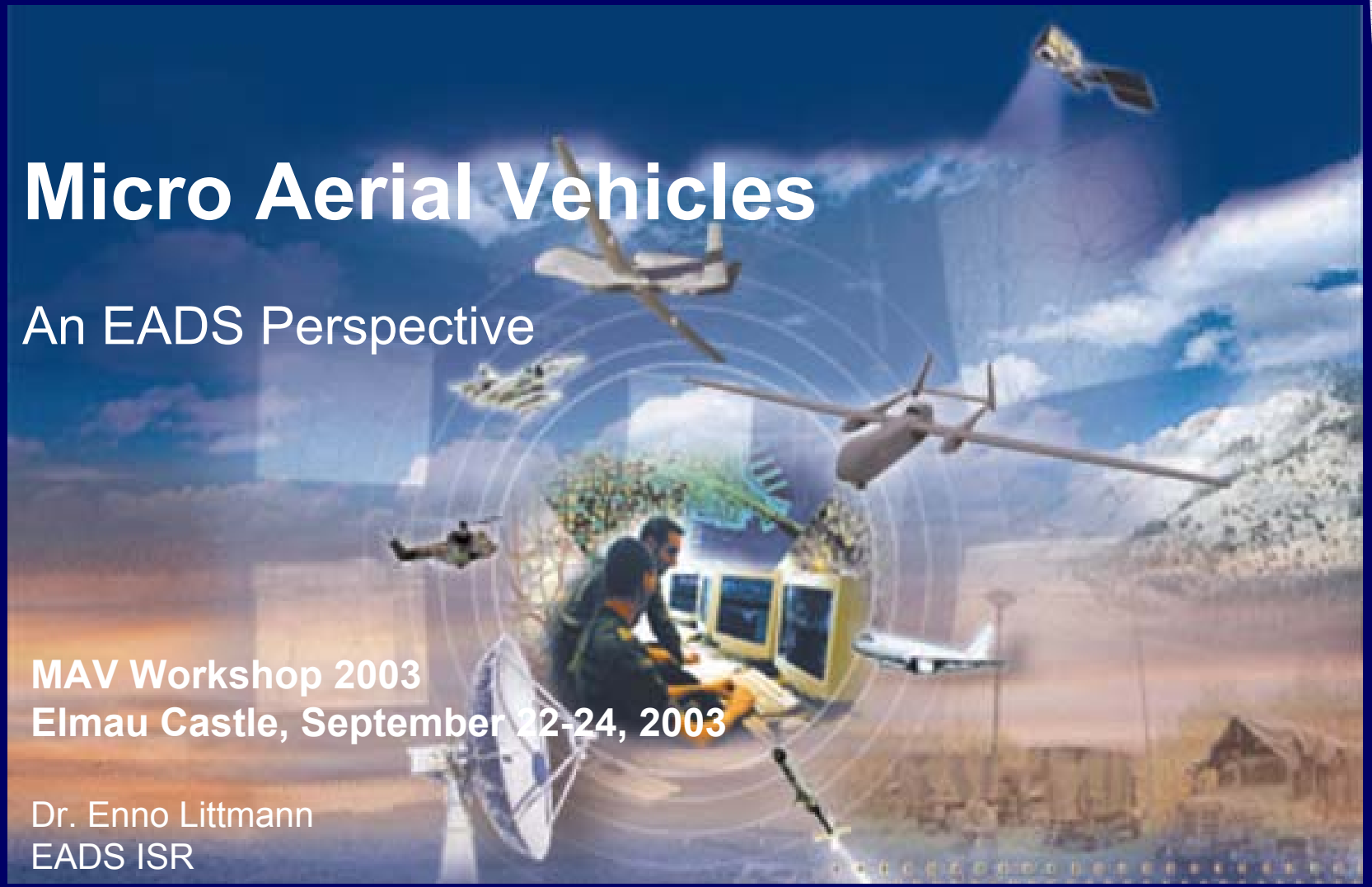


Micro Aerial Vehicles

An EADS Perspective

MAV Workshop 2003
Elmau Castle, September 22-24, 2003

Dr. Enno Littmann
EADS ISR

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
23 JUL 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Micro Aerial Vehicles - An EADS Perspective	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **EADS ISR**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

