SoftNet 2021 Experts Panel III
Design and Synthesis of Personalities
(synthesis of personalities, adoption of AI digital, conversational user interfaces, observability, ramifications of personalities, emotional intelligence, digital co-workers)

SoftNet 2021

Panel Discussion at The Fourteenth International Conference on Advances in Human-oriented and Personalized Mechanisms, Technologies, and Services (CENTRIC) 2021

October 3-7 – Barcelona, Spain / Online

Design and Synthesis of Personalities

(synthesis of personalities, adoption of AI digital, conversational user interfaces, observability, ramifications of personalities, emotional intelligence, digital co-workers)

Chair: *Jeff Stanley*, Lead Human-Centered Engineer, the MITRE Corporation, USA

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  - We work only in the public interest.

- Health, Defense, Transportation, Public Services, etc.

- Mission: Solving problems for a safer world

- Website: *www.mitre.org*

- We have other organizations presenting today as well.

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Jeff Stanley

For 15 years before joining MITRE, Jeff developed interactive applications for organizations such as the Smithsonian Institution, Rosetta Stone, and Ubisoft Entertainment.

Since joining MITRE in 2017, he has led research on human-machine teaming and accessibility.

Jeff holds advanced degrees in Computer Science and Anthropology and an undergraduate degree in Linguistics. His research interests include human-nonhuman interaction, social impacts of technology, sociolinguistic analysis, and the intersection of language and art.

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Narrative on the table

- Personality synthesis is an important and timely topic. Why? What are the use cases?
    - Chatbots, voice interfaces
    - Virtual assistants, humanized apps
    - Autonomous vehicles
    - Robot helpers and companions.

- Two big questions for personality design:
    - **What is the right personality** (or personalities) for a use case?
    - Once the right personality is decided, **how is that personality expressed**?

- Risks and next steps:
    - Development teams need **guidance** to effectively design personality into their applications.
    - What kinds of **standards** are needed to protect the consumer?

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Food for thought

When it comes to being social, people are built to make the conservative error: When in doubt, treat it as human.

… When media violate social norms, such as by being impolite, the media are not viewed as technologically deficient… The violation is viewed as social incompetence and it is offensive.

Byron Reeves and Clifford Nass, The Media Equation (1996), pp. 22, 29

Users of poorly designed VUIs [Voice User Interfaces] report feeling "foolish," "silly," and manipulated by technology, and so they avoid repeat usage. But it doesn't have to be this way.

… Don't leave your VUI persona to chance. From the very beginning, create the ideal employee to represent your brand… Use this persona as an anchor to ground your user experience and give it a familiar consistency.

James Giangola, "Conversation Design: Speaking the Same Language" (2017),
https://design.google/library/conversation-design-speaking-same-language/

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Structure of the panel

Chair

- **Jeff Stanley**, Lead Human-Centered Engineer, MITRE, USA

Panellists

- **Charles Rinker,** PRSONAS, USA
- **Jennifer Strickland,** MITRE, USA
- **Natalie Friedman,** Cornell Tech, USA
- **Corey Miller,** MITRE / Georgetown University, USA
- **Sara Beth Elson,** MITRE, USA
- **Kelly Horinek,** MITRE, USA

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Panellist Position

AI Digital Workforce: Principles for Successful Adoption and Scalability

Charles Rinker, PRSONAS, USA, crinker@prsonas.com

- Defining a human user experience and the challenges of scaling in our physical world

- Why setting AI communications back 2 billion years improves our growing hybrid workforce

- How inclusivity, empathy and emotion drive adoption

- Adapting these principles to specific use case solutions and taking them to scale

→ Focus on human communication, not replication

→ Digital employees increase the number of high-value human positions

→ Adopt frictionless technologies: No training required!

→ Creating standards to support a device-agnostic digital workforce

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Panellist Position

Inclusive Personalities for Conversational User Interfaces

Jennifer Strickland, MITRE, USA jstrickland@mitre.org

- Background of conversational user interfaces (CUI) and inclusive design

- Differences in needs for private and public sector audiences

- Challenges for inclusive CUI personalities

- Recommendations for inclusive CUI personalities

→ The current design of CUIs generally fail to consider audience diversity.

→ The current approach is to take a 'neutral' personality, yet that is rooted in unconscious bias.

→ CUI research needs to consider frameworks like Inclusive Design and Design Justice to meet inclusion and equity.

→ CUI development teams should take full advantage of user-centered research and design tools, to understand and anticipate the range of needs, attitudes, and expectations of their users.

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Panellist Position

Supporting Observability through Social Cues

Natalie Friedman, Cornell Tech, USA nvf4@cornell.edu

- Approaches to artificial personalities

- How personality can be visualized in different modalities

- Related research to the visualized personality

→ How do each of these personality traits demonstrate observability?

→ Common patterns that emerge from our review

→ Design recommendations

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Panellist Position

Linguistic and Speech Technological Ramifications of Personality

Dr. Corey Miller, MITRE / Georgetown University, USA camiller@mitre.org

- How is personality expressed through language?

- How do interlocutors negotiate style?

- How does speech technology impact the conversational experience?

- What macro- and microsociolinguistic factors are at play?

→ Personality infuses all levels of linguistic expression

→ Interlocutors express their relationships through linguistic convergence and divergence

→The quality and breadth of speech technology impacts the authenticity of the experience

→ The linguistics of personality needs to be accounted for in both conversational and technological design

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Panellist Position

Personality Design for a Serious Game to Promote Emotional Intelligence

Dr. (Sara) Beth Elson, MITRE, USA selson@mitre.org

- Defining Emotional Intelligence

- Introducing a Serious Game to Promote Emotional Intelligence within Couples' Relationships

- How We Implemented Emotional Intelligence When Designing a Personality within the Game

- Need for Research on the Validity of Such Implementations

→ Emotional intelligence comprises a wide variety of concepts

→ We designed a serious game to promote emotional intelligence within couples' relationships

→To design this game, we implemented a personality with varying degree of emotional intelligence at different times

→ More research is needed to verify that we have accurately implemented the concept

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Panellist Position

ACQ-SYNC | JumpStart: Building a Digital Assistant You Want to Work With

Kelly Horinek, MITRE, USA khorinek@mitre.org

- Personality begins with a name

- The building blocks of clothing and speech

- Directability in Digital Assistants: From Pro Tips to Tough Love

- Don't hang your Digital Assistant out to dry, back them up with live support

- Bringing it all together to design a digital assistant for acquisition

→ Design for Approachability

→ Don't underestimate the power of Beautiful Design

→ Personality is part of your brand and acceptance

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AI Digital Workforce

Principles for Successful Adoption and Scalability

Chuck Rinker
Chief Executive Officer

- NASA & Black Ops Technology Career
- EA Sports Director: Madden NFL & NCAA College Football
- Under Grad, Electrical Engineering – University of Miami
- BS, Computer Science – Virginia Tech
- AS, Advanced 3D Animation
- Post Grad, Multimedia Technologies – George Washington University

https://www.linkedin.com/in/chuckrinker

PRSONAS

What is an AI Digital Workforce?

An AI Digital Workforce is a scalable team of software personalities that works alongside your human employees providing safe, human customer experiences.

AI Digital Workforce

Principles for Successful Adoption and Scalability

MULTILINGUAL

ATTENTION & STOPPING POWER

NO APP INSTALLATION

ACCESSIBILITY AND ASL

PHYSICAL WORLD ANALYTICS

SAFE TOUCHLESS EXPERIENCE

BRAND AMBASSADOR

CREDIBILITY, EMOTION & EMPATHY

LISTEN, LEARN, IMPROVE

DEMANDS OF SELF-SERVICE IN OUR PHYSICAL HUMAN WORLD

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AI Digital Workforce
Principles for Successful Adoption and Scalability

Innovative Technologies

Artificial Intelligence

ChatBot Frameworks

Cognitive Services*

Machine Learning

Actionable Analytics

Gap

Communications:

7% Verbal
93% Non-Verbal

Human User Experience

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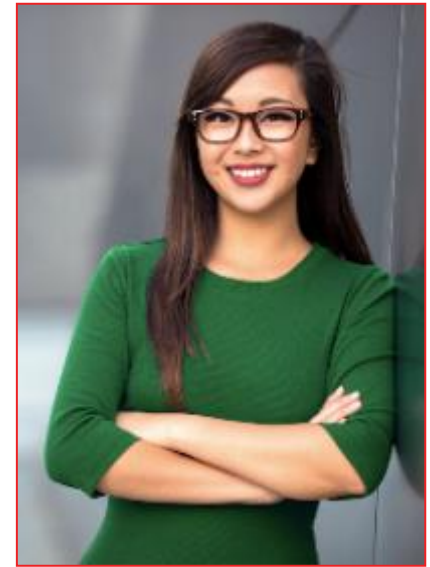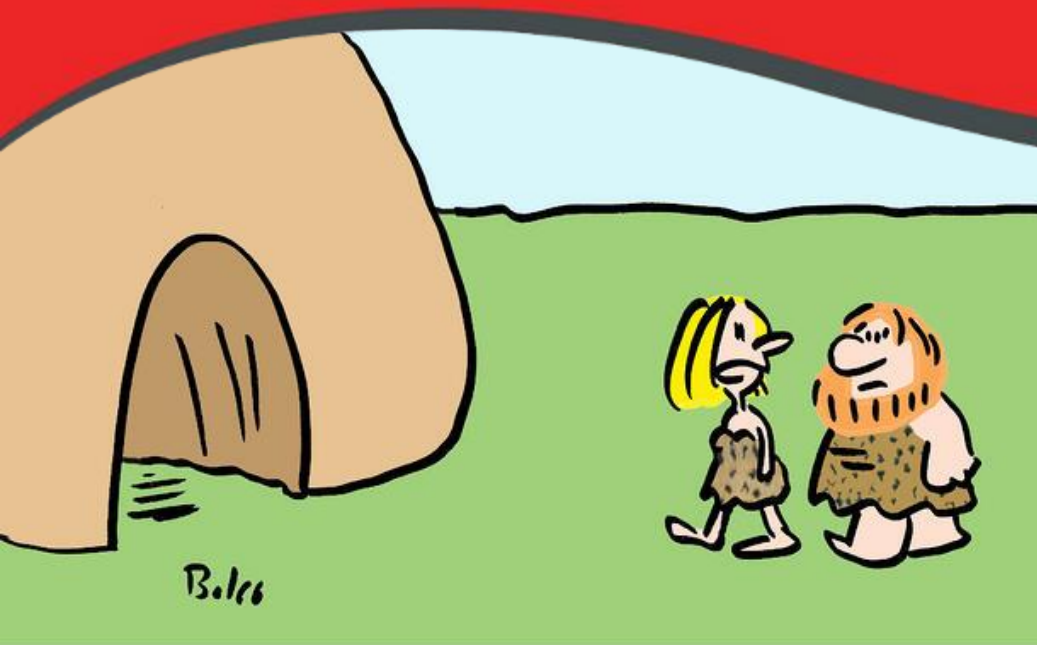
"Be careful how you talk to my father — it's best if you just use grunts and gestures."

