



## The future European Defence Research programme

Reflexions drawn from the report written at the request of the  
European Parliament March 2016  
'the future of EU defence research' (Mauro-Thoma)

[http://www.europarl.europa.eu/RegData/etudes/STUD/2016/535003/EXPO\\_STU\(2016\)535003\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2016/535003/EXPO_STU(2016)535003_EN.pdf)



1. Some specificities of Defence R&D to bare in mind
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3. The necessity of a vigorous action at a European level
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7. How to include EDRP within a comprehensive defence action plan?



# Some specificities of Defence Research to bear in mind



Defence Research is always in search of the decisive operational advantage

- not simply better, but gives **military supremacy** or/and '**offset**' a numerical disadvantage  
E.g. : nuclear weapons – extended range precision-guided munitions
- **disruptive technology** (not incremental) – something that does not exist  
E.g. combat aviation (WWI) – radar (WWII) – stealthiness (CW) etc.
- **importance of all actors** : Academia, SMEs, RTO, Primes, the Military, Intelligence



**Military  
decisive**

*'innovation is at least as important a product of the defence sector as the physical products that embody the new ideas' [Rogerson]*



## Defence research is **long and onerous**

To have a defence research apparatus, a country needs in **the long term**:

### **human competences:**

Scientists (discoveries e.g. no nuclear bomb without Einstein)

Engineers (new ideas must be translated into practical technologies)

Craftsmen (e.g. welding is essential for submarines industry)

### **testing facilities**

wind tunnels

hull basins

advanced computing centres ...

### **industrial plants**

shipyards...

### **launchers (for Space) ...**

**This is very onerous**: the entry ticket to have a 360° defence research is:

France ~ 750 M€/year

UK – Germany ~ 500 M€/year

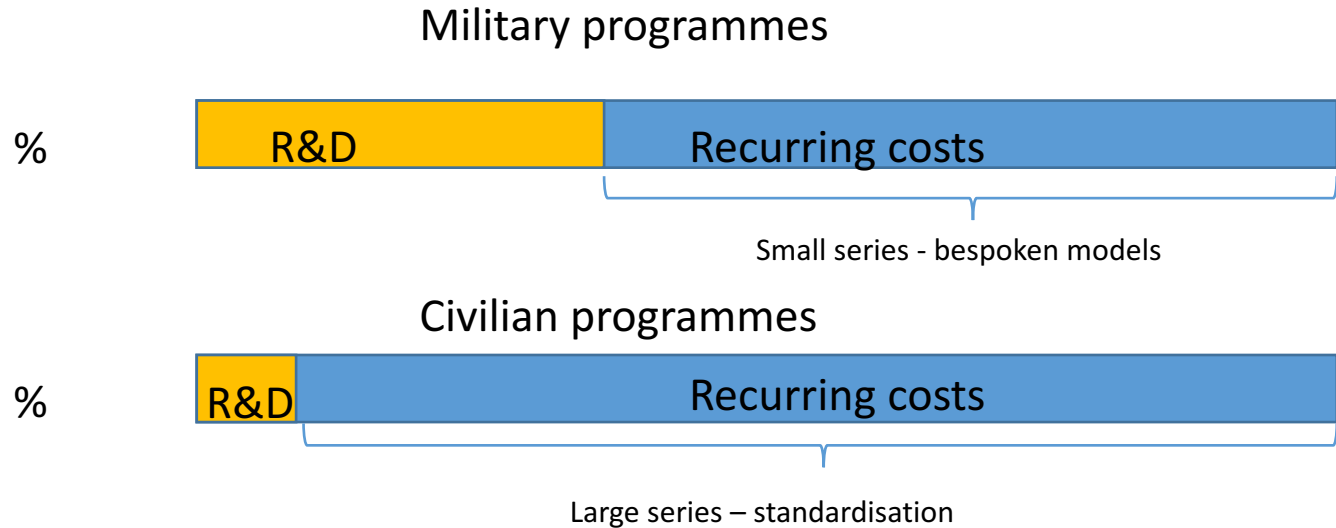


**Long  
&  
costly**



## Defence research is **substantial**

- Due to little series and bespoke programmes, the share of defence research in the procurement process is **substantial**



- Which leads to three types of strategies in order to share non recurrent costs (the industrial Grail)

- ⇒ Master a large national market
- ⇒ Ensure collaborative programmes
- ⇒ Exports

**substantial**

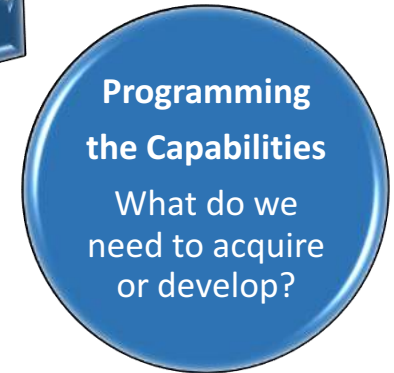
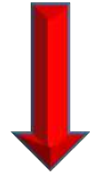


Defence research is **oriented** ...

