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"Science & Technology for Defence: luxury or need?"
Institut Royal supérieur de défense – Bruxelles

European Defence Research and Technology

Defence R&T

Why is there a need for Defence R&T?

- High Tech environment to stay on the cutting edge (Technology watch)

- Flexibility and ability to react within an increasingly complex world

- Knowledge base for advice: smart specifier, smart buyer and smart user

- Development of new concepts for future defence systems

- Critical Technologies for Defence, including European non-Dependence

- Key Industrial capabilities

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Defence R&T

Why is there a need for Defence R&T cooperation?

- Why invent the wheel twice or more at different places?

- Cost saving: not affordable for nations to do it all alone (economic crisis)

- Access to research capabilities not affordable for a Member States alone

- Cooperation leverage (joint investment programme)

- Many format: bilateral, regional, multilateral with proper modalities

- Use of European Technology & Innovation Clusters

- Need for dual-use cooperation with civil sector

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Objectives of Defence Research & Technology

- To support medium to long term European defence capability needs

- To establish agreed European R&T priorities

- To manage or coordinate R&T projects, on behalf of Member States

- To promote less dependence on critical key technologies

- To contribute to build a competitive European Technological and Industrial Base (EDTIB), including SMEs and Research Centers

- To increase synergies, in co-ordination with the European Commission (defence and security research), ESA (critical space technologies), ...

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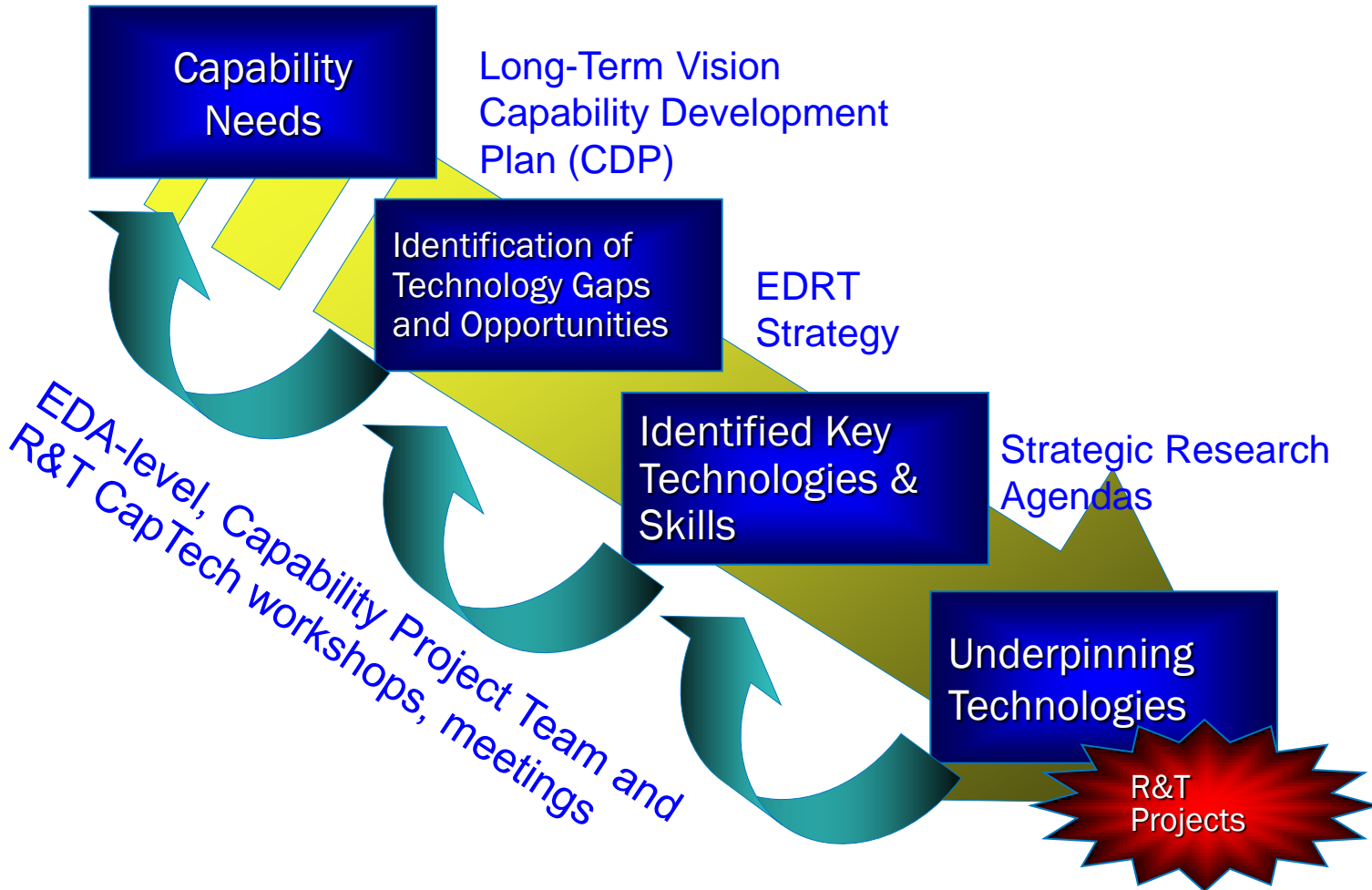www.eda.europa.eu

