RFID Adoption in the Aerospace Sector (Aero-ID Research Programme)

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RFID Academic Convocation
(MIT)
23 January 2006

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- Aim

- Background

- Development of Industrial Research Consortium

- Research Themes and Outputs

- Summary

- Industries Requirements & Perspective
  (Boeing, Programme Sponsor)

Aim

To remove barriers to widescale Automated ID deployment in the aerospace sector through timely and effective R&D.

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Background

2004

- Auto ID Labs instigating various industry initiatives

- Aerospace industry considering broad strategies in RFID area

- Many one off pilots/activities in ID solutions: contact memory, 1D/2D bar code, RFID etc

- Recognition that consumer goods approaches to RFID don't map directly onto other sectors

- Numerous industrial developments emerging

Related Aerospace Activities

Industrial Activities / Trials

Boeing, Airbus, General Electric, BAE Systems, Dasault, Embraer, Nasa
British Airways, Delta Airlines, Virgin Airlines, Fedex, Korean Airlines

Industrial Forums

Aviation RFID Forum (Boeing Airbus)
RFID Journal

Standards Development Activities

EPC Global - Aero Defence Initiative
ATA - Spec 2000 standards development
SITA - RFID technologies programme
IATA - Baggage labelling activity, standards development

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Aero ID Programme

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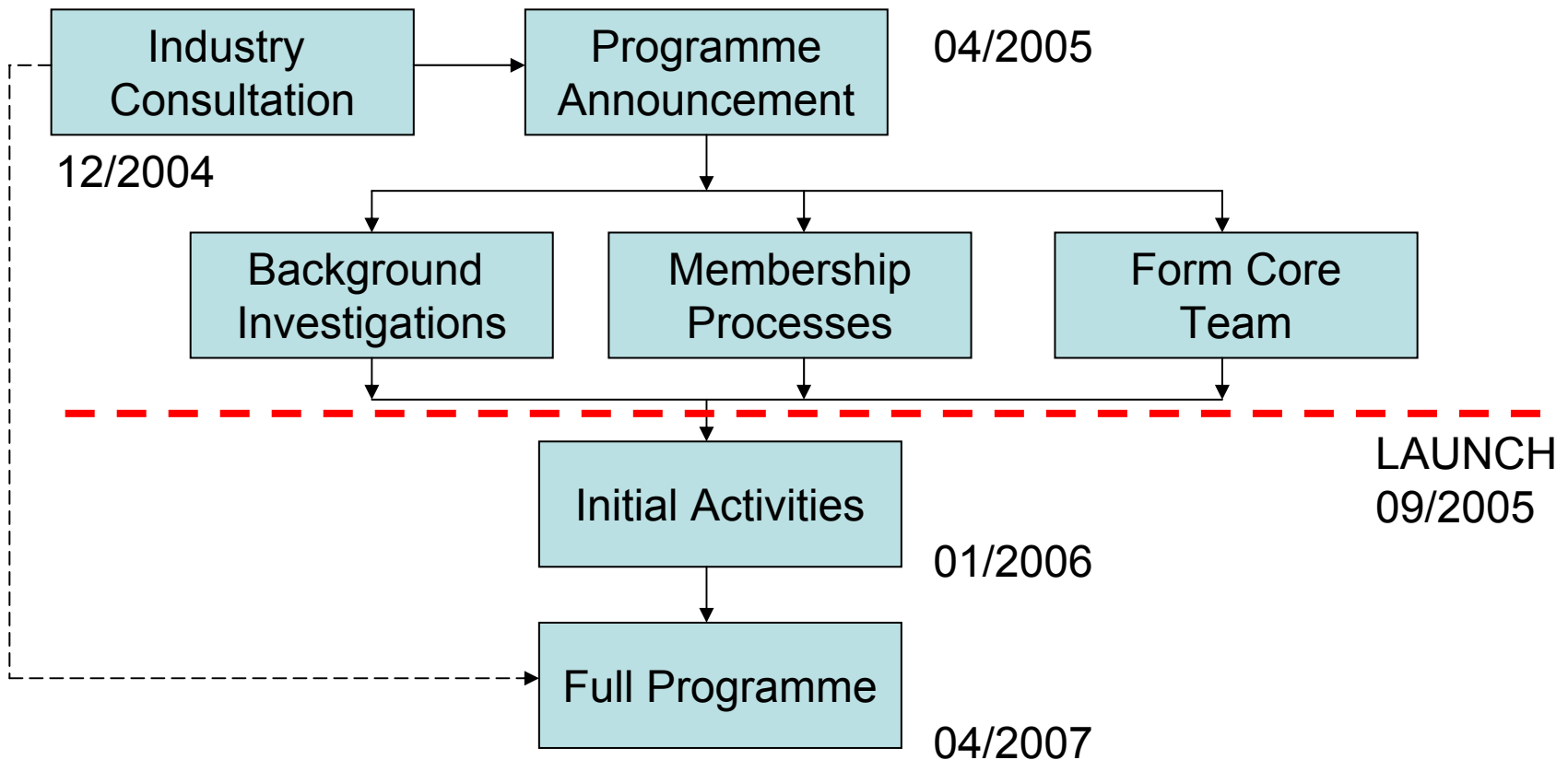
The need for a Research Programme?

