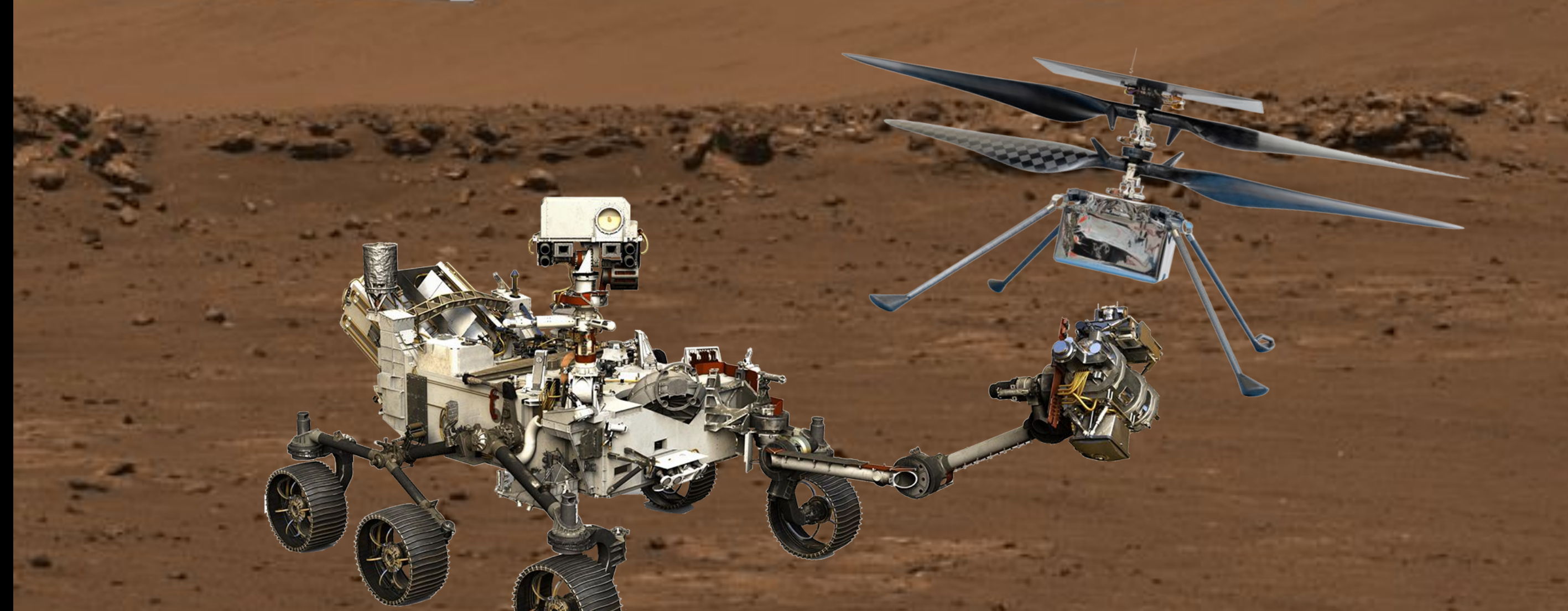


# ARCS

AUTONOMY RESEARCH CENTER FOR STEAHM

## Modeling Trust in Heterogeneous R3 Human-Machine Teams (MoTheR3HMT)



- > [15:07] mission starting
- > Spot was turning very extremely as Operator was giving it move base commands → Someone look into this.
- > Scored fire extinguisher!
- > [15:10] "Breadcrumb is too close to pillar"
- > Scored survivor!
- > Why did spot not turn when it got to end of room → Someone look into this
- > Oh looks like Spot may have dropped a comm node?
- > [15:16] Operator places a stair node. He says it's difficult to set the orientation of the stair node.
- > Operator says it's not difficult to see stairs from the costmap. Maybe it's easier than pointcloud?
- > [15:19] Operator sent Spot away from a risky area to open space. He already knew this area was risky.

robot intention unknown, human team flow

team celebration → communitas

robot intention unknown, human team flow

robot intention unknown, manual operation → human trust recalibration?

manual operation, risk → theoretical mistrust?

### Research Team

ARCS Fellows: Jessica Steiner

ARCS Associates: Julia Spencer, Tran Le

NASA Collaborators: Ali-akbar Agha-mohammadi, Olivier Toupet, Ben Morrell, Marcel Kaufmann, Mike Milano, JPL. Nelson Brown, Armstrong Flight Research Lab.

CSUN Advisor: Nhut Tan Ho, Ph.D. and Kevin Zemlicka, M.A.