**Setting Communications Back
2 Million Years is the Right Thing to Do**

No Training Required

Approachability

Empathy & Emotion

Lower Anxiety

Frictionless Engagement

*Studies shows AI with embodiment increases user confidence, assumes more intelligence, believe that data will remain more private and improved non-verbal communication resulting in vastly improved engagement.

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AI Digital Workforce

Principles for Successful Adoption and Scalability

MULTILINGUAL

NO APP INSTALLATION

ATTENTION & STOPPING POWER

PHYSICAL WORLD ANALYTICS

ACCESSIBILITY AND ASL

SAFE TOUCHLESS EXPERIENCE

BRAND AMBASSADOR

LISTEN, LEARN, IMPROVE

CREDIBILITY, EMOTION & EMPATHY
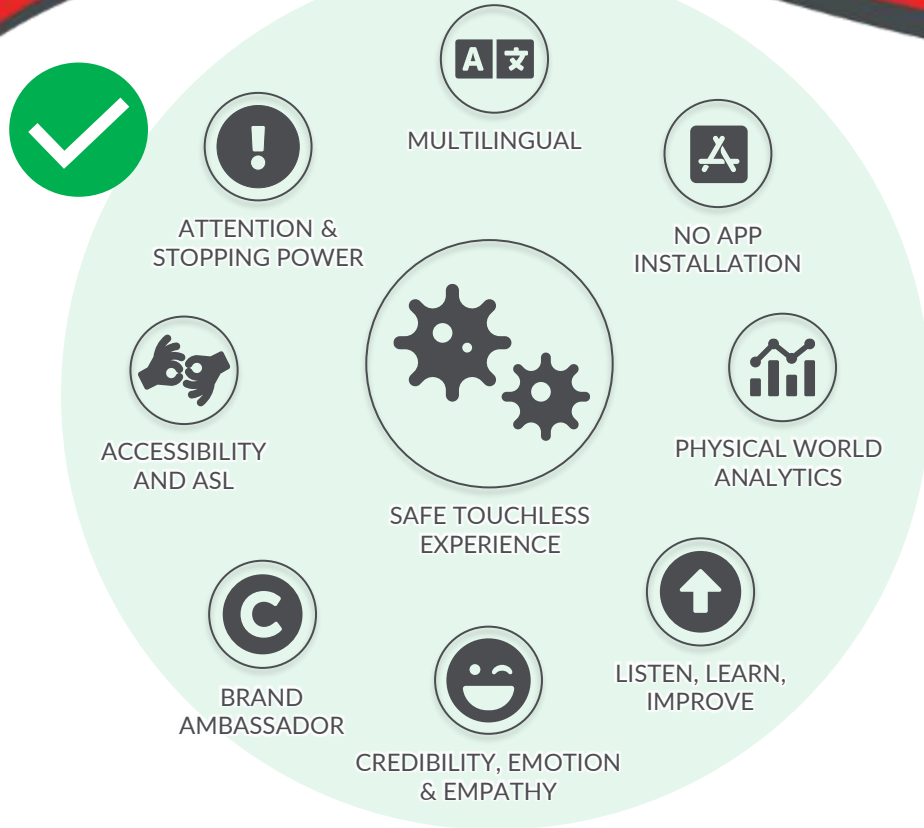
A Scalable Human Experience

An AI Digital Workforce holds the potential to realize all the benefits that AI and current communications possess with loosing the human experience. This is the path to adoption and scalability.

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AI Digital Workforce
Principles for Successful Adoption and Scalability

LEGEND

- ■ Items in RED are API/SDK & Standards
- ■ Items in DARK GRAY are external to nuMedia

AI DIGITAL WORKFORCE SOLUTIONS

Greeters	Visitor Management	Wayfinding	AI Experts

3RD PARTY DEVELOPERS

NATIVE WIN APPLICATIONS	HTML APPLICATIONS

AI Digital Workforce SDK

AI Digital Workforce API

AI Digital Personality Engine™

Microsoft Azure	MICROSOFT AZURE	: AI, Cognitive Services, Analytics, Managed Services
unity	UNITY RENDER ENGINE	: 3D Rendering, Hardware Agnostic, Audio, Animation
	INTEGRATED HARDWARE	: Sonar, Camera, Keyboard Emulator, Buttons, etc.

PRSONAS

PRSONAS

Evolving the Customer Experience through AI Digital Workforce

Charles Rinker
Founder & CEO

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NU MEDIA
INNOVATIONS

We Can Help

Inclusive Personalities for Conversational User Interfaces

A Preliminary Discussion

Jennifer Strickland, Jeff Stanley

jstrickland@mitre.org, jstanley@mitre.org

October 2021

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Authors

Jennifer Strickland [they/them; she/her]
Senior Human-Centered Design, Accessibility Engineer

With more than 25 years of experience in a variety of mediums, Jennifer has led product teams and served in nearly every role in the product lifecycle. Prioritizing inclusion, Jennifer aims to ensure no one is excluded from products and services from the beginning. They see inclusion as culture, not a feature to be backlogged.

Jeff Stanley [he/him]
Lead Human-Centered Engineer

Jeff leads research in human-machine teaming and accessibility at The MITRE Corporation. Before coming to MITRE, Jeff spent 15 years developing games, simulations, learning software, and museum exhibits. Jeff has advanced degrees in Computer Science and Anthropology and an undergraduate degree in Linguistics.

MITRE

Presenter: Jennifer Strickland

jstrickland@mitre.org [they/them; she/her]

Professional Experience

- Senior Human Centered Design, Accessibility Engineer, The MITRE Corporation (2021 – Present)

- Invited Expert, W3C Web Content Accessibility Guidelines (WCAG) Working Group (2019 – Present)

- UX Lead / Product Manager, U.S. Digital Response (2021 – Present)

- Programming Director, 2021 AIGA DC DotGov Conference, focus on inclusion and equity impact (2020 – 2021)

- Senior UX Designer, Accessibility Specialist, Ad Hoc, LLC (2019 – 2021)

- Design Lead, Fidelity Investments (2013 – 2015, 2019 – 2020)

- UX Lead and Web Application Software Engineer, Freelance & JenStrickland.design (1995 – Present)
  [FEMA, Boston Area Rape Crisis Center, Harvard University National Preparedness Leadership Initiative, Houghton Mifflin, Pearson Custom Publishing, MIT University]

Publications & Activities

- Accessible Design for Cognitive Considerations. Ad Hoc, LLC. 2020

- Ohana for Digital Service Design: inclusive digital product lifecycle.

  - 2021 World Information Architecture Day (WIAD), 2021.

  - User Experience Professionals Association (UXPA) DC, 2021.

  - Digital.gov Government UX Summit, 2020.

- You're Killing Your Users.

  - UX Camp, DC, 2021.

  - Black Code Collective at The Washington Post, 2018.

Agenda

- Introduction

- Background

- Challenges for inclusive CUI personalities

- Recommendations for inclusive CUI personalities

- Conclusion
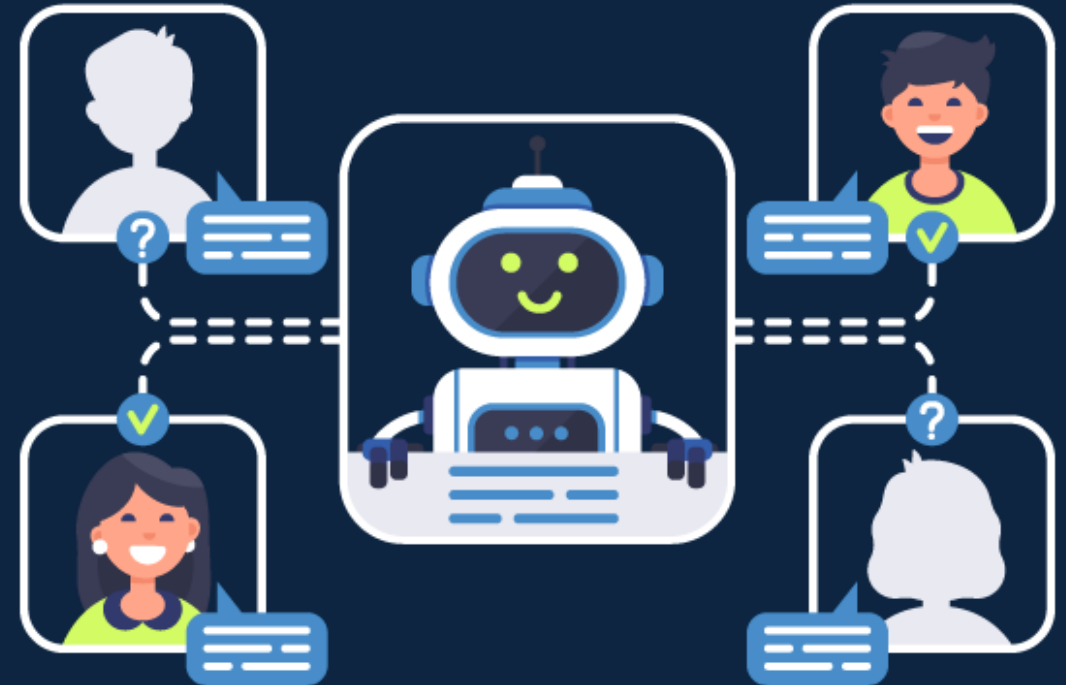
Introduction

Conversational user interfaces (CUIs) such as text-based chatbots and voice-based assistants have become a popular solution for commercial services and are increasingly used to deliver government services as well.

Government services must be accessible for all, a broader audience than private companies.

