

# Solving our Veterans' PACT Act Constraints with the Open-Standard, Cloud-Agnostic, Event-Driven FHIR<sup>®</sup> Health Data Fabric

Accelerating Veterans' Access to Toxic Exposure Benefits and Just-in-Time Healthcare Anywhere and at Any Time

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## Authors' Note

This whitepaper is specifically written for [VA Interoperability Pledge signers](#)<sup>1</sup>, their interoperability solutions teams and other information technology integrators who have committed to developing and providing new capabilities to support the objectives.

This nationwide pledge is a commitment to tear down the boundaries between Veterans and the US commercial healthcare system. The Veteran Interoperability Pledge works toward developing a framework to allow VA and community providers to securely exchange information to assist in the care of Veterans receiving treatment inside and outside the VA.

*"With commitments to transfer vital information and records electronically between VA and signatory health systems, we also hope that this pledge will make it seamless for our partner health systems to identify Veterans at the point of care," said VA Under Secretary for Health Dr. Shereef Elnahal. "That is inherently valuable for the Veteran receiving care, but it will also allow us to send helpful information to our partner health systems that they can then offer to Veterans in their care—to include information about new benefits we are offering under the PACT Act and other resources that assist with suicide prevention and identifying social risk factors" – VA Under Secretary for Health, Dr. Shereef Elnahal'*

When the Department of Veterans Affairs (VA) and US Congress passed the largest ever expansion of VA benefits with the PACT (Promise to Address Comprehensive Toxins) Act, [the velocity and volume](#)<sup>2</sup> of new benefit claim applications doubled. The system was already struggling to meet the demands that resulted from the COVID pandemic. The PACT Act expansion required the addition of a complex set of new compensation and pension qualification rules. This has created a perfect storm for Veterans who are actively sick and have to struggle through a poorly connected benefits process that still overly relies on paper and people instead of modern automation strategies and solutions.

Veterans, VA benefits and healthcare providers have long suffered from the lack of modern, scalable, safe, composable, meaningful, and efficient data interoperability with community care providers and other purchased healthcare data systems. We (the authors of this paper) firmly believe that the velocity and end-to-end quality of benefits and community care applications will continue to deteriorate without the broad, system-level adoption and rapid strategic integration of open healthcare IT standards. Large scale interoperability initiatives require modern-architected interoperability infrastructures and ecosystems with a breath of data fluidity.

Our recommendation is to encourage those committed to building the healthcare system of the future—the VA and pledge signatories—to embrace a system-level open-standards approach to the PACT Act and Interoperability Pledge data initiatives. This will accelerate the time-to-care for Veterans seeking benefits today, future-proof the VBA's (Veterans Benefits Association) latest modernization investments, and accelerate innovation across the ecosystem.

We believe that open standards, clinical reasoning and data automation layers can accelerate and improve quality for each of the five key results outlined in the pledge. This whitepaper shows how Smile Digital Health's enterprise-level implementation of the HL7<sup>®</sup> FHIR<sup>®</sup> open standard will future-proof the government's investments and support the VA's data sovereignty requirements, specifically towards:

- ✓ Enabling health system application access to authoritative VA resources to determine Veteran status.
- ✓ Enabling automation of benefit eligibility determination and referrals.
- ✓ Allowing health system application access to identify local, state, and federal health resources.
- ✓ Allowing VA application access to health-system clinical and administrative data for quality assessment and care coordination.
- ✓ Advancing and implementing federally recognized, national interoperability standards, and privacy and security frameworks related to the execution of the pledge's commitments on the use and exchange of health information.

Smile Digital Health (Smile) is a healthcare IT company whose mission is to unleash next generation, open-standards interoperability capabilities across the globe. We have seen first-hand the transformative power of FHIR and automating data at a population health scale. We have also seen the pitfalls associated with point data solutions which solve only a single issue within a continuum, locked-in proprietary standards, and unscalable FHIR implementations that are only partially interoperable on the surface, to name a few.

The authors and our team at Smile Digital Health are confident in the solutionized approach outlined in this whitepaper as we consult, guide, and lead similar enterprise-level HL7 FHIR data exchange and automation modernizations at scale around the globe.

Onward...



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## Imagine

A world where all Veterans are:

- Eligible for new occupational health benefits (e.g. burn pit toxic exposures and respiratory illness)
- Automatically identified and screened for new VA benefits within 30 days of release
- Able to benefit from a reduction in adjudication time for PACT Act claims from 153.8 days to 30 days
- Able to access new benefit screening, adjudication and subsequent healthcare anywhere they choose, including their local community care organizations and via telehealth engagements

These goals, however daunting, can be achieved using event-driven networks to collect, standardize and syndicate key benefits data, automate processes, and accelerate benefits decisions using intelligent automation principles.

What does such a solution look like? It has:

- **No vendor lock-in** through insistence on canonical use of FHIR open standards, clinical reasoning (CQL<sup>®</sup>, CPG on FHIR) and process automation (BPM+ Health<sup>®</sup>)
- **Just-in-time workflow innovation** with a broad ecosystem of plug and play solutions delivered via FHIR APIs
- **Liberated data and the assurance of portability** to ensure right data, right person, and right time access for those supporting Veterans
- **Improved Veteran data quality** which accelerates care access and safety
- **Cross-network event-driven architectures** that can detect changes to patient data or policy and drive curative actions in near real time
- **Leading industry security** with a commitment to stay ahead of security needs.
- **Breakthrough scalability and performance** results to leverage orchestrated and extensible containerized approaches that ensure peak system operation across hybrid, multi-cloud and on-premises resources

All the technological capabilities necessary to make the above scenario possible already exist today and are readily available. As such, this is not a technology problem; it is a business problem. The business problem revolves around the issue where patient data—healthcare's lifblood in the digital age—is siloed within the boundaries of vendors' solutions due to their use of proprietary data models.