**Defence S&T**



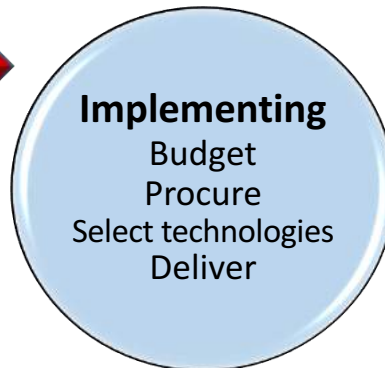
**Defence S&T**



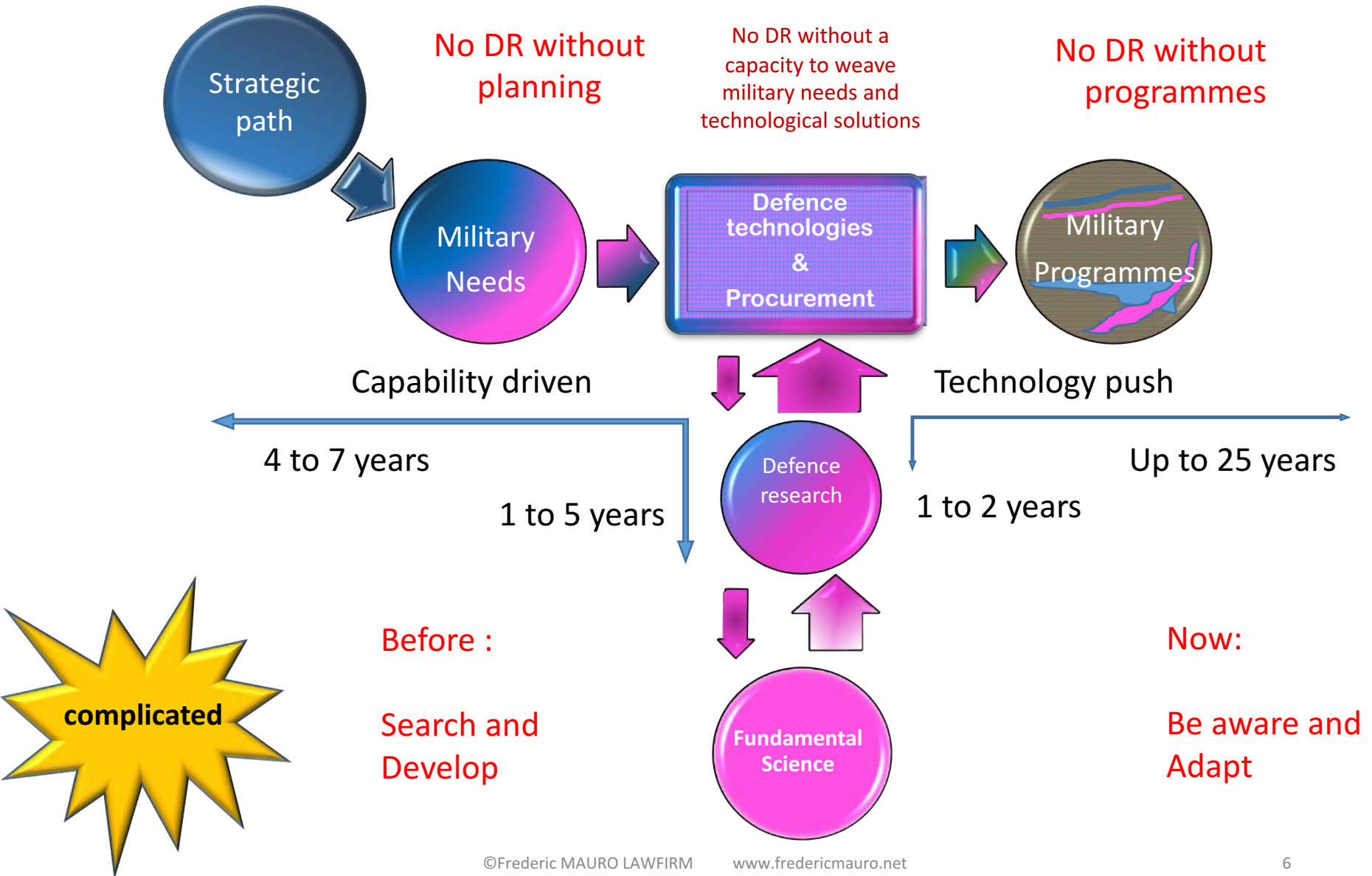
**The strategic path**



**Defence S&T**

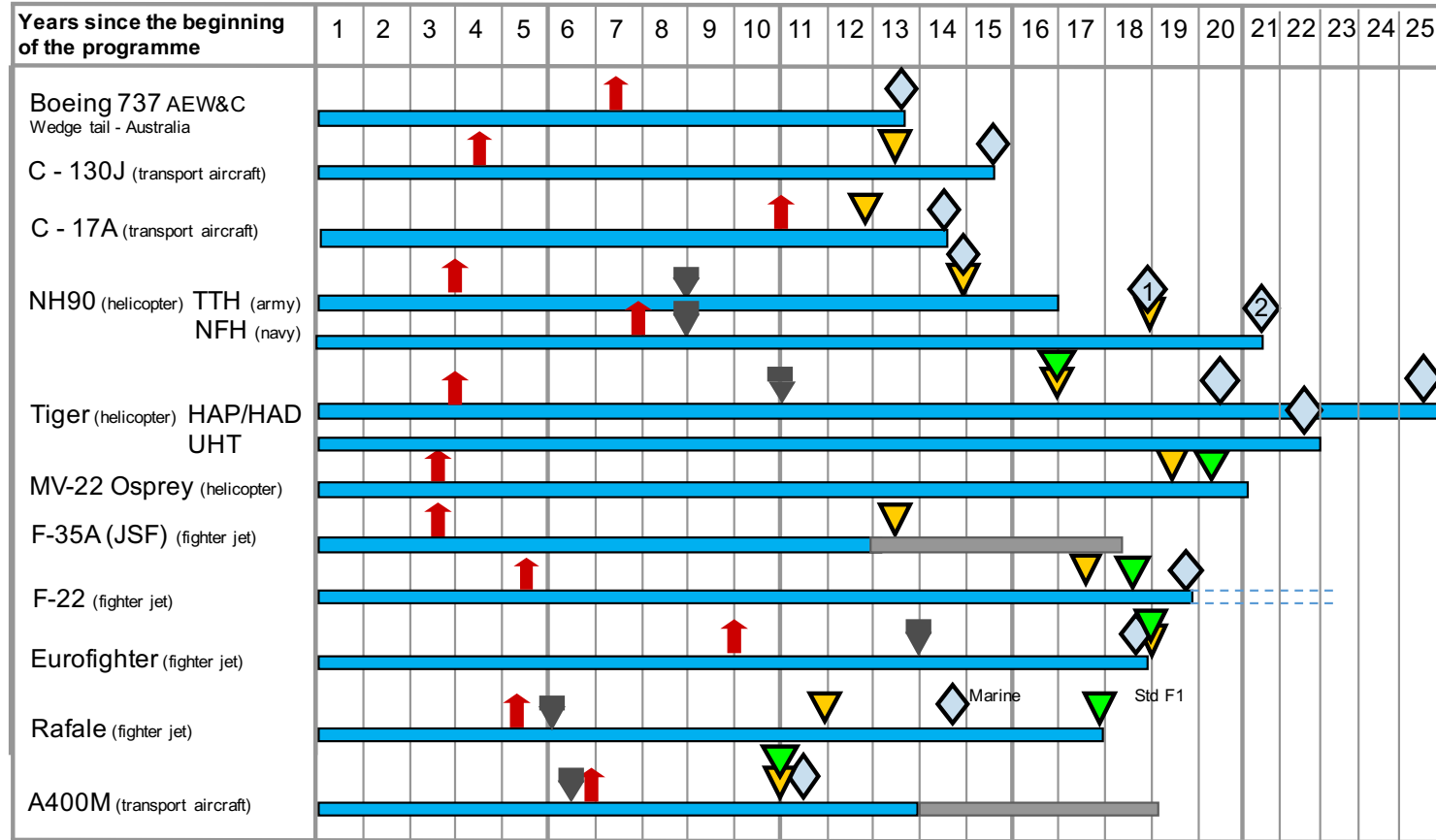


... and **complicated** : the capability/technology conundrum



# No surprise: procurement hardly respect schedule and costs

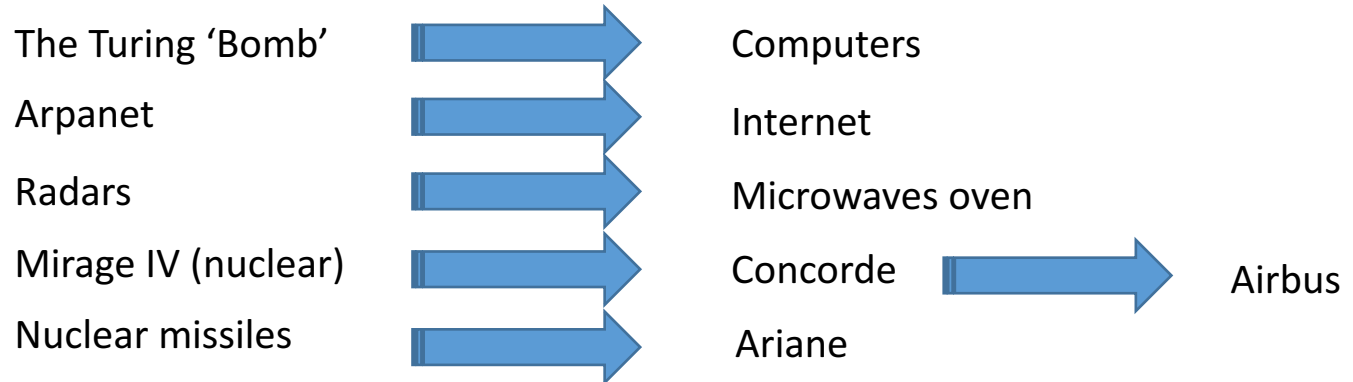
## Main military airplanes and helicopters timelines



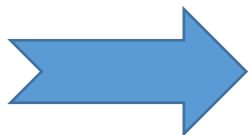
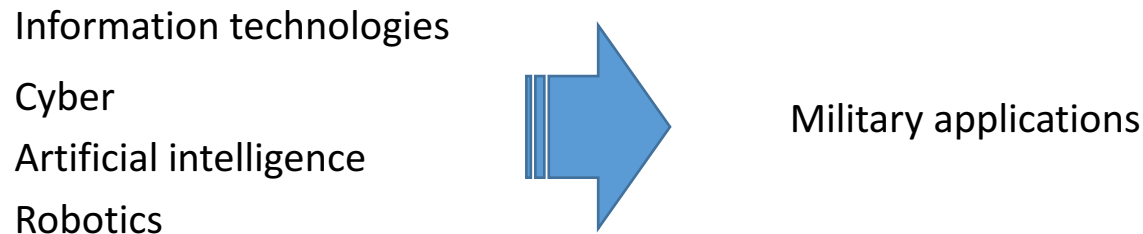


## The new relation between Defence and Civilian research

- Before a leading role to Defence research (serendipity )



- Due to the decrease in defence budgets and the explosion of new technologies, this link has been reversed: civilian technologies have the lead



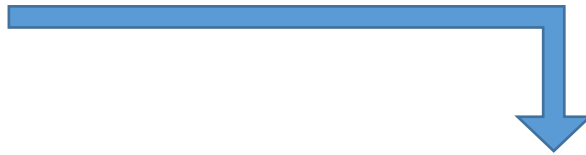
Some companies are wondering whether to stay in the defence business or not  
e.g. E.A.D.S. became Airbus



## Defence research is **essential to the 'strategic autonomy'**

- Strategic autonomy is:

- + Freedom of appreciation (Intelligence, satellites, drones, sensors....)
- + Freedom of decision (Capability to conduct military operations - OHQ)
- + **Freedom of action**
- + Security of supply



Capability to **develop**, to produce, to maintain, to modify, to utilise and ultimately to sell or to donate its own weapons



**no strategic autonomy without defence research**



*'Defence research is as precious as the apple of our eyes'*  
*Laurent Collet-Billon – French DGA*



Military decisive

operational advantage

Long & Costly

It is a long term effort, a seed that we plant that will produce a tree after 15 years

Substantial share of the procurement process

better if shared

Part of a process

Strategically indispensable

No autonomy without it

No DR without planning process  
No DR without military programmes  
The conundrum  
Capability/Technology

# 2

## European Defence Research is coming to an end

A

It has been the main target of budget cuts

