Certification of Reinforcement Learning: Challenges per Safety Criticality and Autonomy

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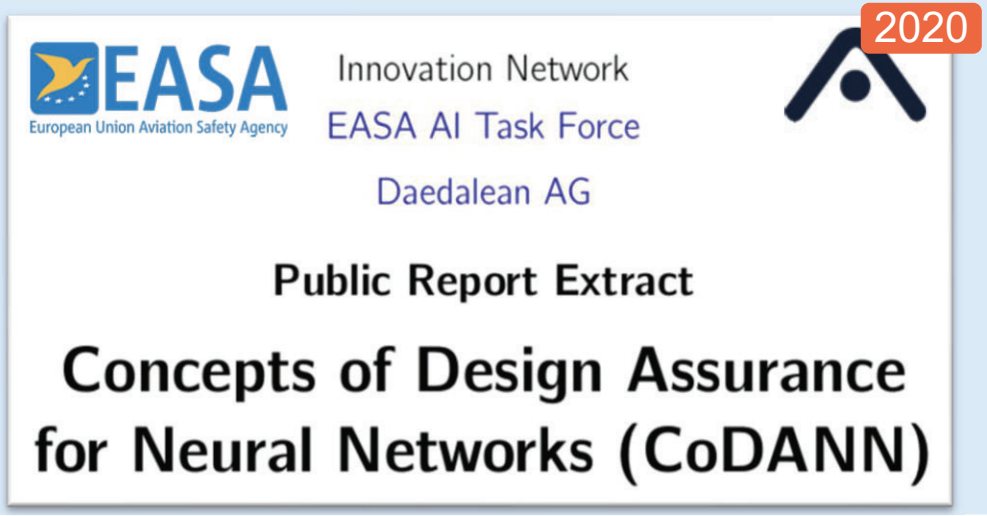
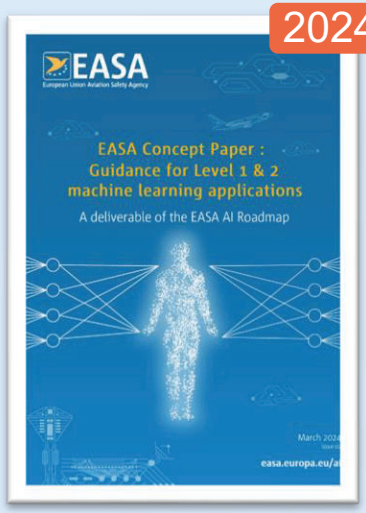
Current State – Machine Learning Certification

Europe



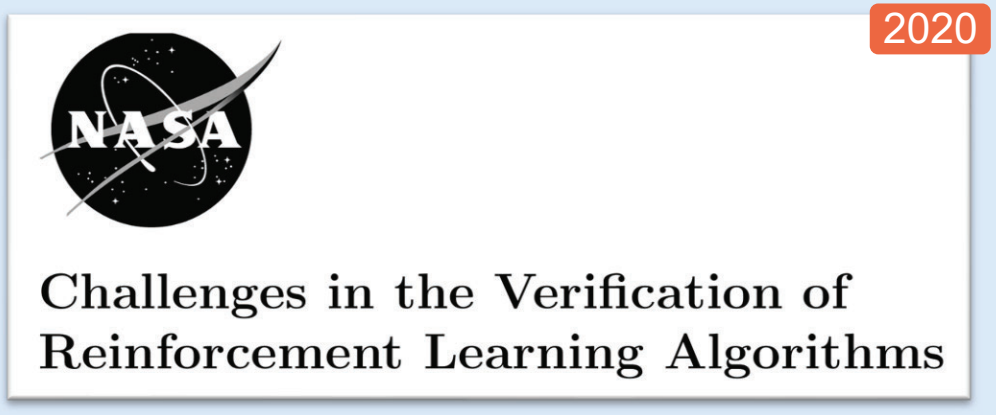
2020

2024



2024

USA



2020

2024
2023

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Current State – Machine Learning Certification

Europe

2020

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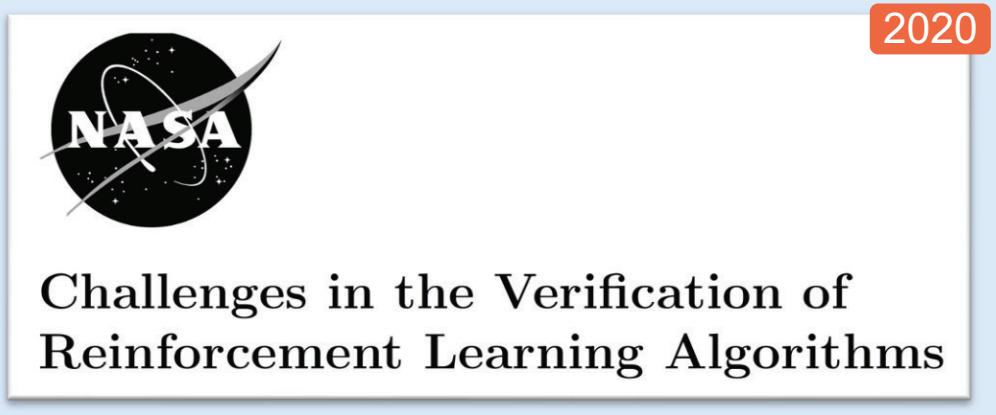
2024

