



SPACE CAPABILITY MATRIX

› **DEVELOPMENT AND APPLICATION TOWARD THE CHARACTERISATION OF
SATELLITE CAPABILITIES**

SASKIA BUCHWALDT & JACCO GEUL

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› INTRODUCTION

- › More threats from space to military operations on earth or to our satellites in space
- › From Space Situational Awareness (SSA) to Situational Understanding (SU)
 - Mere detection and identification of adversary satellites is insufficient
 - Characterisation of the capabilities of an observed satellite is critical



The **Space Capability Matrix (SCM)** aims to support the determination of capabilities of adversary satellites through distinctive (sets of) characteristics that can be obtained



› **SCM DEVELOPMENT & IMPLEMENTATION**

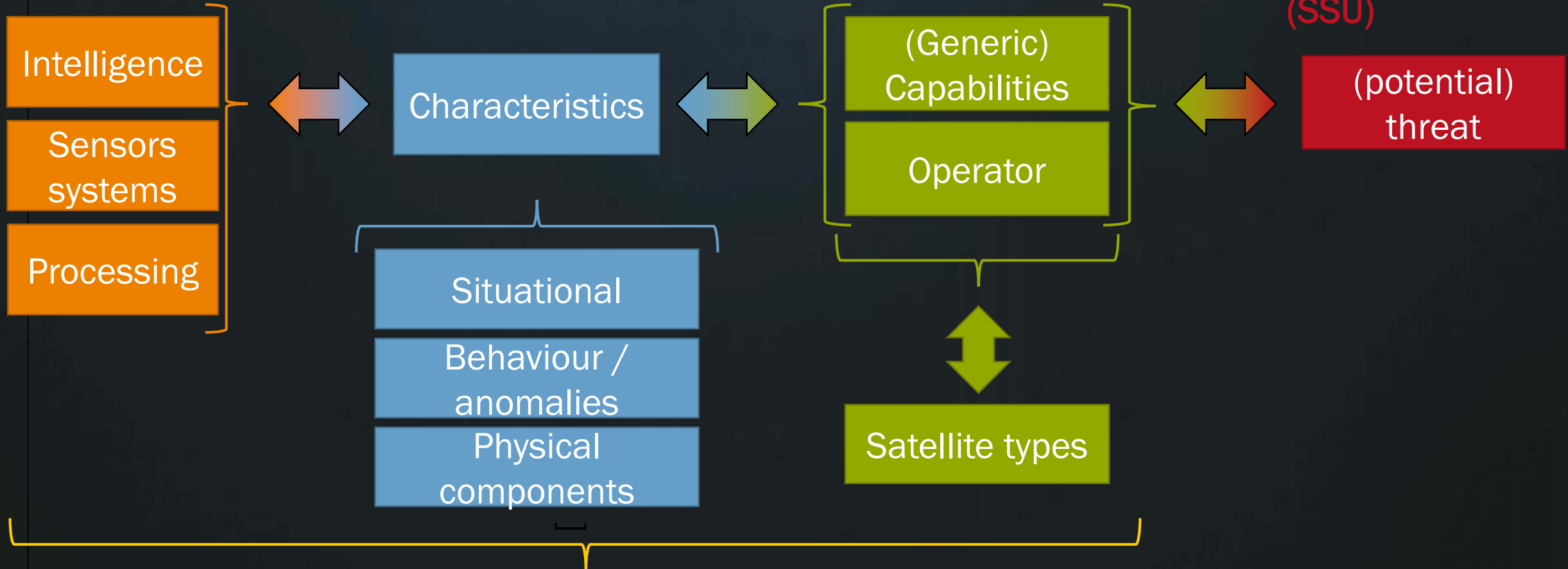
› INFORMATION MODEL

How to observe/
measure/calculate

What to observe/
measure/calculate

