



A review of existing Low, Slow, and Small UAS Counter-measures



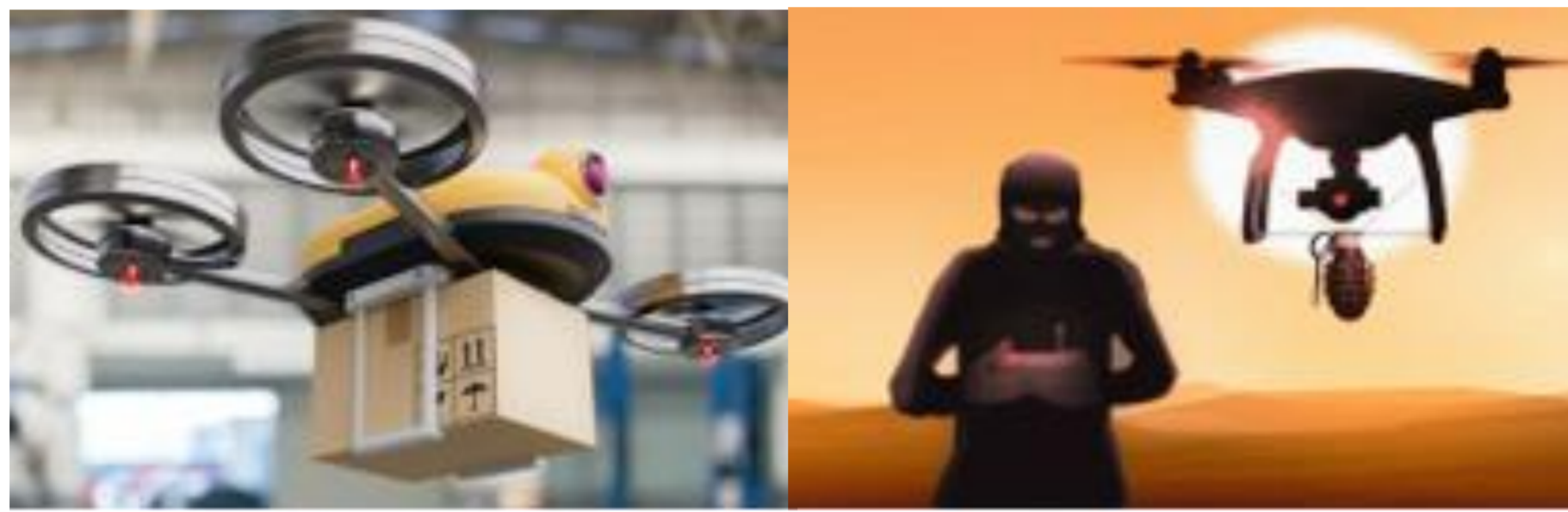
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Research Project

