

## Foundations and goals of gerontechnology

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*H. Bouma. Foundations and goals of gerontechnology. Gerontechnology 2012;11(1):1-4; doi:10.4017/gt.2012.11.01.001.00* The introduction to this special issue describes how the earlier goals of Technology and Ageing Research were widened into the new field of Gerontechnology, which includes the whole technological environment that can assist older people to pursue and explore their interests and to obtain a better quality of life. Two routes are presented. The first is a theoretical approach to the interdisciplinary research field. The second is a pragmatic approach focussed on products and services for health promotion, but which has ambitions beyond the health domain. This issue of Gerontechnology presents papers on the political environment, on the relevance of the concept of 'generation' as distinct from 'age', on memory types and their respective possibilities for technological support, on new tele-health opportunities, and on the scientific approach to technology adherence.

**Keywords: politics, generation, memory, tele-health, adherence**

Gerontechnology (GT) is concerned with technology for ageing persons. At the start of GT, some 20 years ago, the field 'Technology and Ageing' existed already. It was directed at ageing people with physical restrictions, providing them with compensatory aids: electric nerve stimulation for paralysed nerves, electric typewriters controlled by eye movements, closed-circuit television circuits for blowing up texts. Some mental functions were also covered, such as training-algorithms after cerebral accidents. Today this area of R&D is as important as it was before: cochlear, retinal and neural implants, robot arms, legs and vehicles, speech handling systems, and iPads.

GT extended this field to include the total technological environment serving all needs and aspirations of ageing people; technology supporting ageing people in all aspects of their lives, just as it is for younger people. It was clear that this would not happen any time soon by itself: the gap between technological innovation in society and ageing people was already substantial. The first international conference on GT in 1991 indicated how to approach the problem: searching for scientific insight into the origins of this gap, while trusting that such a knowledge base would guide us toward promising pragmatic actions for improvement.

The route taken will now be sketched, admittedly in retrospect, but well documented: the first three international GT conferences (Eindhoven 1991, Helsinki 1996; Munich 1999) in books<sup>1-3</sup>, followed in 2000 by an introductory text<sup>4</sup>, and

later on more continuously in Gerontechnology quarterly journal<sup>5</sup>, also including the conferences 4-8 (Miami 2002, Nagoya 2005, Pisa 2008, Vancouver 2010, Eindhoven 2012). After that, the contributions to the present issue will be introduced.

### THEORETICAL APPROACH

The combinations of insight from two different types of scientific discipline are crucial to understanding GT: (i) Human ageing: theories, concepts and methods of physiology, psychology, sociology, epidemiology; (ii) Technological innovation: theories, concepts, and methods of physics and chemistry, building, communication and information, transport, industrial design, and business. Each of these two clusters concerns an extended area of knowledge and research. Understanding the combination and the interaction between them seemed a difficult and complex journey into the unknown. But, this is what science is for and we started from a solid base, or rather, a number of unconnected solid bases. We might call this the theoretical approach.

The keynotes and other papers of the early GT conferences reflect knowledge and methods in each of the two clusters of disciplines: on the Ageing side demography, epidemiology and sociology, and ageing physical, psychological and social functions such as vision, audition, motor function, memory, and learning; and on the Technology side industrial design, user interfaces and ergonomics, along with developments in relevant engineering disciplines proper. This leads to a matrix between the scientific disciplines

studying human ageing and the scientific disciplines studying technology innovations, in which the cells can be used for plotting relevant concepts and theories<sup>6</sup>.

However, as expected, difficulties arose. Researchers of human ageing and researchers of technology have different backgrounds and function in quite different environments. Generalizing somewhat, they know little of each other's fields and are not mutually attracted, sometimes this verges on aversion: researchers on ageing fearing the technology push as reflected in the mass-marketing of unwanted products, and engineers fearing the vagueness and lack of applicability of social sciences and 'the Arts'. Such difficulties may be characteristic of interdisciplinary research and has also impeded progress in GT. Over the past twenty years, researchers on ageing have generally shown more interest in GT than researchers in engineering, with the exception of workers in the fields of ergonomics, human engineering, and industrial design, who already had experience in a related interdisciplinary arena, methodologies of user involvement being just one example.

