US ARMY RDECOM

U.S. Army Research, Development and Engineering Command

A position on AI and learning

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

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Bob's Big Hard Research Question

If AI-based systems are to understand whether a participant is having fun (enjoyment or pleasure), then these systems will need to be able to perceive the participant's cognitive state in order to judge their level of engagement and affect… so my big research question is:

What is the minimal set of participant data

- historical, self-reported, physiological and behavioral…

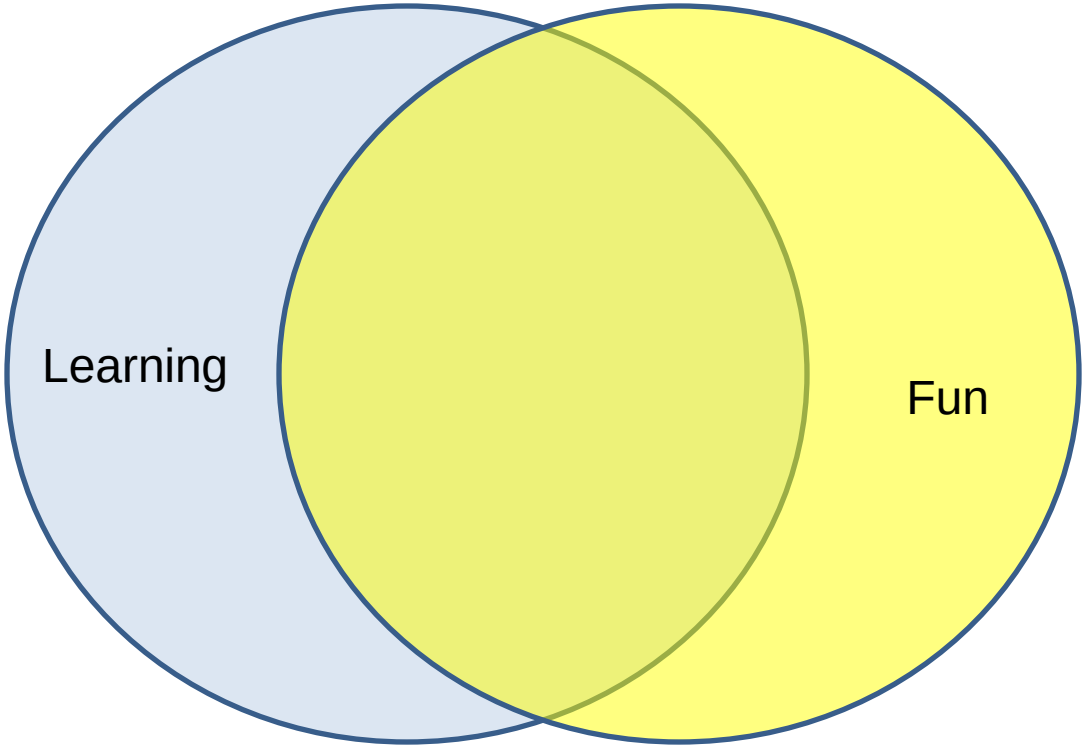
or other methods required to accurately assess

- passively, in real-time, with low cost, accessibility and portability

the participant's cognitive state and tailor their experience?

Next hard problem… when I can do this for individuals, I will want to do this for teams and then organizations.

Learning and Fun



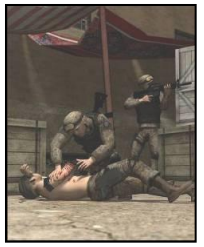
AI for Training Strategy

- **Pull (identified needs) strategy to <u>reduce training support</u>:**
  - **Behavioral representation of entities (people, vehicles)**
    - **friendlies, neutrals, adversaries**
  - **Process support (automated data collection/analysis) for:**
    - **network management**
    - **learning management (tutors)**
    - **authoring of training content**

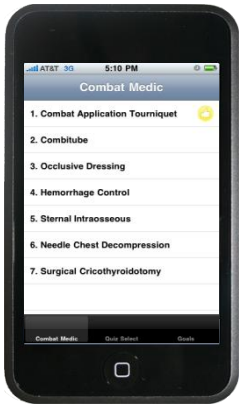
- **Push (innovation) strategy for <u>adaptive, tailored training</u>:**
  - **Improve machine perception (real-time, passive, low-cost) of trainee's behaviors and physiological state**
  - **Improve predictive models of trainee's cognitive and affective state**
  - **Improve linkage of trainee state to selection of instructional strategies/feedback**
  - **Improve intelligent tutoring for teams**

AI for Training
Science & Technology Drivers

Training: ***the process of bringing a person, team or organization to an agreed standard of proficiency by practice and instruction***



