

SUBITO: Competitive Assessment

“How does SUBITO compare with present commercial offering?”

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- **Aim and Methodology**
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- **Assessment Criteria**
- **SUBITO Process Diagram and Enabling Technologies Mapping**
- **Results 1: Basic Functionality and Enabling Technologies Assessment**
- **Results 2: Top Level Capability Assessment**
- **Conclusions and Recommendations**

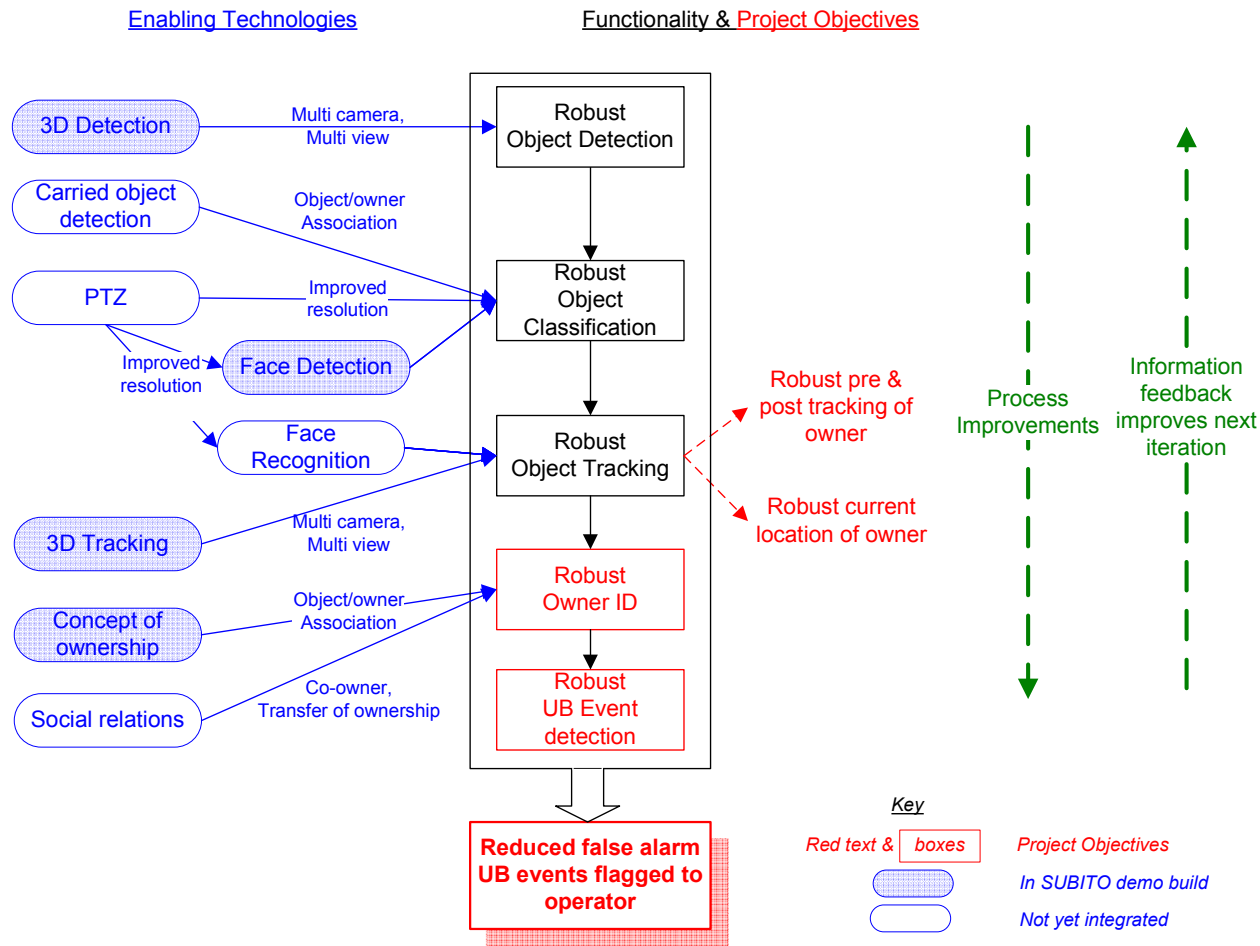
- **Aim (from Annex 1): "Report on the competitiveness of the proposed results as compared to the current state-of-the-art"**
- **Methodology**
 - Define scope of the assessment
 - Product survey: To identify list of 'state-of-the-art' systems with unattended baggage or object capability
 - Define suitable & feasible assessment criteria
 - Assess product systems against defined criteria
 - Formulate conclusions for input to workshop presentation & final report

- **The assessment was limited to systems with ‘Unattended Baggage or Object’ capabilities**
- **Focused on ‘Existing Products’ in the marketplace (‘current state of the art’)**
- **Assessment depth was limited by available specifications to a ‘top level comparison’ of functional capabilities**
- **The assessment does not take into account the ‘maturity’ of the products or the ‘robustness of the solutions’ - it was not possible to assess this.**
- **No ‘performance’ comparison was possible due to lack of comparable data**
- **Results and opinions are based on product information available to SELEX GALILEO at the time of the investigation – this may have changed.**
- **SUBITO is a ‘Capability Demonstrator’ and not a product**

- **A number of avenues were explored to identify products. These included:**
 - Gathering information from other SUBITO tasks (market survey by UoR)
 - Internet Searches
 - Surveying partners & SELEX capability experts
 - Contacting 'product' companies.
- **The survey identified ten companies with products suitable for use in assessment:**
 - Ipsotex.UK
 - Indigo Vision. UK.
 - Elsig. Italy.
 - ObjectVideo. US.
 - Ioimage. Israel
 - Iomniscient. Australian.
 - Analytic Video Systems. Netherlands.
 - BRS labs. US.
 - Intuvision. US.
 - Wavestore. UK.

