SAFEMed
Technical Brief

AUGUST 2025

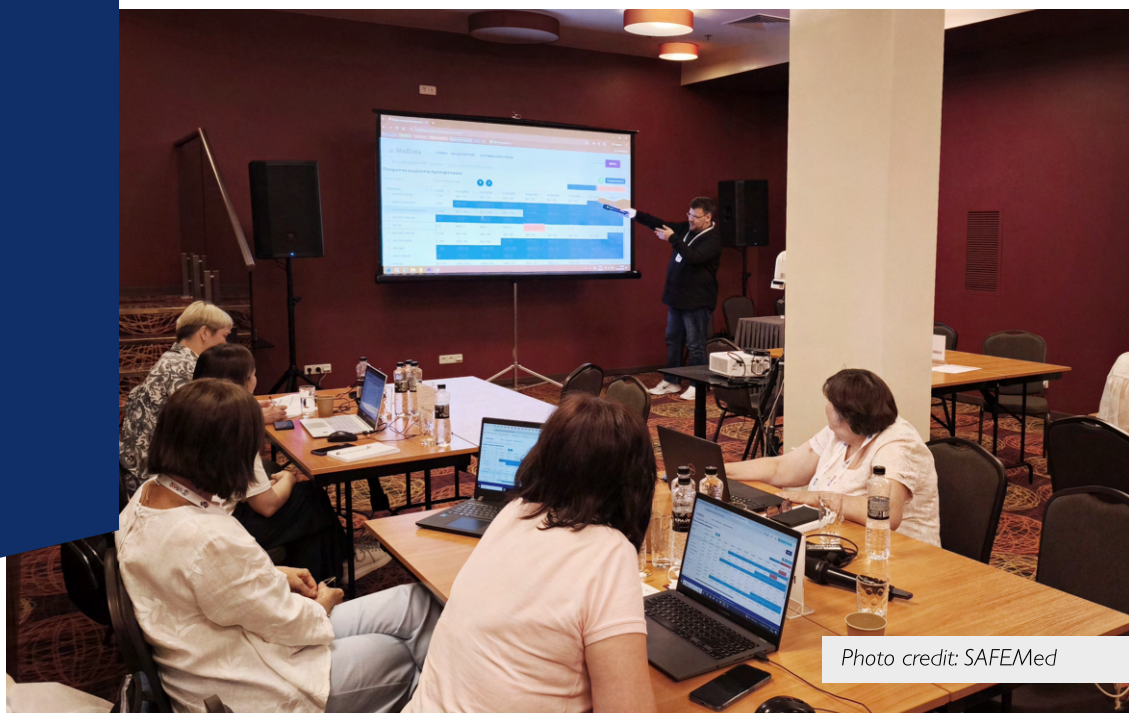


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TRANSFORMING DIGITAL HEALTH IN UKRAINE: SCALABLE SOLUTIONS FOR A RESILIENT AND TRANSPARENT HEALTH SYSTEM

About SAFEMed

Improving access to safe and affordable medicines for the Ukrainian population through ongoing, ambitious health reforms is one of the Government of Ukraine's top priorities. The Safe, Affordable, and Effective Medicines for Ukrainians (SAFEMed) project (2017-2025) funded by the US Government is supporting this effort by applying health system strengthening best practices and evidence-based interventions. SAFEMed works to institutionalize rational medicine selection; systematize public procurement of pharmaceuticals and commodities; support sustainable public-sector pharmaceutical financing; and strengthen the pharmaceutical supply chain in collaboration with the government, civil society, and the private sector.

BACKGROUND

As part of Ukraine's commitment to large-scale health reforms, including steps toward European integration and implementation of the government's health sector strategy, a comprehensive transformation of the healthcare system began in the mid-2010s. A key element of this transformation was the digitization of core health system functions aimed at improving transparency, efficiency, and accountability.

In response to these priorities, the SAFEMed Activity, funded by the United States Government (USG), was launched in 2017 to directly support Ukraine's health reform efforts. From the outset, SAFEMed viewed digital transformation not as an isolated intervention, but as a strategic enabler of systemic change across the health system. The project's approach has focused on supporting national institutions in developing sustainable, interoperable digital systems; and enhancing visibility, responsiveness, and alignment across the country's health infrastructure.

DIGITAL TRANSFORMATION VISION FOR HEALTHCARE IN UKRAINE

Despite the full-scale invasion, Ukraine has a vibrant and growing information technology (IT) sector. The dynamic Ministry of Digital Transformation set an ambitious agenda across diverse sectors of the economy. The country boasts a network of more than 2,150 companies, employing more than 300,000 professionals, many of whom are internationally recognized for their software development, AI, and cybersecurity expertise (source: Ukraine's IT Powerhouse: Innovation Without Limits).

In healthcare, Ukraine's digital transformation, led by the Ministry of Health (MOH), has progressed from fragmented and disconnected systems toward the creation of a national fully integrated digital ecosystem. This ecosystem is designed to support everyday health system operations while enabling strategic reforms, improving transparency, and enhancing the quality and continuity of care.