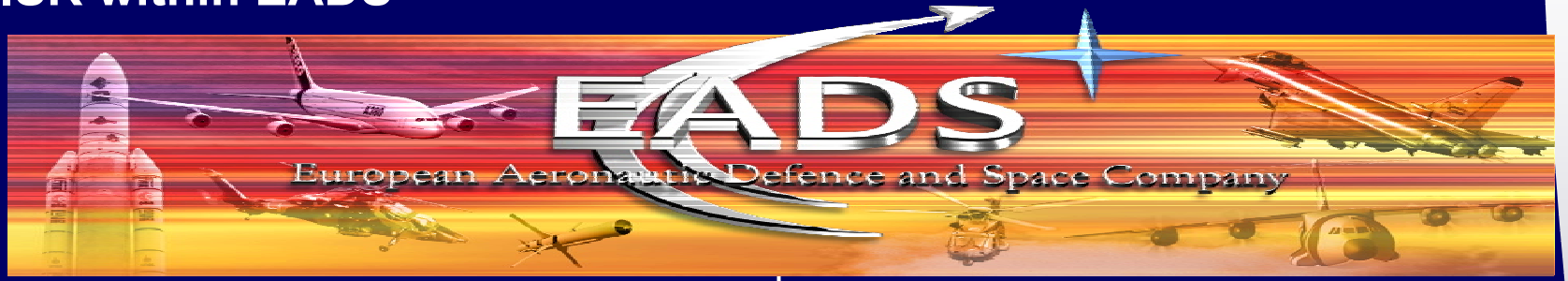
13. SUPPLEMENTARY NOTES
See also ADM001689, EOARD-CSP-03-5073 Micro Air Vehicle Workshop., The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**UU**	**11**	

Organisation
ISR within EADS



Airbus

Military Transport Aircraft

Defence and Security Systems

Space

Aeronautics

Missiles

Military Aircraft

Defence & Communication Systems

Defence Electronics

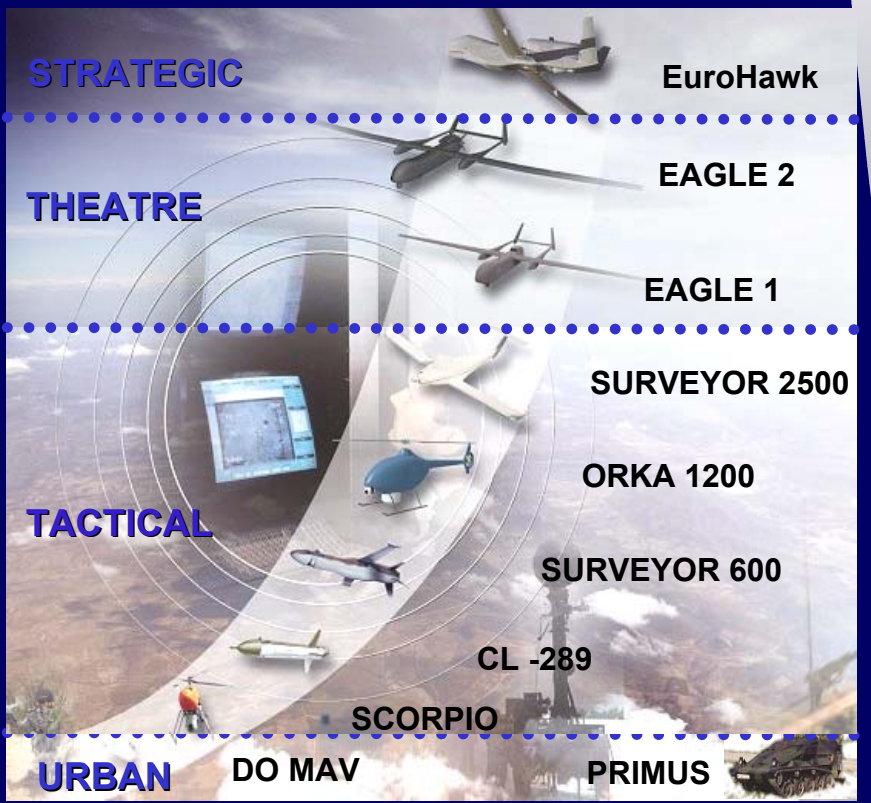
EADS Services

- Naval & Air Defence
- **ISR Systems**
- C3I Systems
- Public Safety
- Communication & Information Networks

