well-being. For change that are likely to use new technologies to catalyze and policymakers, researchers and health providers, large and

Fortunately, a new ecosystem of stakeholders—entrepreneurs

social well-being) see better health outcomes. By refocusing these habits and decisions to support well-being.

induced chronic diseases emerge, before

shift. This shift leads away from treating disease prevention begins with sound evidence.

data that will reveal breakthroughs to illuminate less well-understood risk factors, such as stress and mental illness.

millennial generation will grow up
closing the digital health divide.

companies reformulating products to

of our approaches to treating illness has inspired fundamental rethinking of how we might address the critical chronic disease risk factors

lifestyle risk factors:

• Mental illness
• Unhealthy diet
• Physical inactivity
• Smoking
• Alcohol use
• Drug use

further productive to understand how these might change and how integrated solutions might leverage the power of evidence-based prevention at the center of health policies and actions.

TENSIONS

Oversupplying the engaged vs. Inclusive innovation

Technology-related strategies for health promotion and chronic disease prevention will proliferate over the coming decade. Many of these will target well-understood risk factors, such as physical inactivity, smoking, unhealthy diet, and social determinants of health. However, many of these solutions have not been used to include diverse segments of the population, including people from minority communities, low-income groups, and those with behavioral health conditions. These solutions also may not be accessible to all population groups, especially those who live in rural or urban areas.

Transformed capacities vs. Real-world constraints

Technologies will transform our capacity to sense and distribute information, prevent disease, mitigate risk, and thereby retain our vitality. In theory and in the lab, these new capacities may seem unobtainable, but in reality they will not all be available to all groups of people. There are significant technical challenges to be overcome, particularly with respect to big data, data security, and the use of digital technologies. As we move into the 21st century, we will see more emotional, engaging, immersive, and multi-sensory interfaces that engage all senses.

Utopian optimism vs. Unseen distribution

Just as the conditions that produce good health are unevenly distributed across the United States, the optimism and will to make the most of technology-related strategies are unevenly distributed as well. Social barriers, fear of the unfamiliar, policy changes, and lack of infrastructure will persist. Although innovations emerging from low-resource settings in poor regions may prove transformative, the translation and scaling will not always be direct or obvious.

Best intentions vs. Unintended consequences

Any new innovation brings the possibility of unintended consequences. Using personal data to do good is all well and good, but when that data is used to make commercial decisions about what products are sold, what ads are pushed, and how people are targeted, there is the potential for abuse and harm. As we develop new technologies to support our health, we will have to consider what is private and who has ownership over the data.

In the next decade, we have the

Commissions recommendations

1. Invest in prevention science

Prevention science—the systematic application of scientific methods to predict health outcomes and to avoid them—will be essential. It should be extended beyond epidemiology and public health to include social science, economics, business, and technology. New solutions for chronic disease prevention and health promotion need to be at the heart of health care policy and actions. At the Institute for the Future, we have identified 7 critical technology challenges to prevent and treat chronic disease.

2. Strengthen and expand leadership to deliver a unified message for health and prevention

Advocates of prevention in the public and private sectors should be coordinating and collaborating to build a unified message for health and prevention. This includes local leaders who tackle challenges and create a culture of health. A credible and influential multi-sector network should be established to coordinate and collaborate. Companies should generate shared value by integrating standardized metrics and technologies into their products and services.

3. Make markets work for health promotion and prevention

Markets should be encouraged to consume and buy products that promote health and well-being. New products, services, and technologies for healthier lifestyles should be combined with the support of incentives and structures that encourage innovation and early adoption.

4. Integrate health metrics into corporate reporting

Companies should determine and communicate value by integrating standardized metrics and technologies into their products and services. New products, services, and technologies for healthier lifestyles should be combined with the support of incentives and structures that encourage innovation and early adoption.

5. Promote strong cross-sector collaborations that encourage integration in health promotion and prevention across society

Non-health sectors should be engaged to tackle all factors that influence health. This includes the food industry, education, transportation, and media. Non-health leaders should understand that the health of their workforce is an asset to the company, and that investments in a healthy workforce will have a positive economic impact on the company and its shareholders.
In the next decade, we have the opportunity to create a culture of health, transforming the art and science of health promotion and chronic disease prevention by strategically engaging with technology.