USA

2020



2024

2023

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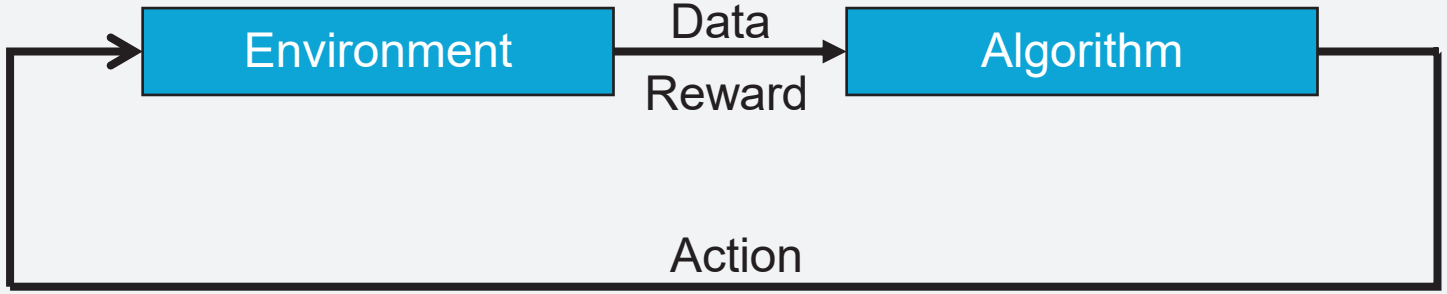
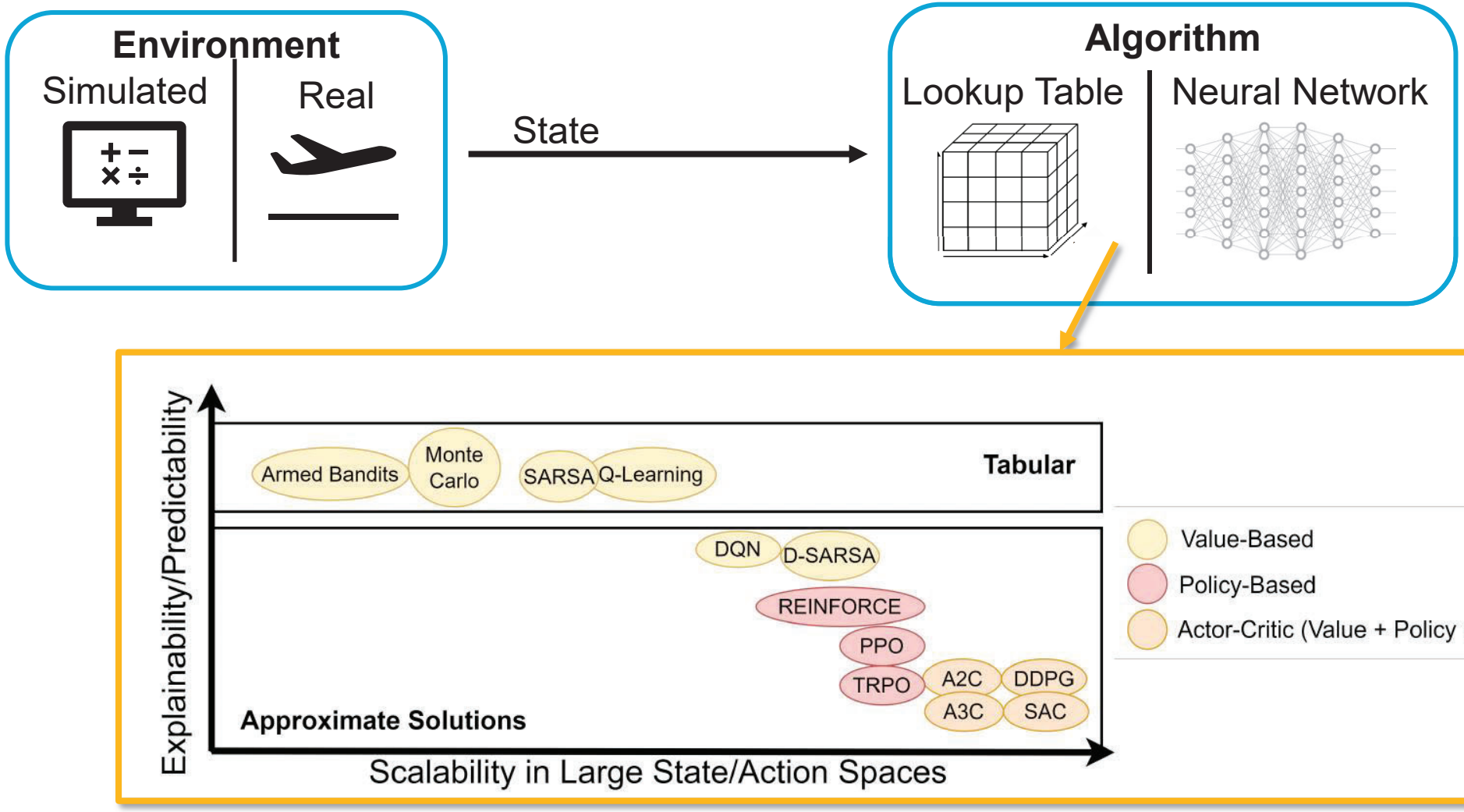
Supervised vs Reinforcement Learning

