IEEE P2795 “SHARING HIGH-ASSURANCE ANALYTICS IN REMOTE ENVIRONMENTS” (SHARE) STANDARDS WORKING GROUP

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UNIVERSITY OF VIRGINIA (UVA) HEALTH & MITRE SMART CONNECTED ANALYTIC LEARNING EXCHANGE (SCALE) LAB COLLABORATION

LEARNING LAB

MITRE's sponsors bring challenges to the partnership and encourage MITRE engineers and UVA clinicians to explore ground-breaking approaches for care delivery via learning metrics and measures, telehealth and remote monitoring, medical cyber security, and shared analytics.

Enabling technology and data management innovation to improve medical care operations

Create robust **connected healthcare ecosystem** that nurtures investigation, safety, and assessment for all aspects of healthcare operations

Development of **powerful analytics** for improved predictive monitoring for critical illness

Enable **effective sharing of analytics** for multi-center development

Provide **frameworks** for bringing effective tools to remote medical facilities

Enable **remote patient monitoring** to reduce cost, improve patient healthcare experience

Cyber & Artificial Intelligence (AI)
Decision Support Infrastructure
Protection and Resiliency

Collaboration initiated in 2015

MITRE

Public Organizations Working in the Public Interest

UVA Health

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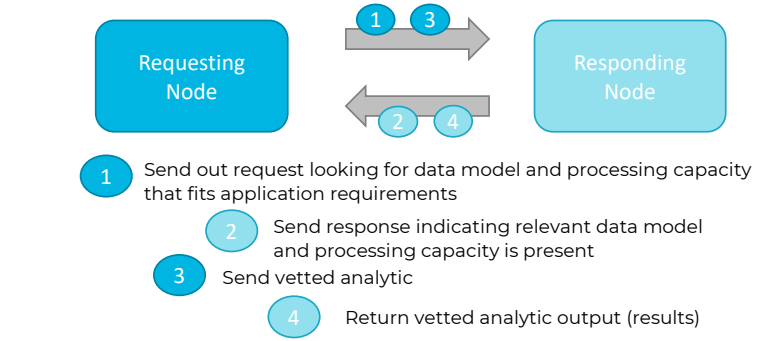
IEEE P2795 STANDARD FOR SHARED ANALYTICS ACROSS SECURE AND UNSECURED NETWORKS

HTTPS://SAGROUPS.IEEE.ORG/2795/

Scope of proposed standard: This standard identifies requirements for trusted high assurance analytic exchange services over secured and unsecured networks.

- The standard defines metadata and frameworks used to support interactions between nodes that are involved in a trusted multipart handshake including discovery of data models and processing aspects available at a remote location, appropriate analytic configuration, and exchange of vetted critical analytic results. This standard supports the exchange of trusted, actionable, and appropriate information for use between analytic producing and consuming nodes.

- The multipart handshake is designed for use between computing nodes operating in potentially denied, disrupted intermittent limited bandwidth (DDIL) environments. These environment involve critical infrastructure (e.g., medical, transportation and utilities) and might be austere compute environments such as those present in IoT and industrial control systems (ICS). The standard does not preclude other applications that employ analytic exchanges.



The IEEE standard for shared analytics aims to standardize interactions between nodes that are required for distributed analytic exchange.

Purpose: Compute nodes serving critical infrastructure operate at different, potentially austere locations. In this environment, the exchange of information between analytic producing and consuming nodes depends on common frameworks to support interactions among nodes.

IEEE P2795 STANDARD FOR SHARED ANALYTICS ACROSS SECURE AND UNSECURED NETWORKS

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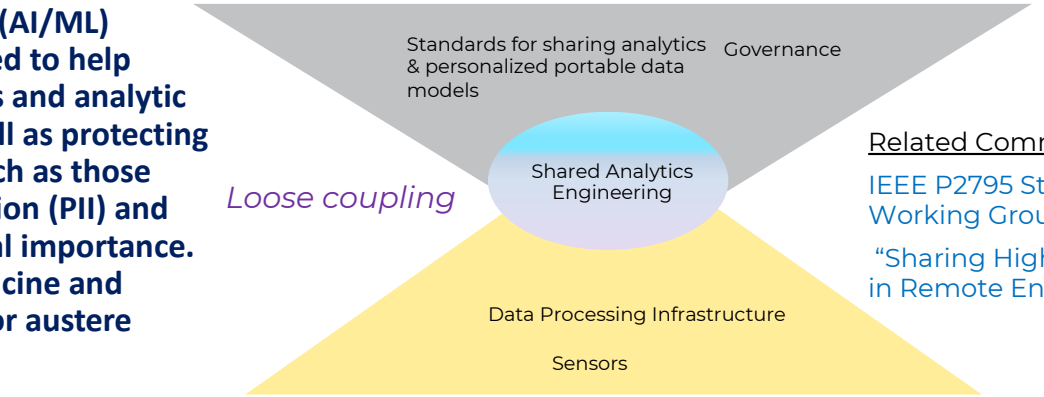
Need for the Project: There is a need for common national and international standards for securely sharing analytic information for use in critical decision making.