EADS UAV Systems Portfolio

ISR covers the complete range of UAVs :

- High Altitude Long Endurance (HALE)
- Medium Altitude Long Endurance (MALE)
- High Speed Tactical UAV
- Vertical Take-Off & Landing UAV
- Slow Tactical UAV
- Micro-Air Vehicle
- Unmanned Ground Vehicle



MAV in EADS

- EADS does not sell UAV's but ISR systems, e.g. for
  - Local / close-up range, hidden, real time situation awareness
  - Over the hill reconnaissance and urban missions
  - Homeland security
  - Civil application (police, fire brigade)
- MAV compete against any other kind of urban intelligence:
  - Local or parachute cameras
  - distributed (noise, BC, …) sensor networks
  - communication intelligence, etc.
- Desirable properties of a MAV platform must be analyzed and subsequently improved
  - Man transportable; low-cost; easy-to-use; easy-to-maintain; reliable; enduring; sufficient range; interoperable
  - sharp, stable day-and-night pictures / sensors
  - low-noise & visibility; reliable, real-time link; operable in buildings

MAV in EADS

- Today, demonstrators but no “product”
- Full system required, including
  - Concept of operations
  - Platform, Communication, Ground Segment, Infrastructure
  - Training, Life Time Support
- Low-end UAV system
  - Low price (< 10 kEUR)
  - Large numbers (> 1000)
  - Frequent upgrade cycles
- Rather marketing than business case
  - Total EADS market < 100 MEUR in xx yrs
- Create MAV family, e.g. fixed-wing / rotary
  - Adopted to mission
  - Interoperable

German MAV – Competitive Testing

- BWB plans competitive testing early 2004 (twice delayed!)
- Acquisition of demonstrator systems planned after
- Market availability assumed
- EADS DO-MAV to be demonstrated to DGA, UK DPA (JUEP)

MAV – a business case?

- EADS ISR is primarily a system leader
  - ISR is a lead system integrator
  - Focus on the most cost efficient available technology
  - Integrate in ISR system tailored to customer needs
  - Simple handling & reliability more important than fancy features

- MAV must be a business case
  - Money wise
  - Marketing wise
  - Technology wise

MAV – a business case?

- Money wise
  - MAV assumed to be a low-cost, high tech product
  - Technology must allow for series production
  - Components should be COTS
  - No high development cost up-front

- Marketing wise
  - Be quick - Technology should leave university & labs as soon as possible and must allow for immediate realization
  - Spiral development - Start simple and upgrade

- Technology wise
  - No over-design - New technologies must allow for better, cheaper, simpler, new solutions

MAV – Research / Industry Relation

- Research
  - Bring first demos rather than ideas
  - Short-term results & stepwise improvements
  - Flexibility to react quicker

- Industry
  - Limited to applied research and product development
  - Watch research market
  - Flexibility to act quicker
  - Invest into (few) promising technology approaches
  - Link between customers and research facilities

MAV – Customer Relation

- Public Customer
  - Public customers with complex procurement structure adverse to acquisition of simple, cheap new systems (Mil, Gov)
  - Long lead times to develop ConOps, request funding
  - Exception: US FCT, SOCOM, GE “Einsatzmittel-Sofortbedarf”
  - Own research institute structure to support military needs
  - (Europe: Limited) funds for product development at industry
  - ConOps rather mission-driven, special requirements regarding availability, all-weather, all-day etc.

- Civil Customer
  - Buys only off-the-shelf
  - All lead investments to be carried by industry
  - Highly unpredictable: compare to satellite / mobile phone story
  - “ConOps” purely cost-driven, flexible wrt environment conditions

Summary

- EADS understands itself as a system house
- Thus, we are interested in new technologies and capabilities arising from the MAV concepts & technology
- The MAV itself is only one part of one possible solution to a specific requirement
- Company investments will therefore be limited at this stage and aim at short-term results (first sales), with options for spiral development
- Investment will aim at system improvement rather than technological “gimmicks”
- Relevant fields are given by operational needs (in-house communication, reliability of total system, handling, etc.)

No single feature has a value in itself

- Companies will share customer research & development money with research institutes but current budgets are small