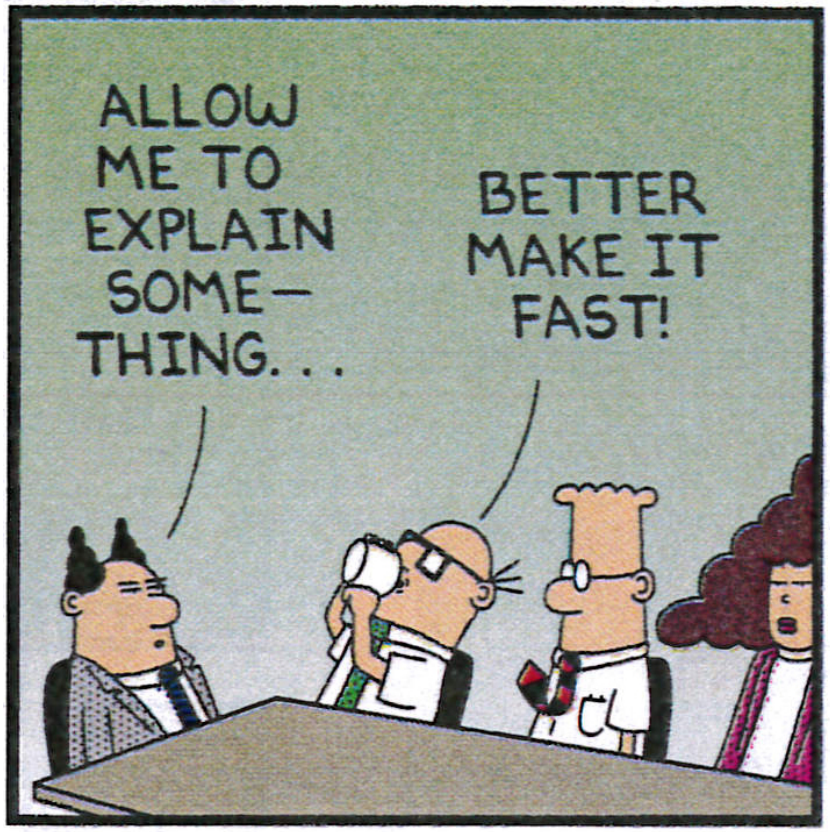
Conceptual Model and Measurement Issues for Explainable AI

October 2019
HFES

Outline

1. Key Concepts
2. Measurement Scales
3. Conceptual Models
4. Measurement Concepts



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Literature Review

Classical Philosophy (Causation)
Cognitive Psychology
Developmental Psychology
Social Psychology
Philosophy of Science
Psychology of Science
Human Factors

591

then

152 more

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Key Concepts

Importance of the “Mental Model” Concept

The system needs a good model of the user (knowledge/experience, goals, context, minimum necessary information)

Explaining as an Interactive Process vs. Explanations as Statements

The user needs a good mental model of the AI; the AI must be aware of user’s goals.

The XAI must help users identify/highlight boundary conditions and thereby engender appropriate trust and reliance.

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Psychometrics

Explanation Goodness - Criteria in the Literature

Veridicality or Fidelity
Completeness
Succinctness
Dimensions of Variation
Predictability