Led by the MOH and supported by national institutions and international partners, the digital health ecosystem is guided by the following principles:

- **Person-centeredness and accessibility** - ensuring digital tools respond to the needs of patients and healthcare providers.
- **Data security and interoperability** - enabling trusted and seamless exchange of information across platforms.
- **Efficiency and adaptability** - allowing the system to respond quickly to emerging needs and crises.
- **Real-time visibility** - providing timely and reliable access to high quality data, enabling proactive decision-making and management across the healthcare system.

These principles directly support Ukraine's strategic health priorities, particularly in the context of digital and eHealth approaches, including:

- Improving governance and enabling data-driven decision-making.
- Strengthening emergency preparedness and ensuring coordinated crisis response through timely access to information, especially in the context of the ongoing war.
- Advancing digital health financing and service contracting mechanisms through digital platforms.
- Aligning health system practices with global digital and healthcare standards for quality, safety, and traceability.

DIGITAL ECOSYSTEM

The architecture of Ukraine's digital health ecosystem follows a layered approach, as designed below:

FOUNDATIONAL INFRASTRUCTURE

The core systems and services that enable secure, standardized data exchange and system-wide connectivity.

- **National Registries** - centralized databases of medicines, medical devices, healthcare providers, and specialized institutions.
- **Master Data Catalogs** - standardized reference data ensuring consistency across digital platforms.
- **Secure Interoperability** - platforms and Applications Programming Interfaces (API) that enable secure data exchange between digital systems, such as Trembita, Ukraine's national interoperability system that facilitates electronic interactions across various government information resources.
- **Identity & Authentication** - services for verifying and managing digital identities of patients and providers.

CORE DIGITAL SYSTEMS

Key systems that manage clinical, operational, and emergency data across the health system.

- **Electronic Health Records** - digital records of patient medical histories and encounters.
- **Health Records** - administrative and financial records used in care coordination and reimbursement.
- **Public Health Tools** - systems for monitoring disease surveillance, immunizations, and public health indicators.
- **Emergency Response Tools** - digital modules for rapid response during crises (e.g., COVID-19 readiness, humanitarian aid tracking).

SUPPORTING SERVICES

Tools that enhance decision-making, optimize supply chain operations, and ensure quality.

- **Analytics** - dashboards and reports supporting evidence-based policy and management.
- **Forecasting** - tools for predicting demand for medicines and supplies.
- **Supply** - systems for managing procurement, distribution, and stock levels.
- **Verification** - tools for medicine serialization and tracking to prevent counterfeit products.

POLICY & GOVERNANCE

Institutions responsible for strategic leadership, regulation, and system coordination.

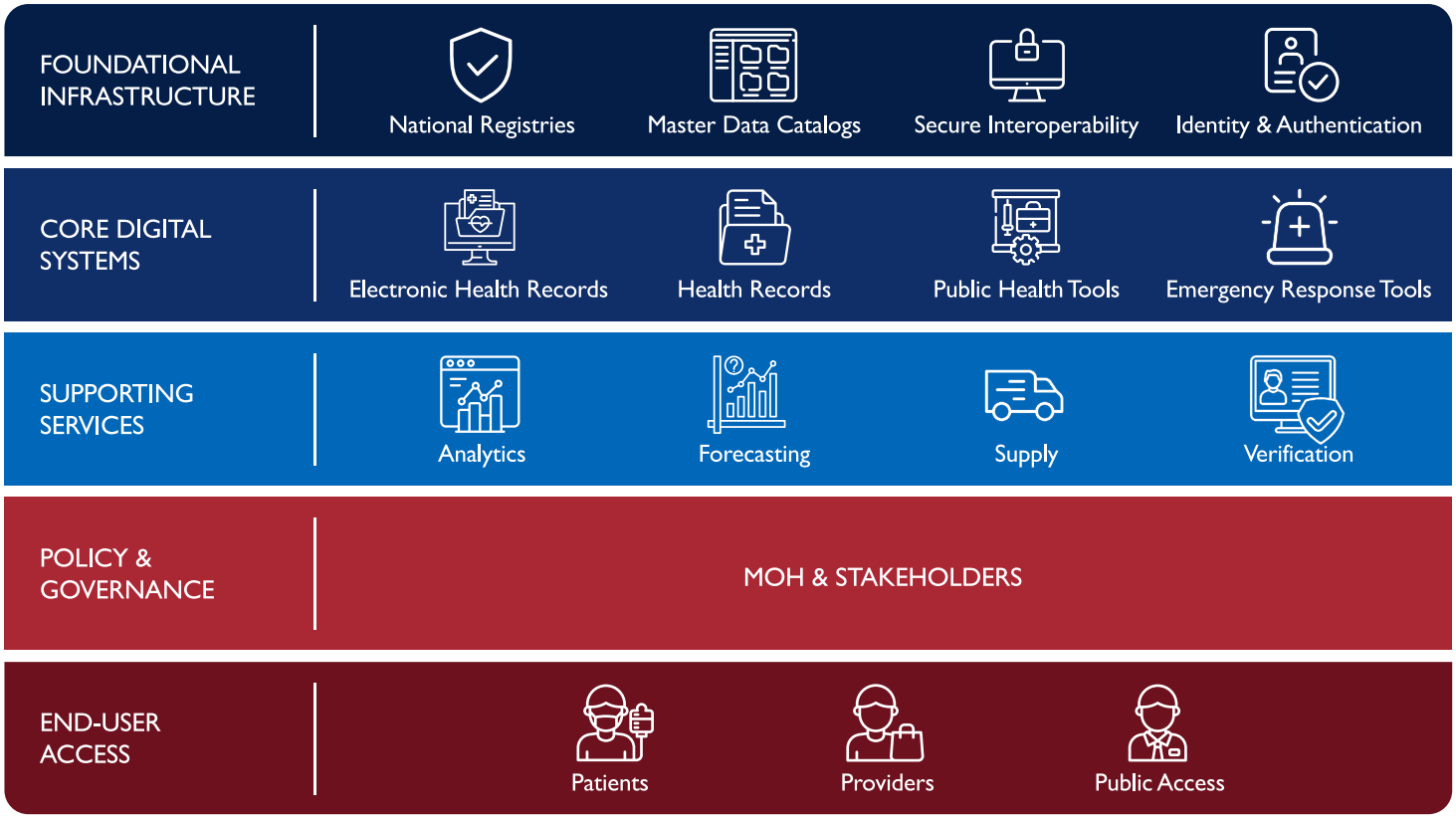
- **MOH & Stakeholders** - includes the MOH, National Health Service of Ukraine (NHSU), Medical Procurement of Ukraine (MPU), eHealth Agency, State Expert Center (SEC), State Medicines and Drugs Control Service (SMDC), and regional health departments providing leadership, oversight, and implementation support.

