

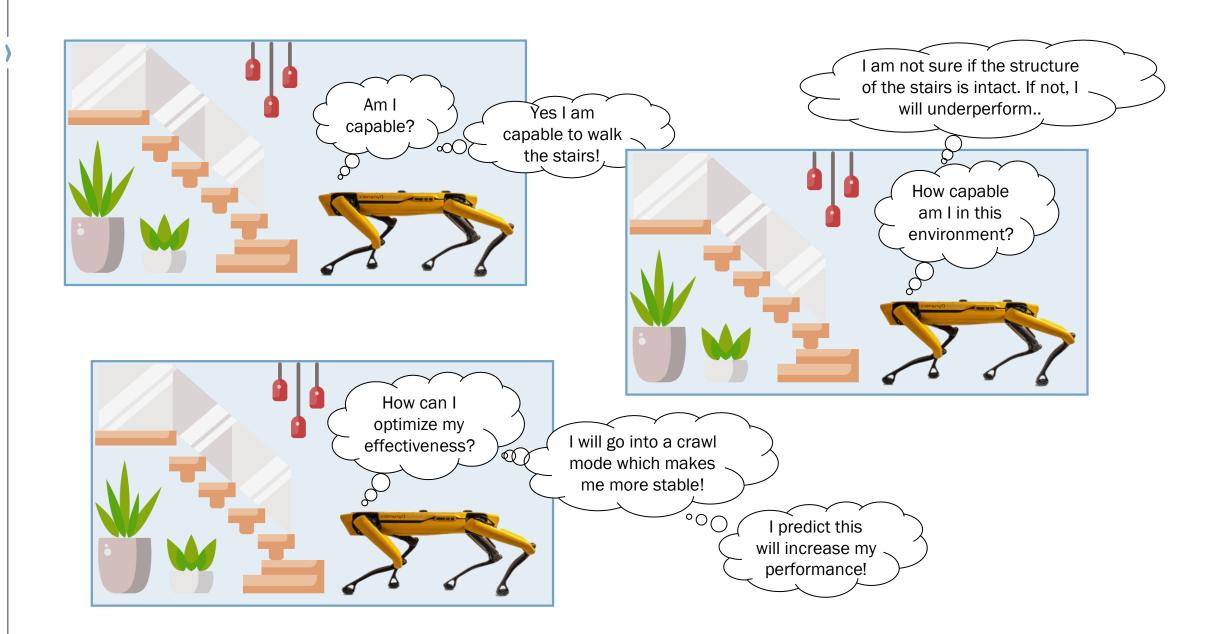




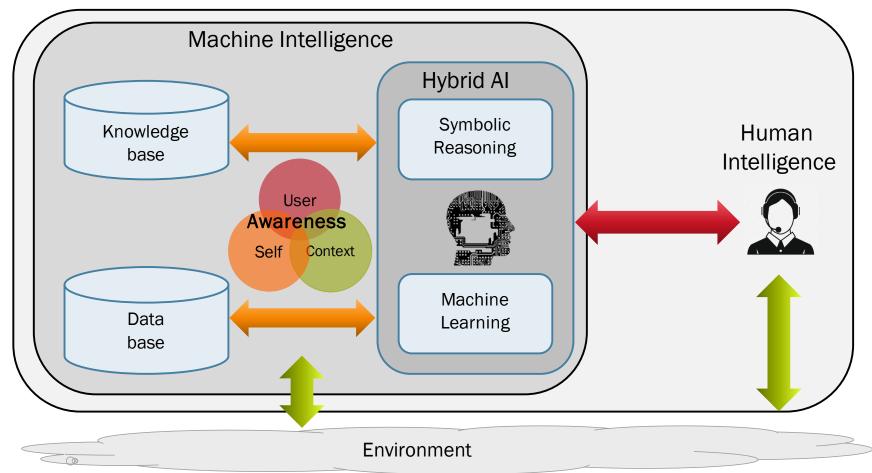


# ACHIEVE LASTING FITNESS AND HIGHER DEGREE OF AUTONOMY IN COMPLEX ENVIRONMENTS BY REAL TIME SELF-ASSESSMENT

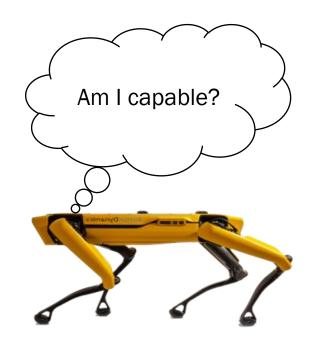




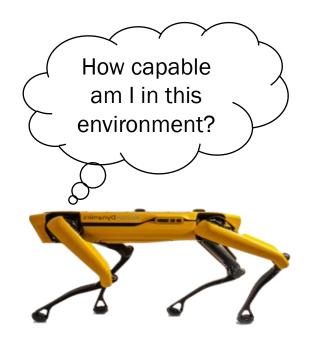
# ACHIEVE LASTING FITNESS AND HIGHER DEGREE OF AUTONOMY IN COMPLEX ENVIRONMENTS BY REAL TIME SELF-ASSESSMENT



