.6	13.1	13.7	14.3	14.9	15.5	16.1	16.8	17.4
USA	58.1	58.1	58.1	58.0	58.1	58.4	58.6	59.0	59.6	60.4	61.4	62.2
Brazil	15.5	16.2	16.8	17.4	18.0	18.7	19.3	20.1	20.8	21.4	21.9	22.6
Sweden	92.9	93.2	93.3	93.5	93.9	94.6	95.2	96.4	98.2	100.3	102.1	104.3
UK	81.5	81.5	81.7	81.6	82.3	84.1	85.8	87.1	88.2	89.2	90.2	91.2
Germany	96.9	98.3	99.9	102.2	105.4	109.4	113.8	122.2	128.9	136.2	142.5	146.4
France	76.9	78.7	80.5	81.7	82.9	83.6	84.5	85.9	86.9	87.3	87.4	89.0
Italy	115.5	118.8	121.9	124.8	127.3	131.4	133.8	135.9	137.8	139.9	141.7	142.8
Australia	56.5	57.1	57.8	58.6	59.5	60.6	61.6	62.6	63.8	67.1	66.5	67.9

Aging and Technology

- ✓ We are in the midst of two striking trends: Widespread population aging and rapid diffusion of technology. Both Phenomena are very new in human history.
- ✓ Aging often comes with the decay in ability, health, and social and economical resources, while technology has the potential to improve one's ability, health and quality of life.
- ✓ It is only natural to consider using technology to solve the various problems of the aging society.

“Now we have added so many years to a life, how can we add more life to those years?”

Gerontology (from Wikipedia)

- ✓ Gerontology (from Greek: γέρων, geron, "old man" and -λογία, -logy, "study of") is the study of the social, psychological and biological aspects of aging. It is distinguished from geriatrics, which is the branch of medicine that studies the disease of the elderly.
- ✓ Gerontology includes these and other endeavors:
 - studying physical, mental, and social changes in people as they age;
 - investigating the aging process itself (biogerontology);
 - investigating the interface of normal aging and age-related disease (geroscience);
 - investigating the effects of our aging population on society, including the fiscal effects of pensions, entitlements, life and health insurance, and retirement planning;
 - applying this knowledge to policies and programs, including a macroscopic (i.e. government planning) and microscopic (i.e. running a nursing home) perspective.

Gerontechnology: Origin and Definition

- ✓ August 1991, First International Congress on Gerontechnology in Eindhoven Netherlands, established the research structure of Gerontechnology [Bouma and Graafmans, 1992]: **mobility, transport and motor performance, communication, information processing and cognitive performance, housing, home health care technology.**
- ✓ Graafmans and Bouma, Eindhoven University of Technology, 1993:
“Gerontechnology includes the research and development of techniques and technological products, based on the knowledge of aging processes, for the benefit of a preferred living and working environment and adapted medical care for the elderly.”

International Society for Gerontechnology (ISG)

✓ Established Sep. 1997

Designing technology and environment for independent living and social participation of older persons in good health, comfort and safety.

Mission

“ISG encourages and promotes technological innovations in products and services that address older peoples' ambitions and needs on the basis of scientific knowledge about ageing processes including cultural and individual differences.”

Vision

“ISG works toward the realization of a society fully served by technology that is as accessible to ageing people as it is to people in younger generations.”

International Society for Gerontechnology

Values

Innovative technology that serves an enabling role for ageing people by:

- Maintaining their independence and equality including considerations of residence, mobility, safety, security, communication, activities, and quality of life
- Supporting their well-being and health as defined by the WHO
- Realising their individual and collective/social ambitions and needs
- Keeping them embedded in their changing socio-cultural environment
- Enhancing their dignity
- Supporting their caregivers

The Scope and Opportunities of Gerontechnology (I)

- ✓ Gerontechnology is an interdisciplinary academic and professional field combining gerontology and technology [Wikipedia].
 - Gerontechnology: biology and physiology, psychology and social psychology, sociology and demography, medicine and rehabilitation
 - Technology: architecture and building, information and communications, mechatronics, Robotics, industrial design
- ✓ Categories of interest of the international journal “Gerontechnology” published by ISG since 2001: health, housing, mobility, communication, leisure, and work.



The Scope and Opportunities of Gerontechnology (II)

✓ Technology Needs of Aging Boomers:

- Lifelong transportation
- Healthy home
- Personal communications
- Productive workplace
- **Support the caregivers** [Coughlin, 1999]

✓ Aging at home and Active aging

- WHO: **Active aging** is the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age [2002].

The Scope and Opportunities of Gerontechnology (III)

- ✓ The overall framework of gerontechnology may be seen as a matrix of **domains of human activities** and **technology interventions** or impact levels [Wikipedia]:

	health & self-esteem	housing & ADL	communication & governance	mobility & transport	work & leisure
enhancement & satisfaction					
prevention & engagement					
compensation & assistance					
care and care organization					

Technological Interventions

Human Activities



元智大學
Yuan Ze University



Thank You

Yeh-Liang Hsu
mehsu@saturn.yzu.edu.tw

<http://grc.yzu.edu.tw/>
<http://designer.mech.yzu.edu.tw/>