Such data may be moved and even transported out of those proprietary models using FHIR APIs. However, simply using FHIR APIs does not allow for the full benefits of true data interoperability. That only occurs when persistence and exchange of data is based on FHIR open standards. At Smile Digital Health, we call this architecture **Care without Boundaries**.

The VA's recent historic commitment to expanding community care access and benefits has been supported with funding to intelligently automate and modernize VA benefits systems. The [2022 VA community care budget](#)<sup>3</sup> alone was \$21.3 billion in FY 2022—a 45% increase from FY 2018. This investment continues to rise (as per the *U.S. Department of Veterans Affairs FY2024 Budget Submission*) with the [2024 mandatory funding request](#) being \$182.3 billion, an increase of \$13.6 billion, or 8.1% above 2023. This includes an additional \$20.3 billion for the Cost of War Toxic Exposures Fund (TEF).

The Department of Veterans Affairs has provided the industry with ample resources to solve the existing Veteran boundaries through seamless PACT benefits and [just-in-time healthcare](#)<sup>4</sup>. The industry, in partnership with Veteran Interoperability Pledge signatories, must now embrace this generational challenge to modernize and automate the benefits pathway for our Veterans.

Smile is an approved FHIR solution in the VA's TRM (Technical Reference Model). We have sufficient proof that a *Care without Boundaries* clinical architectural pattern and enterprise-grade, health data transformation solution is a powerful option to start future-proofing the significant VA's investments. Our FHIR-powered [Health Data Fabric \(HDF\)](#) is a modernly architected, cloud-agnostic, event-driven, HL7 open-standards data and clinical reasoning solution built for architects to compose high reliability, next-generation data networks for healthcare. This allows enterprise architects and developers at the VA to compose FHIR- first, healthcare data networks that can enable numerous clinical, business, technological and operational innovations at scale. It allows what we imagine today to be tomorrow's reality.

The future is now.

**#ChooseOpenStandards #BetterGlobalHealth**

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## Summary

The VA's Interoperability Pledge<sup>1</sup> is drastically changing the landscape for the Veterans' PACT Act and other service-related claims. The extension of screening, claims review, and access to care in leading US provider organizations is wonderful news for Veterans and their families suffering from the burden of toxic exposure, PTSD (post traumatic stress disorder) and other work related conditions.

This curative initiative, however, presents an added challenge to a claims review system that is:

- Teetering on the edge of breakdown from complex and mostly manual processes
- Undergoing the largest ever increase in new claims filed
- Creating a new interoperability ecosystem for Veteran care across the US healthcare ecosystem

In 2022, the PACT Act led to a substantial increase in benefit claims. Unfortunately, it also exposed the widespread challenges of establishing high-reliability interoperability across the fractured US healthcare delivery landscape. The VA has struggled to meet the crushing needs of its population—to automate the data, forms, and the end-to-end flow for each Veteran claim. The systems in between rely heavily on manual entry—human workers who operate as data mules between well meaning but disconnected, proprietary IT systems. This presents a challenge to the vision of timely *right* door access to care for Veterans with presumptive conditions and related healthcare needs.

This whitepaper presents an open-interoperability solution, best practices, and aims to:

- Provide an understanding of the challenges in fulfilling the the PACT Act and VA's Interoperability Pledge with the current system
- Explore the lifecycle and system inefficiencies of a toxic exposure benefits claim under the current system
- Take an open-data first approach that propels high reliability interoperable networks and future proofs investment
- Explore the benefits of Smile's enterprise-level, FHIR-first, event-driven Health Data Fabric architecture and how it supports high-priority use cases—like toxic exposures for Veterans
- Present a technology and business solution to relieve workflow burdens on Veterans and the many knowledge workers in the claim lifecycle
- Deliver intelligent data, knowledge, process and automation recommendations that can accelerate efficiency and improve quality across the claim lifecycle

### Current State: The PACT Act

The PACT Act<sup>5</sup>, short for 'Sergeant First Class Heath Robinson Honoring our Promise to Address Comprehensive Toxics Act of 2022', is a bill designed to support screening, care, treatment, research and resources for Veterans exposed to toxic substances during their military service. The Act was intended to make it easier for Veterans to access VA medical care (including mental health services and counseling), and help Veterans be successful with their VA claims.

The PACT Act expands VA healthcare benefits and eligibility criteria for those benefits. Veterans with a qualifying service are entitled to VA health care and compensation benefits if they have manifested any of the specified diseases after their qualifying service. As a result of this eased access, more Veterans than ever are now able to receive the care they need post service.

However, from a Veteran's perspective, accessing new PACT Act benefits and Community Care support requires going through a series of daunting administrative processes in order to first get screened. Often, Veterans have to undergo this process while in the midst of a mental or physical health crisis. Moreover, according to a survey conducted by the Wounded Warrior Project, nearly a third of the injured cohort of post-9/11 Veterans<sup>6</sup> need help with everyday activities, which presents a significant barrier to completing these administrative requirements. Provision of care is further slowed because claim adjudicators do not have the data to make proper eligibility decisions.