- **Three Assessment Categories were identified based on SUBITO Capabilities**
- **A. Top Level Capability criteria taken from SUBITO primary objectives**
 - Detect UB events
 - Identify Owner
 - Locate current position of owner
 - Pre and post event owner track data
- **B. 'Basic' Functions required in an 'unattended baggage event detection system' to provide the top level 'SUBITO' capabilities**
 - Image Analysis Module: Detect, Classify & Track objects of interest.
 - Threat Analysis Module: Process DCT data to assess and report UB event status
- **C. Novel Enabling Technologies required to provide a more robust solution (a key driver of the SUBITO project).**
 - Carried Object Detection -- object/owner association
 - 3D Detection/Tracking -- robust detect/track in occluded environments
 - Face Detection/Recognition -- robust owner track/classification
 - PTZ -- more resolution for robust detection/owner identification
 - Concept of Ownership -- abandoned object / owner association filter
 - Social Relations -- groups and transfer of ownership filtering
 - Intentionality -- owner goals/intent filtering

SUBITO Process Diagram & Enabling Technologies Mapping



- This diagram illustrates the key functions required in a SUBITO like system and where the 'robustness' enabling technologies can be mapped. Note: it is not a representation of any particular system implementation.

Results 1: Basic Functionality & Enabling Technologies Assessment [Categories B & C]



	Ipsotek	Indigo vision	Elsag	Object Video	loimage	lomiscent	Analytic Video Systems	BRS labs	Intuvision	Wavestore	SUBITO
Image analysis - Basic											
Object detection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object classification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Object tracking	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Image analysis - advanced											
Carried object detection	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	Yes*
3D detection/tracking	?	No mention	Yes	?	Yes	?	No mention	Yes	No mention	Yes	Yes
Use of PTZ	No mention	Yes	Yes	Yes	Yes	No mention	Yes	Yes	No mention	Yes	Yes*
Face detection	No mention	No mention	Yes	No mention	No mention	Yes	Yes	?	Yes	Yes	Yes
Face recognition	No mention	No mention	No mention	No mention	No mention	Yes	Yes	?	Yes	Yes	Yes*
Behavioural analysis / threat assessment											
Simple abandonment rules (spatial/temporal)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Detecting abnormal pedestrian movements	Yes	Yes	?	Yes	Yes	Yes	No mention	Yes	Yes	Yes	Yes
Inferring where people are going (intent/goal prediction)	?	No mention	No mention	No mention	No mention	?	No mention	?	No mention	No mention	Yes
Concept of ownership	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	Yes	No mention	Yes
Social relations (co-owner etc.)	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	No mention	Yes*

Key

Yes	Yes this technology is mentioned
Yes*	Technology exists but not fully integrated into SUBITO demo system
?	Not mentioned but may exist because of other capabilities
No mention	No specific mention

- All have basic image & behavioural analysis capability required to detect unattended baggage
- Some systems include more complex image and behavioural analysis technologies (3D detection, abnormal pedestrian flow etc.) to provide a more robust solution
- Only SUBITO utilises more complex behavioural analysis (e.g. social relations, inference)
- Only one system other than SUBITO (Intuvision) definitely utilises a ‘concept of ownership’

Results 2: Top Level Capability Assessment [A]



	Ipsotek	Indigo vision	Elsag	Object Video	Ioimage	lomniscient	Analytic Video Systems	BRS labs	Intuivision	Wavestore	SUBITO
Detect UB events	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Identify an owner	No	No	No	No	No	No	No	No	Yes	No	Yes
Locate current position of owner	No	No	No	No	No	No	No	No	Yes	No	Yes
Pre & post event tracking of owner	No	No	No	No	No	No	No	No	Yes	No	Yes

- **Assessment against top level SUBITO primary objectives**
- **Only systems which have a ‘Concept of Ownership’ can fulfil main SUBITO objectives**
- **Only one system other than SUBITO (Intuivision) utilises a ‘Concept of Ownership’**

Conclusions and Recommendations



- **SUBITO offers a competitive solution on a functional basis for the Unattended baggage problem.**
- **SUBITO 'functional' capability equals or exceeds that of current state-of-the-art unattended baggage and object detection products.**
- **Only one system other than SUBITO (Intuvision) utilises a 'Concept of Ownership'**
- **Only SUBITO utilises more complex behavioural analysis (e.g. social relations)**
- **All systems have basic image & behavioural analysis capability for UB detection**
- **A 'performance' comparison was not possible due to a lack of comparable data**
- **An agreed European or World 'test standard and database' for assessing 'video analytics' systems of this type would facilitate 'balanced' performance assessment.**

Questions ?