

Network Centric Command and Control by means of Picture Compilation and Sensor Management



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Force Vision
*centre for automation of
mission-critical systems*

Developments

Introduction

Knowledge
Analysis

Command
and Control

Sensor
Management

Results

Questions

- different functions/tasks
- different controls
- similar and/or complementary information

- ☐ implementation of new, complex sensors
- ☐ reduction of education/training times
- ☐ smaller crews
- ☐ shift in mission objectives



SMART-L



SIRIUS



APAR



MIRADOR

24-6-2010



Problem Definition

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Questions

1. sensor management is becoming increasingly knowledge intensive due to shift in mission objectives and sensor complexity.
2. the available amount of combined operational and technical knowledge necessary for sensor management is decreasing.

24-6-2010



Sensor Management Requirements

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1. support the compilation of a **complete** and **accurate** (timely) picture of the environment
2. provide weapon guidance functions

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Picture Compilation

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Operator decisions :

- ☐ when to use which sensor and sensor function for picture compilation or weapon assignment while taking into account:
 - ☐ Emission Control plans
 - ☐ Rules Of Engagement
- ☐ how to set a sensor for optimal results with respect to the mission objectives and meteorological/geographical conditions

24-6-2010



Required Knowledge

Introduction

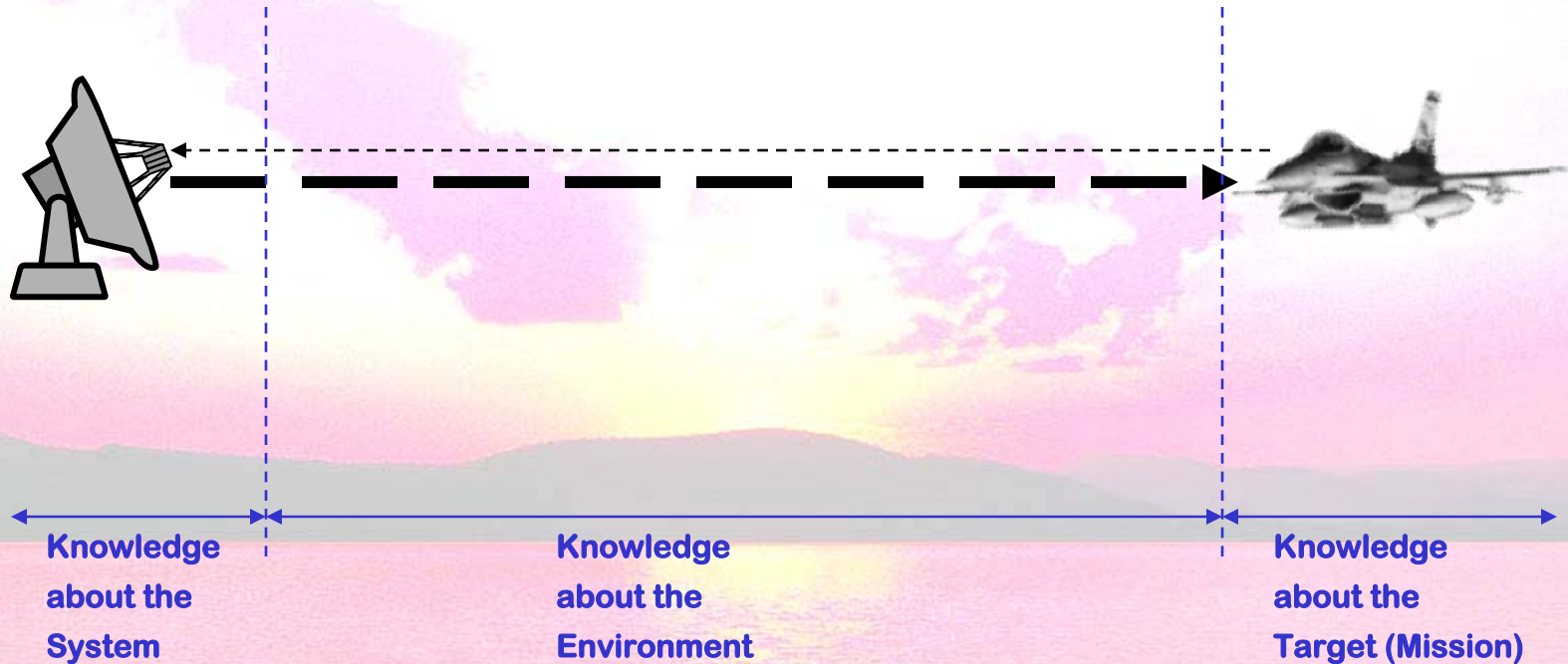
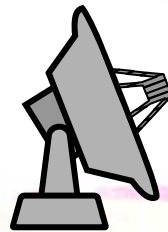
Knowledge
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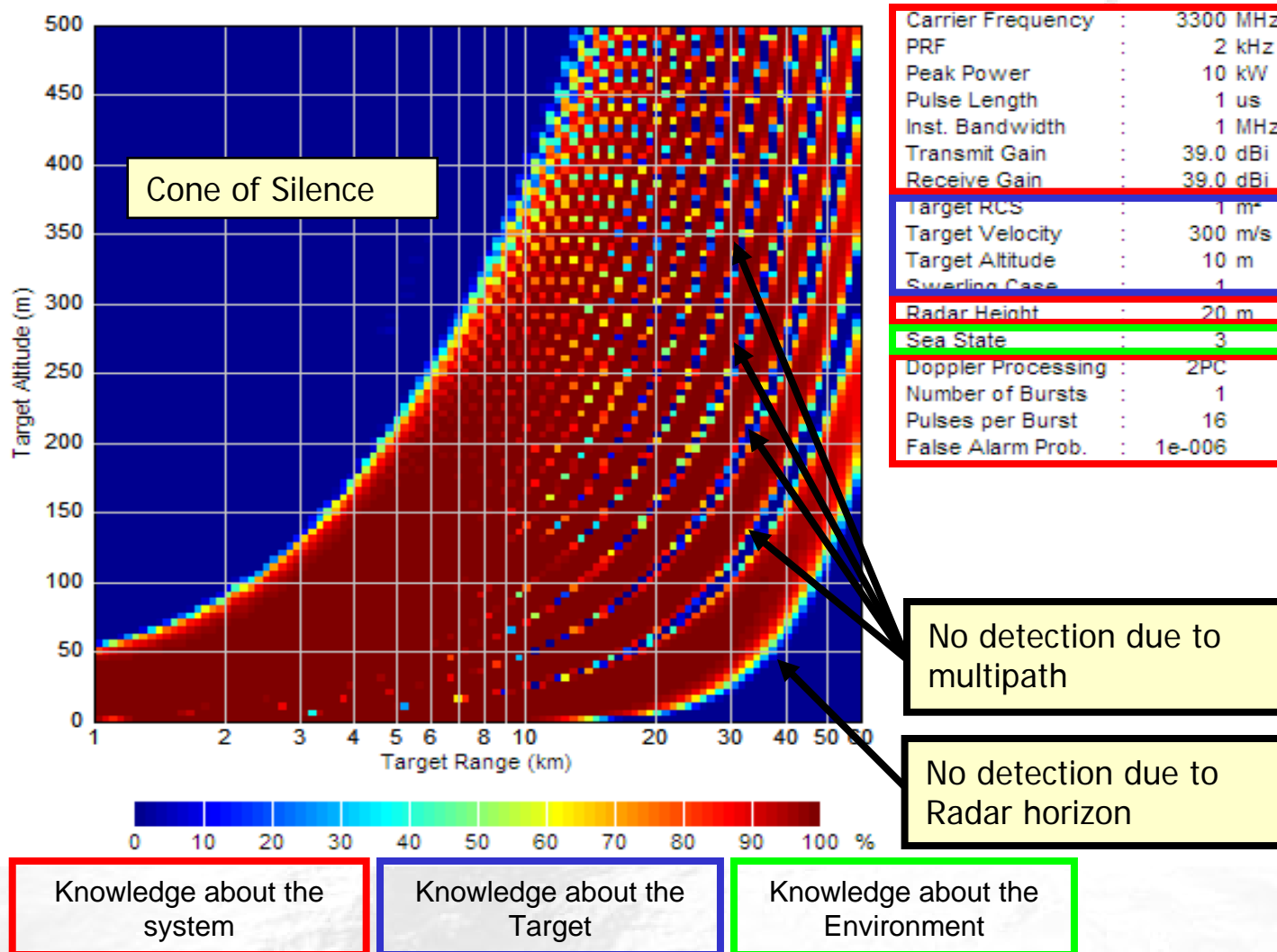