Technology is shaping the way we think about the environment and our relationship to it. The rise of ubiquitous computing, the Internet, and mobile devices is changing how we interact with the world. This change is creating new opportunities for health promotion and disease prevention by providing new tools and platforms to support healthy behaviors.

ENTREPRENEURIAL ESCAPES
The rise of crowdfunding and innovation platforms is creating a new culture of entrepreneurship. In the past, innovation and entrepreneurship were seen as separate, but now they are converging. New tools are emerging to identify connections that were previously invisible. Universal science and technology will contribute to our ability to sense and distribute information, prevent disease, and guide people and their health providers.

CRITICAL CHRONIC DISEASE RISK FACTORS
According to a report by the World Economic Forum and the Harvard School of Public Health, noncommunicable diseases (NCDs) account for 60% of deaths worldwide and 75% in the United States. One-quarter of all NCD-related deaths occur among those under the age of 60. At the top of the list is tobacco use, followed by excessive use of alcohol, unhealthy and unsafe behaviors, poor diet, and lack of exercise.

MULTISENSORY INTERFACES
Multi-sensory interfaces will allow people to experience the world in new ways, providing feedback and changing behavior. As devices that transmit information, mobile health technology will be able to provide real-time data and offer personalized recommendations for improving health.

SUMMARY
In the next decade, we have the opportunity to create a culture of health, transforming the art and science of health promotion and chronic disease prevention by strategically engaging with technology.
Fortunately, a new ecosystem of stakeholders—entrepreneurs, managers, and citizens—see better health outcomes. By refocusing on human and economic vitality requires a paradigm shift. This shift leads away from treating disease and toward promoting health. Before lifestyle-promotion and chronic disease prevention begins with sound evidence. New business stakeholders across sectors aligning in the future decade. Innovators from technology-enabled strategies for health promotion and chronic disease prevention will catalyze a widespread culture of health.

Seizing this opportunity to shape the future is urgent. While the United States is ahead of peer nations in spending on healthcare, see better health outcomes. By refocusing on human and economic vitality requires a paradigm shift. This shift leads away from treating disease and toward promoting health. Before lifestyle-promotion and chronic disease prevention begins with sound evidence. New business stakeholders across sectors aligning in the future decade. Innovators from technology-enabled strategies for health promotion and chronic disease prevention will catalyze a widespread culture of health.

Seizing this opportunity to shape the future is urgent. While the United States is ahead of peer nations in spending on healthcare, see better health outcomes. By refocusing on human and economic vitality requires a paradigm shift. This shift leads away from treating disease and toward promoting health. Before lifestyle-promotion and chronic disease prevention begins with sound evidence. New business stakeholders across sectors aligning in the future decade. Innovators from technology-enabled strategies for health promotion and chronic disease prevention will catalyze a widespread culture of health.

Seizing this opportunity to shape the future is urgent. While the United States is ahead of peer nations in spending on healthcare, see better health outcomes. By refocusing on human and economic vitality requires a paradigm shift. This shift leads away from treating disease and toward promoting health. Before lifestyle-promotion and chronic disease prevention begins with sound evidence. New business stakeholders across sectors aligning in the future decade. Innovators from technology-enabled strategies for health promotion and chronic disease prevention will catalyze a widespread culture of health.
This map is a guide to the landscape of evolving technology innovations:

**FUTURE FORCES**
The future forces will shape how new solutions in health promotion and chronic disease prevention can emerge. They frame forecasts with how stakeholders across private and social sectors will align during the coming decades.

**FORECASTS AND SIGNALS**
The forecasts and signals from health promotion and chronic disease prevention will become central to human and economic vitality. Signals support each forecast with trends and technology advancements that show the future today.

**TECHNOLOGY CATALYSTS**
Technology Catalysts have the potential to change how we interact with prevention and promotion in our daily lives. These eight catalysts lay the groundwork for these interactive and immersive solutions.

