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RÉPUBLIQUE FRANÇAISE

MINISTÈRE DE LA DÉFENSE

DGA

French Indirect Fire vision

18 June 2002

Summary

- Trends for the future
- General considerations
- Presentation of main French programs

Trends for the future

- Higher efficiency, which includes reduction of staff and logistic load
- Higher protection
- Effects gradation and limitation of collateral effects
- Area control

Higher efficiency

Through :

- Precision and smart munitions
- Sensors (UAV, COBRA counterbattery radar…)
- Range increase (52C, GMLRS) which allows a reduction of the logistic load
- Reduction of the sensor to shooter delay (C3I, UCAV)
- Automatisation (MLRS, 2R2M, CAESAR)
- Launcher weight reduction for projectability, but protection and fire power constraints !

Precision and smart munitions -

Current FR plan

	hard area target (armored squadron)	soft area target	point target	very hard point target	mobile target
5-20 km	2003 SFM BONUS	Today (bomblet shell OGRE)	2004 Krasnopol	Dedicated to Air Force ?	2010-2015 UCAV
20-35 km	2008 BONUS+ 52C+ 1D correction	2008 OGRE+52C+ 1D correction GMLRS	2008 FOM		
35-60 km		2008 GMLRS	2008 FOM		

Protection

Through :

- Tactical mobility (MLRS electric drive, CAESAR, 2R2M)
- Range increase
- Crew protection (with probably from 2010 the end of towed Artillery)

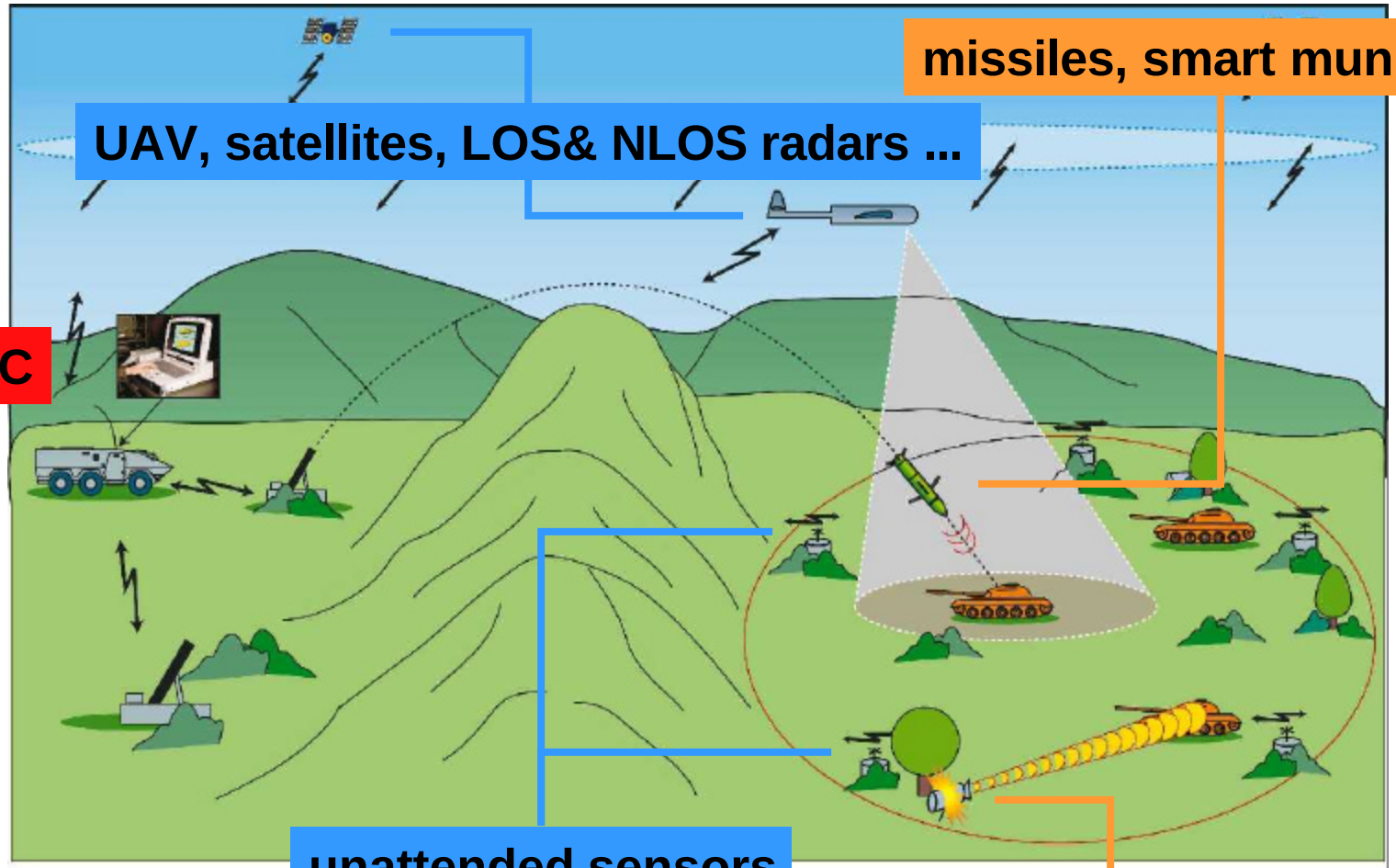
Effects gradation and limitation of collateral effects