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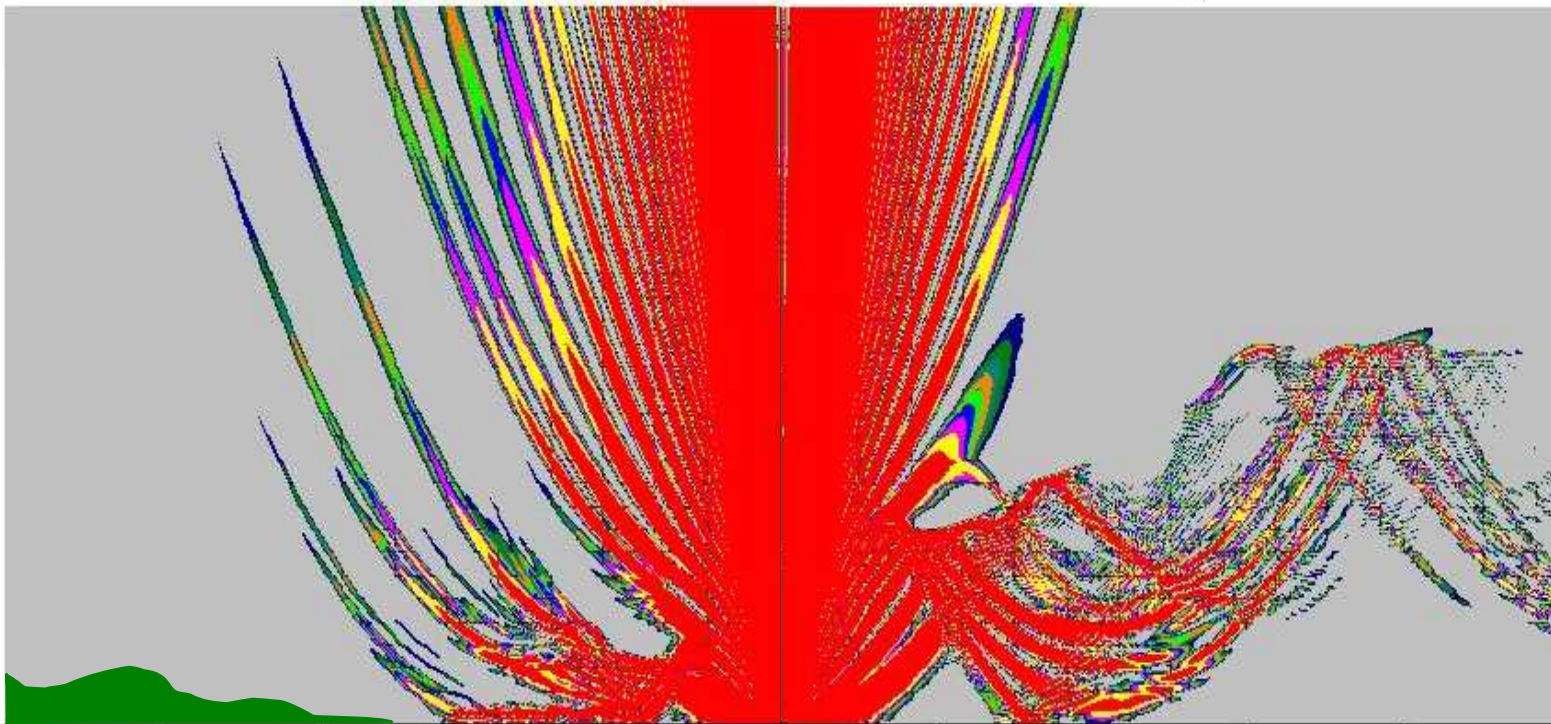


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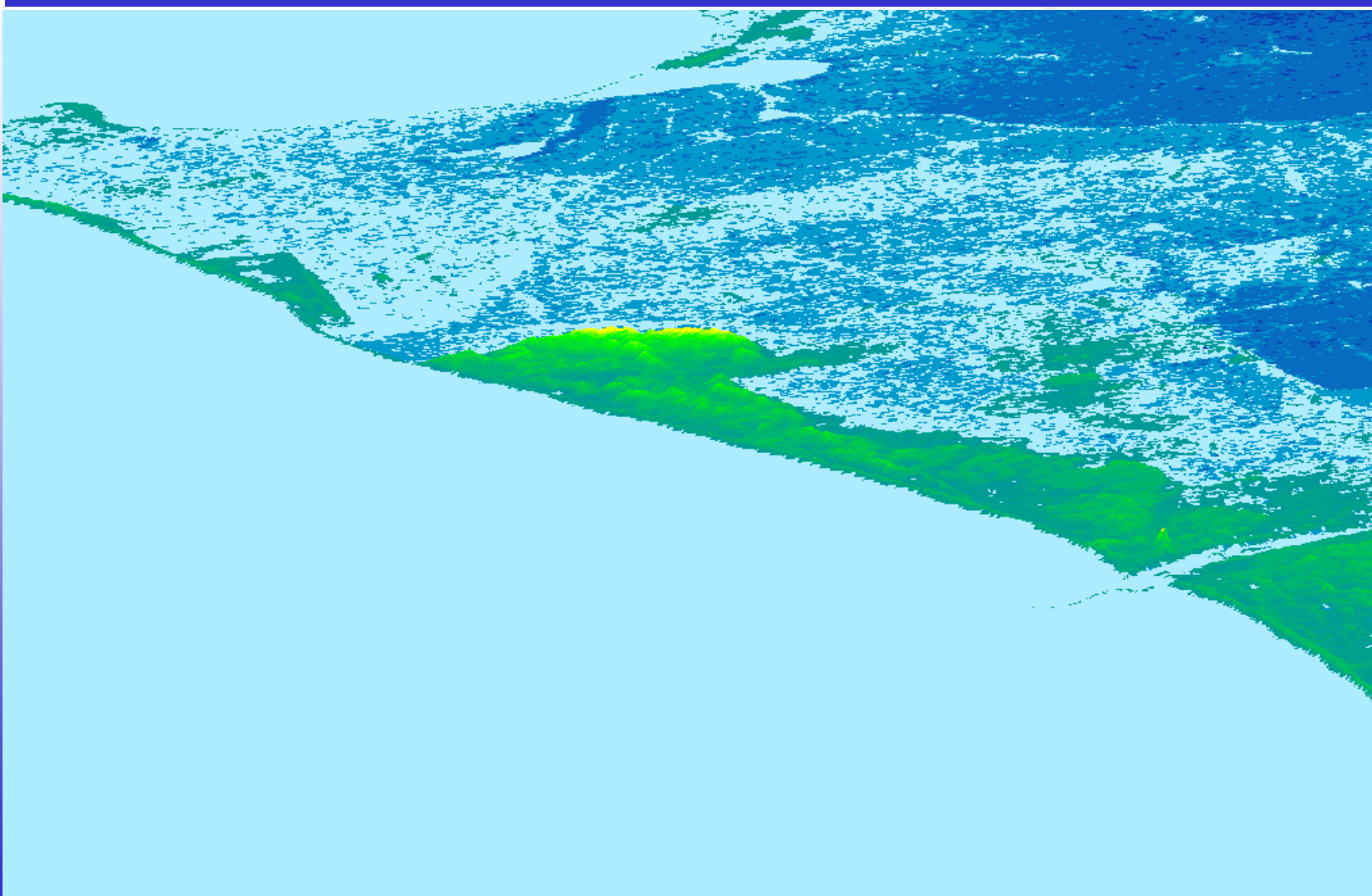
Sensor Performance Models