- **Supervised Learning:**

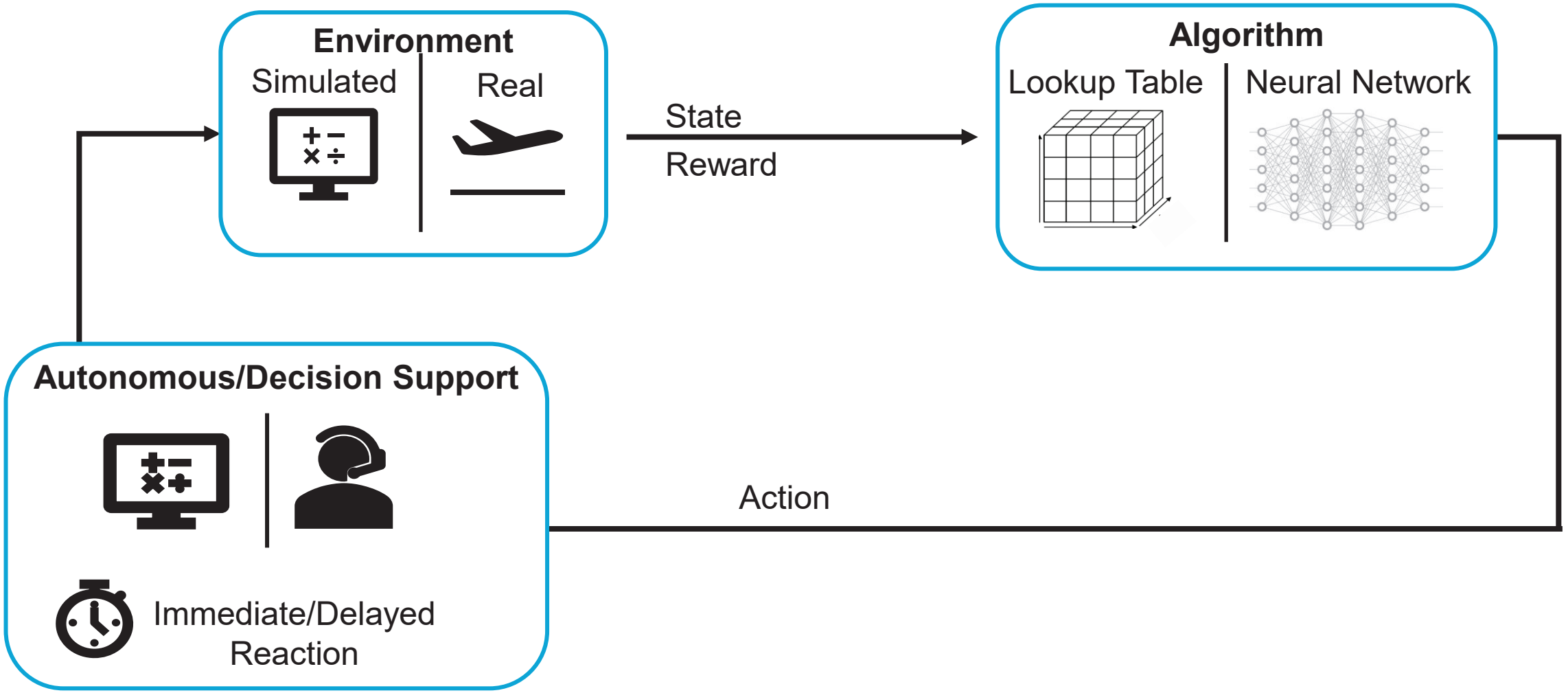
- **Reinforcement Learning**:



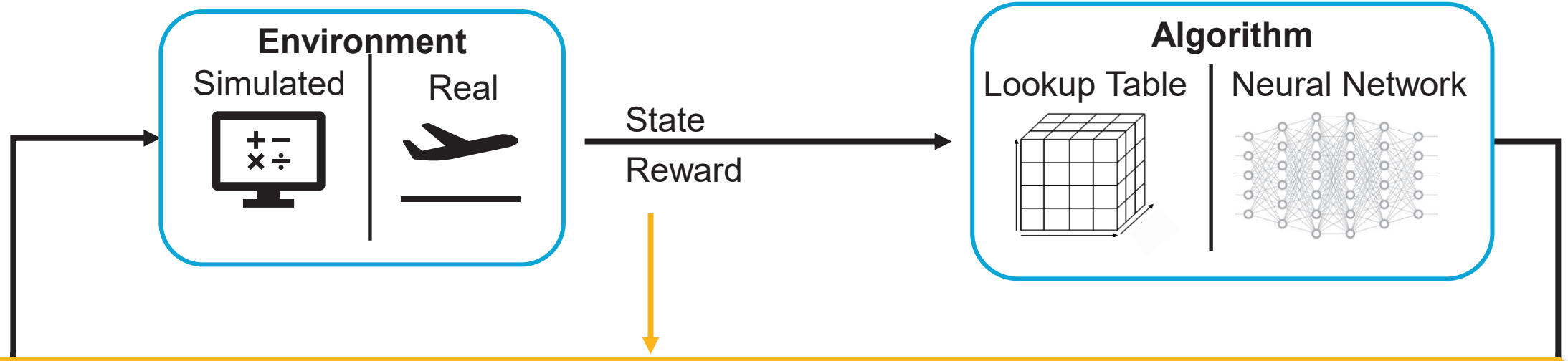
Reinforcement Learning



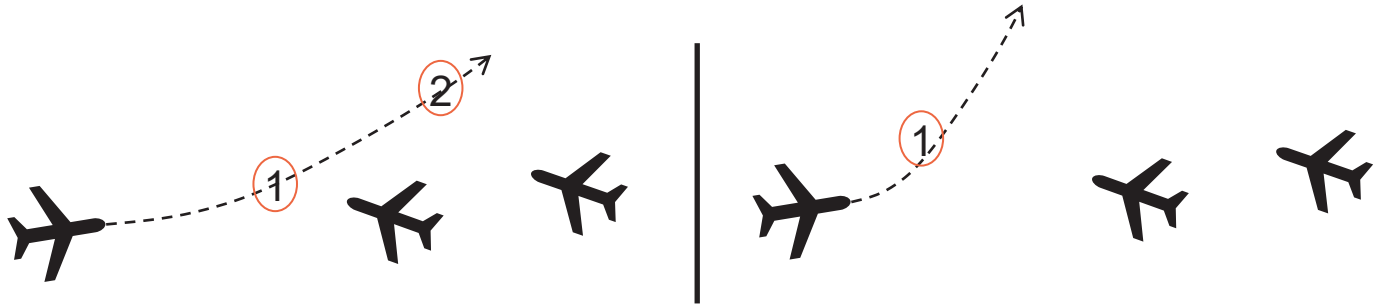
Reinforcement Learning



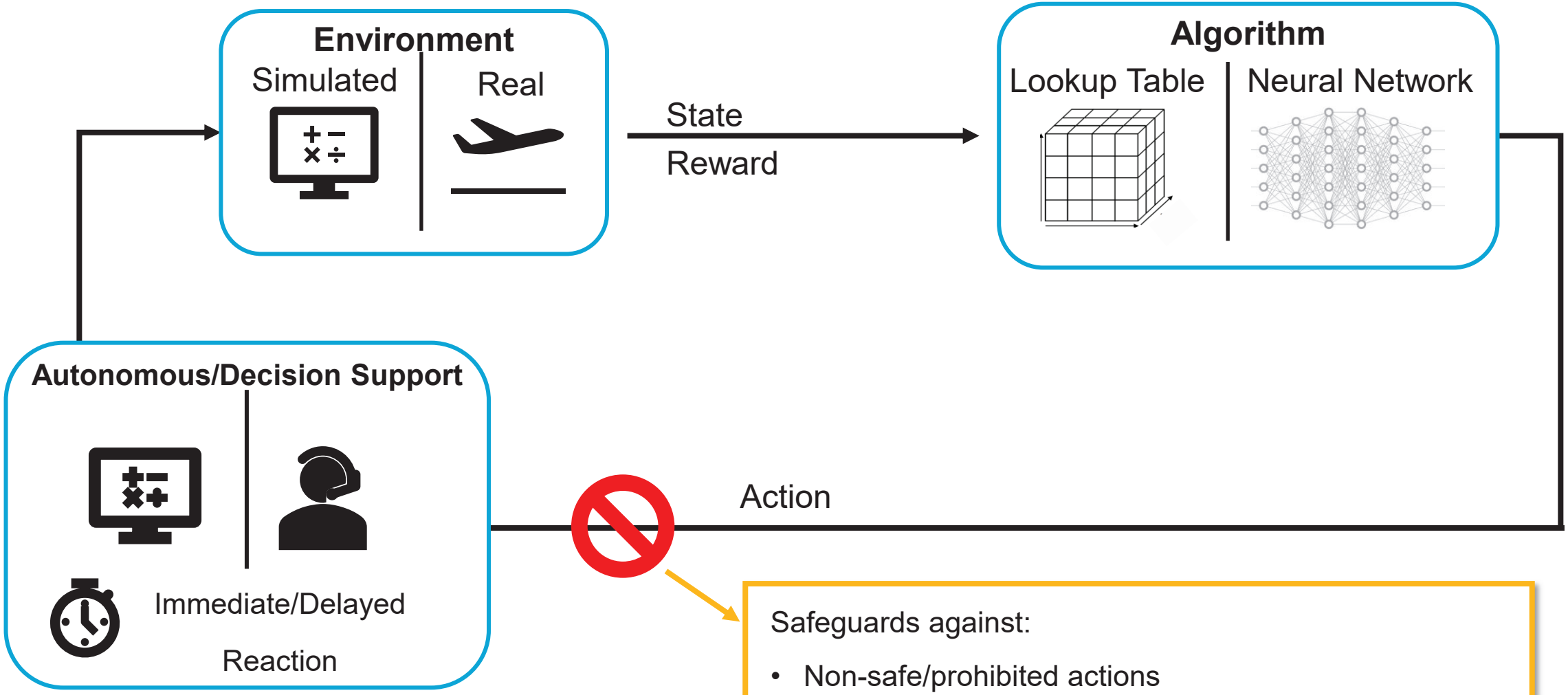
Reinforcement Learning



