

Supporting the Development of Gerontechnology as Part of Silver Economy Building

Klimczuk, Andrzej

Veröffentlichungsversion / Published Version

Zeitschriftenartikel / journal article

Empfohlene Zitierung / Suggested Citation:

Klimczuk, A. (2012). Supporting the Development of Gerontechnology as Part of Silver Economy Building. *AD ALTA: Journal of Interdisciplinary Research*, 52-56. <https://nbn-resolving.org/urn:nbn:de:0168-ssoar-418257>

Nutzungsbedingungen:

Dieser Text wird unter einer Free Digital Peer Publishing Licence zur Verfügung gestellt. Nähere Auskünfte zu den DiPP-Lizenzen finden Sie hier:
<http://www.dipp.nrw.de/lizenzen/dppl/service/dppl/>

Terms of use:

This document is made available under a Free Digital Peer Publishing Licence. For more information see:
<http://www.dipp.nrw.de/lizenzen/dppl/service/dppl/>

SUPPORTING THE DEVELOPMENT OF GERONTECHNOLOGY AS PART OF SILVER ECONOMY BUILDING

^aANDRZEJ KLIMCZUK

*Collegium of Socio-Economic Policy, Warsaw School of Economics, al. Niepodległości 162, 02-554 Warszawa, Poland
email: "aklimczuk@gazeta.pl"*

Abstract: The concept of the "silver economy" is one of the complex response trials to the challenges of ageing societies. Its key objective is to bring goods and services to meet the needs of older people through gerontechnology. Article approximates relationships between technology and ageing and the main features of silver economy and gerontechnology. It is supplemented by examples of support efforts to promote gerontechnology including: (1) documents and strategic programs, (2) network organizations and clusters, (3) research and development institutions. Essay draws attention to the development of solutions such as: strategies for innovation, welfare clusters, regional silver economy networks, research institutions such as "agelab" and cultural institutions "medialab". Study indicates directions for further research.

Keywords: ageing policy, silver economy, gerontechnology, robotics divide, welfare clusters, agelab, medialab.

1 Introduction

The main purpose of this article is to embed gerontechnology, as a new paradigm of research and implementation, in the context of the "silver economy". It is assumed that this approach allows to reduce the negative impacts of an ageing population through public interventions based on the achievements of scientific and technical progress. Silver economy is an economic system oriented on adjusting the spheres of production and distribution of goods and services to the needs of older people and younger generations that are entering the ageing process. After discussing relationships between technology and the ageing of the population, main features of silver economy and gerontechnology will be described. The next point is analysis of good practices in supporting technologies related to ageing and older people that shows some new organizational and institutional solutions. Article will show selected recommendations for practice and possible areas for further research.

2 Technologies and ageing – complex relations

With changes in technology is also associated used nowadays burden (dependency) ratio of working age population by the retirement age population. It is assumed that its growth shows the negative and potential conflict changes in social relations¹. However at the beginning of the XXI century, scientists are moving away from that "apocalyptic demography"². In fact in developed countries, improving the health of seniors and increasing their awareness and social activity, were observed. Burden ratio has been criticized because it does not take into account the potential of technological innovations, as automation and robotics³. These technologies not only allow a longer share of older people in the labor market, but also in partial to labor shortages by increasing the productivity at work and to replace many physical activities – in particular, the tasks identified as "4D": *Dull, Dangerous, Distant and Dirty*⁴.

In Europe, in the coordination of action against ageing, an important role plays: United Nations Economic Commission for Europe (UNECE) and Organization for Economic Co-operation and Development (OECD). R. Ervik analyzing their concepts – respectively: "society for all ages" and "live longer, work longer" – points out that they ignore the technological innovation and do not

include the potential to solve the problems of ageing populations⁵. These concepts assign too much importance to dependency ratios – these rates are indicative of reforms, but ignore the available technology, and thereby leads to inadequate recommendations and activities of public entities⁶.

R. Ervik also argues that one of the challenges in an ageing populations is a phenomenon of "robotics divide". It concerns the unequal access to automation and robotics for countries, regions and local communities, individuals and groups⁷. These divisions may designate a new dimension of social stratification generally referring, not so much to have access to the same technology, as to the facilities offered by it in the performance of activities of daily living. Taking into account changes in technology can contribute not only to a better understanding of the risks from robotics divide, but also to build a more optimistic public policies and future scenarios.

