



# IRSC 2022

INTERNATIONAL RAILWAY  
SAFETY COUNCIL

SEVILLA, OCTOBER 16-21, 2022





# JULIEN BOUCAULT

Innovation officer - EPSF



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# MACHINE LEARNING ALGORITHM IN RAILWAY SAFETY CRITICAL APPLICATIONS : A NSA PERSPECTIVE

# INDEX

**AUTOMATIC METRO VS AUTONOMOUS TRAIN,  
WHAT IS SO SPECIFIC WITH MACHINE  
LEARNING ALGORITHM ?**

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**DEMONSTRATING SAFETY, THE HOLISTIC  
APPROACH OF RAILWAY**

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**CHALLENGES AND ISSUES AHEAD**

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# AUTOMATIC METRO VS AUTONOMOUS TRAIN, WHAT IS SO SPECIFIC WITH MACHINE LEARNING ALGORITHM ?

# Automatic metro vs autonomous train – What is the difference ?

- Automatic metro :

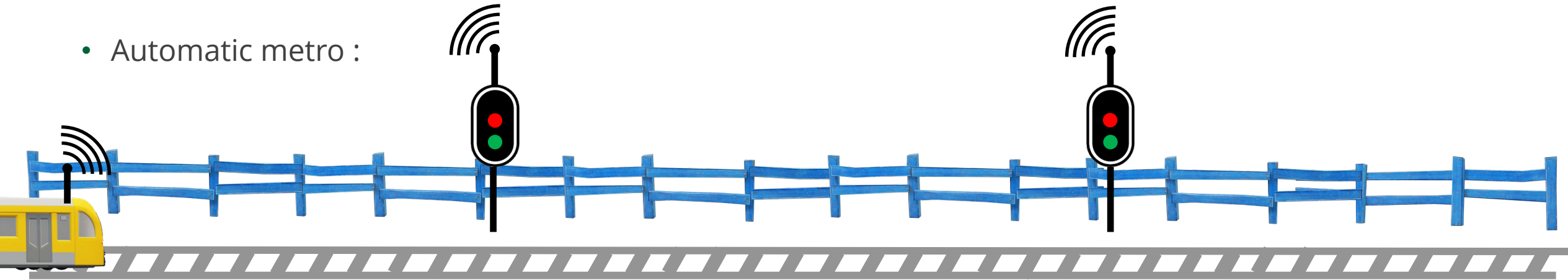


- Autonomous train :



# Automatic metro vs autonomous train - What is the difference ?

- Automatic metro :

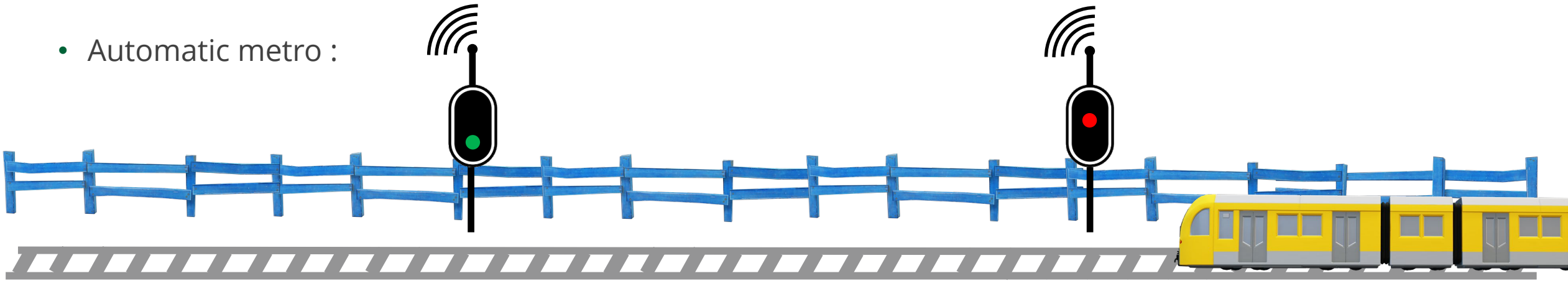


- Autonomous train :