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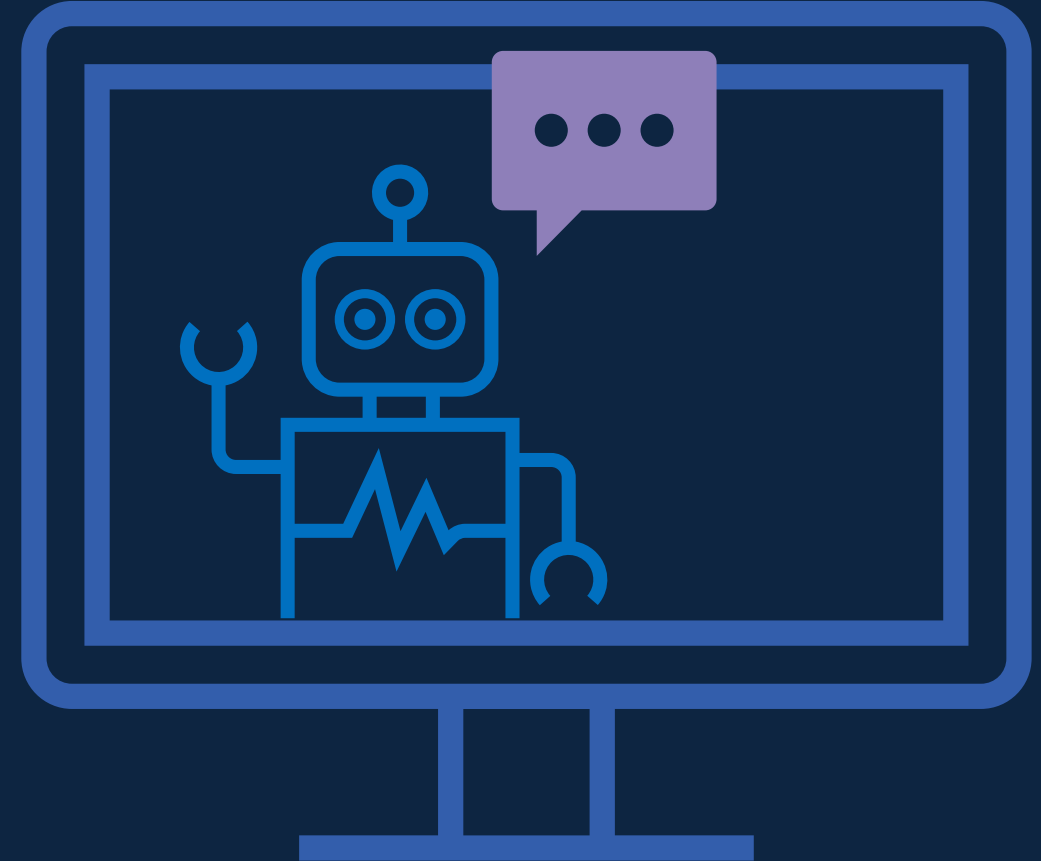
Introduction: Craft a CUI personality for diverse groups of users with disparate needs, wants, and expectations

- How does a CUI's personality include or exclude sections of the population?

- How can we ensure CUIs don't unintentionally alienate the people being served?

- Most existing CUI standards refer to plain language, web content standards, screen reader usability, navigation, and such.

- Existing standards do not explicitly address the novel problem space of artificial personality.

Background: Inclusive design

- Inclusive design is an approach seeking to ensure all can access and are included in the design and outcome of a service or product.

- A key guidepost is being mindful of who is included or excluded.

- It's helpful to take a "design by" approach, bringing the service consumer into the design of outcomes.

  - Hiring for lived experience is a tremendous asset to bringing awareness to inclusive processes.

  - Design workshops with consumers in the design and development processes are invaluable in ensuring outcomes serve diverse audiences.

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Background: Inclusive design for the public sector

- Most private sector products are willing to exclude those with low incomes due to a profitability focus.

- For government or public sector services, people with low income are likely to be the critical users for whom access may be a matter of life or death.

- Government and public sector services are especially relevant for inclusive design due to the range of human experience served — Where else does a service have an audience with such diversity in geography, culture, economics, ability, etc.?

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Background: CUI personality overview

- Personality for CUIs is a topic of interest for researchers and industry.

- Personality shapes a CUI's response content.

- Web-based CUIs often have a visual component like an avatar that can reflect personality.

- For voice-based systems, different voice types can similarly reinforce different kinds of personalities [6].

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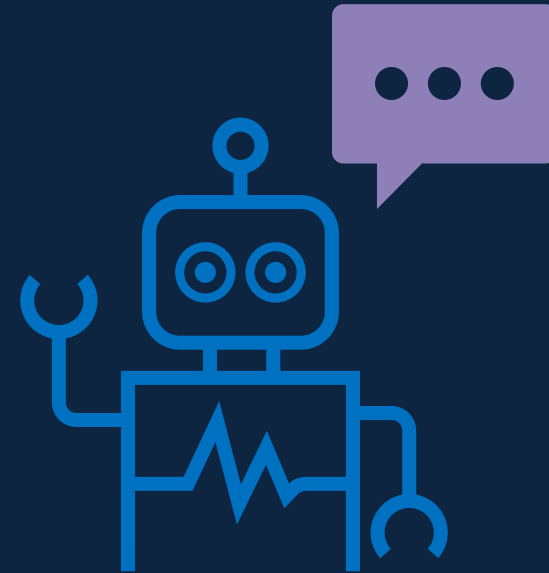
Background: CUI personality strategies

- Some industry experts offer strategies for how to design CUI personalities, such as:

    − identifying personality traits the CUI should have, which can be based on established models of personality (e.g., [7]) or brand values (e.g., [8])

    − identifying kinds of people to use as models for the CUI's behavior.

    − Persson et al. [9] refer to these two strategies as trait schemas versus social role schemas

    − it is possible to use both together, for instance as recommended by Google [10] when developing for Google Assistant.

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Background: Application of inclusive design to CUI personality

UI experts documented six Inclusive Design Principles [11],
for which we provide examples to illustrate applicability to CUI personality.

1. **Provide comparable experience:**
   A CUI should use simple straightforward language so that people who cannot fluently read the CUI's language can complete tasks with success similar to those who can.

2. **Consider situation:**
   A CUI should use empathy if users are likely to be under pressure.

3. **Be consistent:**
   A CUI should adhere to familiar conversational conventions, such as Grice's maxims (see [12]).

4. **Give control:**
   A CUI should give the user plenty of opportunities to steer the conversation.

5. **Offer choice:**
   A CUI should be responsive to different language styles and registers.

6. **Prioritize content:**
   A CUI should convey only content most relevant to the conversation topic so the user can stay focused.

7. **Add value:**
   A CUI should not engage in talk or offer conversation paths that do not improve user experience or satisfaction.

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Challenges for inclusive CUI personalities:
Grace, respect, empathy, and mindful language

- What sort of personality will best serve the user's purpose and scenario?

  - It varies depending on the individual's perspective, which may itself vary based on culture, gender, age, ability, or any of several factors.

  - To bring grace, respect, and empathy to the CUI personality, the design team must conduct inclusive research with a broad range of human experience to design mindful, effective (and possibly affective) conversation.

- Empathy can improve adoption of CUIs and improve human mood [13], [14]. However, inaccurate empathy such as unmerited sympathy may decrease user's trust [15].

- Consider how a person's background may influence the perception of personality, and how that might impact the acceptance of a CUI.

- Follow the Inclusive Design Principles: "provide comparable experience," "consider situation," "be consistent," "give control," "offer choice," and "add value."

Challenges for inclusive CUI personalities:
User's self-identification

- Imagine a CUI that refers to you regularly as a different gender than you identify as, or refers to abilities that you do not have — how would you feel?

- An individual's identity is a personal statement reflecting their history, experience, values, and mission — how might a CUI welcome the full range of human identity, which may vary in language, lingo, tone, and even code switching?

- When designing a CUI's personality, be aware of any biases and stereotypes informing the design and how this could interact with users' self-identification.

- Follow the Inclusive Design Principles: "consider situation," "give control," and "offer choice."
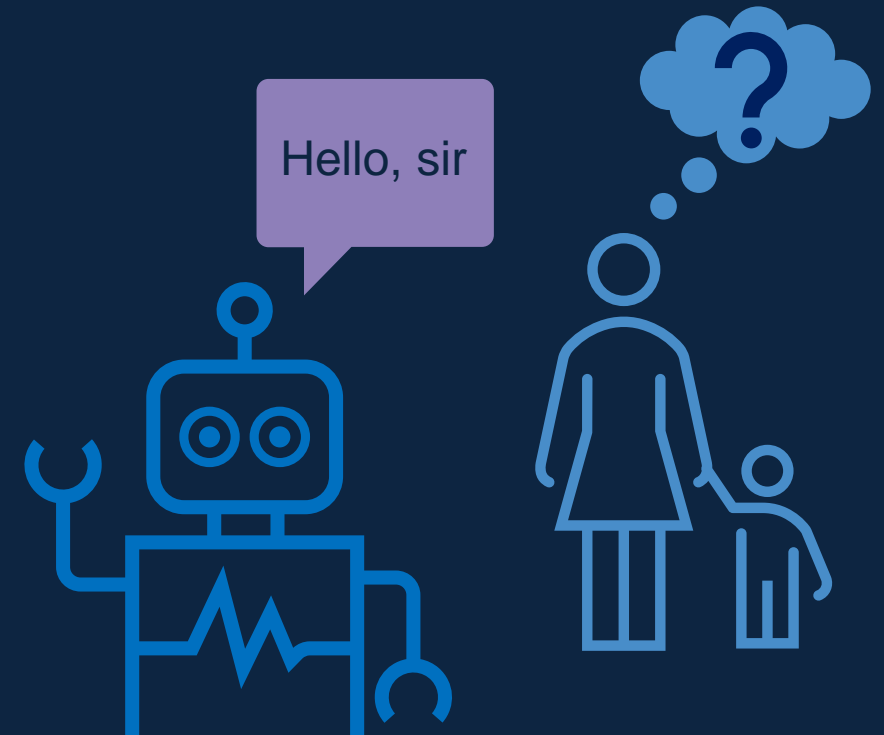
Challenges for inclusive CUI personalities:

User's situation and mood

- There are situations that may be particularly stressful for people, such as navigating an unfamiliar city. Google Maps anticipated this by offering character voices such as Morgan Freeman or Santa Claus, which can defuse tension. Additionally, conversations between passengers and drivers tend to be simple and concise to account for their divided attention [17], [18].

- The user's mood, like situation, affects conversational priorities. While an impatient user needs answers quickly, other users might appreciate additional content acknowledging their emotional state, such as potential targets of fraud [19].

- Follow the Inclusive Design Principles: "consider situation," "be consistent," and "prioritize content."

Challenges for inclusive CUI personalities:
Politeness

- What level of formality and politeness should a CUI show its human user?

- Politeness theory distinguishes between positive and negative face.

- It is important to identify the range of face needs for the CUI's intended users.

- Humans expect the politeness of an interaction to be appropriate to the social relationship. Determine whether users are likely to approach the CUI as a social partner, and if so whether the CUI is viewed as a close peer or as a formal representative of some organization.

- Follow the Inclusive Design Principles: "consider situation," "give control," "offer choice," and "add value."