END-USER ACCESS

Digital interfaces and services enabling interaction between people and the health system.

- **Patients** - access to personal health records, prescriptions, and service history.
- **Providers** - digital tools for service delivery, reporting, and data entry.
- **Public Access** - open data portals and transparency tools for citizens and civil society.

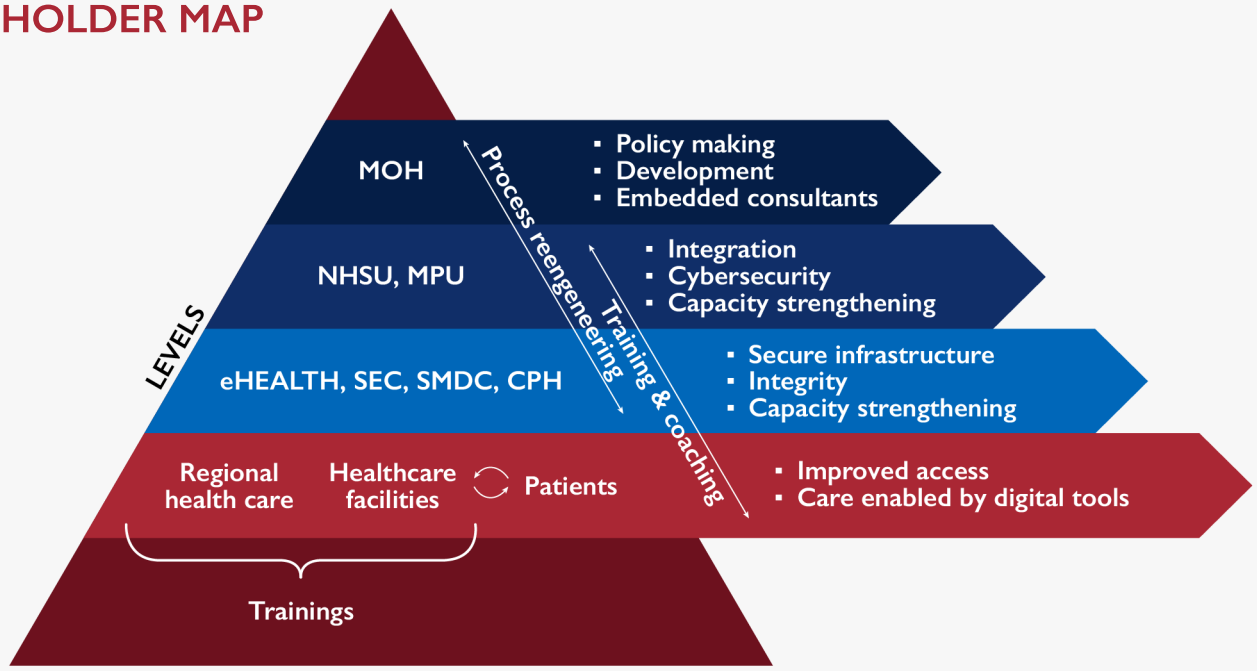
This block can be presented in the form of an infographic of the digital ecosystem as in the example below.



STAKEHOLDERS AND ROLES

Stakeholders involved in digital health have varying degrees of engagement and involvement, ranging from close partnership to indirect benefits.

STAKEHOLDER MAP



The infographic illustrates the multi-tiered structure of institutions engaged in digital health initiatives within Ukraine, highlighting their roles and responsibilities. At the top level, strategic partners such as the MOH, MPU, and the NHSU lead in policymaking and implementing digital health strategies. The next tier includes key implementers like the eHealth Agency, SEC, SMDC, and Center of Public Health (CPH) that drive system interoperability and regulatory oversight. Finally, the lowest level encompasses the beneficiaries, such as regional healthcare facilities and patients, who gain from the enhanced digital health infrastructure, experiencing improved access to medical services and data-driven care efficiency.