- To put coordinated academic effort behind key obstacles for wide deployment

- Provide rigour, objectivity in trials and test activities

- Independent research bodies supporting solutions and standards

- Fundamental Differences with existing Consumer Goods work

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Consumer Goods v Aerospace

1. Product Lifetime	consumer goods have lives measured in months.	Typical aircraft component may have a life of 20-50 years
2. Product Characteristics	Low value and low complexity	High value and high complexity
3. Key Application Areas	supply chain logistics applications are critical	after sales, product service, repair and spares management (in addition to logistics)
4. Environmental Conditions	consumer goods supply chains are relatively well controlled.	aerospace components are often subject to fiercely varying environmental conditions

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Programme Development Process

Industry Consultation → Programme Announcement 04/2005

12/2004

Background Investigations — Membership Processes — Form Core Team

Initial Activities 01/2006

LAUNCH
09/2005

Full Programme 04/2007

Industry Consultation Meetings

Formation meetings prior to programme launch.

Cambridge UK - Dec 2004
Daimler Chrysler - Feb 2005
Paris Air Show - June 2005

- Airframe Manufacturers.
- Part Suppliers.
- Airline Organisations.
- Aero Defence Organisations.
- Ministry of Defence (MOD).
- Maintenance & Service.
  Organisations.
- Light Aircraft Manufacturers.

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Organisations involved in the Programme