- Non lethal effects (µwaves, graphite…) for effects gradation
  - *with probably one single shoot*
- Man in the loop (laser guided Krasnopol, FOM, UCAV…)
- Limitation of duds with possibly at medium term the end of bomblet projectiles

Area control

- At medium term, Field artillery could replace antitank mines, due to antitank mines (ATMs) weaknesses :
  - *difficulty to have a good discrimination*
  - *high loss of ATMs*
  - *pollution and demining constraints*
- Area control at long distance

Area Control



Launcher - MLRS

- Very low probability of use of current MLRS with M26/M77 rockets because of duds
- Threat on the bomblet rockets, even with SDF
- Very high potential of GMLRS cargo (accuracy, range, warhead volume), but
  - *short range limitations*
  - *unitary GMLRS capability not before 2010/2012*
  - *high cost of GMLRS munitions*
- Relevance of the light one pod launcher concept, with a FOM capability, but M26 capability not necessary
- GMLRS probably more convenient for Naval Fire than 155 mm or 127 mm guns

Launcher - Gun

- Intrinsic precision of guns, which allows to have acceptable precision with cheap munitions
- Limited relevance of long range precision munitions due to GMLRS
- Gun well adapted to specific effects (anti-tank, laser guidance, short range…)
- Complementarity of 52C and 1D correction
- Efforts done on projectability, manpower and protection (CAESAR, 2R2M)

Presentation of French programs

- AUF1 modernization program
- CAESAR
- Vehicule Mounted Rifled Mortar
- BONUS
- 1D correction
- COBRA
- TRIFOM

Self-propelled AUF1 modernization program

Objectives of AUF1 modernization program

- **Improve interoperability between French and allied artillery :**
  - interchangeability of munitions and charges : JBMoU
  - C3I interoperability (ATLAS) : ASCA
  - Impacted by CRUSADER cancellation (unlinked modular charges…)
- **Increase range :**
  - 52 caliber ordnance : JBMoU
- **Improve functional autonomy :**
  - ATLAS, PR4G, Navigation…
- **Keep present AUF1 architecture :**
  - standard chassis and turret integrating all artillery functions
  - complete shells+charges autoloader
- **Improve mobility :**
  - use of a new engine with higher performances and a guaranteed logistic support in the future
- **ISD :**
  - 39C version : 2003
  - 52C version : 2005