EDA countries (Bn €)	2006		2014
defence expenditure has decreased by 12 %	215	⇒	195
equipment by 19 %	32	⇒	26
defence R&D by 18 %	11	⇒	9
defence R&T by 31 %	3	⇒	2

sacrificed

EUROPEAN DEFENCE EXPENDITURE in billion euros constant prices 2014	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015 e	Variation in value (2014/2005)	Variation in %	Bench- mark
<b>DEFENCE EXPENDITURE EDA COUNTRIES</b>	<b>218</b>	<b>222</b>	<b>219</b>	<b>215</b>	<b>213</b>	<b>208</b>	<b>203</b>	<b>196</b>	<b>193</b>	<b>195</b>	<b>195</b>	<b>- 27</b>	<b>- 12,0 %</b>	
% change on previous year		+1,8	-1,3	-1,6	-1,1	-2,3	-2,2	-3,4	-1,7	+0,9	-0,2			
as a % of GDP	1,8	1,8	1,7	1,6	1,7	1,6	1,6	1,5	1,5	1,4	1,4			
as a % of overall gov. Expenditures	3,9	3,8	3,7	3,5	3,3	3,2	3,2	3,1	3,0	3,0	3,0			
<b>Investment (equipment and R&amp;D)</b>	<b>43,0</b>	<b>44,9</b>	<b>45,0</b>	<b>44,4</b>	<b>45,5</b>	<b>40,1</b>	<b>39,9</b>	<b>38,2</b>	<b>34,7</b>	<b>34,7</b>	<b>34,7</b>	<b>- 8,3</b>	<b>- 19,3 %</b>	
as a % of defence expenditure	19,4	20,5	20,9	20,9	21,9	19,7	20,3	19,8	17,8	17,8	17,8			20,0 %
<b>equipment</b>	<b>32,2</b>	<b>34,6</b>	<b>35,6</b>	<b>35,3</b>	<b>36,4</b>	<b>32,1</b>	<b>32,2</b>	<b>30,5</b>	<b>25,9</b>	<b>25,9</b>	<b>25,9</b>	<b>- 6,3</b>	<b>- 19,6 %</b>	
as % of defence investment	74,9	76,9	79,2	79,5	80,0	79,9	80,8	79,7	74,6	74,6	74,6			
<b>R&amp;D</b>	<b>10,8</b>	<b>10,4</b>	<b>9,3</b>	<b>9,1</b>	<b>9,1</b>	<b>8,1</b>	<b>7,6</b>	<b>7,7</b>	<b>8,8</b>	<b>8,8</b>	<b>8,8</b>	<b>- 2,0</b>	<b>- 18,5 %</b>	
as a % of defence investment	25,1	23,1	20,7	20,5	20,0	20,3	19,2	20,2	25,4	25,4	25,4			
as a % of defence expenditure	4,9	4,7	4,3	4,3	4,4	4,0	3,9	4,0	4,5	4,5	4,5			
<b>R&amp;T (subset of R&amp;D)</b>	<b>2,9</b>	<b>2,7</b>	<b>2,7</b>	<b>2,5</b>	<b>2,2</b>	<b>2,2</b>	<b>2,1</b>	<b>2,1</b>	<b>2,0</b>	<b>2,0</b>	<b>2,0</b>	<b>- 0,9</b>	<b>- 31,8 %</b>	
% of defence investment	6,8	6,1	5,9	5,5	4,8	5,5	5,2	5,6	5,8	5,8	5,8			
as a % of defence expenditure	1,3	1,2	1,2	1,2	1,1	1,1	1,1	1,1	1,0	1,0	1,0			2,0 %

