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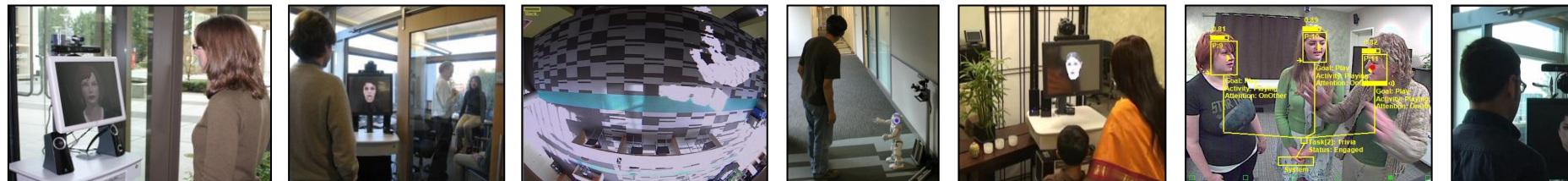
Researcher

Adaptive Systems and Interaction

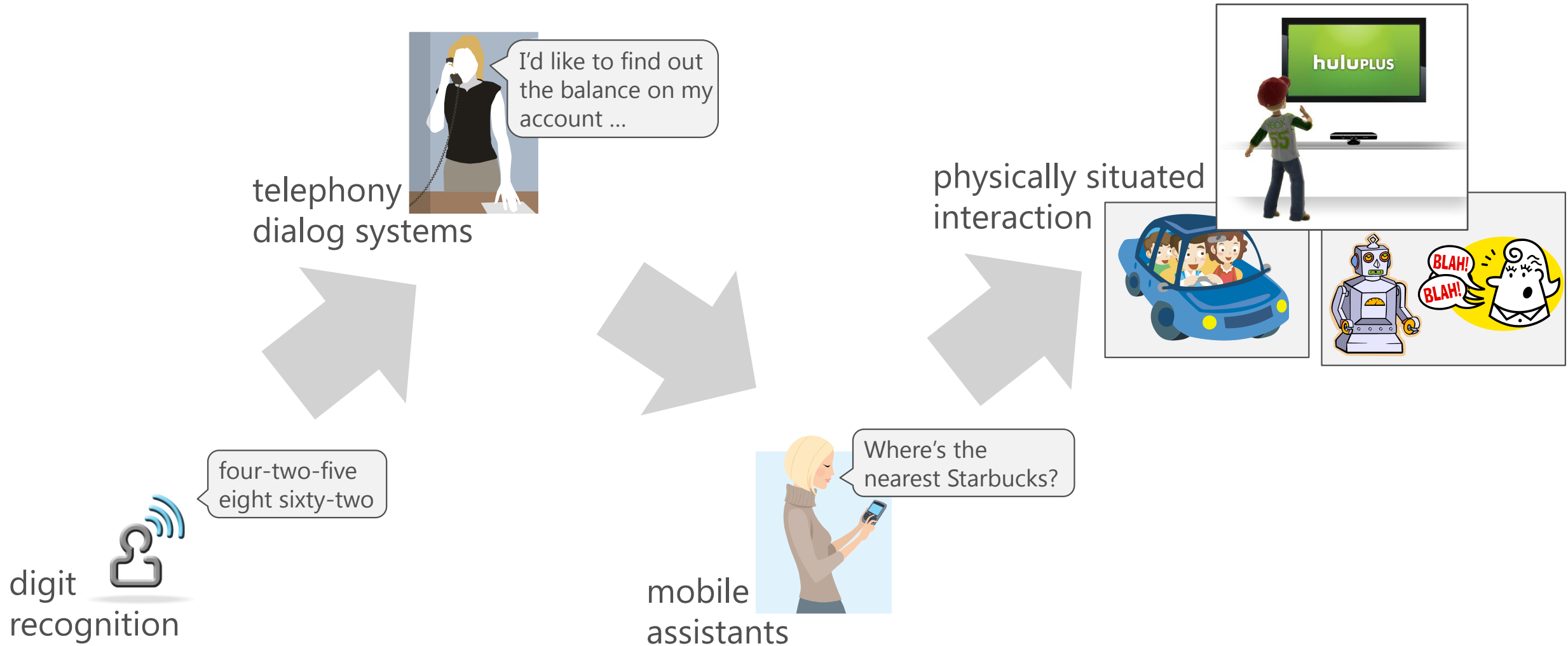
Microsoft Research

Research area: Physically Situated Language Interaction

develop **computational models** that enable systems to engage in fluid spoken language interaction in **physically situated settings**