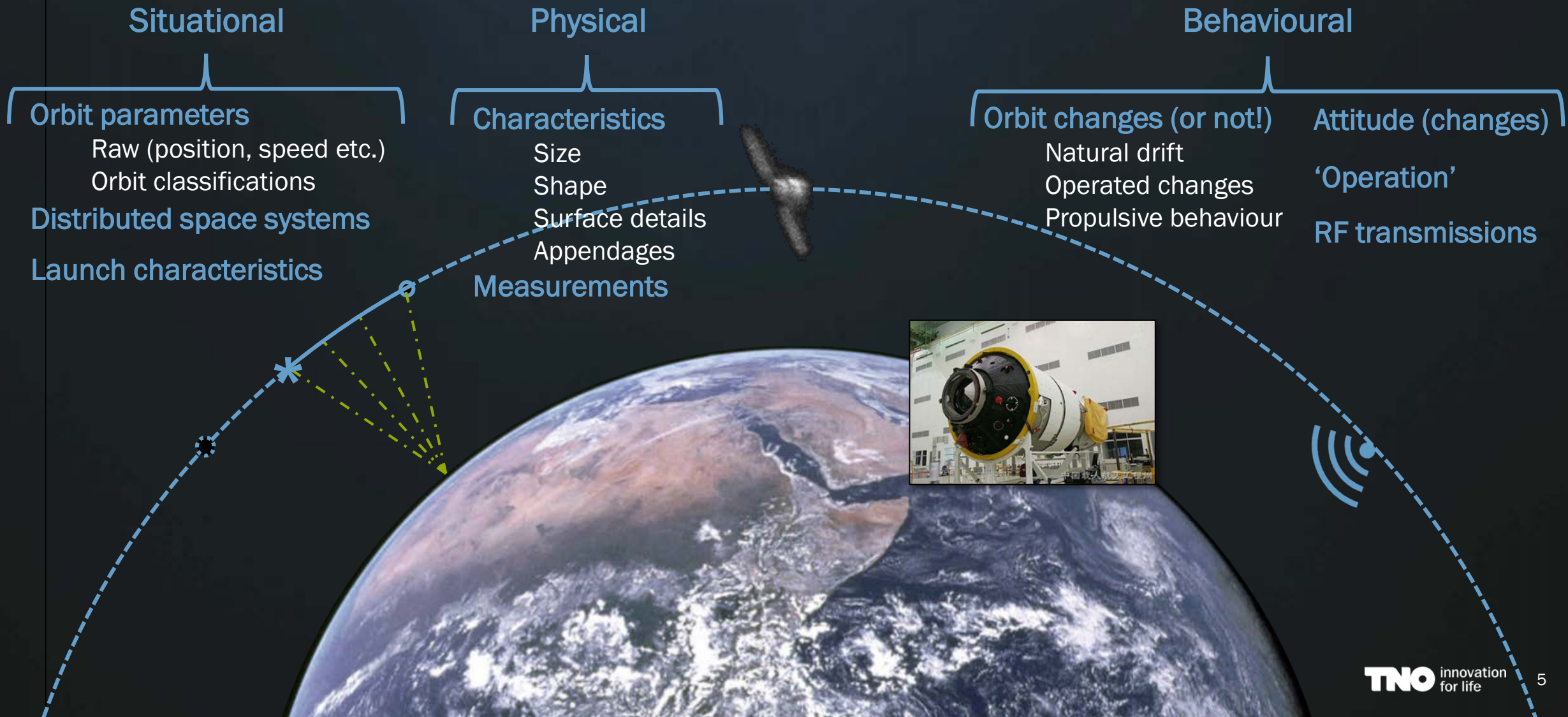
What this implies

Space Situational
Understanding
(SSU)



Space Capability Matrix

SATELLITE CHARACTERISTICS CLASSIFICATION



SCM TOOL FOR PROOF OF CONCEPT

1	Space Capability Matrix		How to observe/measure/calculate			What it implies		Analysis
2	What to measure/observe/calculate		Intelligence	Sensor systems	Processing	Generic capabilities and operator	Satellite types (per main purpose)	Case
3	Characteristics							
4	Main category	Subcategories						
5	Level 0	Level 1						
6	Situational characteristics							
7		Orbit parameters						
		Distributed space system						
56								
61		Launch characteristics						
67	Behavioural characteristics							
68		Operation						
71		Orbit changes (or not)						
81		Attitude changes						
89		Radiofrequency (RF) transmissions						
108	Physical characteristics							
109		Measurements						
111		Satellite characteristics						