Authors' own production – FM 2016 - from EDA restated figures published 7 June 2016

EUROPEAN COLLABORATION in billion euros constant prices 2014	2006	2007	2008	2009	2010	2011	2012	2013	2014	Variation in value	Variation in %	Bench- mark
<b>on defence equipment</b>	<b>6,7</b>	<b>6,6</b>	<b>7,6</b>	<b>7,8</b>	<b>7,7</b>	<b>7,7</b>	<b>5,9</b>	<b>4,6</b>	<b>5,1</b>	<b>- 2,1</b>	<b>- 31,8 %</b>	
as a % of defence investment	20,8	19,0	21,3	22,0	21,2	24,0	18,2	15,0	19,8			35,0 %
<b>on defence R&amp;T</b>	<b>0,28</b>	<b>0,36</b>	<b>0,44</b>	<b>0,31</b>	<b>0,26</b>	<b>0,27</b>	<b>0,14</b>	<b>0,17</b>	<b>0,17</b>	<b>- 0,1</b>	<b>- 39,0 %</b>	
as a % of defence R&T	9,5	13,1	16,6	12,8	11,7	12,4	6,9	8,0	8,6			20,0 %



## It is extremely concentrated on three countries

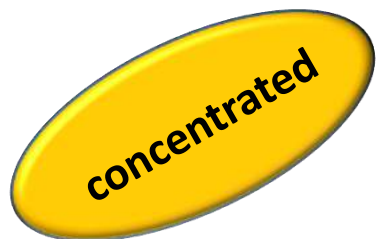
UK + F + D =

R&D      R&T

93 %      89 %

En millions d'euros aux prix courants 2014	R&D	Cumul	Cumul en % du total	R&T	Cumul	Cumul en % du total	R&T en collaboration
UK	3 753	3 753	43	439	439	23	1
France	3 563	7 316	83	764	1 203	63	130
Germany	846	8 162	93	483	1 686	89	0
Poland	217	8 379	95	10	1 686	89	2
Sweden	106	8 484	97	61	1 747	92	13
Italy	103	8 587	98	restricted	1 747	92	0
Spain	75	8 663	99	42	1 789	94	21
Netherlands	59	8 722	99	59	1 849	97	6
Finland	35	8 757	100	25	1 874	99	1
Czech Rep.	16	8 774	100	7	1 880	99	1

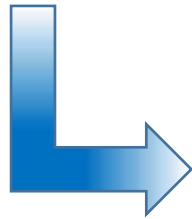
In Million €	8 791	1 899	177
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## It is full of duplications

Collaborative R&T with a total of 177 M€ against 1 899 M€ barely exist



That means necessarily that the main countries are doing almost the same studies

Instead of pushing European countries to collaborate, cuts in defence budgets have increased self protection and isolationism





## A growing gap with the American ally (almost 50 bn€/year)

46 Bn €  
Per year

7 Bn €  
Per year

COMPARISON EU-US Bn€ in current prices		2006	2007	2008	2009	2010	2011	Average per year
<b>Equipment</b>								
	European Union	29,1	32,2	33,3	32,5	34,3	29,2	31,8
	United States	71,5	72,7	79,8	92,6	100,8	91,9	84,9
<b>R&amp;D</b>								
	European Union	9,7	9,6	8,6	8,4	8,6	7,8	8,8
	United States	54,7	53,3	51,1	56,7	58,1	53,8	54,6
<b>R&amp;T (subset of R&amp;D)</b>								
	European Union	2,7	2,5	2,5	2,3	2,1	2,1	2,4
	United States	10,6	9,7	7,3	8,2	10	8,3	9,0
<b>Total investment</b>								
	European Union	<b>38,8</b>	<b>41,8</b>	<b>41,9</b>	<b>40,9</b>	<b>42,9</b>	<b>37</b>	<b>40,6</b>
	United States	<b>126,2</b>	<b>126</b>	<b>130,9</b>	<b>149,3</b>	<b>158,9</b>	<b>145,7</b>	<b>139,5</b>

EDA Defence Data portal - presentation and last column are Authors' own production - FM 2016

EDA has not published any comparison between EU and the US since 2011, due to methodological difficulties to compare the aggregates.



Which will increase with the US 'third offset initiative' (if confirmed: + 18 Bn \$ per year)



## An example of the gap between US defence R&D and EU R&D:

### UCAS (Unmanned Combat Air System Demonstrator)

First flight of Boeing X 45's: **2002**



First take on/take off from an Aircraft carrier of Northrop Grumman X 47's: **2013**



First in-flight refuelling of a X 47: **2015**



## An example of the gap between US defence R&D and EU R&D

First flight of Dassault's Neuron:

2012

+ 10 years



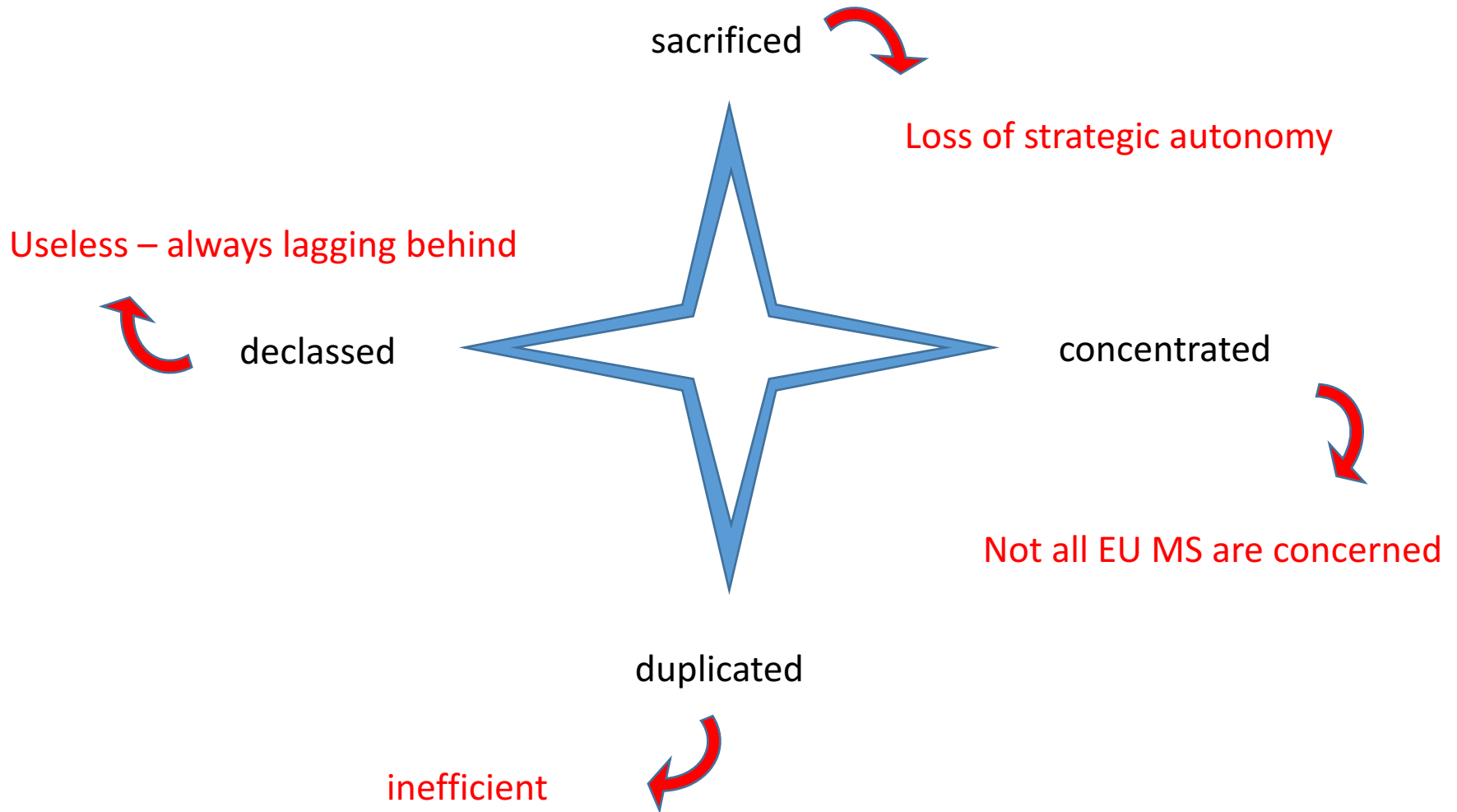
2013

First flight of BAE's Taranis

+ 11 years



European Defence Research is copying with ten years delay and at more expensive cost what U.S. industry is doing now, not even knowing whether it is worth it



# 3

## The necessity of a vigorous action at a European level

### Business as usual is not an option

- No realistic perspective, that Member States increase their defence expenditure
- Even if they do so, it is not sure that it will benefit to Defence research (e.g. D)
- In ten years time the European defence industry will be a niche industry out of touch of with the main cutting edge technologies (robotics, I.A., lasers etc.)

### The Union has already started to react

- Commission Communication 2013  
⇒ The Union shall consider a Preparatory action
- Parliament's Pilot Project (1,5 M€) 2014  
⇒ first time the word 'military' is used in the budget – MEP Michael Gahler (D)
- Commission's Preparatory Action (90 M€/3years) 2017 – 2019  
⇒ The G.O.P. paved the way and proposed 500 M€/year for a EDRP

# A future European Defence Research Programme 2021-2028 ?

## 1. The question of the compliance with the treaties?

Three legal opinions:	Council	Compliant
	EEAS	Compliant
	Commission	Not compliant (‘if aimed at capabilities development’)
The only public legal opinion is in the Mauro-Thoma report for the European Parliament		Compliant



But at the end it is a political decision and only the Judge can tell

## 2. The question of the added value?

If no action today, there will be no European Research tomorrow, and no Strategic autonomy the day after tomorrow

There is now an **agreement on the principle** of the EDRP

The open questions are:

Size ?

Scope ?

Governance ?

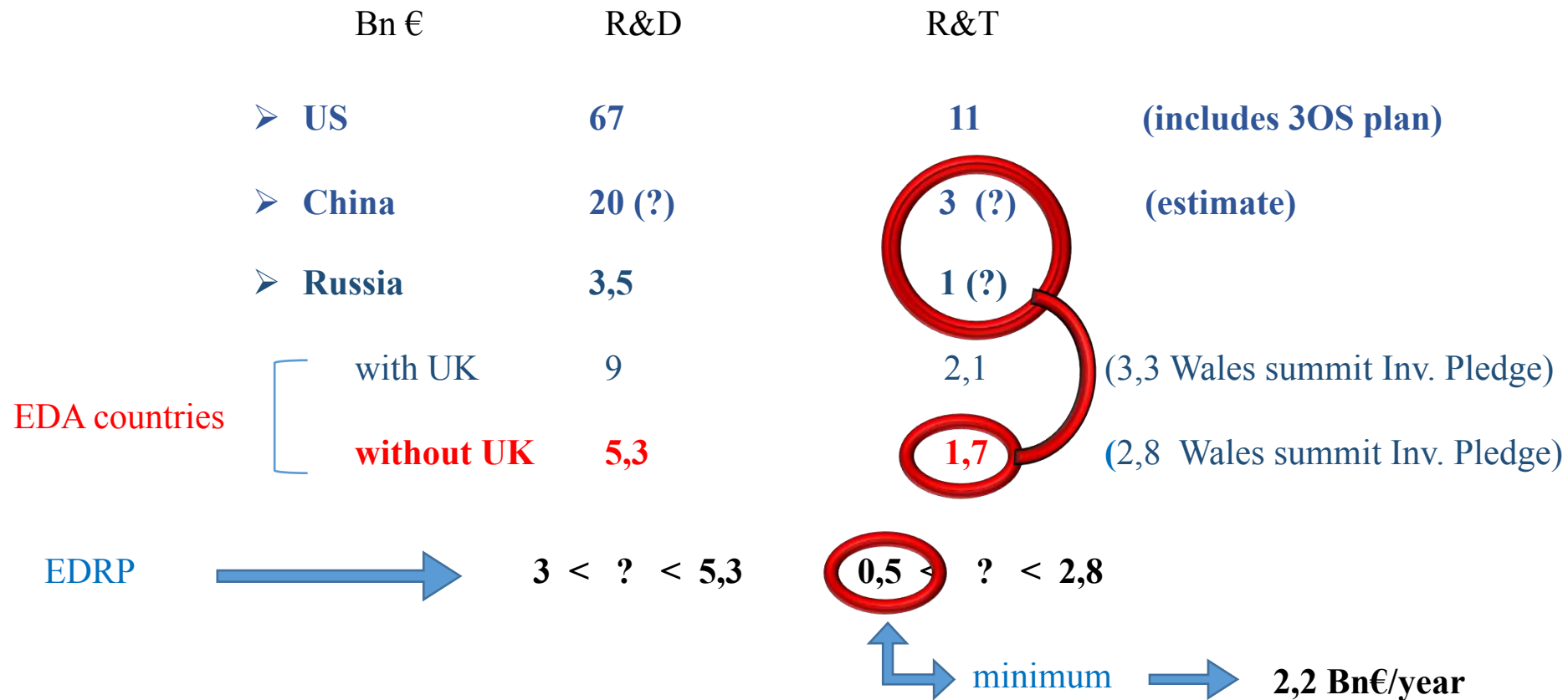
Articulation with a wider plan ?