3 Silver economy and gerontechnology

In 2007, the European Commission proposed a European Union countries implementing reforms towards building a "silver economy". It was assumed that this is a concept relating to the "combination of good supply conditions (high levels of education, R&D, responsive and flexible markets) and the growing purchasing power of older consumers offers a huge new potential for economic growth"⁸. It is recognized that this is not one sector, but rather a set of products and services from many existing sectors including information technology, telecommunications, financial sector, housing, transport, energy, tourism, culture, infrastructure and local services and long-term care. P. Enste, G. Naegele and V. Leve agree: "silver economy should not be regarded as an own economic sector but rather as a cross-section market, in which numerous industrial sectors are involved"⁹. This phrase is sometimes used alternatively with the term "silver market," which appeared in the early 70s XX century in Japan, with a gradual increase in available facilities for older people. It is a market segment that contains goods, values and services to wealthy individuals over 50., as well as special solutions in trade between economic operators to enable them to adapt to an ageing workforce. Silver market also contains ideas of "universal" and "intergenerational" design. P. Enste, G. Naegele and V. Leve distinguished fourteen silver market segments¹⁰.

The starting point in the creation of strategic programs aimed at the silver economy building should be analysis of the possibility of different production spheres and goods and services distribution. It is important to integrate and stimulate the activity of entities from different sectors, taking into account the characteristics of each country and region. Equally important

⁵ R. Ervik, *A Missing Leg of Ageing Policy Ideas...*, *op. cit.*, p. 20-21.

⁶ *Ibidem*, p. 6-7, 11-14.

⁷ *Ibidem*, p. 22.

⁸ *Europe's demographic future. Facts and figures on challenges and opportunities*, European Commission, Luxembourg 2007, p. 96.

⁹ P. Enste, G. Naegele, V. Leve, *The Discovery and Development of the Silver Market in Germany*, [in:] F. Kohlbacher, C. Herstatt (eds.), *The Silver Market Phenomenon. Business Opportunities in an Era of Demographic Change*, Springer, Heidelberg 2008, p. 330.

¹⁰ Segments of silver market are: (1) IT applications in inpatient and outpatient care; (2) smart living, housing adaptations and supported living services, increasingly on an IT-basis; (3) promotion of independent living, likewise increasingly on an IT-basis; (4) gerontologically relevant areas of the health economy, including medical technology and e-health, hearing and seeing aids technology, dental prosthetics and orthopaedics; (5) education and culture in "response" to higher levels of education and more spare time; (6) IT and media, in particular in conjunction with other market segments such as health, the promotion of independence and security; (7) service robotics, especially in combination with the promotion of independent living in the case of older people with severe health constraints; (8) mobility and the promotion of mobility, e.g. car traffic safety; (9) recreation, travel, culture, communication and entertainment; (10) *Fitness and wellness* in response to the higher health awareness particularly of the "younger old"; (11) clothing and fashion to document social integration; (12) services facilitating everyday life and other home services; (13) insurance coverage, especially with regard to age-specific "risks"; (14) financial services "sensitive to demography", especially in the area of capital protection, wealth maintenance and dissaving counselling. See: P. Enste, G. Naegele, V. Leve, *The Discovery and Development...*, *op. cit.*, p. 330-331.

¹ A. Klimczuk, *Bariery i perspektywy integracji międzypokoleniowej we współczesnej Polsce*, [in:] D. Kaluza, P. Szukalski (eds.), *Jakość życia seniorów w XXI wieku z perspektywy polityki społecznej*, Wyd. Biblioteka, Łódź 2010, p. 92-107.

² P. Szukalski, *Zagrożenie czy wyzwanie - proces starzenia się ludności*, „Polityka Społeczna” 9/2006, p. 7-9.

³ R. Ervik, *A Missing Leg of Ageing Policy Ideas: Dependency Ratios, Technology and International Organizations*, ESPAnet, Urbino, 17-19.09.2009, www.espanet-italia.net/conference2009/paper/15%20-%20Ervik.pdf [10.11.2012], p. 6-7, 11-14.

⁴ *Ibidem*, p. 9-10.

issues are: consideration of the internal diversity of elderly social category; development of marketing to older people; meeting the needs of poorest elderly; empowerment representing the interests of older consumers; products and services development based on dialogue; development of user-friendly design; promotion of consumer rights among the elderly¹¹. Particularly important is the coordination of these activities with regard to actions of public sector, commercial and non-government entities in technology transfer field. It is reasonable to take into account four barriers to construction of regional silver economies¹². It is important to undertake a top-down and bottom-up efforts to build social capital of older people and to adapt infrastructure to the needs of local senior citizens¹³.