Spoken Language Interaction



Systems

Scene analysis

Tracking

Visual focus-of-attention

Relationships

Sound source localization

Diarization

Speech recognition

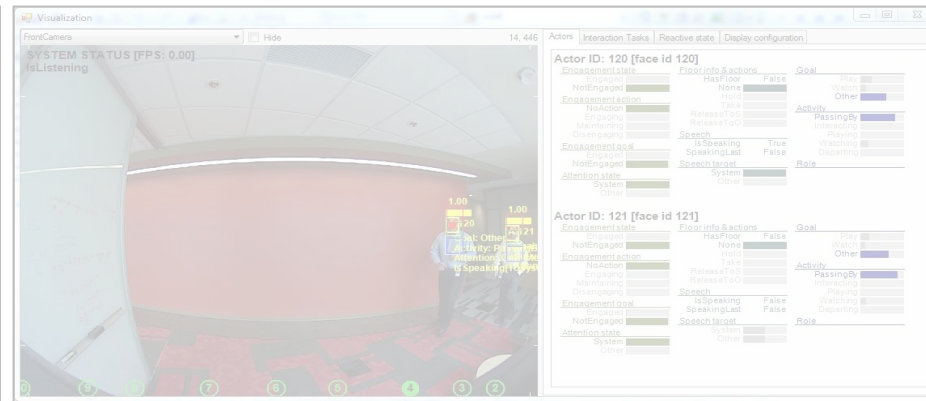
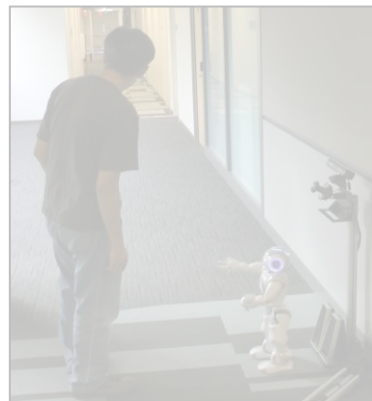