The circle of care surrounding Veterans—caregivers, providers, care coordinators, and the Veterans themselves—has to go through the burdensome process of constantly brokering critical healthcare data from one system to the next. This results in resource wastage, loss of efficiency, and the increased risk of an escalating health condition. This is how a lack of interoperability sabotages the

vision of Care without Boundaries. At the time of writing this whitepaper, the PACT Act has been in effect for just over a year, and the VA is already showing progress<sup>7</sup> in expanding benefits and care. As the need for increased access and enhanced timely care rises, it is essential to significantly improve data analytics, data exchange and interoperability capabilities across the lifecycle of a claim. High reliability and automation capabilities have solved similarly complex problems in other industries, such as finance and banking. The key to unlocking the next level of value starts with standardizing and syndicating the data in a secure way.

### The Veterans' Problem: Claim and Care with Boundaries

Between 2010 - 2019, the VBA largely solved their issue of backlogged claims with a series of key modernization strategies, contracts, and a network of public private sector collectives involving Preferred Provider Organizations (PPOs). Along with leaders in the industry, they established a claims flow system that was highly efficient and increasingly usable by Veterans and their Veterans Service Organization (VSO) representatives, attorneys, and other agents. This largely addressed the claims flow increases seen after periods of war on terror actions.

In 2020, the COVID pandemic brought the world to a screeching halt, and for most patients, their access to just-in-time healthcare encounters and other services. Many Veterans turned to their rich Mission Act benefits<sup>8</sup> for telehealth and other localized healthcare services. While the process laid out for these accommodations was sound, the administrators working across the benefits continuum struggled to handle the increase in claims and the number of new health IT applications. The applications' proprietary data models were poorly integrated with the main benefits processing system. Like all healthcare providers, Veterans and benefits professionals (knowledge workers) are faced with



the problem of having to aggregate and harmonize Veteran health data before making specific decisions for each claim. As well, they have to juggle an increasing number of tools in the benefits and claims workflow. These highly trained knowledge workers must then manually log back into a number of IT tools in order to push the claims package forward to the next stop in the claims pathway.

In 2022, the long awaited PACT Act was finally passed and operationalized by the Mission Brigade of VBA representatives and industry partners. These newly covered benefits came as a great relief to Veterans suffering toxic exposure cancer syndromes, PTSD, burn pit, and mental health conditions. This has led to more than 4 million Veterans<sup>7</sup> being screened for PACT benefits.

These new benefits led to a 72% relative increase in overall claims volume<sup>9</sup> on an already overburdened adjudication system. Unsurprisingly, the system modernizations enacted in the early 2010s (and only gradually updated) are unable to handle this surge of new, complex benefit claims. As a result, claim processing wait times have increased since 2022<sup>10</sup>. The additional health data verification requirements of PACT Act claims take an average of 153.8 days<sup>11</sup>, and are 20.36% slower to process than all other VA claims.

Today, it is commonly accepted that both healthcare workers and patients are, to a large extent, considered knowledge workers. Healthcare knowledge workers, like benefits adjudicators and Veterans Service Officers (VSO) act as conduits, manually connecting data from numerous disconnected IT systems, learning new decision rules and completing repetitive, unrelenting IT tasks along the claims lifecycle. Veterans possess context and knowledge about their condition, history and previous healthcare interactions, and they also have to manually track and provide their information, often repeatedly. This has created manual work-arounds and an unreasonable tolerance for the deep inefficiencies surrounding knowledge brokering

in healthcare. From an informatics perspective, we see a desperate requirement for interoperability and automation at various steps in the knowledge worker workflows.

These basic interoperability inefficiencies present major roadblocks in health system management, but also present a ripe opportunity to apply current technologies to reap the benefits of ecosystem wide, intelligent, open-standards automations. When end-to-end system inefficiencies are the issue, the Theory of Constraints (TOC)<sup>12</sup> is proven to be an effective cure in healthcare and other process heavy industries. The TOC is described as a holistic philosophy that views an organization—such as the VA—as a system of many interacting and interdependent components. With theory and common constraint patterns, there are really only two outcomes with flow patterns:

1. They get worse over time until a critical failure and breakdown occurs. Commonly, we refer to this as 'watching the wheel fall off'.
2. Foundational technology modernization solutions, combined with workflow-first change management solutions, provide new capabilities to drastically reduce core system constraints, create new ecosystems and set new quality benchmarks.

As mentioned above, the VA funding request has increased significantly between 2020 and 2024. Given the above allocation, there are certainly enough resources now to foundationally modernize the legacy community care interoperability barriers the VA faces. Technology isn't the problem, as FHIR-driven modernizations have already proven capable in numerous modernization initiatives across the globe. It is a business and system-level problem. The financial resources combined with proven expertise in large-scale FHIR implementation and strategic work-flow first change management plan is the solution.

Smile's solution offers a way to intelligently automate and modernize the VA community care interoperability systems with a stack of open interoperability standards. Using a data and informatics perspective, it offers a Veteran-centric approach to accelerate PACT Act benefit adjudication and 'just-in-time' care, in their hometown or anywhere they choose. Since the solution is built on open-standards, it can run on any cloud environment and be used to customize and create solutions not just for today's problems and constraints, but for the future as well.

### Use Case: A High-level Overview of a Toxic Exposures Claim Life-cycle within the Current Care with Boundaries System

In this section, we have outlined the general steps that a Veteran with multiple cancers submitting a toxic exposure claim (as covered by the PACT Act) would take. At every step, there are a large number of data collection tasks that require paper and/or electronic forms to be completed repeatedly. These inefficiencies are the best targets for intelligent automation as they have the largest impact on the full PACT benefit ecosystem.

