



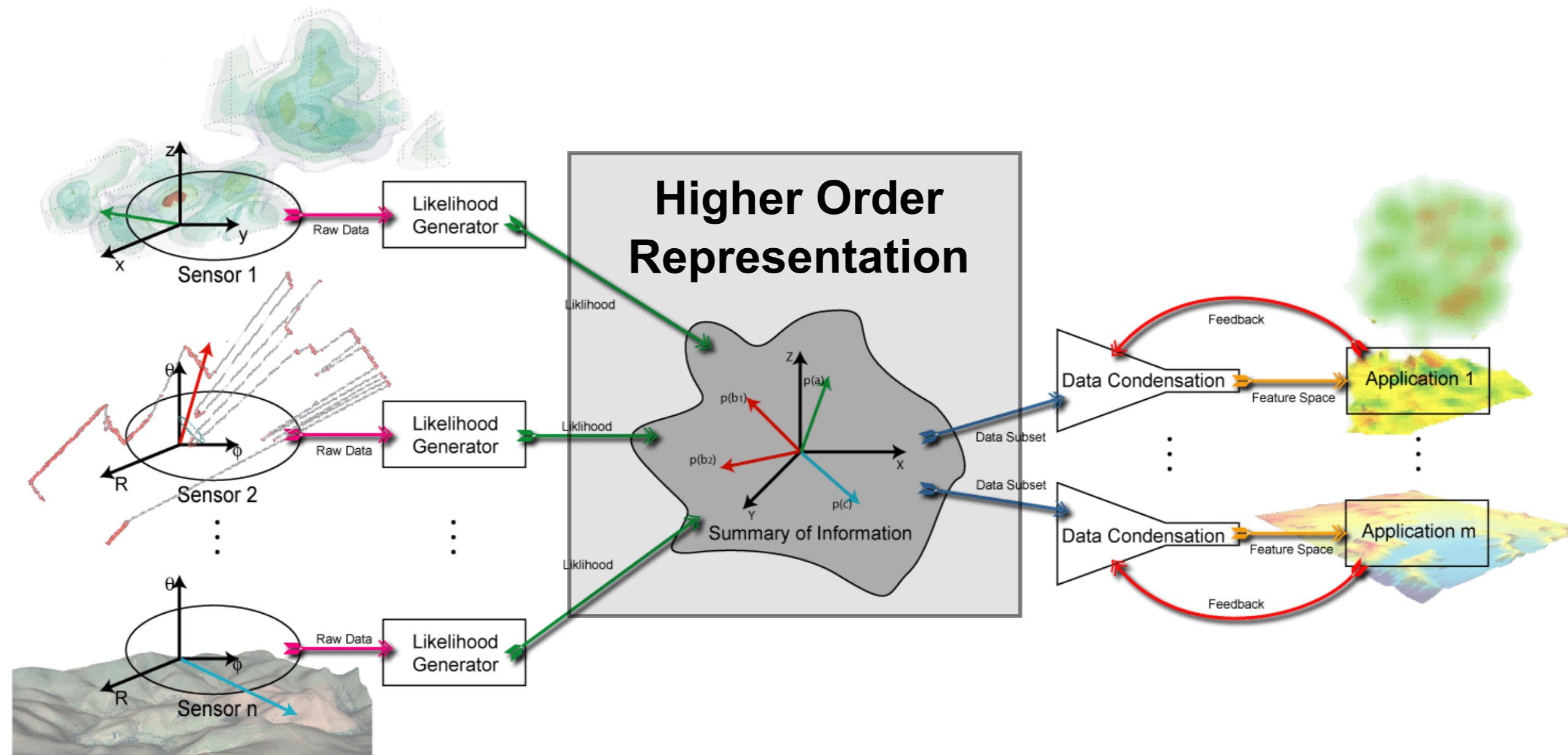
Richard Brimble, Richard Grover, Peter Hobson and Julia Will  
richard.brimble@baesystems.com  
richard.grover@baesystems.com

# Higher Order Data Representation

*What is an optimal representation?*

AIM	Approach	Outcomes
To address the fundamental gap between existing sensing and representation work and applications such as obstacle detection or localisation	Three different viewpoints were considered: 'Engineering' (optimal representations) 'Information Processing' (content centric) 'Data Processing' (no prior knowledge of tasks)	Results of investigating each viewpoint and a proposal for future developments in this area

Higher Order Data Representations describe constructions in which raw data is abstracted into a form more suitable for use on autonomous platforms.



This model identifies two key problems:

Data is captured in a sensor-centric manner irrespective of the system tasks.

Interpretation of data is based on transforming a sensor-centric representation into a task-centric form for a specific goal.

These problems were tackled from three viewpoints:

**A Data Processing View**

Given future advances in computing, is it possible to record the raw data and retrieve and process the necessary data on demand?

**An Engineering View**

How can an engineer perform a systematic trade-off to identify an optimal representation given a set of sensors and tasks?

**An Information Processing View**

What representation is required when an autonomous system's tasks are unknown ahead of time?

## Recommendations

Investigation into the management of large-scale datasets of sensor information.

Construct an engineering handbook of representations.

Investigation into novel information processing techniques.

Contact : richard.brimble@baesystems.com