



MINISTÈRE DE LA DÉFENSE

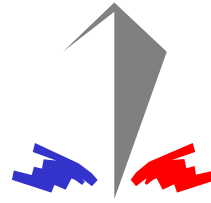
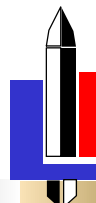
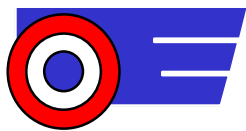
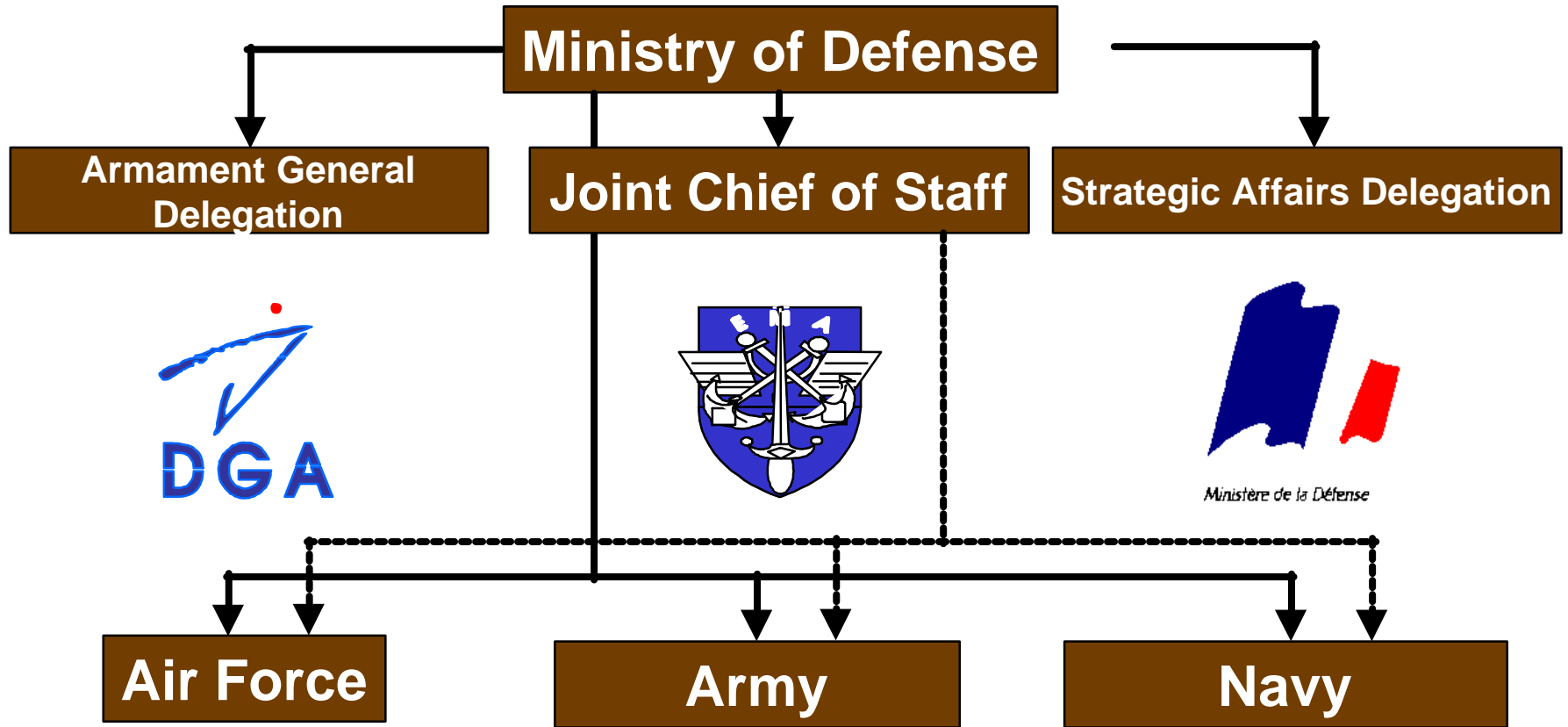
How T&E reduces defense programs risks : a French perspective