### Research Objective

A five-year longitudinal study to examine trust calibration and evolution in heterogeneous Human-Machine Teams (HMT) operating in contexts involving Real systems, multiple Real human and highly autonomous non-human team members, and Real consequences (R3). We seek to adapt, extend, and validate extant theoretical trust models, using the Lee & See (2004) model as the baseline.

### Research Approach

Employ a set of complementary ethnographic methods for select heterogeneous R3 HMT at NASA JPL, i.e., participant observation, survey, unstructured and semi-structured interview.

Analyze data using a grounded theory approach, involving thematic coding and a constant comparative method to generate hypotheses and new theoretical models.

Utilize an iterative case study method to refine design, preparation, and collection phases based on emergent themes or topics.

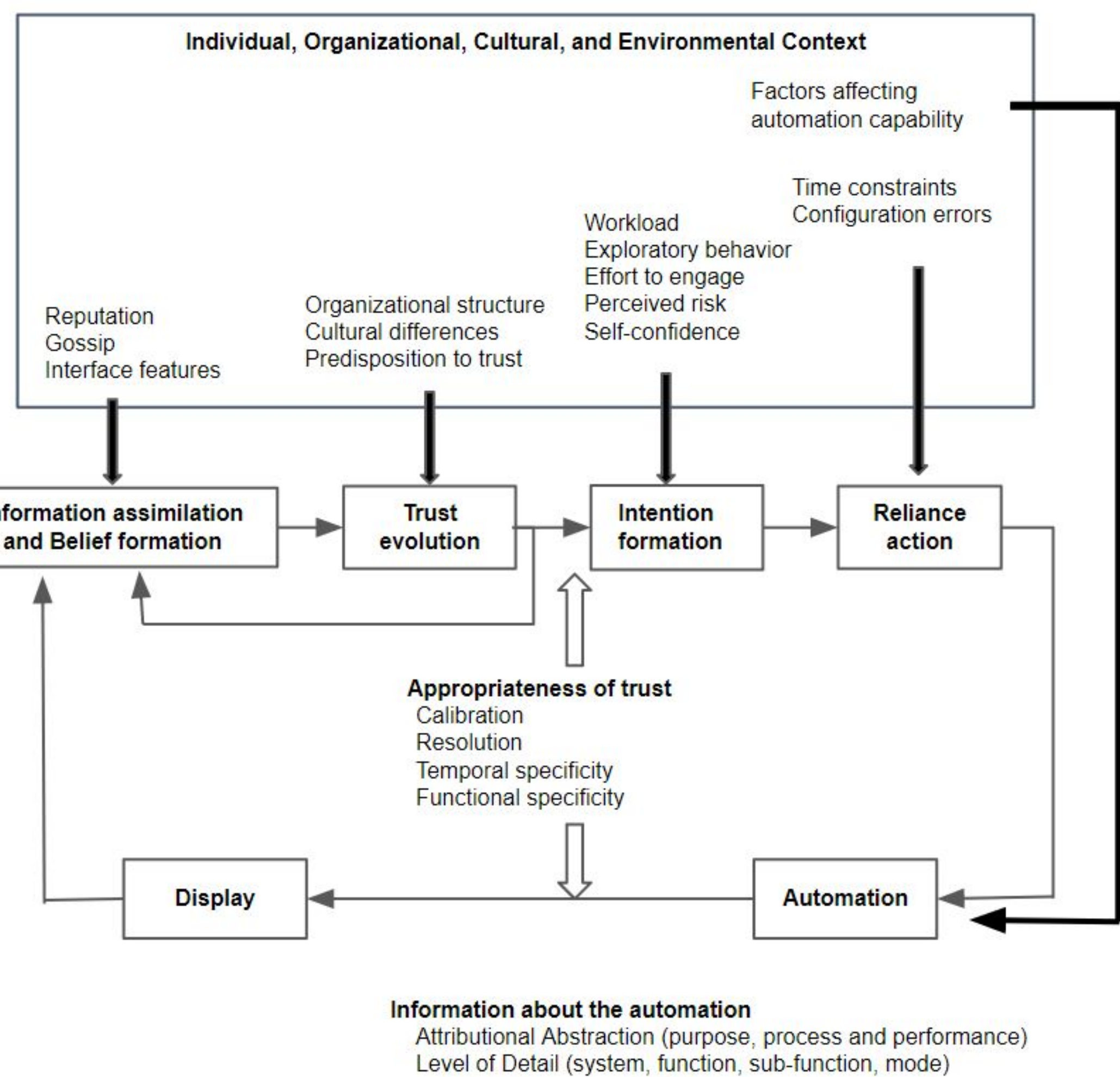


Figure 1: Dynamic Process Governing Trust and Its effects on Reliance, from (Lee & See, 2004)