# 4

## What should be the size of the EDRP ?

No technical advice – only a political decision

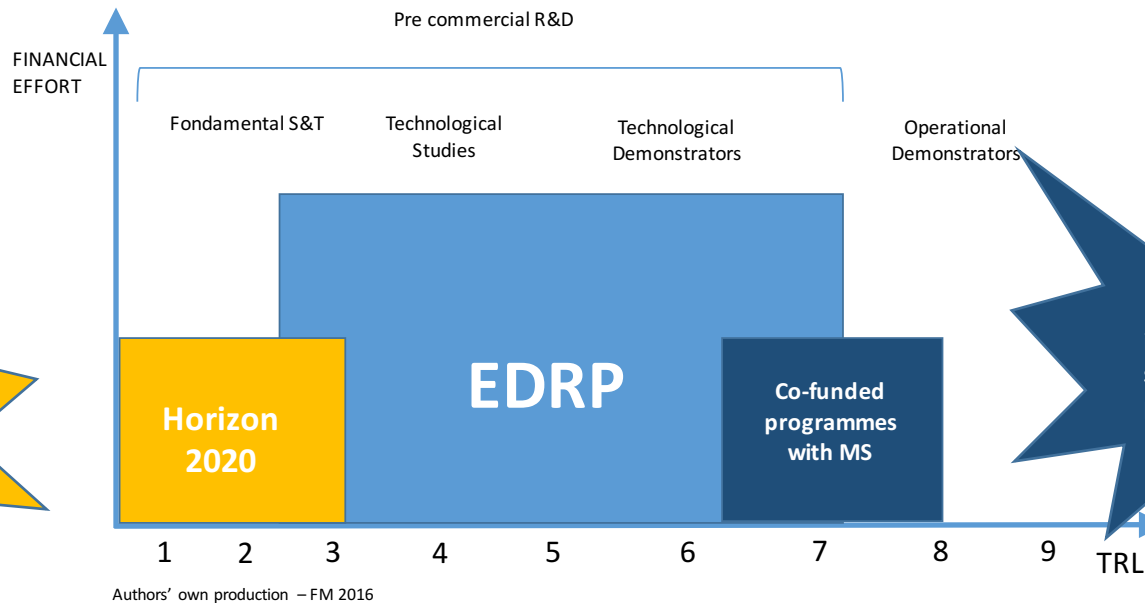
What is the benchmark ?



# 5

## What should be the scope of the EDRP ?

- ❖ 2021 might be too late: make sure that a significant amount of Horizon 2020 is dedicated to **dual use** in 2018 2019 and 2020 budgets
- ❖ **Focus ERDP on defence from TRL 3 to TRL 7**
- ❖ Consider the possibility of **co-funded programmes** at later stage (2023 upwards)



Between TRL 1 & 3 no difference between defence & civilian research

It is crucial that Defence research is followed by sound armament programmes



## How to Include the ERDP within a comprehensive defence action plan

**EDA as it stands will not be able to support a big programme**

Setting the orientations and selecting the projects is critical and has to be done in the common interest not according to the **unanimity rule**

**EDA's budget is out of proportion with EDA's missions:**

EU EDA:            129 personnel ;            budget €30 million (operational budget: €6m)

US DARPA:        219 personnel ;            budget € 2.7 billion

**If the Union wants to utilise EDA - which we recommend – then the Union has first to modify EDA and then to set the size of the programme**