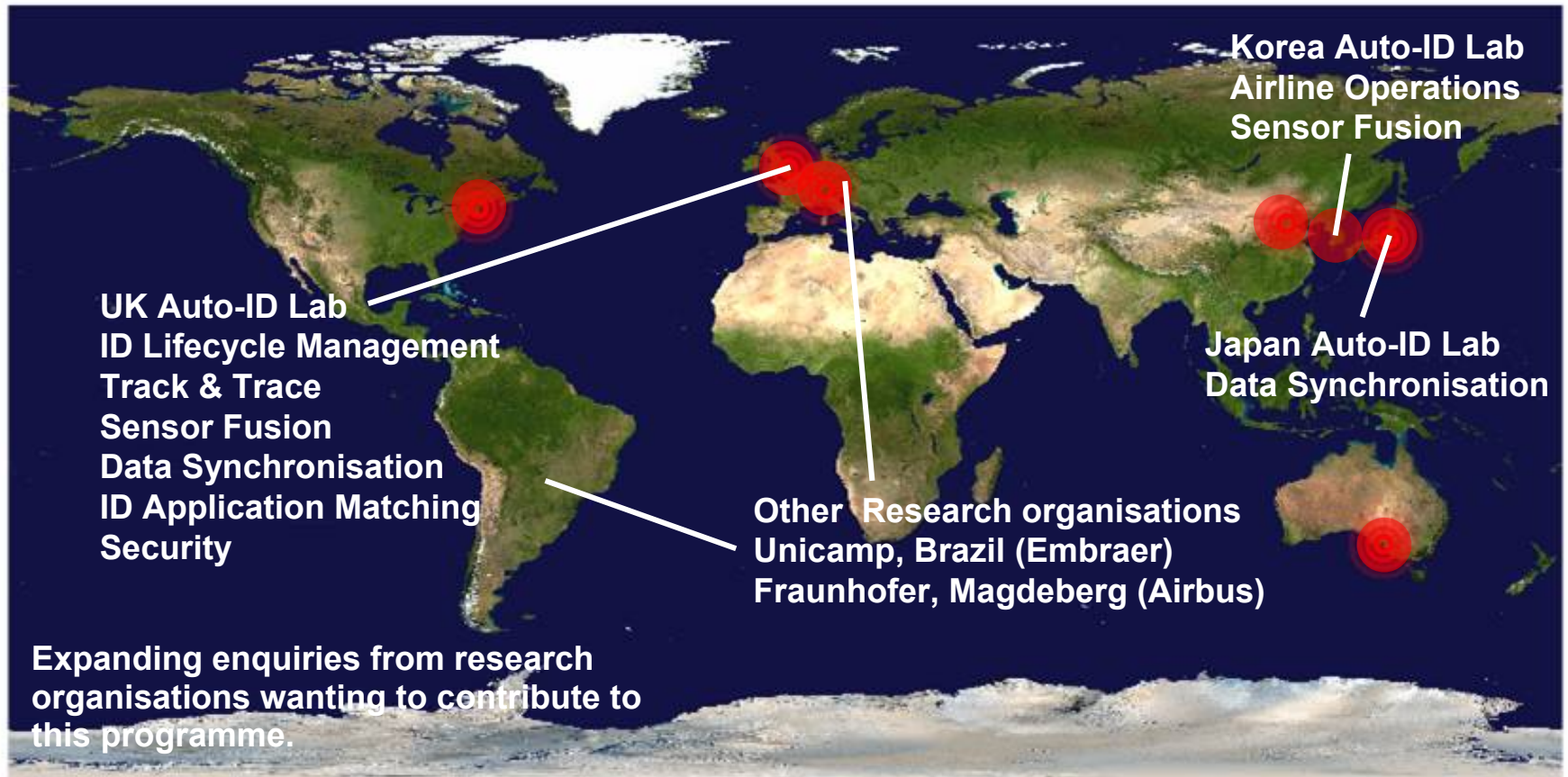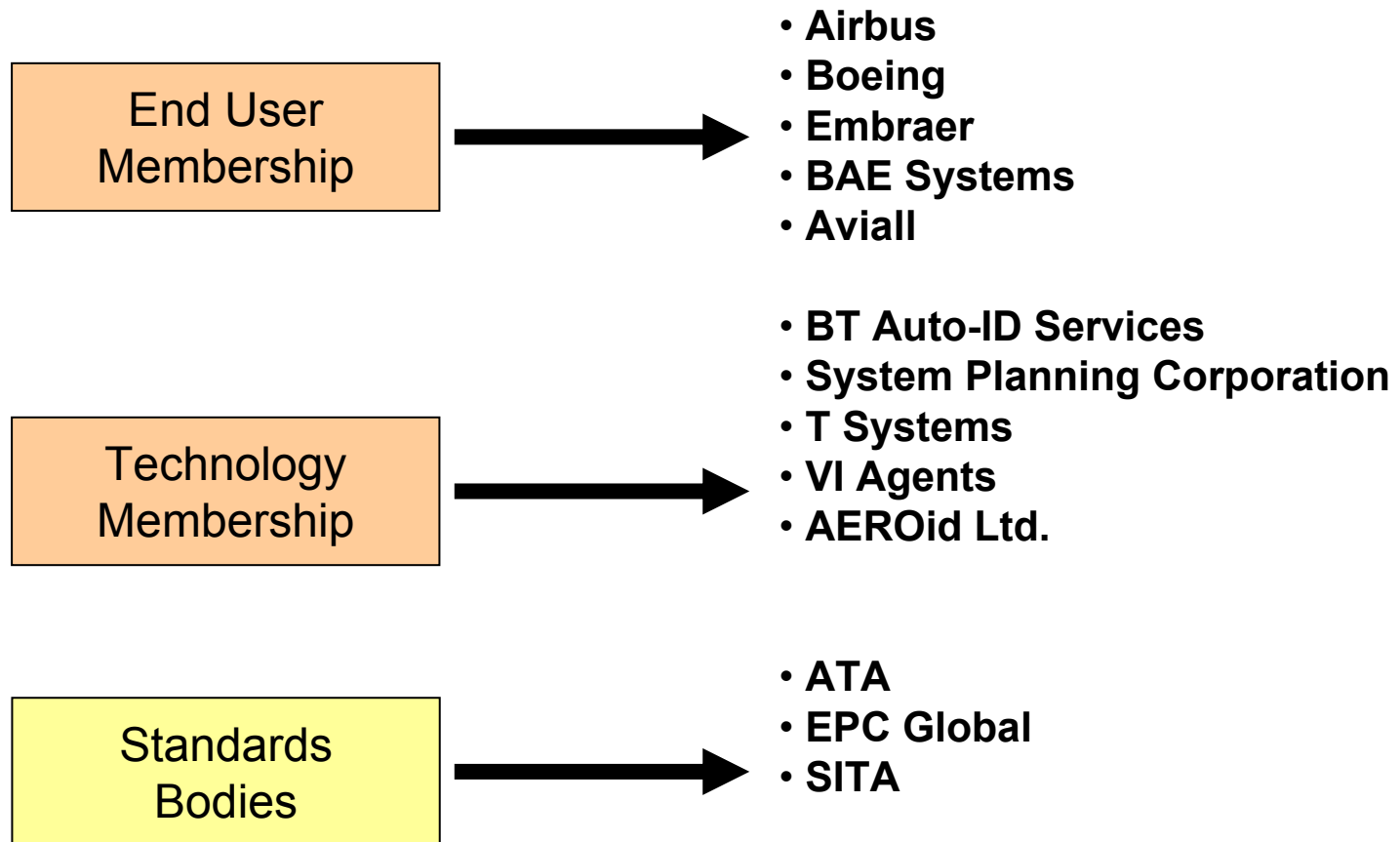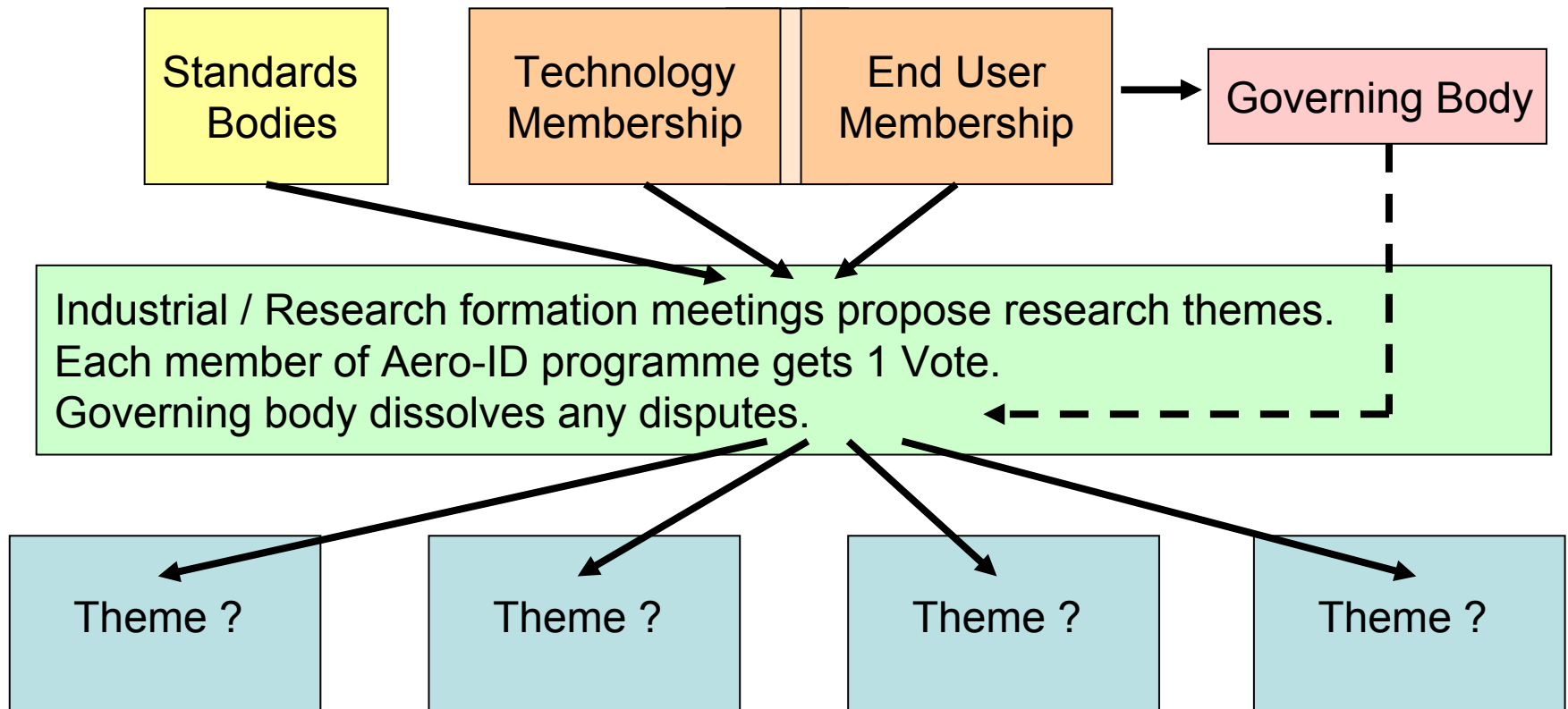|			
End User Membership	Membership Fee 10K-40K UK pounds depending on turn over	**Cambridge Auto- ID Lab**	Programme management. Provide research input as skill sets meet the needs. Help fund other research partners.
Technology Membership	Membership Fee 10K-40K UK pounds depending on turn over	**Auto-ID Labs**	Provide research input skill sets meet the needs. May bring new sponsors to the Programme.
Standards Bodies	No Membership Fee Free Manpower to programme	**Other Research Organisations**	Provide research input skill sets meet the needs. (May have direct funding via programme sponsor)

