COALITION FOR INNOVATION

HealthTech Blueprint for the Future

Coalition for Innovation, supported by LG NOVA

Jami Diaz, Director Ecosystem Community & Startup Experience
William Barkis, Head of Grand Challenges & Ecosystem Development
Sokwoo Rhee., Executive Vice President, LG Electronics, Head, LG NOVA

Blueprint Chairs

Alex Fang, CleanTech Chair
Sarah Ennis, AI Chair
Alfred Poor, HealthTech Chair

Authors

John Barton, Victor L. Brown, H. Timothy Hsiao, John Hsu, Sylwana Kaźmierska, Ricardo Machado, Ann M. Marcus, Nicholas Matias, Qiana Martin, Alfred Poor, Refael Shamir, Mark Wesson

The views and opinions expressed in the chapters and case studies that follow are those of the authors and do not necessarily reflect the views or positions of any entities they represent.

Senior Editor, Alfred Poor

October 2025

Preamble

The Coalition for Innovation is an initiative hosted by LG NOVA that creates the opportunity for innovators, entrepreneurs, and business leaders across sectors to come together to collaborate on important topics in technology to drive impact. The end goal: together we can leverage our collective knowledge to advance important work that drives positive impact in our communities and the world. The simple vision is that we can be stronger together and increase our individual and collective impact on the world through collaboration.

This "Blueprint for the Future" document (henceforth: "Blueprint") defines a vision for the future through which technology innovation can improve the lives of people, their communities, and the planet. The goal is to lay out a vision and potentially provide the framework to start taking action in the areas of interest for the members of the Coalition. The chapters in this Blueprint are intended to be a "Big Tent" in which many diverse perspectives and interests and different approaches to impact can come together. Hence, the structure of the Blueprint is intended to be as inclusive as possible in which different chapters of the Blueprint focus on different topic areas, written by different authors with individual perspectives that may be less widely supported by the group.

Participation in the Coalition at large and authorship of the overall Blueprint document does not imply endorsement of the ideas of any specific chapter but rather acknowledges a contribution to the discussion and general engagement in the Coalition process that led to the publication of this Blueprint.

All contributors will be listed as "Authors" of the Blueprint in alphabetical order. The Co-Chairs for each Coalition will be listed as "Editors" also in alphabetical order. Authorship will include each individual author's name along with optional title and optional organization at the author's discretion.

Each chapter will list only the subset of participants that meaningfully contributed to that chapter. Authorship for chapters will be in rank order based on contribution: the first author(s) will have contributed the most, second author(s) second most, and so on. Equal contributions at each level will be listed as "Co-Authors"; if two or more authors contributed the most and contributed equally, they will be noted with an asterisk as "Co-First Authors". If two authors contributed second-most and equally, they will be listed as "Co-Second Authors" and so on.

The Blueprint document itself, as the work of the group, is licensed under the Creative Commons Attribution 4.0 (aka "BY") International License: https://creativecommons.org/licenses/by/4.0/. Because of our commitment to openness, you are free to share and adapt the Blueprint with attribution (as more fully described in the CC BY 4.0 license).