R&T – Key Technologies to develop

How to select the R&T goals to achieve

- **Capability-driven for short and medium terms needs**

  - Force Protection, Software Defined Radio (ESSOR), Sense & Avoid (MIDCAS), Maritime Mine C-M (MMCM), CBRN (Bio-EDEP), …

- **Industrial analysis to master technologies for long term needs**

  - Future Air Systems (ETAP, UAV, etc.), Ammunitions, …

- **Technology-driven to take care of technical (r)evolutions, …**

  - Mainly R&T projects generated in CapTechs, JIP ICET, …

➢ CapTech networks to develop strategic research agendas and technology roadmaps

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Capability Development Plan priorities

CDP "Top 10"	Maturing actions	Core drivers / environments
1. Counter Improvised Explosive Device (C-IED) 2. Medical Support 3. Intelligence Surveillance and Reconnaissance 4. Increased Availability of Helicopters 5. Cyber Defence 6. Multinational Logistic Support 7. CSDP Information Exchange 8. Strategic and Tactical Airlift Management 9. Fuel and Energy 10. Mobility Assurance	1. Maritime Mine Counter-Measures 2. Chemical Biological Radiological and Nuclear 3. Counter-Man Portable Air Defence Systems 4. Military Human Intelligence	1. Comprehensive Approach 2. Network Enabled Capabilities 3. Radio Spectrum Management for EU Capabilities 4. Space 5. Single European Sky

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Combining capability drive and technology push

Capability Needs

Long-Term Vision
Capability Development
Plan (CDP)

Identification of
Technology Gaps
and Opportunities

EDRT
Strategy

Identified Key
Technologies &
Skills

Strategic Research
Agendas

Underpinning
Technologies

R&T
Projects

EDA-level, Capability Project Team and
R&T CapTech workshops, meetings

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CapTechs – Technology domains & networks

Information Acquisition & Processing (IAP)	Guidance, Energy & Materials (GEM)	Environment, Systems & Modelling (ESM)
IAP1 Components	GEM1 Materials & Structures	ESM1 Naval Systems & their Environment
IAP2 RF Sensor Systems & Signal Processing	GEM2 Energetics, Missiles & Munitions	ESM2 Aerial Systems & their Environment
IAP3 Optical Sensor Systems & Signal Processing	GEM3 Ground Systems & their Environment	ESM3 Systems of Systems, Space, Simulation & Experiment
IAP4 CIS & Networks	GEM4 Guidance & Control	ESM4 Human Factors & CBR Protection

- The detailed technical coverage of each group is posted on the EDA website (http://www.eda.europa.eu/Aboutus/Howweareorganised/Organisation/RandTdirectorate/CapTechs)

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EDA Instruments to foster Defence R&T

- **EDA funded studies**

  Typically to review the state of the art of a technology domain, or to carry out a prefeasibility study.

- **Promote Defence research targeted projects (Cat. B)**

  About 40 projects so far, all technology domains, mainly underpinning research, average characteristics up to ~10 contributing member states, ~5-6 M€ value (but biggest one was € 50 million) , ~3 years duration

- **Develop Defence Research Joint Investment Programmes - JIP (Cat. A)**

  2 projects launched so far (Force Protection, 55M€ and Innovative Technologies, 15 M€), up to 20 contributing members (cM), 2 to 3 years duration, principle of global balance, call for proposals.