CAESAR : Truck Mounted Artillery System

CAESAR : Truck Mounted Artillery System

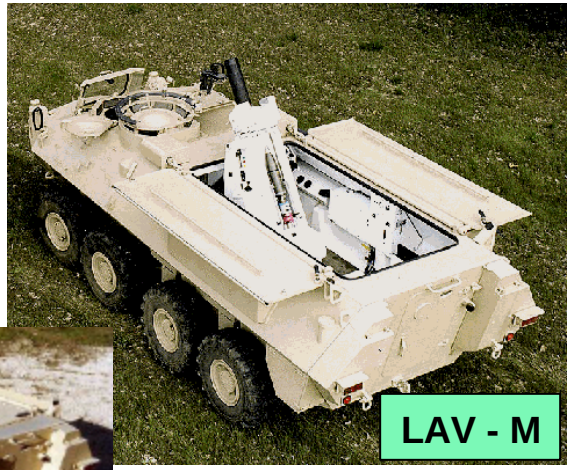
- 155 mm/52 caliber self-propelled gun
  - *JBMoU compliant*
- Characteristics :
  - *Mobility : Off-road vehicle (6 x 6), 600 km range, air or sea transportable*
  - *Autonomy : on-board crew (5 or 6 men), on-board ammunition (16 complete rounds)*
  - *Fire power :*
    - setting into and out of action : less than 1 min
    - range : 42 km
    - firing rate : 3 rounds in 15 sec, 6 rounds in 1 min
- Acquisition of 1 battery for evaluation of the concept as a replacement of 155TRF1

Vehicle Mounted Rifled Mortar

- Casemate mounting :

More survivable + low political footprint (roof closed on movement = standard APC shape), very accurate, reduced logistics footprint (reduced size and weight), can easily fit a large range of LAV, air transportable.

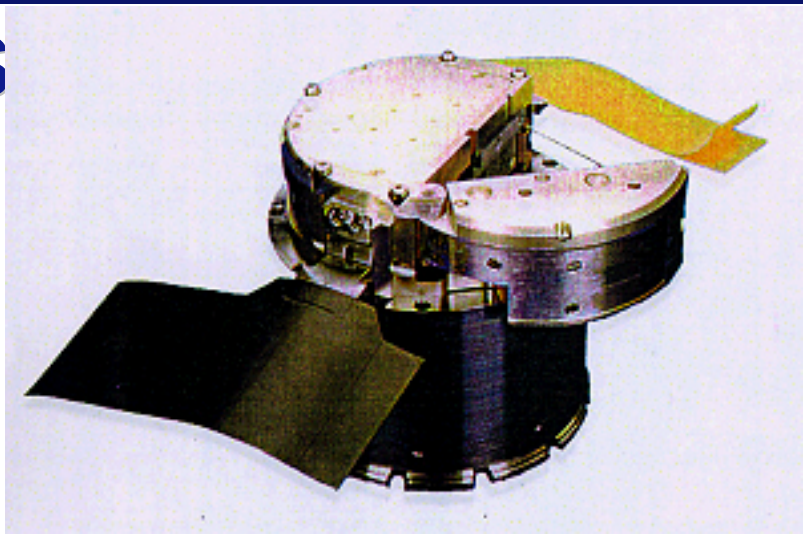
- Acquisition of 1 system for evaluation



Vehicle Mounted Rifled Mortar

- Ready to fire :
  - *After vehicle stopping : £ 30 s*
- Rate of fire :
  - *Up to 10 rounds in 1 min (with SALD)*
- Maximum range :
  - *13 km with Rocket Assisted Projectile*
- Firing capabilities :
  - *Azimuth : 360°*
  - *Elevation : 40 to 87°*
- Fire for effect at first round
- Able to fire smooth ammunition
- Potentially well adapted to Area control and short range