- **With the emergence and proliferation of cloud-based artificial intelligence and machine learning (AI/ML) platforms and commercial services, the need to help sustain both the integrity of analytic results and analytic computation describing information, as well as protecting the confidentiality of sensitive data sets such as those containing Personally Identifiable Information (PII) and Personal Health Information (PHI), is of vital importance. Health care use cases may include telemedicine and humanitarian applications during disaster or austere scenarios.**



IEEE P2795 STANDARD FOR SHARED ANALYTICS ACROSS SECURE AND UNSECURED NETWORKS

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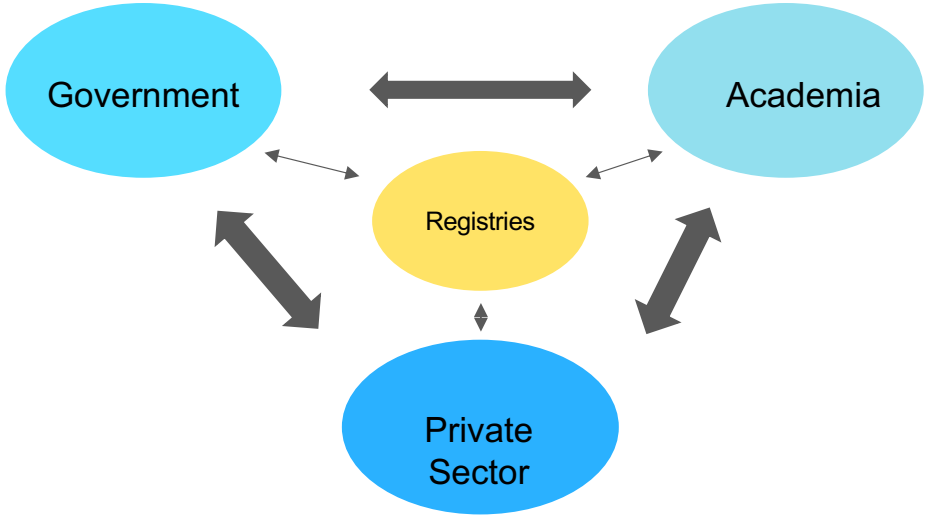
Stakeholders for the Standard: Stakeholders for this standard include any organizations that collect, compute, analyze, and share analytic results and analytic describing information. The standard of exchange to be defined should be implemented by analytic computation platforms and services and employed by all consumers of analytic information intended for use in critical decision making.

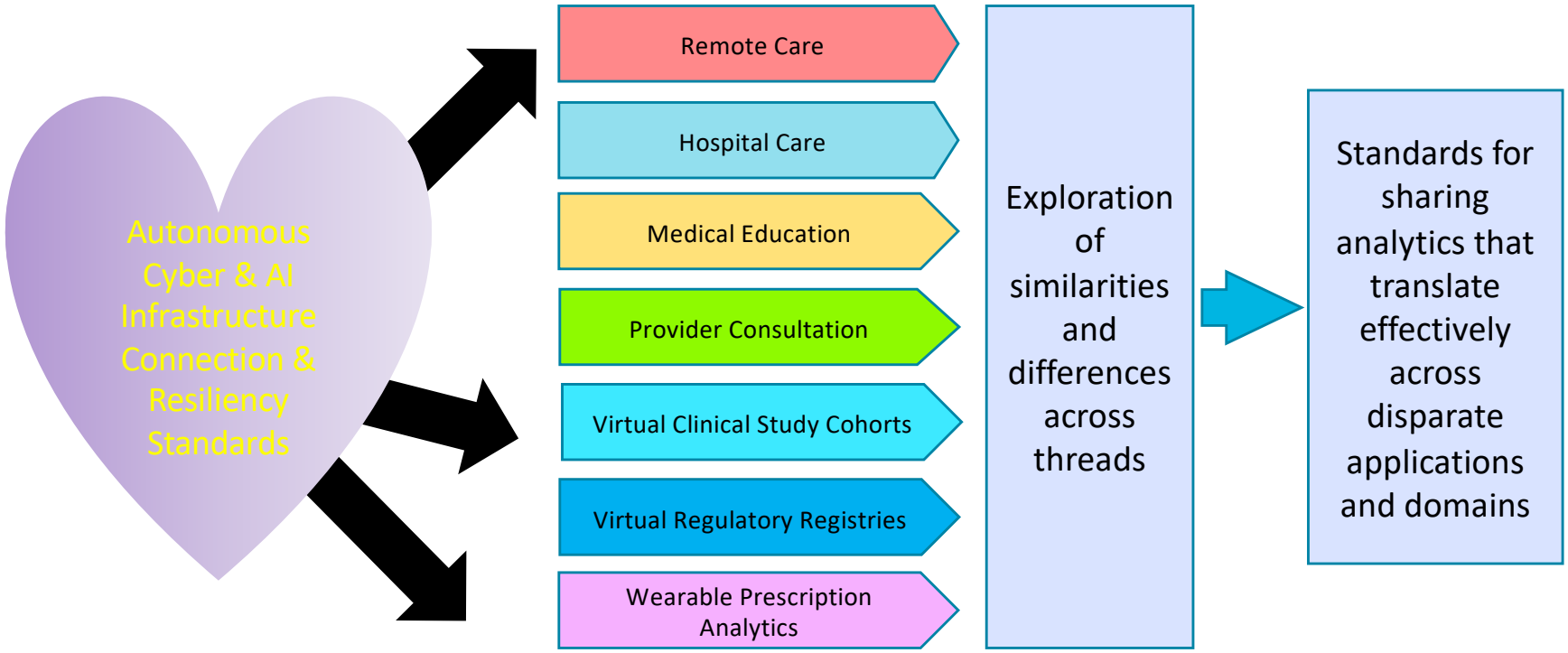
- **This can include government agencies [such as various US organizations including Department of Defense (DoD) and Department of Veterans Affairs (VA) Interagency Program Office (IPO), Defense Health Agency (DHA), Veterans Health Administration (VHA), Food and Drug Administration (FDA), National Institutes of Health (NIH)] as well as industry and global organizations, humanitarian charities, and academic organizations attempting to apply high value analytic engines, platforms, and services in support of business and mission operations.**