Research organisations involved in Aero-ID

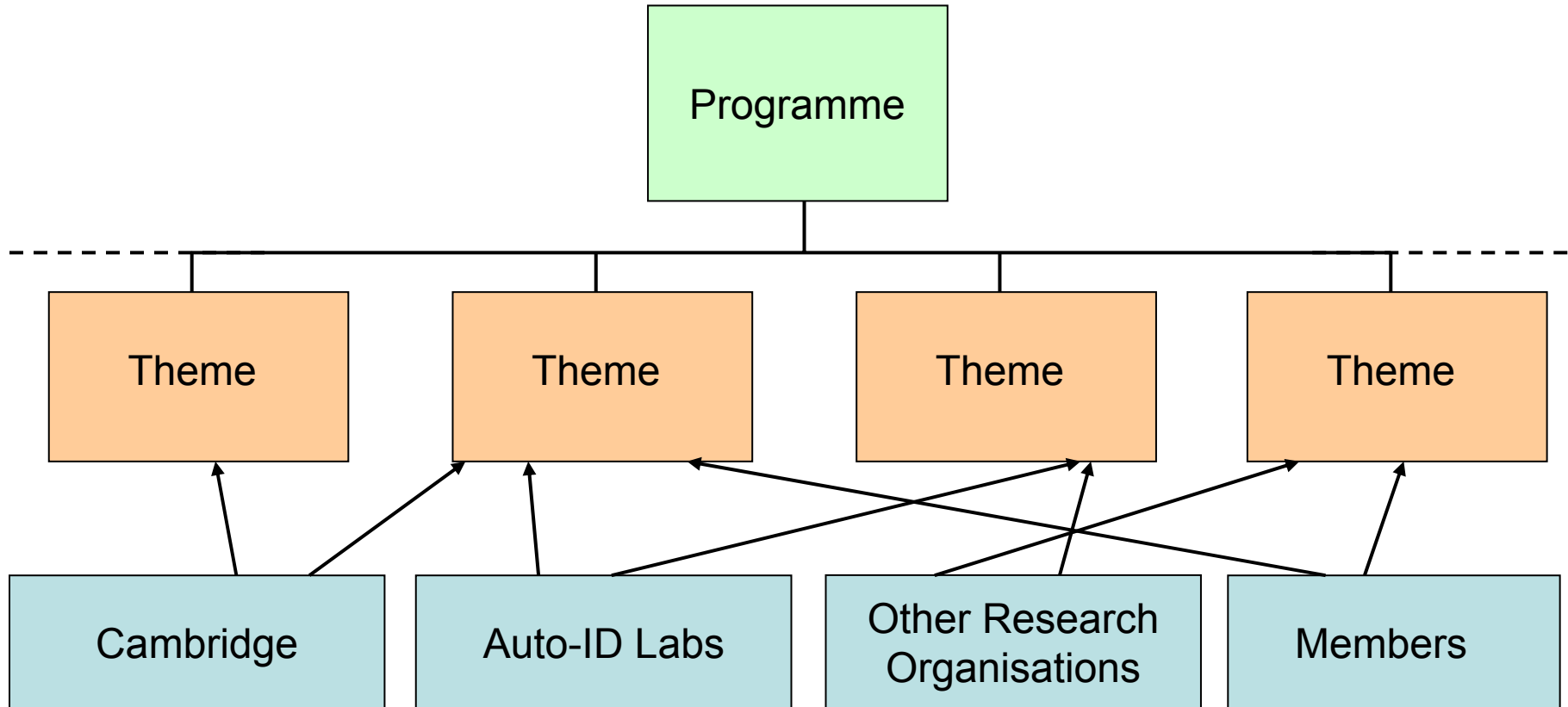
Korea Auto-ID Lab
Airline Operations
Sensor Fusion

UK Auto-ID Lab
ID Lifecycle Management
Track & Trace
Sensor Fusion
Data Synchronisation
ID Application Matching
Security

Japan Auto-ID Lab
Data Synchronisation

Other Research organisations
Unicamp, Brazil (Embraer)
Fraunhofer, Magdeberg (Airbus)

Expanding enquiries from research organisations wanting to contribute to this programme.

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Industrial Sponsors of the programme

End User Membership	→	• **Airbus** • **Boeing** • **Embraer** • **BAE Systems** • **Aviall**
Technology Membership	→	• **BT Auto-ID Services** • **System Planning Corporation** • **T Systems** • **VI Agents** • **AEROid Ltd.**
Standards Bodies	→	• **ATA** • **EPC Global** • **SITA**

Programme governance & membership

Standards Bodies

Technology Membership | **End User Membership** → **Governing Body**

Industrial / Research formation meetings propose research themes.
Each member of Aero-ID programme gets 1 Vote.
Governing body dissolves any disputes.

Theme ?   Theme ?   Theme ?   Theme ?