### HYBRID AI SOLUTIONS FOR REAL-TIME SELF-ASSESSMENT OF



**A SYSTEM'S CAPABILITIES** 



A SYSTEM'S PERFORMANCE IN ITS CONTEXT

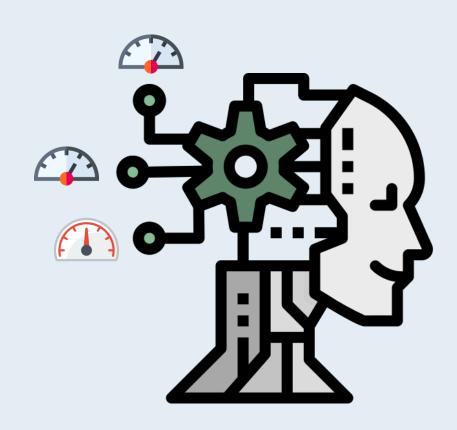


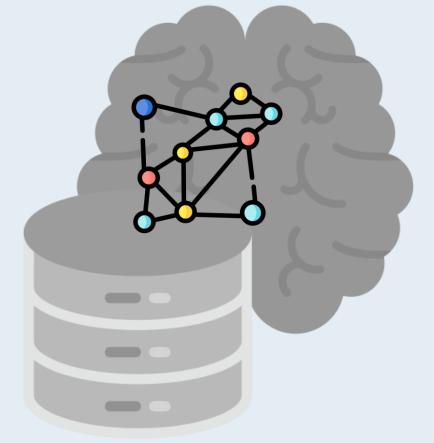
POSSIBLE INTERVENTIONS TO OPTIMIZE THE SYSTEM'S EFFECTIVENESS



# REAL TIME SELF-ASSESSMENT OF A SYSTEM'S CAPABILITIES





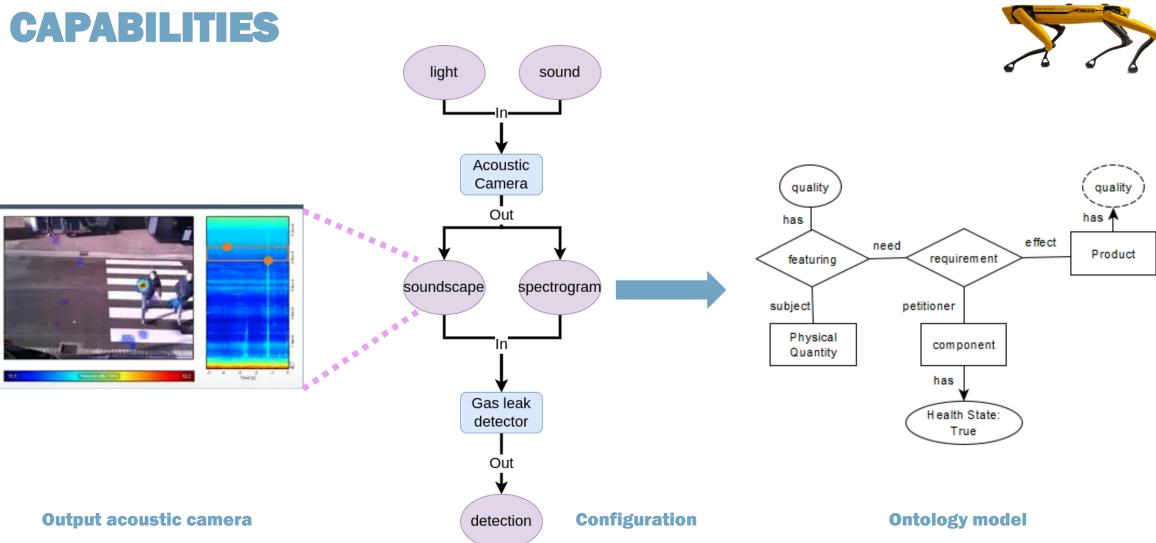