The IEEE SHARE working group was recently expanded beyond just health to "Sharing High-Assurance Analytics in Remote Environments" to accommodate the contributions to include cyber & AI infrastructure protection and resiliency, extending the analytic standards and services working group effort several years.

IEEE P2795 STANDARD USE CASES AND WORKFLOWS CATALYZED THE WORKING GROUP

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795



IEEE P2795 STANDARD FOR SHARED ANALYTICS ACROSS SECURE AND UNSECURED NETWORKS

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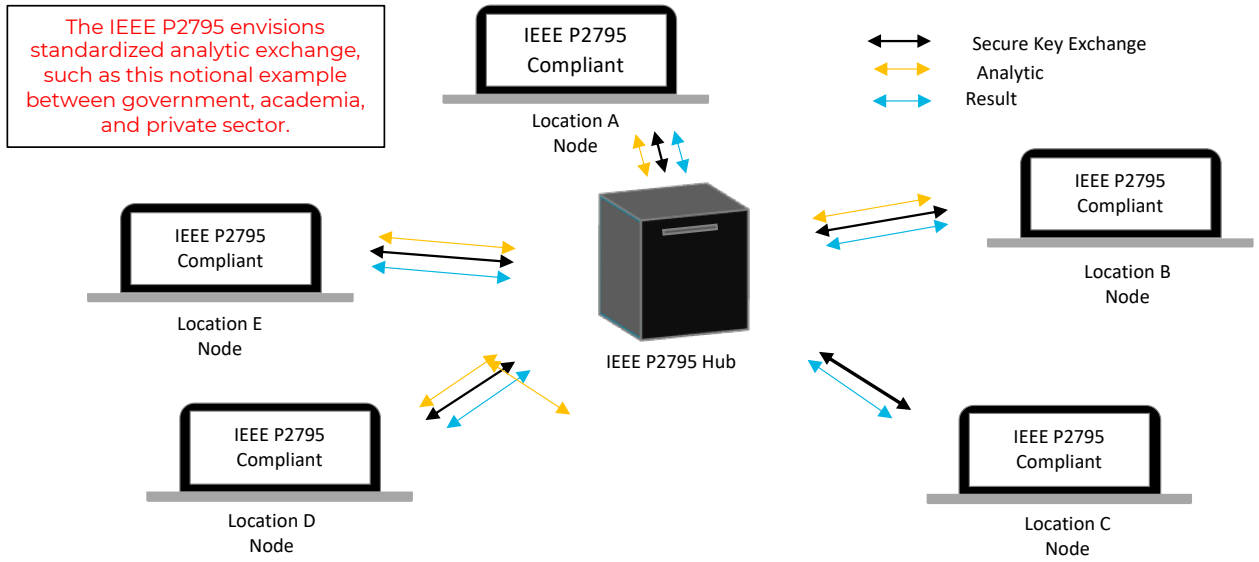
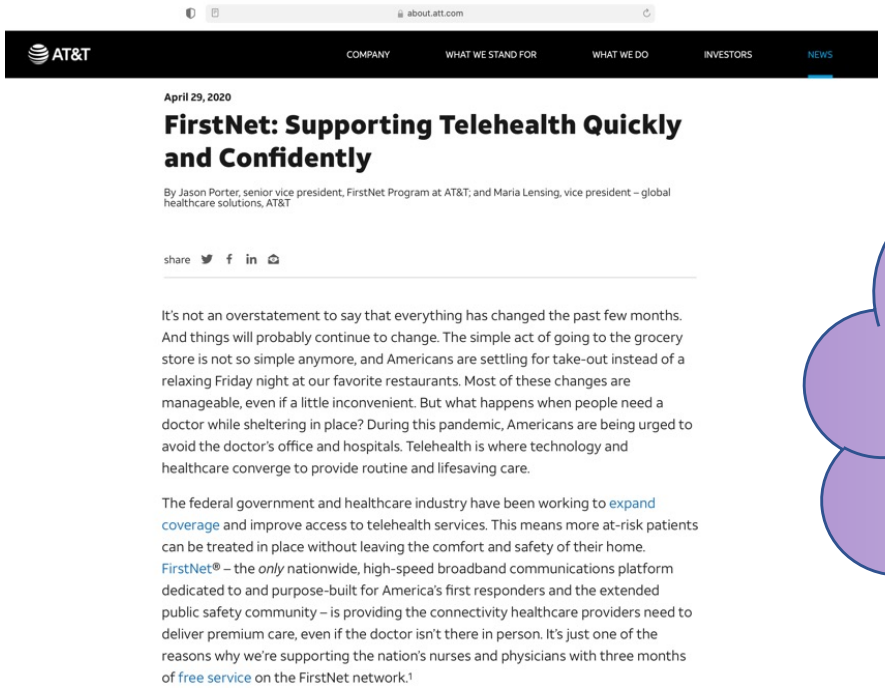
Additional Explanatory Notes: To the best of our knowledge there are no other standards or projects with a similar scope but we welcome the opportunity to collaborate with other organizations. The scope, purpose, need, and stakeholders were updated for the approved IEEE P2795 PAR based on feedback and inputs the past few years in the working group and to accommodate austere environments.