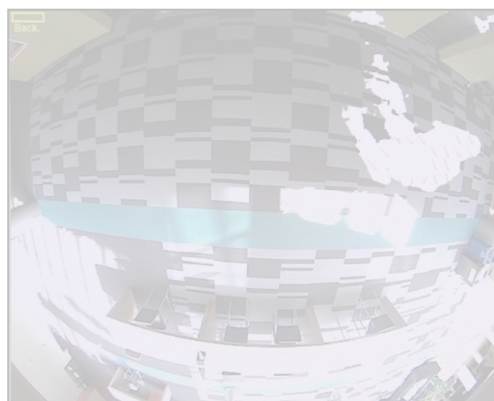
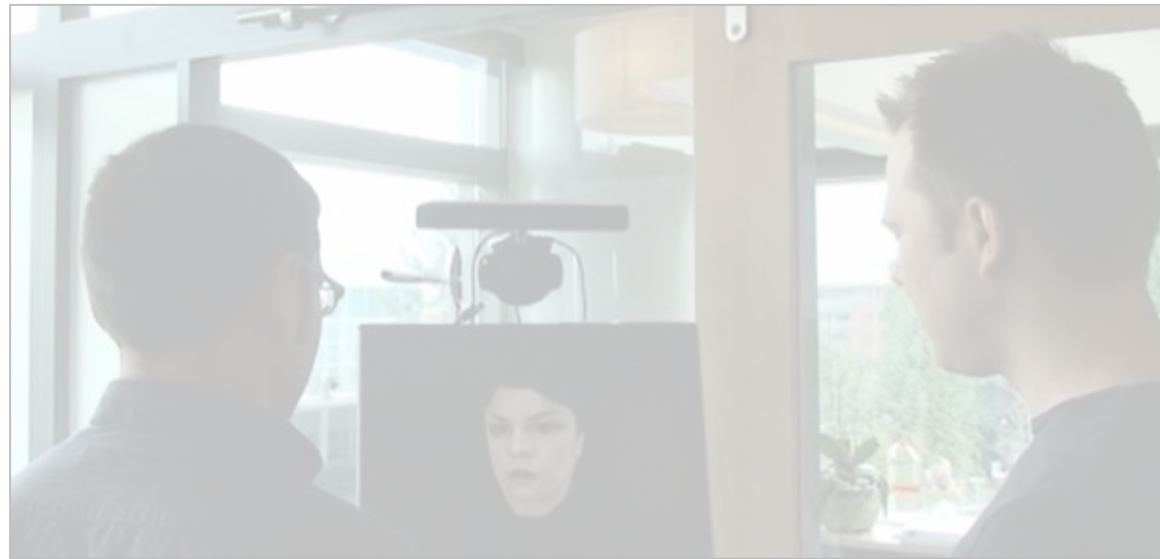
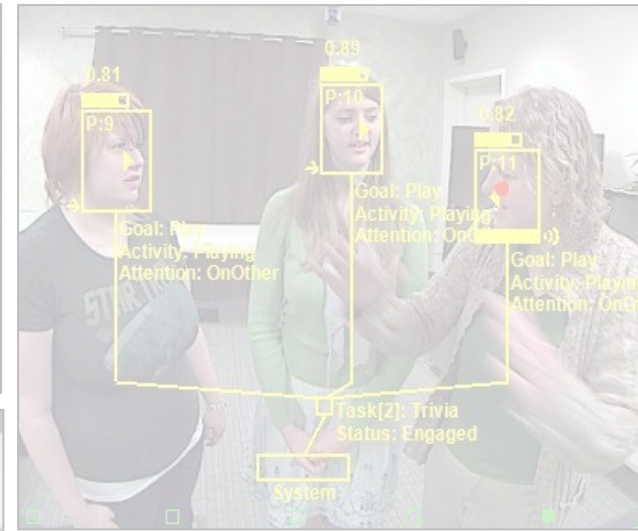
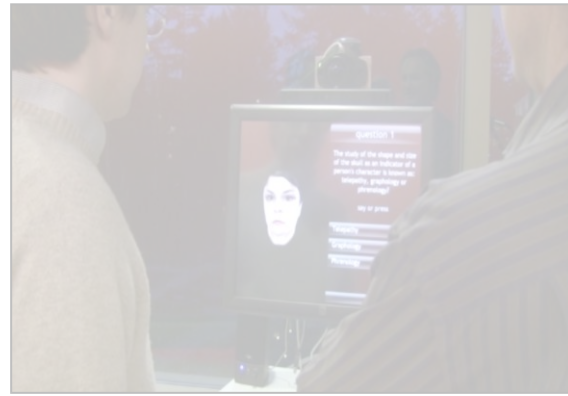
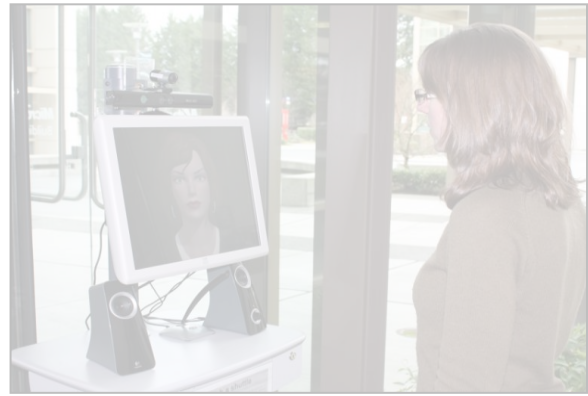
Models