---

**FRIENDLY ADVISORS**

![Friendly advisors encourage behavior change to overcome risk factors](Photo credit: Flickr user kt.ries)

**AMPLIFIED AFFINITIES**

![Social algorithms will connect isolated people with networked ones to promote interpersonal health. Social networks will scale the lessons learned from peer-led chronic disease management into amplified population health.](Image 112x33 to 354x231)

**QUANTIFIED GENERATIONS**

![Data-driven self-knowledge ignites intergenerational health engagement and promotion](Image 112x33 to 354x231)

**PERSONAL PARTICIPATORY EVIDENCE**

![Online communities for sharing experiences, treatments, and genetic markers will lead to new insights and support peer-to-peer prevention care. Shared databases will reveal what underlies risk factors for effective prevention.](Image 112x33 to 354x231)

**PROGRAMMABLE CARE**

![Social bots, autonomous algorithms, and software bots will interact in more human ways—coaching, teaching, entertaining, and motivating us. An assisted decision-making will help people care for their friends and neighbors.](Image 112x33 to 354x231)

**PERSONALIZED PREVENTION PRESCRIPTIONS**

![Reasorbable, adhesive, and ingestible sensors will create healthy habits, as inexpensive stick-on sensors and focused feedback help manage risks. Aggregating and analyzing behavior patterns will reveal new triggers for behavior change.](Image 112x33 to 354x231)

**SEAMLESS WORK-LIFE INTEGRATION**

![Platforms and algorithms will adjust tasks to create more ideal work habits. The algorithms will move people away from screens, filter light, and create bubbles of sound and silence.](Image 112x33 to 354x231)

**MICROBIAL MOBILIZATION**

![Microbial mapping and signatures teach us how our internal biodiversity affects risk factors, disease, appetite, and mood. Interventions into the gut-brain connection will open up new approaches linking diet and mental health.](Image 112x33 to 354x231)

**NEW BUSINESS MODELS**

![Business and social interests align for upstream interventions](Image 112x33 to 354x231)

---

**CONNECTION SCIENCE**
All stakeholders contribute data and connections to the art and science of health promotion and chronic disease prevention.

**RISE OF NETWORKS**
Bottom-up solutions address health promotion and disease prevention.

**TECHNOLOGY CATALYSTS for human and economic vitality 2030**

**ENTREPRENEURIAL ECOSYSTEMS**
Lean iteration at all levels creates vital human and economic systems.

**CREATE THRIVING COMMUNITIES**
Abundant urban data and real-time visualization tools will create new opportunities for participatory planning, empowering citizens to have a voice in designing urban food systems, buildings, transportation, and other healthier, sustainable environments.

**SMART SENSORS**

![Sensors combine with GPS to map environmental health—from air quality to physical activity levels](Image 112x33 to 354x231)

**WEALTH IN WELL-BEING**
Health is a valuable asset. New markets will invest in health-promoting ventures that range from conventional financial models, crowdfunding, and alternative currencies to microinvesting in personal health assets and co-ops.

---

**New business models**
Business and social interests align for upstream interventions.

**Wealth in well-being**
Health is a valuable asset. New markets will invest in health-promoting ventures that range from conventional financial models, crowdfunding, and alternative currencies to microinvesting in personal health assets and co-ops.
The Vitality Institute Commission on Health Promotion and the Prevention of Chronic Disease in Working-Age Americans intends to catalyze coordinated innovation across sectors in the United States, realizing that a healthy workforce increases productivity and profitability, while also improving the vitality and personal well-being. Use this map as a guide to explore how future innovations and new solutions might leverage technology to empower people and inform organizations to pursue a culture of health.

A CALL TO ACTION

The Vitality Institute Commission on Health Promotion and the Prevention of Chronic Disease in Working-Age Americans intends to catalyze coordinated innovation across sectors in the United States, realizing that a healthy workforce increases productivity and profitability, while also improving the vitality and personal well-being. Use this map as a guide to explore how future innovations and new solutions might leverage technology to empower people and inform organizations to pursue a culture of health.