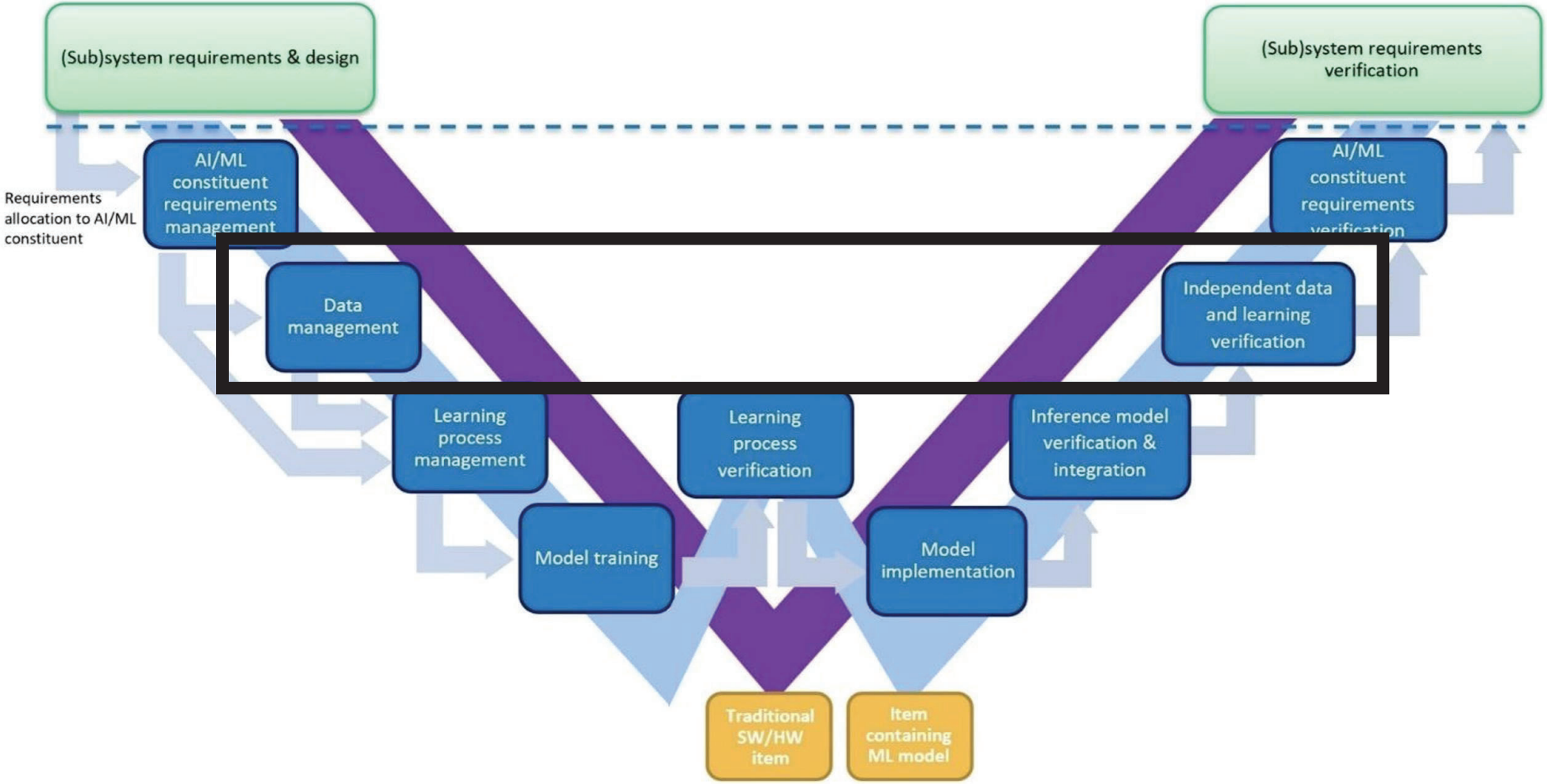
- Future rewards: sequence of actions vs immediate action – bad action can lead to a good state
- Maximization of reward
- Multi-objective reward formulation