IEEE P2795 IMPACTS: FUTURE RESILIENT AUTONOMOUS CONNECTIVITY STANDARDS FOR HUMANITARIAN, EMERGENCY MEDICINE, AND DISASTER RESPONSE



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AT&T COMPANY WHAT WE STAND FOR WHAT WE DO INVESTORS NEWS

April 29, 2020

FirstNet: Supporting Telehealth Quickly and Confidently

By Jason Porter, senior vice president, FirstNet Program at AT&T; and Maria Lensing, vice president – global healthcare solutions, AT&T

share

It's not an overstatement to say that everything has changed the past few months. And things will probably continue to change. The simple act of going to the grocery store is not so simple anymore, and Americans are settling for take-out instead of a relaxing Friday night at our favorite restaurants. Most of these changes are manageable, even if a little inconvenient. But what happens when people need a doctor while sheltering in place? During this pandemic, Americans are being urged to avoid the doctor's office and hospitals. Telehealth is where technology and healthcare converge to provide routine and lifesaving care.

The federal government and healthcare industry have been working to expand coverage and improve access to telehealth services. This means more at-risk patients can be treated in place without leaving the comfort and safety of their home. FirstNet® – the *only* nationwide, high-speed broadband communications platform dedicated to and purpose-built for America's first responders and the extended public safety community – is providing the connectivity healthcare providers need to deliver premium care, even if the doctor isn't there in person. It's just one of the reasons why we're supporting the nation's nurses and physicians with three months of free service on the FirstNet network.[1]

IEEE P2795
Analytic Exchange Protocol

Enables The Future

Autonomous Cyber& AI Infrastructure Connectivity & Resiliency Standards

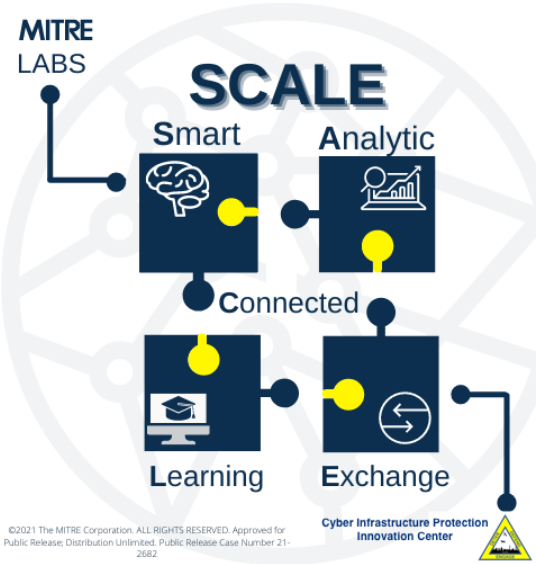
https://about.att.com/innovationblog/2020/04/fn_telehealth.html

