Thoughts on becoming a standards leader & medical technology futurist as women in engineering

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MITRE & IEEE WOMEN IN ENGINEERING (WIE)
1st "CHATS WITH WOMEN IN ENGINEERING EXECUTIVE LEADERS" SERIES TALK

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Abstract

IEEE community engagement approaches leveraging diversity can increase leadership opportunities for all women to impact future technical standards. Inclusive engineering in medicine technical standards are essential for better health care delivery needed for human flourishing. Interactions between humans and technology can vary widely based on social aspects and creative innovation. Standards help guide how one partners with and interacts with others as part of human systems or how a technical system works or interoperates. Equipoise between interoperability, privacy, and security is encouraged while interacting with human and technical systems by defining inclusive standards. It is essential thus to formulate standards with as comprehensive a worldview as possible aware of the spectrum of human identity. Modern medical analytic automation in learning health systems should avoid intentionally or unintentionally incorporating bias. The IEEE P2795 shared analytics standard adopts an inclusive architecture and handshake approach to metadata design of health analytic exchange networks.

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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.

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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.

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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.

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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.

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Why Standardize how to Share Analytics and Portable Data Models?

- 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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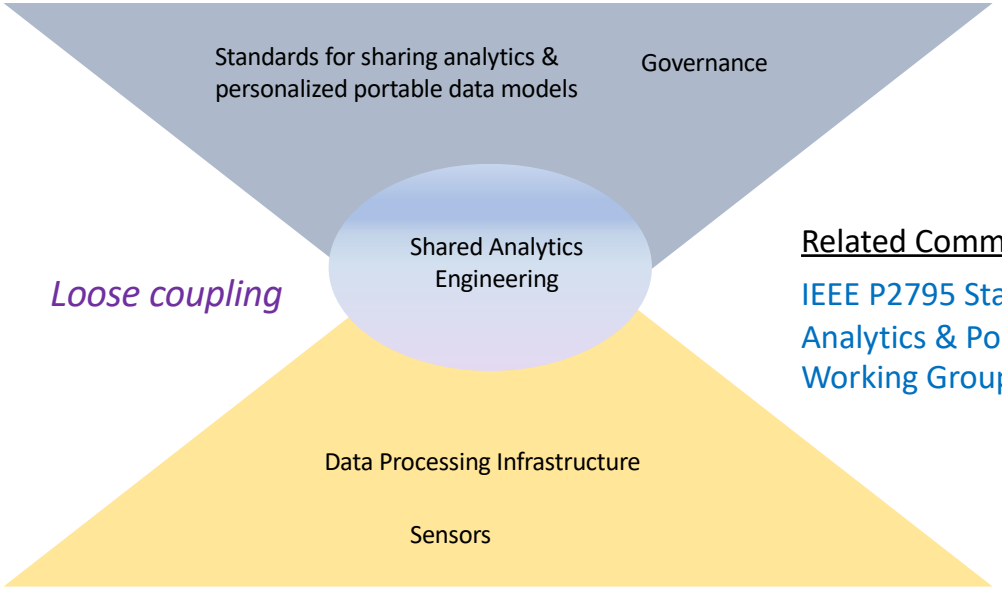
New Approach: Shared Analytics Engineering



