



HARVARD
Extension School

ISMT E-138 Final Paper

Life Extension

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Table of contents

Table of contents.....	2
Problem statement.....	3
Abstract.....	3
Our Methodology.....	3
Understanding the Challenge of Life Extension.....	4
Changing the course: applying foresight methodology for possible interventions.....	6
Envisioning a desirable future for aging and life extension.....	7
References & Sources.....	9

Problem statement

“How might we provide society with the resources needed to achieve sustainable life extension?”

This is a critical question that needs to be addressed in the challenge of life extension. As advancements in medicine and technology continue to extend our lifespan, there is a need to prepare society for the social and economic implications of a longer-lived population.

Abstract

The adaptive challenge of life extension involves exploring ways to extend the human lifespan and reverse ageing, which raises many ethical, social, and economic questions. The implications of life extension technologies are significant, including potential impacts on resource consumption, environmental sustainability, social stability, and advanced ethical thinking. This paper leverages the tools and techniques learned in class to explore the interconnections and trade-offs across various domains, including science, society, economics, and ethics. Ultimately we propose several interventions and discuss how to achieve better outcomes against this paradigm shift.

Our Methodology

Using System Thinking and System Maps, we analyze the complex network of factions involved in the challenge of life extension, including relationships, stakeholders and coalitions. By exploring the dynamics and connections formed within the system, we identify the major positive, negative and balancing loops, as well as deviant voices. We also analyze possible delays for interventions.

To create a desirable future, we employ the backcasting foresight methodology, working backward to identify the interventions needed to bridge the gap between the future and the present. In our approach, we also scan the horizon for relevant strong and weak signals, which we incorporate into our methodology.

Understanding the Challenge of Life Extension

As humans, we have always been fascinated with the idea of extending our lifespan, and the pursuit of immortality has been a constant theme throughout history¹⁰. Medicine has been intertwined with this pursuit since the Old Kingdom of Ancient Egypt, circa 2600 BC. From the mythical Fountain of Youth to the modern-day advancements in medicine, we have been relentless in our quest for longevity. Despite the progress made in the field of medicine, we are still facing the challenge of extending our "healthspan" - the period of life when we are free from chronic diseases and disabilities¹². However, with recent advancements in technology and an increasing understanding of the complex interplay of genetics and environment, we are on the cusp of a new era of medical breakthroughs that could finally help us achieve this elusive goal¹¹.

Weak signals	Strong signals
<p>The development of anti-aging therapies and gene editing technologies, which could extend human lifespan and healthspan¹.</p> <p>More people are changing their behaviors and seeking out information on ways to improve their health and extend their lifespan¹⁴.</p> <p>Questions about the implications of radically extended lifespans for societal structures⁹.</p> <p>The possibility of indefinite life extension may increase harshness towards social transgressors²⁴.</p>	<p>Explosion of longevity startups in the last 3-5 years⁴. Oxford Economics estimated the longevity industry to be worth \$7.6 Trillion²⁹.</p> <p>Wealthy individuals' investments on extending not only their "lifespans" but also their "healthspans" ⁶.</p> <p>The development of life extension and its pursuit are not new from a historical perspective¹⁰.</p>

Changing the course: applying foresight methodology for possible interventions

We have applied backcasting foresight methodology to propose interventions for a desirable future in life extension. Although we work backwards from future view to present view to identify our interventions, we present our proposed interventions captured in the System Map first. We also discuss the implications of these interventions in this section.

As we analyze advancements in anti-aging science, we believe that the possibility of extending human life expectancy by a decade or more within a decade is becoming increasingly feasible¹. Initiatives like Sam Altman's backing of a \$100 million fund focused on longevity research are leading the charge³. Recent progress suggests that humans could live up to 150 years with the help of aging and longevity genes, dietary restriction, and advancements in science and technology⁷. While the potential for radical life extension has never been greater, there are ethical questions to consider⁵.

The impact of increased lifespan on our society is a crucial consideration¹⁰. For example, providing resources for longer lifespans may benefit those who have access to these resources and can afford them, while others may be left behind, leading to further inequality. It is essential for us to consider how our interventions will impact different stakeholders and their perspectives, including deviant voices who may be opposed to life extension technologies for ethical or other reasons.

Implementing our interventions may also pose several challenges and risks, such as regulatory hurdles, economic constraints, and social acceptance¹¹. Regulatory bodies may take longer to approve life extension technologies due to ethical concerns, safety issues, or lack of evidence. Additionally, economic constraints, such as high costs of research and development and limited funding, may limit the development and distribution of life extension technologies. Public acceptance of these technologies may be slow due to ethical, moral, or religious reasons, which may lead to social instability and opposition.

To address these challenges and risks, we opted for the backcasting foresight methodology based on our comprehensive literature review⁹. This approach considers the desired future and works backward to determine the steps needed to achieve that future. By using weak signals to identify emerging trends, backcasting allows us to

anticipate future challenges and opportunities, making it easier to prepare for them proactively.

The future of human longevity looks promising, but it is essential for us to consider the diverse perspectives of all stakeholders, including those who may be opposed to life extension technologies⁵. By envisioning the future we want and working backwards to determine the necessary steps to achieve it, we can create a roadmap that maximizes the benefits of anti-aging science while minimizing its risks. For real longevity to be achieved, we need a large paradigm shift where we do not address people's health only when they get sick²⁹.

Envisioning a desirable future for aging and life extension

The desired future of achieving a meaningful extension of human "lifespan" and "healthspan" would involve several breakthroughs in medical science and technology that would allow people to live longer and healthier lives.

Advanced medical technology, genetic engineering, nanotechnology, brain-computer interfaces, and artificial intelligence could all contribute to extending human life and improving health. However, addressing social and ethical considerations, such as overpopulation and access to life extension technologies, is also critical.

Achieving this future requires adaptive leadership that can navigate the complex and diverse perspectives of stakeholders, including those with deviant voices. Ethical and religious groups, environmental groups, skeptics, social justice advocates, and critics all have valid concerns that must be taken into account. Informal community leadership could play a critical role in engaging these stakeholders and promoting a shared vision for the future.

In envisioning a desirable future for aging and life extension, it is essential to prioritize not only the extension of life but also the improvement of healthspan. Addressing the root causes of aging, such as poverty and lack of access to healthcare, should also be a key focus.

New system map: The challenge of life extension after interventions



[View the presentation slides](#)

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