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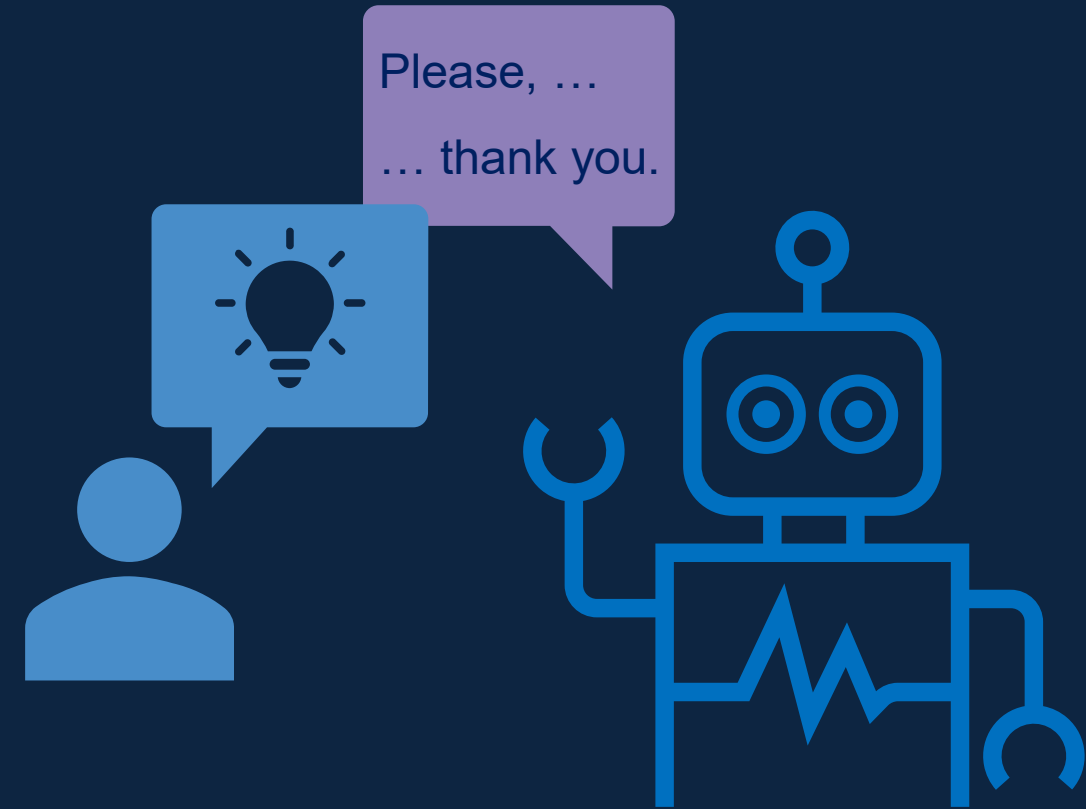
Challenges for inclusive CUI personalities:
Different interaction styles and preferences

- When speaking with CUIs assisting with chronic disease management, patients preferred different healthcare provider interaction styles, such as paternalistic, informative, and deliberative, based on their ages and the nature of their disease [22]. In domains like healthcare that have clear taxonomies of interaction styles, CUI designers need to determine what user attributes will influence their preferences, or simply test a range of interaction styles with a large representative sample of target users to understand which are preferred.

- Follow the Inclusive Design Principles: "consider situation," "give control," "offer choice," and "prioritize content."

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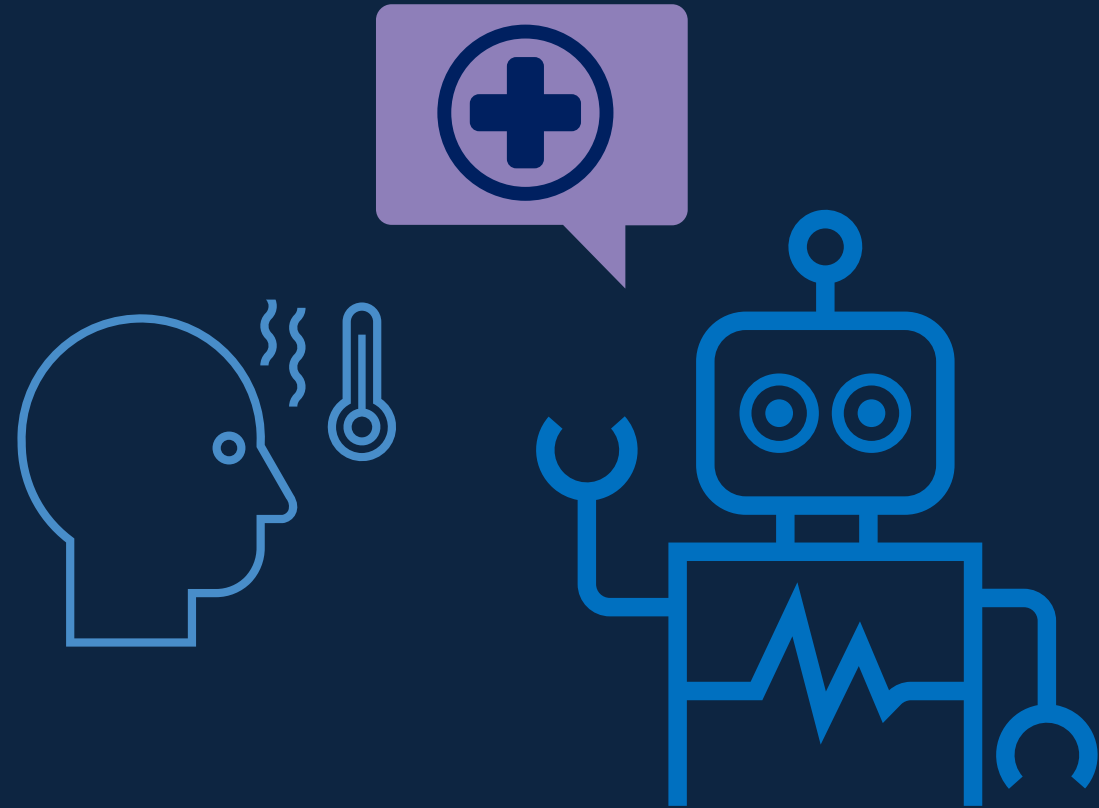
Recommendations for inclusive CUI personalities:
Know your users, be aware of who you are including/excluding
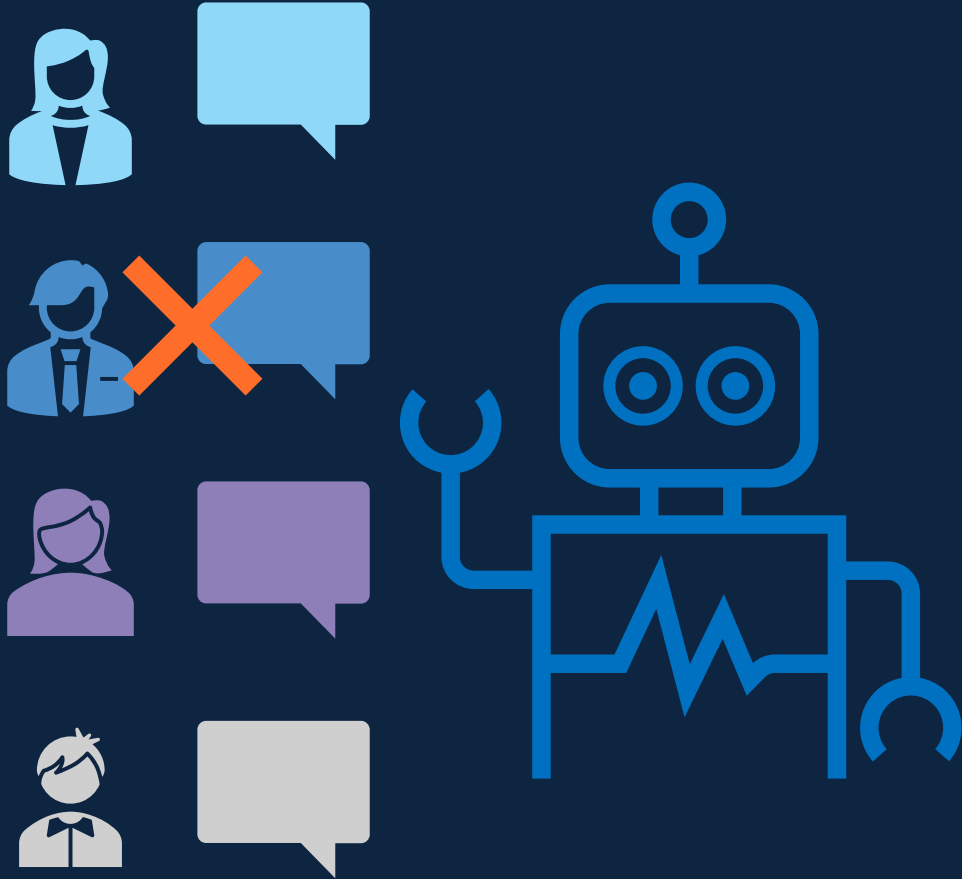
- When designing a CUI, understand your audience through user research, interviews, and contextual inquiry.

- Some teams document a list of those they are willing to exclude (for example, users of Internet Explorer 7 since it is well-past the sell-by date) and keep the list in mind throughout the design and development to guide decision-making.

- Providing a text-based chatbot along with any audio is a way to be inclusive of those with hearing considerations.

- For Veteran survivors of military sexual trauma, research might reveal some personality features may be too "soft" and make the Veteran feel they are not understood. Get to know your audience and provide personalities that suit their needs.

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Recommendations for inclusive CUI personalities:
Offer a range of personalities for a range of people
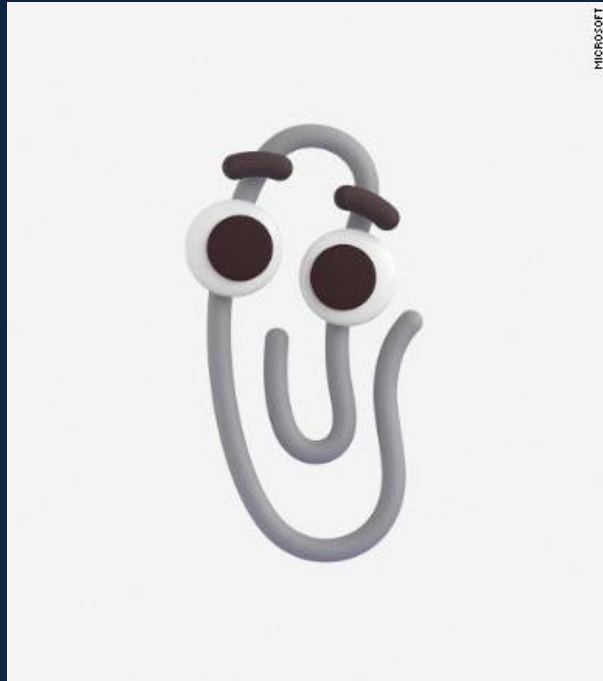
- Offering a selection of personalities is one avenue that some interfaces offer. For example, Siri offers a selection of voices as well as languages from a range of countries and regions. Each has a slightly different personality, and some users select their language from a particular region because of the personality they associate with it, such as a U.S. user choosing a U.K. accented voice.

- Microsoft's Clippy virtual assistant evolved to offer alternative avatars with different personalities. An important rule of thumb, though, is: "No matter what you choose, avatars won't cure bad interactions. Just ask Clippy."

In other words, personality choices must be targeted and not just for the sake of variety.

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Recommendations for inclusive CUI personalities:
Make sure the bot's personality enhances its purpose

Understanding the user's purpose is key in designing suitable services. Depending on the audience, the bot may need to be formal or casual; humor and even conflict may be used to provoke critical thinking.

- In the "Bots of Conviction" case study, the bot was a cat that asked the user if they would **bury their loved ones beneath their bed**. Users generally were surprised, which allowed the bot to reveal that in some ancient cultures they did this to keep their loved ones close. The bot's personality is confidently of another culture, eliciting discourse and reflection.

- In helping Veterans ready for life after active duty, a bot may need to be both compassionate and challenging, as it reminds users to go to training, submit forms, and attend to other tasks.

