Case Study

Intel® AI technologies

Empowering US Heroes through Data Sovereignty, Ethical AI and Precision Health

AI MINDSystems and Intel enable a collaborative, multi-party, person-centered GenAI solution that is made compliant and possible with privacy-enhancing technologies.

Solution Ingredients

- Intel® Xeon® Scalable Processors
- Intel® Gaudi® 2 AI Processors
- Intel®Data Center GPU Max Series
- Agilex® 7 FPGAs
- Intel® Software Guard Extensions (Intel® SGX)
- Intel® Trust Authority

Executive Summary

AI MINDSystems Foundation, in partnership with Intel, is pioneering a secure, equitable, and person-centered data ecosystem that empowers individuals with control over their health and personal information. This transformative approach drives responsible AI advancements in healthcare, social services, and life sciences, starting with US military service members, veterans, first responders, and their families through the National HERO initiative.

Challenges in the Digital Landscape

- **The Data Divide; A Barrier to Progress:** The current fragmented and siloed nature of health and personal data, coupled with a lack of individual control and financial participation in the data economy, is crippling AI's potential to revolutionize healthcare and life sciences.
- **Outdated Practices; A Call for Change:** Existing data practices are fraught with compliance, security, privacy, and ethical concerns, urgently demanding a new paradigm that fosters trust, empowers individuals, and unlocks the full potential of data-driven innovation.

AI MINDSystems Foundation is driving responsible AI advancements for a better future in healthcare and life sciences, beginning with United States active-duty service members, veterans, first-responders, and their immediate families.

AI MINDSystems Foundation's Solution: WISDOM Networks

- **Enabled by Intel® Solutions.** WISDOM Networks leverage multiple Intel® technologies, including: the Intel® Trust Authority, Intel® Xeon® Scalable Processors, Intel® Gaudi® 2 AI Processors, Intel® Data Center GPU Max Series, Agilex® 7 FPGAs, and enhanced Intel® Software Guard Extensions (Intel® SGX).
- **Secure, Multi-Party Healthcare, Social Services, and Research.** WISDOM Networks are poised to transform healthcare and catalyze clinical research innovation for both healthy smart cities and underserved rural communities. These replicable data and AI utilities leverage the power of blockchain, web3, and privacy-enhancing technologies (PETs) to facilitate secure, data-driven automation and multi-party ethical AI practices. The acronym WISDOM stands for "Worldwide Informatics System and Data Ontology Matrix" and encapsulates the network's inherent intelligence and purpose.
- **Uncompromising Data Security and Privacy.** At the heart of the approach lies an unwavering commitment to safeguarding health information and personal data. The Foundation employs a cutting-edge combination of fully homomorphic encryption (FHE) and other advanced PETs, such as trusted execution environments (TEEs) and zero-knowledge proofs (ZKPs). This robust, multi-layered approach ensures that data remains secure and private throughout its lifecycle, even during computation and analysis.

Real-World Impact

- **The National HERO initiative.** The National HERO (Health Enhancing Resource Orchestration) initiative is a pioneering endeavor set to revolutionize healthcare, social services, and decentralized clinical research. By harnessing the potential of WISDOM Networks, National HERO champions equitable, personalized care, democratizes access to clinical research as a care option, and empowers patients through data sovereignty. This transformative initiative prioritizes the needs of US military service members, veterans, first responders, and their families, recognizing their invaluable contributions and unique healthcare challenges.
- **Transforming Research and Care.** National HERO introduces innovative research modalities, such as decentralized and hybrid clinical research as a care option (CRAACO) and near-real-time real-world evidence (NRT-RWE). These advancements promise to accelerate research timelines, enhance decision-making, and improve patient outcomes. Initial capabilities will focus on privacy-preserving clinical trial matching in **mental health** and **oncology**, demonstrating the potential to radically improve upon the way research is conducted and integrated into personalized care pathways.

The Data Dilemma: Fragmentation and Low Individual Control

In the digital age, health and personal data volume is exploding, yet it remains scattered across a vast and growing number of organizations, creating a data landscape rapidly increasing in its fragmentation. This fragmentation, compounded by the absence of verifiable digital identities and individuals' near-total lack of control over their data, severely hampers our ability to fully leverage AI's potential for personalized healthcare and countless other advancements.

Current practices, reliant on extensive data sharing and centralization for analytics and AI training, are riddled with risks. Privacy breaches, security vulnerabilities, compliance challenges, and ethical concerns cast a long shadow over these approaches. Moreover, these centralized structures stifle research and innovation, providing only a fragmented and incomplete view of individual health and well-being.