CATALYSTS OF DIGITAL TRANSFORMATION

Ukraine's digital health transformation since 2017 was driven by structural, political, and international dynamics that accelerated large-scale change. SAFEMed strategically leveraged these catalysts to maximize the sustainability, impact, and effectiveness of its digital health interventions.

EUROPEAN UNION INTEGRATION AND INTERNATIONAL ALIGNMENT

Since Ukraine's ratification of the European Union association agreement in 2017, alignment with global best practices — including pharmaceutical traceability, data standards, and patient safety — became a national priority. SAFEMed actively supported this agenda by introducing systems such as the medicines verification platform aligned with international traceability standards, enhancing quality control and safety, and positioning Ukraine for deeper integration with Europe and the rest of the world.

DONOR ENGAGEMENT AND COORDINATION

Between 2017 and 2025, active involvement from international donors including USAID, the Global Fund, World Health Organization (WHO), the World Bank, and United Nations Development Programme (UNDP) provided critical funding, expertise, and coordinated accountability. SAFEMed effectively leveraged this collaboration to harmonize resources, minimize duplication of effort, and accelerate digitalization processes. Joint funding and technical support enhanced the scope and sustainability of interventions such as the MedData platform, eStock management, and national digital registries.

PUBLIC DEMAND FOR TRANSPARENCY AND ACCOUNTABILITY

Public expectations intensified after significant healthcare reforms from 2018 onward, demanding greater transparency, efficiency, and equitable service delivery. SAFEMed capitalized on this demand by supporting the development of public-facing dashboards, open-data tools, and transparent digital procurement systems. These solutions improved public trust, promoted accountability, and strengthened the commitment of government institutions toward continuous digital improvement.

INSTITUTIONAL REFORMS AND DECENTRALIZATION

Between 2017 and 2020, broader administrative reforms — particularly decentralization and transparent procurement practices — created a supportive environment for digital health tools. SAFEMed integrated digital solutions into ongoing institutional reforms by closely aligning with government processes, embedding technical expertise directly within key national agencies, and ensuring local ownership and operational alignment from the outset.

POLITICAL WILL AS A KEY ENABLER

High-level political commitment from the Ministry of Health and other government stakeholders since 2017 significantly accelerated digital health reform. SAFEMed leveraged this political support to secure institutional buy-in, rapidly scale pilot initiatives into national systems, and facilitate critical regulatory and legislative changes. Strong governmental leadership ensured that digital solutions transitioned smoothly from concepts into sustainable, nationally owned platforms.

Collectively, these catalysts allowed SAFEMed to implement digital interventions effectively — unlocking resources, fostering institutional cooperation, and embedding resilience into Ukraine's healthcare infrastructure for lasting transformation.

OUR APPROACH: FROM GAPS TO SYSTEMIC INTERVENTIONS

At the outset of the project, SAFEMed identified key structural challenges in Ukraine's digital health landscape — including fragmented processes, lack of interoperability, and limited institutional capacity to design or manage scalable systems. These insights were drawn from early engagement with stakeholders, including the MOH, and informed the project's strategic and phased implementation approach.

This approach was built around five core pillars:

1. Problem-driven assessment and systems thinking

SAFEMed analyzed institutional workflows and data flows to identify underlying issues. Solutions were designed to address these root causes, creating sustained system-wide improvements. Further, we built on and reinforced existing systems to ensure that activities would be institutionalized beyond the life of the project.