- **U.S. Army is deployed worldwide on a consistent basis so training technology needs to be:**
  - **accessible wherever the Soldier is located**
  - **interactive regardless of infrastructure available**
  - **intuitive so it can be used in the absence of instructors**



- **The time allotted for training is limited so training needs to be:**
  - **efficient as well as effective**
  - **engaging, challenging and relevant to the Soldier's mission**
  - **adaptive to the trainee's needs and capabilities**

AI in Training
Economic Realities

- **The U.S. Army is a large population distributed worldwide and covering a variety of occupational specialties**
  - **Maintaining the proficiency of this population is challenging and expensive**
  - **New missions = new training content**
  - **New personnel and equipment = continuous training**

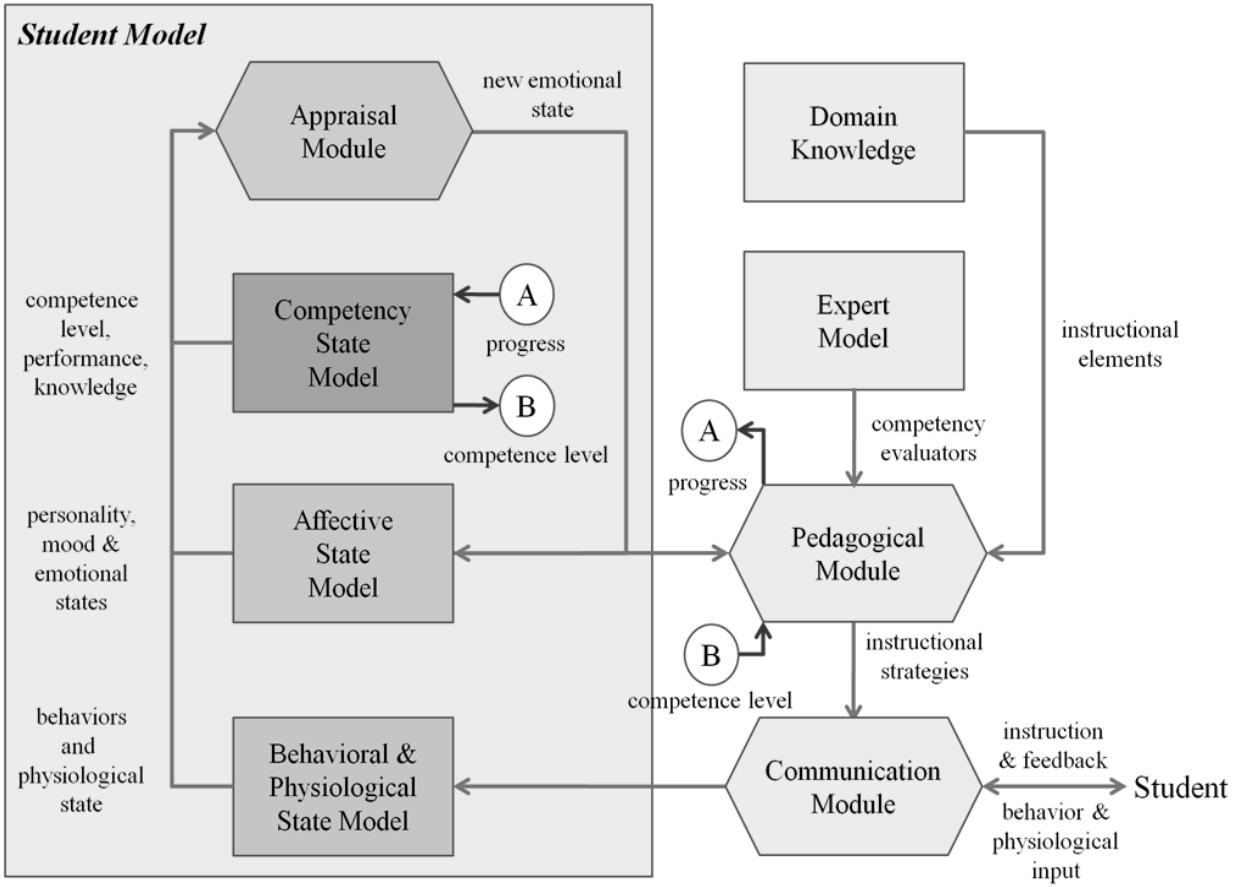
- **AI technology (tools and methods) are needed to:**
  - **reduce training costs**
  - **while maintaining training effectiveness**
  - **and improving availability and adaptability**

AI for Training Challenges

- **Adaptable tutoring systems**
  - **improve perception/prediction of trainee's state**
  - **improve assessment of learning, performance, competence and retention**
  - **improve selection of appropriate instructional strategies based on the trainee's state (e.g. competency level)**
    - **content, tempo, challenge, flow and feedback**