STAKEHOLDERS FOR CHANGE

The Vitality Institute applies knowledge about the evolving science and art of prevention and health promotion to building healthier societies, fostering health promotion.

The Institute for the Future

The Institute for the Future (IITF) is an independent, nonprofit research group with more than 30 years of forecasting experience. The IITF conducts long-term organized forecasting and Strategic Scenario Planning. The IITF develops a unique global perspective on the future. We provide insights into the strategy, design, and development of business models and organizational structures that enable people to sense and prepare for change.

www.future-institute.com | www.futureinstitute.org | @FutureInstitute | www.facebook.com/InstitutefortheFuture

TECHNOLOGY CATALYSTS FOR HUMAN AND ECONOMIC VITALITY 2030

TENSIONS

Overupplying the engaged vs. Inclusive innovation

Technology-enabled strategies for health promotion and chronic disease prevention will evolve far beyond the passing fad into a core component of how we create environments of communities. Early adopters will embrace new tools, technologies, and services that promise to promote health. For others, these solutions will not feel culturally inappropriate, but instead bring a sense of empowerment to people who experience them. Technology-enabled services that are not able to overcome these barriers. Where people do not experience a change in their health status, they may not be able to incorporate technology into their lives.

Transfomed capacities vs. Real-world constraints

Technologies will transform our capacity to sense and distribute information, prevent disease, and mitigate risk, and thereby reformulate our bodies. With this enabling power, the ability to sense and prevent disease, it will be possible to improve the quality of care and reduce costs. As we move to a world where people can access to cutting-edge technology, there will be a greater focus on how to transform this into a reality.

Utopian optimism vs. Univen distribution

Just as conditions that produce good health are unevenly distributed across the United States, the optimism and will to make the most of technology-enabled strategies are unevenly distributed as well. Social barriers, the unfamiliarity, price, and infrastructure of these tools will limit their uptake. Additionally, there is a need to focus on how to transform this into a reality. Although innovations emerging from low-resource settings in poor regions may be the most promising, they need to be able to incorporate technology into their lives.

Best intentions vs. Unintended consequences

Any new innovation brings the possibility of unintended consequences. With our经济社会 and political system, the ability to use a technologie product, market, or network has a higher probability of spreading and disparities may interfere with the delivery of personal, social, and technological benefits to people. In all areas of intervention may divert resources from other important health needs. In the workplace and school environments, there is a need to focus on how to transform this into a reality.

COMMISSION RECOMMENDATIONS

1. Invest in prevention science

Prevention science—the systematic application of scientific methods to understand health determinants, and develop and implement evidence-based interventions supported by a variety of funding sources to promote health. The Commission recommends that policymakers should allocate more funding to health education and training that should be focused on public health policy to include funding for public health programs, technology, engineering, human factors, transportation, and agriculture.

2. Strengthen and expand leadership to deliver a unified message for health and prevention

Advocates of prevention in the public and private sectors can identify, disseminate, and use evidence-based and effective solutions to promote health. The Commission recommends that policymakers should allocate more funding to health education and training that should be focused on public health policy to include funding for public health programs, technology, engineering, human factors, transportation, and agriculture.

3. Make markets work for health promotion and prevention

Markets should be aligned to encourage patient-centered care and purchase and use the technology and practices that will improve health. Artificial intelligence, machine learning, and technologies for healthier living should be encouraged to be included in the digital health divide.

4. Integrate health metrics into corporate reporting

Corporate health metrics should be integrated into corporate reporting to ensure that companies are committed to the health of their workforce and to the health of the community. The Commission recommends that policymakers should allocate more funding to health education and training that should be focused on public health policy to include funding for public health programs, technology, engineering, human factors, transportation, and agriculture.

5. Promote strong cross-sector collaborations that recognize the importance of health promotion and prevention across society

Non-health sectors should be engaged to tackle all factors that influence health. Policymakers should focus on the role of other sectors as they aspire to make progress, and they should work collaboratively to develop policies and a case for prevention.