*By LtGen Daniel Reydellet
Director Test & Evaluation centers*

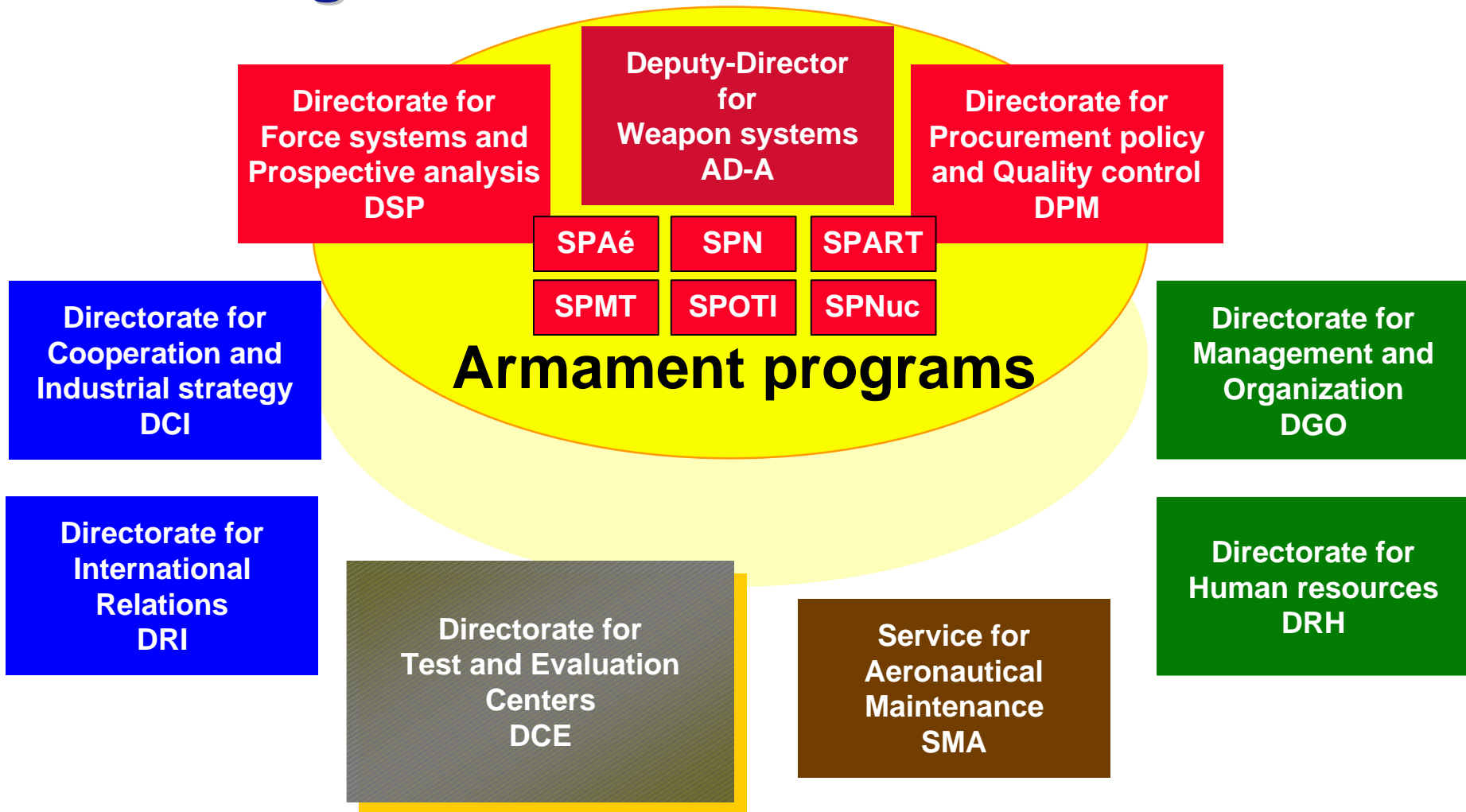


DGA

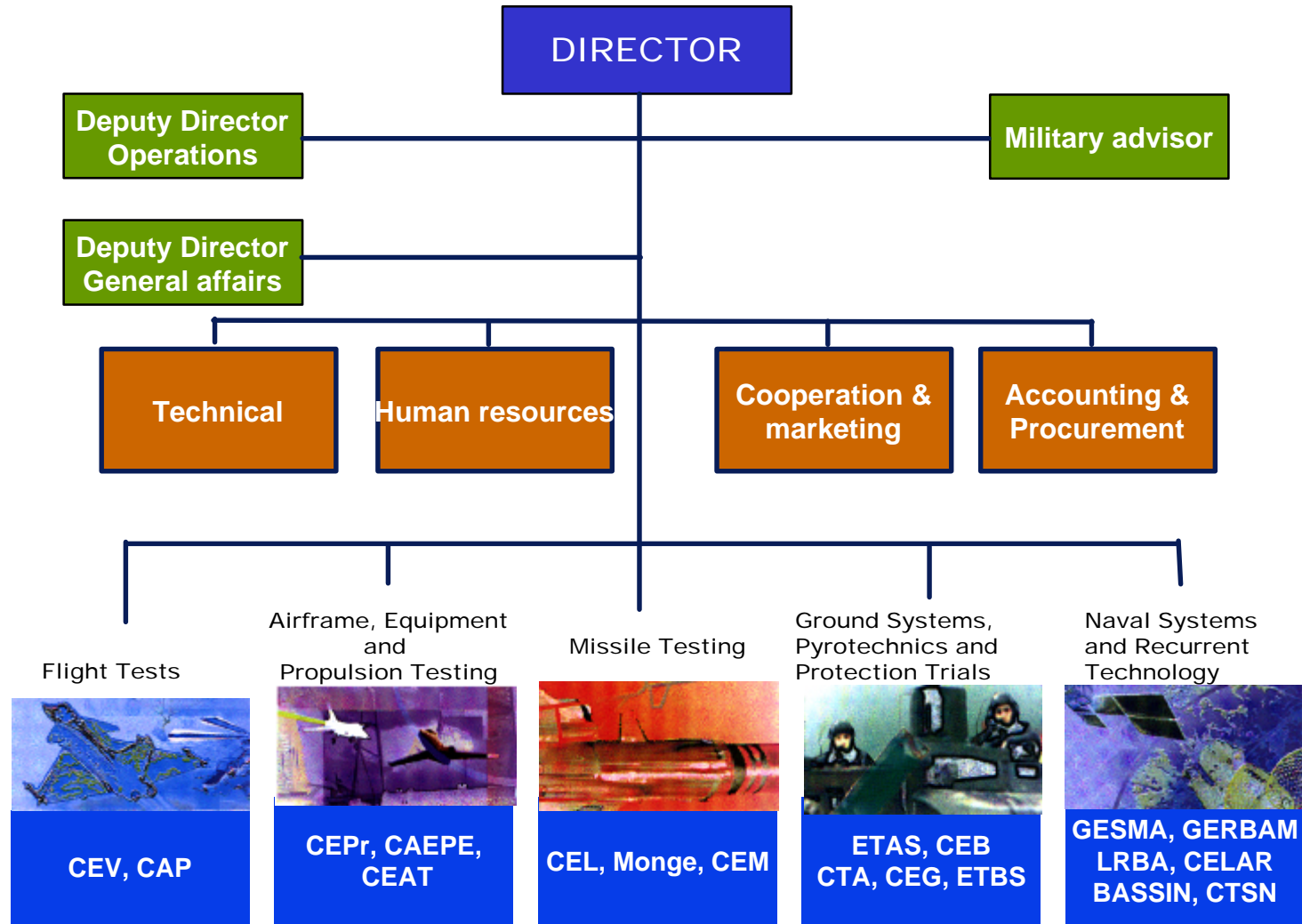
Organization Chart : MoD



Organization Chart : DGA