Gerontechnology is a key element of the silver economy. The author of this term is J. Graafmans¹⁴. His colleague H. Bouma clarified the definition recognizing that this is a: "study of technology and aging for the improvement of daily functioning of the elderly"¹⁵. This science has an interdisciplinary approach compatible with the sustainable development and combining research, design, production and marketing. Since the first international congress of gerontechnology in 1991 five directives were recognized: (1) preventing problems; (2) increasing the opportunities for self-dealing with problems without changing the skills and environment; (3) compensating for the loss of the option when facility is not able to supply; (4) providing care only when needed, (5) the study and improvement of existing designs¹⁶. History of institutional gerontechnology as a science and practice, however, dates back to the 70s XX and research on the basis of ergonomics, gerontology, geriatrics and urbanism¹⁷. Today it is also linked to environmental and developmental psychology, nursing, medicine, rehabilitation, architecture, and data processing and telecommunications. International Society for Gerontechnology played a key role in popularizing the field in 1997¹⁸.

At the core of gerontechnology lies the knowledge about the biological and psychological human development¹⁹. Many products, services and spaces no longer perform its function for elderly. These are for example too small buttons, letters, foreign terms, symbols, complex instructions, blurred colors, codes and passwords, bulky architectural barriers. Gerontechnology research cover five main areas: (1) health and dignity; (2) housing and everyday life; (3) mobility and transport; (4) communication and management; (5) work and leisure²⁰. There are different dimensions²¹ and levels²² of gerontechnology. In the undertaken

subject meso level is particularly relevant - interactions between organizational divisions in institutions and solutions for dialogue about products and technologies, such as municipal senior councils, associations of public authorities, manufacturers, designers and consumers.

4 Types of gerontechnology development support

Based on a review of the literature three main solutions used to support the development of gerontechnology and broader silver economy can be distinguished. These are approaches that can be adapted to the resources, goals, values and needs of the individual entities and regions, taking their cooperation into account. Namely: (1) documents and strategic programs; (2) network organizations and clusters; as well as (3) research and development institutions²³.

4.1 Documents and strategic programs

An example might be provided by "Challenges for Building a Future Society - the Role of Science and Technology in an Aging Society with Fewer Children" report by the government of Japan in 2006, which reviewed the scientific tasks for tackling the demographic change. The document discusses the status of research in many disciplines, priorities for further research, the areas of international cooperation and promotion of science²⁴. Among others, it brought closer support for technology important in: prevention, diagnosis and treatment of heart disease, cancer, Alzheimer's disease, a regenerative medicine, creating artificial bones and organs, antidepressants, enabling further work and study of the elderly, the development of safety, personalized medical care using cybernetics and robotics.

National Institute on Aging established in the United States in 1974 as a government agency determines the directions of research and prepares scientific staff and collaborates with external entities. Announced in 2007, the plan covers six directions of research: (1) improving knowledge on successful ageing, diseases and disabilities of the elderly; (2) continuation of the activities to prevent disease and disability, opportunities to improve the health and quality of life of older people; (3) prevention and treatment of Alzheimer's disease, dementia and other diseases of the brain; (4) improving knowledge of the effects of ageing on society, information about them; (5) improving opportunities for reducing and eliminating health inequalities among older people; (6) supporting the development of infrastructure and resources for the promotion of research and communicating their results²⁵. Institute conducts research and commission grant competitions: external - tasks for universities, hospitals, medical centers and others, as well as internal - conducted at the premises of funders and other government agencies. In 2009, the United States developed the road map of robotics development with particular emphasis on labor replenishment and providing assistance to live in old age²⁶.

In the European Union in 6 and 7 Framework Programme in 2004-2012 years existed consortium "European Research Area in Ageing" gathering and coordinating research undertaken by thirteen research centers. In cooperation with the European Commission, the consortium developing the exchange of knowledge, led a scholarship program for young scientists, summer schools and a discussion

¹¹ *Ibidem*, p. 337-338.

¹² These are: (1) lack of interest of silver economy and a favorable environment to their actions in the economic entities; (2) limiting the silver economy offers to wealthy older people; (3) a negative pattern of seniors consumption lifestyles; (4) too little attraction force of regions for older migrants. See: A. Klimczuk, *Strategic Responses on Population Ageing in Regional Policy*, [in:] Š. Hittmár (ed.), *Theory of Management 4. The Selected Problems for the Development Support of Management Knowledge Base*, EDIS, University of Žilina, Žilina 2011, p. 261-265.