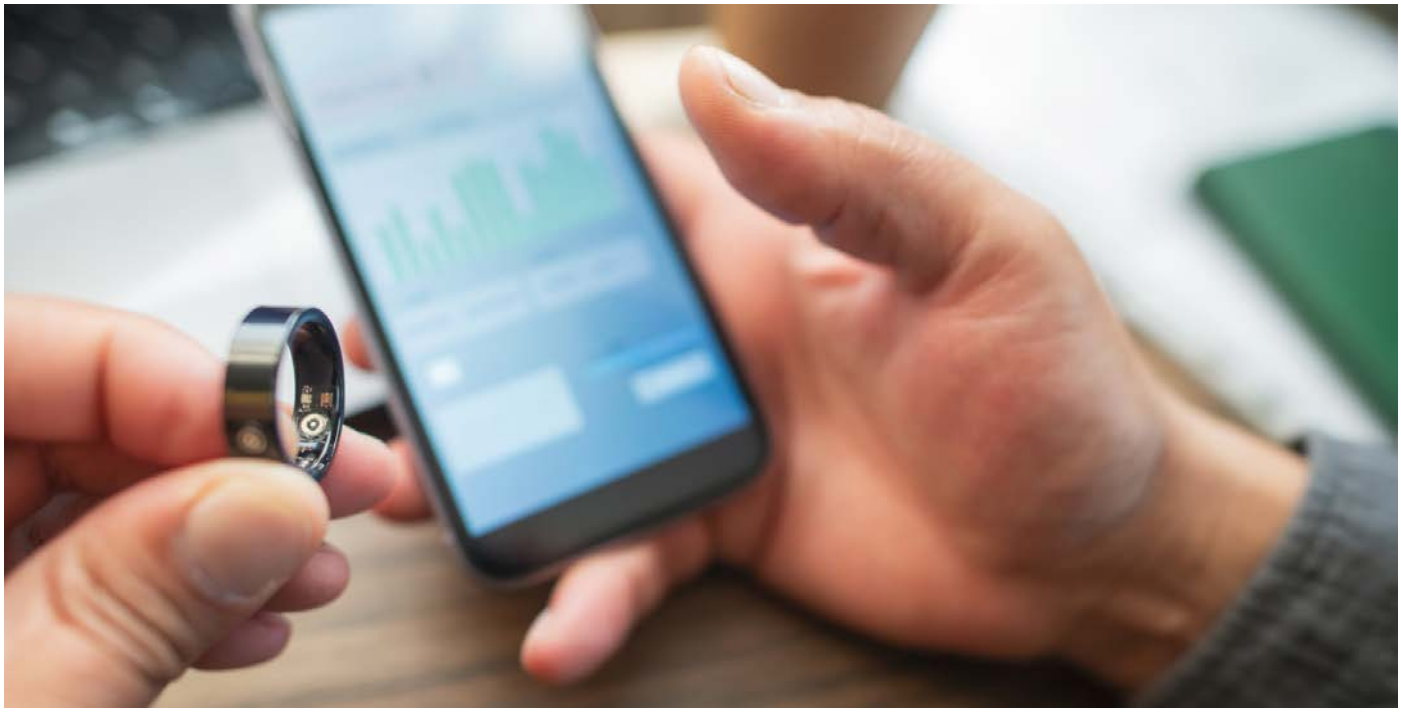
The Coalition is intended to be a community-driven activity and where possible governance will be by majority vote of each domain group. Specifically, each Coalition will decide which topics are included as chapters by majority vote of the group. The approach is intended to be inclusive so we will ask that topics be included unless they are considered by the majority to be significantly out of scope.

We intend for the document to reach a broad, international audience, including:

- People involved in the three technology domains: CleanTech, AI, and HealthTech
- Researchers from academic and private institutions
- Investors
- Students
- Policy creators at the corporate level and all levels of government

Chapter 12: The Future of Wellness & Diagnostics Testing

Authors: Ann M. Marcus, Refael Shamir



Introduction

The landscape of healthcare is undergoing a dramatic shift. Where once diagnostics were confined to sterile labs and wellness was relegated to annual checkups, today's innovations allow individuals to monitor and manage their health in real time, on their own terms. Powered by artificial intelligence, biosensors, and data interoperability, the future of wellness and diagnostic testing lies at the intersection of personal empowerment and institutional transformation. This chapter explores how emerging technologies are redefining the continuum of care: enabling early detection; fostering autonomy; and posing new ethical questions about the ownership, use, and protection of health data.

The Rise of Personal Health Technologies

One of the most profound developments in modern healthcare is the advent of devices that track biometric and behavioral data continuously. Whether worn on the wrist, embedded in clothing, or integrated into the bathroom, these tools offer unprecedented insights into day-to-day health. Devices such as the Oura Ring and Apple Watch not

only track steps or heart rate; they signal when something is wrong.

For instance, take the story of a nurse practitioner whose Oura Ring alerted her to unusual physiological patterns, prompting her to seek medical attention. That vigilance led to the early diagnosis of Hodgkin lymphoma. “If I didn't have the Oura ring, I'm sure I would have figured it out eventually. But having this information… made me take it more seriously," after alerts from her Oura Ring prompted her cancer diagnosis and early treatment interventions, noted Nurse Practitioner Nikki Gooding in a March 2025 article on People Magazine’s website.