Explanation Satisfaction – User Judgments

Understandable
Satisfying
No Irrelevant Details
Usefulness
Instills Trust

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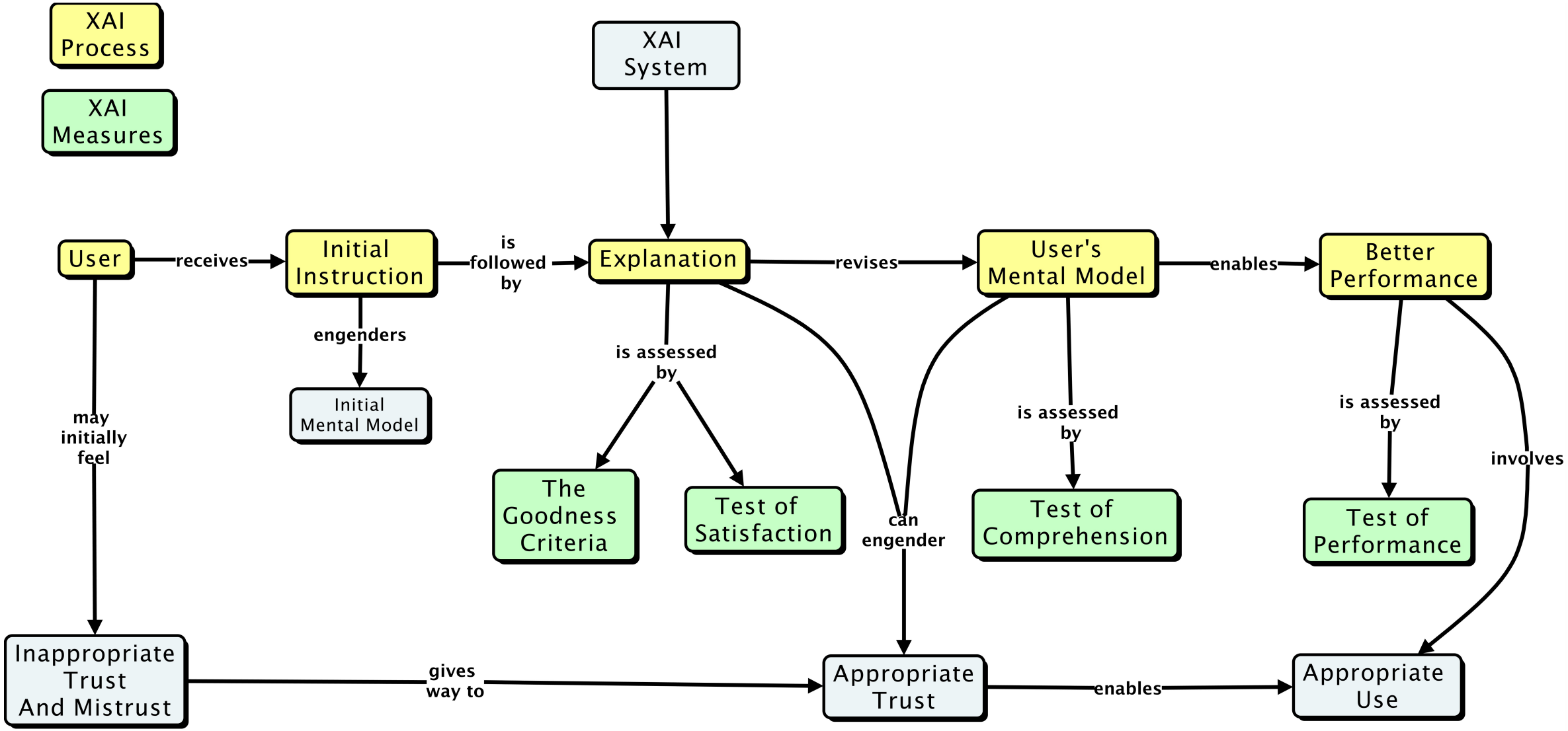
How the Classes of Measures Fit into the XAI Program