¹³ A. Klimczuk, *Kapitał społeczny ludzi starych na przykładzie mieszkańców miasta Białystok*, Wiedza i Edukacja, Lublin 2012, p. 84-94, 257-268.

¹⁴ J. Graafmans, V. Taipale, *Gerontechnology. A sustainable investment in the future*, [in:] J. Graafmans, V. Taipale, N. Charness (eds.), *Gerontechnology. A sustainable investment in the future*, IOS Press, Amsterdam 1998, p. 3.

¹⁵ *Ibidem*, p. 3.

¹⁶ *Ibidem*, p. 5-6.

¹⁷ D.C. Burdick, *Gerontechnology*, [in:] J.E. Birren (ed.), *Encyclopedia of Gerontology: Age, aging, and the aged*, Academic Press, Oxford 2007, p. 629.

¹⁸ *International Society for Gerontechnology*, www.gerontechnology.info [12.11.2012].

¹⁹ D.C. Burdick, *Gerontechnology*, *op. cit.*, p. 625-627.

²⁰ There are already a number of products and services using gerontechnology including: websites, solutions to perform telework and remote education, telemedicine, detectors, alarms and sensors, medical kits, diet and beauty, clothing, sunglasses and camera equipment to improve hearing and sense of smell, bathroom and kitchen systems, switches lights, windows and doors, flooring slip, handrails, stair lifts, smart homes, sports equipment, solutions that increase driving safety, road signs, elevators with large hubs and reduced handrails, door handles, curbs and benches. See: D.C. Burdick, *Gerontechnology*, *op. cit.*, p. 627-629.

²¹ According to B. Rzezyński there are utilitarian and humanitarian dimensions of gerontechnology. The first covers the offer and implement products and services to overcome the limitations in communication and access to various infrastructure facilities. The second seeks to restore the productivity of senior citizens in the community. Gerontechnology is realized in individual and infrastructural-organizational dimensions. First involves a biotech instruments, assisting and supporting that have to restore or mitigate the effects of lost operability. Second concerns reconstruction of functional location and urban space. See: B. Rzezyński, *Gerontechnologia w perspektywie urbanistycznej*, [in:] J.T. Kowaleski, A. Rossa

(eds.), *Przyszłość demograficzna Polski*, „Acta Universitatis Lodzianensis. Folia Oeconomica” 231, Wyd. UL, Łódź 2009, p. 289.

²² D.C. Burdick indicates the micro- and macro-structural levels of interaction of gerontechnology and its users. At the micro level are important sensory, perceptual, cognitive or motor interactions with assistive technologies and interfaces. While on macro level considerations such as ethical and moral implications of the available information for older people on the Internet and the potential to create more useful devices for computing. See: D.C. Burdick, *Gerontechnology*, *op. cit.*, p. 620-621.

²³ Compare: A. Klimczuk, *Transfer technologii w kształtowaniu srebrnej gospodarki*, [in:] M. Grzybowski (ed.), *Transfer wiedzy w ekonomii i zarządzaniu*, Wyd. Akademii Morskiej w Gdyni, Gdynia 2011, p. 65-70.

²⁴ *White Paper on Science and Technology 2006. Challenges for Building a Future Society - the Role of Science and Technology in an Aging Society with Fewer Children*, Ministry of Education, Culture, Sports, Science and Technology, Japanese Government, Tokyo 2006.

²⁵ *Living Long & Well in the 21st Century: Strategic Directions for Research on Aging*, National Institute on Aging, Bethesda 2007.

²⁶ H.I. Christensen (ed.), *Roadmap for US Robotics. From Internet to Robotics*, Computing Research Association, Washington 2009.

forum, undertook cooperation with national ministries and agencies. The consortium continues under the current in 2012-2020 "European Innovation Partnership on Active and Healthy Ageing"²⁷. The other form is developed as "Ambient Assisted Living Joint Programme"²⁸. Programme is implemented by an association formed by government scientific agencies from 20 countries of the European Union with Israel, Norway and Switzerland. By 2013 half of the funding program is from European Commission, half from member states. The aim is to provide grants and funding R&D partnerships made up of small and medium-sized enterprises, consumer organizations and academic institutions. Key priorities for support are works on electronics, embedded systems, control and generation of energy, new materials, interfaces and communication, software and computer networks.