**Measure component performance** 

**Ontology model of the internal system** 



**REAL TIME SELF-ASSESSMENT OF A SYSTEM'S** 

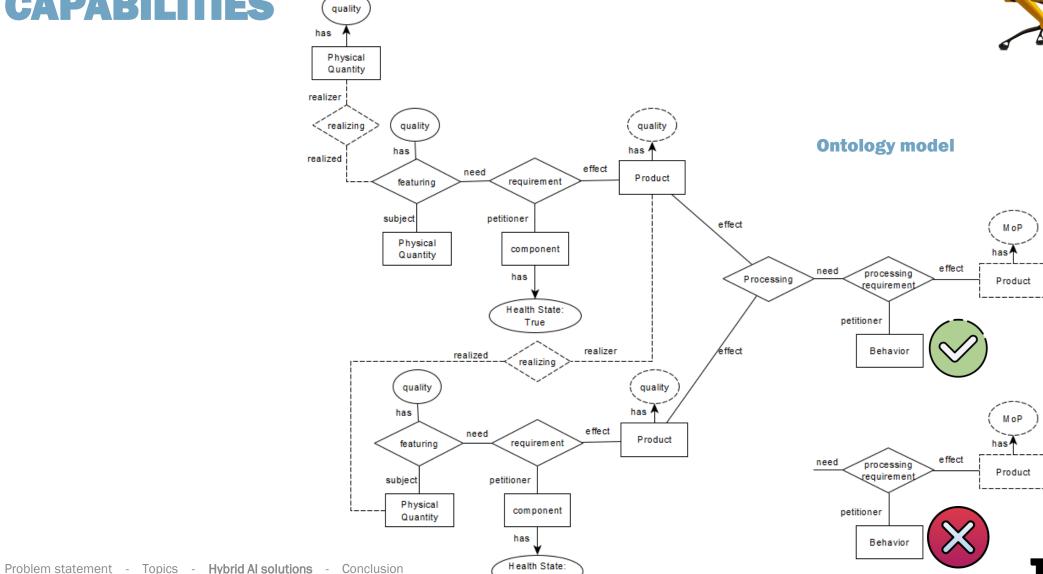




Am I capable?

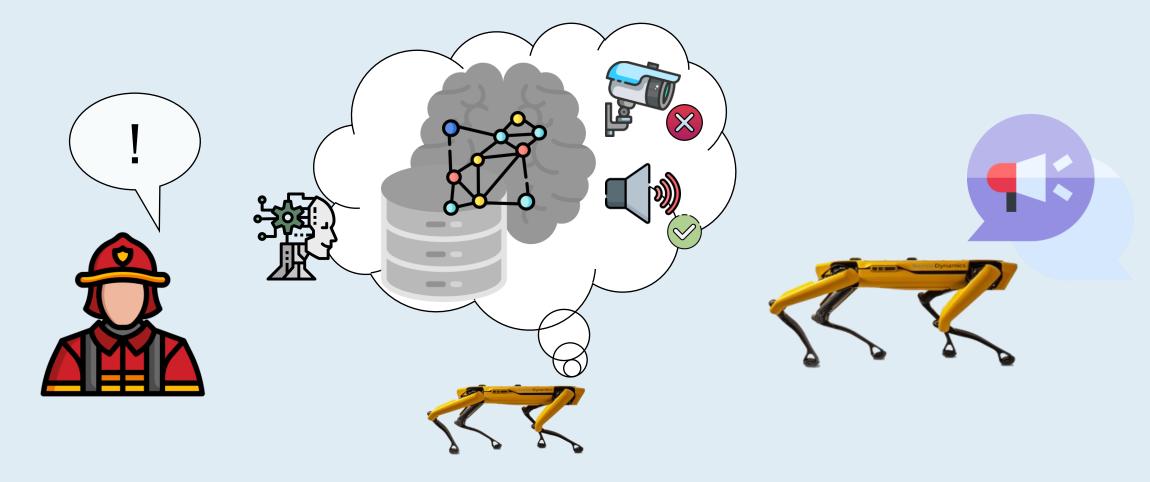
### REAL TIME SELF-ASSESSMENT OF A SYSTEM'S CAPABILITIES (quality)