Environmental Influences



Geografical Information



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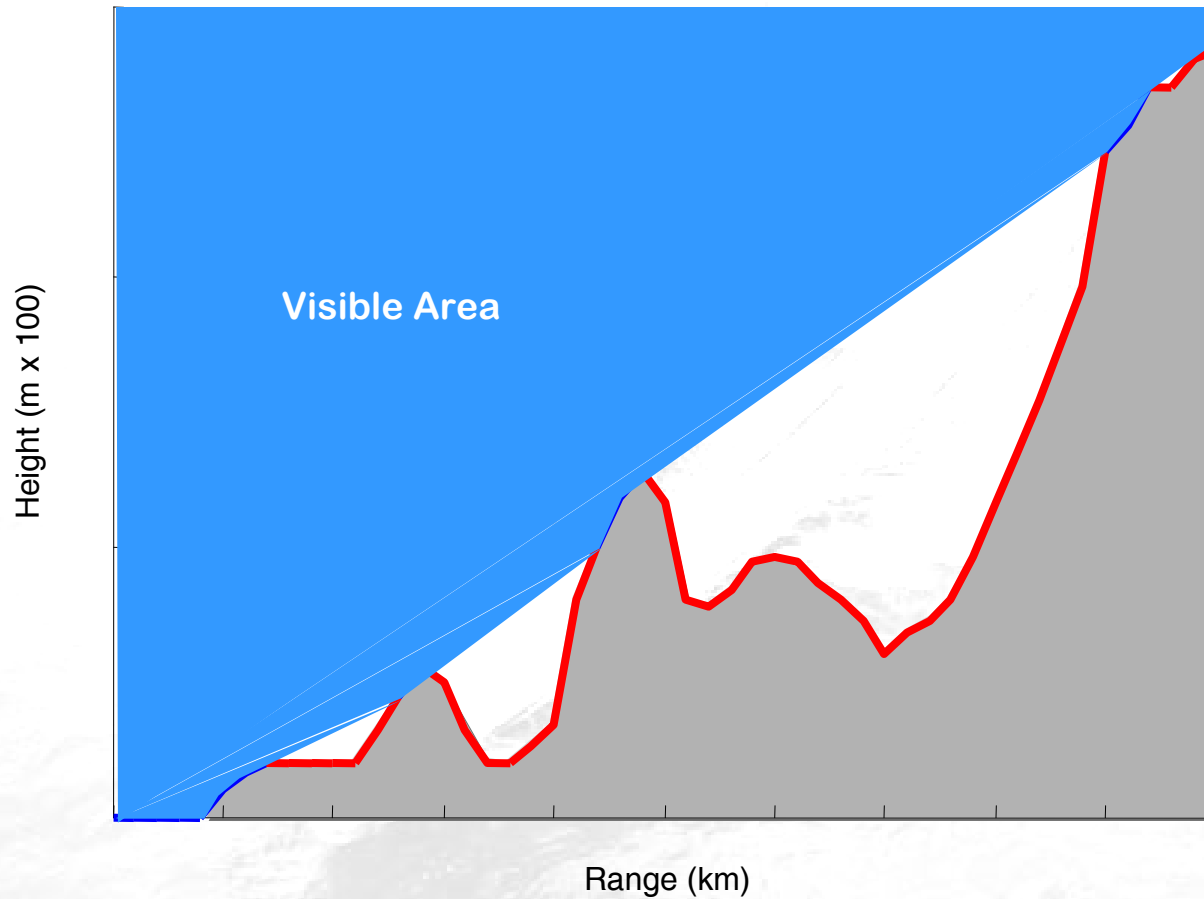
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