2. Agile co-design and stakeholder engagement

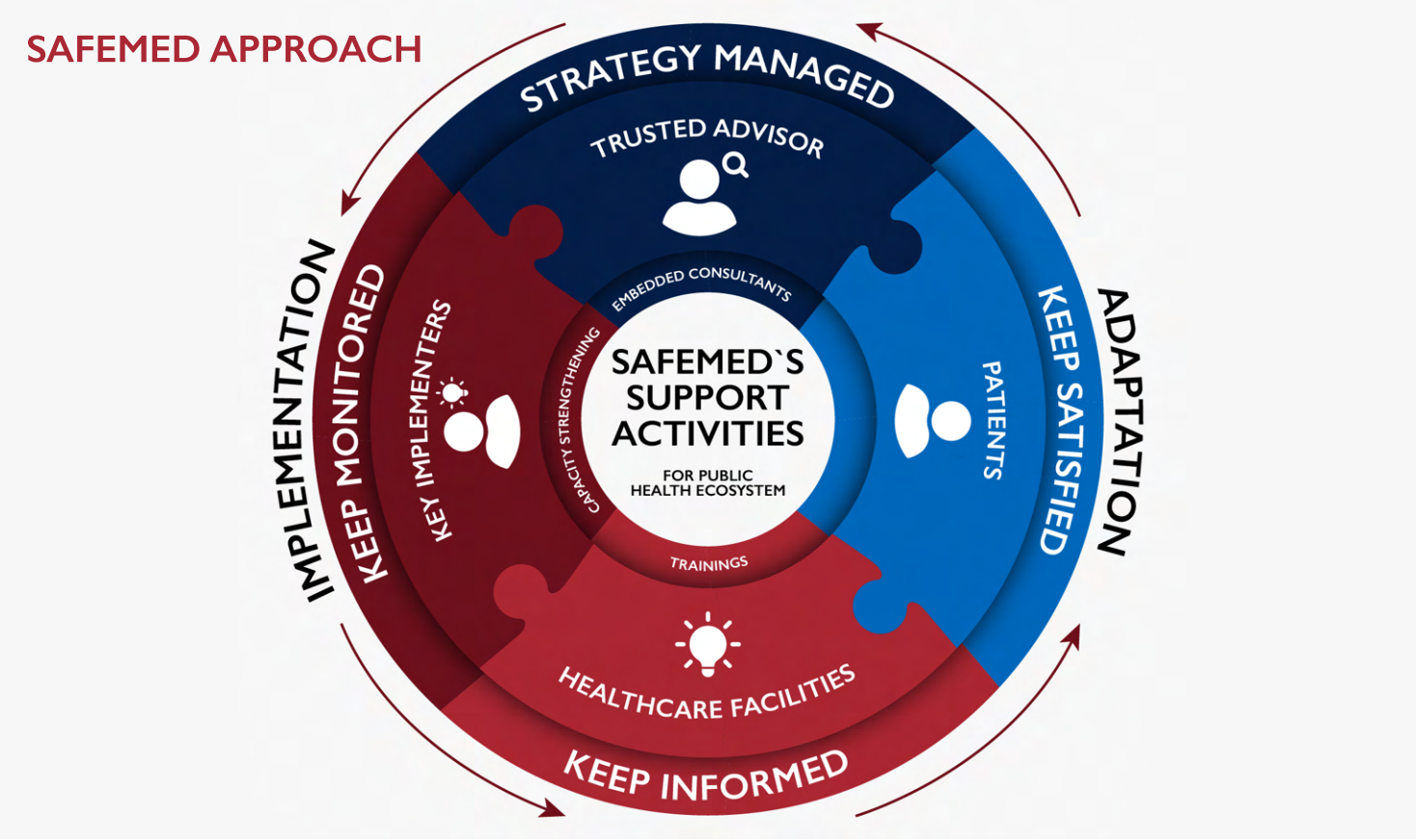
SAFEMed worked collaboratively with government institutions, Ukrainian IT firms, and domain experts using agile methodologies (such as the Software Development Life Cycle, or SDLC). Iterative planning, prototyping, and refinement ensured solutions remained relevant and adaptable. Patient needs were consistently considered, by aligning technical solutions with user value-accessibility, traceability, and continuity of care.

3. Interoperability and reusability by design

All systems were developed using modular architecture and open standards to facilitate integration across platforms and avoid duplication. Interoperability was prioritized from the beginning — enabling data exchange between agencies and continuity of care across service levels.

4. Reliance on local capacity and sustainability planning

SAFEMed's implementation model focused on strengthening institutional capacity by leveraging existing government IT teams and supplementing them with embedded consultants. As agencies matured, technical responsibilities — including system administration and licensing — were gradually transferred to public institutions, laying the foundation for long-term sustainability.



5. Emergency readiness and system resilience

Designed with built-in flexibility, quickly adapting to respond to emergencies, including COVID-19 and wartime disruptions, enables continuous operation and responsiveness.

Through this comprehensive and structured approach, summarized in the infographic above, SAFEMed transitioned from addressing short-term needs to establishing long-term systemic improvements, embedding resilience, scalability, and institutional ownership into Ukraine's health sector.

💡 Why local development matters

SAFEMed's reliance on in-country development teams and IT firms led to faster, more responsive system creation — with significantly lower cost. According to an IT audit conducted for MPU, the development of MedData by SAFEMed-supported consultants was approximately 40% less expensive than comparable outsourced options. This approach also ensured full ownership and long-term maintainability by the public sector.

SUSTAINABLE COUNTRY-LEVEL SOLUTIONS

SAFEMed supported the design, development, and institutionalization of strategic digital tools embedded into Ukraine's national health systems. These solutions addressed structural inefficiencies across the supply chain, governance, public health, and data use — not as isolated interventions, but as part of a coordinated, resilient digital ecosystem. The following areas highlight how the project's contributions created scalable and sustainable impact:

1. Enabling frameworks for scalable solutions

Support for a framework enabling rapid development of digital tools

To enhance digital capacity within national institutions, SAFEMed supported the creation of a flexible development platform that enables quick adaptation to shifting needs. Initially developed for MPU, this platform evolved into the foundation of

MedData, a customizable toolset used to support procurement workflows, data reporting, and emergency modules. Over time, the same framework powered tools for COVID-19 hospital readiness tracking and humanitarian aid monitoring — demonstrating high cost-efficiency and sustainability. An internal MPU IT-audit later confirmed that this in-house development approach was more cost-effective than outsourcing comparable systems.

