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Contribution by WHO

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PRIORITY THEME 2: Science, Technology and Innovation in the age of AI

United Nations Commission on Science and Technology for Development (CSTD)

WHO Input (Data, Digital Health, Analytics and AI)

1. **Can you provide some successful examples of how AI and data are being used to advance science and innovation across WHO member-states? *(Please describe how these applications transformed research and development practices and their impacts)***

   A. The **WHO Family of International Classifications (WHO-FIC)** provides a globally harmonized framework for collecting, classifying, and analyzing health data across diseases, interventions, functioning, and related domains. At its core is the International Classification of Diseases (ICD)—the world's diagnostic standard for health information, research, billing, and policymaking. The launch of ICD-11, developed through an unprecedented global collaboration involving over 90 countries, represents a major leap forward in health data interoperability. Unlike its predecessors, ICD-11 is digitally native, semantically structured, and built to integrate with AI-driven systems through its ontology-based architecture and standard APIs. It supports real-time data exchange, automated coding, and natural language processing—transforming how data is captured at the point of care and across public health systems.

   Combined with complementary standards like the International Classification of Functioning (ICF) and International Classification of Health Interventions (ICHI), the WHO-FIC enables semantic and syntactic interoperability—crucial for AI applications such as disease surveillance, decision support, and federated learning. These standards underpin not only accurate global health reporting and burden of disease modeling but also allow Member States to leverage AI to extract, classify, and harmonize unstructured data at scale—supporting innovation in research, analytics, and health system design.

   B. WHO, through the **Global Initiative on AI for health with ITU and WIPO**, has been working on benchmarking and reviewing science for research and development in the following main areas:

   - **Diagnostics and screening:** AI-enabled tools for tuberculosis detection, cervical cancer screening, and radiology are being piloted and evaluated in collaboration with Member States. These applications have enhanced diagnostic accuracy and timeliness, while also generating new evidence on how AI can be safely deployed in health systems.
   - **Epidemiological modelling and outbreak response:** During the COVID-19 pandemic and other public health emergencies, AI-supported data analytics were used to enhance surveillance, forecasting, and modelling. This accelerated research on disease dynamics and enabled quicker public health responses.
   - **Drug discovery and personalized care:** AI methods are being explored to accelerate drug discovery pipelines and to support personalized approaches to prevention and care. WHO collaborates with academic and industry partners to ensure these innovations align with public health needs, including in low- and middle-income countries.

   C. The **Global Digital Health Certification Network (GDHCN)** is an emerging global trust architecture, hosted by WHO since 2023, linking 84 countries (and their 2 billion+ citizens), that enables secure, cross-border verification of health data while preserving privacy and national sovereignty. By establishing a foundation for verifiable data provenance, GDHCN allows countries to authenticate the origin and integrity of digital health records—an enabler for trusted data exchange, global research collaboration, and regulatory-grade evidence generation. Its decentralized design supports federated learning architectures, which could allow Member States and partners to run AI models across distributed datasets without moving sensitive personal information—accelerating scientific discovery while respecting data protection principles. As a WHO-governed, open-source infrastructure, GDHCN exemplifies how global digital public goods can power innovation at scale, supporting everything from surveillance and genomics to clinical trials and cross-border health system strengthening.

D. **Global, Open GIS Infrastructure,** such as **RAMP / ABLE (AI-driven geospatial tool)** The **Replicable AI for Microplanning (RAMP)** project powers the **ABLE** tool, uses deep learning on satellite imagery to automate extraction of building footprints and settlement delineation. This GIS application accelerates the creation of denominator data for population estimation, immunization planning, and emergency response logistics. The project is publicly documented and accessible via rampml.global.

- **GeoPoDe Geospatial Platform** — GeoPoDe (Geographic, Population & Demographic Data) serves as an open geospatial data hub. It hosts standardized country-level geospatial datasets, interactive mapping, population exports, and geometry downloads—enabling Ministries of Health to integrate real-time geospatial intelligence into public health decision-making. Available at geopode.world.