Engagement

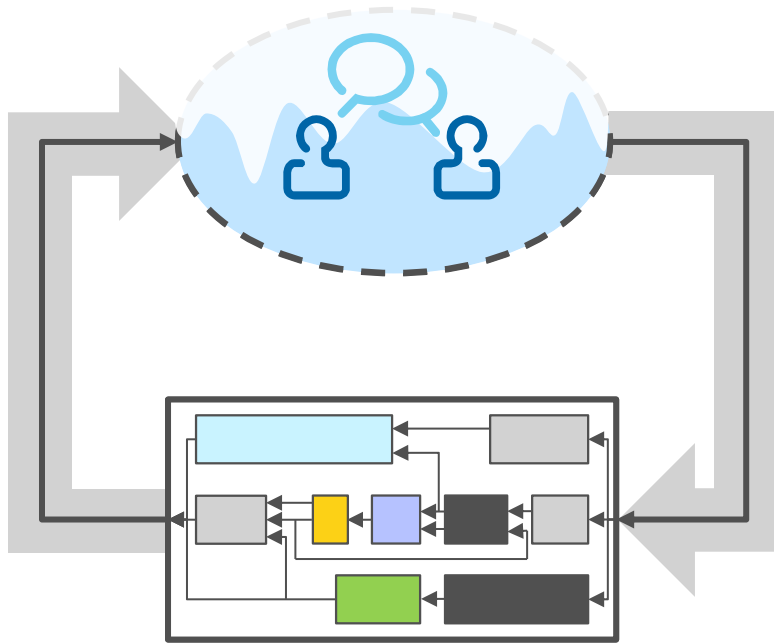
Turn-taking

Grounding

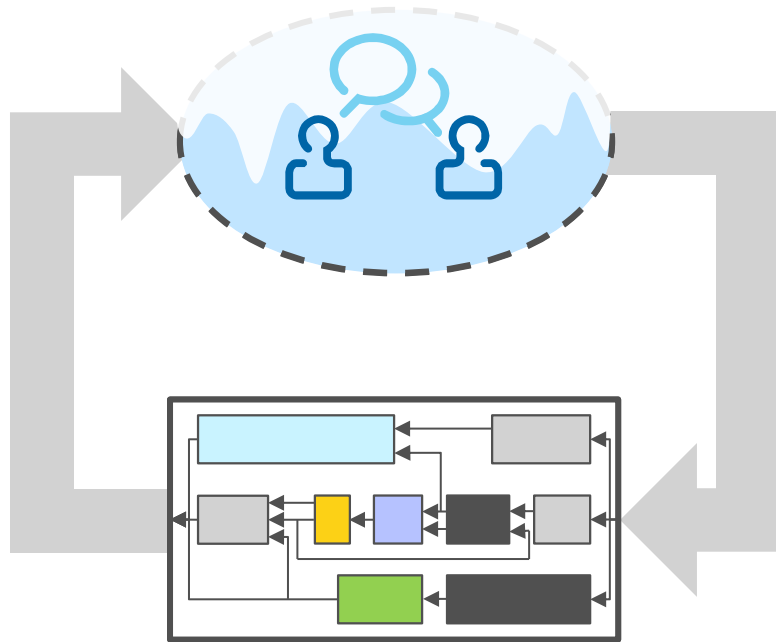
Interaction planning



Interactive systems



(PO)MDP/RL approaches



Scalability

High-dimensional state.

High-dimensional streaming observations.

Multiple coordinated outputs; parallel actions.

Multiple time scales; long horizons.

