STRINGS

Revolutionizing Healthcare Efficiency:

Unveiling the Power of Micro-Workflows
for Streamlining Data Management and
Clinical Processes

Strings | 2024

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Introduction

The rapid growth of healthcare data has reached unprecedented proportions, constituting approximately 30% of the world's stored data[1]. Healthcare alone is estimated to generate up to 137 terabytes of data per day[2], with both clinical and machine-generated data contributing to this tremendous volume. What's more, the introduction and adoption of new and valuable healthcare technologies means that healthcare data is growing by 47% every year.

Healthcare providers tasked with the overwhelming job of reviewing, managing, and maintaining this data face an untenable challenge. Recent findings from the National Institutes of Health (NIH) indicate a distressing trend in which 12.9% of patient safety incidents are linked to provider stress with an alarming, 30.6% of these incidents resulting in severe harm, prompting urgent investigation[3].

A substantial portion of provider stress stems not only from this escalating data load, but also from the complex and often cumbersome workflows associated with the capture, discovery, and review of clinical information during patient encounters. Moreover, the persistent burden of repetitive data-related tasks is regularly cited as a major contributor to burnout across the entire continuum of care.

Fortunately, technological advancements offer some hope. Technologies that automate tedious, repetitive tasks and not only collect, but enrich curated data in ways that meet the unique needs of clinical specialties, providers, and patients can have a significant impact on streamlining clinical workflows, reducing burnout, and enhancing quality and safety.

1. OECD (2019), *Health in the 21st Century: Putting Data to Work for Stronger Health Systems*, OECD Health Policy Studies, OECD Publishing, Paris, https://doi.org/10.1787/e3b23f8e-en.
2. HealthTech Magazine. "Structured vs. Unstructured Data in Healthcare." *HealthTech Magazine*, May 2023, https://healthtechmagazine.net/article/2023/05/structured-vs-unstructured-data-in-healthcare-perfcon#
3. Marra AR, Algwizani A, Alzunitan M, Brennan TMH, Edmond MB. Descriptive Epidemiology of Safety Events at an Academic Medical Center. Int J Environ Res Public Health. 2020 Jan 4;17(1):353. doi: 10.3390/ijerph17010353. PMID: 31947963; PMCID: PMC6982027.

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Automate Grunt-Work with Micro-Workflows

Addressing these multifaceted challenges requires a new approach to clinical workflow design. Not only do traditional healthcare workflows suffer from interoperability dilemmas, grappling with the diversity in standards like HL7 and FHIR, the inflexible nature of disparate systems and configurations across various vendors also results in disjointed, cumbersome workflows that impede efficiency and require repetitive monotonous administrative work.

Enter micro-workflows—a paradigm shift that dissects intricate tasks into smaller, autonomous steps. Think of assembling a large puzzle: instead of grappling with the entire puzzle at once, micro-workflows strategically divide the task into smaller, more digestible pieces and all the pieces are already right-side up.

Consider a routine healthcare encounter where a provider captures an image from a mobile device and includes it in a patient's Electronic Health Record (EHR) as a macro-workflow. In contrast, micro-workflows deconstruct this process into discrete steps, for example, identifying the patient within the EHR, capturing the image, inputting relevant metadata from the encounter, and seamlessly sharing the image with the patient's care team, when necessary.

The essence of micro-workflows lies in their granularity, focusing on specific elements of the overarching workflow. This approach enables targeted attention, facilitates automation, and offers flexibility for individual component modification or enhancement without causing disruptions to the entire process. Effectively, micro-workflows offer a strategy to render complex healthcare workflows adaptable, efficient, and responsive to evolving clinical requirements and technological advancements.

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This revolutionary approach to discrete task segmentation and automation expedites processes, mitigates burnout, and fosters precision in diagnosis and reporting. Moreover, these workflows bridge disparate data sources, culminating in a unified view in which to identify trends and anomalies to provide better clinical insights and optimize key cost performance indicators.

By aggregating and relating data, micro-workflows ensure seamless and streamlined coordination across the healthcare continuum to optimize efficiency and empower providers to focus on patient care rather than managing arduous administrative tasks.