4.2 Network organizations and clusters

Another example of gerontechnology support is the network organization²⁹ *SEN@ER - Silver Economy Network of European Regions* established in 2005 on the initiative of Nordrhein-Westfalen government in Germany. Its aim is to create and establish the framework conditions for new products and services aimed at improving the quality of life of older people and thus providing jobs and employment and strengthening the forces of regional economies and their competitiveness. This mission involves collaboration with industrial partners, social and public authorities. Conditions of establishment *SEN@ER* came from the development of "Silver Economy" initiative started in 1999 in Nordrhein-Westfalen³⁰. Land that was the first in Germany that attempted to restructure corresponding to the demographic challenge. At first it was expected to stimulate local stakeholders to create services and products aimed at senior citizens. The barrier, however, turned out to be many solutions addressing only to the wealthy seniors. Then decision was made to search for consumers outside the region. In 2003, after organizing a workshop in Brussels for representatives of local governments and non-governmental organizations a network was established which officially exists since 2005. Its key regions are Extremadura (Spain), Limburg and Gelderland (Netherlands), Limousin (France), Mid-East Region (Ireland) and North West Region (United Kingdom). The network has a joint secretariat responsible for the coordination, integration and documentation of actions, contacts with the European Commission and the Committee of the Regions, the collection of research results related to the silver economy, supporting the organization of thematic conferences, conducting recruitment website and network members. *SEN@ER* cooperates including: identify of actions that require political support, promote silver economy, integration of professional associations and business organizations, the analysis of the EU's financial programs and presenting recommendations and joint political declaration. The works also include five "special interest groups": active employment and entrepreneurship of the elderly, independent living, participation in culture, skill development and regional strategies. *SEN@ER* also runs a database of European Union documents related to silver economy, good practices, system for searching partners to projects, newsletter, workshops, annual conferences and competitions to promote best practices. Among the selected projects of network are: senior entrepreneurial initiative; computer system to coordinate social services for the elderly; system of smart devices for ageing in place; intercultural seniors creativity

academy; initiative for active ageing of migrants and ethnic minorities which live in European Union.

In Nordrhein-Westfalen its headquarters also have created in 1995, German Society of Gerontechnology focused on small and medium enterprises engaged in the creation, development and sale³¹. Organization conducts standardization and certification of friendly seniors products and services. Since 2007, there is a *Innovations Allianz* – network organization of 26 universities in the region to work with businesses and other associations and institutions. In 2009, the network has developed a topics directory of R&D on ageing, which may be subject to commercialization³².

Other network organizations on the silver economy and gerontechnology are EdeAN, CAST and RooBO. *The European Design for All e-Accessibility Network* (EdeAN) with secretariat in London is established in 2002. It's the network, which brings together 160 organizations focused on developing and promoting services available to all³³. Founded in 2003 and headquartered in Washington, DC *LeadingAge Center for Aging Services Technologies* (CAST) is a coalition of more than 400 companies, governments, academic institutions and service companies serving the development, evaluation and adaptation of technology to the needs of seniors³⁴. While RooBO is a network run by the Robot Laboratory - R&D unit established in 2004 by the Japanese city of Osaka³⁵. In 2010, the network brings together 107 companies and 337 members of the various sectors involved in robotics also for seniors. Network runs trade fairs, conferences, demonstrations, experiments, training of personnel and exchange of scientific and business.

A different solution is developed from the mid-90s XX century in Finland called "prosperity clusters," a type of clusters³⁶ with specializing in the R&D, consultancy and production and service to improve the quality of life and independence of seniors³⁷. This initiative is coordinated by National Research and Development Centre for Welfare and Health (STAKES). Within these clusters are for example efforts to reduce barriers in the urban space, creating a system of home care, a system of document circulation between institutions. *Seniorpolis* is a cluster developed since 1999 in the municipality of Ristijärvi involving public entities, non-governmental and commercial-related products and services, caring, construction, tourism, transport and information technology³⁸. After conducting preliminary research of cluster concept work on the construction of innovative nursing homes, senior housing and a leisure and cultural institutions were taken. Cluster also contains common brand of products and services. Since 2006, it comprises a consortium and a center of expertise for gerontechnology testing, including smart homes, furniture and equipment for seniors, which are to be export goods of the region.

4.3 Research and development institutions

In the world there are at least a dozen R & D centers specializing in the development of gerontechnology. Senta is a team formed in 1997 in Berlin by six local universities³⁹. Its specialties are interdisciplinary studies and projects developed jointly by engineers, technicians, artists, and social scientists. In 1998, Jerusalem was

²⁷ ERA-AGE2, www.era-age.group.shef.ac.uk [12.11.2012]; *European Innovation Partnership on Active and Healthy Ageing*, http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing [12.11.2012].