Intelligibility

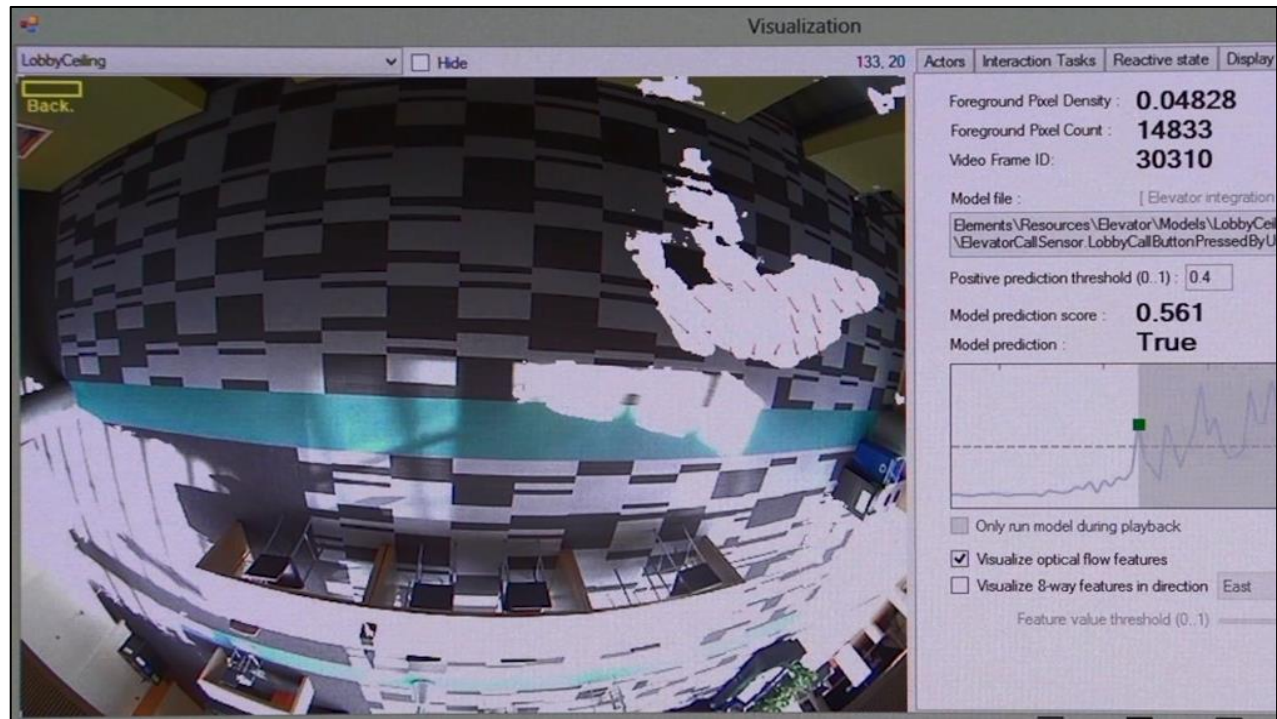
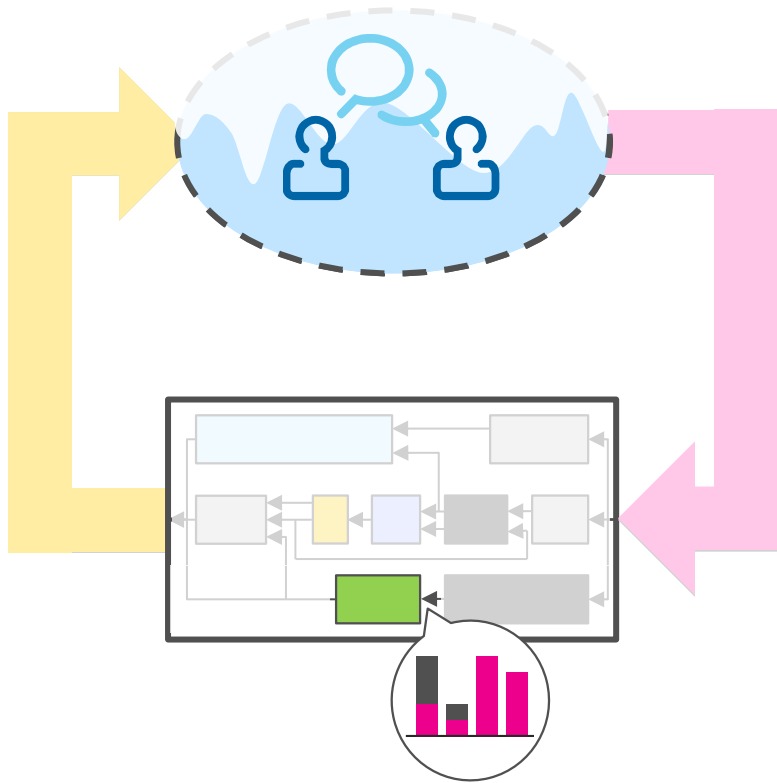
Takes control away from developers.



