Ideas related to the use of Context in AI systems
Context

• Def: circumstances that form the setting for an event, statement, or idea, and in terms of which it can be fully understood and assessed

Encounter Situation:

• Patient (age, gender, complaint, other patient hx, preferences, …)
• Provider (specialty, preferences, schedule/interruptions, …)
• Environment (inpatient/outpatient, resource availability, …)
• At some point in time (or short period of time)
“Intended Action” Context

• A context with a more detailed information about the goal activity from the prospective of an actor in a context.

• Examples
  • Patient has general goals of Wellness, but might have more specific goals of better understanding interactions with a med,
  • Provider has general goals of Helping/Caring for patients, but might have more specific goal of placing an order for a med.

• Intended Actions are infinitely granular
  • E.g. To treat the patient v. subtask to place the order v. subtask to fill out dose v. sub task to press key…

• Intended Actions are key to meaningful understanding of the communication.
Artificial Intelligence and Intent

- Artificial intelligence / Machine Learning must be given knowledge of the goals in order to create a useful output. But this is often implicit in the design of the product.

- The goal of the AI generally is to suggest something helpful for a human to review, but this requires that the AI and human have more clarity each others current intent.
  - Suggesting at the wrong place or time for the human thwarts the AI goal of being helpful.

- HL7 Standards may be helpful to clarify.
Use Case Example:

- **<EHR: Cerner|Epic|...>** passes encounter context to **<VoiceAI: Nuance|Suki|...>**
  - Encounter type: Ambulatory
  - Specialty: Family Medicine
  - Complaint: Cough and shortness of breath
  - Age: 45; Gender: Female; WBC=17.5; CXR = …infiltrate… (“History + Now”)
  - Problems: Diabetes (“History + Now”)
  - Meds: Insulin (“History + Now”)
  - Allergies / Procedures / Immunizations, …
  - ? Consent info / Preferences
- **Voice AI passively listens to conversation**
  - “looking at your chest xray, I think you have a pneumonia I’d like to repeat the CBC and start you on Augmentin”
- **Voice AI creates a note considering both the conversation and the encounter context from the EHR.** It passes back a note with action context that this is suggested for documentation.
  - AI suggested documentation: “Hx: This is a 45 yo female with a history of diabetes presenting with a cough and shortness of breath. …AvP: Pneumonia. Will start Augmentin and recheck CBC”
- **Voice AI examines relevant encounter context and passes back suggestions with action context that identify where the user might order or add structured elements.**
  - AI suggested problems: “SNOMED:xxx|Pneumonia|” {evidence: “I think you have a pneumonia”}
- **EHR Matches order catalog to find best matches for orders at that site, and displays suggestion with transcript evidence.**
Issues to solve

• Context semantics and workflow – Generally
  • How much to send initially and is there a need for call back semantics to ask for more data depending on AI service needs.
  • Terminology - E.g. Role = ?License, vs. Level of Training vs. specialties,

• Standards to define appropriate levels of granularity and identify where and when AI suggestions are relevant and in what context.
  • E.g. Which suggestions go to orders context vs problem list vs …
  • E.g. Which suggestions appropriate workflow inline, vs interruption of workflow vs send to mailbox for later.

• Standards for passing the certainty of Suggestion and relevant evidence related to AI suggestions (e.g. warning that training datasets not well representative for this patient or specialty context)