²⁸ *Ambient Assisted Living Joint Programme*, www.aal-europe.eu [12.11.2012].

²⁹ Network organization is defined here as "a collection of independent organizations operating in a particular industry but also related with others by cooperation bonds". See: A.P. Wiatrak, *Organizacje sieciowe - istota ich dzialania i zarzadzania*, „Współczesne Zarządzanie”, 3/2003, p. 8; cited by: T. Dryl, *Organizacja sieciowa*, [in:] M. Czerska, A.A. Szpitter (eds.), *Koncepcje zarządzania. Podręcznik akademicki*, C.H. Beck, Warszawa 2010, p. 251.

³⁰ *SEN@ER*, www.silvereconomy-europe.org [12.11.2012]; P. Enste, G. Naegle, V. Leve, *The Discovery and Development...*, op. cit., p. 325-339; M. Ferry, V. Novotný, V. Mancusi, T. Gross, J. Bachtler, *Regions for All Ages: The Implications of Demographic Ageing for Regional Policy*, European Policies Research Centre University of Strathclyde, Glasgow 2006, p. 31-33, 80-90; B. Augurzky, U. Neumann, *Economic resources of senior citizens. Regional economic and fiscal effects of promoting the senior citizens economy in North Rhine-Westphalia*, Ministerium für Gesundheit, Soziales, Frauen und Familie des Landes Nordrhein-Westfalen, Bonn 2005.

³¹ GGT Deutsche Gesellschaft fuer Gerontotechnik, www.gerontotechnik.de [12.11.2012].

³² *The Innovation Alliance*, <http://innovationsallianz.nrw.de> [12.11.2012]; *The Universities of North Rhine-Westphalia: Your Partners for European Research Projects That Address „The Ageing Society”*, NRW Innovation Alliance, Bonn 2009.

³³ *European Design for All e-Accessibility Network*, www.edean.org [12.11.2012].

³⁴ *LeadingAge Center for Aging Services Technologies*, www.leadingage.org [12.11.2012].

³⁵ *Robot Laboratory*, www.rob-labo.jp/english/ [12.11.2012].

³⁶ Cluster is defined here as: "geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries and associated institutions (eg. universities, standards bodies and industry associations) in particular fields, competing with each other but also cooperating". See: B. Plawgo, M. Klimczuk, M. Citekowski, *Klasy jako potencjal rozwoju - województwo podlaskie*, BFKK, Białystok 2010, p. 9.

³⁷ Compare: M. Ferry, V. Novotný, V. Mancusi, T. Gross, J. Bachtler, *Regions for All Ages...*, op. cit., p. 25-28, 61-72; M. Castells, P. Himanen, *Spoleczeństwo informacyjne i państwo dobrobytu. Model fiński*, Wyd. Krytyki Politycznej, Warszawa 2009, p. 108-111.

³⁸ *Seniorpolis*, www.seniorpolis.com [12.11.2012].

³⁹ *Senta*, www.senta.udk-berlin.de [12.11.2012].

established *The Israeli Center for Assistive Technology & Aging* (GeronTech) – non-governmental organization dedicated to technological and market research as well as Israeli-American cooperation⁴⁰. Focused more on the use of information technology action leads *Center for Research and Education on Aging and Technology Enhancement* (CREATE) – consortium formed in 1999 by universities in three different regions of the United States⁴¹. *Technical Research Centre for Dependency Care and Autonomous Living* (CETpD)⁴² operates in Spain since 2003. In 2009, in Oakland, the Center for Technology and Aging was founded – a non-governmental organization that promotes its own research and leads gerontechnology grant programs⁴³.

AgeLab at the Massachusetts Institute of Technology established in 1999 is a particular example. The aim of the center is “invent new ideas and creatively translate technologies into practical solutions that improve people’s health and enable them to ‘do things’ throughout the lifespan”⁴⁴. Interdisciplinary cooperation here concerns the study of health, transport, communication, housing, economic and political innovation, the evolution of jobs, preparing for old age. Analysis on infrastructure, expectations and capacity to implement institutional innovations for seniors. AgeLab offers unique tools and methods of research, description of which is beyond the scope of this article. AgeLab distinguishes the openness and activities for the development of a positive image of gerontechnology. Centre allows domestic and foreign partners to support research and training, conducting joint projects, partnerships, enable access to data collected by the institute and creation of joint consortia. The center has an offer for volunteers, provides information about the results of research for seniors and their families concerning safe driving, preparing for natural disasters, long term care and retirement planning. Laboratory keeps its work, press releases and video media available by using social networking websites and blogs.