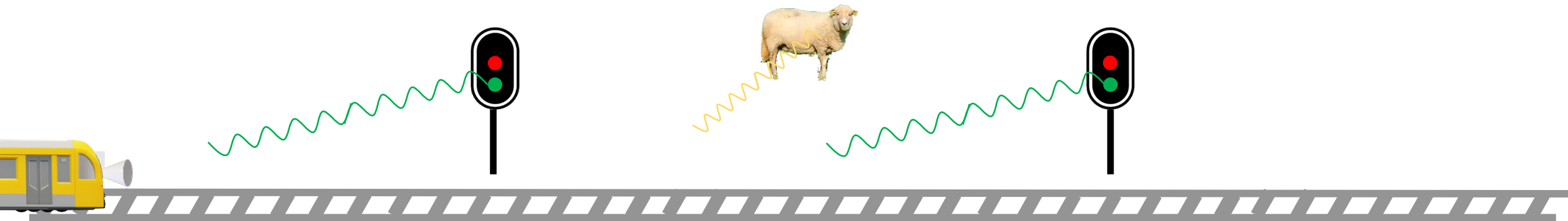


# Automatic metro vs autonomous train - What is the difference ?

- Automatic metro :



- Autonomous train :





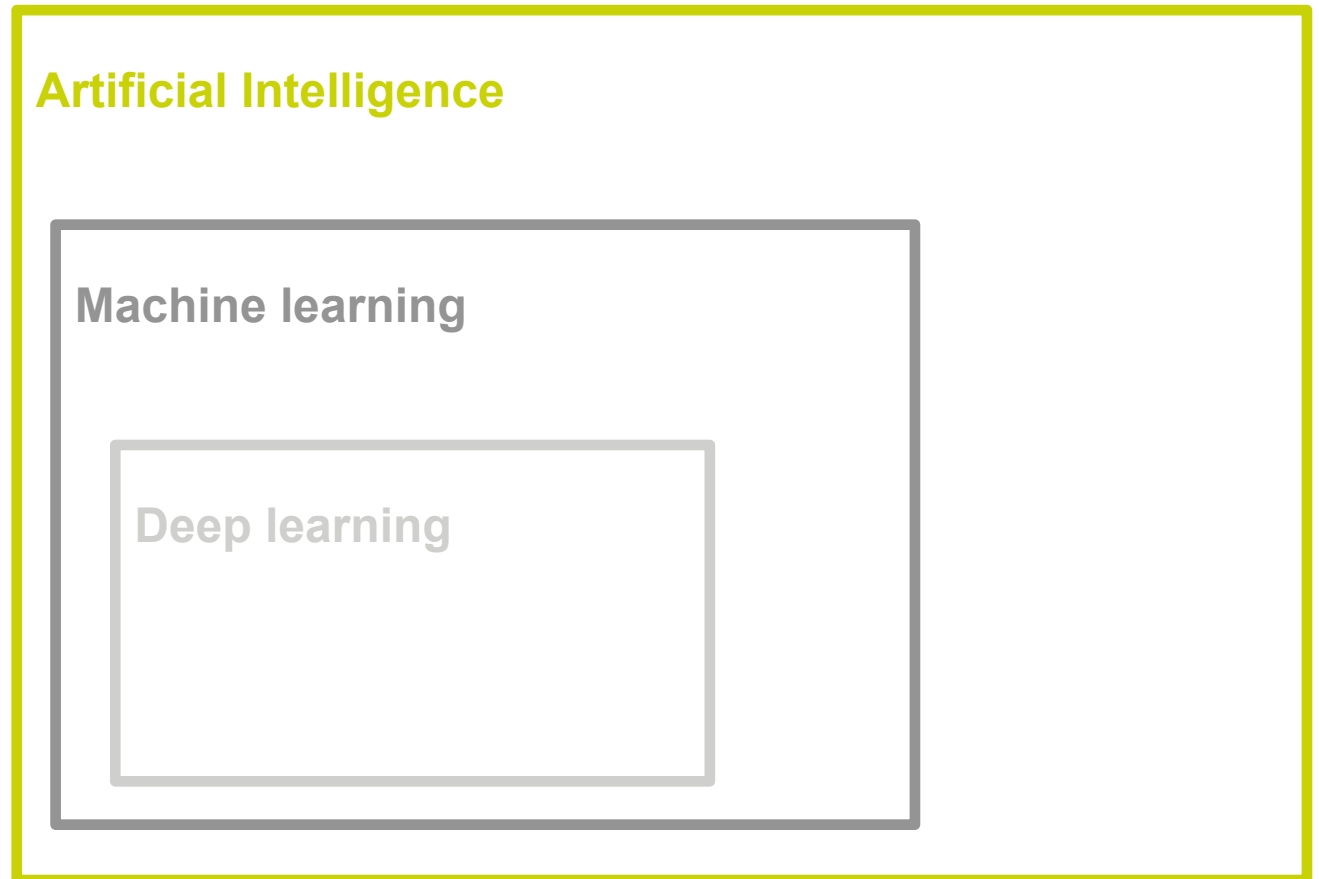
# AI and ML, what are we talking about exactly ?