Our use case revolves around Sergeant James B. Barnes, who completed three years of military service in North Africa. Like most of his company, Sergeant Barnes spent time working in burn pits, which are massive fires used to dispose of rubber, plastic, medical waste and other unwanted materials. Towards the end of his three years of service, Sergeant Barnes, who was otherwise in good health, started developing an irritating cough, and patches of skin on his face and hands started itching. Several weeks after his return home, the cough worsened, and he noticed that he was uncharacteristically out of breath during routine activities.

Sergeant Barnes resides at his farm in central Wyoming, which is outside the 40-mile distance requirement stated by the VA. This made access to VA medical clinics challenging for him, and he had to visit a local community hospital for his care needs. Even after several trips to his local hospital, his cough was persistent and it significantly impacted his ability to run the operations of his farm. It was eventually discovered that he had developed multiple respiratory lumps in both his lungs, which were growing too slowly to be considered cancerous.

This initiated the long and manual process for Sergeant Barnes to gather the necessary documents, liaise with his VA administrator and the local hospital to complete his benefits claim and receive the necessary financial compensation. This process had to occur in parallel with him coming to terms with his diagnosis, his new treatment plan and figuring out how to continue running his farm.

### The VA PACT Act Submission Process

**1. Application Submission:** This process begins when a Veteran or their eligible dependents submit an application for VA benefits. This application requires necessary documentation and evidence related to the specific benefit being sought. Only about 25% of claims today are submitted electronically. The remainder are submitted at a local VA office.

Since Sergeant Barnes didn't live anywhere near a VA office or clinic, he chose to submit electronically with the help of an agent from a non-profit VBO to guide and advocate for him along the end-to-end claim journey. The documents required include all relevant clinical documentation, along with evidence to link his condition to the years of toxic exposure in the burn pit during his time in military service. It takes Sergeant Barnes over a month to collect the necessary documents and submit his application.

**2. Initial Review:** Upon receiving the claim application, the VA analyst conducts an initial review to ensure it is complete and that all required documentation is included. The analyst concludes that the Sergeant's symptoms started during service but did not become severely limiting until a few months after his completion with the military. The initial review is completed as the basic geographic and time criteria is met.

**3. Eligibility Determination:** The VA assesses the applicant's eligibility for the requested benefit based on factors such as military service, service-connected disabilities, income, and other relevant criteria.

Sergeant Barnes was able to prove how severely limited the operations of his farm were because of his condition, and as such, his eligibility was confirmed.

**4. Gathering of Evidence:** Sergeant Barnes and the knowledge workers related to his claim have to collect documentation from different sources. When the benefit being sought after requires additional evidence—medical records, financial information, or service-related documentation—this manual process of collecting, harmonizing and distributing forms and documents is a big lift. Like many Veterans, Sergeant Barnes' healthcare information is scattered across many different sources. He experiences delays and the added financial burden of several months at this stage in the process. Despite his proactivity, there is a backlog of claims and it is a highly manual process for the claims analyst to complete the necessary steps. As such, the claim has already been in the system for 56 days at this point.

**5. Medical Examinations (if applicable):** For disability compensation claims, the VA may schedule medical examinations to assess the extent and severity of service-connected disabilities. The purpose of the exam is to determine whether the supplied information qualifies him for service-connected disabilities,

such as increased healthcare benefits and compensation. When these exams and the related Disability Benefits Questionnaire (DBQ) forms are completed, it helps determine the disability rating and compensation amount for the claim. This step is often hindered by the inability to retrieve a patient's complete medical record from disparate IT systems.

Sergeant Barnes needs a series of medical exams; the claims analyst has notified him of this and set his claim to 'pending' until all the proper medical exam results are submitted online. Since Sergeant Barnes' case requires multiple exams, he has to visit different specialty clinics across Wyoming and Utah. He has to find the appropriate clinics, schedule his appointments, and drive for several hours for each appointment. After each visit, he has to follow up and get copies of the relevant records from each clinic and hospital for submission to the claims portal. This step adds around 14 weeks (98 days) to the life-cycle of the claim. When all the exams and forms are completed, Sergeant Barnes then has to call his VBA agent to restart the claim.

Had he lived near a local [Interoperability Pledge Partner facility](#)<sup>1</sup>, he could have gotten most of these exams completed in one visit and one place; but at the time of his submission, there were no Pledge Partners in the State of Wyoming.

**6. Rating Decision:** The VA claims are evaluated, and a rating decision is made based on the available evidence and criteria for the specific benefit. For disability compensation, this decision includes assigning a disability numerical rating. This rating expresses the severity of the disability, which in turn affects the amount of disability compensation and benefits the Veteran may receive.

After 154 days from his initial claim submission, a decision has finally been made for Sergeant Barnes' claim case. The average decision time for a claim is 153.8 days, which is more than 40%

longer than all other VA benefit applications, due to the added complexity of multiple exams scheduled across different US commercial healthcare providers and VA resources and the high level of manual administrative work at every step.

**7. Waiting and Decision Notification:** The VA communicates the decision to the applicant through a formal notification letter. This letter outlines the decision, the reasons for it, and the effective date of the benefit, if approved.

While Sergeant Barnes waits for the claim decision, he is still severely limited by his condition. His local care team and specialists have put him on a medical care plan to help manage his symptoms. He cannot manage his farm's operations to the same level he was used to and has had to hire help. To maintain his finances, he needs his disability and financial assistance claim to come through, as his bills (personal, medical, and from the farm) are piling up. It has been over 159 days since his initial submission.

**8. Appeal Process:** If the Veteran disagrees with the VA's decision, they have the right to appeal. The appeal process can involve several stages, including a review by a Decision Review Officer (DRO), a hearing before the Board of Veterans' Appeals (BVA), and, if necessary, an appeal to the U.S. Court of Appeals for Veterans Claims. This part of the process can take up to several years from amassing the proper evidence to its final approval.