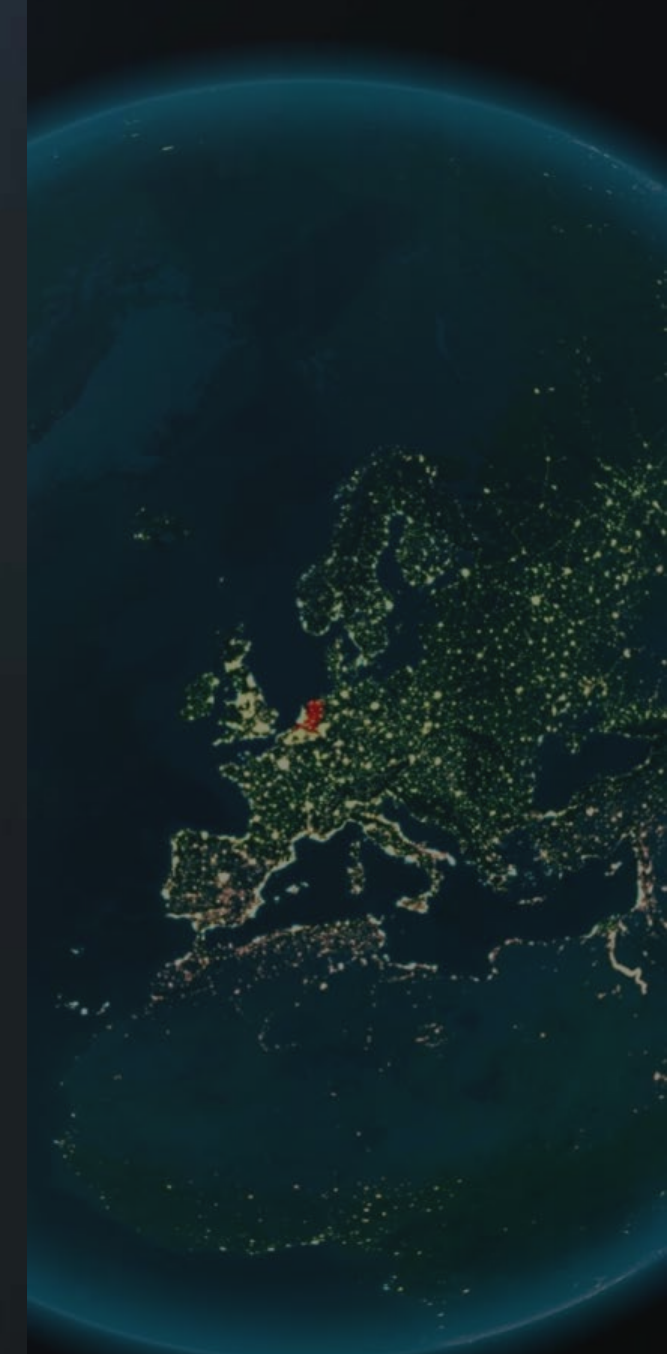
› **INTENDED USE**

SPACE CAPABILITY MATRIX

› APPLICATION – 1/2

1. Operational application

- › Determining capabilities of unfamiliar space systems
- › Determining optimal sensor assignment tasking for capability refinement