2. System-level digital solutions

eStock: strengthening supply chain visibility and coordination

SAFEMed invested resources into supporting the development of eStock, a national health supply chain information system. Designed to replace fragmented manual processes, eStock now enables centralized demand planning, procurement tracking, inventory monitoring, and distribution management. The system supports over 1,000 facilities that receive centrally procured supplies and captures more than 50,000 deliveries annually. It improves transparency, reduces stockouts, and supports evidence-based allocation of medicines across Ukraine. Based on internal estimates, the use of eStock is expected to reduce average delivery planning and coordination time by up to 30%, allowing for faster response and more efficient logistics operations in emergency and routine settings.

Standardization through national digital registers and interoperable data architecture

To improve data standardization and system interoperability, SAFEMed supported the institutionalization of a National Register of Medicinal Products (NRM) and a National Register of Medical Devices (NRMD). These authoritative sources serve as the backbone of integrated health systems — reducing duplication, enabling clean data exchange, and ensuring regulatory alignment with global standards for traceability, safety, and quality.

3. Targeted systems for public health and safety

National medicines verification system

To align Ukraine with global traceability practices and reduce the circulation of falsified medicines, SAFEMed supported the design and legal framework for a medicines verification system. This system will be unique in its governance model — managed by a non-governmental entity, but fully interoperable with state IT systems and operating under the regulatory oversight of the MOH. It will utilize 2D matrix coding for serialization and real-time product authentication across the supply chain. In addition to its technical architecture, the intervention involved substantial policy support to advance reforms enabling this model — ensuring data exchange, institutional coordination, and alignment with international standards for pharmaceutical safety.

Digital tools for pandemic preparedness and disease control

SAFEMed supported the development of several digital modules that strengthen Ukraine's public health resilience. These included a COVID-19 hospital readiness dashboard, a vaccine logistics tracking system, and an antiretroviral quantification tool all developed with the CPH and MPU. These tools enabled real-time data use, supported resource allocation, and helped national institutions respond rapidly to emergency needs.

4. Organizational capacity and data use

ERP system implementation support for key national health institutions

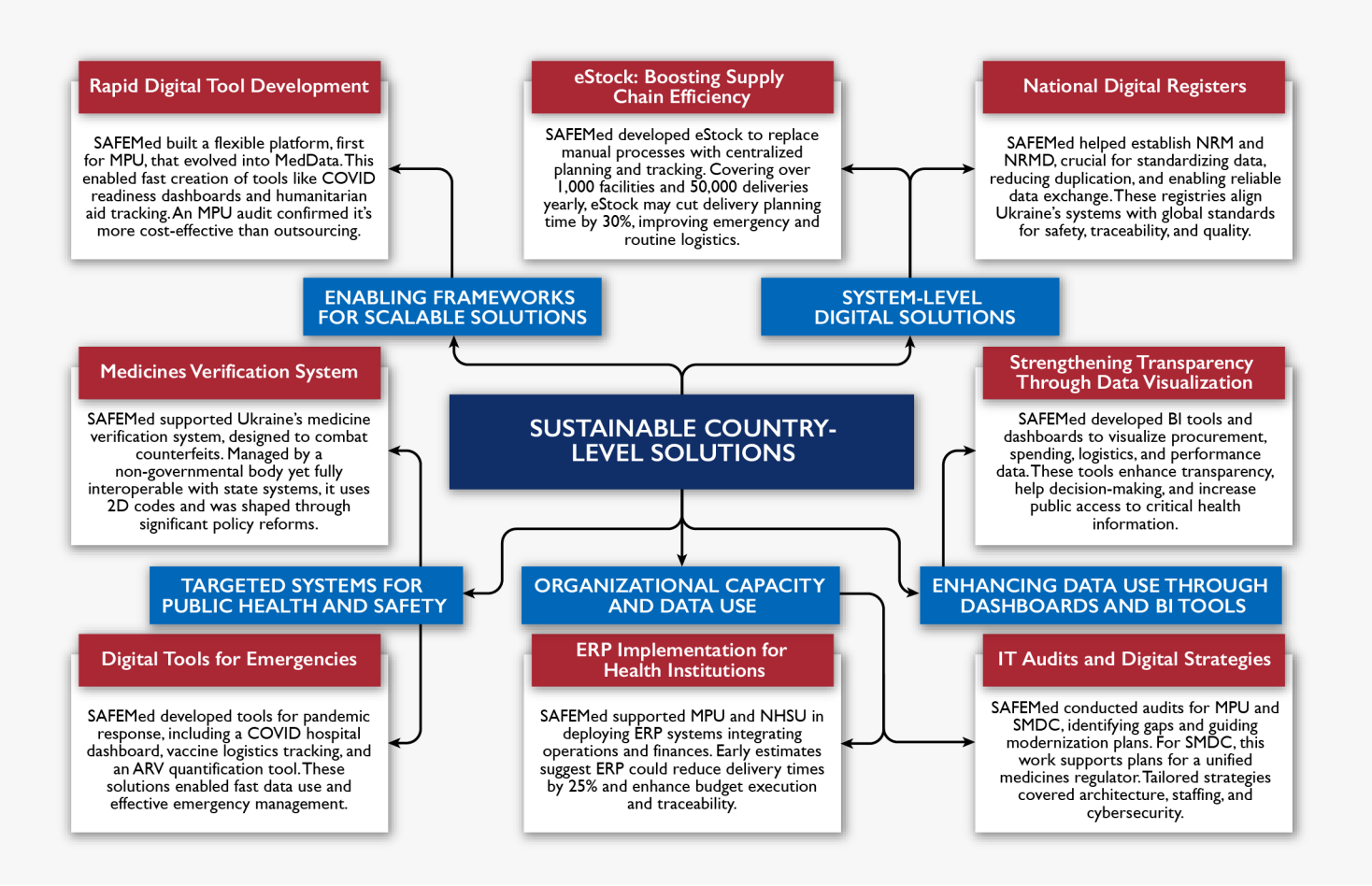
SAFEMed provided advisory and development support to both MPU and NHSU to implement Enterprise Resource Planning (ERP) systems that integrate procurement, financial, and operational processes. These systems replaced spreadsheet-based workflows and introduced automation, version control, and real-time monitoring — improving compliance and efficiency. According to preliminary estimates, the ERP implementation at MPU could reduce medicine delivery times by up to 25%, improve budget execution, and enhance traceability throughout the procurement cycle.