After Sergeant Barnes submitted his claim, it took 160 days for him to finally receive the long-awaited notification from the VA. His claim is at risk due to the lack of sufficient consensus in the medical diagnosis of his respiratory lumps, which are not conclusively cancerous. The claim and financial assistance the Sergeant was hoping for will not come through.

## Accelerating Veterans' Access

**9. Payment or Benefits Activation:** If the application is approved and all appeals (if applicable) are resolved in the Veteran's favor, the VA begins disbursing payments or providing other benefits as appropriate.

In the case of Sergeant Barnes, while his benefits have been activated, they are insufficient and he struggles to manage bills and medical scheduling across his care continuum.

### Systemic Inefficiencies Brought About by Un-intelligent Forms

The goal of the VA PACT Act is to ensure that eligible veterans and their dependents receive the benefits and support to which they are entitled. However, Sergeant Barnes' case demonstrates how navigating the VA disability benefits claim process can be time-consuming and challenging due to the inaccessibility of compiling data from various disconnected IT systems.

At each step of the process, calculating a Veteran's benefits and claim is a largely manual process. Care access and benefit continuity is at risk due to the fractured US interoperability health ecosystem. In an ecosystem like this, people have become the interoperability data widget between the various systems, and these inefficiencies are a primary contributor to the lowered velocity, agility, and overall quality across the claims pipelines.

Since Sergeant Barnes' eligibility was just short of positive for toxic exposures, given the lack of medical consensus on their respiratory diagnosis, he must complete several Compensation and Pension evaluation exams until all the relevant DBQ forms have been completed and verified. Certified benefits agents, who undergo annual training, are responsible for completing these forms. A skilled DBQ worker can fill out the 8-page blank form in about 45-60 minutes if they can locate the

necessary data within the numerous disconnected tools. If the information is inconclusive or not available, then it takes weeks to schedule new medical tests for the Veteran and close those data gaps. This questionnaire may have to be completed repeatedly in certain cases, from the ground-up each time, depending on the medical consensus of the condition.

The innumerable paper and digitized paper forms are a bane of the healthcare knowledge worker's life. They proliferate in both number and complexity. They have also become a prime reason that healthcare providers now spend more than 60% of their time filling out forms in health information systems. Though much of the information is available electronically from different sources, it is rare that even the basic fields are pre-populated.

### FHIR Adoption in US Federal Regulations

Before we get to the solution, it is essential to look at the US Federal Regulations around standardization. Beginning in 2020 with the [Cures Act Final Rule](#), the ONC adopted a suite of regulatory provisions and a [§170.315\(g\)\(10\) certification](#) for use of HL7's FHIR in standardized APIs for patient and population services. The CMS followed suit with [CMS 9115-F Advancing Interoperability and Patient Access](#), which required certain payers to adopt FHIR standardized APIs. The main intent of these rules is to promote interoperability and other advancements in how healthcare information is shared between patients, payers, providers and the EHR vendors that support them. Another purpose of these rules is to penalize information blocking, which has been a significant issue in healthcare that has kept patients apart from their own data and affected their agency in choosing providers and services that best fit their needs.

Both the ONC and CMS have since proposed further regulations that both advance the maturity of FHIR technology and increase its scope, demonstrating the federal dedication to FHIR as a new and evolving data standard. The following ONC and CMS legislative requirements have led to the rapid maturation and number of applications of FHIR at scale.

- [Burden Reduction with the CMS Prior Authorization Rule](#)
- [The Consolidated Appropriation Act \(CAA\), 2021](#)
- [CMS Hospital Price Transparency Rule](#)
- [CMS Digital Quality Measures](#)

These regulations serve as a guide for the VA and support IT industries for systems-level innovative initiatives. Additionally, these open interoperability frameworks have been implemented and improved by [waves of early adopters](#) similar in scope and size to the VA.

### Towards the Solution: Care and Benefits without Boundaries

*Care without Boundaries* is defined as reliable, high-quality, timely, satisfying coordinated care provided anywhere. For Veterans, *Care and Benefits without Boundaries* expands to include accurate, appropriate, and eligible benefit claims that they deserve and expect.

This requires a redesign of systems of care, the spaces and interactions between them. This prompts us to explore architectures that facilitate real-time data processing, enabling the generation of actionable insights to enhance clinicians' situational awareness when making care decisions,

The objectives contained in the VA Interoperability Pledge are achievable if the chosen implementation couples an enterprise-level technology architecture that is event-driven, cloud agnostic and built on the HL7 FHIR data standards with an implementation management strategy that enhances system-level automation, performance and efficiency.

regardless of the care setting. This is the power of event-driven architecture. Such an architecture is empowered by data from different systems that need to be connected across the ecosystem of care, through another architectural design construct called a data fabric. Together, these two approaches make automation of data, knowledge, and processes tangible.

The objectives contained in the VA Interoperability Pledge are achievable if the chosen implementation couples an enterprise-level technology architecture that is event-driven, cloud agnostic and built on the HL7 FHIR data standards with an implementation management strategy that enhances system-level automation, performance and efficiency.

### Theory of Constraints and Automation Strategies

The Theory of Constraints (TOC)<sup>13</sup> is a management philosophy and problem-solving methodology that asserts that in any complex system, there is usually one primary limiting factor, or constraint, that impedes the system from achieving its highest goals. To identify and resolve the constraint in a structured and systematic way, optimize performance and efficiency. By constantly identifying and addressing constraints, TOC aims to create a more streamlined and effective operational framework for organizations and large systems, ultimately enhancing their ability to achieve success.