› **PROOF OF CONCEPT** **HYPOTHETICAL CASE**

Step 1: Initiation

Step 2: Characterisation

2.a: Gathering information & data processing

2.b: Entering data into the SCM

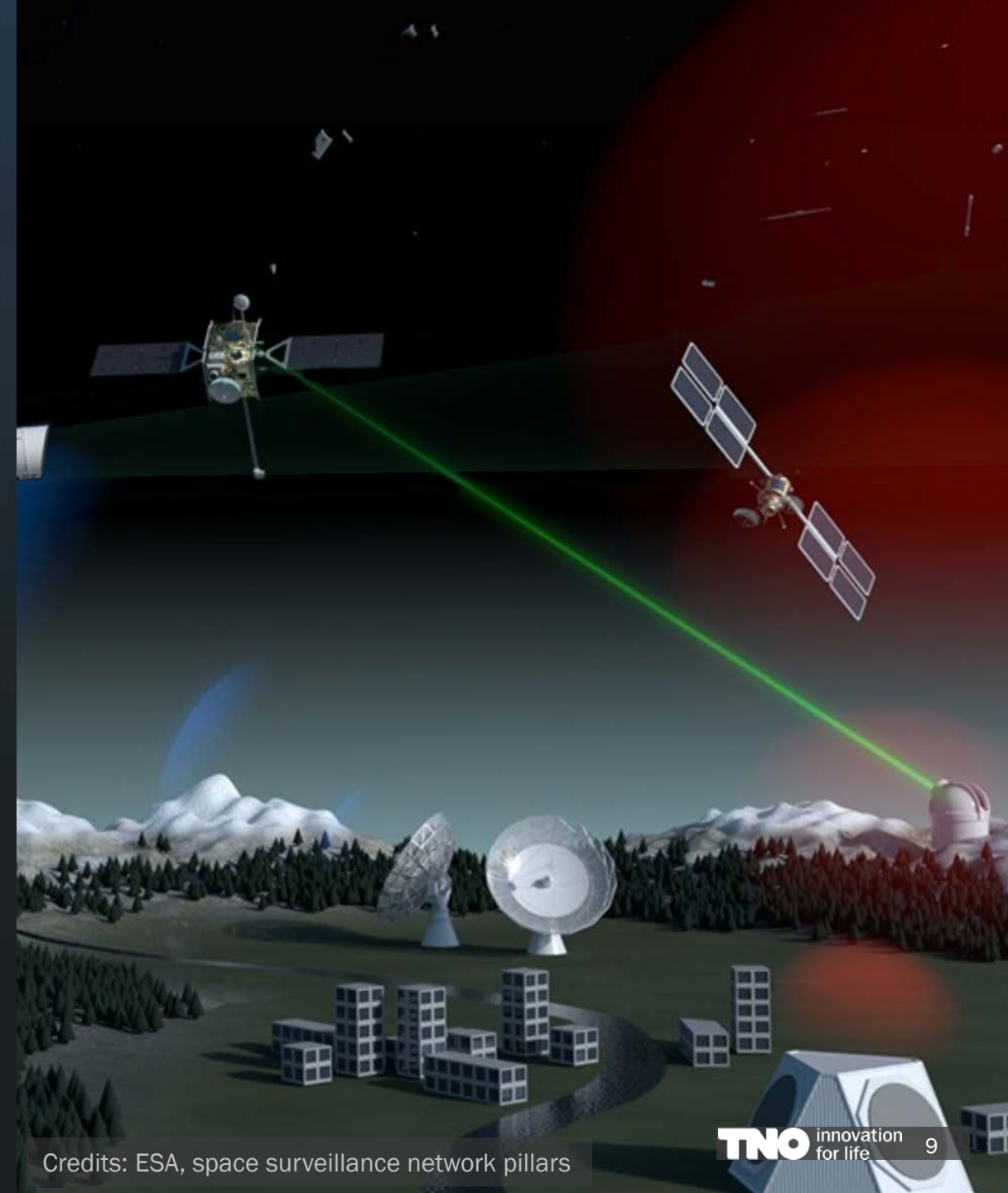
2.c: Determining (generic) capabilities

Step 3: Follow-on research

3.a: Identifying data gaps of opportunity

3.b: Gathering additional data

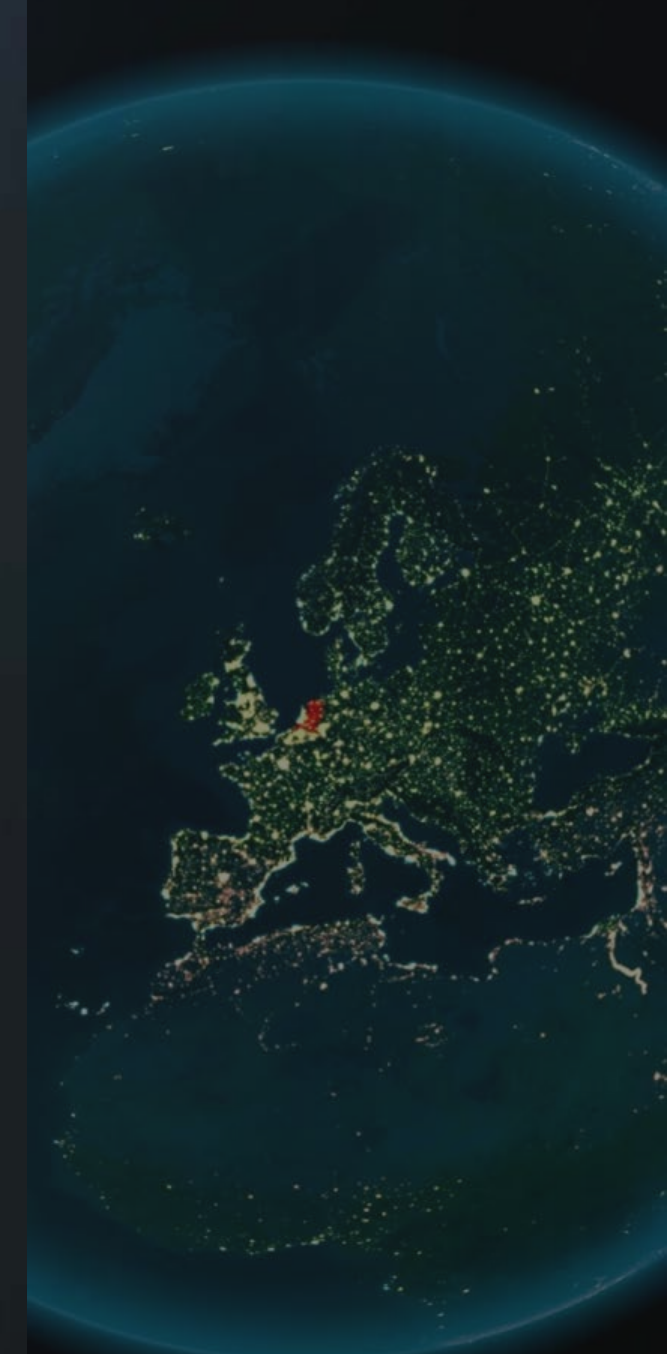
3.c: Refining capabilities



› APPLICATION – 2/2