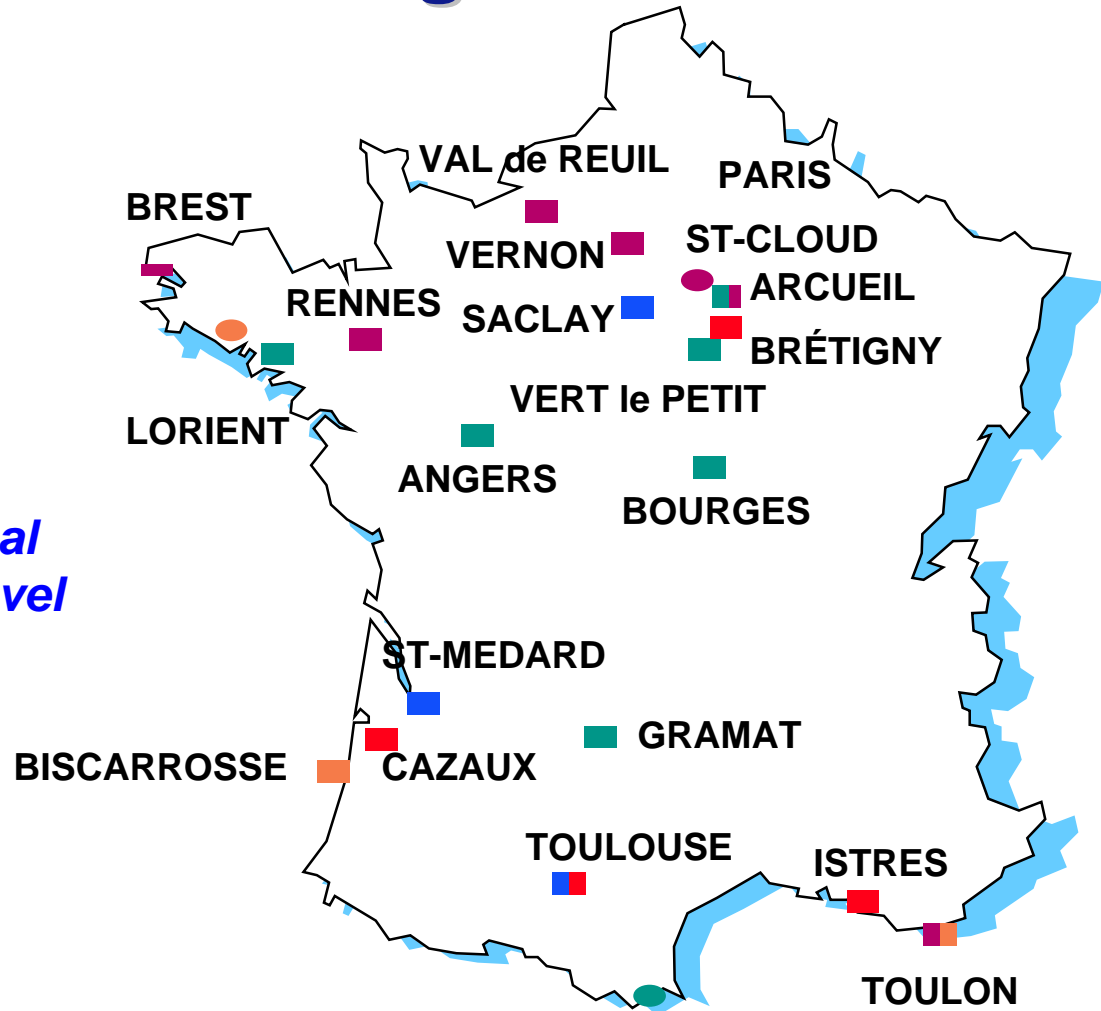


Overall Organization

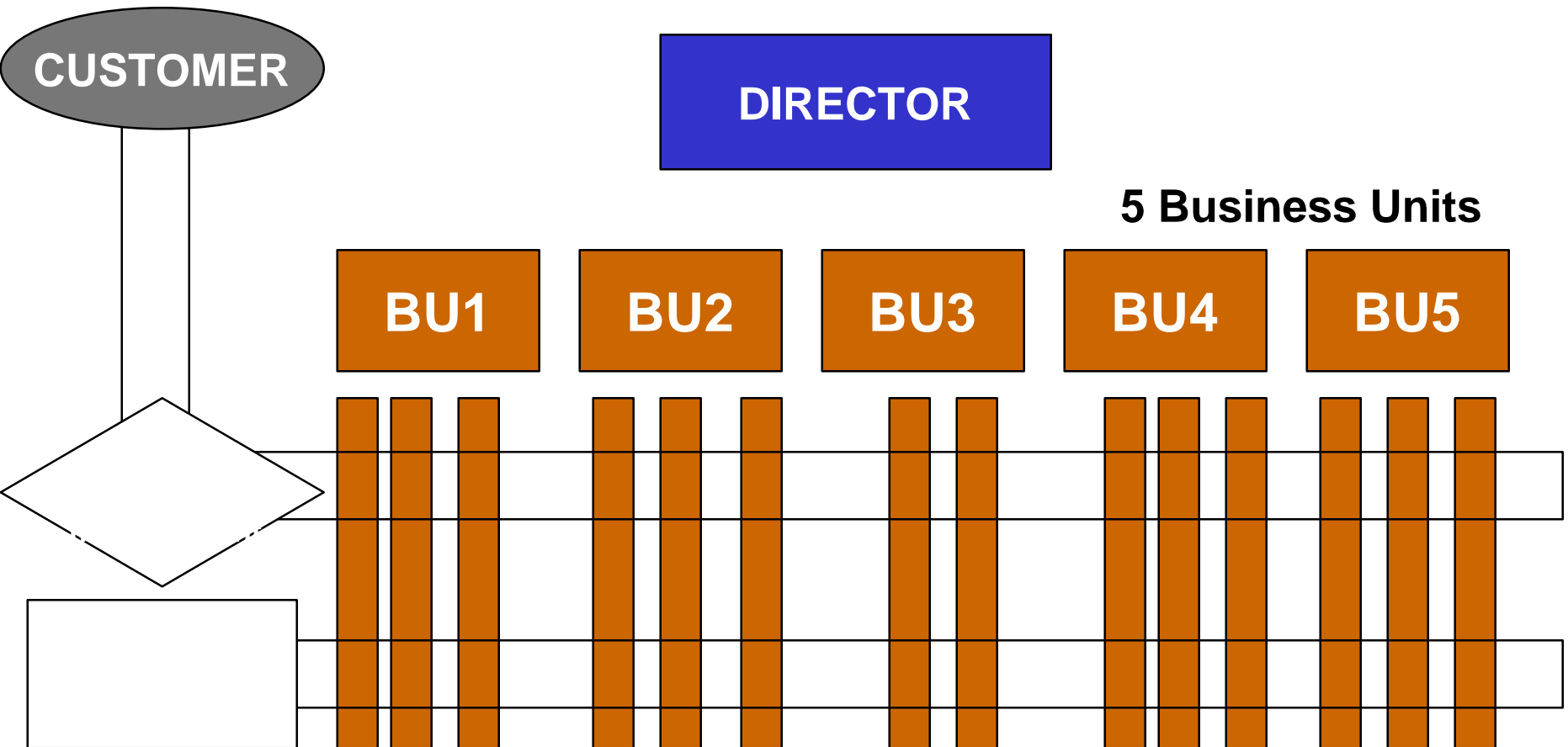


A decentralized organization

- **18 CENTERS**
- **Workforce of 8,000 including 1,900 scientists, professional engineers and high level managers**
- **Investment M€ 100**
- **Turnover G€ 0,7**



A matrix approach for the main transverse functions



18 « production » centers

Close links with programs offices

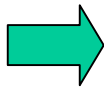
- based upon 2 key principles :



- A **systematic contract** for each task performed
- A **focal point** in charge of T&E issues is designated for each program as part of the Integrated Project Team : the “**RESA**”