Conceptual Process Models

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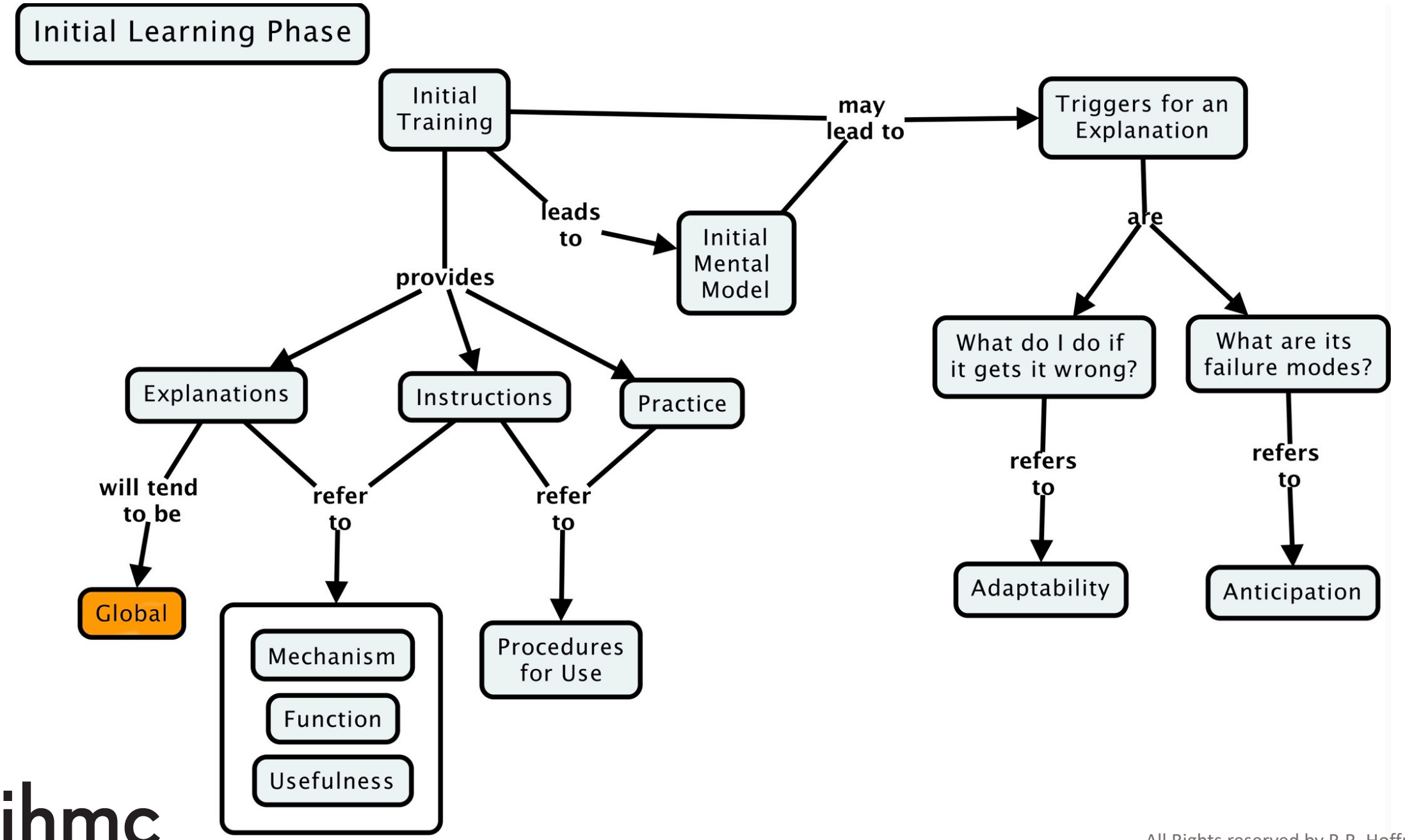