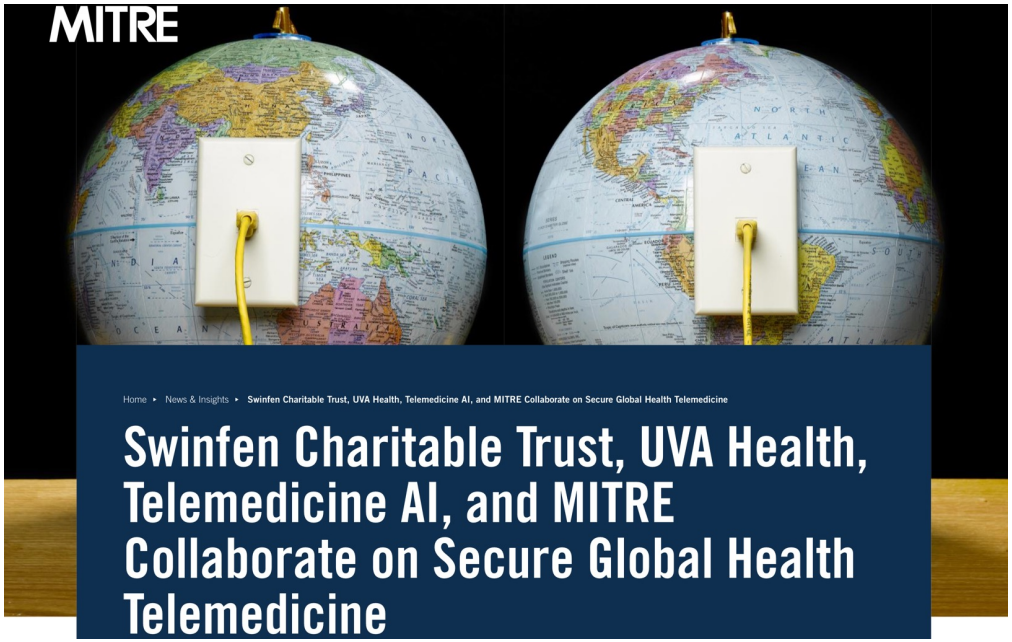
MITRE LABS STANDARDS CONTRIBUTIONS

Providing inputs to IEEE P2795

Cyber & AI Protection & Resiliency

Global Humanitarian Infrastructure





https://www.mitre.org/news-insights/news-release/swinfen-charitable-trust-uva-health-telemedicine-ai-and-mitre

http://www.mitre.org/cipic

IEEE P2795 ANALYTIC EXCHANGE STANDARDS AND SERVICES FOCUS

- Enable Data Model & Analytic Computation Portability
- Develop Quality of Cyber and AI Decision Support Metrics & Measures
- Create Trusted Analytic Exchange & Edge Computing For Human Systems

Want to volunteer? Participation is free for anyone, join IEEE to vote on the standard

https://sagroups.ieee.org/2795/

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ABOUT THE SPEAKER

Ms. Cj Rieser Ph.D. is a MITRE Labs Cyber Infrastructure Protection Innovation Center (CIPIC) Cyber & AI Innovation Principal Engineer, University of Virginia (UVA) School of Medicine Public Health Sciences Research Faculty, Senior IEEE Member, & the IEEE P2795 Standards Committee Chair. She founded MITRE's Smart Connected Analytic Learning Exchange (SCALE) Lab, which grew out of foundational studies & innovations in trusted edge computing in complex austere settings. In her previous role as the MITRE@UVA Health Learning Lab Site Partnership Leader directing MITRE innovation & other cross-sector Federally Funded Research and Development Center (FFRDC) programs, Dr. Rieser explored the impacts of emerging medical systems technologies needed to advance safe equitable trusted critical decision support workflows, metrics, and measures. Cj's translational research & teaching interests span national security & public sectors mission critical needs using creativity as a catalyst. Her field work focuses on trusted cognitive edge sensing analytics for decision support, mobile cyber-physical systems, human learning, & workplace thriving. Dr. Rieser's doctoral research as a National Science Foundation (NSF) Fellow was supported by the Integrative Graduate Education and Research Traineeship (IGERT) program at Virginia Tech focused on advanced networking.

BACKGROUND

https://twitter.com/MITREcorp/status/1422980660889796615

'An Aspiration to Help'

Over decades, Dr. Cj Rieser has watched the power of IEEE connectivity standards such as the IEEE 802.11™ family for Wi-Fi® connectivity and other internet standards "unfold around the world." Today, she chairs the IEEE P2795™ Shared Health Analytics in Remote Environments (SHARE) Working Group, which is defining requirements for sharing access to sensitive information for analysis without moving that data beyond firewall protection and to a centralized location.

Cj said her interest in IEEE standards work "stemmed from an aspiration to help build smart connected communities that help grow care and learning networks benefitting all people—especially those in vulnerable populations."

Cj now leads the working group through the standards development process in various ways, such as serving as point of contact for questions or comments, planning meetings, organizing work and working closely with the other IEEE P2795 officers. For example, the working group recently formed sub-working groups focused on shared analytics data models, quality of metrics and measures, analytic computation models, and trusted analytic exchange.

"The healthcare field has some global examples of how emerging medical technologies can transcend boundaries for the overall good, yet health disparities and bias persist, including in digital health environments. The IEEE P2795 shared analytics standard will hopefully one day help transform digital health—especially around future medical cyber systems that must be resilient, privacy preserving, and inclusive of the care and learning needs of all people."

https://beyondstandards.ieee.org/common-purpose-different-paths-stories-of-ieee-standards-developers

MITRE & UVA HEALTH COLLABORATION – MS. CJ RIESER PH.D.

Mission Focus and Impact – Smart Connected Care

The MITRE & UVA collaboration continues to garner sponsor support and have impact across both the national security and public service sectors.

In collaboration with UVA and other academic and industry participants, MITRE engages military, veteran, civilian health, and other sponsors to leverage engineering approaches for:

- learning metrics and measures
- telehealth and remote monitoring
- medical cyber, and shared analytics

This activity focuses on reference platforms for both sensitive and non-sensitive experimentation, as well as standards studies spanning regulatory registries, clinical trials, wearables, garrison and expeditionary spaces, and clinical hospital and telehealth care needs.