Making the Transition to Micro-Workflows

All health systems rely on established workflows for day-to-day operations, but, hidden within these broader processes lie smaller, often overlooked micro-workflows. The accumulation of these seemingly insignificant tasks, such as uploading data or inputting metadata during routine patient encounters contributes significantly to the mounting burden on healthcare professionals and the subsequent burnout rate.

Recognizing Micro-Workflows

You may not realize it, but within the context of every macro workflow, you are already executing multiple micro-workflows, albeit manually. Consider the scenario of wound care as a macro workflow. During a typical patient encounter, the practitioner captures images of the wound, locates the patient's record in the EHR, uploads the photos to the patient record, and adds additional encounter details.

These seemingly small efforts may not sound burdensome for a single patient interaction, but when multiplied by dozens of similar interactions each day, these repetitive tasks decrease the amount of time that providers have for meaningful patient interaction, lower overall productivity, increase the likelihood of human error, and contribute significantly to burnout and fatigue.

Enter Strings

Strings is a first-of-its-kind imaging ecosystem orchestrator that breaks down large, cumbersome processes into smaller, more manageable micro-workflows. By automating tasks across clinical, IT, and AI applications, Strings significantly reduces manual effort to accelerate clinical workflow. For Strings, automation and optimization are not merely buzzwords – these concepts translate into real, measurable outcomes:

1. Strings knows that repetitive tasks drive burnout which is why we're automating grunt work. At a typical client, Strings executes an average of 31 workflows per minute, resulting in a measured IT resource savings of 3.5 resources a year.

2. Strings knows that speed is critical which is why we provide monitoring and support of end-user workflows at machine speeds. Operating at a rapid pace to ensure that clients are receiving timely, proactive insights, Strings analyzes over 3 billion data points every 10 seconds, triggering more than 644 Strings interactions per second to provide meaningful insights into clinical workflows.

3. Strings has an intrinsic understanding of healthcare data which is how we are able to provide nuanced infrastructure monitoring with meaningful data models, impact assessments, and deviation analyses to quickly uncover the root causes of resource strain or failure. Strings delves into the realm of data, uncovering, analyzing, and modeling over 6,000 pages per hour of log file errors and warnings – a task that would typically take 167 hours for an individual to accomplish.
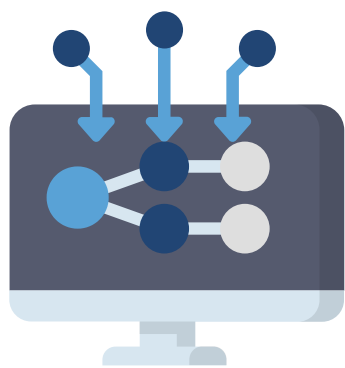
3 Billion

Datapoints analyzed
every 10 seconds
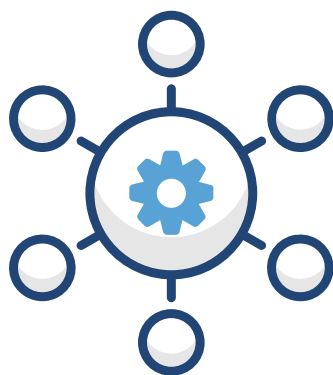
31

Automated macro-
workflows executed
per minute

644

Automated micro-
interactions
per second

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The Strings Data Service Platform

The Strings Data Services Platform represents a groundbreaking shift in healthcare data management by seamlessly integrating disparate systems to band data and connect workflows across healthcare organizations.

Traditional approaches to healthcare data consolidation have grappled with fragmented information housed across various platforms that struggle with mismatched communication standards and interoperability challenges. Strings, however, transcends the limitations of a mere data repository, router, or interface engine by operating as a dynamic conduit, facilitating the interconnection of EHRs, VNAs, DMSs, and data lakes to empower providers, operators, and artificial intelligence systems to visualize a unified stream of clinical and operational data.