- **Launch Technology Demonstrators (Cat. B)**

  To prepare armament programmes, to bridge the valley of death in innovation; 2 projects launched so far: ESSOR (Software Defined Radio, 130 M€) and MIDCAS (Sense and Avoid for UAS, 50 M€), few contributing member states

- **Promote work in cooperation with institutional actors (EC and ESA) in European Framework Cooperation (EFC)**

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EU Defence R&T Expenditure in 2010

Large variations in pMS investment

BE, CZ, FI, PL, PT, SI (5 – 50 M€)

3 %

Remaining pMS (< 5 M€) 1 %

Cooperative R&T 264 M€ (11.8%)

R&T 2 100 M€ (1.07 %)

UK, FR (> 500 M€)

63 %

DE, ES, IT, NL, SE (50 – 500 M€)

33 %

Total European Defence Expenditure 194 G€

Key Facts & Figures for R&T Investment

JIP – FP (Force Protection)

- 20 cM, 55M€, 5 capability areas
- 18 projects funded, 125 entities
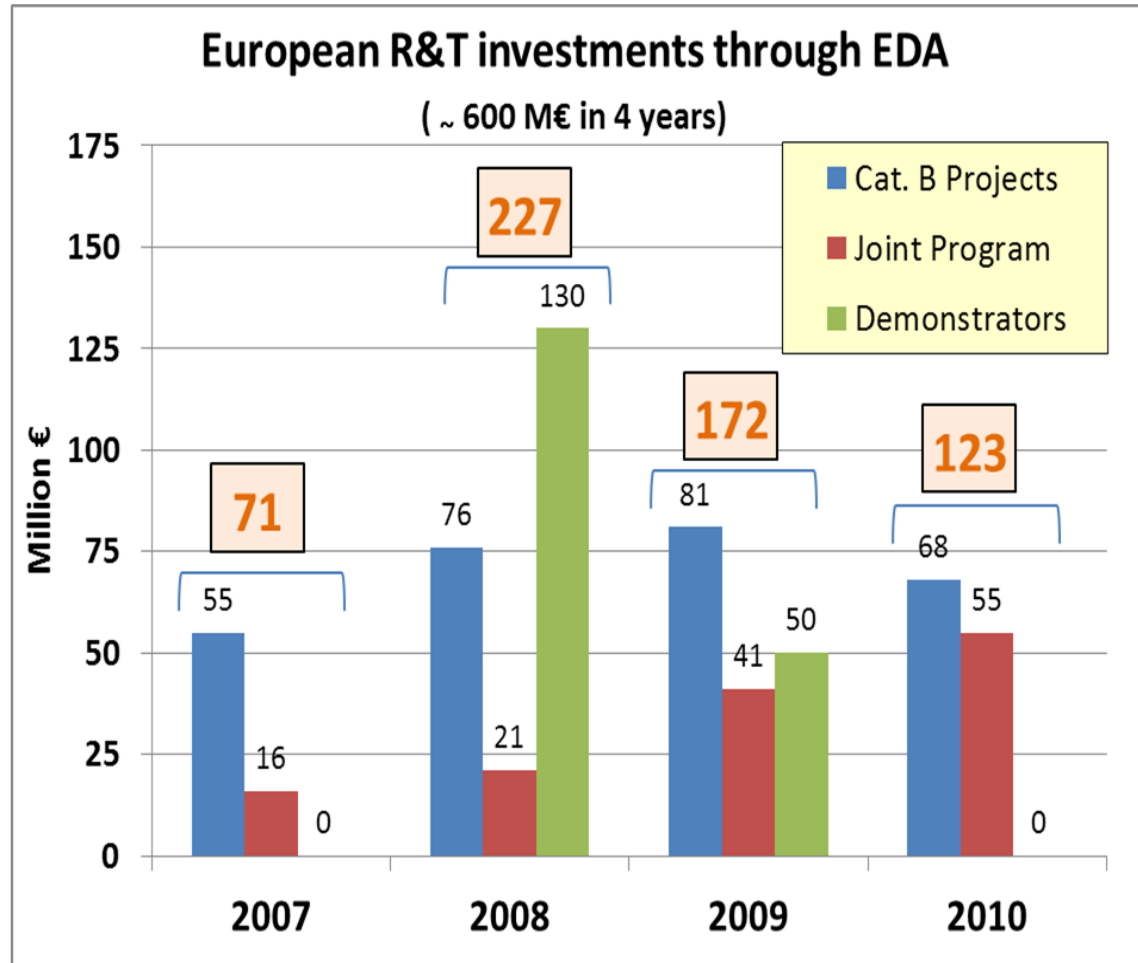
JIP - ICET (Disruptive Technologies)

- 15 cM, 15.5M€, 3 technology areas
- 12 projects funded, 75 entities

JIP- UMS (Unmanned Maritime Sys.)