Notable collaboration between MITRE and UVA includes:

•Partnering to scale, document, measure, and share telehealth services to vulnerable populations in response to the COVID-19 pandemic as well as provide provider wellness and resiliency tools

•Leading standards development with the IEEE Engineering in Medicine and Biology Society, resulting in the IEEE P2795 standard for sharing analytics

•Improving expeditionary health technology readiness through field exercises and mobile medical experimentation

https://sites.mitre.org/uvahealth/

UVA HEALTH AND MITRE HELP KEEP AT-RISK POPULATIONS SAFE FROM COVID-19

UVA Health and MITRE partnered to develop COVID Rapid Response Kits—a critical new tool for fighting the pandemic in Virginia. These kits, expanded telehealth capabilities, and remote monitoring are improving care for many vulnerable residents.

https://www.mitre.org/publications/project-stories/uva-health-and-mitre-help-keep-at-risk-populations-safe-from-covid

Building a Joint Learning Lab through Academic Engagement

MITRE's UVA site launched in 2015. Located on the grounds of the UVA School of Medicine and UVA Medical Center, it quickly became a hub for collaboration and experimentation. It includes a robust connected healthcare ecosystem that nurtures investigation, safety, and assessment for all aspects of healthcare operations.

UVA HEALTH AND MITRE - CREATING A TELEHEALTH BLUEPRINT

- "In just four short weeks, our partnership enabled a rapid response process for vulnerable populations," says David Cattell-Gordon, director of operations at the UVA Center for Telehealth. "This collaboration has already played an important role in helping save the lives of frail elderly during a major outbreak in skilled nursing facilities in our communities."

- The blueprint focuses on two main factors: communicating with isolated patients and delivering telehealth facilities and services to remote, at-risk groups. This approach enables medical teams to deliver ongoing care while continuing social distancing to reduce the load on health systems around the nation.

- COVID-19 poses challenges that require creative solutions for remote sensing, distributed surveillance, early detection, resource allocation, and resiliency planning. Since MITRE is using artificial intelligence to solve similar data and analytic challenges for national security, it was a natural fit to pivot this expertise to tackle the pandemic.

> "Our shared commitment to public service enables us to overcome the barriers that inhibit the technology and data management innovation we need to improve medical care operations."

https://www.mitre.org/publications/project-stories/uva-health-and-mitre-help-keep-at-risk-populations-safe-from-covid

IEEE P2795 EXEMPLAR - FORMING A COMMUNITY OF INTEREST

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

In 2014 several academic medical centers identified a need to share predictive analytics across secure and unsecured networks during an International Society for Complex Acute Illness meeting.

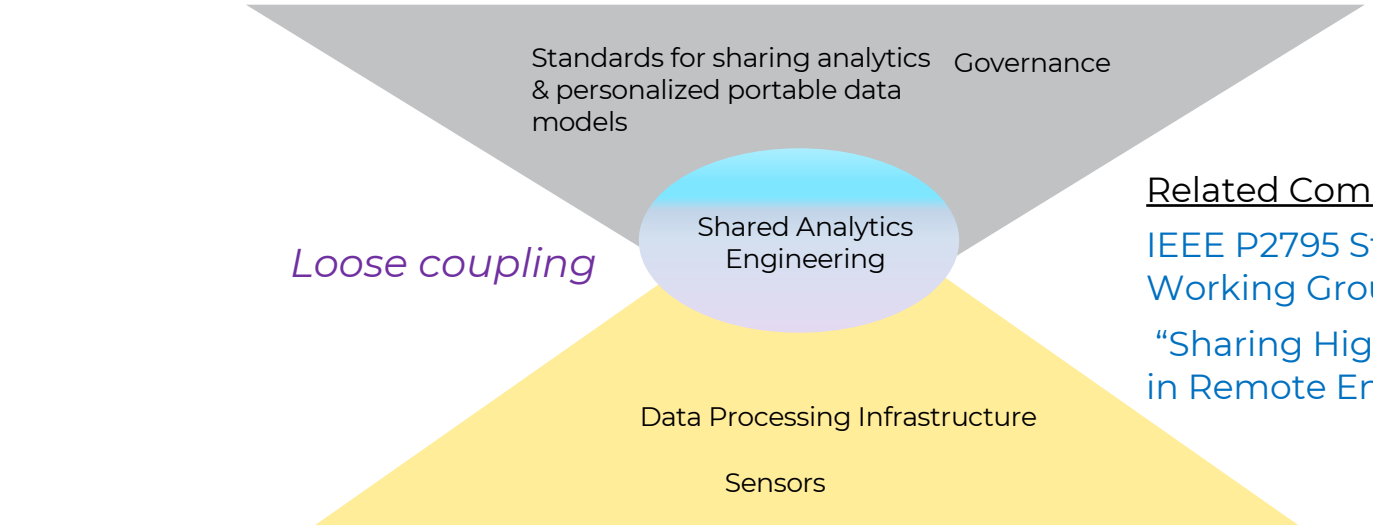
Innovative research and development efforts were initiated between MITRE and the University of Virginia (UVA) Health system to develop an environment to support community discovery of signatures of illness for infants, leading to a vibrant partnership the past five years.

The essence of the challenge which was initially explored by MITRE and UVA in a 2015 International Clinical Analytics Summit was to be as inclusive of patient cohorts and novel analytic approaches as possible.

In 2016 a summit commenced at UVA hosted jointly with MITRE and health care leaders from the state of Virginia that explored enterprise challenges in health data analytics.

WHY STANDARDIZE HOW TO SHARE ANALYTICS AND PORTABLE DATA MODELS?