Digital infrastructure audits and strategy development

To guide long-term digital investment, SAFEMed conducted comprehensive IT audits for MPU and the SMDC. For MPU, the audit helped identify critical gaps in infrastructure, security, and process automation — informing a roadmap toward modernization. For SMDC, the audit was part of broader support to consolidate regulatory functions into a future unified national Medicines Regulatory Authority. Following both assessments, SAFEMed developed tailored digital transformation strategies outlining architecture, staffing, cybersecurity, and investment needs.

5. Enhancing data use through dashboards and business intelligence tools

To strengthen transparency and data-driven decision-making, SAFEMed supported the development of business intelligence tools and public dashboards. These included visualization tools for procurement flows, pharmaceutical spending, delivery tracking, and institutional performance. Designed for reuse and public engagement, these tools improved government accountability and citizen access to critical health information.



STRATEGIES FOR SUCCESSFUL IMPLEMENTATION

The successful delivery of SAFEMed's digital interventions was enabled by practical, embedded, and locally grounded strategies. These approaches ensured not only technical execution but also long-term ownership, sustainability, and results for Ukrainian institutions.

1. Embedded technical assistance within national institutions

SAFEMed deployed experienced consultants directly within key institutions — including MOH, MPU, NHSU, and the MOH own state agency responsible for eHealth activities, Electronic Health — to provide hands-on technical assistance throughout the design, development, and implementation lifecycle. These embedded experts supported process analysis, solution architecture, testing, deployment, and institutional alignment.

Example: In MPU, SAFEMed-funded developers worked daily with logistics and procurement teams to co-design MedData modules for demand planning, stock tracking, and emergency coordination.

Impact: SAFEMed supported over 50 IT consultants across 4 institutions over 8 years, directly contributing to the creation of systems now maintained by government teams. Of these consultants, 40% transitioned to government bodies.

2. Joint planning and co-development with government actors

Every system was developed through structured collaboration with government counterparts. SAFEMed facilitated user journey mapping, business process modeling, user story writing, prototyping, and testing — ensuring that digital tools were relevant, usable, and aligned with institutional mandates.

Example: NHSU analysts and SAFEMed consultants co-developed automated calculation and reporting logic for the Affordable Medical Program (AMP) within NHSU's SAP-based ERP system. This included solutions for recalculations tied to patient registry status, detailed reporting breakdowns for healthcare facilities and pharmacies, and resolution of technical issues encountered during pilot and production phases.

Result: The consultants prepared requirements and functional designs for the necessary system changes and supported the development and implementation of those changes, enabling NHSU to launch updated PMG 2025 reimbursement packages. These included various payment models, such as fixed budgets, mixed models, and per-service payments. The improvements enhanced the accuracy and transparency of reimbursement calculations and reporting for both primary and specialized healthcare services, as well as for healthcare facilities and pharmacies.

3. Modular and standards-based system design

SAFEMed promoted the use of open standards and modular architectures to enable interoperability, reuse, and flexibility. This allowed digital solutions to integrate seamlessly with national platforms and to be extended or adapted over time. Importantly, this approach made systems easier to support and maintain by national stakeholders — consistent with SAFEMed's core principle of designing tools for full government ownership and long-term sustainability.

Example: MedData's modular architecture enabled the rapid rollout of new emergency response tools — such as COVID-19 hospital readiness tracking and humanitarian aid modules — without altering core system functionality. Built in 2018 to meet the needs of MPU, it later served as the foundation for the national supply chain management information system (eStock), demonstrating its scalability and long-term value.

Result: This architecture reduced downtime and development costs, enabled rapid adaptation during crises, and allowed government teams to scale the platform for broader supply chain management. For example, the Humanitarian Aid Module — built on MedData — was developed in just one month and enabled the tracking of over $500 million worth of humanitarian aid, including 12,800 tons of critical supplies such as medicines, medical equipment, power generators, ambulances, and medical furniture. In late 2022, at USAID's request, the Ukraine Monitoring and Learning Support project conducted a six-month Third-Party Monitoring (TPM) pilot. The TPM confirmed that the SAFEMed-supported humanitarian supply chain operated efficiently and transparently, successfully delivering critical aid down to the healthcare facility level during the first 18 months of the war.