For individuals:

- **Greater agency and control over personal and health information:** Individuals gain unprecedented control and transparency in how their health and personal data is used, ensuring privacy and security.
- **Direct financial participation in the data and AI economy:** Individuals can actively participate in the data economy, securely monetizing their data while advancing healthcare and research.
- **Improved clinical outcomes:** AI-driven insights and personalized care, powered by individual massively multi-modal data, have strong potential to improve health outcomes and well-being.

For healthcare and life sciences enterprises:

- **Enhanced data security and privacy:** Robust data protection measures, including a unique combination of fully homomorphic encryption and zero-knowledge proofs, ensure security and privacy of sensitive personal and health information.
- **Accelerated research and innovation:** Access to diverse, high-quality data and multi-party, collaborative AI in training and at runtime can accelerate research and innovation, leading to faster breakthroughs and personalized treatments.
- **Reduced costs:** Streamlined data management and efficient collaborative AI-driven processes can reduce administrative burdens and costs by removing redundancies across enterprises and sectors, optimizing resource allocation.

> "The only party that should aggregate an individual's health, biometric, and massively multi-modal personal information is the individual themselves. The only data over which an individual can have verifiably complete control is that which they have taken into their direct custody. We believe we have created the business model, incentive design, and technical architecture to achieve, scale, and sustain this, and will be rigorously studying its impact beginning in early 2025."
>
> *– Heather Leigh Flannery, Co-Founder and CEO of AI MINDSystems Foundation*

While the 21st Century Cures Act has empowered individuals in the United States to collect and share their protected health information (PHI) from HIPAA-covered entities, the healthcare and life sciences industry continues to grapple with the inefficiencies and costs associated with fragmented personal data—data that is vital to understanding and improving social, environmental, and occupational determinants of health. These inefficiencies stem from the constant, highly redundant efforts to collect accurate individual data without directly involving the individuals themselves. This approach not only burdens the public and private sectors with substantial costs but also denies individuals the opportunity to consolidate, curate, and derive value from their own data.

Currently, individuals lack the means to leverage the combined insights from their health and personal data for their own independent purposes, generate ongoing earnings from it, or receive compensation or other incentives for the health-promoting behaviors reflected in that data. This missed opportunity not only hinders data-driven innovation but also fails to financially and logistically support individuals' health-promoting behaviors, which are often inhibited by social, environmental, and occupational determinants of health.

The National HERO (Health Enhancing Resource Orchestration) initiative is a pioneering endeavor set to revolutionize healthcare, social services, and decentralized clinical research by harnessing the potential of WISDOM Networks.

Individual People Monetizing Data Under Their Custody

Empowering individuals to aggregate, curate, and monetize the personal and health data they've brought under their custody has profound implications for the healthcare and life sciences industries, and for all sectors that serve consumers directly.

Granularly consented, fairly compensated, selectively disclosed, and decentralized data transactions have the potential to revolutionize how we conduct population-scale computational tasks. These transformative possibilities include:

- **Advanced Machine Learning:** Enabling sophisticated federated and swarm learning techniques, complete with weighted attribution to assess individual model contributions.
- **Privacy-Preserving Inference:** Safeguarding model inputs and outputs, as well as the model software at runtime, through secure inference mechanisms that maintain data confidentiality.
- **Streamlined Clinical Trials:** Optimizing site selection, patient matching, and recruitment processes for decentralized and hybrid clinical trials, leading to faster, more inclusive studies.
- **Enhanced Health & Market Research:** Improving data integrity, inclusivity, and human research subjects protections while reducing costs and accelerating research timelines compared to traditional methods.
- **Targeted Philanthropic Impact:** Facilitating the precise matching of philanthropic resources to urgent, personalized needs, maximizing the effectiveness and speeding the delivery of charitable giving.
- **Incentivized Health Promotion:** Verifying health-promoting behaviors that have been financially sponsored or otherwise incentivized, supporting both individual clinical aims and public health priorities.
- **Proactive Public Health Interventions:** Empowering timely monitoring and effective interventions in public health, including during national emergencies, through real-time, privacy-preserving data analysis.
- **Dynamic, Person-Centered Workflows:** Triggering real-time, secure collaboration across organizations as patient data updates, streamlining care coordination for chronic, acute, urgent, and emergent needs.

This literally person-centered approach enables full-context, verifiable, longitudinal, *significantly* multimodal data acquisition transactions from and about a single individual or family. At the discretion of individual data subjects or their caregivers, the same price discovery function supports either remuneration or tax-deductible donations. These transactions are strictly voluntary, financially fair, flexible, easily forensically verifiable, and auditable on-demand.

An AI-enabled, person-centered trusted data ecosystem is an urgent societal requirement, difficult or impossible to fulfill without structural change and the introduction of

new business models and operating frameworks that unify the public and private sector. This new ecosystem has the potential to radically reduce healthcare costs, enhance care and data quality, and foster ethical and compliant secondary data use—all while empowering and appropriately compensating individuals, families, and communities. To achieve this, individuals must be able to continuously synchronize the masses of data generated about them into their direct custody, in enterprise-grade but self-sovereign decentralized data and AI infrastructures.