Healthcare practitioners are recognizing the value of continuous wearable sensing and AI health tools to data to generate greater self-awareness and enable earlier detection and more informed care by medical providers. “As physicians, we often only get a snapshot of what's happening for a patient,” observed Dr. Sandeep Kishore, MD, PhD, an associate professor of Medicine at University of California, San Francisco (UCSF) who is part of a joint UCSF and UC Berkeley team preparing to pilot wearable devices to help treat some people with diabetes and high blood pressure (UCSF June 2025 online news article). He noted that wearables, such as electronic blood pressure cuffs or other electronic devices, could record a patients’ measurements daily and provide their physician with a new window into their health over time. Kishore added, “Artificial intelligence has the potential to sift through the firehose of data to detect new patterns in diseases.”

Similar innovations are emerging in women’s health. A wearable ultrasound bra, pioneered by Canan Dağdeviren at MIT, offers daily scans for breast cancer detection, dramatically increasing monitoring frequency and early detection rates. Another bra, the Eva, was invented by Julian Rios Cantu, an 18-year-old Mexican student, who was inspired by his mother’s experience with breast cancer. It features 200 sensors that can track temperature and texture changes as a method for detecting early breast cancer development for which he earned the top prize at the Global Student Entrepreneur Awards in Frankfurt, Germany.

The lesson from these examples is clear; continuous, user-initiated monitoring has the power to surface health anomalies that may otherwise go undetected. These tools are democratizing diagnostics, bringing clinical-grade insight to everyday users, and enabling earlier detection and treatment for better outcomes and a reduction in healthcare costs.

Data Sovereignty and Empowerment

While healthcare providers and researchers can certainly benefit from having the additional data that these devices provide, the digitization of health information introduces critical questions about data ownership, privacy, and consent. Individuals today increasingly expect not just to access but to control their personal health data: a movement known as data sovereignty. It is the idea that individuals and organizations have the right to control their own data and determine how it is collected, stored, used, and shared as a way to assist them in accessing services.

An innovative concept that permits this type of control is a personal data wallet. One thoughtful example of a personal data wallet is the Personal Access System for Services (PASS), under development by Open Commons in Portland, Oregon. PASS is an open-source application designed for housing-insecure individuals to give them secure, user-controlled data exchange across housing and health services while maintaining privacy and revocability. It allows them to store and share essential documents, including medical histories.

PASS additionally aims to assist caseworkers with processing and providing documents needed to complete the housing-assistance application process. It allows data and associated documents to be easily shared with case workers and with anyone else the user designates. In addition, it allows users to grant access to personal data, revoke previously granted access, and prevents unauthorized access. PASS makes data interoperable across health management information systems (HMIS) throughout the United States. A trial release of the application will be available for testing in the field soon.

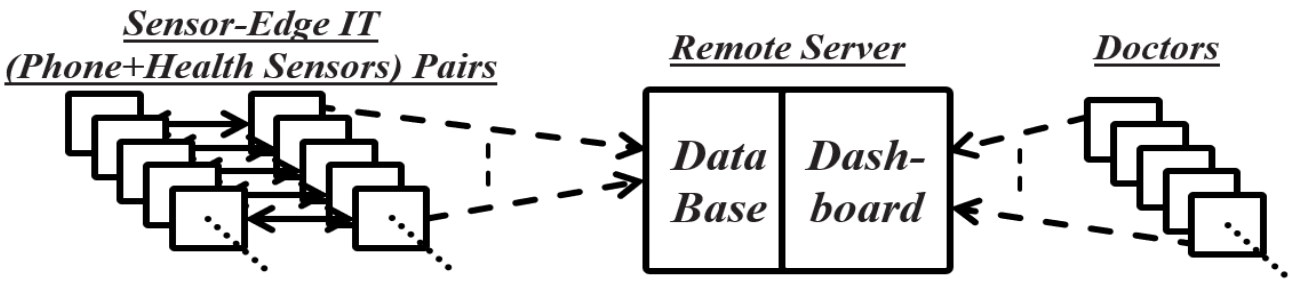


Figure 1: End-to-End System Architecture for Data Sharing and Analysis of Private Health Records.