Strings stands as a fully-managed solution, providing real-time oversight of enterprise imaging workflows, applications, and infrastructure. Extending well beyond data management or resource monitoring, Strings proactively analyzes complex healthcare IT environments to identify anomalies and patterns in application workflows in real-time. This empowers users to model data for a spectrum of enhancements, including transformations, enrichments, automations, and visualization that will inform and accelerate any enterprise imaging initiative.
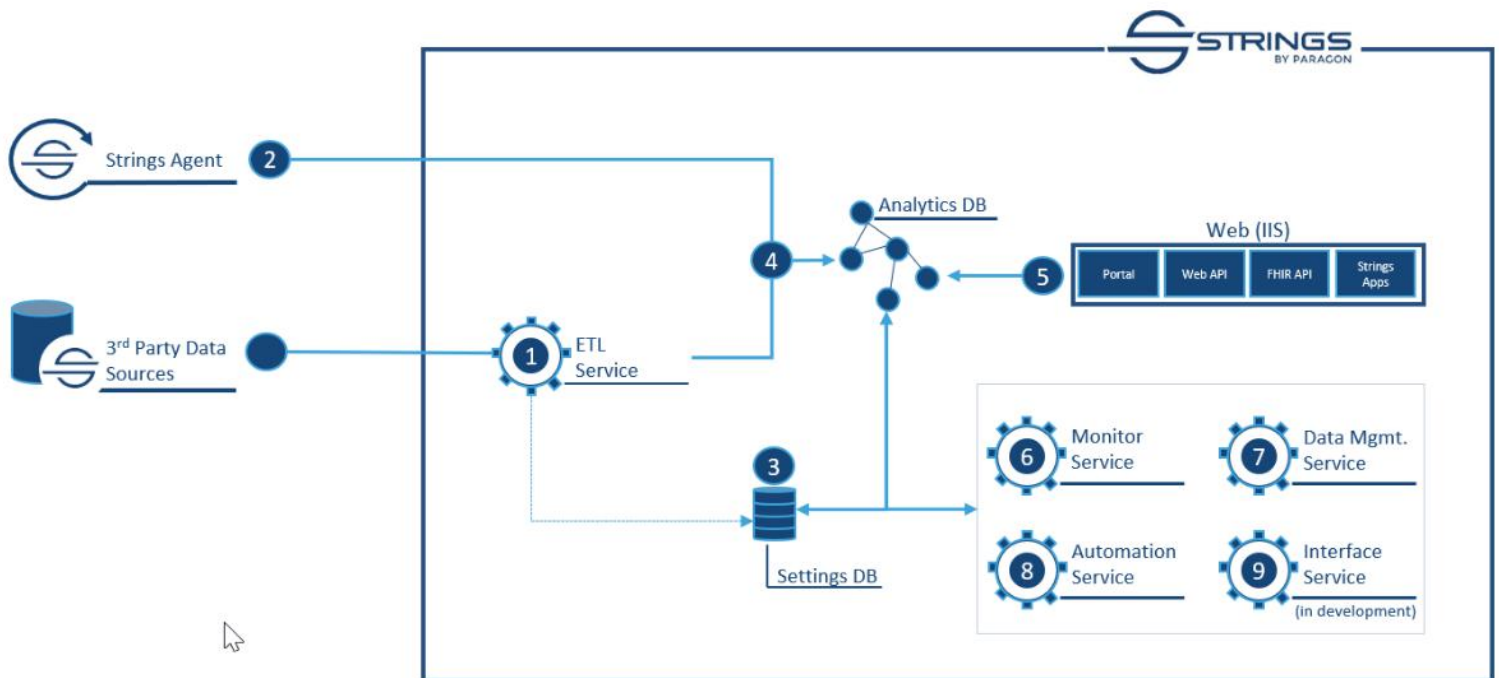
Strings Use Cases

Current deployments of Strings in both medium and large-scale healthcare organizations have yielded remarkable results that have impacted every operational tier.

Strings' sophisticated infrastructure monitoring and data modeling capabilities have enabled clients to visualize anomalies and patterns in clinical workflows to inform optimization and automation while significantly reducing the time it takes to identify and mitigate root causes of infrastructure strain. This not only ensures predictability, productivity, and uninterrupted operational continuity across the enterprise, but provides much-needed visibility into care delivery throughout large, and often geographically dispersed healthcare organizations.