5 Conclusions

The paper highlights on the: relations of technological change to the process of ageing; discussion on the legitimacy of burden ratio of working age population to retirement age population; phenomenon of “robotics divide”; major segments and characteristics of the silver market and gerontechnology; as well as experiences of different countries in developing them.

New technologies play important role in meeting the challenges of aging populations. Supporting the development of gerontechnology as a key component of silver economy should be considered an important strategic task. It is necessary to take this paradigm into account in shaping the innovative policies as well as tasks for entities included in the technology transfer and commercialization of knowledge systems. In this way, support for gerontechnology may also be regarded as an important instrument of regional development, if a permanent structures for cooperation of bodies representing the public administration, business and nongovernmental organizations (business support and social economy institutions) will be formed. At the same time it is important to emphasize that the silver economy is not just for the elderly, but also for ageing and younger generations and it has the potential to prepare them for old age.

Public entities should be taking at least four actions: (1) further promotion of knowledge about silver economy and gerontechnology concepts, taking into account the internal diversity of older people; (2) the avoidance of discrimination based on age in the design and promotion of gerontechnology and silver economy models; (3) shaping scientific and educational institutions specializing in gerontechnology such as agelab and placing curricula of this discipline to universities; (4) popularization of cultural institutions like medialabs – interdisciplinary, open to public activity, co-managed, building links between business, science and social

activity while taking into account Internet culture and intergenerational relationships – to shape the image of gerontechnology during the intergenerational integration projects.

There are at least four possible directions for further research: (1) research on the consequences of population aging for the system of science and higher education, as well as technology transfer and commercialization of knowledge. Analysis in subjects such as the lengthening of human life and medicalization of old age; (2) assessment of existing national and regional activities for the silver economy; (3) diagnosis of opportunities to create networked organizations, clusters and centers of research and development focused on shaping of the silver economy and gerontechnology. Including regional specialization of those models; (4) research into methods of innovation planning and design in gerontechnology, as well as analysis on silver market marketing instruments.

Literature:

1. Augurzyk, B., Neumann, U. *Economic resources of senior citizens. Regional economic and fiscal effects of promoting the senior citizens economy in North Rhine-Westphalia*. Bonn: Ministerium für Gesundheit, Soziales, Frauen und Familie des Landes Nordrhein-Westfalen, 2005. 50 p.
2. Burdick, D.C. *Gerontechnology*, [in:] J.E. Birren (ed.), *Encyclopedia of Gerontology: Age, aging, and the aged*, Oxford: Academic Press, 2007. 619-630 p. ISBN 0-12-370530-4.
3. Castells, M., Himanen, P. *Spoleczeństwo informacyjne i państwo dobrobytu. Model fiński*, Warszawa: Wyd. Krytyki Politycznej, 2009. 228 p. ISBN 978-83-61006-27-5.
4. Dryl, T. *Organizacja sieciowa*, [in:] M. Czerska, A.A. Szpitter (eds.), *Koncepcje zarządzania. Podręcznik akademicki*. Warszawa: C.H. Beck, 2010. 245-261 p. ISBN 978-83-255-1530-0.
5. Enste, P., Naegele, G., Leve, V. *The Discovery and Development of the Silver Market in Germany*, [in:] F. Kohlbacher, C. Herstatt (eds.), *The Silver Market Phenomenon. Business Opportunities in an Era of Demographic Change*. Heidelberg: Springer, 2008. 325-339 p. ISBN 978-3-540-75331-5.
6. Ervik, R. *A Missing Leg of Ageing Policy Ideas: Dependency Ratios, Technology and International Organizations*. ESPANet, Urbino, 17-19.09.2009, www.espanet-italia.net/conference2009/paper/15%20-%20Ervik.pdf [10.11.2012]. 26 p.
7. *Europe's demographic future. Facts and figures on challenges and opportunities*. Luxembourg: European Commission 2007. 184 p. ISBN 978-92-79-07043-3.
8. Ferry, M., Novotný, V., Mancusi, V., Gross, T., Bachtler, J. *Regions for All Ages: The Implications of Demographic Ageing for Regional Policy*. Glasgow: European Policies Research Centre University of Strathclyde, 2006. 113 p.
9. Graafmans, J., Taipale, V. *Gerontechnology. A sustainable investment in the future*, [in:] J. Graafmans, V. Taipale, N. Charness (eds.), *Gerontechnology. A sustainable investment in the future*. Amsterdam: IOS Press, 1998. 3-6 p. ISBN 978-90-5199-367-7.
10. Halicki, J. *Spoleczne teorie starzenia się*, [in:] M. Halicka, J. Halicki (eds.), *Zostawić ślad na ziemi*. Białystok: UWB, 2006. 255-276 p. ISBN 978-83-7431-090-1.
11. Christensen, H.I. (ed.) *Roadmap for US Robotics. From Internet to Robotics*. Washington: Computing Research Association, 2009. 98 p.
12. Klimczuk, A. *Bariery i perspektywy integracji międzypokoleniowej we współczesnej Polsce*, [in:] D. Kałuża, P. Szukalski (eds.), *Jakość życia seniorów w XXI wieku z perspektywy polityki społecznej*. Łódź: Wyd. Biblioteka, 2010. 92-107 p. ISBN 978-83-62378-08-1.
13. Klimczuk, A. *Kapitał społeczny ludzi starych na przykładzie mieszkańców miasta Białystok*. Lublin: Wiedza i Edukacja, 2012. 270 p. ISBN 978-83-61546-97-9.
14. Klimczuk, A. *Strategic Responses on Population Ageing in Regional Policy*, [in:] Š. Hittmár (ed.), *Theory of Management 4. The Selected Problems for the Development Support of Management Knowledge Base*. Žilina: EDIS, 2011. 261-265 p. ISBN 978-80-554-0420-2.