Solution: WISDOM Networks and the AI MINDSystems Trusted Data Ecosystem

AI MINDSystems Foundation directly addresses the challenges of fragmented enterprise data and the inadequate individual control of data subjects by:

1. **Empowering individuals** with identity, data and AI sovereignty, advanced privacy-preservation, and the opportunity to financially participate in the data economy; and in parallel,

2. **Enabling enterprises** to lower compliance costs, mitigate security risks, while significantly advancing their capabilities in ethical AI, inclusive data governance, and secure multi-party computing.

Its solution, WISDOM Networks, blends neuroscience and neuromorphic computing with classic and generative AI, leveraging Intel technologies, including: Intel Trust Authority, Intel Xeon Scalable processors, Intel Gaudi 2 AI processors, Intel Data Center GPU Max Series, Agilex 7 FPGAs, and enhanced Intel SGX. Through these and other exponential technologies operated in new business models, the organization aims to revolutionize the healthcare and life sciences landscape by:

- **Establishing Trust and Collaboration:** WISDOM Networks create a secure operating environment and business framework for public and private sector organizations and individuals to collaboratively compute and engage in auditable, secure multi-party workflows *without centralizing their source data*.
- **Empowering Individuals:** By enabling individuals to use their own self-sovereign AI on their own terms, using the health and personal data about them continuously synchronized into their direct custody, the introduction of WISDOM Networks begins a new era of person-centric care and research.
- **Driving Innovation:** Through decentralized clinical research and verifiable insights, WISDOM Networks aim to accelerate the development and deployment of responsible AI solutions that benefit everyone.

WISDOM Networks leverage a powerful combination of technologies to achieve these goals. Blockchain serves as the foundational trust layer. It not only provides a decentralized, immutable ledger to orchestrate verifiably compliant data discovery and use; it also enables Decentralized Identities (DIDs), Verifiable Credentials (VCs), and the tokenization of unique data payloads, documents, incentives, payments, and donations. Varying combinations of Privacy-Enhancing Technologies (PETs) safeguard sensitive information throughout the ecosystem. Critically, AI MINDSystems Foundation's innovative use of hardware-accelerated Fully Homomorphic Encryption (FHE) in combination with Zero-Knowledge Proofs (ZKPs) allows computations to be performed on encrypted data, preserving privacy even during analysis.

> "Intel's Agilex® 7 FPGAs provide unparalleled performance advantages in processing the computationally intensive operations required for privacy-enhancing technologies like fully homomorphic encryption and zero-knowledge proofs. The high degree of parallelism and hardware acceleration these devices offer enable us to execute complex cryptographic computations more efficiently than ever before. This not only accelerates our privacy-preserving analytics but also allows us to scale our AI solutions to meet the real-world demands of healthcare and life sciences applications without compromising data security or privacy."
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> *– Rami Akeela, PhD, Chief Wireless and Privacy Enhancing Technology Officer at AI MINDSystems Foundation*

ZKPs play a crucial role in further enhancing security and privacy, enabling cryptographic verification of information without revealing the underlying data, adhering to the principle of data minimization. Moreover, ZKPs empower a subset of secure multi-party workflows to progress seamlessly without the need for direct data sharing, unlocking entirely new possibilities for compliant collaboration.

By directly deploying AI models to decentralized data sources, WISDOM Networks fosters collaborative learning, scalable model enhancements, multi-party secure inference, and real-time analytics—all while exceeding the highest standards of data security and privacy. This unique and groundbreaking approach has the potential to transform population and public health, ultimately improving health equity for all.

In summary, WISDOM Networks and the AI MINDSystems Trusted Data Ecosystem aim to deliver:

- **Enhanced Security, Privacy, and Individual Data Sovereignty:** Robust protection for sensitive health and personal information and technology and incentive alignment for individual, community, and family data sovereignty.
- **Accelerated Research, Translation, and Innovation:** Efficient, collaborative research and translation while preserving privacy, introducing breakthroughs in research modalities.
- **Improved Patient Access and Outcomes:** Personalized care and targeted interventions based on comprehensive data insights, with new data economics improving access to care.

- **Reduced Health Administrative Costs:** Streamlined data management and elimination of redundant data collection, data science, and data and AI governance efforts.
- **Ethical AI Development:** Transparent, accountable AI models built on a foundation of trust.
- **Decentralized Identity and Verifiable Credentials:** Individuals and enterprises control decentralized identities, enabling secure and selective disclosure of verified information to verified parties, and when needed, enabling on-demand audits and 3rd-party forensic analysis.
- **Tokenized Data Economy:** Facilitates fair, verifiable data sharing and computational transactions, dynamic multi-party incentives, and low-cost, traceable, high-volume payments.
- **Data Minimization & Secure Multi-Party Workflows:** ZKPs enable selective disclosure and multi-party collaboration while adhering to the principle of data minimization, without compromising data privacy.