- In contrast, the Amazon customer service bot is friendly, upbeat, and apologetic as it addresses customer service issues. If it took a humorous approach, that would likely offend some customers already upset about a product issue.

Recommendations for inclusive CUI personalities:
Understand users' tendency to anthropomorphize
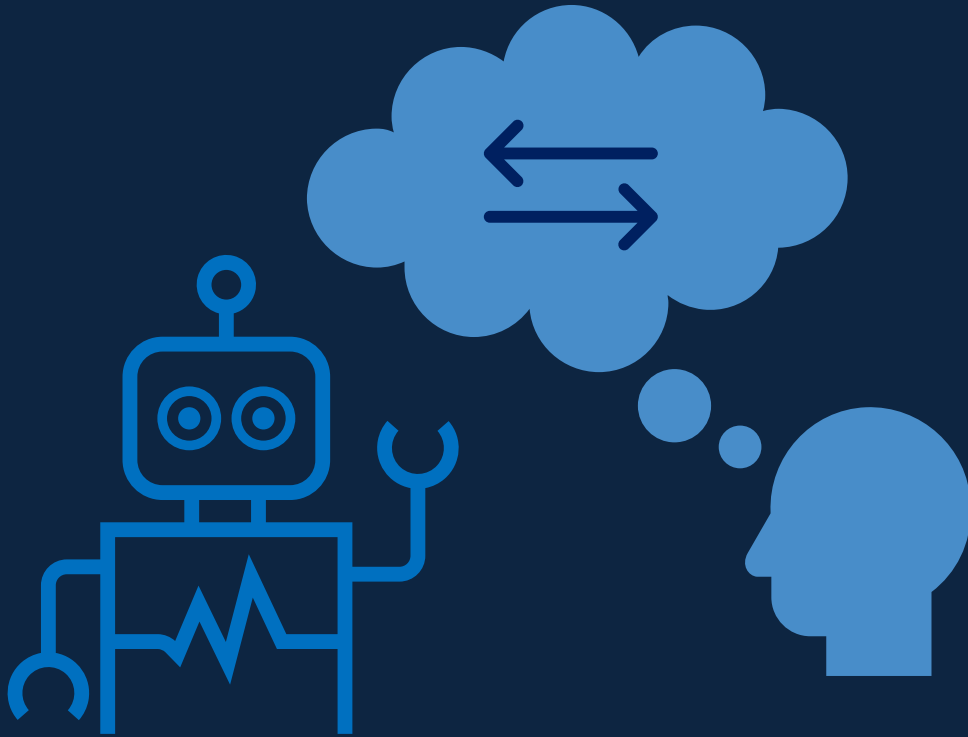
- Some of the challenges mentioned in this paper depend on whether users are likely to view the CUI as a social partner or a transactional means to an end.

- Factors affecting a user's tendency to anthropomorphize technology include age, gender, computer anxiety, and need for interaction [25].

- Users likely to anthropomorphize CUIs can be expected to appreciate social conventions such as appropriately polite and empathic language.

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Conclusion

In this paper we presented challenges that should be systematically addressed in research to move toward inclusive CUI personalities, as well as some overarching recommendations or themes to guide development.

- Studies exploring the impacts of empathy and politeness in conversational robots and software need to be integrated with studies of how diverse users respond to manifestations of social cues in technology.

- CUI dev teams should take advantage of user-centered research and design tools, such as personas, user stories, and structured interviews to understand and anticipate the range of needs, attitudes, and expectations of their users.

- Most CUIs take an initially neutral personality and when an interaction becomes more complex transfers the conversation to a human being. Until a CUI can precisely adapt to a user's preferences, that approach remains among the most inclusive. However, ambitious research, synthesis, and tool development can bring us closer to CUIs that serve all potential users at all times of day.
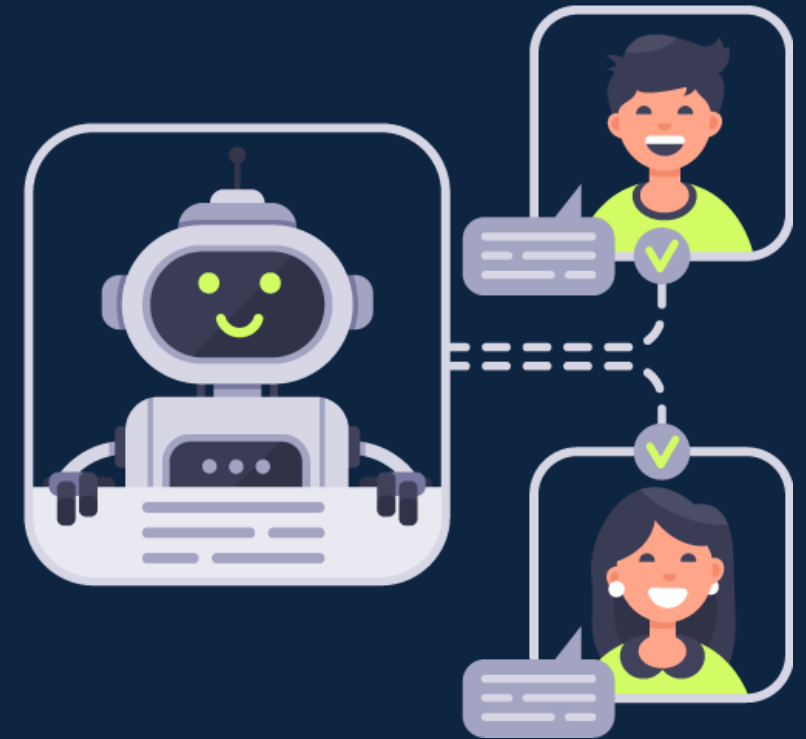
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Thank you!

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See paper for references

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CENTRIC 2021

Presenter

Supporting Observability through Social Cues

Natalie Friedman, Cornell Tech, nvf4@cornell.edu

Patricia McDermott, MITRE, pmcdermott@mitre.org

Jeff Stanley, MITRE, jstanley@mitre.org

- Approaches to artificial personalities

- How personality can be visualized in different modalities

- Related research to the visualized personality

→ How do each of these personality traits demonstrate observability?

→ Common patterns that emerge from our review

→ Design recommendations

Natalie Friedman

CORNELL TECH

Education

- PhD Student, Information Science, Cornell Tech
- B.A., Cognitive Science, UC Santa Cruz

Current Projects

- Collecting dataset of faces reacting to robots making mistakes
- Designing clothes for robots + exploring the functions of clothes

Supporting Observability through Social Cues

Summary

Motivation

- Important to have a mental model of what a robot:
  - can do,
  - Is currently doing,
  - Is about to do.
- How can social cues help people understand what is going on 'under the hood'?

Method

- Review of 40 papers with instances of robot or software agent personality traits influencing observability.
- Selected and assessed six cues to clarify their relationship to observability.

Supporting Observability through Social Cues

Introduction

Observability

- Through transparency, teammates generate:
    - a shared understanding of the task [6]
    - calibrate trust based on the team members' capabilities [6]
    - situational awareness of the task, robot, and environment [7][8].
- Enhance perception of system reliability

Personality and Social Cues

- "characteristic sets of behaviors, cognitions, and emotional patterns that evolve from biological and environmental factors" [9].
- Example: Slouching after failure

Supporting Observability through Social Cues
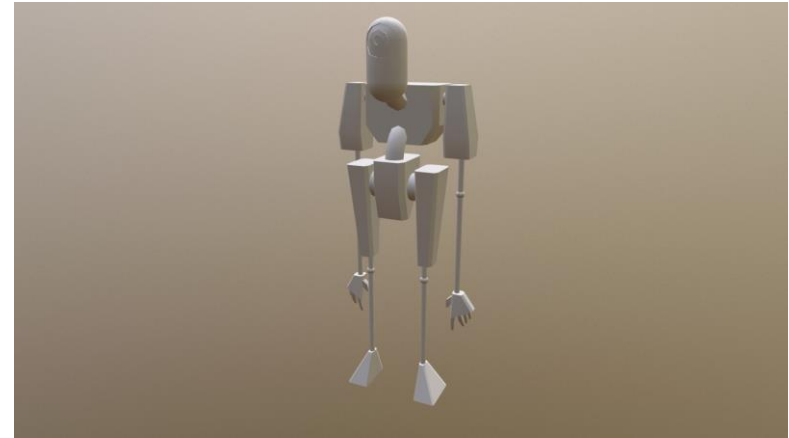
Methods

1. Reviewed "A Taxonomy of Social Cues for Conversational Agents" by Feine et al. [4], which systematically identifies 48 social cues.

2. In parallel, search keywords in ACM Digital Library and Google Scholar:
   - "observability"
   - "mental model"
   - "status"
   - "common ground"
   - "predictability"
   - "machine personality"

3. Narrowed results using the following criteria:
   - Display system state dynamically (not static features like gender and name).
   - Applied to both physical and virtual agents.
   - One representing posture, voice, and dialogue.

Supporting Observability through Social Cues

Social Cues + Relationship to Observability

Social Cue	Feine's Definition [4]	Relationship to Observability	Source
Head movement [Posture]	The agent moves its head. (I.e., nodding and turning)	In addition to more obvious indicators of agreement and disagreement, head movement can be used to indicate nuanced beliefs and goals such as confidence, thinking, and remembering	[18]
Facial expression [Posture]	The agent expresses a gesture by executing one or more motions with his facial muscles (i.e., smile or eyebrow raise)	Facial expressions, like raising eyebrows (in conjunction with relaxing hands) can show that an agent is letting a person speak.	[30]
Voice Tempo [Voice]	The pace of the agent's voice.	The speed of computerized speech conveys urgency of a situation in a predictable and systematic way, and speech pacing conveys confidence.	[21][22]
Pitch Range [Voice]	The degree of variation from the agent's average pitch. (I.e., monotone, animate voice)	Exaggerated pitch range can draw attention to important or high-confidence information. Humanlike pitch range should be appropriate to the trustworthiness and competence of the machine.	[25]
Greetings and farewells [Dialogue]	The agent expresses a word of welcome or marks someone's departure.	Small talk, which include greetings and farewells, can improve perception of an agent's good will and credibility.	[30]
Ask to start/ pursue dialogue [Dialogue]	The agent requests the user's permission to start, continue, or end the conversation	Asking to start or pursue a dialogue communicates that the human is in charge and is in support of the Human-Machine Teaming theme of Directability	[3][32]

See paper for references.

Supporting Observability through Social Cues

Discussion

Risks:

- Setting wrong expectations:
  - Moving eyes on a robot might be perceived that a robot can see, which could lead to a mistrust of an agent.
- Universal vs. cultural
  - Social cues may be sensitive to the cultural context
  - Universally, lowered eyebrows, lips firmly pressed, and bulging eyes to convey anger.
- "Uncanny valley" [33], in which robots that look a lot like humans, but not quite human, are perceived as creepy and cause revulsion.

Design recommendation:

- Multiple cues in a row, or different modalities demonstrated in parallel ideal for observable personality

Supporting Observability through Social Cues

Conclusion

- Importance of understanding what is going on "under the hood"

- Assessed:
    1. definitions of the cue,
    2. examples of the cue,
    3. the relationship to observability
    4. associated risks of using the cue inappropriately.