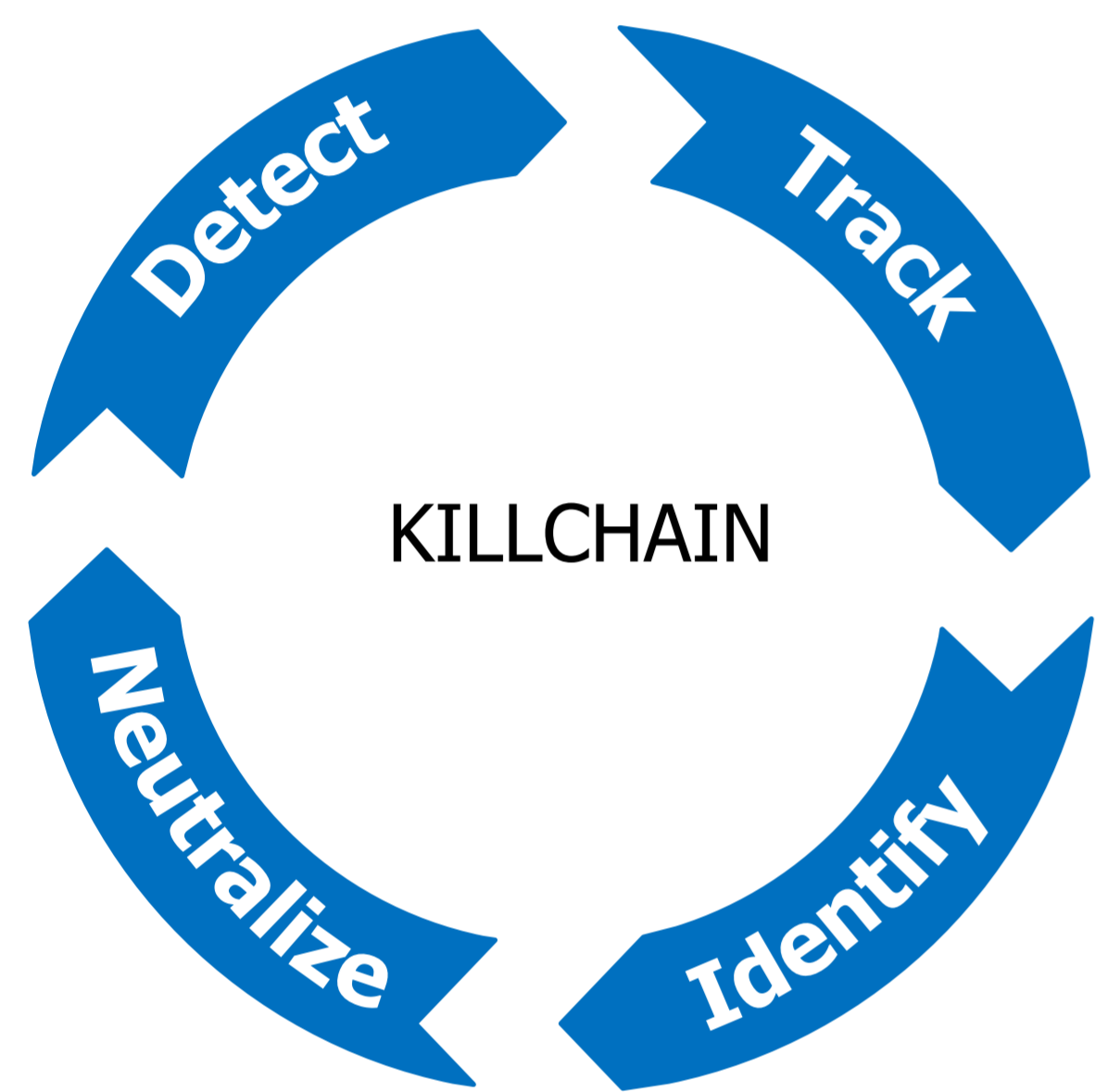
This research project aims at developing a tool able to predict the performance of C-UAS systems on the one side and the risk (induced collateral damage) on the other side, along the kill chain DTIN (Detection-Track-Identification-Neutralization)

Introduction

NATO Class 1 mini and micro UASs subcategories have plenty of applications, including malicious ones