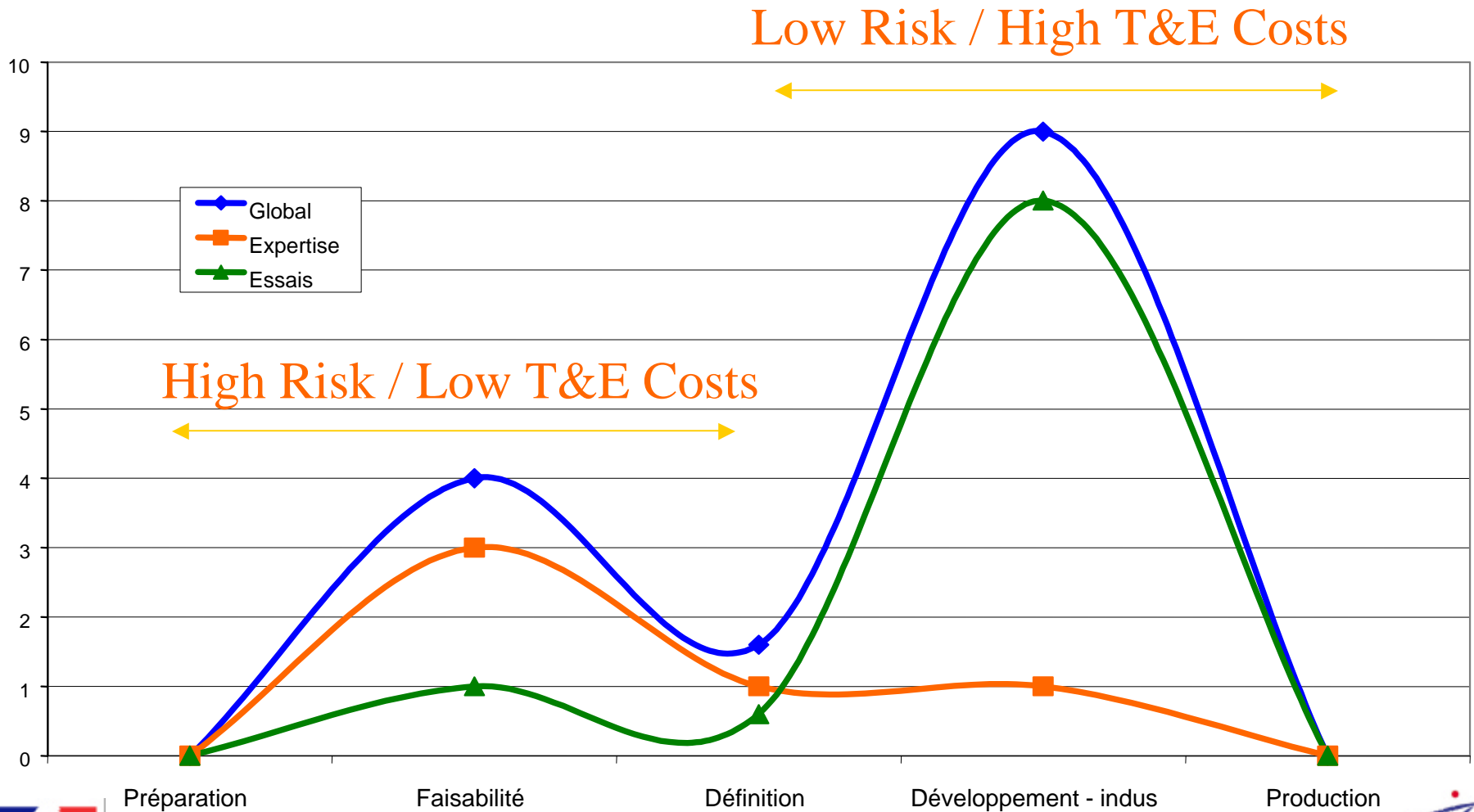
How T&E reduces defense programs risks

- T&E too often seen as a programmatic risk
- T&E only to check the performances
 - Too late
 - Risks added to the program
- Technology outbidding / Cost effectiveness
 - risk reduction



Spend money on T&E earlier

Toward a modeling of T&E Costs ...