- What is artificial intelligence (AI) ?



# AI and ML, what are we talking about exactly ?

- What is artificial intelligence (AI) ?
- What is machine learning (ML) ?

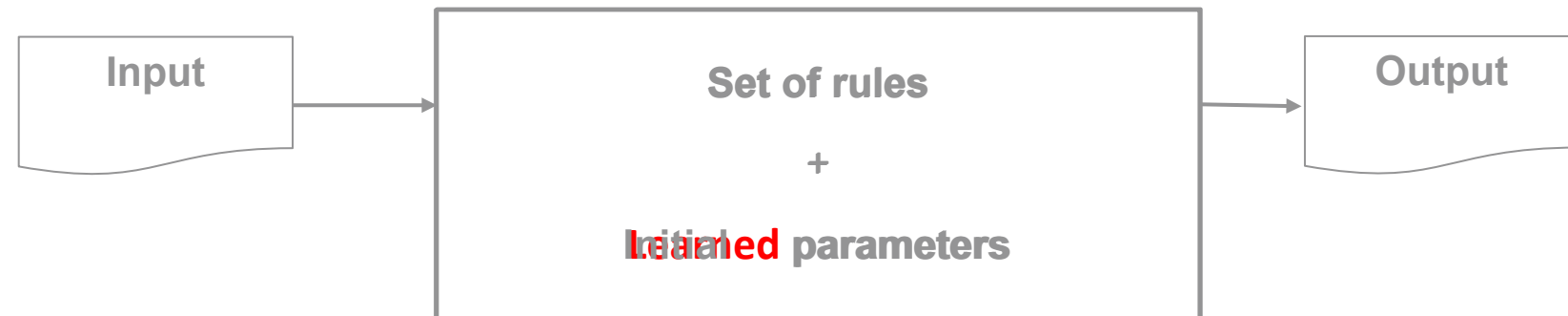


## What is so specific with ML ?

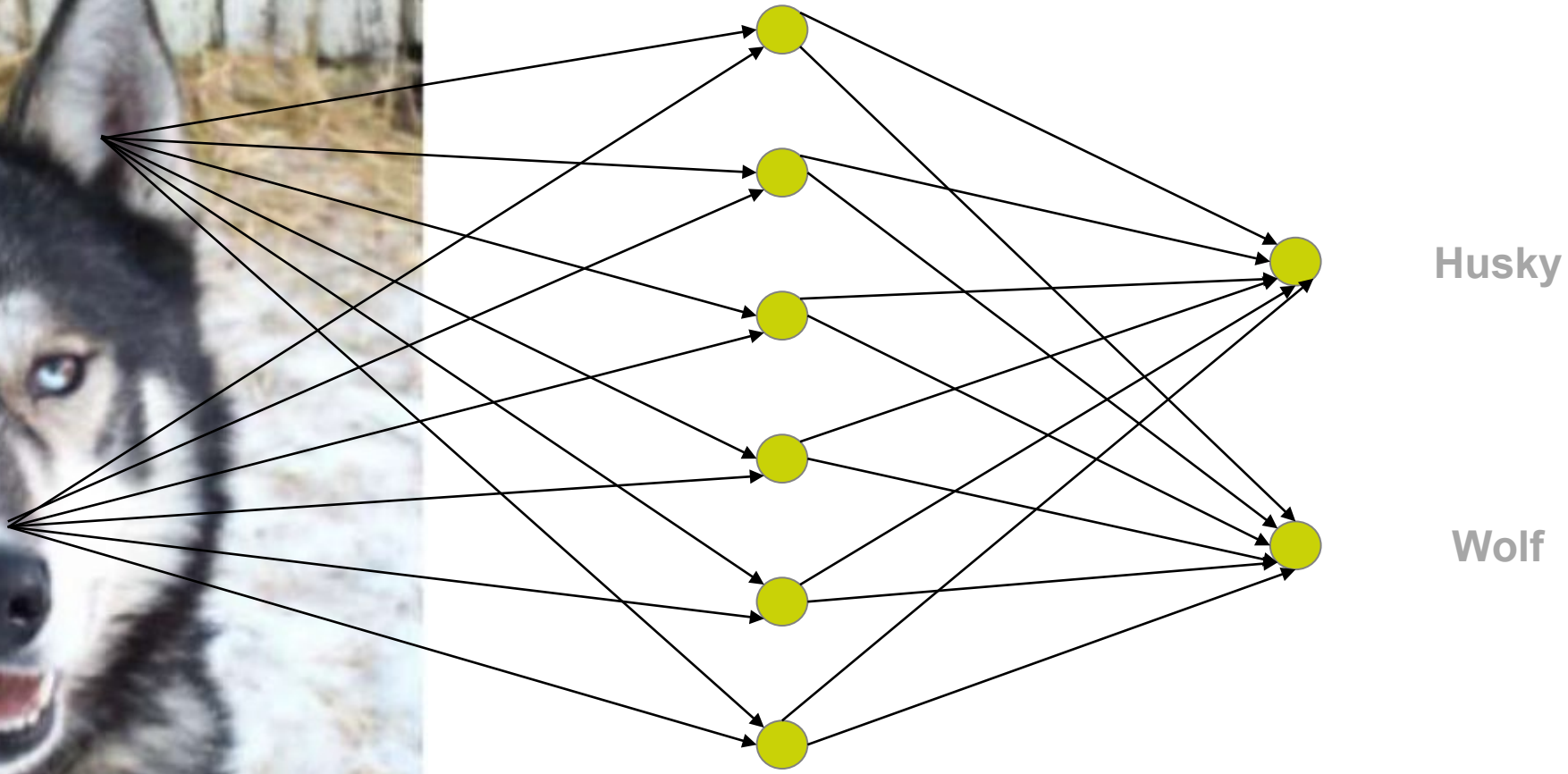
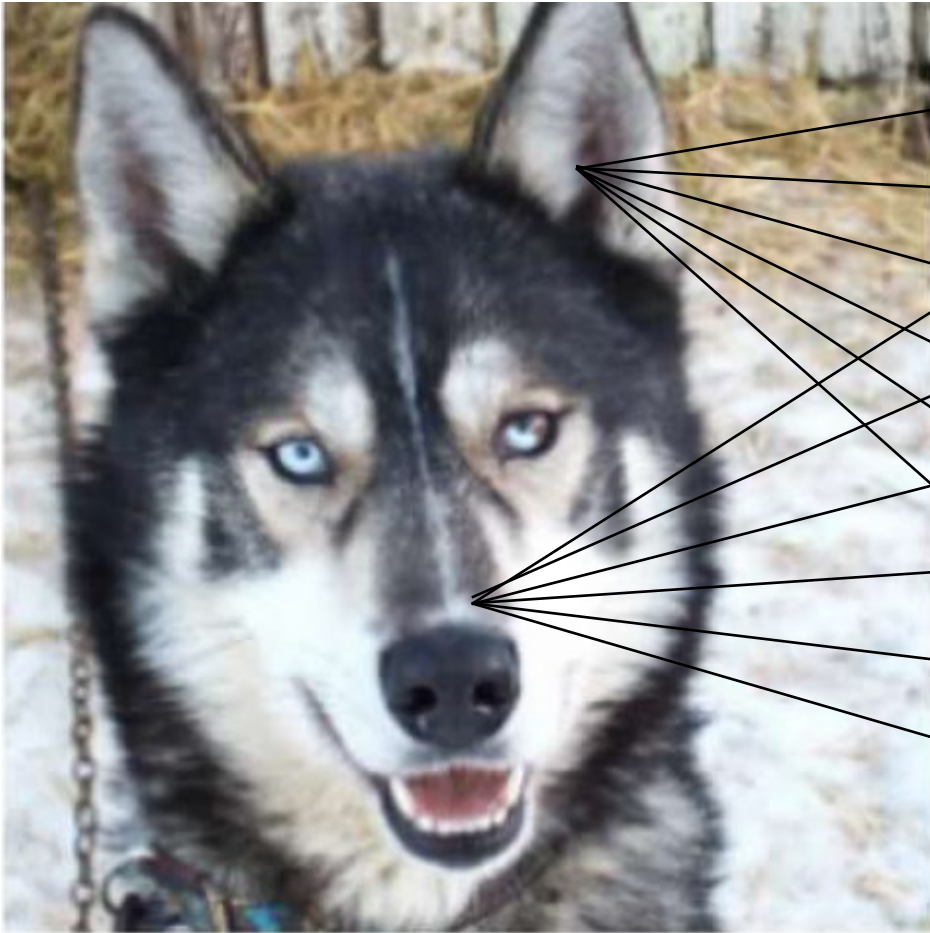
- “Classic” algorithm:



- Machine learning algorithm:



# What is so specific with ML ?



# DEMONSTRATING SAFETY, THE HOLISTIC APPROACH OF RAILWAY

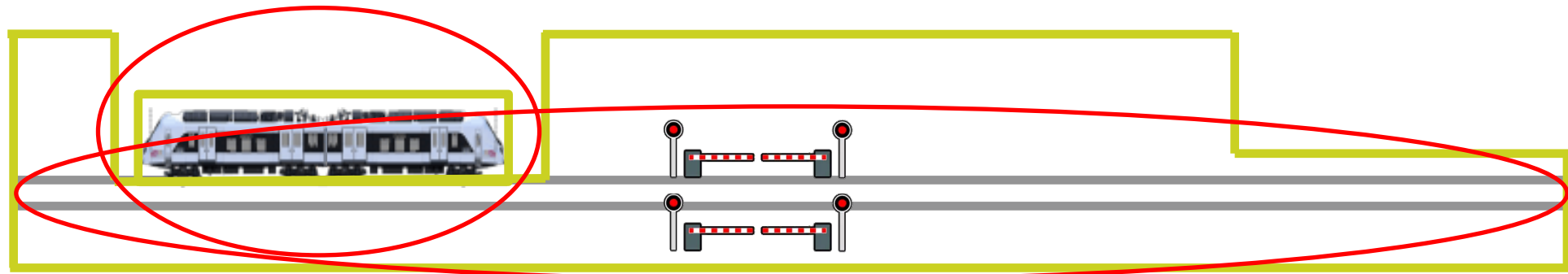


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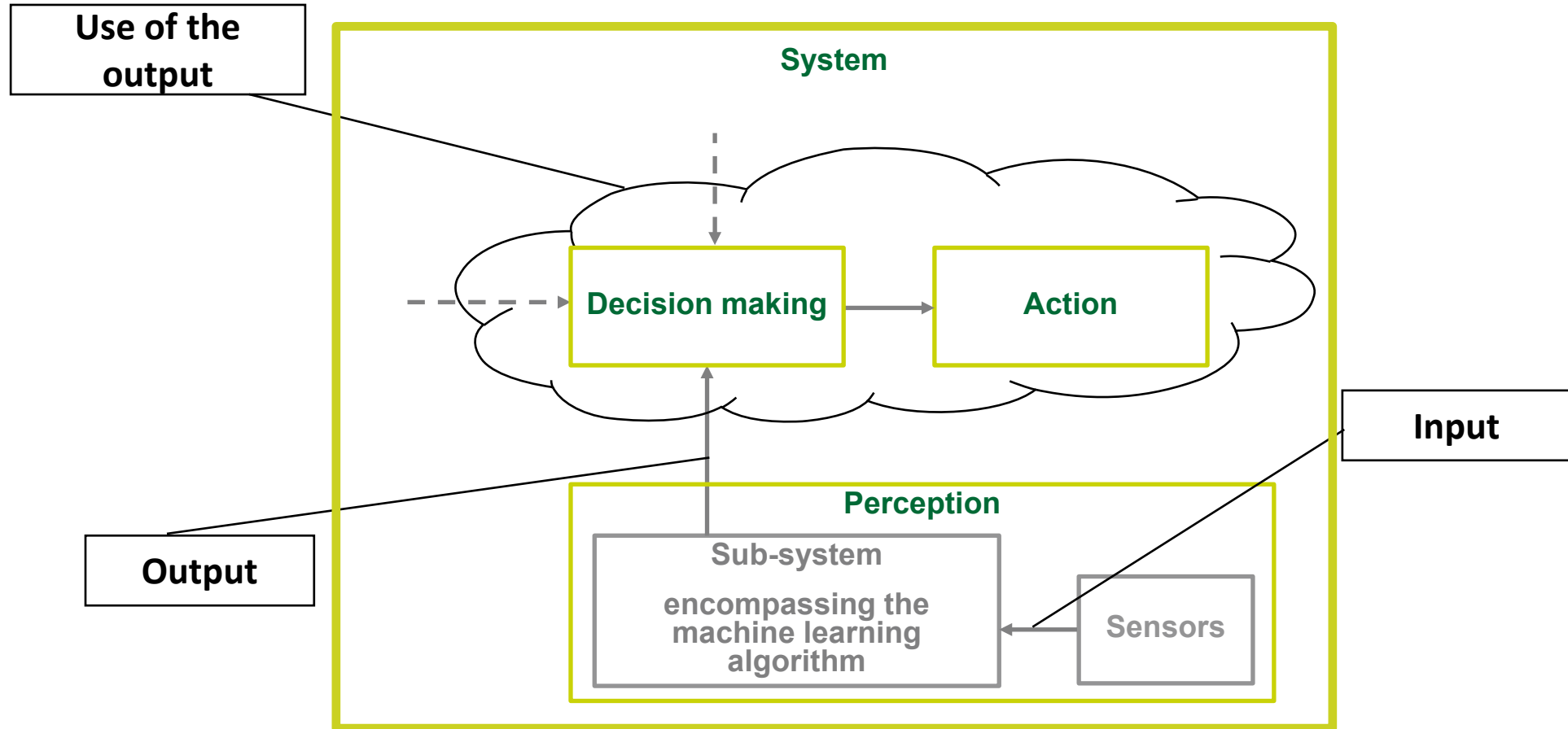


# Authorization within the european interoperable regulatory framework

- Technical systems :
  - Fixed installations ;
  - Vehicle ;
- Entities (safety management system – SMS) ;
  - Railway undertaking ;
  - Infrastructure manager ;