4. Institutional capacity building and planned handover

Institutional capacity building was integrated throughout the project. SAFEMed provided structured mentorship, technical documentation, user manuals, and access to international learning platforms to prepare government teams for system ownership. In parallel, SAFEMed financed essential software licenses to support secure system development, testing, business analysis, and cybersecurity. These investments ensured uninterrupted workflows, enhanced institutional capacity, and facilitated sustainable handover.

Example: To support NHSU's ERP implementation, SAFEMed provided access to learning platforms to strengthen in-house expertise. SAFEMed also financed licenses for tools used by MPU to maintain secure and efficient digital operations beyond

the project lifecycle, with costs of the most essential licenses for long-term operations taken over by the government agencies themselves.

5. Information security and data protection

SAFEMed prioritized information security as a cross-cutting requirement across all digital solutions. Systems were designed in compliance with national cybersecurity protocols and general principles of secure system architecture, including role-based access control, authentication mechanisms, and protection of sensitive medical and institutional data. Where applicable, SAFEMed-supported systems were aligned with the requirements of the national information protection certification process, ensuring readiness for formal approval under Ukrainian cybersecurity regulations.

Example: In MedData and eStock, user access was strictly configured based on roles and institutional mandates. SAFEMed-supported teams collaborated with institutional IT leads to implement layered authentication and safeguard sensitive health and supply chain data - reinforcing operational control and national compliance.

These strategies were essential not only to the success of individual digital interventions, but also to fostering long-term resilience and digital maturity across Ukraine's health institutions.

LESSONS LEARNED

SAFEMed's work in digital health transformation offered valuable insights into what makes national-level digital reform effective and sustainable — especially in a dynamic and resource-constrained environment like Ukraine's. These lessons are relevant not only for healthcare, but for broader public sector digitalization efforts.

National systems take time - and must be built to last

Developing sustainable national platforms requires patience, sequencing, and political will. Systems must be designed to be flexible and interoperable from the outset, with the capacity to withstand political transitions, changes in leadership, and evolving institutional structures. ***Short-term success is not sufficient if systems are not adaptable to long-term realities.***

Digital reform must align with broader national priorities

The most successful digital initiatives were those that supported — and were supported by — broader sectoral reforms. For example, systems for procurement, contract management, or patient records were effective because they complemented national efforts to decentralize services, improve financing, and strengthen primary care. ***Digitalization cannot be siloed; it must reinforce the country's health policy direction.***

Long-term strategies outperform reactive fixes

While emergency response often drives initial demand for digital tools, sustainable impact comes from integrating digitalization into national strategies. SAFEMed's focus on modular, reusable systems ensured that tools built for a crisis could be repurposed or scaled for long-term use. ***Building with a long-term vision prevents the accumulation of disconnected, short-lived solutions.***

Institutional ownership is the foundation of sustainability

Perhaps the most important lesson: digital systems cannot thrive without clear ownership and capacity within national institutions. Embedding solutions in the workflows, budgets, and strategies of government agencies — and ensuring that local teams can operate and evolve them — is essential for long-term success.

Cost-efficiency as a strategic advantage

Investing in local development teams not only ensured stronger institutional alignment and faster response, but also significantly reduced costs. SAFEMed's experience showed that in-house development — when paired with proper coordination and quality control — can deliver robust systems at a fraction of the cost of outsourced solutions, while maintaining full public ownership.

CONCLUSION: A FOUNDATION FOR THE FUTURE

Over the course of its engagement, SAFEMed contributed not just to the development of individual digital tools, but to the creation of a coherent, interoperable, and future-ready digital architecture for Ukraine's healthcare system.

These digital solutions are no longer isolated pilot initiatives — they are embedded into the national health infrastructure. They operate at scale, align with government strategies, and are integrated into the daily workflows of institutions like the MOH, MPU, NHSU, and eHealth Agency. As a result, they serve as practical tools for reform, decision-making, and service delivery.

The systems developed and supported by SAFEMed are designed for sustainability. Their modular structures and open standards make them adaptable to future needs, whether driven by health system reform, emergency response, or evolving global standards. Their governance and maintenance are now in the hands of national stakeholders, ensuring continued relevance and accountability.

Most importantly, these digital foundations contribute to the long-term modernization of public health in Ukraine. They improve transparency, efficiency, and resilience — not just in routine operations, but in the face of crisis. And they offer a model for how targeted technical support can enable systemic transformation when aligned with national ownership and strategic vision.

SAFEMed's contribution goes beyond tools and systems — it helped shape the strategic capacity of Ukraine's health institutions to lead, govern, and expand digital transformation in the years to come.

Learn more at msh.org/projects/safe-affordable-and-effective-medicines-for-ukrainians/

This publication is made possible by the support of the American people, under the terms of contract number AID-121-C-17-00004, funded by the US Government. The contents of this publication are the sole responsibility of Management Sciences for Health and do not necessarily reflect the views of the United States Government.

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