Despite such difficulties, theoretical understanding has greatly advanced in several cells of the interdisciplinary matrix<sup>6</sup>, and the present issue of Gerontechnology provides a number of new examples; we have gained a better understanding of the challenges of ageing amidst innovative technological environments.

## **PRAGMATIC APPROACH**

The GT books and journal reflect a second, more pragmatic approach to the field as well. Technology is directed at applications for human use; GT is directed at applications for the ageing population. So, we can start with considering the life of ageing persons, and see what ambitions and needs might be served by existing or new technologies. This is an extension of the methodological route of the earlier 'Technology and Ageing' agenda. This approach has been crystallized in the following five broad domains<sup>7</sup>: health and self-esteem, housing and living, mobility and transport, information and communication, and work and leisure.

The needs and ambitions of older people to compensate for diminishing physiological and mental functions were already obvious. Active prevention was added, as it was clear from longitudinal studies and from common sense that infirmities and disease in old age may have a long hidden early history, with a potential for interventions by the person him- or herself, by the direct environment, and also otherwise such as through public

engineering<sup>8</sup>. Lifestyle improvements, accident prevention, and protection from communicable diseases, are just some examples. Care support was added as well, since technology offers many options to ease the tasks of professional and informal carers, both physically and in terms of information and communication. Medical technology as a specialist field has largely been left outside the GT scope.

## **Life has more to offer than health concerns**

Prevention, compensation, and care support are all health concerns. These reflect objectively the increased likelihood with advancing age of restrictions and chronic disease, and subjectively the misleading view of ageing as beset with health problems. Disease as it occurs is a double hazard: first the pain and restrictions of the disease itself, and second the continued attention drawn to the disease both by oneself and by family and friends, and therefore resulting in less interest in other goals. Life is not and should not be restricted to aspects of disease and the suffering from disease; there are quite different and more rewarding things to do and to attend to. Therefore personal ambitions for enriching life are at the top of the list of what technology can potentially do for ageing people. Quite a few Internet services, such as contact groups of people with similar interests, are exemplary for this type of application.

The matrix of domains of life and goals of ageing people provides a scheme for overseeing many existing and potential GT applications and has appeared an excellent tool for guiding research and development<sup>9</sup>.

## **THE PRESENT ISSUE**

When approached by the editor-in-chief for suggesting themes to the present issue, it was clear to me that insights should be at the core. What are the problems and solutions we encounter and understand at present? GT contributions that offer theoretical progress, explain new concepts and their difficulties, analyse problems, and open up and pave roads to more and better products and services for ageing people.

## **Policies**

Gerontechnology started in Europe. At first, efforts were supported by a subsidy from European Union (EU) funds for small-scale workshops, which helped to establish a network of interested professionals. But political interest waxes and wanes, and the vision that society in the near future, driven as it is by technology innovations, should embrace the rapidly growing population of older persons just as well as younger persons, was lacking. The term 'lifelong learning'

was coined, but not as a fruitful concept but as a misleading slogan. I am not aware of any large-scale systematic and sustained program in either politics or business to train the usage of essential new skills to older citizens, many of whom are from a generation with relatively limited formal education, and, particularly in the case of women, without relevant job experience.

Issues arising from demographic developments on one hand, and changes in society by technological innovations on the other, were both clear-cut and generally acknowledged, but the potential to solve existing and future problems of the first by guiding developments of the latter was not identified or utilized. Also GT itself, with its core of research activities, did not succeed in convincing the political and business community to put GT on their active agenda's. Taipale's paper 'Politics, policies and gerontechnology'<sup>10</sup> provides a concise analysis with lessons for the future, and not just for now or just for industrial countries, as the basic concerns will be with us in most countries for many years to come.

## Age and generation

Ageing can be identified by the numbers of years since birth or the numbers of people with certain properties such as gender or diseases: all numbers. However, since people are very different, age differently, and have grown up and lived in very diverse physical, social, and cultural environments, age itself is not an interesting variable in itself and this is also true for age distributions. In GT, the role of age is indirect at most, as a rather overall indicator of more interesting parameters, such as the types of environment in which one has lived for certain time periods or the numbers of years one can still be expected to live after retirement. This leads to the need of theoretical concepts related to age that have more explanatory force in understanding the extensive diversity of older people. Age cohort is still directly related to age, but the sociological concept of 'generation' is a theoretical construct, as a number of successive age cohorts sharing certain essential elements in their environment during their upbringing or later in life. The terms pre-war generation or baby-boom generation are examples.