How T&E reduces defense programs risks

- Risk management is today a major issue
- T&E has a major role to play
- Relationship between the T&E community and the program managers at all stages of the acquisition process



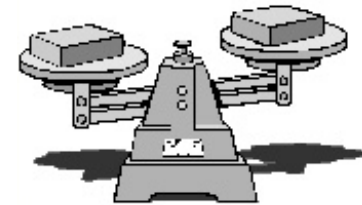
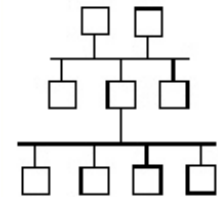
How T&E reduces defense programs risks

- T&E has a crucial role to play during the Science & Technology phase
 - reduce technical risks
 - Expertise, Test & Evaluation
- Involvement of DCE as early as possible

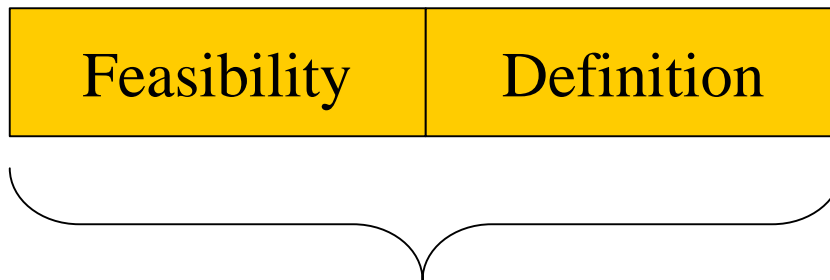


How T&E reduces defense programs risks

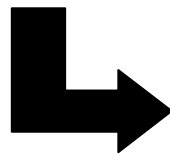
- T&E community must define all the tasks needed to be performed during the conception and realization phases
- Risk sharing with industry
 - evaluation through a balanced and contradictory analysis
 - high level of expertise required
- Test services
- Expert and independent advice



How T&E reduces defense programs risks



"RESA"



Risk reduction
Risk Management Plan

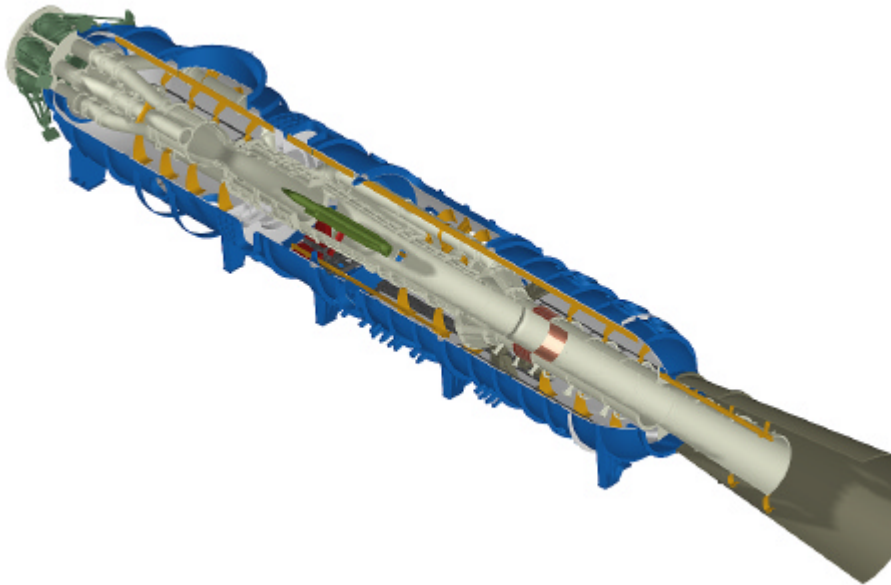
Airworthiness of the integration of a non-piloted aircraft