In the context of healthcare, the Theory of Constraints equips healthcare professionals and teams with a structured approach to address three fundamental questions, guiding problem-solving and decision-making:

1. What needs to be changed in healthcare processes and systems to improve patient outcomes?
2. What should these changes entail to optimize patient care and resource management?
3. How can these changes be effectively implemented within the healthcare organization to enhance both patient care and financial sustainability?

According to this seminal healthcare TOC meta-analysis published by Basingstoke et al<sup>12</sup>, in 2022, each of the 42 TOC implementations yielded favorable outcomes, delivering both tangible and intangible advantages. The primary benefits highlighted by the authors predominantly revolved around heightened productivity, with a staggering 98% (n = 41) of cases leading to the treatment of a greater number of patients. Additionally, 83% of cases (n = 35) reported marked enhancements in the timeliness of care.

What is even more remarkable is the extent of the improvements observed in the selected studies. On average, patient waiting times saw a 50% reduction, patient length of stay decreased by 38%, operating room productivity was boosted by 43%, and there was a noteworthy 34% increase in throughput. From the analysis, it is apparent that TOC implementations did not just excel in one business area. ***They exhibited success and improvements across the entire spectrum of healthcare and social care.***

The recommendations and changes inspired by TOC showcase almost immediate results with efficiency and quality gains with data-first automation. The gathered evidence unequivocally

substantiates TOC as a highly promising solution to address the longstanding challenges in healthcare, ultimately elevating the quality and timeliness of care—two indispensable prerequisites for effective healthcare delivery. The TOC as a management and implementation system parallels perfectly with the technology of the Health Data Fabric to offer a comprehensive solution to large-scale data transformation.

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### Health Data Fabric

Data is the lifeblood of health information systems and their overarching ecosystems. It is also the most common and eminently fixable constraint across healthcare today. Unfortunately high quality data and useful information is scarce in healthcare workflows. For this reason, the first step to modernizing large systems is to utilize open healthcare data standards within the technical architecture. Using FHIR at the core of a data fabric enables the many benefits of modern automation and analytics capabilities to radically reshape the data transformation journey. The success of global FHIR implementations has proven that similar intelligent automations are now inevitable across healthcare.

In healthcare, such a system—a Health Data Fabric (HDF)—minimizes integration effort, drastically reducing system complexity and improving the velocity of healthcare quality initiatives.

Gartner describes a data fabric<sup>14</sup> as a means of tackling business problems where data is fragmented, unstandardized and generally unavailable to support business operations. The notion of a robust data fabric as defined by Gartner incorporates:

1. An event-based data integration layer to extract data from source systems
  2. A high-performing data store to cache data making it available for data processing, computing and analytics user cases
  3. A core, highly scalable, AI/ML insight infused knowledge graph
  4. A collection of microservices with APIs that provide additional data processing, computing and or data delivery capabilities
- An API gateway to provide, govern and control data consumer access via APIs to a variety of channels and data sources

The innate composability of a data fabric, means that it can be progressively implemented. It enables business agility and accelerates digital transformation due to its microservices approach. Many APIs allow for modern data and knowledge syndication, assuming open standards are employed. In healthcare, such a system—a Health Data Fabric (HDF)—minimizes integration effort, drastically reducing system complexity and improving the velocity of healthcare quality initiatives.

The solution is TRM approved, meets the latest federal exchange data requirements, and also ensures that the data sits natively in a secure, open standard format that can be tapped for authorized purposes. A solution like this unlocks the new age of healthcare.

Smile's HDF (see Figure 1) offers an event-driven, architecturally modern approach to aggregate, normalize and stream healthcare data to FHIR APIs. The solution is TRM approved meets the latest federal exchange data requirements, and also ensures that the data sits natively in a secure, open standard format that can be tapped for authorized purposes. A solution like this unlocks the new age of healthcare.

Being highly composable and modular, the ecosystem of both internal and external facing solutions can work together harmoniously. This is because the HDF data model can achieve high cohesion with low coupling at the interface of each solution, as well as within the data persistence layer. All health data that is ingested into Smile's HDF is transformed into FHIR resources and bound to medical terminology. This allows a singular and computable data structure from which all downstream solution components can flow within the fabric.