True

## REAL TIME SELF-ASSESSMENT OF A SYSTEM'S CAPABILITIES



**Understand the task** 

**Reason about own performance** 

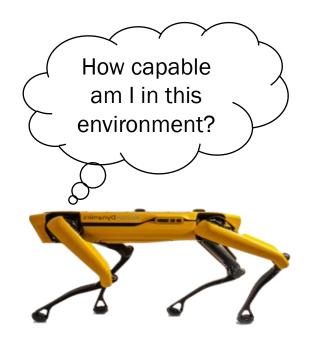
**Act effectively** 



### HYBRID AI SOLUTIONS FOR REAL-TIME SELF-ASSESSMENT OF



**A SYSTEM'S CAPABILITIES** 



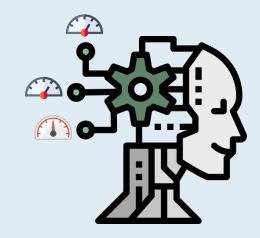
A SYSTEM'S PERFORMANCE IN ITS CONTEXT



POSSIBLE INTERVENTIONS TO OPTIMIZE THE SYSTEM'S EFFECTIVENESS



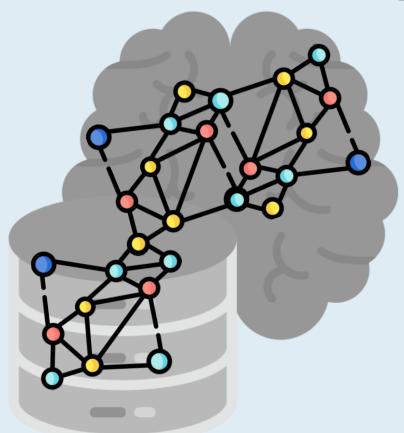




**Measure component performance** 



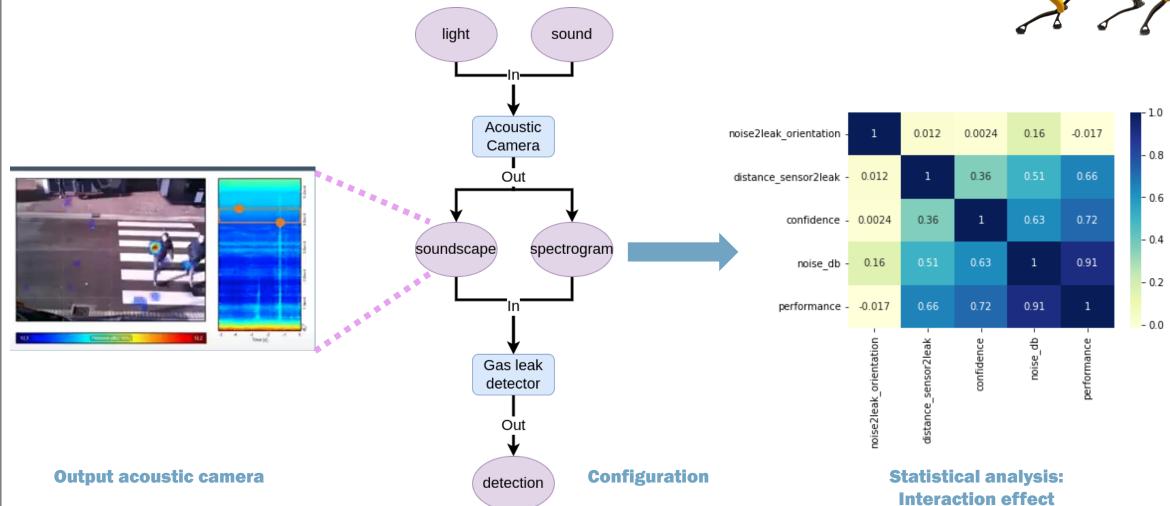
**Measure environmental conditions** 



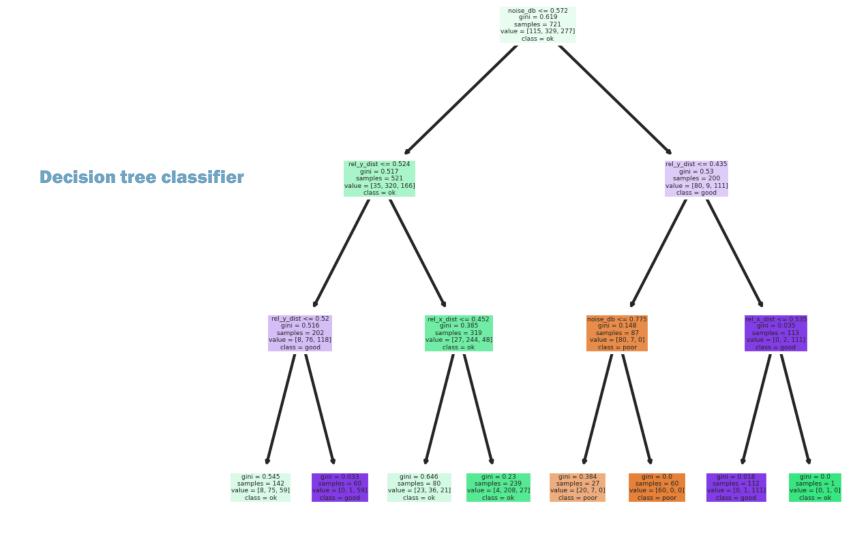
Ontology model of the internal system and environmental conditions