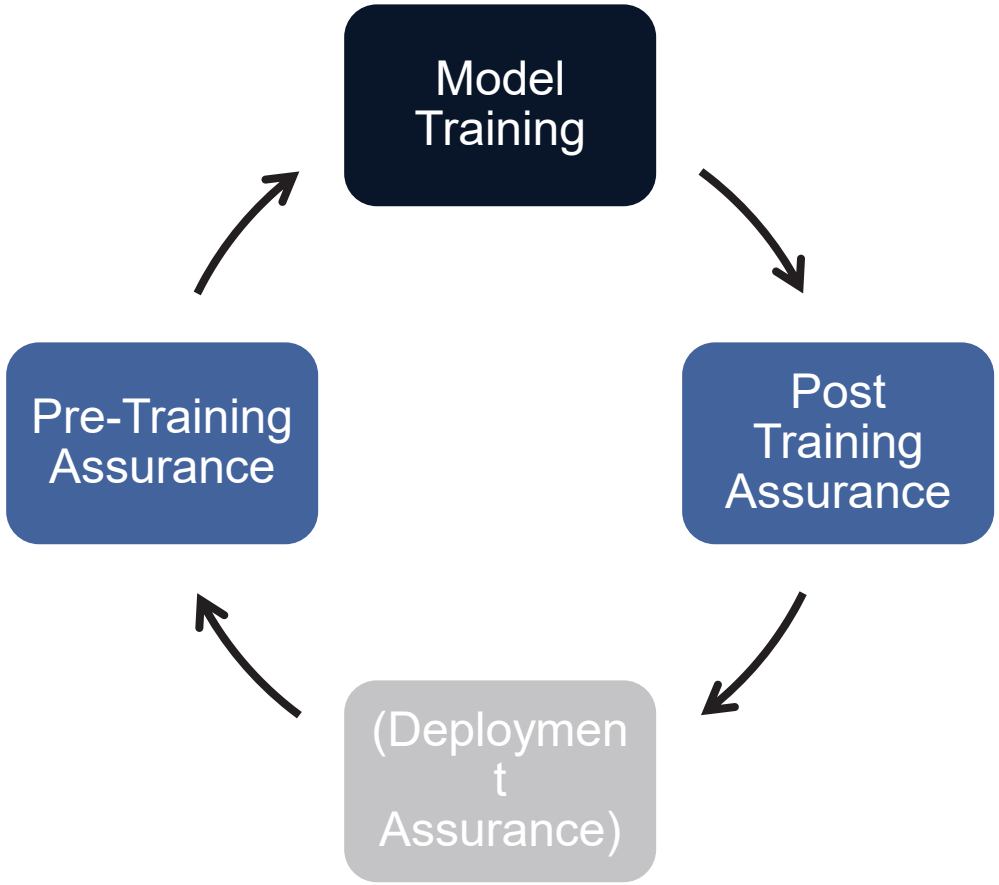
Reinforcement Learning



Reinforcement Learning – Data?