- 11 cM, 53 M€, underwater techno.
- 11 projects funded

Cat. B Projects

- 2007 - 10 projects signed for 55M€
- 2008 - 12 projects signed for 76 M€
- 2009 - 18 projects signed for 81 M€
- 2010 - 11 projects signed for 68 M€

European R&T investments through EDA

(~ 600 M€ in 4 years)

Legend: Cat. B Projects · Joint Program · Demonstrators

Year	Cat. B Projects	Joint Program	Demonstrators	Total
2007	55	16	0	71
2008	76	21	130	227
2009	81	41	50	172
2010	68	55	0	123

Technology Demonstrators – **ESSOR** (130 M€ in 2008) **and MIDCAS** (50 M€ in 2009)

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EDA Joint Investment Programmes (Cat. A)

JIP (1) Force Protection (FP)

19 Member States & Norway – 55 M€

Call 1 - Collective survivability

Call 2 - Tactical wireless com., individual

## Call 3 - Data analysis & data fusion

Call 4 - Mission planning and training

- Synchronisation of JIP-FP activities with the EC FP7 activities is possible
- Strong participation of *"the small ones"* (SME, academia, non-governmental research establishments) – and good success rate (23%) – 4 out of 8 contracts are lead by SME

JIP (2) Innovative Concepts and Emerging Technologies (ICET)

11 Member States & Norway – 15,5 M€

- Promote high risk R&T projects starting at low TRL
- Collect research themes from a broad base SME & Academia
- Technology areas
  - Improved Autonomy
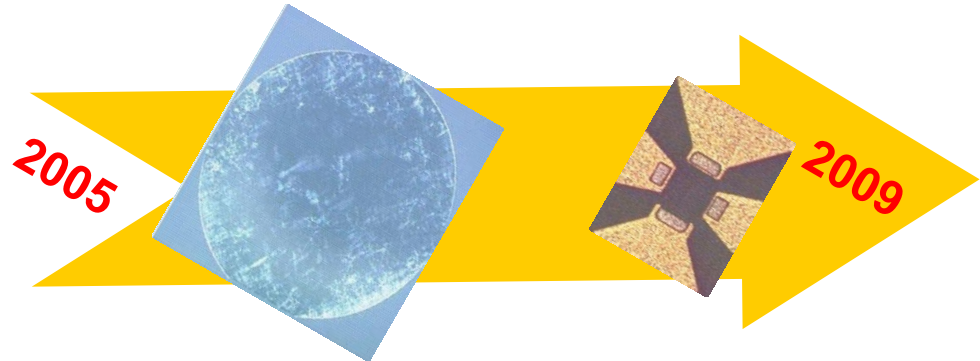 - New Solutions for Materials & Structures
  - Data Capture and Exploitation

Legend: COMPANIES, LABORATORIES, ACADEMIA, SME
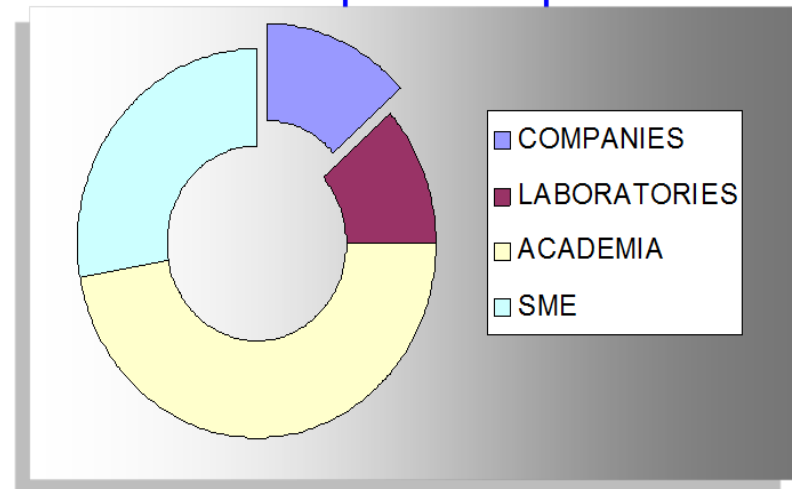
Projects for *detection* capability, GaN

KORRIGAN (2004 – 2009)

Result: European Supply Chain Established (low volume production)

