Next Generation Trauma Care Response

Question: How hard can Autonomous Critical Care Systems be?!

In looking at the rapid evolution of technology including intelligent systems, machine learning, robotics and autonomous vehicles - why can't that be applied to improve the safety and quality and effectiveness of care delivery, especially to the highest acuity patients who have experienced trauma - either military or civilian disaster - are remote from healthcare facilities and who need to be stabilized perhaps by individuals with minimal healthcare skills and perhaps for days before being evacuated ... how hard can that be?

Before dismissing this future focused question, remember that not that long ago, what is now called Automated External Defibrillator (AED), located in public facilities around the world, met with the same high level of skepticism. Just sayin' ...

This narrative comes from research being conducted at the Johns Hopkins University / Applied Physics Lab (JHU/APL) as part of the Medical Device Interoperability Reference Architecture (MDIRA) project (detailed below).

For this Gemini Device Interoperability project, the key question will be whether and to what extent the narratives and requirements and reference architecture components and capabilities can be mapped to and implemented over the SDPi+FHIR architecture and realized in interoperable medical technology products.

Page Updates Pending (2021.04.15)

1. Update with latest content from MDIRA Profile DPP re. use case
2. Call out soon-to-be released video & specification 2.0
   a. MDIRA RI Video Link
   b. ...
3. Link to new MDIRA FAQ and other Documents on their public page
4. Link to MDIRA Profile page

JHU / APL MDIRA Project

The MDIRA project home page has a REALLY COOL VIDEO, provides links to download the latest specification and related documentation, and gives a project overview:

The Defense Health Agency funded the U.S. Army Medical Research and Development Command to research technical architectures to support autonomous medical systems for prolonged care in austere environments and hospitals of the future.

The result is MDIRA, the Medical Device Interoperability Reference Architecture, a technical framework intended to guide stakeholder organizations and industry in developing interoperable, safe, and secure medical device systems that will deliver advanced and autonomous medical care. The MDIRA research team is engaging stakeholders from Government, industry, academia, and civilian healthcare who are on the cutting edge of integrated clinical environments, closed-loop care systems, medical device and cybersecurity standards, and regulatory clearance and approvals for patient safety.

The MDIRA Specification Document Version 1.0 provides requirements and implementation guidance for MDIRA-compliant systems focused on trauma and critical care in austere environments. MDIRA will evolve incrementally based on on-going research and collaboration.

Here is the draft that was included in an update to the HL7 Devices Working Group meetings in 2020 February:
Additional overview information is available in briefing documents such as the following MDIRA project report out at the 2019 September HL7 Devices Working Group meetings:

Reference Architecture & ICE Conceptual Model

- Difference of "reference architecture" vs. Implementation architecture (see below)
- Background / overview of ICE - include content from the SDPi white paper ... perhaps article references etc.
- Relationship to B-ICE-PS
- Relationship to SDPi+FHIR layers model

Note: ICE generally specifies a hub-n-spokes centralized control or "supervisor" approach; SOA can be constrained so as to support this type of model

NITRD MDI "Listening Session" Narrative

To help advance this area of research, on 2019-JUL-17 the U.S. Networking and Information Technology Research and Development (NITRD) Program conducted a "listening session" workshop, organized by the Health Information Technology Research and Development (HITRD) Interagency Working Group (IWG) and in collaboration with the U.S. FDA on the topic: Interoperability of Medical Devices, Data, and Platforms to Enhance Patient Care.

As part of the workshop, a narrative was published for public comment, the comments reviewed, and then "listening session" presentations and themes. This NITRD workshop narrative was subsequently used as a starting point for the MDIRA / ICE narrative and use case analysis below.
Note that the workshop also included a briefing on medical autonomous systems that includes the MDIRA project:

Source: NITRD Workshop materials

**MDIRA Use Case Analyses**

<from above to Gherkin / Cucumber & ReqIF ...>

<component use cases from SDPi white paper>

**MDIRA / ICE over SDPi+FHIR**

<ref the SES MDI model>

<requirements / objectives of this narrative but factoring in the MDIRA requirements and framework>

<in scope / out-of-scope ... today>

<link to Topics of Interest>