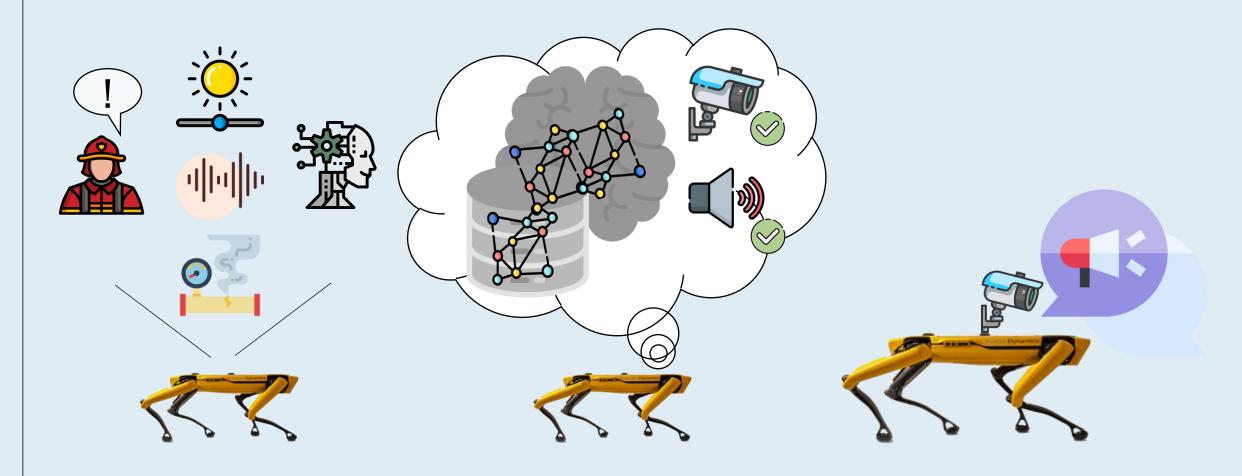












**Understand the task, self and environment** 

Reason about own performance in the measured environment

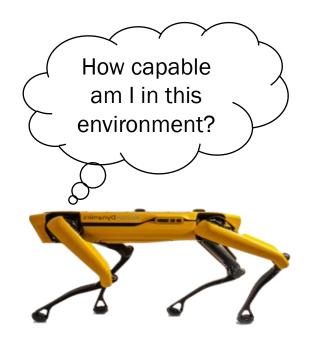
**Act effectively** 



### HYBRID AI SOLUTIONS FOR REAL-TIME SELF-ASSESSMENT OF



**A SYSTEM'S CAPABILITIES** 



A SYSTEM'S PERFORMANCE IN ITS CONTEXT

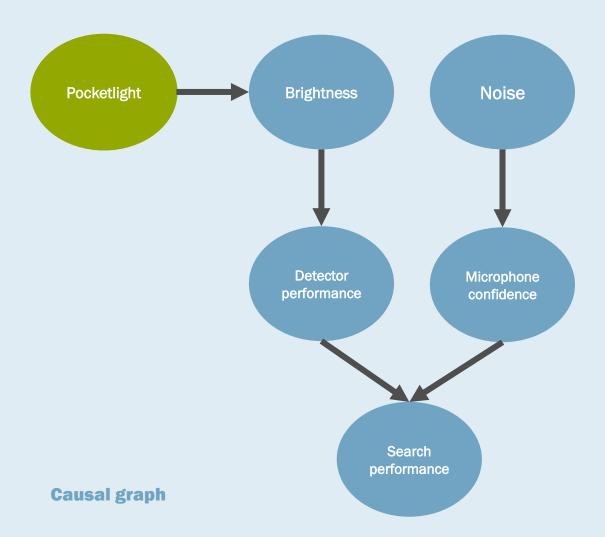


POSSIBLE INTERVENTIONS TO OPTIMIZE THE SYSTEM'S EFFECTIVENESS