- **AccessMod** — A free and open-source WHO tool for modeling physical accessibility to healthcare using GIS principles. **AccessMod 5** enables analysis of travel-time surfaces, geographic coverage (including facility capacity constraints), referral routes, zonal statistics, and health infrastructure scaling-up scenarios. It supports evidence-based planning for Universal Health Coverage (UHC). Accessible at accessmod.org

E. We developed a **small area estimation (SAE) platform to advance maternal and child health in Africa** to help countries break the stagnation in maternal and child health outcomes seen since 2015 in the SDG era. The platform allows governments to move beyond national averages by utilizing subnational information from surveys and potentially, routine health information system, to identify subnational hotspots, monitor service delivery gaps, and design interventions tailored to local needs. By simplifying advanced statistical methods into an accessible interface, SAE empowers policymakers and health teams to generate actionable evidence without requiring extensive technical expertise.

To ensure sustainability, we trained health workers and analysts in ten African countries—including Rwanda, Burkina Faso, and Senegal—building a strong foundation of local expertise at national and subnational levels. Looking ahead, the platform can be further enhanced through artificial intelligence, which will automate data processing, improve predictions, and model policy scenarios in real time. This will transform SAE into a dynamic, AI-enabled decision-support system that helps governments allocate resources more effectively, monitor progress with precision, and accelerate reductions in maternal and child mortality.

These few illustrative examples - examples demonstrate that when developed, shared, and made available responsibly - digital, data analytics and AI can enhance access to care, expedite the pace of scientific research, and foster innovation in health systems worldwide.

2. **What specific challenges, bottlenecks, or failures have you encountered in implementing AI and data for science and innovation? What are the lessons learned?**

WHO's work with Member States and partners has highlighted several **recurring challenges** in implementing AI and data for science and innovation:

- **Fragmentation and projectization of partner investments**, often not aligned with national priorities, planning cycles or leadership
- **Data reporting burdens** generated by partners and organisations – some studies suggest up to 30% of a nurse midwife's time in LMICs is spent on recording data that is never used in planning or decision-making.
- **Data ownership**: often unclear data sharing agreements and unsafe storage of confidential data protection policy implemented
- **Data access and quality:** Health data remain fragmented, siloed, and often lack interoperability. Datasets are frequently not representative of diverse populations, particularly from low- and middle-income countries, which risks perpetuating inequities in AI performance. Data that does manage to get be accessed and reused in other systems is often not kept up to date, resulting in temporal inconsistencies across otherwise correct datasets.
- **Bias and safety risks:** Without systematic evaluation, AI systems may amplify existing health disparities or introduce unsafe practices, particularly if trained on narrow or non-representative datasets.

- **Infrastructure and capacity gaps:** Limited computational resources, weak digital infrastructure, and shortages of skilled personnel constrain the ability of many health systems to adopt and sustain AI solutions as well as basic/essential data acquisition and management infrastructure.
- **Regulatory readiness:** Few countries currently have robust regulatory frameworks tailored to AI in health. This creates uncertainty for developers and policymakers, slowing the safe deployment process.
- **Sustainability of pilots:** Many AI tools are introduced through small-scale pilots but are not integrated into long-term health strategies, leading to fragmented efforts and limited impact. Pilots themselves are often designed from the ground-up with scalability in mind.

Lessons learned:

- Reliable, representative datasets and international norms on evidence standards are essential for trustworthy AI.
- Governance frameworks must be context-sensitive, allowing adaptation to countries' varying levels of readiness with links to legal frameworks.
- Sustainable adoption requires moving beyond pilot projects to system-level integration, with clear pathways for scale-up.
- Multistakeholder engagement—including governments, civil society, private sector, regulators, patients, academia, and industry—is critical to increase accountability, anticipate risks, foster trust, and align innovation with public health needs.
- Local foundations, capacity (human resource and technological), dedicated agencies or clear lines of authority, national strategies and policies absent.
- Governance and regulatory systems gaps lead to market confusion and vulnerability to poor quality, overpromising and potentially harmful systems or algorithms being deployed at costs not sustainable in the long run.