# A holistic approach



# CHALLENGES AND ISSUES AHEAD



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# Three main challenges

**Certifiable**

Auditable

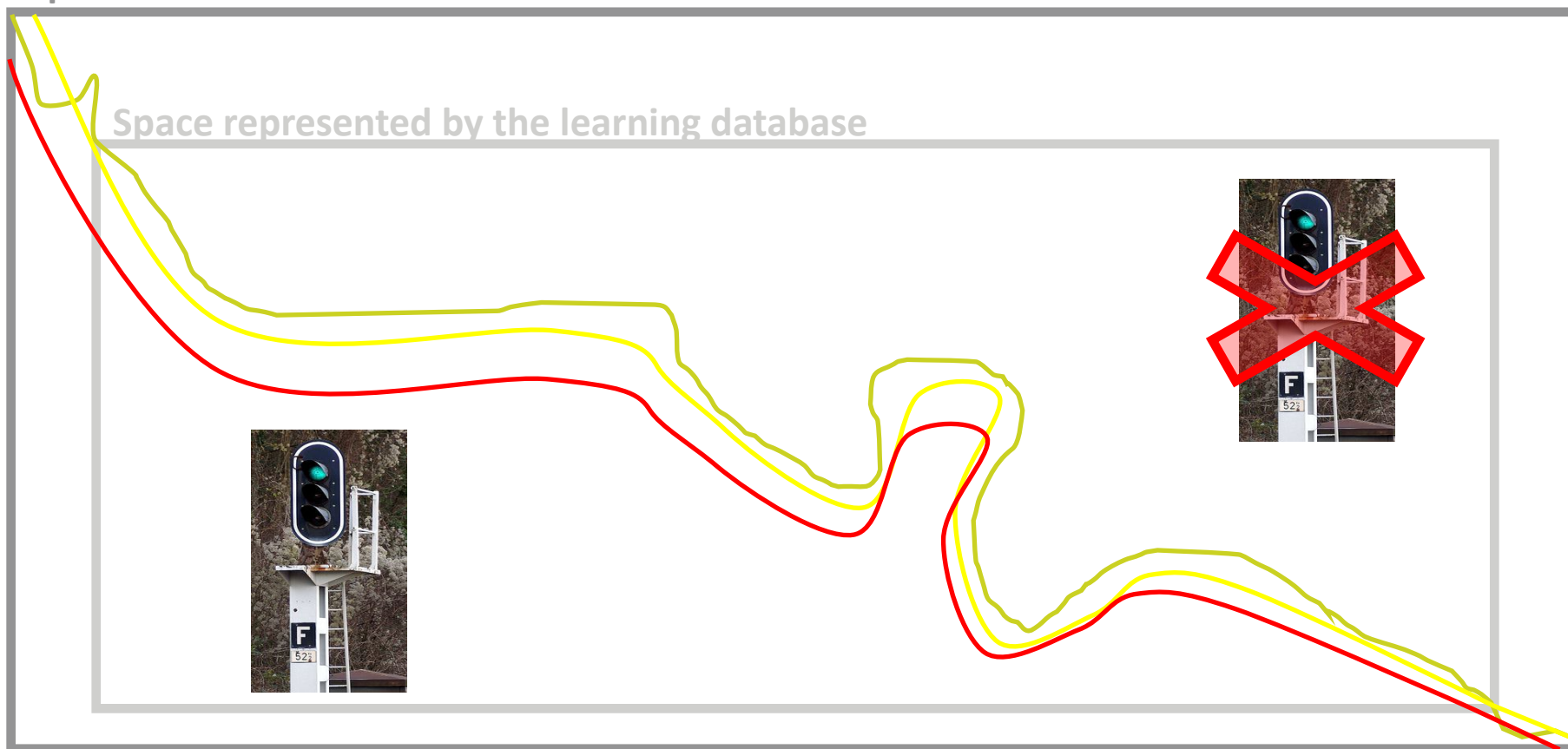
Reproducible

# Three main challenges

**Certifiable**

**Accuracy**

Space of the area of use



# Three main challenges

Certifiable

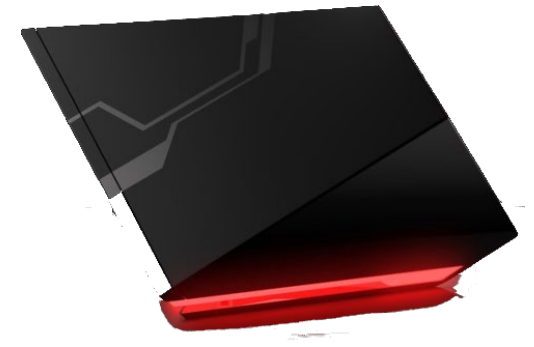
Over time



1977



2022



Tomorrow ?

# Three main challenges

**Certifiable**

**Auditable**

**Reproducible**

# Three main challenges

Auditable