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795



Related Community

IEEE P2795 Standards SHARE Working Group

"Sharing High-Assurance Analytics in Remote Environments"

The areas in the top half of the bowtie represent emerging coordination activities and business requirements while the bottom half of the bowtie include traditional engineering activities

IEEE P2795 EXEMPLAR - FORMING A COMMUNITY OF INTEREST

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

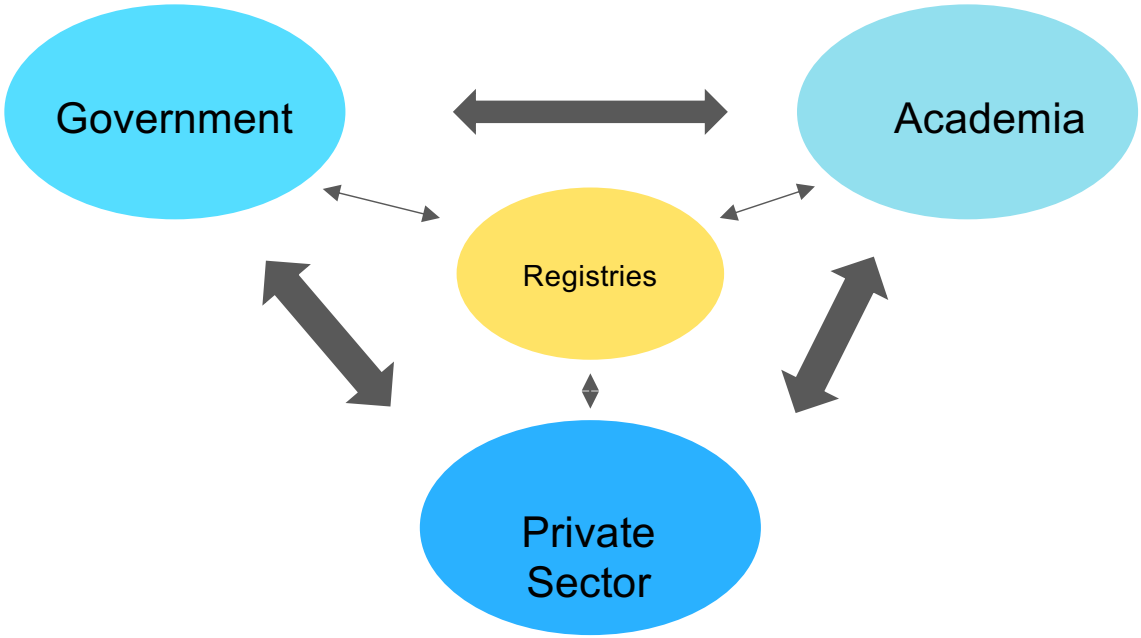
Such an approach enabled creative approaches to emerge from around the country through multiple shared analytics summits in 2017 and 2018 which included learning labs inclusive of engineers and clinicians.

These summits explored simulated use of prototypical shared analytics architectures developed by MITRE and tested with UVA Health and their academic partners from around the nation.

Insights from these experimental exercises studying human technical interfaces allowed nuances and even cultural and enterprise approaches to be studied from various parts of the nation's research enterprise across university health systems from coast to coast.

TRANSITIONS OF CARE - SHARING ANALYTICS AND PORTABLE DATA MODELS

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795



IEEE P2795 EXEMPLAR - FORMING A COMMUNITY OF INTEREST

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

Insights from the clinical collaborations provided led to a working group founded by military, veteran, and civilian government sponsors along with academia and industry.

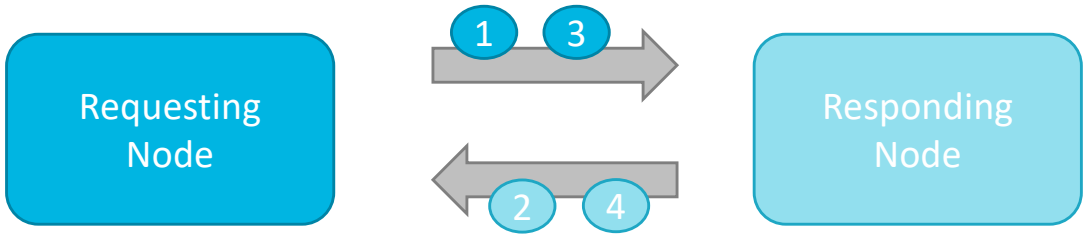
That working group led to a Project Authorization Request (PAR) submitted to the IEEE engineering in medicine and biology society (EMBS) initiating a global working group called SHARE (Sharing Health Analytics in Remote Environments) that kicked off in 2019 to develop the IEEE P2795 Standard for Shared Analytics Across Secure and Unsecured Networks.

This standard identifies the requirements for using shared analytics over secured and unsecured networks, including for telehealth.

It establishes a consistent method of using an overarching interoperability framework to utilize disparate smart connected care data systems for analytic purposes without an analytic user having explicit access to or sharing the data within these systems.

FOUR STEP IEEE P2795 ANALYTIC EXCHANGE

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795



1. Send out request looking for data model and processing capacity that fits application requirements
2. Send response indicating relevant data model and processing capacity is present
3. Send vetted analytic
4. Return vetted analytic output (results)

The IEEE standard for shared analytics aims to standardize interactions between nodes that are required for distributed analytic exchange.