Strings has rapidly become an indispensable tool for many, already attaining several remarkable achievements, such as:

1 EPIC Images Capture Automation

By automating roughly 1600 micro-workflows a day, Strings has eliminated approximately 467 hours per month of physician and nursing workflow efforts at Aurora Health.

The Challenge:

Swiveling between the EHR and specialty clinical applications to achieve a holistic understanding of a patient's diagnosis required doctors and nurses to perform repetitive, manual tasks that were contributing to fatigue and burnout.

The Solution:

Strings streamlines manual tasks by using EHR events to trigger automation of several micro-workflows. Searching for patients, reviewing encounter and appointment details, and saving images, relevant metadata, and notes to the hospital's specialty solution is now completely automated.

② AI Orchestration for Stroke Cases

Helping to orchestrate and monitor approximately 5527 possible stroke cases each week, Strings has taken the stroke care team's response time from 25 to 6 minutes at Advocate Health.

The Challenge:

Essential data that was buried in the EHR needed to be added to the specialty stroke coordination app used by the stroke care team.

The Solution:

For every stroke encounter, Strings automatically triggers several automated micro-workflows, including searching the EHR for the NIH stroke score, and immediately saving it to the stroke coordination app used by the response team.
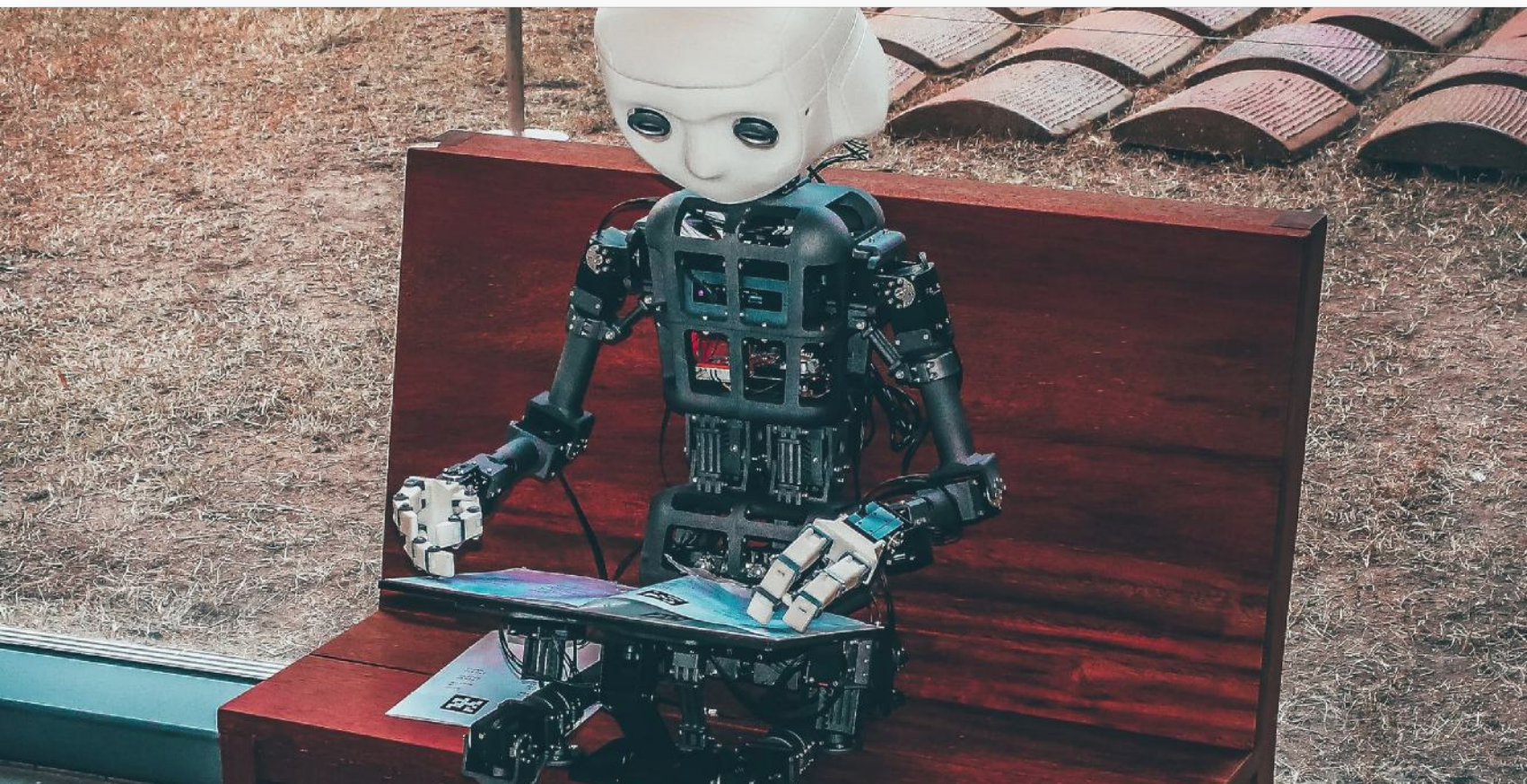
③ Point-of-Care Ultrasound Workflow Enhancement