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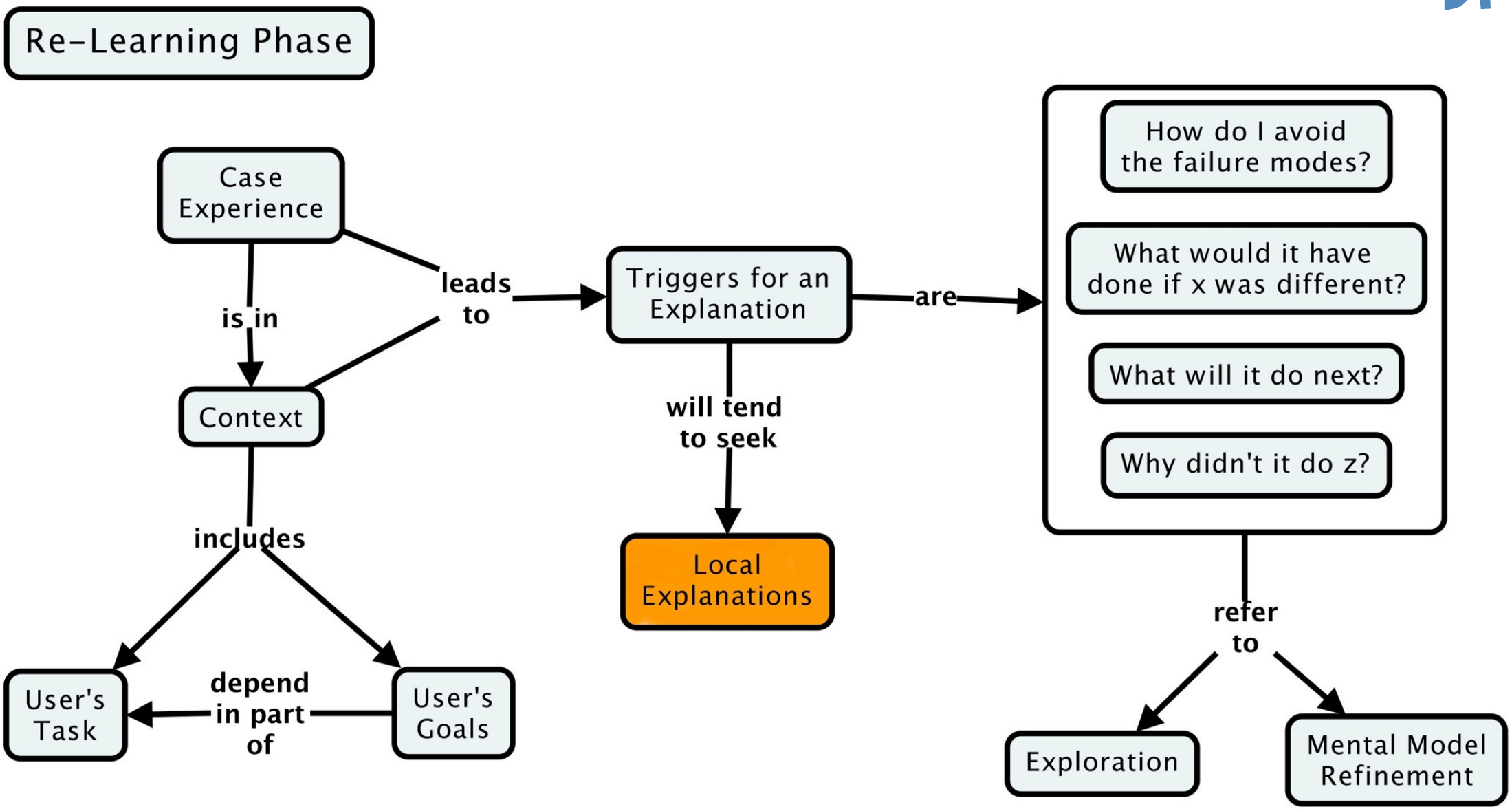

Some Concerns

- AI ≠ DN and ML
- Heat Maps have nothing to do with heat
- Data visualizations do now show what the machine “pays attention to”

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Some Concerns

- XAI was already addressed in the second generation of Expert Systems and Intelligent tutoring Systems. Those lessons learned have been forgotten.

- The focus of current XAI systems on local explanation does not address the core problem:

  Robust, defeasible, context-sensitive inference over world knowledge.

Good luck with that !

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Thank you!

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