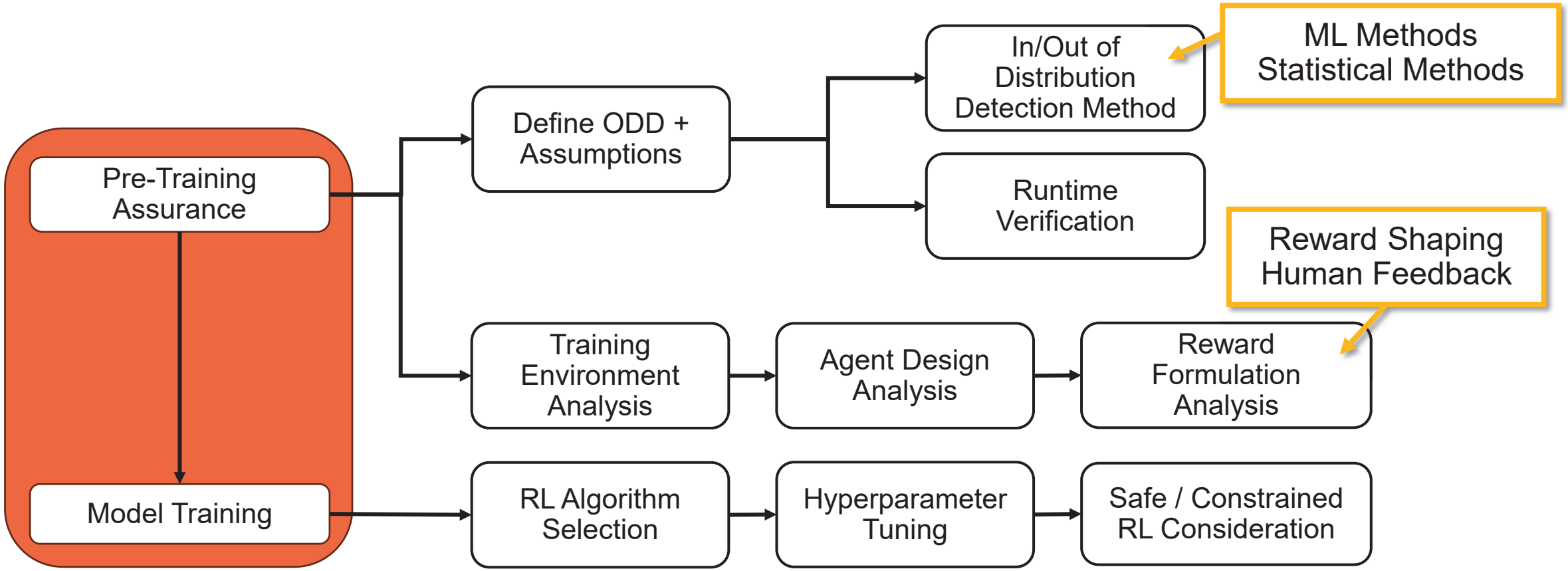


Reinforcement Learning – Data?