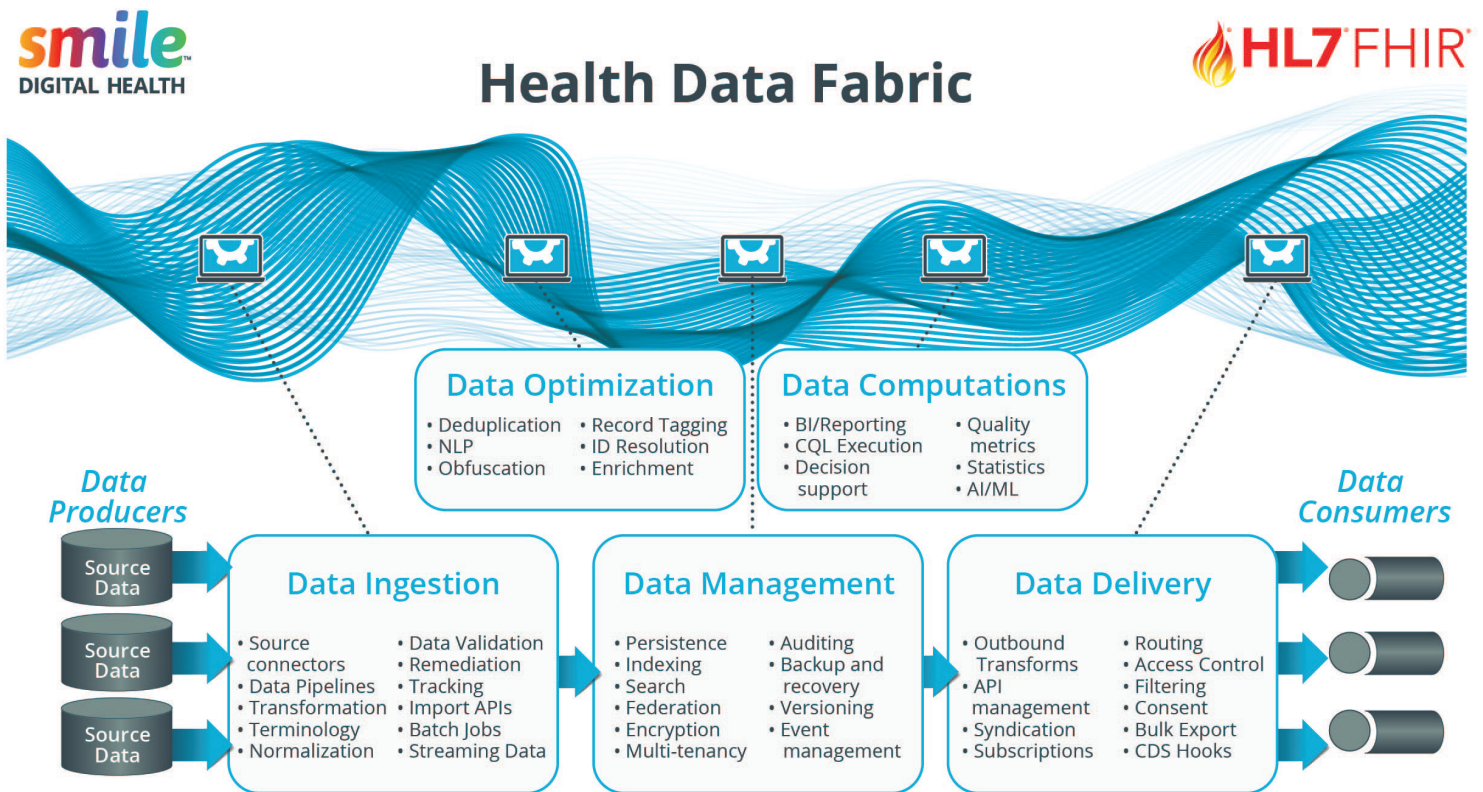


Figure 1: Visual Representation of Smile Digital Health FHIR-powered Health Data Fabric



## FHIR-powered Solution: *Care without Boundaries*

### The Health Data Fabric and Large-Scale Implementation

The basis of a Health Data Fabric is that it is an open-standards, data first, interoperability ecosystem that enables important use cases like near real time quality measurement, high reliability claims pathways and just-in-time decision support.

Smile has supported several large scale health data transformation implementations. We have found the presence of the following characteristics to be most closely correlated to success when it comes to streaming large scale data networks. We will explore these characteristics to demonstrate the improvements to the Veteran's experience and the VA benefits system.

- **HL7 FHIR open data standards**
  - Open standards decrease long-term vendor lock-in, increase options and flexibility for future needs, product choices and capabilities.
  - They accelerate innovation with the ability to quickly integrate existing tools just-in-time to create new solutions using Smart on FHIR tooling.
  - VBA and Veterans achieve data sovereignty and ownership aims.
- **Event-driven architecture to support a benefit claim like for toxic exposures**
  - With event-driven architecture, the Sergeant's claim would have automatically restarted when his exams were completed, rather than waiting for an appointment with a VBA representative to restart the claim.
  - The time spent waiting and following-up between appointments would decrease due to automated scheduling actions when data completeness had been achieved.

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- **Population health, scale and performance**
  - The data interoperability ecosystem is able to handle volumes without sacrificing performance by using auto-scaling and other techniques.
  - With both scale and performance, the backlogs of claims as well as future claims can withstand data outages and access issues, ensuring smooth workflows.
- **Security and trust are established at every architecture and business layer**
  - Veteran healthcare claims data is increasingly in danger due to the increase in [healthcare data hacking activity](#)<sup>15</sup>.
- **Patient-centric, golden record<sup>16</sup> across all data types**
  - Comprehensive, longitudinal records that combine medical, clinical, historical, and, in the case of Veterans, military health records are essential to providing efficient and timely care.
  - The reduction in duplication of effort and manually searching for missing information is significant.
- **Modularity and Composability**
  - An organization like the VA requires enterprise-level architecture for claims that is agile enough to adapt to regulations, changing volumes and resource constraints.
  - Data and decision results need to weave between systems and modules in the benefits workflows, with auditable trails.

### Enabling Automation to Create Efficient Systems

Given the growing adoption of FHIR with the mandates from CMS and ONC in the US, most EHR vendors have clinical data available from FHIR APIs. As part of the Health Data Fabric, intelligent FHIR APIs can be used to automate forms—like the complicated and time-consuming DBQ—at every step of the benefits claim screening pathway. After automating these screenings, answers can be saved as individual results and would be available for review by anyone with privileged access. This reduces manual effort and maintains data accuracy and readability for knowledge workers. It also saves time and improves the Veteran's experience, as they would not have to constantly answer the same questions repeatedly through multiple screenings.