Programme Structure

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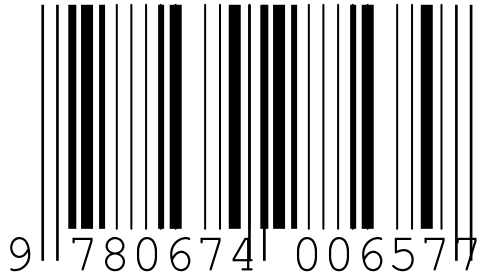 (Boeing, Programme Sponsor)

Research Themes Overview

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Life Cycle ID Management

- AIM: Managing the evolution of a component or piece of equipment through its life cycle

- RATIONALE:
  - Coordination of ID and data associated with item as it passes through design, manufacturing, maintenance, repair and component upgrade cycles
  - critical for safety, fitness for performance and legislative compliance.

- COLLABORATORS: SITA, VI Agents, ATA

ID (Delivery) Application Matching

- AIM: To guide best ID delivery solution selection

- RATIONALE:

  – ID delivery technology may be different at different stages of a product's life

  – influenced by capability, price, and value of data.

  – ID selection entirely influences the cost effectiveness of ID implementation.

- COLLABORATORS: BAE Systems, SITA, Airbus, Embraer, SPC

ID Application Matching

ID Assessment Criteria

- Characteristic
- Data capacity (ID)
- Data nature
- Human visibility/ readability
- Simultaneous identification
- Robustness
- Operating distance
- Line of sight needed?
- Problematic objects (e.g. metal)
- Sensor cost
- ….

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Sensor Integration (Fusion)

- AIM: Evaluate methods for integrating ID data

- RATIONALE:

  – ID needs to be efficiently integrated into real time data-capture systems

  – synergies from combining ID technologies with other sensory information (e.g. ID and temperature, ID and location)

- COLLABORATORS: Boeing, Embraer, ATA, Airbus, BT Auto ID Services

Data Synchronisation

- AIM: Evaluate methods for integrating ID linked product data

- RATIONALE:

  – must maintain product data <u>both</u> on RFID tags and <u>also</u> on different networked databases

  – Data distributed across multiple organisations as ownership of an aircraft changes through its lifetime