FR, GE, IT, NL, ES, SE, UK

≈ 40 M€

2005 — From Substrate to Device — 2009

MANGA 2009 – 2013

13,5 M€

DE, FR, IT, SE, UK

Upscaling Manufacturing

MANGUS
2012 – 2015
12 M€
Demonstration
FR, UK, DE, SE, NL

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Unmanned Maritime System –UMS (Budget 54 M€ - 14 projects)

Contributing Members States: BE, DE, ES, FI, FR, IT, NL, NO, PL, PT, SE

UUVs

USVs

Systems Integration

SE   FR   NO   GE   GE   FR   ES

Design Integration

SoS – Standards

Sub-system (plug&play)

| Sensors | Comm | etc. | Mine sweeping | Mine neutralisation | etc. |
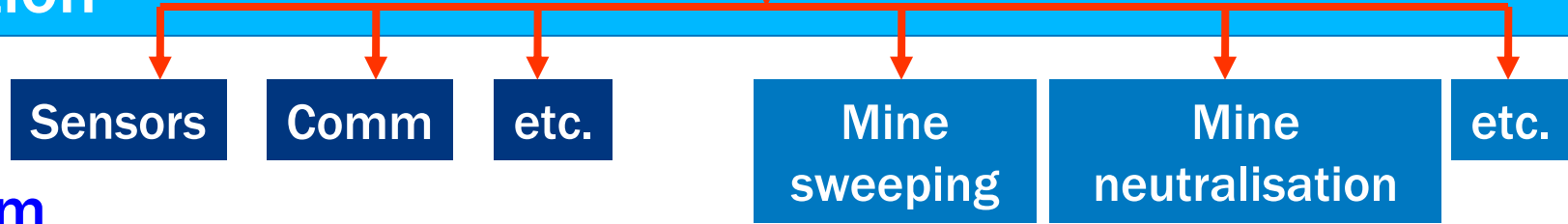
Technological Demonstrations

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European Technology Non-Dependence

Issue

- Increasing need for strategic approach on European technology dependencies

- Global economic crisis

  - Investments in costly basic technologies are shrinking throughout Europe which increase the technology dependence from the US and Asian suppliers.

  - This continuously growing technology dependence is not only a defence issue; it affects all sectors and has become a strategic issue for Europe.

Raising awareness on European non-dependence

- To address policies and strategies while providing a solid scientific base

  - Include among others: Components (electronics, photonics, etc.), Materials (e.g. carbon fibres) and other Specific devices (GPS) but also industrial policy and strategy.

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Cooperation with the European Commission

- The increased exploitation of civilian research and technology work in military systems reduces costs

- The signature of the Lisbon treaty allows closer cooperation between EDA and the European Commission

EFC- European Framework Cooperation

- The purpose of the EFC initiative is to improve coordination between the EC FP7 and EDA activities in the development of dual use technologies

- EDA will promote the potential of dual-use technologies for defence needs in the future framework programme HORIZON 2020

SEVENTH FRAMEWORK PROGRAMME

to

Horizon 2020

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European Framework Cooperation (EFC)

Overall objective:

- promote R&D security cooperation between EDA, ESA and European Commission
- coordination of projects to avoid duplication and to find coherence
- maximising complementarity among civilian security and defence-related security

Governance:

- separate frameworks, separate budgets, and separate rules – BUT
- common objectives, synchronised calendars, sharing of expertise & information

Actions:

- Identify suitable topics: CBRN , UAS, Cyber Security
- Time alignment of work programmes and calls where possible
- Evaluation pooling and exchanging expertise where possible
- Simultaneous and coordinated implementation and demonstration
- Information sharing in workshops

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Joint Investment Programme on CBRN Protection (JIP CBRN) within EFC

- **Objectives:** next generation detection (B and C), M&S, improved DECON process and personal/collective protection

- **Contributing members States:**
  AT, BE, CZ, DE, ES, IE, IT, FR, NL, PL, PT, SE and NO

- **Financial value:** ~ 12 M€

- **Time frame:** 2012 – 2015

  - Call 1 launch 2 May 2012, First contracts March 2013

  - Call 2 in April 2013

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Conclusion on European Defence R&T

- The EDA is working with the Member States to select Critical Defence Technologies where collaboration should be directed

- This process is driven by the Capability Development Plan priorities and Industrial strategies

- This approach aims in bringing new dynamic to allow cooperation and innovative R&T projects

- Cooperation instruments put in place have proven to be efficient but need to improve IPR issues, budget availability, alignment, …

- Increase synergies, with the European Commission (dual use technology research), ESA (critical space technologies), …

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Thank you for your attention!