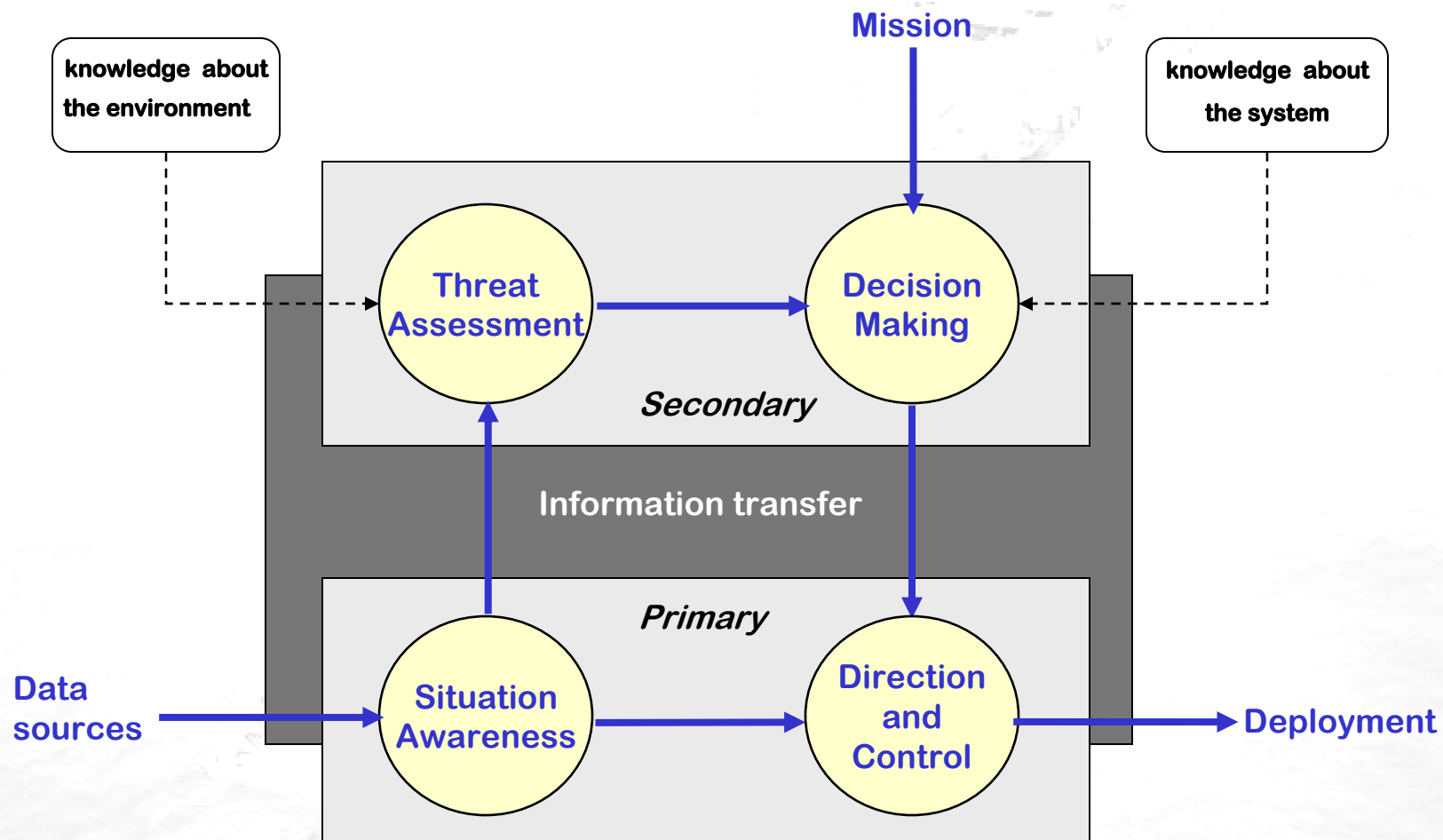
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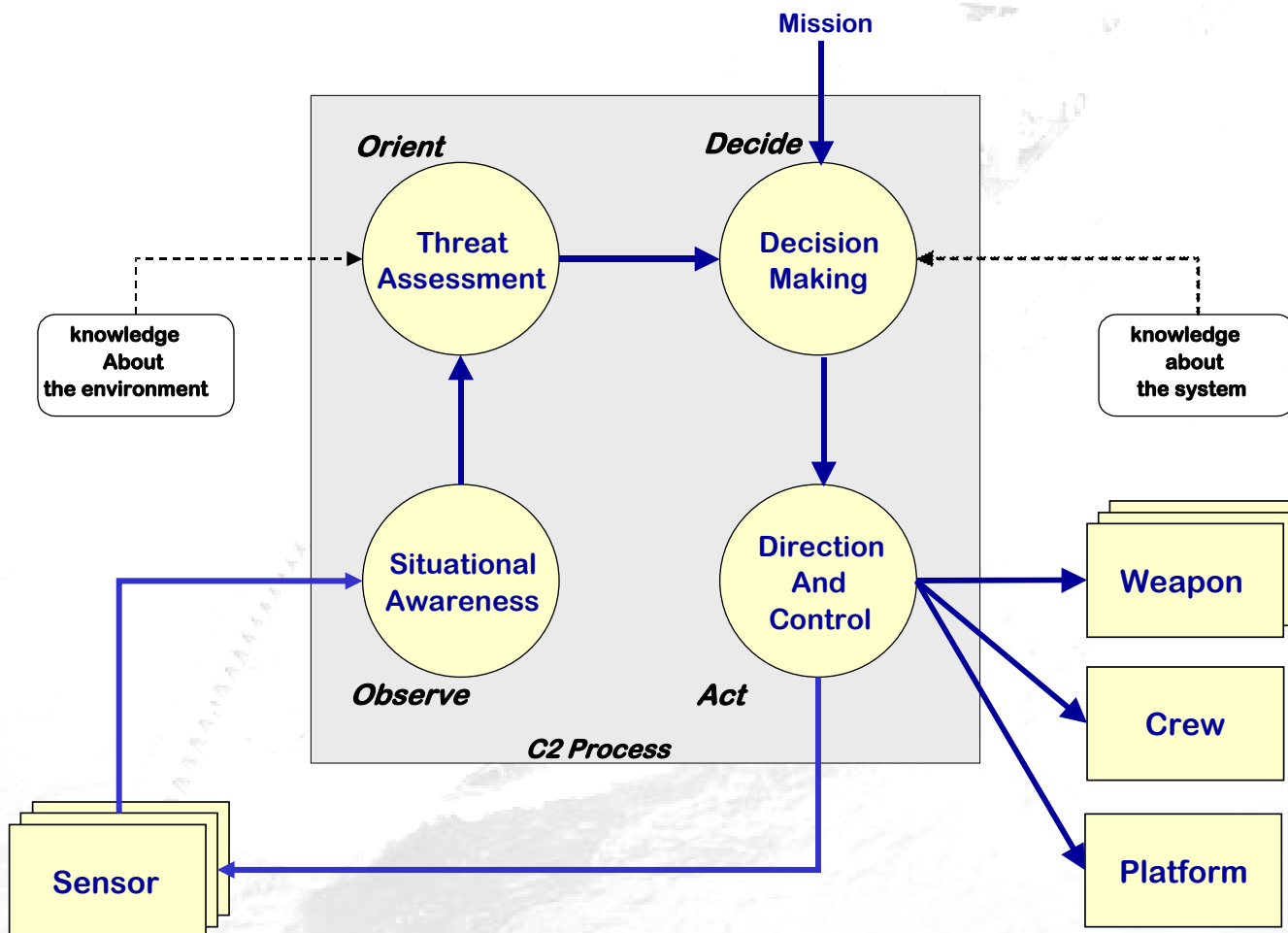
Shadow Zones