FREE-JET TESTING AT CEP_r

« CHEFREN » TEST INSTALLATION

A new test installation, unique in the world



- *means required to produce a free-jet test*
- *CHEFREN test installation specificities*
- *advantages to gain from CHEFREN test installation*

Means required to produce a free-jet test

FREE-JET TESTING = TEST CELL + AIR FLOW GENERATION MEANS

Upstream :

Air supply

- *hot*
(300-400°C)
- *compressed*
(7 bars)
- *dry*
- *high mass flow rate*
(>200 kg/s)

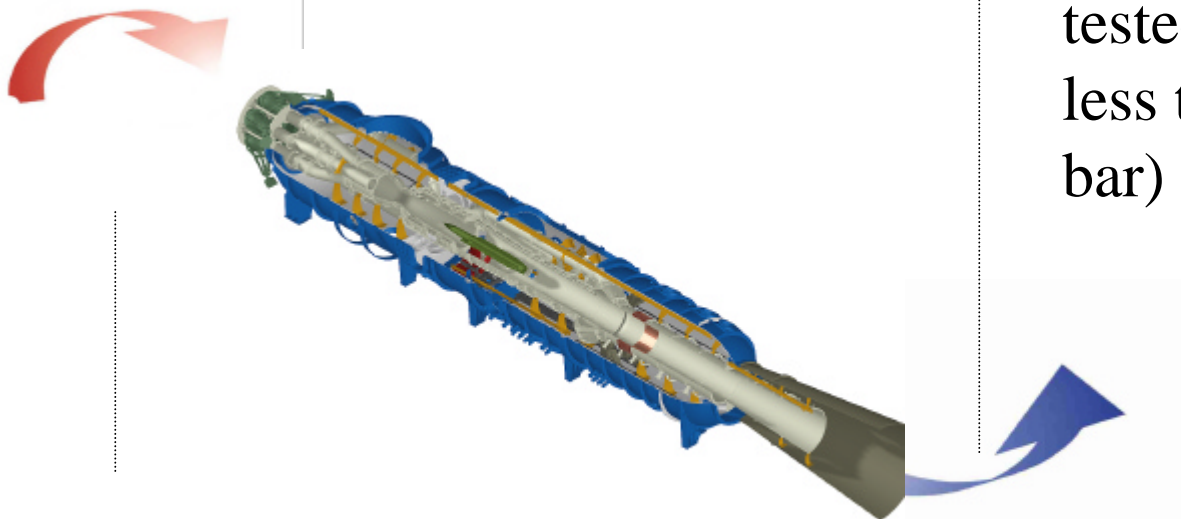
The test cell :

altitude test cell

Downstream :

Air extraction

(low pressure around the tested missile less than 0.1 bar)



CHEFREN Test Installation : means of reduction of risks

⊗ Common specificities with free-jet testing...

- Production of speed conditions by accelerating the compressed hot air inside the **Mach nozzle**,
- Production of **altitude** conditions thanks to the **low pressure** around the missile, equal to the static pressure of the real flight

**Reproduction
of real flight
conditions
around the
missile**

⊗ ...and two specificities that are unique in the world :

- Dynamic **variation** of **altitude**
- Dynamic **variation** of **attitude** (incidence et sideslip)

**Reproduction
of the flight
TRAJECTORY**

Advantages to gain from CHEFREN test installation ?



GLOBAL COST REDUCTION on the assessment on weapon systems :

- non destructive and renewable test,
- continuous air flow generation at CEPr enables to carry on many tests within a day,

RELIABILITY: a significant number of high altitude test points can be carried on before real flight tests, and repeated if required during the development,

RISKS REDUCTION :

- exploration of non tested points during real flight tests to validate running margins,
- exhaustiveness of measured data (no limitation due to telemetry as on real flight tests),

ADAPTABILITY :

- the speed can change by adapting the Mach nozzle,
- the altitude range can be extended within the specimen dimensions

Conclusion

- Independent T&E function
- Involvement in the very early stage of the program
- High level of technical expertise
- Implementation of an integrated process with the Program Office
- “Testing is for learning and reducing the risks”

How T&E reduces defense programs risks



Any questions ?