Explainability



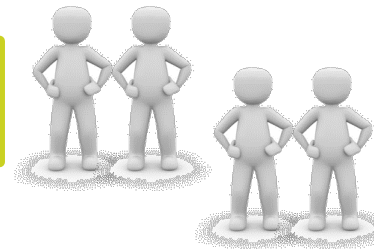
Operator using a tool working with ML



Immediate accident analysis



In-depth accident analysis



Time

# Three main challenges

**Certifiable**

**Auditable**

**Reproducible**

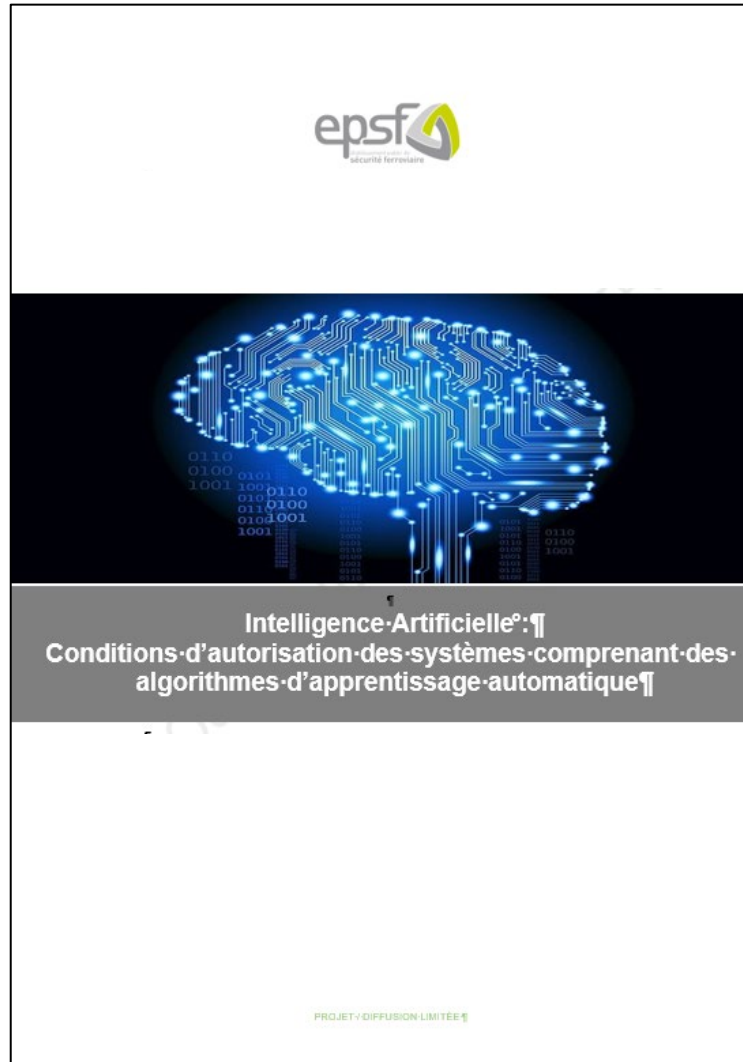
# Three main challenges

Reproducible

Learning



# Position paper...coming soon...







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