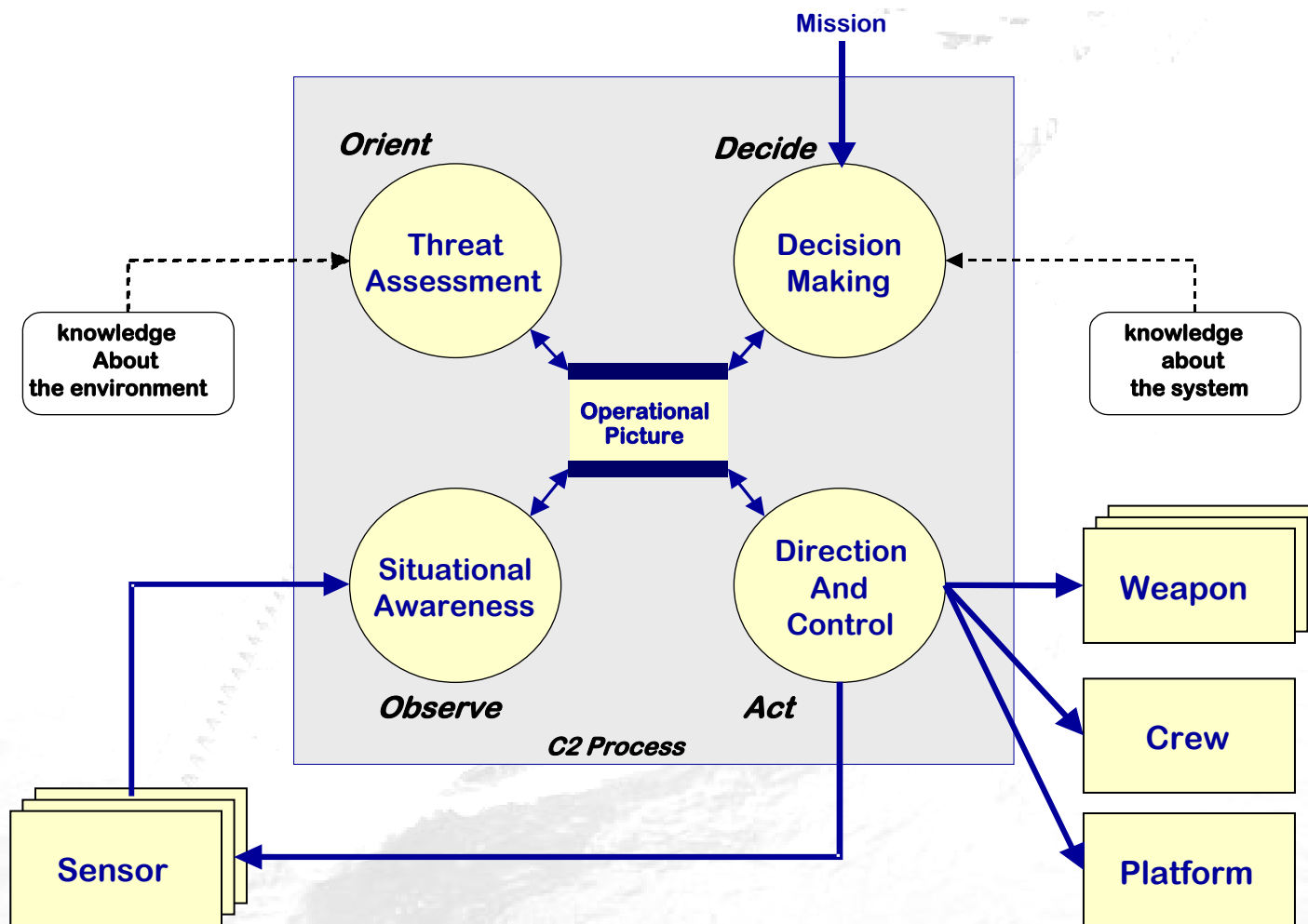
Cognitive Model



Process Model (I)



Process Model (II)



Object Properties

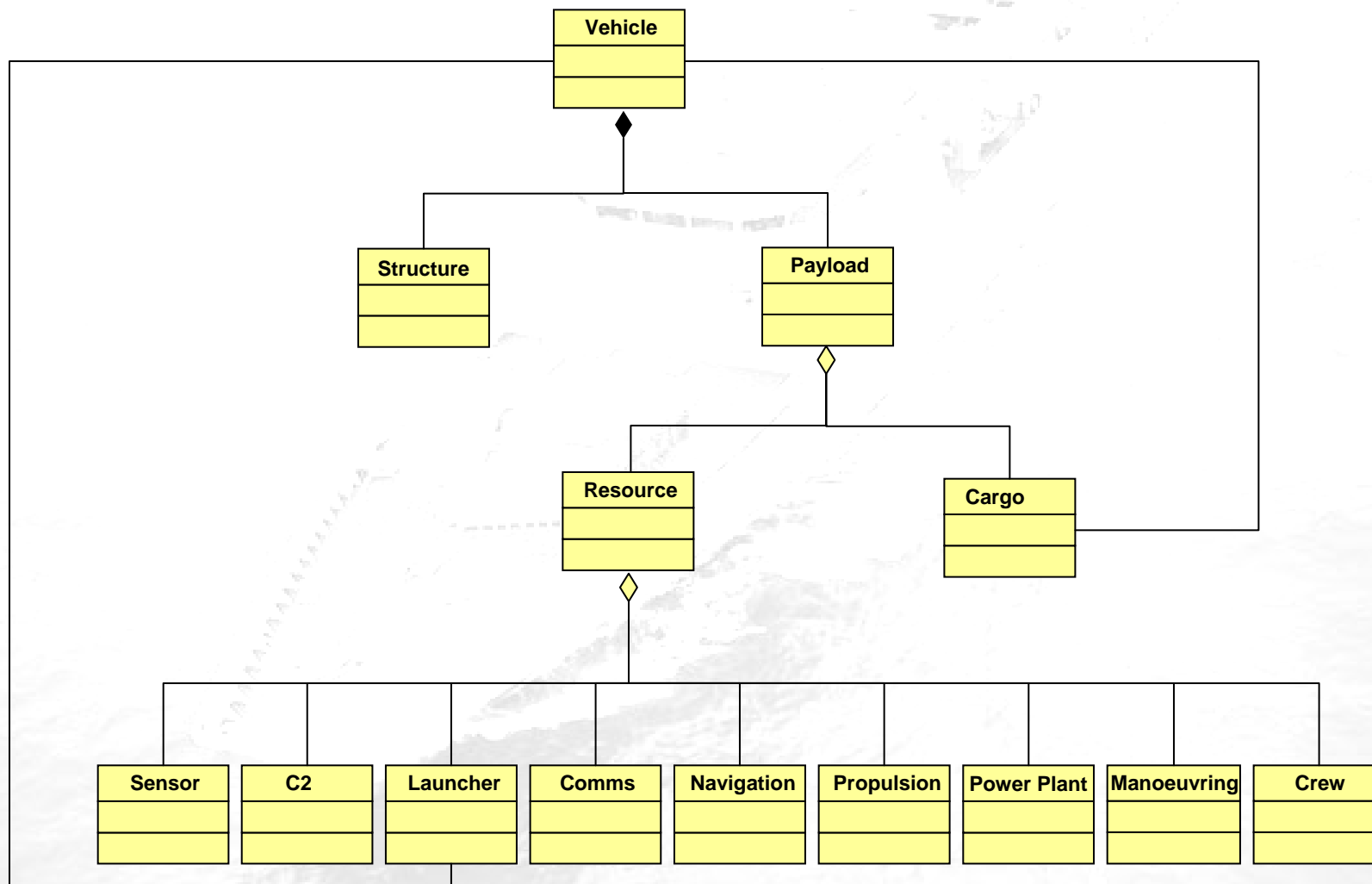
Basic OP object attributes:

- ☐ state vector (position, velocity, acceleration)
- ☐ type/class
- ☐ identity

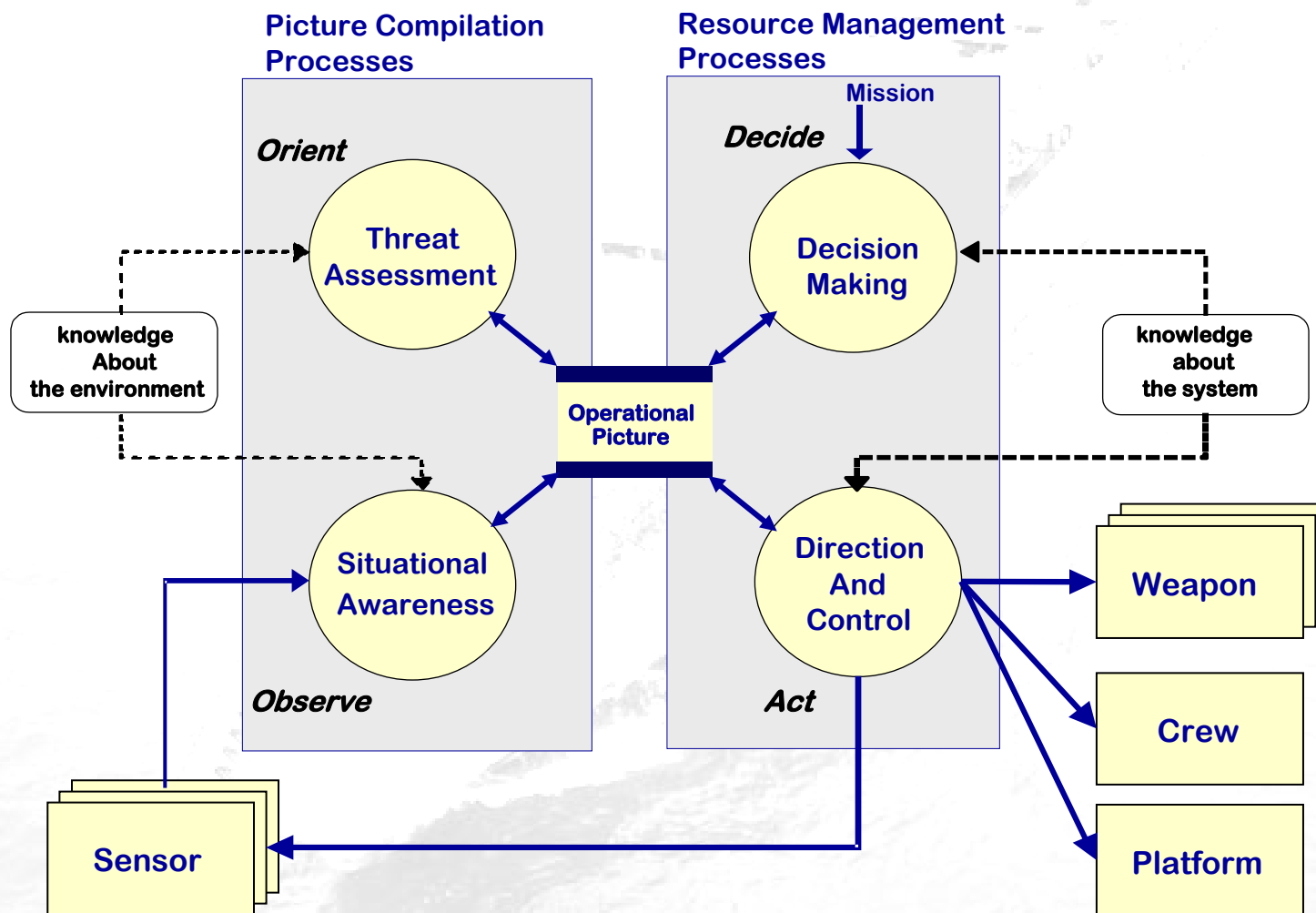
related uncertainties



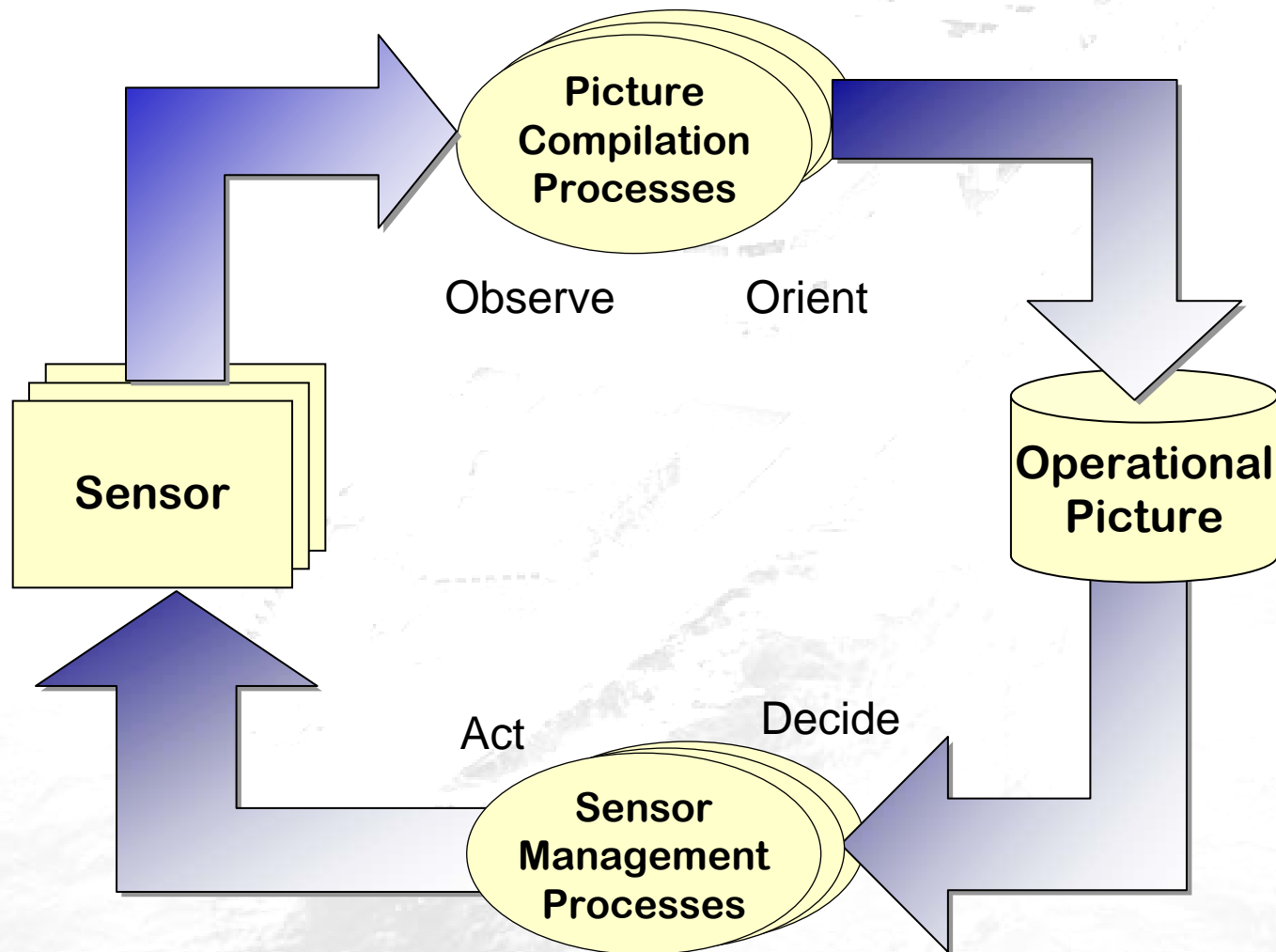
Generic Object Model



Process Model (III)



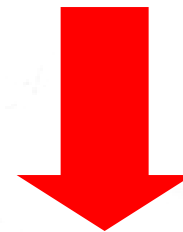
C2 and Sensor Management



Picture Compilation processes

- ☐ Detect
- ☐ Associate/Correlate
- ☐ Track
- ☐ Fuse
- ☐ Classify
- ☐ Identify
- ☐ Recognise Intent
- ☐ Estimate Risk