2. Planning and development application

- › Determining a characteristics gap
- › Determining required data and information processing capabilities
- › Qualitative comparison of various observation and processing capabilities and input for larger trade studies
- › Requirements definition on the development of observation and processing capabilities



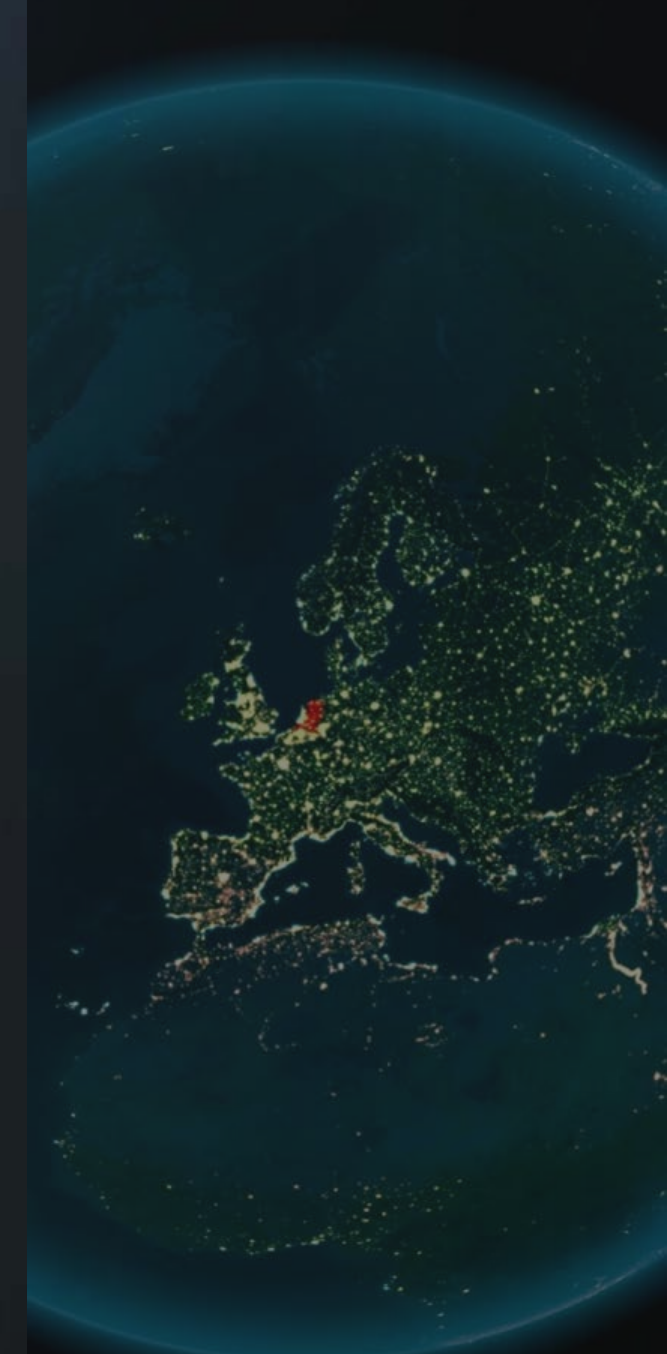
› CONCLUSIONS

Operational application: SCM supports (in case setting)