The escalating cost of healthcare and the impact of lifestyle risk factors—tobacco use, excessive use of alcohol, unhealthy diets—contribute to growing evidence that assuring preventive care will become actionable recommendations to catalyze a widespread culture of health. In this new public health imperative and a core value in society, the Commission has generated five recommendations. In the next decade, we have the opportunity to make progress, to empower patients, and to reduce the risk of death. Where they aspire to make progress, and they should work collaboratively to develop policies and a case for prevention.

In the next decade, we have the opportunity to make progress, to empower patients, and to reduce the risk of death. Where they aspire to make progress, and they should work collaboratively to develop policies and a case for prevention.

In the next decade, we have the opportunity to make progress, to empower patients, and to reduce the risk of death. Where they aspire to make progress, and they should work collaboratively to develop policies and a case for prevention.
for change that are likely to use new technologies to catalyze
and toward promoting health. Before lifestyle-shift. This shift leads away from treating disease
of deaths among top ten risk factors

**DEATHS BY TOP TEN RISK FACTORS**

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Percentage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dietary Risks</td>
<td></td>
</tr>
<tr>
<td>High Body Mass Index</td>
<td></td>
</tr>
<tr>
<td>High Blood Pressure</td>
<td></td>
</tr>
<tr>
<td>Tobacco Use</td>
<td></td>
</tr>
<tr>
<td>Alcohol Use</td>
<td></td>
</tr>
<tr>
<td>Physical Inactivity</td>
<td></td>
</tr>
<tr>
<td>High Blood Sugar</td>
<td></td>
</tr>
<tr>
<td>Infections</td>
<td></td>
</tr>
<tr>
<td>Obesity</td>
<td></td>
</tr>
</tbody>
</table>

According to a report by the World Economic Forum and the Harvard School of Public Health, noncommunicable diseases (NCDs) account for 60% of deaths worldwide and 70% in the United States, realizing that a healthy workforce increases productivity and contributes to overall economic vitality and personal well-being. Use this map as a guide to explore how future innovations and new solutions might leverage technology to empower people and inform organizations to pursue a culture of health.

**TENSIONS**

Technology-enabled strategies for health promotion and chronic disease prevention will answer the growing citizen demand to reduce the burden of chronic diseases. These strategies will recognize the importance of primary prevention and will address the critical gaps in preventing and treating chronic diseases. However, the pace of development of new technologies and products may be more rapid than the ability of communities to adapt and apply them at scale. As stakeholders across populations, e-patients are collaborating with healthcare providers to increase awareness of their role in disease prevention and chronic disease prevention begins with sound evidence.

**OVERSUPPLYING THE ENGAGED VS. INCLUSIVE INNOVATION**

Technology-enabled strategies for health promotion and chronic disease prevention will answer the growing citizen demand to reduce the burden of chronic diseases. These strategies will recognize the importance of primary prevention and will address the critical gaps in preventing and treating chronic diseases. However, the pace of development of new technologies and products may be more rapid than the ability of communities to adapt and apply them at scale. As stakeholders across populations, e-patients are collaborating with healthcare providers to increase awareness of their role in disease prevention and chronic disease prevention begins with sound evidence.

**COMMISSION RECOMMENDATIONS**

The Institute for the Future (IFTF) is an independent, nonprofit research group with more than 40 years of forecasting experience. The Commission is a multidisciplinary team of experts from across the sciences and humanities who have come together to address this question: What are the opportunities and challenges of adopting new technologies to improve health and well-being?

1. Invest in prevention science
2. Strengthen and expand leadership to deliver a unified message for health and prevention
3. Make markets work for health promotion and prevention
4. Integrate health metrics into corporate reporting
5. Promote strong cross-sector collaborations that promote the use of health promotion and prevention in society

**TECHNOLOGY CATALYSTS**

**STRATEGIC ORCHESTRATION**

The Vitality Institute Commission on Health Promotion and the Prevention of Chronic Disease in Working-Age Americans in 2013-14 to place the power of evidence-based prevention at the center of health policies and actions in the United States. With a vision of health being embraced as a strategic imperative and a core value in society, the Commission has generated five actionable recommendations to catalyze a widespread culture of health.