# INTERVENTIONS TO OPTIMIZE THE EFFECTIVENESS

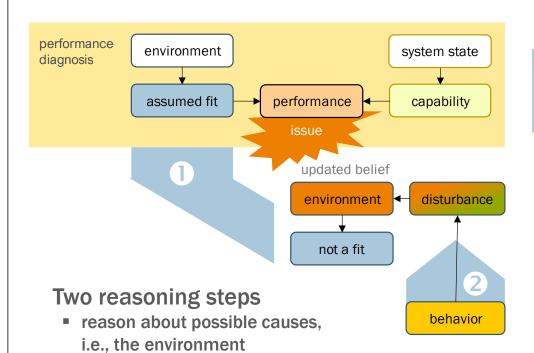


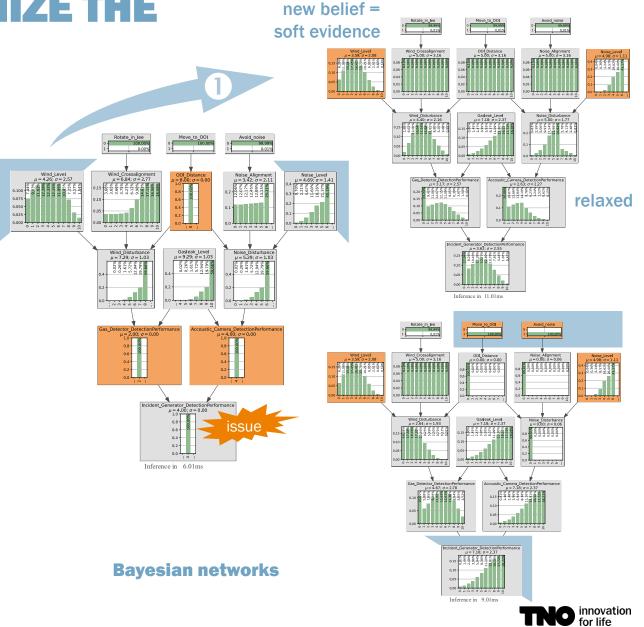






# INTERVENTIONS TO OPTIMIZE THE EFFECTIVENESS

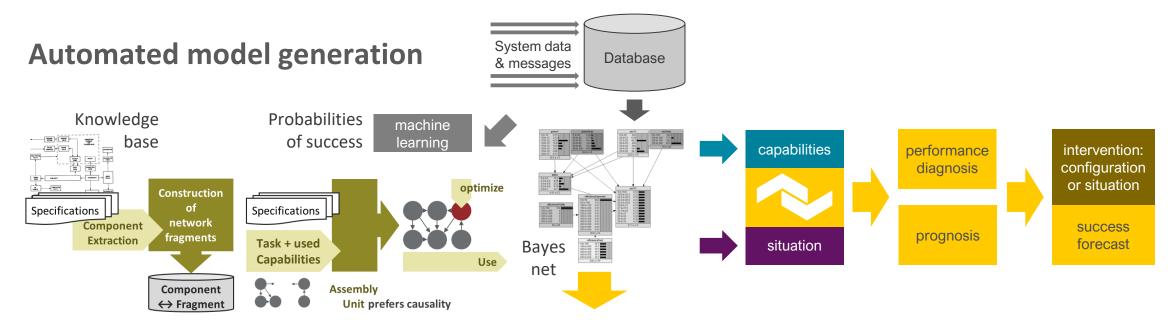




 predict the effects of interventions to counter inferred disturbances

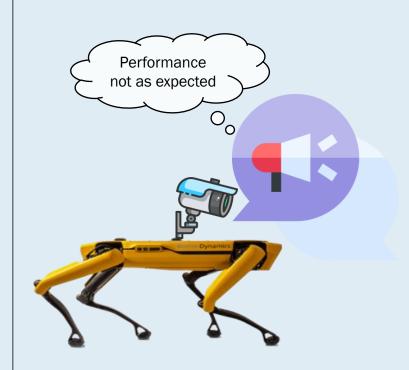
### INTERVENTIONS TO OPTIMIZE THE EFFECTIVENESS

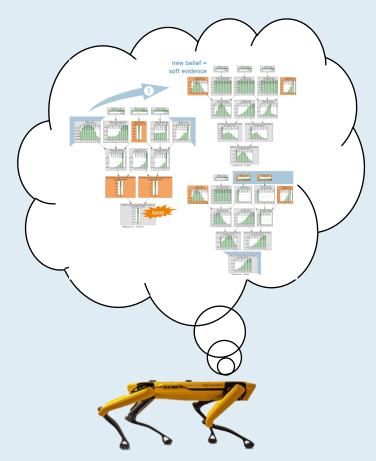