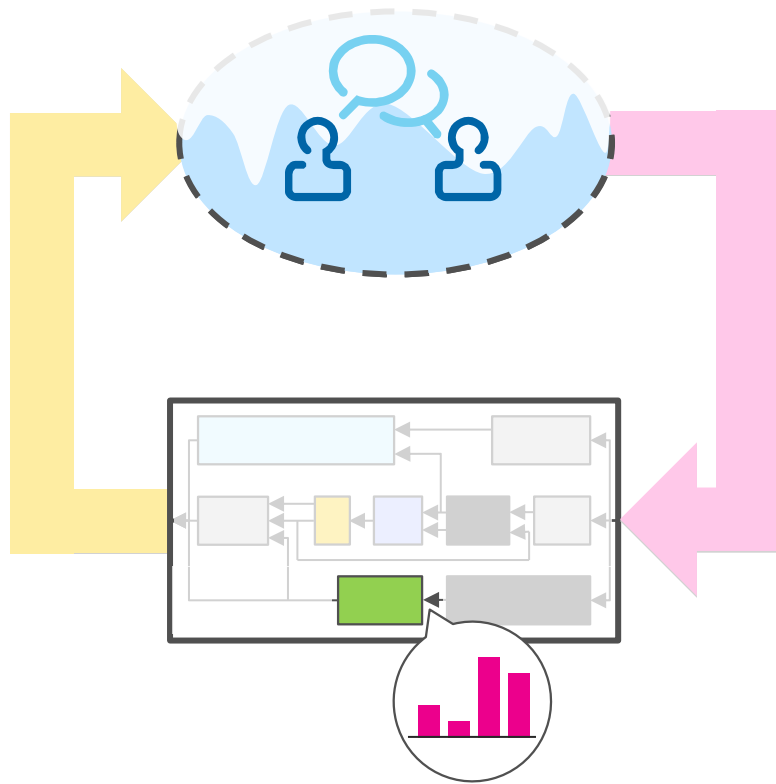
Supervised learning

Feedback problem

Trained models may shift their own input distribution.
Humans [agency] in the loop amplifies challenges.



Supervised learning



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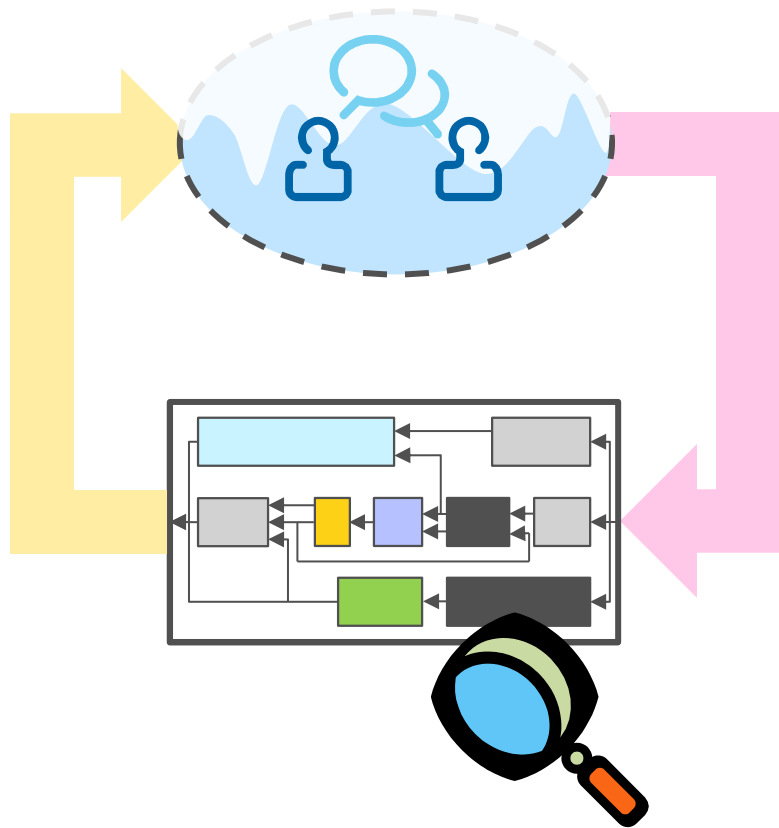
Online learning / exploration

Characterize and understand distributional shifts?
New modeling techniques for handling it?
Lifelong learning? Learning to forget?

Evaluation protocols and techniques



Integrative AI challenges



Science of systems learning?

“Reliable systems from non-reliable components”

Reflection?

Know when, **why** and **how** you don't know

Blame assignment, model interplay

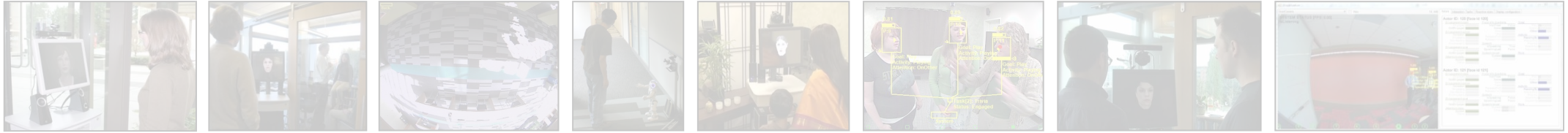
Model evidential, computational, and production delays

Extension → open world learning?

Human computation; learning from interaction; by demonstration



Machine learning for interactive systems



Scalability

Intelligibility

Feedback problem

Integrative AI / ML

...

Outreach

Toolkits

Evaluation protocols

Grand challenges

...