Countermeasures needed



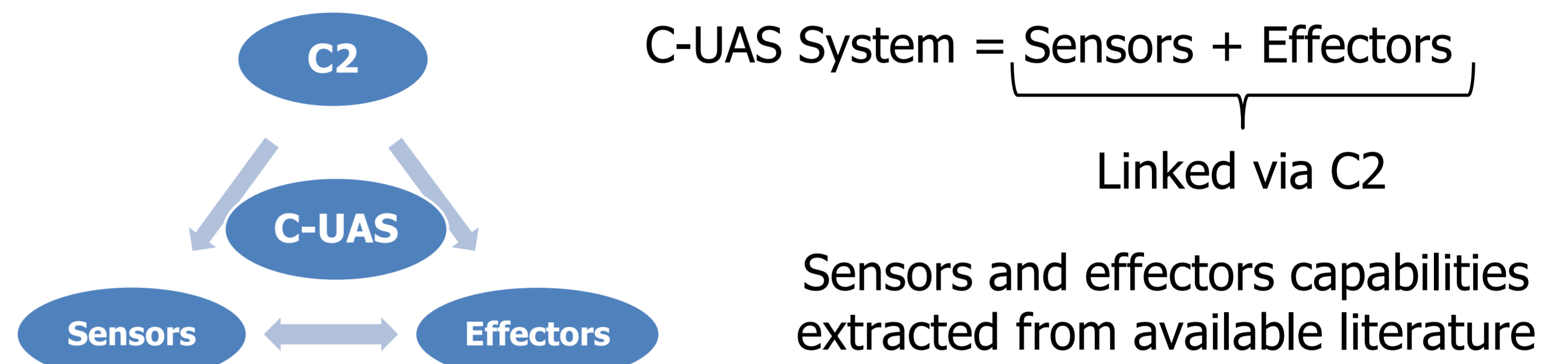
Review of existing systems



Parameters \equiv Performances

Performance analysis is needed

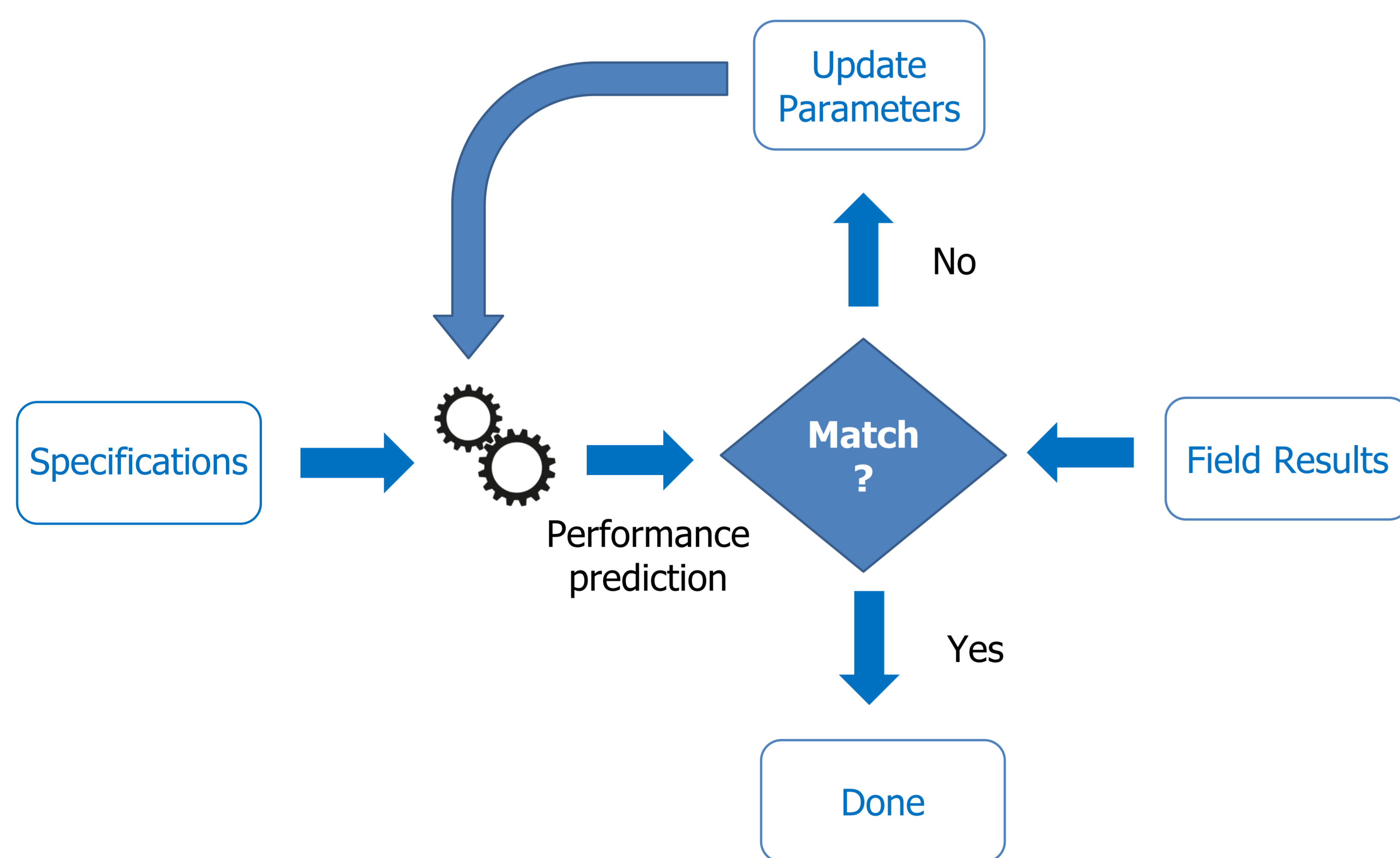
Technology review



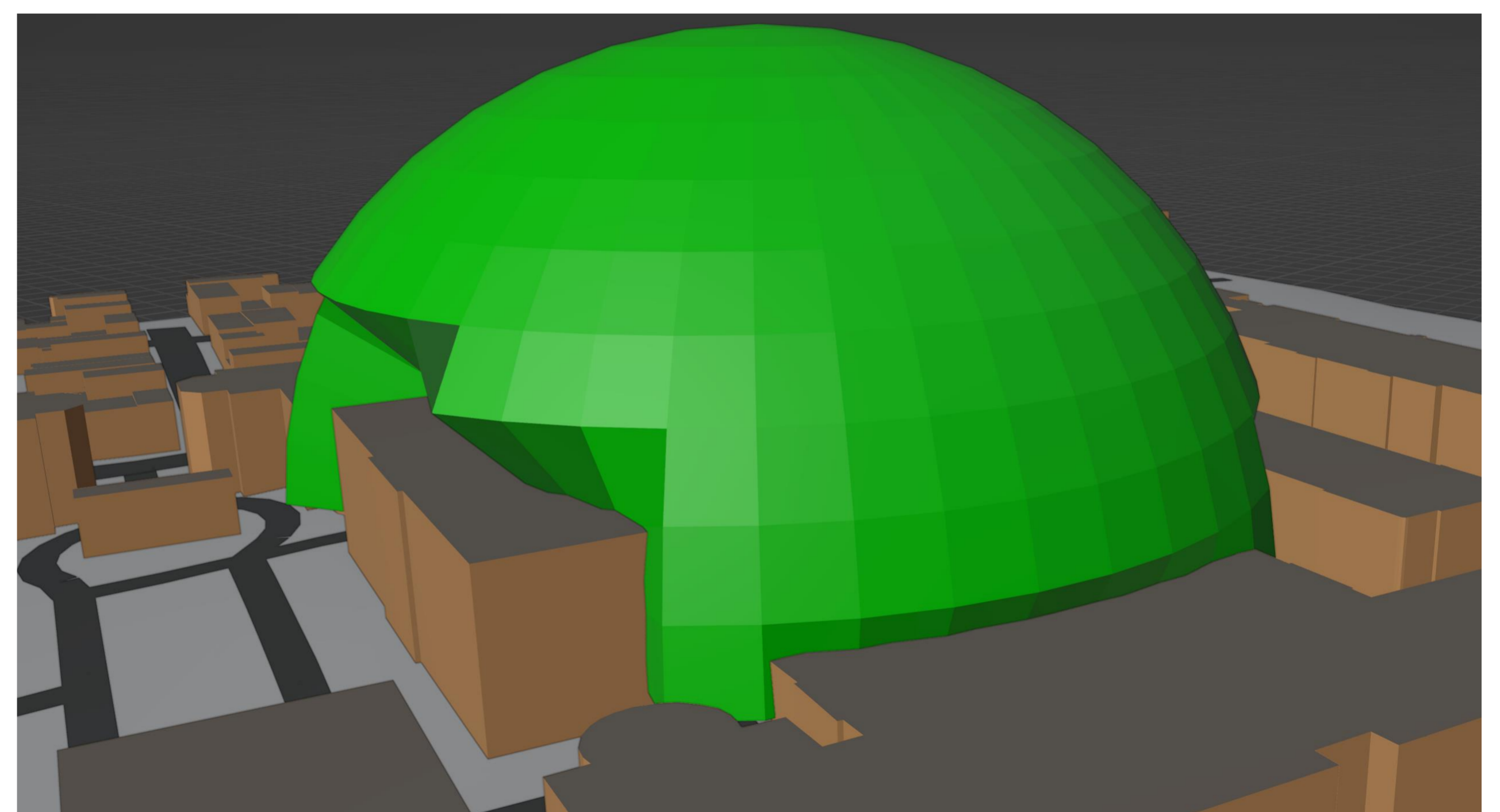
Sensor	LOS	Range	Active/Passive	Detection	Identification	Impact of environment
EO	LOS	Medium	Passive	Possible	Possible	High (rain, fog, ect.)
IR	LOS	Medium	Passive	Possible	Possible	High (rain, fog, ect.)
Acoustic	LOS	Short	Passive	Possible	Difficult	High (noise)
LIDAR	LOS	Medium	Active	Difficult	Possible	High (rain, fog, ect.)
RF	NLOS	Short	Passive	Possible	Possible	High (humidity)
RADAR	NLOS	Long	Active	Possible	Difficult	Low

Effector	LOS	Maximum Range	Kill Mechanism	Target	Impact of Environment
Nets	LOS	< 100 m	Soft	All	Important (wind, rain, etc.)
ABMs	LOS	km	Hard	All	Not important
Missiles	LOS/NLOS	km	Hard	All	Not important
Hunter-Killer Drones	LOS/NLOS	100 m	Hard	All	Important (wind, rain, etc.)
Jammers and Spoofers	LOS/NLOS	km	Soft	Non-fully-autonomous	Important (humidity)
Hijackers	LOS/NLOS	km	Soft	Non-fully-autonomous	Important (humidity)
HELs	LOS	Several km	Hard	All	Important (fog, rain, etc.)
HPMs	LOS	100s m	Hard	All	Not important

Systems



The relevant parameters extracted from literature will be fed into models to predict performance



Based on sensors/effectors parameters and developed models, an action area, represented in greenish color, can be dynamically computed

Conclusions & Future Work

Conclusion

- Lack of data → difficult performance assessment
- Lack of standards → lot of ≠ evaluation metrics
- Dynamic field → keep parameters up-to-date

Future Work

- Combination of an exhaustive set of sensors/effectors
- Various complexity levels
- Collateral damage assessment