When an 'unintelligent' form is missing information, it is manually put into a pending or waiting mode and has to be manually restarted by a VBO representative when the information is submitted. With intelligent automated forms, the waiting and restarting modes are automated which decreases the speed of claims administration. Significant time can be saved and quality improved by automating these common and challenging constraints in the benefits workflow.

FHIR innovators today across the globe are using [open-source structured data capture](#)<sup>17</sup>(SDC) libraries and FHIR to automate forms and other workflow tasks to enable efficient flow and enhance quality, [even in healthcare](#)<sup>18</sup>.

### Solutioning the PACT Act and Interoperability Pledge

Signatories of the VA Interoperability Pledge and those supporting PACT Act solutions are dedicated to honoring America's Veterans and enhancing their health and well-being. They have committed to collaborating with the Department of Veterans

Affairs to advance technologies that improve care coordination and enhance the efficiency of healthcare services for Veterans, their families, caregivers, and survivors. This timely pledge addresses Veterans' health concerns stemming from burn pits and toxic exposures.

This comprehensive approach, combining interoperability with patient matching and data consistency, empowers the VA and community providers to communicate efficiently, ultimately enhancing care coordination and improving patient outcomes.

The VA's Interoperability Pledge goals are closely intertwined with the advantages of Smile's HDF, perfectly aligning to enhance healthcare for Veterans. In this section, we explore how the VA Pledge's three primary goals align with the key benefits of the HDF's FHIR-based data automation strategies:

- **Accurate Veteran Identification** is a pivotal pledge objective, and a clear benefit of FHIR-based Health Data Fabric. With a standardized framework for seamless data exchange across different healthcare IT systems and devices, patient information is readily available where and when needed. FHIR supports comprehensive patient records with patient matching and linking mechanisms that are essential for accurately identifying Veterans. Through standardized matching algorithms and identifiers, FHIR helps match incoming patient data with existing records, significantly reducing the risk of duplicate or incorrect patient entries. This consistency ensures that when Veteran information is exchanged, it is represented using a uniform and standardized terminology, effectively reducing the risk of misinterpretation.

This comprehensive approach, combining interoperability with patient matching and data consistency, empowers the VA and community providers to communicate efficiently, ultimately enhancing care coordination and improving patient outcomes.

- **Connecting Veterans with Resources** is the second VA pledge goal, which focuses on connecting Veterans with VA and community resources that promote health quality and lower expenses. *The primary strength of the FHIR-based HDF lies in its ability to standardize the exchange of healthcare data, fostering interoperability among Community Care networks, the Department of Veterans Affairs (VA), and community providers.*

This ensures that patient information can flow seamlessly between these different healthcare systems in a standardized, uniform, secure and auditable way. In this context, real-time data access is also supported, which is crucial for Veterans seeking care in the community. Community Care providers who leverage FHIR-compliant interfaces and APIs can access up-to-date patient information—including medical history, medication lists, care plans, and military health records—enabling them to make informed decisions and deliver high-quality care. This reduces the risk of misinterpretation and guarantees that care in the community aligns with the VA's established standards, ultimately promoting efficient access to vital resources and reducing Veterans' out-of-pocket expenses.

- **Coordinating Care** requires responsive and reliable clinical and administrative data and periodic quality assessments. *With enhanced data security and privacy from meticulously integrated stringent security and privacy standards, Smile's HDF ensures the impervious protection of patient data as it flows between healthcare systems.* This

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dual-layered protection not only upholds patient confidentiality but also fosters unwavering quality assessment and the efficient orchestration of care.

As an interoperable health data standard, FHIR is fast becoming the linchpin in community care networks as it seamlessly connects a multitude of healthcare systems, including those employed by the VA and community providers. This fluid interconnectivity ensures that patient data traverses without hindrance, driving effective and patient-centric care coordination at high speeds. *The data connectivity offered by FHIR is enhanced by Smile's HDF by future-proofing modernization efforts, adjusting to new regulations and legislative mandates and fostering systems-level innovation and data transformation across the health ecosystem.*

## What You Need to Do Today

Beyond the FHIR standard, choosing an enterprise-level platform that provides modularity, driven by composability, is highly recommended. This enables solutions to be flexible and not tied down to a single solution. A Health Data Fabric, should allow a FHIR server to be paired up with other key features through configuration so that it can be molded to fit various use cases or scenarios. It should provide the ability to integrate bi-directionally, bringing feedback into the system so that improvements can be made. Bringing these capabilities together enables easy integration, and intelligent analytical support for large scale learning health systems.

Smile HDF's inherent scalable, secure, and flexible benefits make the system adaptable, resilient, and primed to handle high-velocity data flows, evolving care coordination requirements and changing regulations. Automating benefit eligibility determination and referrals with open-standards, streamlines the process of linking Veterans to community care. This paves the way for Veterans to access the care they require with remarkable

efficiency. Smile's HDF is a TRM approved solution that not only elevates the reliability and safety of care coordination but also instills a sense of dynamism, ensuring that healthcare systems can keep pace with the ever-evolving needs of patients and the industry.

Open-standard, cloud agnostic, event-driven, enterprise-level data systems are modernizing health IT across the globe. These large scale modernizations can enable the necessary improvements to the quality of Veterans benefits experience and meet the VA's goals. The technology and the ability to implement it at scale exist today. The technology, coupled with the VA's financial commitment, the VA Interoperability Pledge goals, and the evolving regulations around data exchange, create the perfect storm for large scale data transformation. ***This means faster benefits for Veterans and a future proofed innovation strategy to springboard benefits systems into a better state.***

Superior care, cost and resource efficiencies and enhanced quality of timely care anywhere, at any time for Veterans is no longer a distant imagined future.

It can start today.

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