- Cues should be used in parallel with other cues.

See paper for references.

Supporting Observability through Social Cues

SoftNet 2021 Experts Panel III
Design and Synthesis of Personalities
(synthesis of personalities, adoption of AI digital, conversational user interfaces, observability, ramifications of personalities, emotional intelligence, digital co-workers)

CENTRIC 2021

Presenter

Supporting Observability through Social Cues

Natalie Friedman, Cornell Tech, USA, nvf4@cornell.edu

- Approaches to artificial personalities

- How personality can be visualized in different modalities

- Related research to the visualized personality

→ How do each of these personality traits demonstrate observability?

→ Common patterns that emerge from our review

→ Design recommendations

Linguistic and Speech Technological Ramifications of Personality

Corey Miller, The MITRE Corporation, camiller@mitre.org

October 7, 2021

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Corey Miller

- **Professional Experience**
  - Principal Computational Linguist, The MITRE Corporation
  - Adjunct Lecturer, Georgetown University Linguistics Department
  - Senior Research Scientist, Center for Advanced Study of Language, University of Maryland (2009-2016)
  - Senior Speech Scientist, Nuance, 1998-2002, 2004-2009
- **Publications**
  - *A Frequency Dictionary of Persian*, Routledge
  - *Trends in Iranian and Persian Linguistics,* de Gruyter Mouton
  - "Corpus Creation and Evaluation for Speech-to-Text and Speech Translation"
  - "Pronunciation Modeling in Speech Synthesis"

Motivation

- **Personality is a two-way street: both humans and machines exhibit personality traits that interact and can be reflected in the language of each**

- **Knowing how language reflects personality and is interpreted with respect to personality can help designers build more effective and accepted agents**

- **The current state of speech-to-text (STT), text-to-speech (TTS) and natural language understanding (NLU) impacts the extent to which linguistically expressed personality traits can be synthesized, recognized and understood**

  - Whether or not we want to aim for human-like voices or personalities (potentially risking the uncanny valley) in our virtual agents, human perception of synthetic personality plays an important role in acceptance of technology

    - Does anthropomorphic speech and language correlate with likeability contra Bartneck et al. (2009) with respect to robots and their ability to move?

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Sociolinguistic variation & language attitudes

- **Macro: Language, dialect, diglossia**
  - Who speaks what language to whom and when? (Fishman 1965)
  - Swiss German versus Swiss Standard German (Khosravani et al. 2021)
- **Micro: Accent, sociolect, ethnolect, idiolect**
  - NZers preferred health care robot with an NZ synthetic voice over US, UK (Tamagawa et al. 2011)
  - Singaporeans preferred UK voice over Singaporean-accented for virtual help desk (Niculescu et al. 2008)
  - Viennese found local dialect synthetic voices appropriate for "lighter" applications such as "district info", "talking clock" and "game" vs. "administration" and "health domain" (Pucher et. al 2009)

Perception of synthetic (para)linguistic features

- **Phonetics**
  - Modern (neural) TTS has more reductions/fillers than previous generation (concatenative)
    - judged less intelligible but more likeable/human-like/familiar (Cohn & Zellou 2020)
- **Emotion**
  - Listeners perceive gradience in arousal but not valence in TTS (Cohn et al. 2020)

- **Gender**
  - Gender expansive (GE) individuals more likely to judge synthetic voices in androgynous zone as other– akin to native speakers picking up on native cues of voicing and phonetic contrasts (Hope & Lilley 2020)

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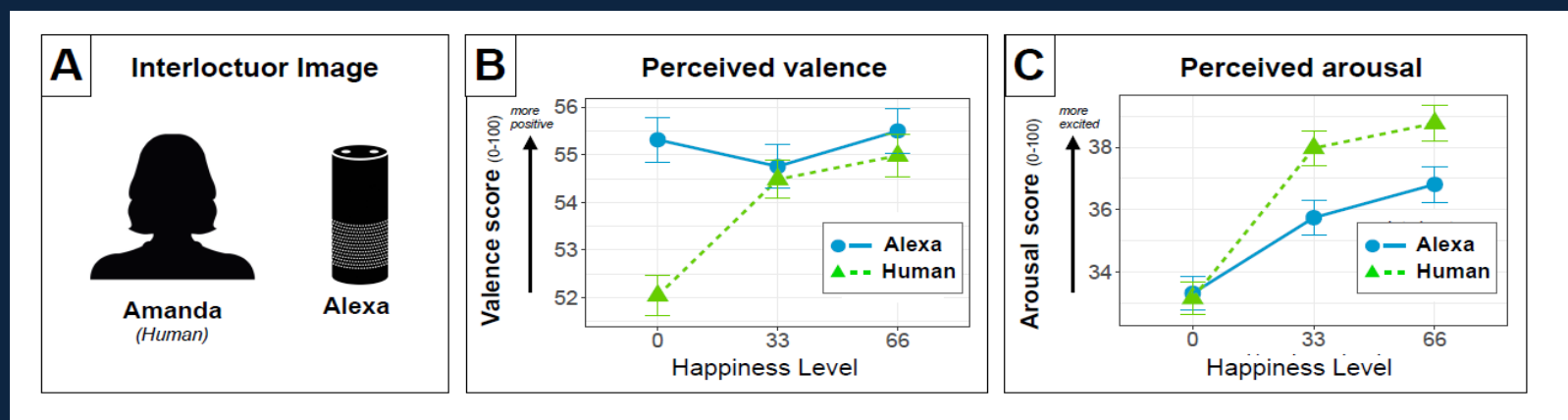
How do interlocutors negotiate style?

- **Accommodation/Entrainment/Convergence/Alignment/Imitation**
  - Closeness, Empathy
- **Human "copies" Computer**
  - Prosody
    - Cohn & Zellou (2019)
- **Computer "copies" Human**
  - Yamazaki et al. (2021)
- **Establishing intimacy**
  - *masu/desu*,T/V (Chiba et al. 2021)

Divergence also possible (Giles & Ogay 2007)

- Phonetics
  - Gessinger et al. (2021)
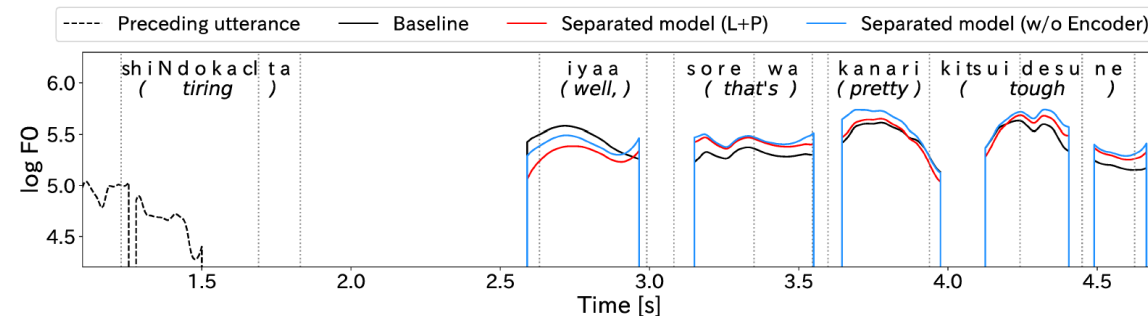
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Figure 2: *F0 contour of synthesized speech. The figure shows the system utterance "Well, that's pretty tough." added to the end of the preceding utterance "It was so tiring." English words in parentheses are translations from Japanese.*

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How does speech/human language technology (HLT) impact the conversational experience?

- **TTS**
  - Capability: Style transfer – synthesize appropriate sociolinguistic variation
  - Evaluation: intelligibility, naturalness (human-like?), acceptability
- **STT**
  - Capability: Multilingual/dialectal models – recognize natural variation/translanguaging
  - Evaluation: word error rate (WER), semantics/natural language understanding (NLU)
- **NLU + Speech Emotion Recognition (SER)**
  - From semantic (literal) to pragmatic (conventional) understanding
- **Spoken Response Generation**
  - Word/phrase emphasis, correct and natural prosody for given/new information (Yamazaki et al. 2021)

In-group advantages for apprehending localized speech

- **Trust (Jiang et al. 2018)**

- **Own-Group Bias (Bestelmayer et al. 2015)**

Table 1
Major perceptual and acoustic parameters of the experimental stimuli (mean, standard deviation).

Measure	Vocal Expression		
	Confident	Doubtful	Neutral
In-group accent			
Perceived Confidence (1–5)[a]	4.33 (.40)	1.74 (.51)	3.79 (.32)
Out-group/Regional accent			
Perceived Confidence (1–5)	3.83 (.36)	1.95 (.28)	3.36 (.45)
Out-group/Foreign accent			
Perceived Confidence (1–5)	3.48 (.52)	1.99 (.39)	3.14 (.44)

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- **Intelligibility (Clopper at al. 2012)**
- **Emotions (Jakob et al. 2021)**

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STT: How to handle variety

- **Traditionally, locale-specific models worked best (Biadsy 2012)**

System/Test Set	AE	SA	EG	JO	LB
AE	**27.7**	34.4	41.4	22.3	36.8
SA	31.0	**28.7**	41.4	23.0	42.0
EG	37.7	45.9	**24.6**	24.7	36.9
JO	32.6	42.6	38.7	**18.5**	34.8
LB	34.0	44.0	36.9	20.4	**24.2**

Table 4. WER (%) of the Cross-Dialect Evaluation

System	Dialect-Specific	Combined
AE	27.7	29.7
SA	28.7	30.0
EG	24.6	29.8
JO	18.5	19.2
LB	24.2	27.9

Table 3. WER (%) of the Dialect-Specific vs. Combined Systems

- **Today, combining models outperforms individual ones (Kannan et al. 2019)**

Table 3: *WER from the best multilingual E2E model and monolingual baselines.*

Exp	Model	Hindi	Marathi	Beng.	Telugu	Gujarati	Tamil	Mala.	Kann.	Urdu	Avg
B0	Monolingual CTC	18.6	19.8	26.8	25.1	29.6	24.5	47.1	30.0	29.5	28.0
B1	Monolingual RNN-T	16.1	21.3	**18.2**	25.5	26.4	27.6	54.4	29.5	27.4	27.4
B2	Multilingual RNN-T	**15.9**	**17.1**	21.5	**23.2**	**24.0**	**21.6**	**45.8**	**18.7**	**16.0**	**22.6**

Languages are listed in descending order of training data amount.