IEEE P2795 EXEMPLAR - FORMING A COMMUNITY OF INTEREST

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

The IEEE P2795 metadata design for health analytic exchange networks envisions a standardized four-part handshake allowing analytic providers to make trusted inquiries regarding the available data model and processing architecture, suggest appropriate analytics based on that inclusive request, allow data sources to vet such analytics, and thus provide appropriate privacy preserving responses.

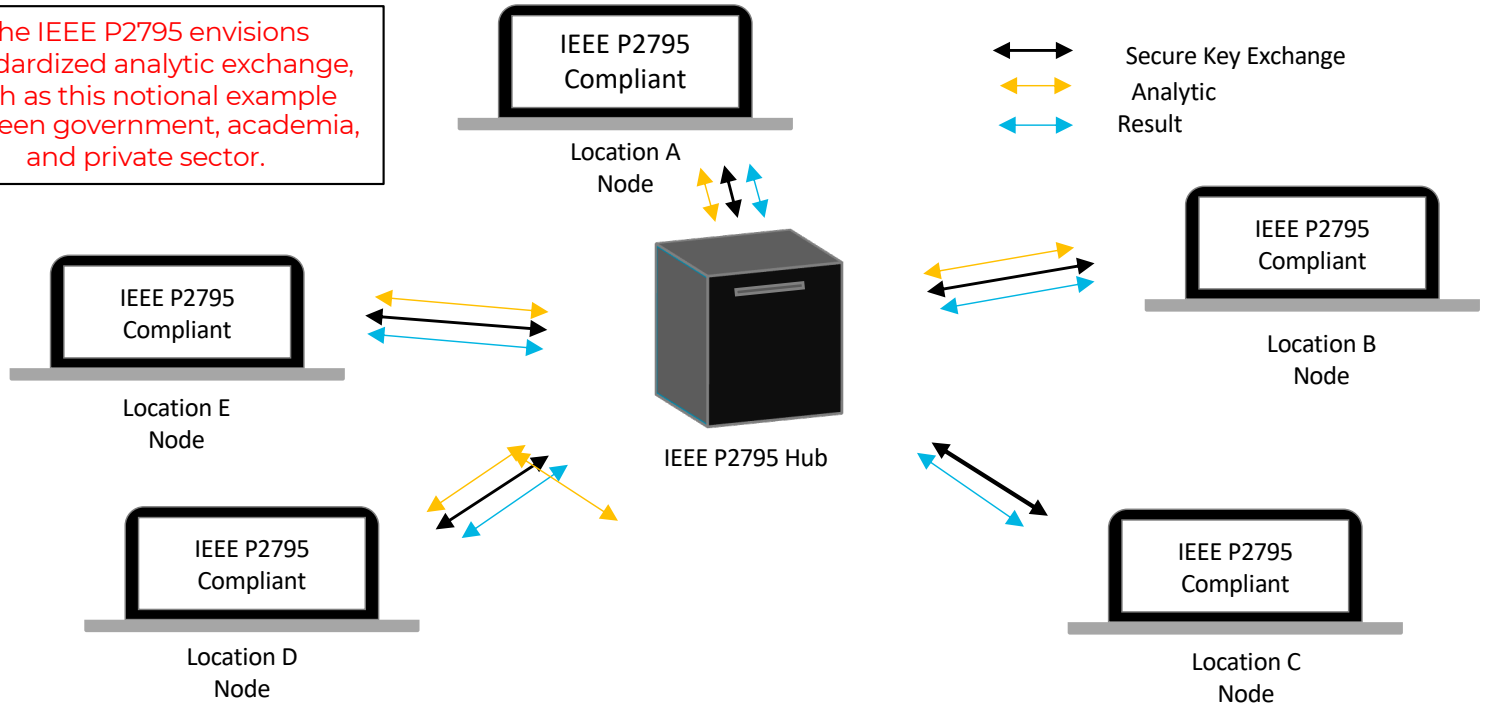
Such privacy preserving distributed processing architectures are essential in this time of global data privacy regulations and allow analysis to be inclusive of the data space as it actually is, including diverse ever evolving models representing the intersectional health analytic and clinical needs of cohorts locally or globally.

Together, community engagement approaches leveraging diversity within the IEEE Women In Engineering (WIE) society and beyond can increase leadership opportunities for all women to impact future technical standards like IEEE P2795, which hopefully will help humans flourish in the future.

NOTIONAL IEEE P2795 NETWORK ARCHITECTURE AND DATA FLOW

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

The IEEE P2795 envisions standardized analytic exchange, such as this notional example between government, academia, and private sector.



WHY STANDARDIZE HOW TO SHARE ANALYTICS AND PORTABLE DATA MODELS?

COLLABORATION AND BEST PRACTICES: EXPERIENCES CHAIRING IEEE P2795

Shared analytics allows for big data approaches across providers, without breaking rules of privacy

Standardization of shared analytics would allow many organizations to participate in a distributed analytics network independent from each node's individual architecture

Standardized non-proprietary approaches to enable health IT products to provide privacy preserving analytic interoperability are needed … driving the need for IEEE P2795 compliant meta-data allowing trusted analytic exchange

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