⁴⁰ GeronTech, www.jointnet.org.il/gerontech/ [12.11.2012].

⁴¹ CREATE, www.create-center.org [12.11.2012].

⁴² Technical Research Centre for Dependency Care and Autonomous Living, www.epsevg.upc.edu/cetpd/ [12.11.2012].

⁴³ Center for Technology and Aging, www.techandaging.org [12.11.2012].

⁴⁴ MIT AgeLab, <http://agelab.mit.edu> [12.11.2012].

15. Klimczuk, A. *Transfer technologii w kształtowaniu srebrnej gospodarki*, [in:] M. Grzybowski (ed.), *Transfer wiedzy w ekonomii i zarządzaniu*. Gdynia: Wyd. Akademii Morskiej w Gdyni, 2011. 57-75 p. ISBN 978-83-7421-1673.
16. *Living Long & Well in the 21st Century: Strategic Directions for Research on Aging*, Bethesda: National Institute on Aging, 2007. 56 p.
17. Plawgo, B., Klimczuk, M., Citkowski, M. *Klasy jako potencjał rozwoju - województwo podlaskie*. Białystok: BFKK, 2010. 126 p. ISBN 978-83-925168-9-7.
18. Rosset, E. *Miejsce człowieka starego w społeczeństwie*, [in:] *Encyklopedia seniora*. Warszawa: Wiedza Powszechna, 1986. 20-34 p. ISBN 83-214-0274-7.
19. Rzezyński, B. *Gerontechnologia w perspektywie urbanistycznej*, [in:] J.T. Kowaleski, A. Rossa (eds.), *Przyszłość demograficzna Polski*, „Acta Universitatis Lodzianis. Folia Oeconomica” 231. Łódź: Wyd. UŁ, 2009. 287-304 p. ISSN: 0208-6018.
20. Synak, B. *Ludzie starzy*, [in:] *Encyklopedia socjologii. Tom 2*. Warszawa: Oficyna Naukowa, 1999. 144-149 p. ISBN 83-85505-96-2.
21. Szukalski, P. *Zagrożenie czy wyzwanie - proces starzenia się ludności*, „Polityka Społeczna” 9/2006. 6-10 p.
22. *The Universities of North Rhine-Westphalia: Your Partners for European Research Projects That Address „The Ageing Society”*. Bonn: NRW Innovation Alliance, 2009. 56 p. ISBN: 978-3-00-033413-9.
23. *White Paper on Science and Technology 2006. Challenges for Building a Future Society - the Role of Science and Technology in an Aging Society with Fewer Children*. Tokyo: Ministry of Education, Culture, Sports, Science and Technology, Japanese Government, 2006. 442 p.

Primary Paper Section: A

Secondary Paper Section: AE, AO, AP