A rapid global assessment conducted by WHO in March 2025 revealed the alarming fragility of digital health systems in many low- and middle-income countries following abrupt donor funding withdrawals. These sudden exits have jeopardized core digital infrastructure supporting essential services such as HIV, TB, immunization, surveillance, and maternal and child health—exposing deeper systemic vulnerabilities: fragmented, non-standardized systems, limited local capacity, and heavy reliance on external financing and technology. The findings underscore an urgent need for a paradigm shift toward **Resilient Essential Digital Health Infrastructure (REDHI)**—a country-led, standards-based, and locally maintainable approach rooted in **open interoperability standards, digital public infrastructure (DPI), and reusable digital health system components**.

In response, WHO, in collaboration with ITU, other UN agencies, and leading private and technical sector partners, has launched a **multi-stakeholder effort** to build local capacity and accelerate deployment of the **Full-STAC approach**. This approach integrates **Open Standards** (such as HL7 FHIR, ICD, LOINC), **Open Technology** (including DPI-aligned tools like the Open Health Stack), **Open Architecture** (e.g., ITU's GovStack, OpenHIE), and **Open Content** (e.g., WHO SMART Guidelines) to enable countries to design, implement, and sustain digital health systems that are interoperable, extensible, and aligned with national priorities. Since 2022, this coalition—spanning governments, regional networks (HELINA, AEHIN, RELACSIS), technical bodies (HL7, Google, academic partners), and WHO-led normative efforts—has jointly developed guidance, training curricula, and FHIR-based tools tested through hackathons, bootcamps, and field deployments.

The REDHI Initiative builds on this momentum to deliver rapid stabilization of at-risk systems and to foster a durable transition toward country-owned, financially sustainable digital infrastructure. By leveraging the convening power of the **Global Initiative on Digital Health (GIDH)** and anchoring efforts in co-design with local governments, REDHI provides a practical, action-ready framework for countries to not only recover from the current digital health system crisis—but to rebuild stronger, smarter, and more self-reliant – for both current digital health and data systems, but also for future AI-based solutions.

3. **Can you provide examples of strategies or policy instruments to support AI and data for science and innovation?** ***(Please describe how ethical considerations—such as fairness, transparency, privacy, and accountability—are being incorporated and provide relevant details such as links, budget, evaluation, or other information to characterize them)***

   WHO has developed global strategies, normative guidance, and practical tools to help countries harness AI responsibly in health. Key initiatives (links embedded in bullets) include:

   - **Global Strategy on Digital Health 2020–2025** (extended to 2027): Provides a high-level framework for integrating digital health, including AI, into national health plans, with a focus on equity, security, and sustainability.
   - **WHO Guidance on Ethics and Governance of Artificial Intelligence for Health (2021):** Outlines six key principles—protecting human autonomy, promoting human well-being and safety, ensuring transparency, fostering responsibility and accountability, ensuring inclusiveness and equity, and promoting AI that is responsive and sustainable.
   - **Regulatory considerations on AI for health (2023):** Developed in collaboration with regulators and partners, these instruments support Member States in adapting existing medical device regulations to address the specific challenges of AI, including continuous learning algorithms and data-driven risk profiles.
   - **Global Initiative on AI for Health (GI-AI4H):** A multistakeholder platform coordinated by WHO that develops benchmarking protocols, promotes evaluation standards, and fosters collaboration across governments, academia, industry, and civil society.
   - **WHO's data principles and various related policies**, data sharing agreements and personal data protection, under data governance efforts 2021-2024
   - WHO's Data Governance summit in 2021, together with an evaluation helped laid the foundations for WHO's data governance reforms
   - **Capacity-building and education:** Self-paced, certificate-granting courses on an introduction to AI for health ethics and governance, as well as use-case-based training for AI developers. Additional courses on regulatory considerations and traditional medicine are under development. WHO's new academy, based in Lyon, provides a strategic, global best practices and more integrated approaches to capacity building.
   - **WHO SMART Guidelines**: WHO has developed a common format for requirements documentation and specifications for public health and clinical applications, ensuring they are consistently mapped to open interoperability standards such as HL7 FHIR, ICD, and LOINC. By creating a structured digital layer of evidence-based guidance, SMART Guidelines not only enable interoperable health systems but also generate high-quality, AI-ready data—laying the foundation for science, innovation, and the responsible use of AI in health.Across all strategies, ethical considerations—fairness, transparency, accountability, privacy, and human oversight—are explicitly embedded. Evaluation processes include consultation with experts from Member States, independent review, and alignment with international standards.