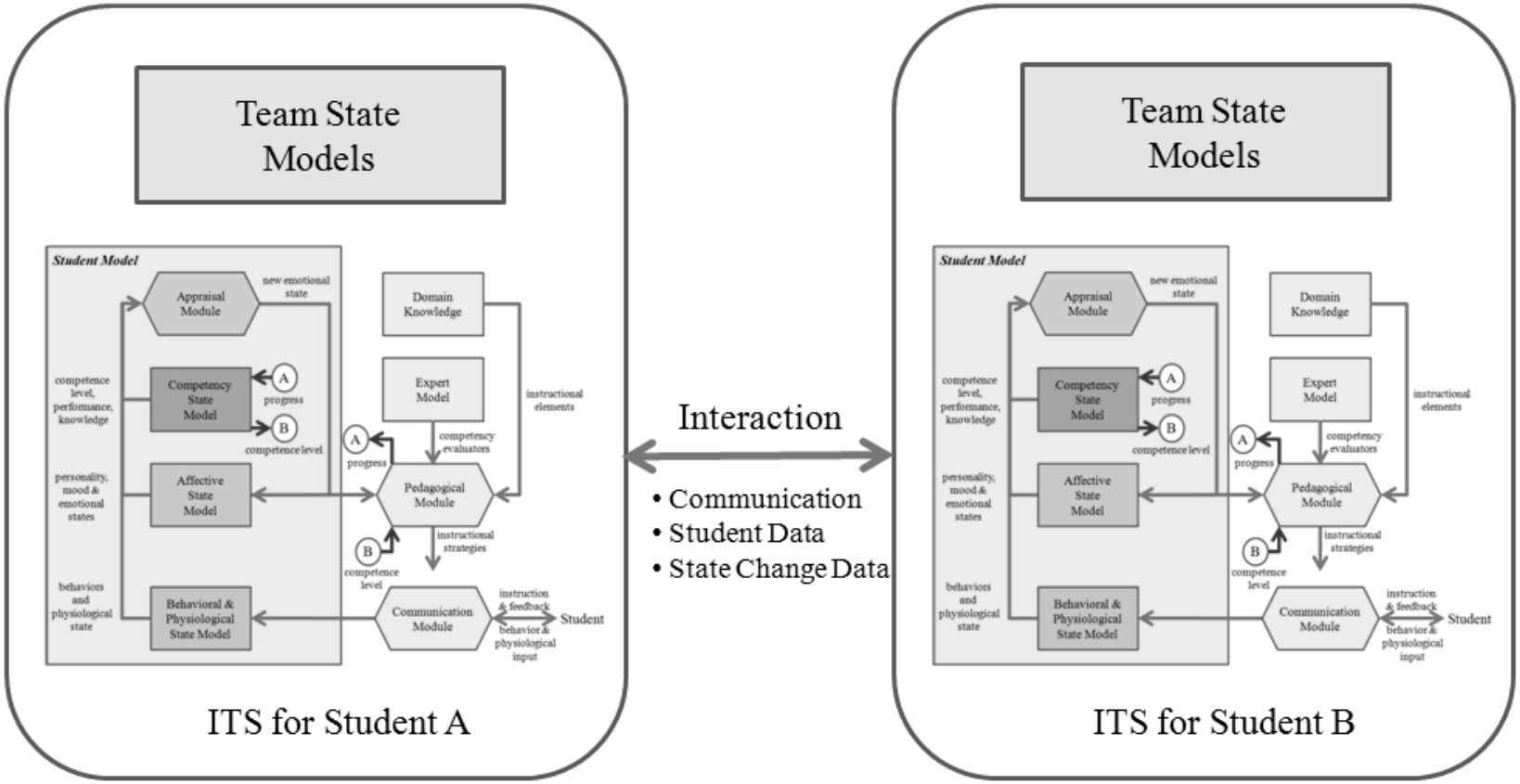
- **Training process agents**
  - **improve the usability of training and operational system technology**
  - **manage the flow of training information and content to Soldiers on mobile learning platforms**
  - **improve the efficiency of authoring training content**

A model of an Individual Intelligent Tutoring System



Sottilare, R. (2010). *Toward the Development of an Intelligent Tutoring System for Distributed Team Training through Passive Sensing*. In Proceedings of the 10th Intelligent Tutoring Systems Conference, Pittsburgh, June 2010.

A model of a distributed team Tutoring Systems Framework



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Questions

- *<u>For the other panel members</u>: What do you see as the critical elements of AI research for users of your entertainment products and consumer services? How are those elements similar/different from the items that I discussed here?*

- *<u>For the audience</u>: What common characteristics might exist for AI applications focused on fun and serious learning?*