- Leverage more data
- Possibility to handle multiple languages/dialects with one model: translanguaging

Conclusions

- **Personality infuses all levels of linguistic expression**
- **Interlocutors express their relationships through linguistic convergence and divergence**
- **The quality and breadth of speech and human language technology impacts the authenticity of the experience**
- **The linguistics of personality needs to be accounted for in both conversational and technological design**

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10

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Personality Design for a Serious Game to Promote Emotional Intelligence

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October 7th, 2021

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SoftNet 2021 Experts Panel III
Design and Synthesis of Personalities
(synthesis of personalities, adoption of AI digital, conversational user interfaces, observability, ramifications of personalities, emotional intelligence, digital co-workers)

SoftNet 2021

Panellist Position

Personality Design for a Serious Game to Promote Emotional Intelligence

Dr. (Sara) Beth Elson, MITRE, USA selson@mitre.org

- Defining Emotional Intelligence

- Introducing a Serious Game to Promote Emotional Intelligence within Couples' Relationships

- How We Implemented Emotional Intelligence When Designing a Personality within the Game

- Need for Research on the Validity of Such Implementations

→ Emotional intelligence comprises a wide variety of concepts

→ We designed a serious game to promote emotional intelligence within couples' relationships

→To design this game, we implemented a personality with varying degree of emotional intelligence at different times

→ More research is needed to verify that we have accurately implemented the concept

Dr. (Sara) Beth Elson

Professional Experience

- Principal Behavioral Scientist, MITRE Corporation (2011-present)
- Behavioral Scientist, RAND Corporation (2007-2011)

Publications & Activities

- "Social media use at a U.S. military academy: Perceived implications for performance and behavior." *Social Media and the Armed Forces*, Swiss Federal Institute of Technology (2020).
- "The Moonraker study: Evaluating the behavioral effects of host-based cyber deception." MITRE Corporation, (2019).
- "Critical analytic thinking skills: Do they predict job-related task performance above and beyond general intelligence?" *Personnel Assessment and Decisions, 4(1),* (2018).
- "A Mathematical Approach to Gauging Influence by Identifying Shifts in the Emotions of Social Media Users." *IEEE Transactions on Computational Social Systems, 1.4*: 180-190 (2014).
- "Sociocultural Approaches to Understand Human Interaction: A Discussion of New Theoretical Frameworks, Issues, and Modern Communication Technology," *Sociocultural Behavior Sensemaking: State of the Art in Understanding the Operational Environment*, MITRE Corporation, (2014).
- *Using Social Media to Gauge Iranian Public Opinion and Mood After the 2009 Presidential Election,* RAND Corporation, (2012).
- *What Do Iranians think? A survey of attitudes on the United States, the nuclear program, and the economy,* RAND, (2011).

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How Can We Address Veteran Suicide, Homelessness, and Other Problems Stemming from Couples' Breakup?

- At present, the only information veterans and others can get on relationships is in books, workshops, videos, the internet, and from licensed therapists.

- But some don't like to read.

- Not all can go to workshops.

- Some veterans lack access to therapists.

- Not all videos and websites are based on science, and those that are lack the experiential element that is valuable in learning.

Design a Serious Game to Promote the Emotional Intelligence Necessary to Facilitate Relationships

- Our goal was to build a game that will provide a safe, immersive, interactive, accessible, and experiential environment for learning.

- The game is based on behavioral scientific research on what makes relationships work.

- Built in Unity, the game can be deployed to multiple platforms.

- A flexible "content pack" architecture using JSON configuration files allows for easy adaptation of the game for different use cases.

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The Learning Objectives of *Now We're Talking* ©*

Centrality of trust in relationships

Building commitment and avoiding betrayal

Nurturing fondness and admiration instead of contempt

Building love maps

Turning towards bids instead of turning away or against

Expressing emotions instead of being closed

Validating emotions instead of dismissing them

Accepting responsibility instead of becoming defensive

Treating conflict as a win-win interaction instead of a zero-sum game

Accepting influence instead of rejecting it

Using soft start-ups instead of criticism

Addressing conflicts instead of avoiding them

Importance of shared humor

Now We're Talking Gameplay
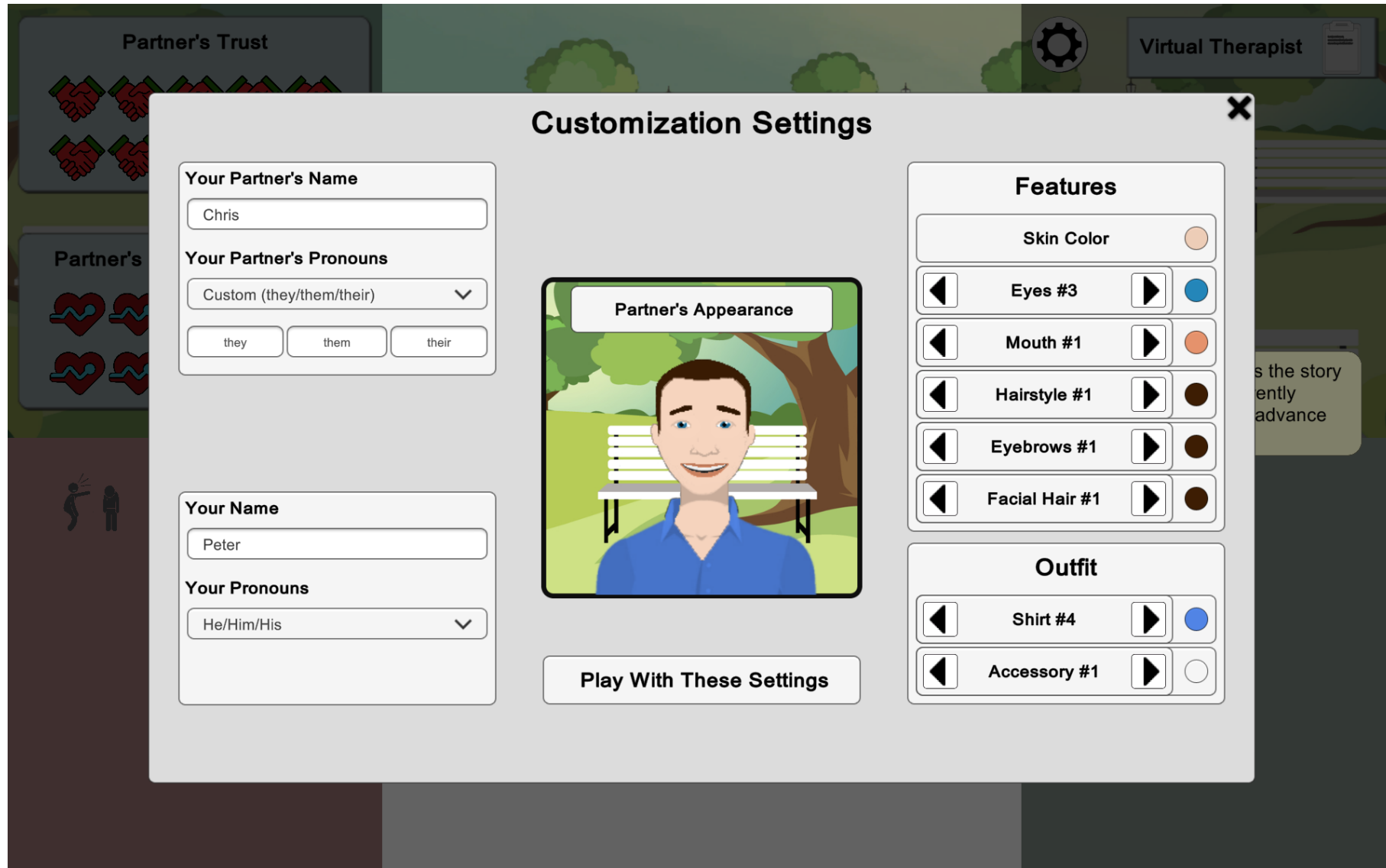
Now We're Talking Gameplay (slide 2)
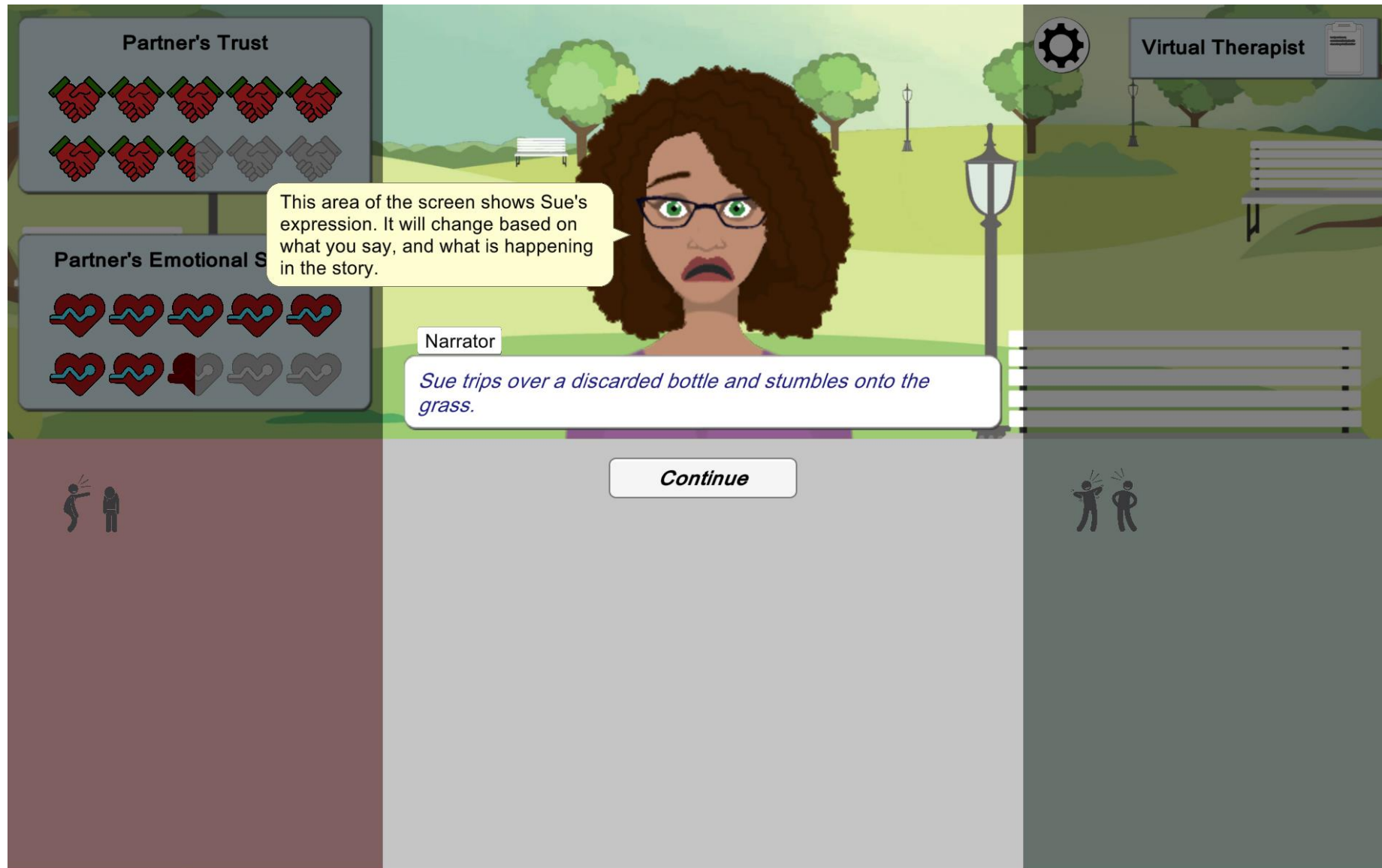
Throughout the Game, the Virtual Partner Displays Varying Degrees of Emotional Intelligence

- **Emotional intelligence is the ability to be aware of our emotions, understand them, control them, express them, and use them to attend to any given situation in an appropriate way.**

- **Emotional intelligence also increases our capacity for <u>empathy</u>—the ability to imagine yourself in another's situation and to try and feel what they feel.**

  - Empathy creates an emotional connection, which leads us to try to be more kind and helpful to others.