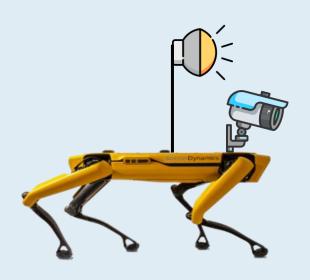


Hybrid AI for diagnosis to identify the best intervention given a lack of performance









**Detect underperformance** 

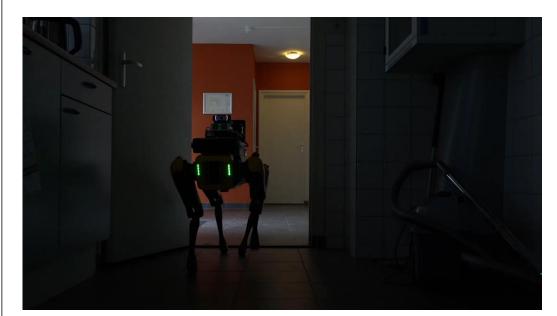
**Reason about the cause and fitting interventions** 

**Act effectively** 



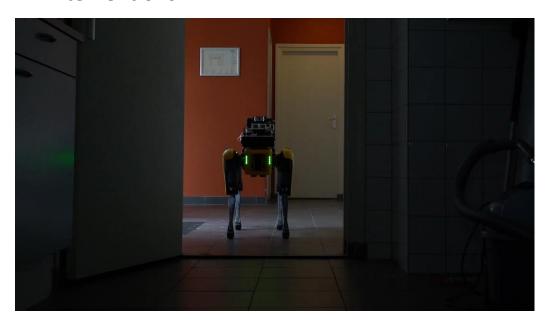
#### **CONCLUSION**

- **)** Hybrid AI for real time self-assessment
  - Capabilities
  - Performance in context
  - Interventions for optimisation