4. **Are you engaged in promoting open innovation or open data? If not, why? If yes, can you share specific projects and outcomes?** ***(Please provide relevant details such as links, budget, evaluation, or other information to characterize them)***

   WHO actively promotes open science, open data, and transparent evaluation processes to support the development of trustworthy AI in health. Key examples include:

   - **Open Code Initiative:** WHO encourages open-source approaches and shared infrastructure for AI model evaluation and development, enabling reproducibility and reducing barriers for low- and middle-income countries to participate in innovation.
   - **Collaborative dataset development:** In partnership with academic institutions and research centres, WHO is piloting the creation of representative test datasets that can be shared under responsible governance models. These datasets are designed to support both global benchmarking and domestic innovation.
   - **Publicly accessible open data sets:** The World Health Data Hub and the Global Health Observatory make official statistics as well as underlying specific data sets available in a structured way through downloads, APIs and visualizations, along with additional descriptive resources that support both human and AI processing. All official data disseminated by the Organization is shared through the IGO CC V4 license. Content is shared and reused by multiple institutions including unstats.un.org from UNDESA.

- **Reference Data Archive:** A semi-public system that allows for approved researchers to work with sensitive data within a controlled trusted environment. Aggregated outputs suitable for public use in different applications and analyses are then made available. This includes analysis and processing done through AI models. The first example of this is the Reference Death Archive (https://data.who.int/platforms/rda)
- The **WHO Mortality Database'** raw data have been shared on WHO website and can be re-used for non-commercial use https://www.who.int/data/data-collection-tools/who-mortality-database. Widely used by researchers as empirical data to their modelling work or as evidence to substantiate their findings. Budget for this work: One full time professional and costs for the maintenance of the portal approximately USD 300K annually
- **Mortality tools: ANACoD3** – a WHO tool for transforming raw mortality and cause-of-death data into actionable insights https://icd.who.int/anacod .Designed for health ministries, researchers, and policy makers, it's an innovative online and offline tool that includes a comprehensive analyses of mortality and cause-of-death. Budget for this work: about USD 50K – 70K annually
- **Death Distribution Methods** – WHO's online tool for estimating the registration completeness of deaths aged 15 years and above using Death Distribution Methods (DDM) enables data producers and analysts to estimate the completeness of mortality data that are captured through vital registration systems. It can also analyze completeness of mortality data at both national and sub-national levels. https://who-death-completeness.shinyapps.io/death-completeness-dev/, Budget for this work: about USD 50K – 70K annuallyWHO has collaborated with Google and other partners to develop the **Open Health Stack**—an open-source toolkit for building FHIR-native, DPI-aware, and AI-ready health applications—ensuring alignment with WHO's standards for interoperability, privacy, and trusted health data use. Through this and initiatives like the Open Digital Health Summit, WHO demonstrates its commitment to open innovation, open standards, and global capacity building in digital health.

Through these efforts, WHO seeks to foster an innovation ecosystem where data, evidence, and tools are not locked behind proprietary barriers but shared in ways that protect privacy while advancing global health.