**If the Union is not capable to modify EDA then it has to consider other solutions:**

Set an ad hoc **Joint Undertaking/Joint Technological Initiative**

Create a **Defence research General Directorate/Defence research Commissioner**

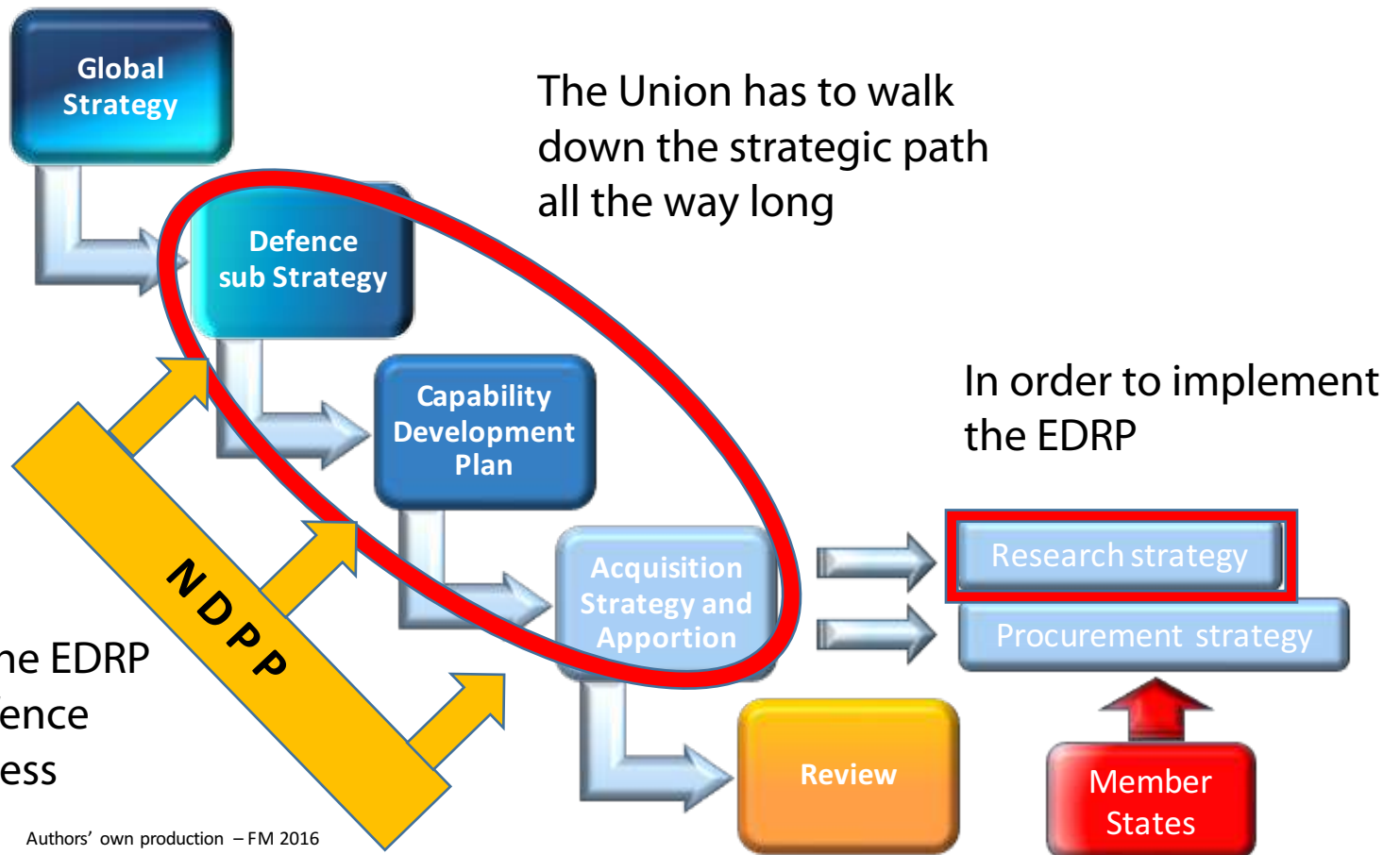


# 7

## How to Include the ERDP within a comprehensive defence action plan

### A

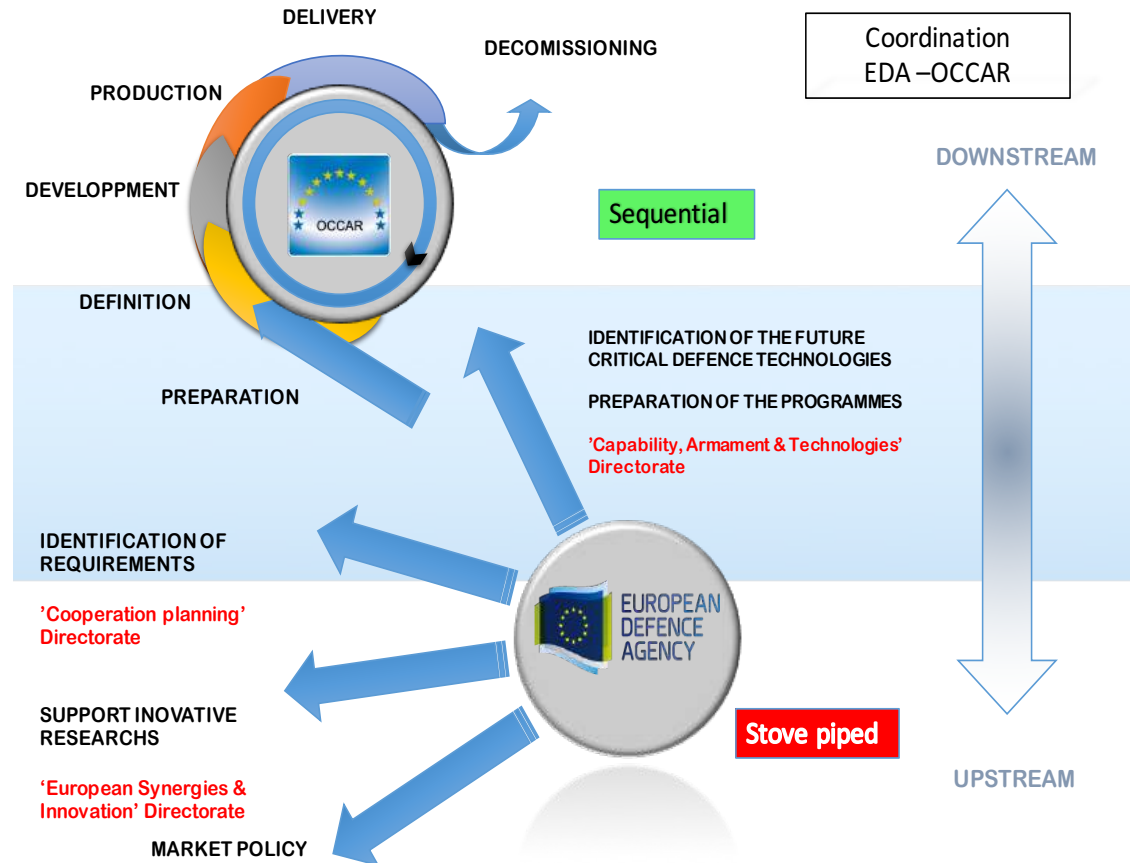
#### Connecting EDRP with capability needs



# B

## Connecting EDRP with armament programmes

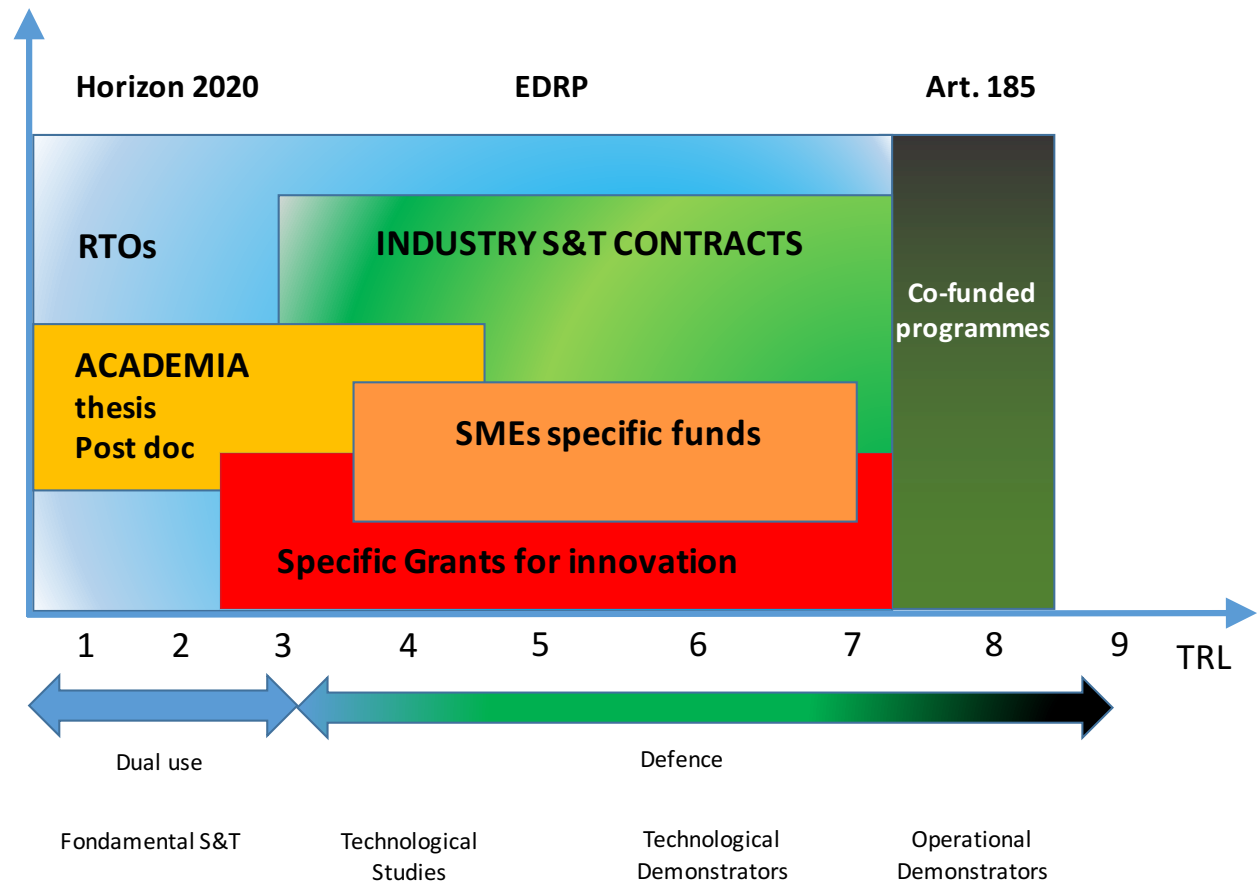
- Co-finance some major projects with the Member States
- Enable the Union to acquire dual assets e.g. Space
- **Merge EDA, OCCAR and Lol-FA**