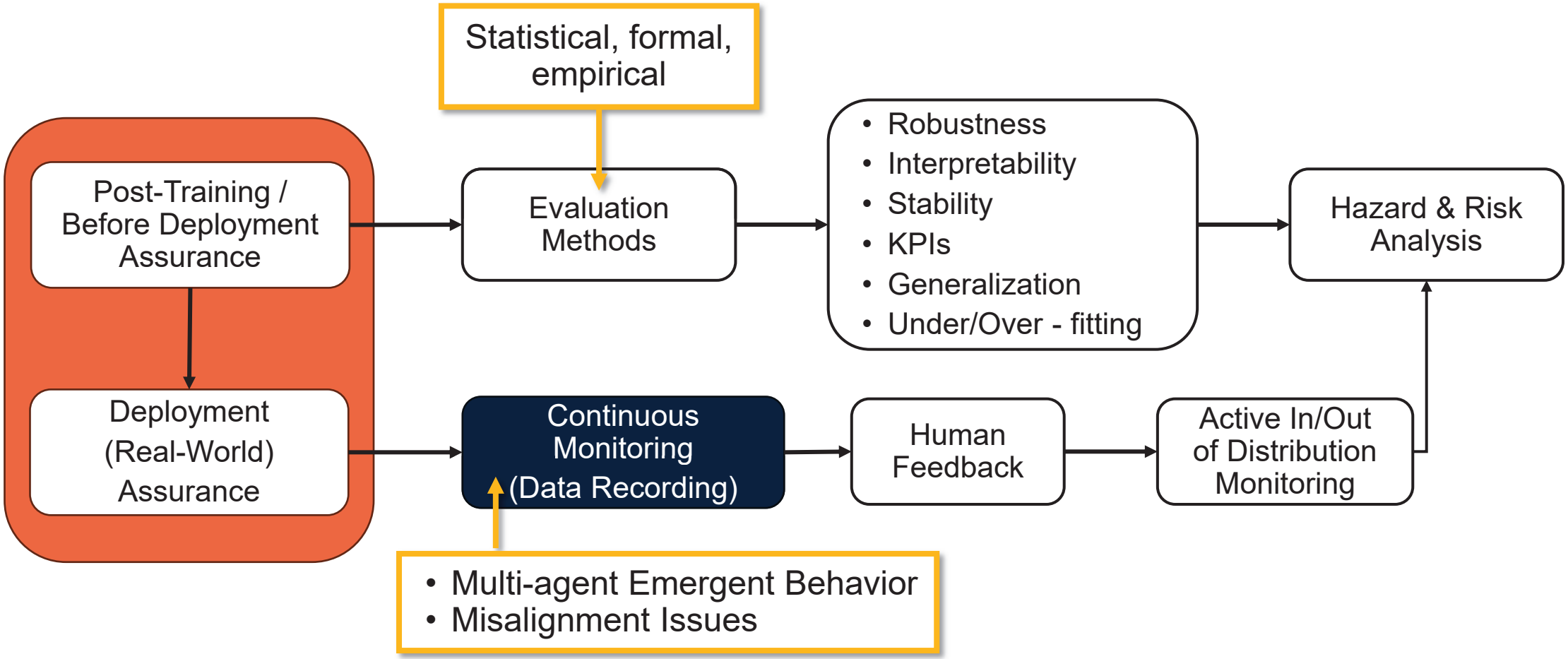


- No pre-existing data
- Running the model to learn about actions taken
- Post-assessment explainability/predictability of actions

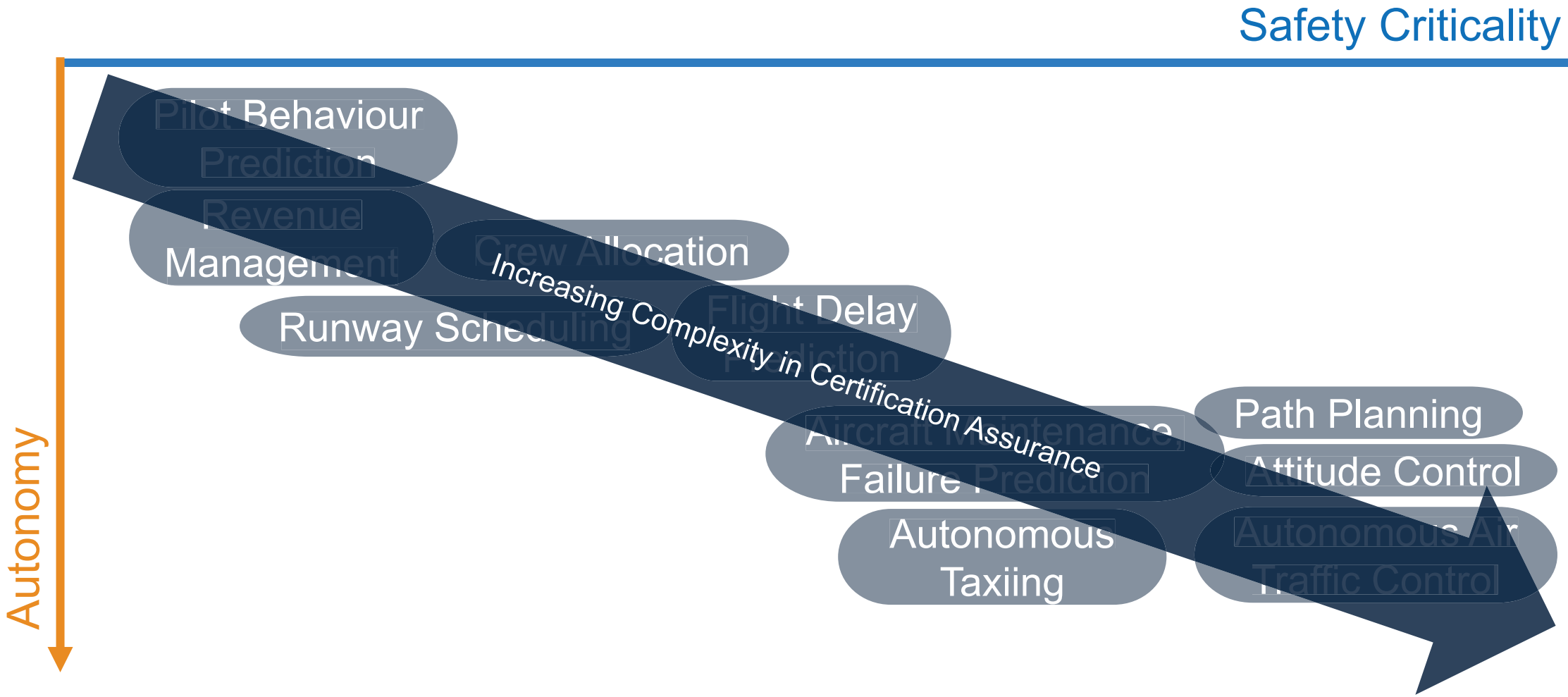
Proposal – Model Training



Proposal – Post Training



Certification Reinforcement: Criticality/Autonomy



Conclusions

Certification of reinforcement learning starts before the training processing

Iterative process – post deployment analysis will be used for future training

Certification procedure should differ per characteristics of the model

Much more still: human factors, safety risk mitigation….

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Thank you for your attention!

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