Real-World Impact: The National HERO Initiative - A Catalyst for Change

By harnessing the potential of WISDOM Networks, National HERO champions equitable, personalized care, democratizes access to clinical research as a care option, and empowers people and families through data sovereignty.

> "As we harness AI's transformative power to deliver personalized care at scale, there's no better starting point than the brave individuals who have served our nation. Empowering them and their families to control their data, govern its use, and benefit financially represents a revolutionary step forward. This technology will enhance care coordination, community engagement, and drive positive change. We're at the forefront of a new era in veteran care, and I'm honored to be part of it."
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> *– Dr. Hassan Tetteh, Co-Founder and Chief Veterans Health Officer at AI MINDSystems Foundation, and Author, "Smarter Healthcare with AI: Harnessing Military Medicine to Revolutionize Healthcare for Everyone, Everywhere" (Forbes Books, November 2024)*

Spearheading this transformative initiative is Hassan Tetteh, MD, MS, MBA, Co-Founder and Chief Veterans Health Officer at AI MINDSystems Foundation. A triple board-certified surgeon with 25 years of distinguished service in the U.S. Navy, Dr. Tetteh brings a wealth of experience in clinical informatics and health AI innovation to the National HERO initiative.

Innovating in Research Modalities and Care Delivery

National HERO introduces AI MINDSystem Foundation's paradigm shift in research modalities and translational sciences through innovations such as:

- Decentralized and hybrid clinical research as a care option (CRAACO)
- Near-real-time and real-time, real-world evidence (RT-RWE*)
- Precision dynamic insights for real-world education and continuous translation (Precision DIRECT*)
- Safe, clinically-relevant, individually-directed pragmatic trials (SCRIPTs*)

The initial focus in the initiative is on privacy-preserving research and care coordination in mental health and oncology, specifically targeting the subset of the National HERO cohort enrolled in or eligible for means-tested healthcare and social safety net programs. This strategic emphasis underscores the commitment to addressing the complex healthcare needs of underserved communities and prioritizing improvements in health equity.

A Collaborative Approach to Transformation

National HERO aims to redefine personalization, efficiency, and privacy by empowering individuals with complete, enterprise-grade data and AI infrastructures under their direct control. This approach will facilitate seamless access to care, support, and resources tailored to individual needs, orchestrated across numerous organizations. By adopting a human-centered design approach and fostering collaboration among diverse stakeholders, WISDOM Networks are being meticulously crafted within the National HERO initiative to address the multifaceted needs of multiple sectors. This collaborative effort ensures a common, capital-efficient, transparent, and accountable operating model, maximizing the impact and reach of these versatile utilities.

Forging a Path to the Future

WISDOM Networks, built on a foundation of trust, compliance, security, and inclusive computational governance, are paving the way for a new era of safe, ethical, and accessible AI. By granting individuals unprecedented control over their health and personal data, the AI MINDSystems Trusted Data Ecosystem, powered by Intel's solutions, is poised to enable AI-personalized well-being without compromising freedom, privacy, or security. Through strong partnerships and groundbreaking innovations, AI MINDSystems Foundation is at the forefront of creating a truly person-centered, secure, and equitable healthcare system.

Join the Movement

To explore how you can contribute to this transformative vision and participate in the National HERO initiative, please contact national.hero@ai-mindsystems.org.

About AI MINDSystems Foundation

AI MINDSystems Foundation is a non-profit pioneering exponential technology-enabled systemic interventions to advance humanity's health, safety, prosperity, and privacy. Its mission is to transform how these technologies are accessed and adopted by underserved communities, and how data from those communities is collected, stored,

and used for the advancement of ethical AI, community health, and the pursuit of health equity, digital equity, and environmental sustainability. To achieve this, the organization is creating a new, trusted data ecosystem, a just data economy financially inclusive of data subjects, and self-sovereignty of identity, data, AI, and personal digital twins. By placing MIND (My Individual Networked Data) at the center of their work, the organization aims to create a world where empowered individuals and families have agency over their data and can leverage it for their benefit.

For More Information

Learn more about AI MINDSystems Foundation.

Get insights on Intel AI Solutions.

Explore how you can contribute to this transformative vision and participate in the National HERO initiative.

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* RT-RWE (Real-world evidence), Precision DIRECT (precision dynamic insights for real-world education and continuous translation) and SCRIPTs (safe, clinically-relevant, individually-directed pragmatic trials) are trademarks of AI MINDSystems Foundation.

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