  – possibility for error owing to poorly synchronised data

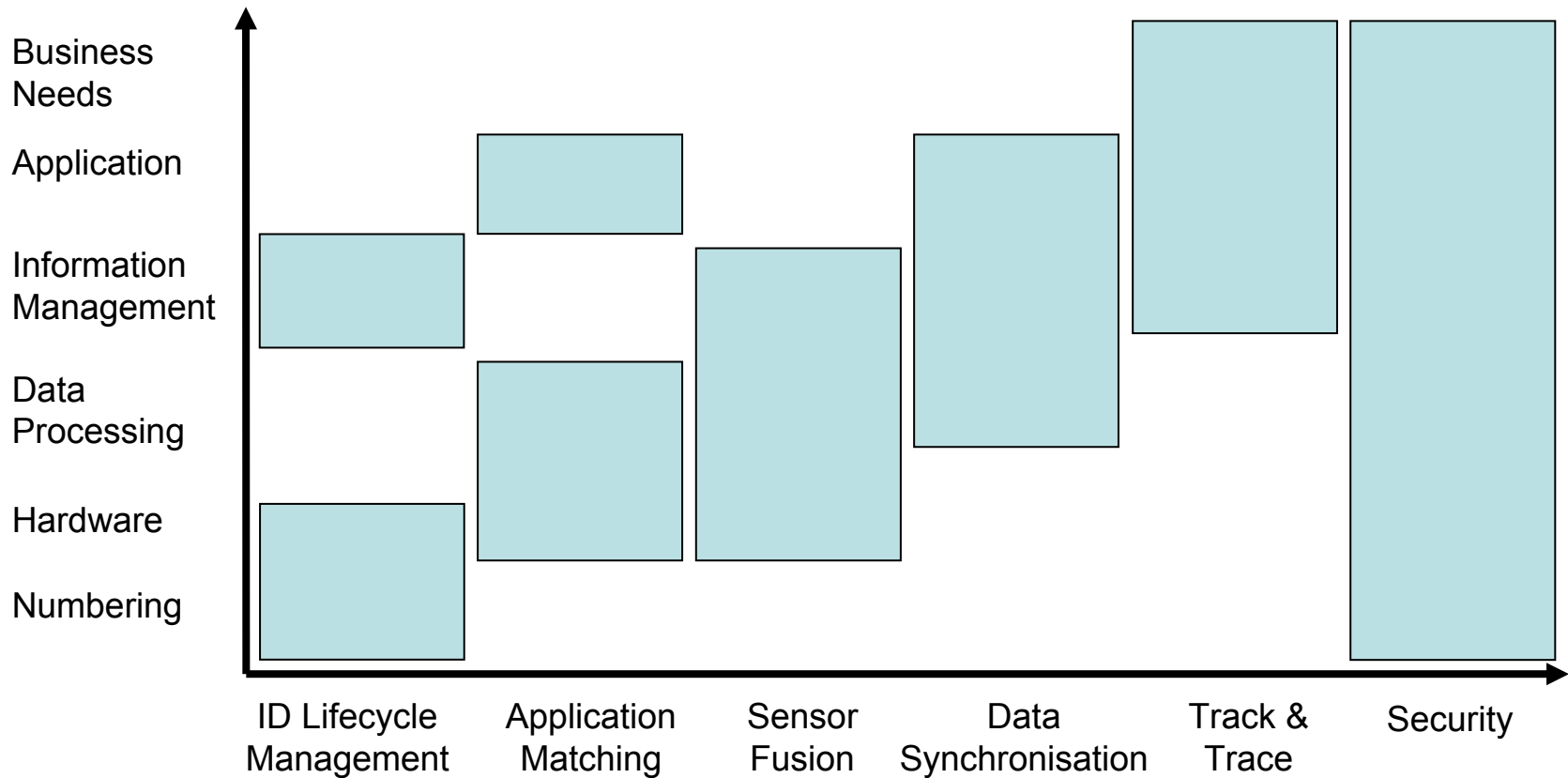- COLLABORATORS: Boeing, T Systems, BT, SITA

Tracking and Tracing

- AIM: Evaluate methods for integrating ID data into existing & new T&T strategies

- RATIONALE:
  - Key role of ID system is to
    - a) track the current state of a component and
    - b) trace its <u>full</u> history in a timely, accurate and complete manner
  - Performance enhancement, regulatory factors, quality assurance and health and safety issues are critically dependent on this.
  - Need systematic approach for incorporating ID into T&T

- COLLABORATORS: Embraer, Boeing, Airbus, BAE Systems, Aviall

Security

- Critical issue for many organisations and for all themes

- Key focus areas
  - Supply chain security
  - On Site Security
  - Synchronisation
  - Traceability
  - Safety

- COLLABORATORS: SPC, ATA, SITA

Themes Spectrum

Deliverables

Readily usable outputs:

- tools to support deployment
- Analysis / Guidance on pilot results
- Guidelines on complex requirements
- Demonstrations to clarify application issues
- Software prototypes
- Industry White Papers

Initial Outputs – January 2006

AIP-001/UC   Aero Sector Track & Trace Methods and Benefits

AIP-002/UC   Sensor Fusion – Issues and Applications

AIP-003/UC   ID Application Selection Process

AIP-004/SI   Aerospace Numbering Scheme Translation Demonstration

AIP-005/SP   Security

AIP-006/UC   Aerospace Serialisation

AIP-007/KE   Data Synchronisation Investigation

Current Research Team

- **Cambridge - UK:** Duncan McFarlane, Alan Thorne, Victor Prodonoff, Andy Shaw, Mark Harrison, James Brusey, (Thomas Kelepouris, Lila Theodorou)
- **Japan - Keio:** Yukiko Yumoto, Shigeya Suzuki
- **Korea - ICU:** Yoon Chang
- **Brazil - Unicamp:** (At formation stage)
- **Germany - Fraunhofer, Magdeberg:** (At formation stage)

Further information: www.aeroid.org

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