Reenvisioning the EHR with a Virtual Assistant

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Conflict of Interest

• Yaa Kumah-Crystal MD, MPH

• Discloses the following relevant relationship with commercial interests:

  • Research partnership with Nuance Communications

  • Use of NLP libraries for research and development
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Agenda

• What has this year taught us?
• Why do we have a love hate relationship with our technology?
• How does this impact our ability to care for our patients?
• What in the world can we do?
Learning Objectives

• Discuss the value of Artificial Intelligent (AI)-enabled natural language processing and understanding technologies in the advancement of healthcare delivery.

• Describe a framework for the usability design considerations, information request mapping, and artificial intelligence/natural language understanding platform that can be built to process voice requests.

• Discuss the implementation considerations for the incorporation of voice user interfaces in a healthcare setting.

• Create a vision for the future of patient-physician interactions where your principal technologies are delightfully reliable, intuitive, and intelligent; they naturally become a trusted partner in patient care.
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“Unprecedented Times”
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![Diagram showing different perspectives of a glass of water.](image-url)
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Deus ex machina

- Latin: “god from the machine”
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Technology
1995
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Love-Hate Relationship With Technology

HIMSS21
Technology

technology /tekˈnɒlədʒi/ noun

the application of scientific knowledge for practical purposes
Practical Purpose

- “Practical” can be subjective
- Enable
  - Ability to accomplish a task with greater efficiency
- Empower
  - Ability to discover new solutions and approaches
Practical Purpose: Calculations

- Long Division

\[
\begin{array}{c}
\text{divisor = denominator} \\
\quad 23 \div 6 \\
\hline
\quad 0 \quad 2 \quad 3 \\
- 0 \quad \underline{-0} \\
\quad 1 \quad 3 \\
\quad \underline{-12} \\
\quad 1 \quad 9 \\
\quad \underline{-18} \\
\quad 1
\end{array}
\]
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Skeuomorphism
making items represented resemble their real-world counterparts
Ability to accomplish a task with greater efficiency
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**EHR + Skeuomorphism**
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Chart Review

Labs
Reenvisioning the EHR with a Virtual Assistant

Chart Review

Labs
Reenvisioning the EHR with a Virtual Assistant

Chart Review

Labs
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We’re going on a bear hunt.
We’re going to catch a big one.
What a beautiful day!
We’re not scared.

Uh-uh! A river!
A deep cold river.
We can’t go over it.
We can’t go under it.

Oh no!
We’ve got to go through it!

wading through a river of content
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“Top of Their Ladder”
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Under The Hood
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VEVA Processing

User Query

Speech to text

Intent Fulfillment

Text to speech

Results Display

What is her A1C?

Sally’s A1C is 8.6
There are many ___________ ways to choose a/an ___________ to read. First, you could ask for recommendations from your friends and ___________. Just don't ask Aunt ___________, she only reads ___________ books with ___________ -ripping goddesses on the cover. If your friends and family are no help, try checking out the ___________ Review in The ___________ Times. If the ___________ featured there are too ___________ for your taste, try something a little more low-___________, like ___________: The ___________.
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NLP Limitations

- Humans do not speak like text
  - Fragmented, disorganized
  - Hesitations, corrections, repetitions

- Backchannel noises
  - Manage turn-taking in conversation
  - uh vs uh-huh
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NLU Context

“\textit{I ran out}”

\begin{itemize}
  \item I ran out of house and twisted my ankle
  \item I didn’t take my medication because I ran out
\end{itemize}
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How To Human
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From Data to Insight

- **Data → Insight**

- **Data**: Unstructured elements

- **Information**: Organized and contextualized to convey something specific

- **Knowledge**: A deeper level of understanding rooted in competence and framework for incorporating new information

- **Wisdom**: The ability to discern and judge which aspects of that knowledge are true, right, lasting, and applicable to your life
Insight
There are two kinds of people in this world. Those who can extrapolate from incomplete data.
Problem Solving
I could have sworn we drew a hematocrit last time

He’s been staring at the screen for a while... am I ok?
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“The reasonable man adapts himself to the world. The unreasonable man persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man.”

— George Bernard Shaw
Call to action to The Unreasonable Man

See systems where they don’t exist
Covey these systems into existence
Questions

It looks like you have a question.

Yes
Go away Clippy!
Contact

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