***Increasing
Level of
Required
Operational
Knowledge***

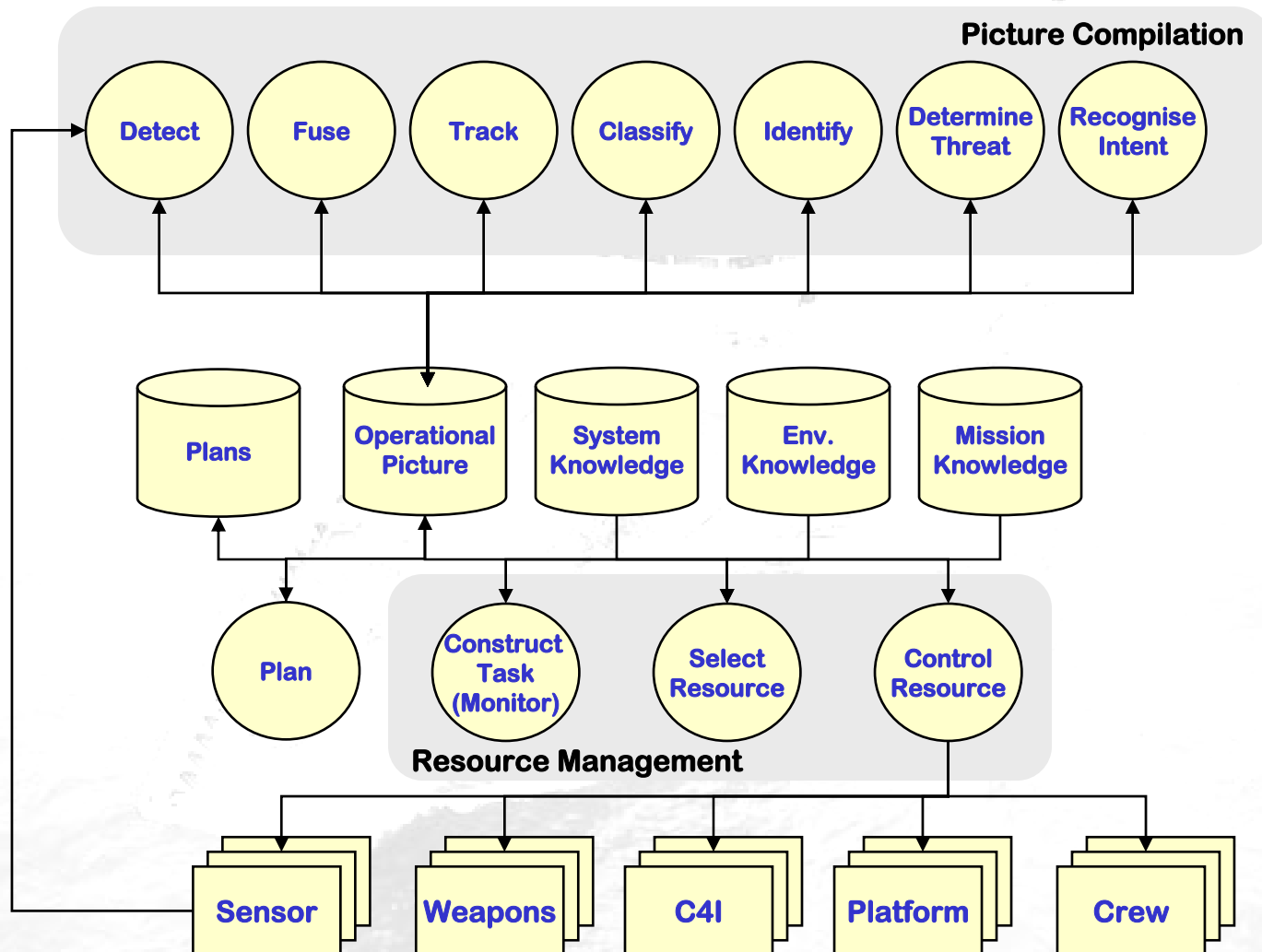


Sensor Management

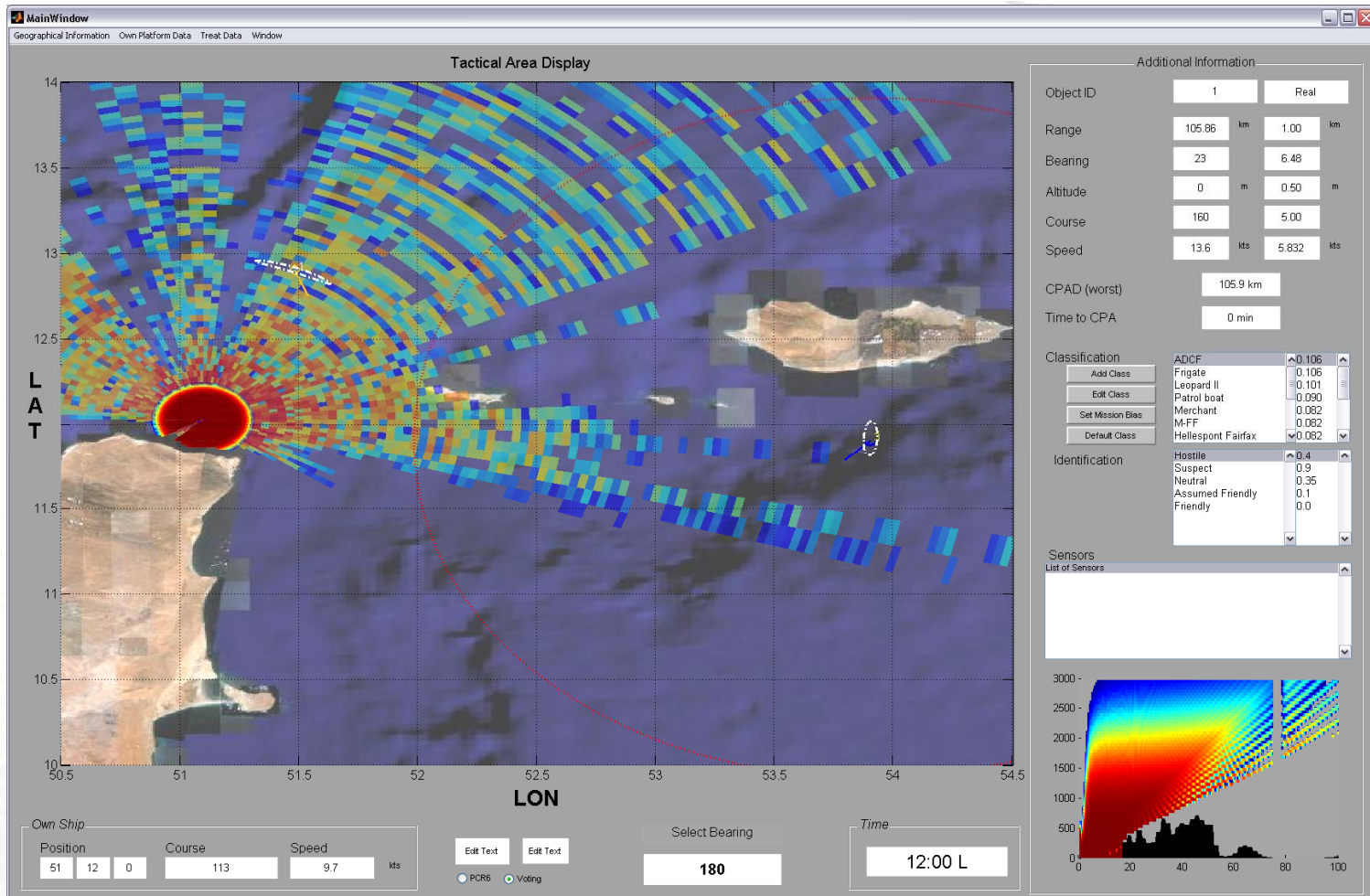
Three management stages :