- › Identification of the capabilities of the satellite under investigation by registering its characteristics
- › Determination of information sources that could confirm or exclude distinguishing characteristics for further narrowing down potential capabilities

Planning and development application:

- › Used in directing in-house technological development projects



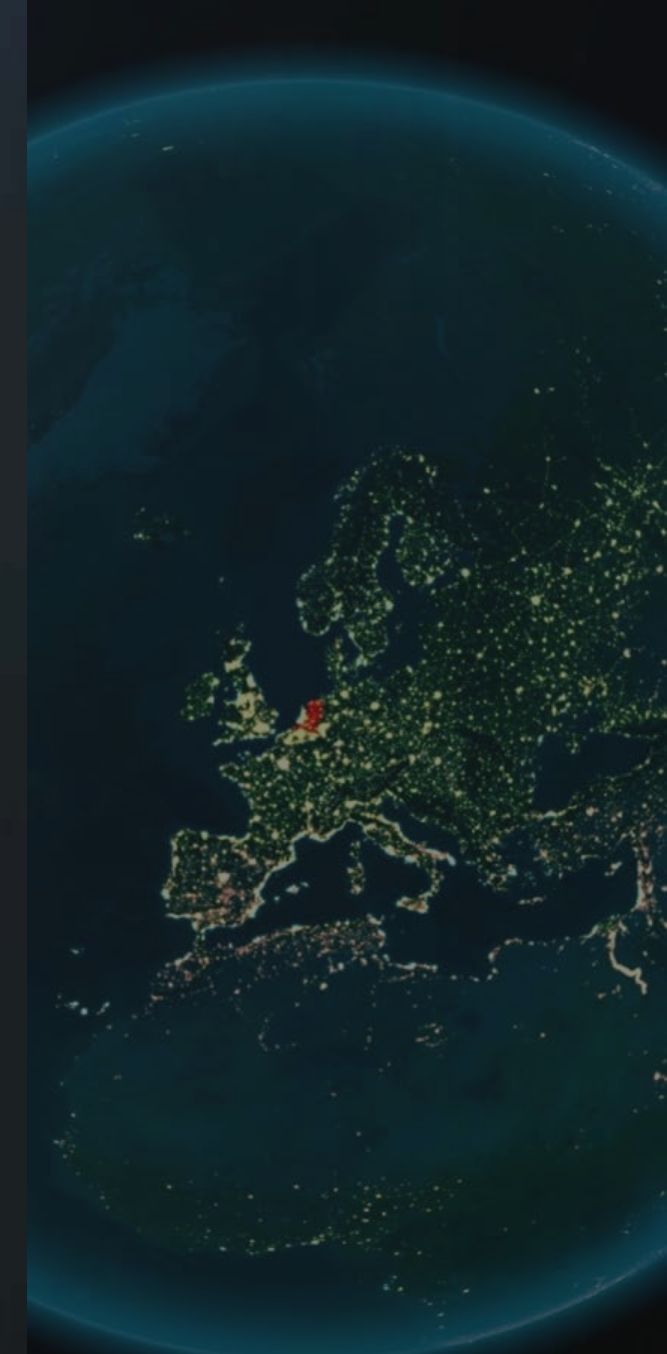
› **FURTHER RESEARCH**

(Concept) development:

- › Testing in simulated and operational setting
- › Improving outcome by finding more distinguishing characteristics via use more data (sources) / intelligent processing

Application:

- › Developing a more user friendly and task suitable tool
- › Further explore planning and development application



› **THANK YOU
FOR YOUR TIME**

Saskia Buchwaldt¹ and Jacco Geul²

TNO Defence Safety and Security

Oude Waalsdorperweg 63

2597 AK Den Haag

THE NETHERLANDS

¹saskia.buchwaldt@tno.nl ²jacco.geul@tno.nl