Once users control their information, they can pre-populate forms, apply for services more easily, and selectively grant access to providers or researchers. This level of control is especially critical for transient or marginalized populations often excluded from traditional health systems.

Similar projects include My Digital Data Locker Baltimore, Kiip, and OpenWallet Foundation; these demonstrate a shift toward user agency in health data ecosystems. Much more can be done to mature this space.

Easier Research Access to Aggregated Health Data

The challenge of effectively monitoring patients remotely began in the early 1920s using telephone and radio waves. Globally, countries such as Germany recently approved nationwide efforts in digitizing health records, thus joining a long list of countries that already support electronic form storage of health data (including the U.S.). Systems that combine state-of-the art biosensors enhanced with edge AI (aka AutoML) and comprehensive data security allow users to transmit health data to physicians and researchers.

An example of a system that can aggregate user data on a centralized remote server – allowing queries across a vast array of patients – is depicted in Figure 1.

A plethora of devices – introduced for data collection to allow for early detection and better research – have been on the market for some time including such hallmark devices as the Dexcom continuous glucose monitor (CGM) first released in 2006; the Fitbit first released in 2009 that can detect respiratory issues, early COVID-19 symptoms before diagnosis, and heart rate variability; the Apple Watch, first released in 2015, that can detect falls and atrial fibrillation, tachycardia, and other heart conditions (ECG added in 2018); and a Smart Toilet first introduced in 2023 by Stanford University that could detect bladder / kidney disease and digestive biomarkers…to name just a few.

More recently a host of new health detection devices have been introduced that are embedded in clothing or textiles.

Device / Platform	Format	Monitors:
Hexoskin Smart Shirt	Shirt / Vest	ECG, HR, HRV, breathing, activity
Siren Diabetic Socks	Socks	Foot temperature
Sensoria Socks / Nadi X Pants	Socks / Yoga Pants	Gait biomechanics, posture feedback
Cambridge Smart Pajamas	Pajamas	Breathing, sleep states, apnea
Acoustic Smart Textile (Wang et al., 2025)	Fabric	Pressure, humidity, sound, strain
3D E-Textile Maternal & Sport System	Garment	ECG, EMG, maternal health signals
Nanowear SimpleSense	Smart Shirt	ECG, respiration, activity

Table 1: Health detection devices embedded in clothing or textiles

From the research perspective, the value of aggregated, anonymized health data is immense. These datasets enable longitudinal studies, support remote patient monitoring, and offer a foundation for epidemiological insights. Yet ethical collection and usage practices are vital.

Recent national efforts such as Germany's health record digitization initiative and the U.S. federal investment in interoperability standards highlight growing recognition of the need for the ability to connect data to multiple systems. During the COVID-19 pandemic, the limitations of disconnected health data became painfully obvious, underscoring the value of real-time, population-level health monitoring.

Researchers now advocate for systems that balance privacy with utility: models that use edge computing and federated learning to protect individual identities while still drawing insight from mass data. Refined architectures like the one in Figure 1 illustrate how biosensors can feed into secure, centralized systems for physician analysis, forming an ethical backbone for real-time diagnostics.

AI in Predictive Diagnostics: A New Frontier

Perhaps the most transformative advancement in healthtech is AI's role in predicting illness before symptoms arise. Tools once used to assess chronological age are now being used to calculate biological age: a more meaningful indicator of health and longevity.

Research on "biological age" has accelerated in the past three years, powered by large biobanks, multi-omics assays, and ever-larger AI models. Instead of counting the candles on your birthday cake, scientists are now reading molecular and physiological "fingerprints" that reveal how fast (or slow) your body and brain are really aging. Those same measurements are beginning to flag early disease, guide drug trials and — most relevant for everyday life — spot reversible risk factors years before symptoms appear. Artificial intelligence is being combined with new physiological analyses, such as testing for brain plaque to signal Alzheimer's, protein tests to identify heart disease risks early, and other new science to help identify ways to stay healthy longer.