1. construct a sensor task: assign a *sensor function* to an object
2. assign a sensor to an object - sensor function combination
3. determine required budget and sensor settings

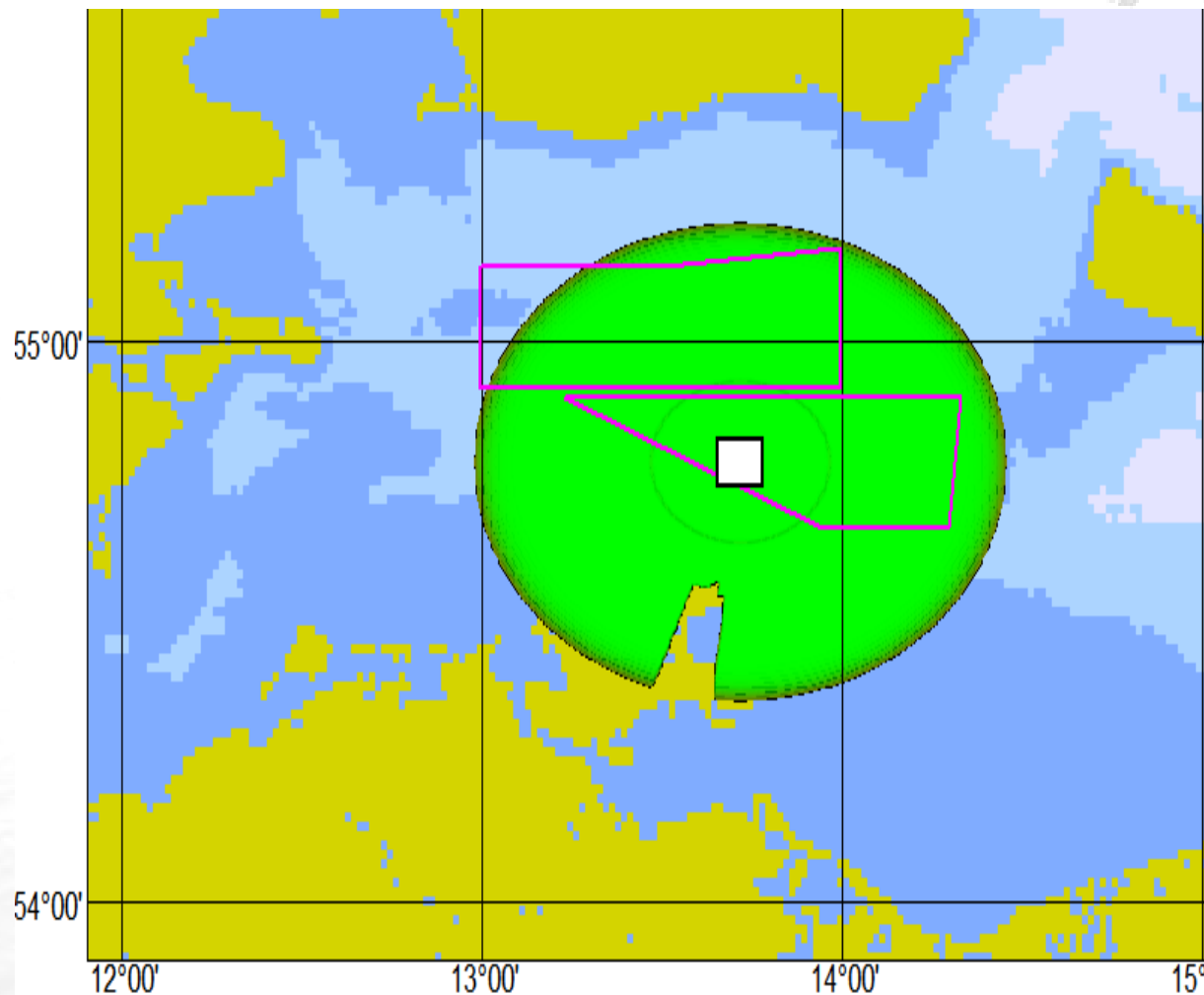
Integrated Model



Sensor Range



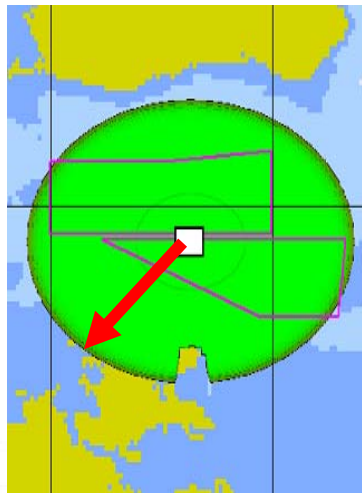
Performance Prediction



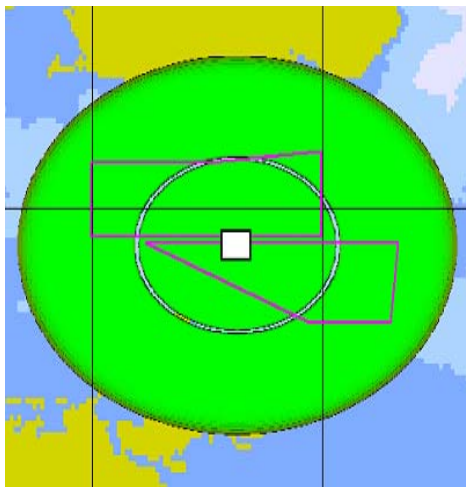
Observations



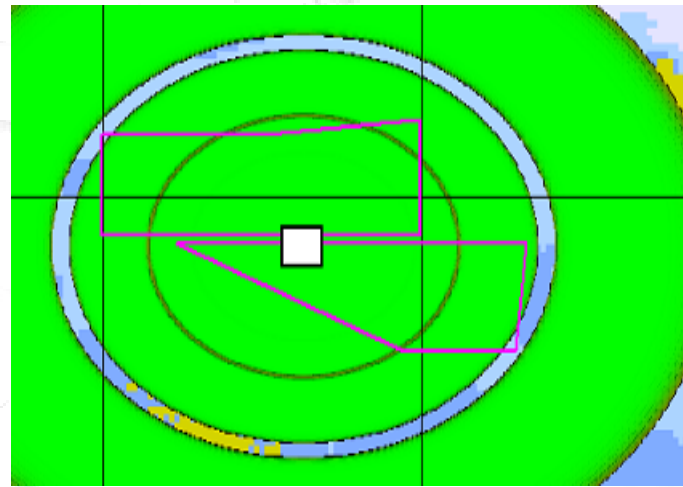
Detection Ranges and Lobing



H = 100 m
R = 26 nm



H = 200 m
R = 32.5 nm



H = 400 m
R = 45 nm

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Questions ?



Sensor Range