We Implemented Emotional Intelligence in a Variety of Ways within the Virtual Partner

Facial expressions and dialogue tags to express tone, context, and narration

- A text-based game loses the speech modality to express tone

- We used facial expressions for partner tone and reactions

- We used *stage direction* via *dialogue tags* for tone, context, narration

- Author can directly control facial expressions, or use algorithms to set based on state variables

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The Following Example Depicts a Virtual Partner with Low Emotional Intelligence:
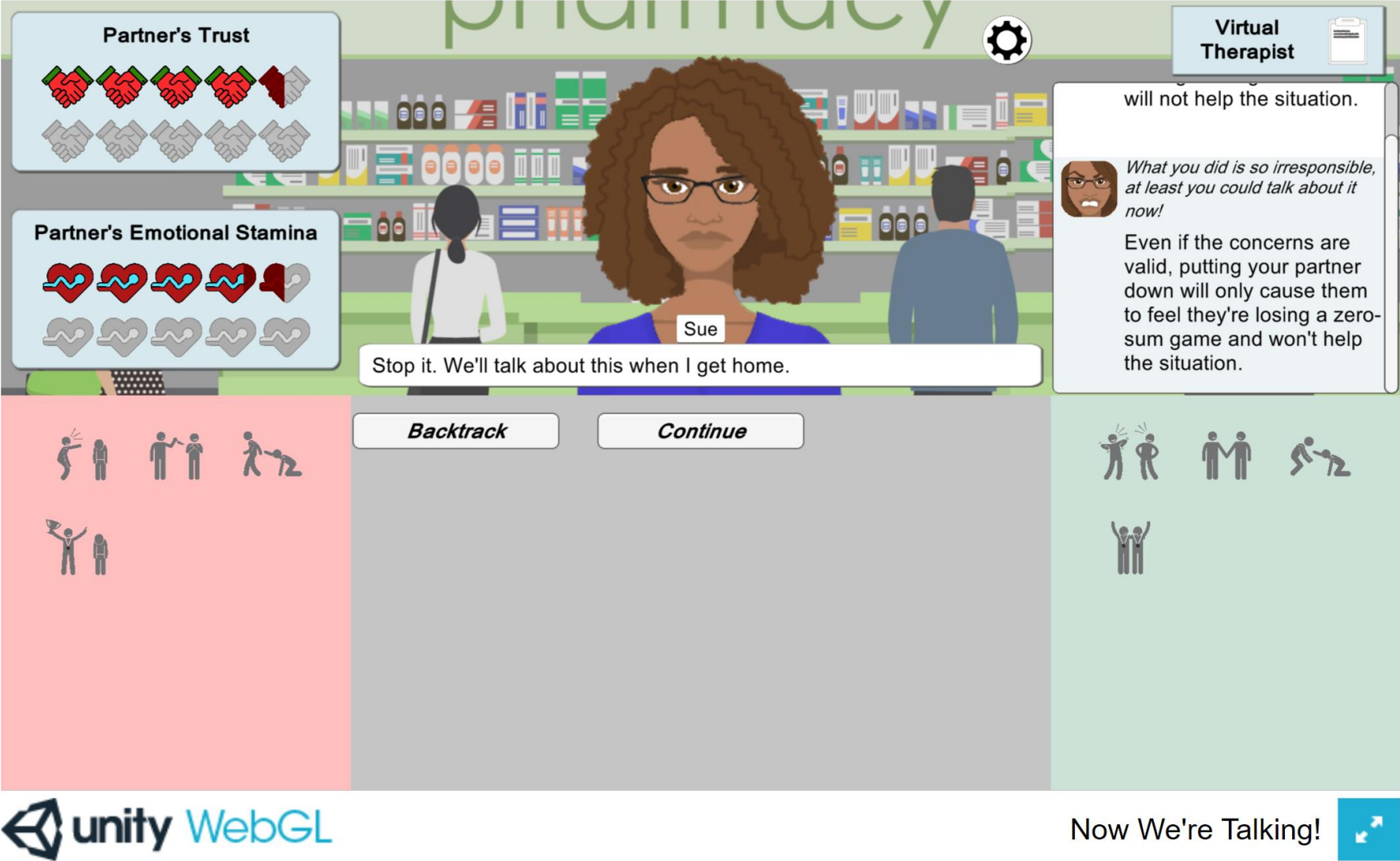
The Following Example Depicts a Virtual Partner with High Emotional Intelligence:

- **In conclusion, one can design emotional intelligence in a variety of ways, but research will be needed to verify the validity of these designs.**

Thank You

Dr. Sara Beth Elson, PI

selson@mitre.org
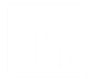
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IARIA

ACQ-SYNC | JumpStart:
Building a Digital Assistant You Want to Work With

Kelly Horinek, MITRE, USA, khorinek@mitre.org

Co-Authors: Patricia McDermott, Kerrianne Marino

October 7, 2021

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Kelly Horinek

Strategic Advisor and Principal Analyst in the Center for Acquisition and Management Sciences Division of MITRE. She holds a BBA in Marketing from Texas A&M University, is a Certified Professional Contracts Manager, and a former Contracting Officer.

Kelly is the Principal Investigator for the ACQ-SYNC MITRE Independent Research project.

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Meet the Team

Patricia McDermott
Principal Cognitive
Engineer
Research Co-PI

Kerrianne Marino
Human Factors Engineer
Designer Extraordinaire

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Position

- [ ] **Design for approachability**

- [ ] **Don't underestimate the power of beautiful design**

- [ ] **Personality is part of your brand and acceptance**

ACQ-SYNC Innovation

JumpStart acquisition strategy and schedule, bring joy to the process, and connect teammates

Leverage the best in human-machine teaming, gamification, decision support, AI, mainstream apps

Personality Begins with a Name

Our Inspiration

Connotations
- Familiar
- Comforting
- Resonate
- Memorable
- Clever rather than back into an acronym no one can remember

How To Choose the Brand Name For Your Business - AfricaX (africaextended.com)

ACQ-SYNC | JumpStart App
- PEG for Policy Education and Guidance
- Real Name

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The Building Blocks of Clothing and Speech

Help Always, Hurt Never

Meet PEG

AI Avatar for <u>P</u>olicy, <u>E</u>ducation, & <u>G</u>uidance

Humor

CLASSY

Not Antagonize

Trusted

Kinder, Gentler Tone

Nice to meet you!

PEG

Using Clothing to Indicate Goals
"Voice" and Tone of the messaging stays consistent

Acquisition is a long journey. I'll help you keep your team on pace. With my advice, you can make the plan and work the plan. With the team's commitment, you won't need to push out deadlines to make things work. You'll have enough time built in to feel confident about meeting your goals.

Avoid Replanning PEG

Short on time? No playing around! I will guide your team to the most direct path to success, so you award on time. I will keep an eye on the big picture timeline and suggest ways to keep on track. When you need to replan, I'll look for the quickest option that gets you close without sacrificing quality.

Speedy PEG

I can point you to unique activities to help you find the right-fit strategy for your competition. You can count on me to suggest creative solutions around obstacles and help your team be more innovative! Additionally, you'll be building your technical stature by trying new activities.

Innovative PEG

PEG as your "personal Board of Directors"

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Directability in Digital Assistants: From Pro Tips to Tough Love

Directability = Ability to direct and redirect an agent's tasks, resources, and priorities (McDermott et. al, 2018)

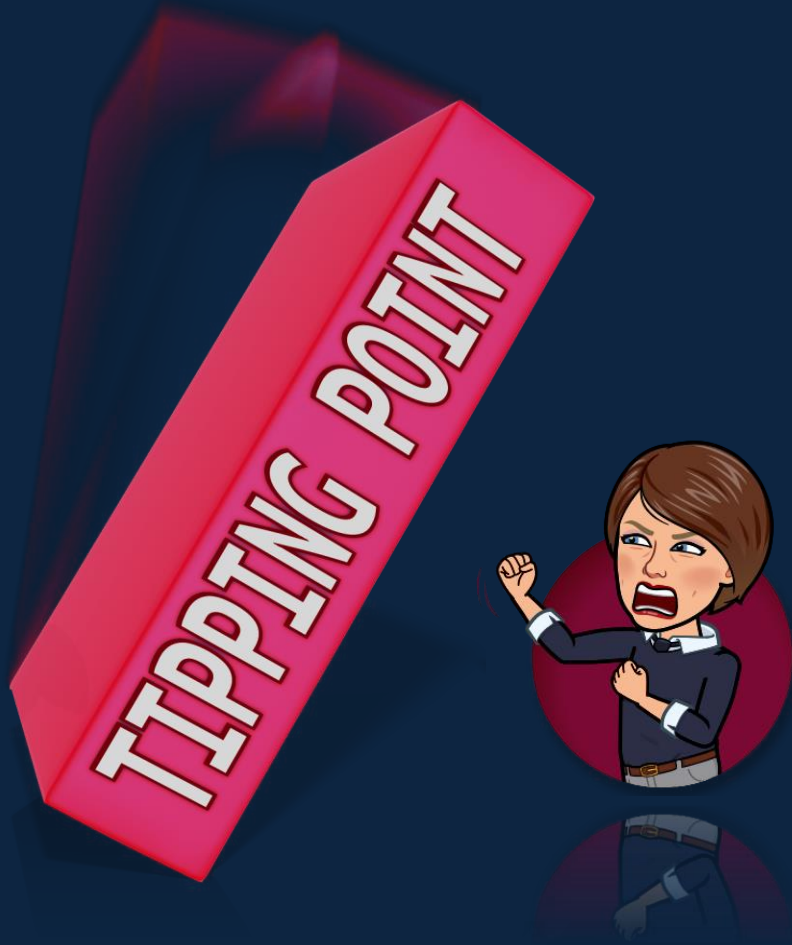**MITRE**

Back up your Digital Assistant

Exploring the cut point

- Users may or may not be predisposed to chatbots and digital assistants

- Chatbots as the first line of defense

- In our opinion, some have gone too far

- Don't hang your Digital Assistant out to dry, back them up with live support
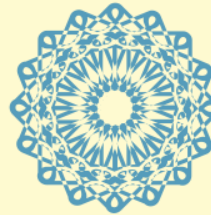
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Ask yourself, "How badly do you want your idea to live?"

- Nancy Duarte, *Resonate*

Design for approachability

Don't underestimate the power of beautiful design

Personality is part of your brand and acceptance

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