## Involving all Member States in the EDRP

- Invest in the industrial sectors that are crucial for **strategic autonomy ex. FCAS**
- Make EDA a **centre of excellence** at the disposal of the Member States (e.g. Darpa)
- Help the Member States to maintain their **most fragile links** in their defence research ecosystem



Authors' own production – FM 2016

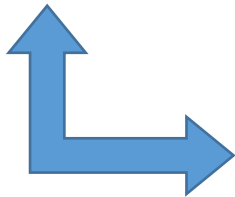


## Incentivising European industries to play the game

### Address all industries fears

- ❖ Industries are reluctant or at least cautious towards EDRP
  - Fear of the spread of **Intellectual Property Rights (IPR)** and possible creation of copy cat companies
  - Lack of trust with regard to **confidentially rules**
- ❖ Those issues have to be solved in a proper way

### Consider the demand side of the market



Make sure that heavy investments industries might consent will be followed by sound armament programmes agreed upon strong commitments

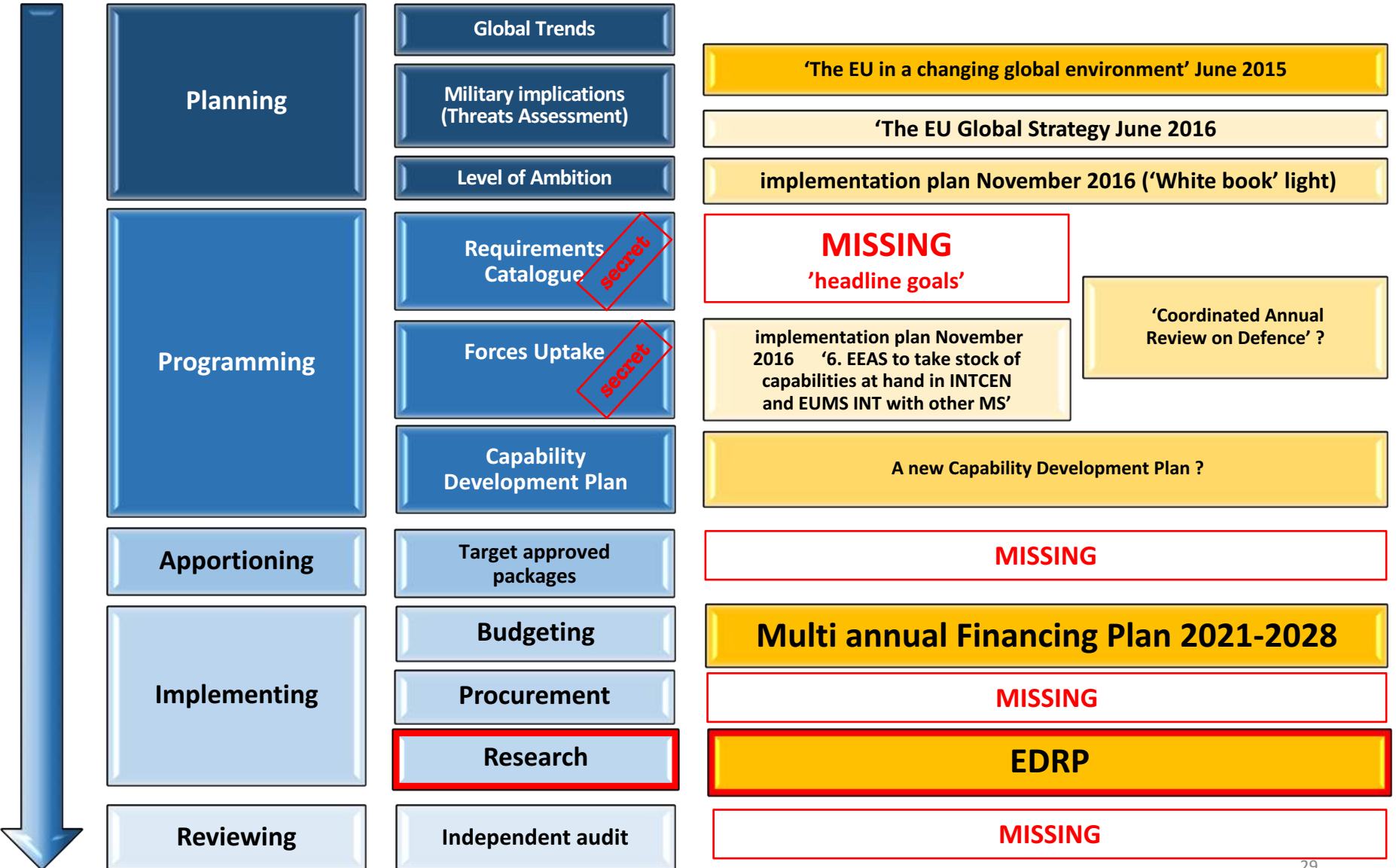
# Conclusion

## What are the working strands for the moment?

- 1** The size **Gossip: 500 M€/year** **But only the E.P. will tell**  
**i.e. 3,5 Bn€/7 years ?**
- 2** The scope **'A continent-wide joint research programme on defence would be a natural extension of Hz 2020' Federica Mogherini – EDA annual conference 10<sup>th</sup> November 2016 (meaning?)**  
**Increase sense that the Union could co-finance some assets through a 'European Defence Fund' in order 'to support the joint financing of jointly agreed defence capability programmes' (announcement of the action plan - Elzbietha Bienkowska – EDA annual conference 10<sup>th</sup> November 2016)**
- 3** The governance **'I have launched a review focused on the future of the Agency, together with Jorge (Domecq) and we are working on concrete recommendations to be presented in the coming months by next spring' Federica Mogherini EDA annual conference 10th November)**

4

# The inclusion in a defence planification process



5

## Connecting EDRP with armament programmes

**'6. EDA with its participating Member States to develop further proposals concerning output-oriented capability development, Key Strategic Activities, R&T, more structured cooperation, critical enablers and Security of Supply, and prepare for their implementation' (Implementation plan 10<sup>th</sup> November 2016**

**Stress test: technological pieces for the Future Aircraft Combat System?**

**Merging EDA with OCCAR: not on the map**

6

Involving all Member States in the EDRP



Or just the ones who want

**Work in progress**



7

Incentivising European industries to play the game

**Work in progress**

Defence Research is the crucible in which defence capabilities are forged.

It is the long term investment we need to keep alive our freedom of action, to defend our values and to preserve our liberties.

A vigorous and immediate action is a necessity if the Union wants to keep open the doors towards strategic autonomy.