5. **Are you engaged in putting in place mechanisms to foster collaboration around AI and data for science and innovation among different stakeholders (e.g., university-industry, or private-public)?**

The **Global Initiative on Digital Health (GIDH)** is a WHO-led, country-driven platform that aligns global efforts to accelerate the digital transformation of health systems. Rather than adding new layers of complexity, GIDH strengthens coordination across partners and initiatives—placing country priorities and national digital health strategies at the center. It aims to move the global community beyond fragmented, short-term projects toward sustainable, interoperable, and locally governed digital ecosystems that can deliver real impact.

GIDH operates through four mutually reinforcing pillars. First, it provides a Country Needs Tracker to surface and prioritize national digital health demands, enabling partners to align their investments more strategically. Second, the Country Resource Portal enhances visibility into available tools, financing, and implementation support—facilitating more efficient coordination and reducing duplication. Third, GIDH delivers a Transformation Toolbox, including the Global Digital Health Monitor (GDHM), which helps countries benchmark progress, assess maturity, and advocate for investment in foundational infrastructure and standards. Finally, GIDH serves as a global convening platform, enabling peer learning, shared problem solving, and the co-development of digital public goods. Together, these functions help embed global standards, governance frameworks, and trust architecture into national digital health systems—building the foundations for long-term, data-driven transformation.

WHO is also the secretariat for the **Health Data Collaborative (HDC)**. The HDC was formed in 2017 in an effort to align partner technical, financial and political resources with country data and digital priorities – outlined in national development and health plans. The HDC currently has over 1100 members from over 400 organisations including multilaterals, countries, civil society, private sector, academia, global health initiatives and donors. The HDC is engaged with over 25 countries to support greater alignment of partner resources with national priorities, in line with

SDG targets. In addition to producing multi partner global public goods, convening peer country learning opportunities and technical webinars, the HDC works through several technical multi partner working groups. These can provide efficient and effective resources to support country priorities, including CRVS, Routine Health Information Systems, digital and interoperability and data and digital governance.

Its principles—promoting health data as a global public good, championing country ownership, and driving incremental actions for tangible impact—align closely with values of interoperability, trust architecture, and systems-building. By facilitating shared learning, aligning investments, and scaling standardized tools, the HDC helps countries transition from fragmented pilots to locally governed, resilient information systems with sustainable ROI.

The **WHO Technology Task Force** serves as a model for how multilateral organizations can bring private-sector innovation into alignment with global public health priorities. By convening leading technology companies around country-driven needs, the Task Force helps channel innovation toward foundational challenges—such as data quality, interoperability, and responsible AI integration—while reinforcing local capacity and governance. It exemplifies WHO's commitment to ensuring that technological progress serves the public good, rather than commercial interests alone.

6. **Are you engaged in any bilateral, regional, or international partnership aimed to foster AI for STI? (*Please describe the benefits and challenges of participating in these partnerships)***

WHO actively engages in international partnerships to foster responsible use of AI in science, technology, and innovation for health. WHO co-leads the **Global Initiative on AI for Health** (GI-AI4H) in partnership with the International Telecommunication Union (ITU) and the World Intellectual Property Organization (WIPO). This tripartite collaboration brings complementary strengths to bear: WHO anchors the initiative in public health priorities and governance frameworks, ITU provides digital infrastructure expertise and AI standardization processes, and WIPO contributes legal and innovation system perspectives. Together, we are working to build the normative and technical foundations countries need to adopt AI responsibly across health domains—from primary care to diagnostics, public health surveillance, and workforce augmentation.

Beyond high-level advocacy, the GI-AI4H has delivered concrete outputs. These include global regulatory convenings that bring together national medicines and health technology agencies to align on safety, oversight, and performance assurance for AI-enabled tools; early-stage benchmarking frameworks for evaluating AI systems in key domains such as radiology, pathology, and epidemiological forecasting; and guidance on integrating AI into existing national digital health strategies. The benefits of this partnership lie in its ability to convene diverse stakeholders around common goals and to move beyond ad hoc solutions toward interoperable, trusted systems. A key challenge remains ensuring coherence across jurisdictions and avoiding duplication—but partnerships like this help set the agenda for responsible, scalable AI for health innovation globally.