Related Community

IEEE P2795 Standard for Sharing Analytics & Portable Data Models Working Group

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

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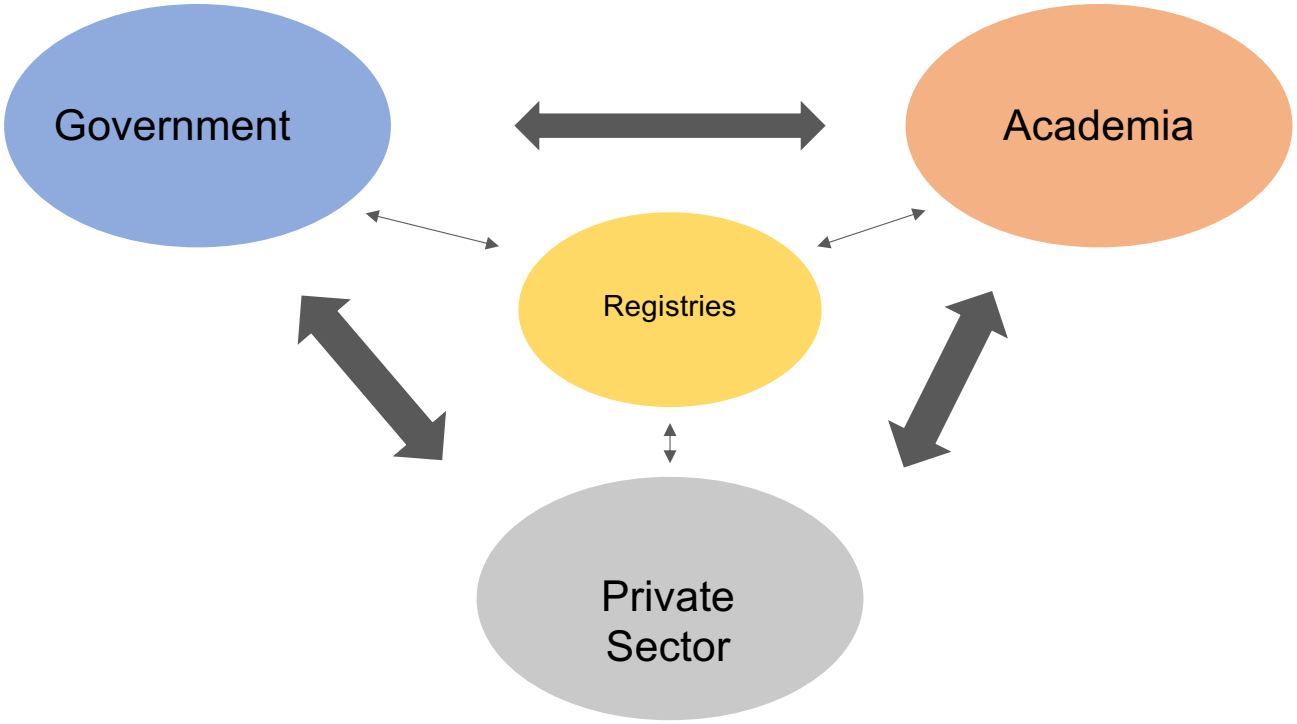
Envisioned Transitions of Care Enabled by Sharing Analytics and Portable Data Models



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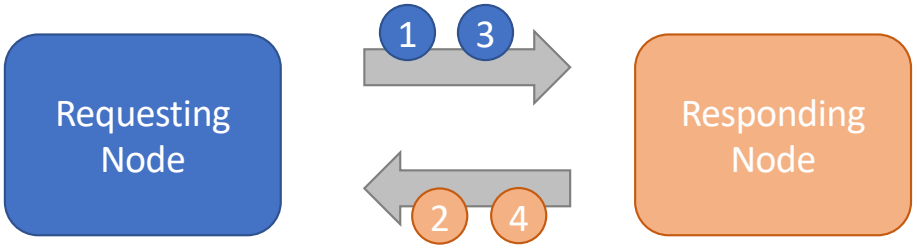
Proposed Four Step IEEE P2795 Analytic Exchange



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.

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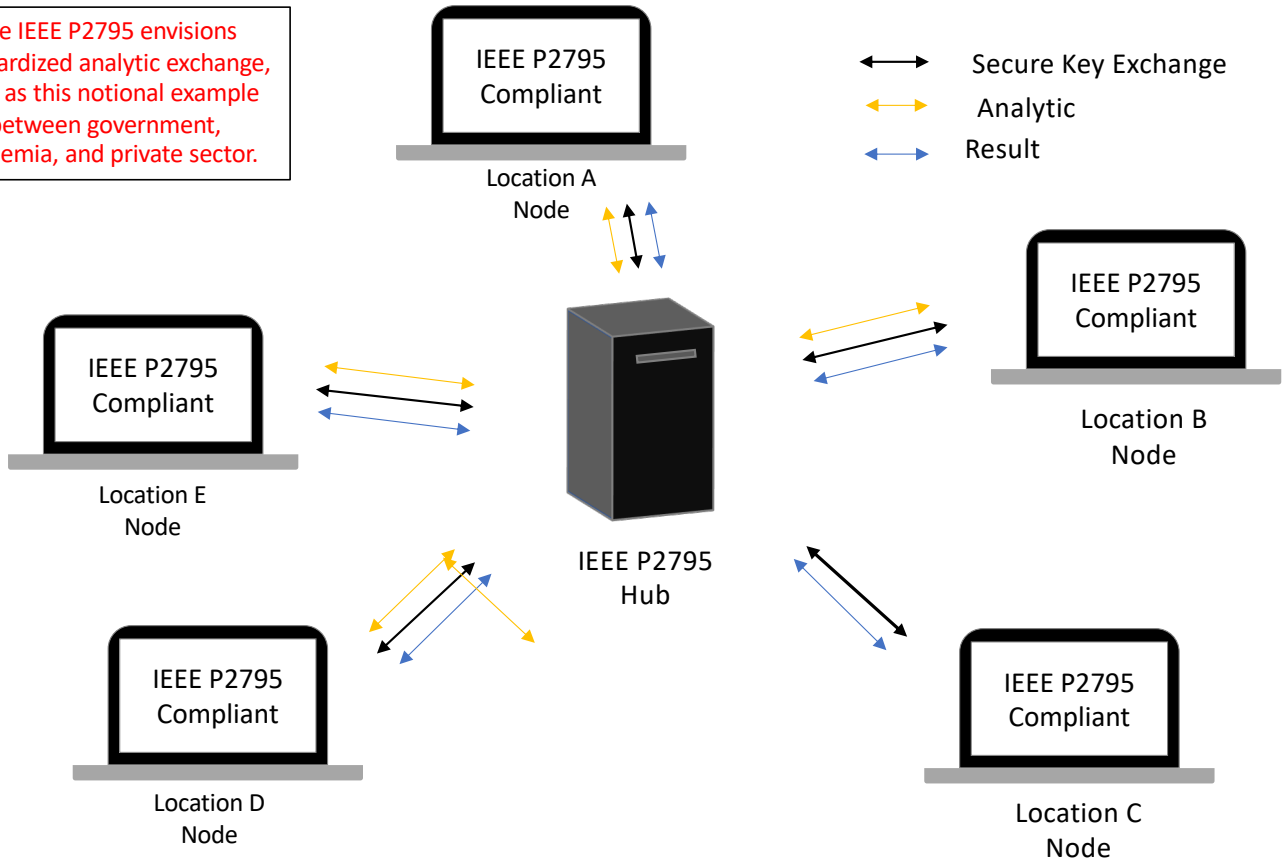
Notional IEEE P2795 Network Architecture and Data Flow