Enhancing the Point-of-Care Ultrasound (POCUS) workflow has not only resulted in substantial enhancements to patient care and health equity but has also unearthed a $1.5 million annual revenue opportunity by granting comprehensive data access to the entire care team.

The Challenge:

POCUS has been referred to as the new stethoscope of healthcare tools, but because most POCUS solutions are designed for departmental use, it presents a significant administrative challenge. In larger healthcare systems with over a million daily patient encounters, POCUS modalities are not equipped to present a filtered patient list, making it nearly impossible to cleanly associate a study with a patient and an encounter.

The Solution:

Strings enables real-time EHR queries to present a location-based list of active patients and encounters on point-of-care ultrasound modalities. Providers can now easily associate imaging data with a patient chart to effortlessly support billing workflows – formerly a cumbersome process for unsolicited imaging orders.

4 Back-Office Operations

By monitoring over 40,000 end-user interactions per hour at Sentara Healthcare, Strings' advanced data modeling has reduced the time taken to identify the root cause of infrastructure overload from months to minutes.

The Challenge:

With a geographically dispersed health system, how do IT teams begin to measure, monitor, and respond to radiologists when they report that a study is slow to load on their workstation? Current infrastructure monitoring tools can tell you that a CPU is spiking, but what's missing is the nuanced data that illustrates why the CPU is spiking. Infrastructure monitoring tools lack the ability to recognize and model the relationships of the applications that are leveraging a particular resource.

The Solution:

Using Strings to monitor and model every user interaction across multiple applications (from loading of a worklist, to launching of a study, to scrolling through study images) the team was able to visualize the relationships between the workflow, applications, and associated infrastructure to quickly identify the root cause of the performance degradation. By using the time-based deviation analysis, the team was able to proactively monitor data loads week over week in order to adjust workflows and resources as required.

Realizing the Potential of Micro-workflows in Healthcare Optimization

As healthcare data continues to grow at an exponential rate, causing clinical workflows to increase in complexity, the strain on care providers to manage and synthesize this information continues to mount - taking a significant toll on provider well-being and patient safety.
By breaking cumbersome workflows into smaller, automated components, micro-workflows promise adaptability, efficiency, and responsiveness to evolving clinical needs and technological advancements.

The ability to identify and orchestrate micro-workflows represents the next step in the evolution of healthcare digital transformation. Strings offers the ability to bridge the gap between disparate data sources in order to analyze and model billions of data points to facilitate meaningful organizational optimization throughout the enterprise. By enabling real-time access, interoperability, and comprehensive monitoring, Strings is poised to revolutionize enterprise imaging initiatives, empowering organizations to achieve unparalleled efficiency and innovation in their operations.

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At Strings, we understand the challenges faced by healthcare organizations of all sizes and profiles. Having been at the forefront of transforming how medical imaging is managed in today's healthcare ecosystem, we recognize that this evolving landscape requires a new approach to holistic healthcare IT management. Strings by Paragon is the industry's first imaging ecosystem orchestrator that automates and optimizes clinical workflow, centralizes infrastructure monitoring, and enriches data from diverse sources - all through a single pane of glass.