Some of the specific examples are

- **Consortium of AI for Health Collaborating centers:** A network of top AI for health labs and university centers and research institutes across all WHO regions that functions as a global network of research institutes and laboratories. It enables countries and independent laboratories to develop and apply benchmarking protocols, conduct evaluations, host technical workshops, facilitate international and regional exchanges, and contribute to the development of normative guidance.
- **Engagement with regulators and governments:** WHO works with national and regional regulatory authorities, such as through AIRIS, to align approaches to AI oversight, exchange lessons learned and build capacity.
- **Academic and research partnerships:** WHO collaborates with universities and technical centers worldwide, including the WHO Collaborating Centre on AI for Health Governance and the Technical University of Delft, to co-create evaluation methodologies, collaborate on

guidance, and host events aimed at connecting experts and enhancing technological capacity.

These partnerships enable the pooling of expertise and resources, harmonization of evaluation practices, and the creation of public goods (e.g., shared datasets, training materials) that strengthen global capacity.

Further efforts are underway to coordinate across diverse legal systems and levels of readiness, and to ensure equitable representation of low- and middle-income countries in global AI governance.

7. **How can international cooperation enhance the use of AI and data for science and innovation to support technological capacity building in WHO Member States? In what ways can the UN CSTD contribute to this effort?**

International cooperation is critical to ensuring that the integration of AI and data into health systems supports long-term, equitable innovation rather than fragmented, short-term deployments. As health challenges and populations increasingly transcend national borders—driven by conflict, climate, and displacement—collaboration must extend across countries, sectors, and institutions. It must also align political, technical, and financial resources around foundational systems rather than isolated tools. Effective cooperation should support the development of resilient, locally governed digital infrastructure, rooted in global standards, enabling policies, and trust architectures. By coordinating investments around common building blocks—such as semantic and syntactic interoperability, digital public goods, and verifiable credentials—the global community can help countries leapfrog toward cost-effective, secure, and sustainable data and AI integration. This includes strengthening not only technical capacity, but also institutional readiness, governance, and policy leadership.

WHO is actively working to strengthen technological capacity for AI in health, with a focus on inclusivity and equity:

- Capacity-building and training: Through the WHO Academy, WHO has launched global courses on AI ethics, governance, and practical use cases. Tens of thousands of learners worldwide have already participated. New modules on regulatory considerations and traditional medicine are under development.
- Regional and national engagement: WHO organizes workshops and consultations to help countries integrate AI into digital health strategies, strengthen regulatory readiness, and build domestic innovation ecosystems.
- Knowledge sharing and open science: WHO promotes open benchmarking results, FAIR data principles, and cross-country exchanges of lessons learned, ensuring that low- and middle-income countries can access and apply global knowledge.

The UN Commission on Science and Technology for Development (CSTD) can play a pivotal role in this effort by helping to scale and align global action:

- Amplify cross-sectoral lessons: Extend WHO's health-specific approaches (e.g., benchmarking, ethics, governance) into broader science, technology, and innovation discussions, creating synergies across sectors.
- Promote open science and equity: Encourage international cooperation on open datasets, infrastructure sharing, and capacity development, especially for countries with limited resources.
- Convene and align UN system efforts: Help coordinate across UN agencies to avoid duplication and ensure coherent global approaches to AI governance and innovation.
- Support South–South and triangular cooperation: Facilitate platforms where countries can share best practices, pool resources, and collectively build capacity.

Through its convening power, CSTD can help shift the global narrative from short-term pilots to systems-based innovation, ensuring that AI and data strengthen health systems, accelerate progress toward the SDGs, and deliver tangible benefits for all.