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



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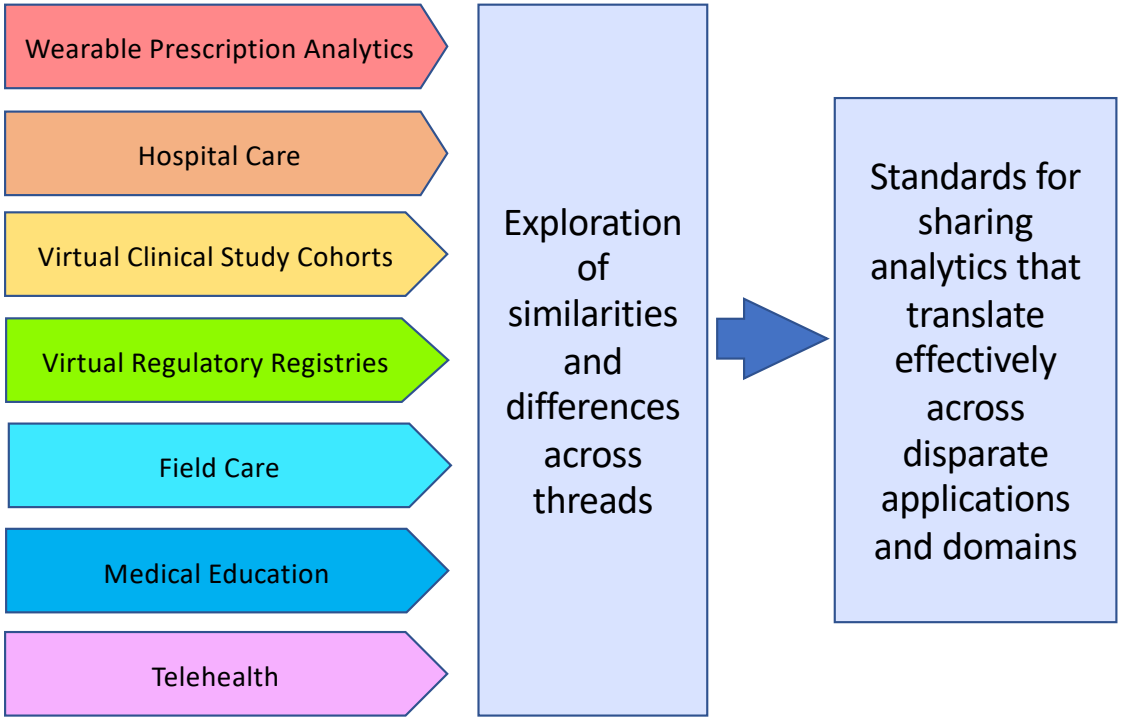
IEEE P2795 shared analytic and portable data model standard use cases and workflows



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Questions?