Bryan Johnson's "Don't Die" initiative exemplifies this new frontier. His self-experimentation and publication of protocols have ignited interest in personalized aging clocks and holistic metrics that track vitality. These technologies assess everything from epigenetic tags and protein levels to electrical heart signals and stress biomarkers.

These tools not only predict disease risk but also inform lifestyle interventions. An elevated heart-age score from an Apple Watch might prompt dietary changes; a sleep tracker showing chronic insomnia could lead a patient to cognitive behavioral therapy.

Cultural and Public Trust Challenges

Yet the power of these technologies is tempered by public skepticism. Concerns over trust, transparency, and misuse remain at the forefront. Core trust drivers include system reliability, perceived fairness, privacy protections, and human oversight.

Additionally, cultural norms shape trust differently. In the U.S., where privacy and autonomy are deeply valued, AI-driven diagnostic systems often face more scrutiny than in collectivist societies that emphasize communal benefit over individual data control.

Trust gaps can be exacerbated by poor communication. When users don't understand how an AI reaches its conclusions, they may reject even highly accurate insights. To build trust, systems must be explainable and interactive: not just accurate.

AI for Caregivers and Decision Support

Another critical, emerging domain is the use of AI to support caregivers: both professional and family based. A 2024 article in the journal JMIR Aging explores how AI-based support tools can reduce

caregiver burden, offering guidance, symptom monitoring, and emotional validation.

These tools help caregivers triage priorities, track patient health changes, and know when to seek professional help. In environments such as elder care or dementia support, AI can monitor agitation patterns, remind patients to take medication, and even flag emerging health crises.

However, such support systems must be deployed ethically. Caregivers must remain in control, and AI should complement, not replace, human empathy and judgment. Misplaced reliance on chatbots or unvetted apps can result in reduced quality of care or privacy breaches.

Navigating Public vs. Private Interests

The commercialization of health data is perhaps one of the most contested ethical frontiers. Many systems collect personal health data under the guise of self-improvement, only to repurpose it for profit-driven motives: pharmaceutical targeting, insurance pricing, or political micro-targeting.

Consider the case of 23andMe, whose genetic data partnerships raised concerns about secondary use beyond user consent. Or Sam Altman's iris-scanning "WorldCoin" project, which paid individuals to submit biometric data that would later train identity verification systems.

Distinguishing between public-good applications — including early pandemic detection or nutrition alerts — and commercial exploitation is vital. Transparency in data usage, user opt-in mechanisms, and enforceable accountability structures are key components of a responsible data ecosystem.

With care, clarity, and collaboration, we can ensure that tomorrow's diagnostic breakthroughs lead to greater levels of wellbeing for everyone, not just those who can afford them.

Author (In order of contribution)

Ann M. Marcus, Director, Ethical Tech & Communications, WeAccel
Ann M. Marcus is a Sonoma-raised, Portland-based communications strategist and ethical technology analyst focused on smart cities, community resilience, and public-interest innovation. She leads the Marcus Consulting Group and serves as director of ethical technology and communications at WeAccel.io, a public-good venture advancing mobility, communications, and energy solutions for communities. Ann has advised public and private organizations—including Cisco, the City of San Leandro, Nikon, AT&T, and InfoWorld—on trust-based data exchange, digital public infrastructure, resilience strategy, AI and more. Her current projects include a California senior evacuation program, a Portland robotics hub, and digital energy resource initiatives with utilities in Portland and the Bay Area.

Refael Shamir, Founder, Letos
Refael Shamir, is a seasoned entrepreneur in the field of affective neuroscience, and is working towards introducing a new medium for gaining insights into spontaneous human reactions based on seamless integrations of devices in everyday environments. Refael is also a renowned speaker having presented his learnings in highly acclaimed conferences such as NVIDIA GTC, MOVE Mobility Re-Imagined, NeurotechX, among others.

For more information about the Coalition for Innovation,
including how you can get involved, please visit coalitionforinnovation.com.

View the Next Chapter