**Without self-assessment** 

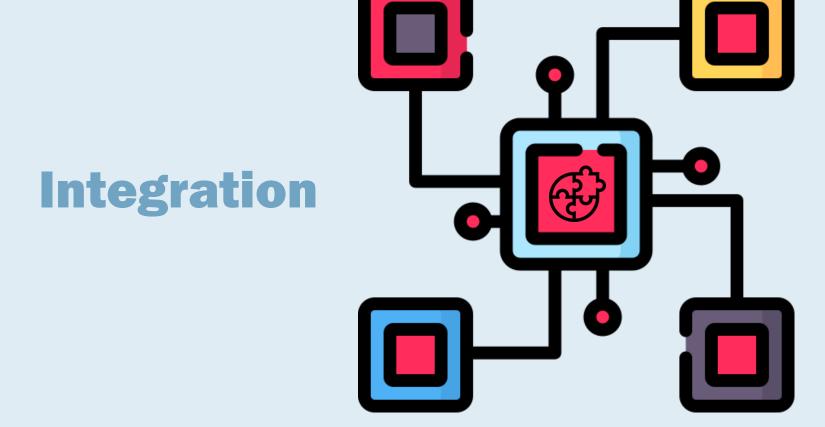
- **)** Allows self-optimisation in highly dynamic environments
  - Lasting fitness
  - Higher degree of autonomy
  - Increase effectiveness and decrease operator interventions



With self-assessment

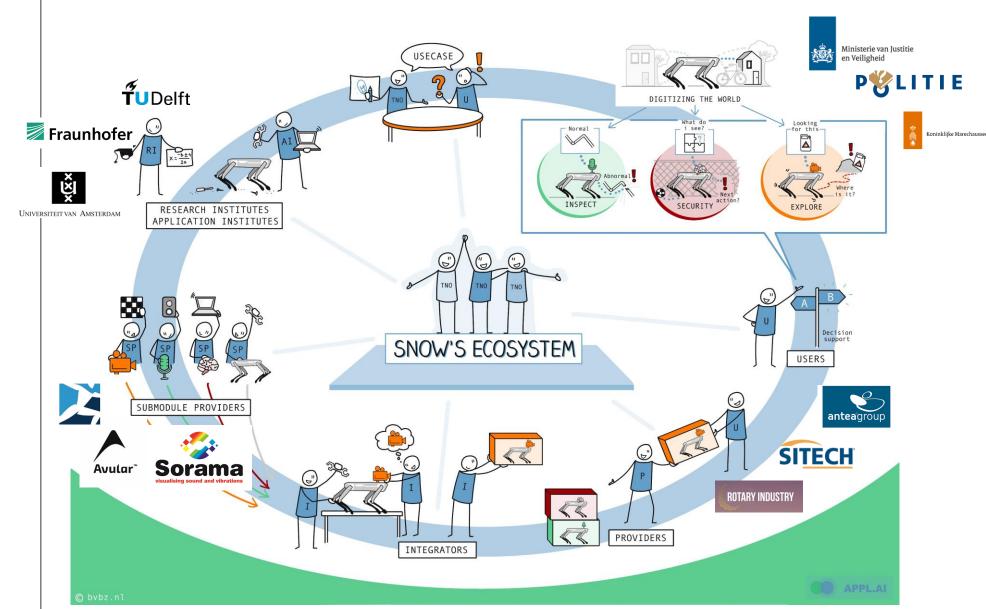


### **CHALLENGES**





### **SNOW ECOSYSTEM - EXTERNAL COLLABORATION**



#### **Research institutes**

<u>Fraunhofer</u>

TU-delft

Universiteit van Amsterdam

#### Submodule providers

<u>Avular</u>

Sorama

**Boston Dynamics** 

#### Integrators/providers?

Sitech

**Rotary Industries** 

Antea Group

#### Users

**KMAR** 

Politie

<u>Dienst Justitiële Instellingen</u>

Ministerie Justitie en veilgheid