This has been extended to the concept of 'technology generation' for a number of successive age cohorts that shared certain technological environments. Common types of user interfaces, such as for TV sets, is just one documented example<sup>11</sup>, but the concept has much more to offer, as we can deduct from observing the experience of young adults and children, who take for granted and integrate into their lives mobile

phones with cameras and Internet communication that did not exist ten years ago. The role this plays in politics indicates its powerful influence, which leaves members of the older generations outsiders; also this phenomenon is not-at-all restricted to so-called industrial countries. Obviously, 'technology generations' are a fruitful area of GT research, identifying real options, values and hazards characteristic of the present era of Internet as it functions for the diverse older population. The paper of Fozard and Wahl: "Age and cohort effects, etc."<sup>12</sup> provides a birds-eye overview of GT developments with age vs. generation as the leading paradigm.

## Memory and learning

The common view of ageing is that physical and mental functions will deteriorate. However, this is quite an over-generalization, as can already be seen from the fact that in old age so many artists, music-directors, politicians, among others, have remained active and influential. For human memory functions, a nuanced review was already provided by Craik and Bosman in 1992<sup>13</sup>. In the present issue, the review by Charness, Best, and Souders: "Memory functions and supportive technology"<sup>14</sup> shows that most findings in the early review are still valid, with progress in the field of mapping the different conceptual types of memory and their role in everyday tasks. Also the explosion of new technological possibilities to compensate for diminishing function, in practice often beset with difficulties, are discussed in this welcome review providing guidance for many practical applications.

## Internet for health care

GT owes much to ergonomics and industrial design, since in these fields several methods were developed and tested for user participation in product development. In GT, such testing is directed at the target group of ageing people, which is not as easily reached as students and, moreover, much more diverse. Representative samples of ageing people available for shorter or longer tests may be difficult to organize. Based on psychology, Wright's paper: 'The Internet's potential for enhancing health-care'<sup>15</sup> is not restricted to ergonomics, but goes beyond that by exploring the transition from the classic Internet services to the more broadly encompassing tele-services that now are becoming available. Her paper also identifies many problems that put to rest the superficial early optimism that neglected the different impacts on the many professional and laymen users involved. Also it paves the road towards useful applications, driven by a richer experience for older people rather than by the lower financial budgets that may well result from it.

## Acceptance and adherence

Another longstanding GT problem is why so many technological innovations are picked up by ageing people only hesitantly or not at all. The earlier, and wrong, rewording of this problem in the 1990s: 'old people are afraid of technology' has now disappeared. But the phenomenon has not. If old people do not recognize the functionality as useful, or do not have the financial means to consider owning it, the explanation seems straightforward. But the actual problems are more difficult to understand. The technology acceptance model (TAM) and its later developments have been with us for many years without much success, i.e. with limited explanatory power. The paper of Bouwhuis, Meesters, and Sponselee: 'Models of the acceptance of tele-care solutions, etc.'<sup>16</sup> offers an analysis as to why TAM is too abstract a model, and sketches acceptance as a real and complicated issue, that includes elements of social psychology and lack of proper training support. It also suggests technol-

ogy adherence as a concept that might lead to a better understanding, and, consequently, greater predictive power. Actions to improve technology adherence are included in their analysis.

## CONCLUSION

As the 8<sup>th</sup> international GT conference is taking place in Eindhoven, just as the first one in 1991, looking back is an obvious reflex. However, the present issue is in no way an overall comparison, if only because at the time of writing this 8<sup>th</sup> conference is still to come. More importantly, for the selected themes the authors provide us with up-to-date overviews of present theoretical analyses, insights, and resulting applications complete with their many unknowns and difficulties. As for myself, I have experienced reading the papers as highly rewarding and I would like to thank the editor-in chief for taking this initiative as well as my colleagues who authored the papers. I hope the readers will derive an equally fruitful similar experience from this issue.

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