155 mm SFM BONUS

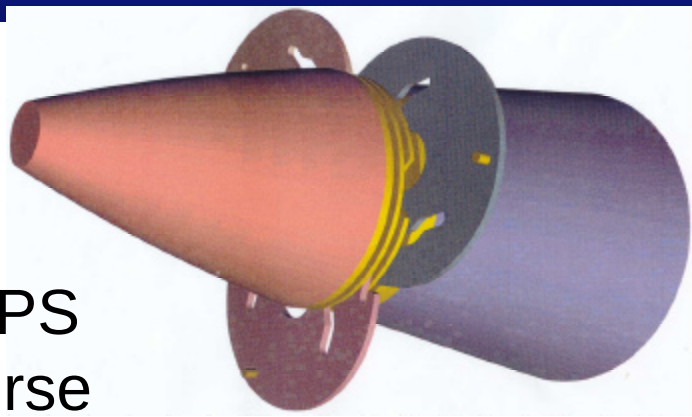


- Qualification of BONUS in September 1999 after a campaign of active firings

  ⇨ success

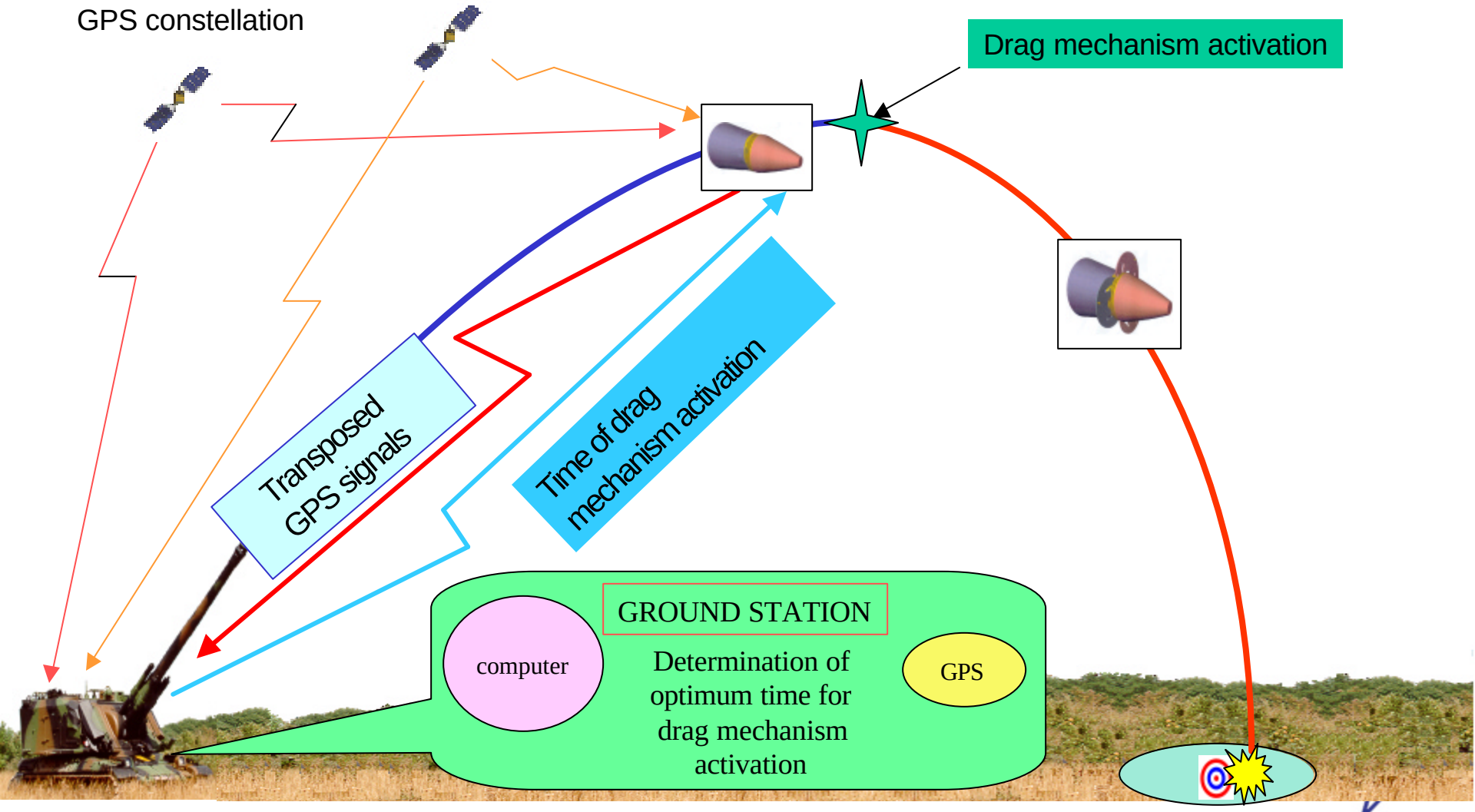
- **Facilitization phase contracted in July 1998 and production phase contracted in June 2000**
- **Delivery of first lot in July 2002**
- **ISD : 2003**
- **Main contractors : Bofors Defense (subsidiary of United Defense) and GIAT Industries**
- **Main advantages : aiming capability, submunition trajectory, footprint, UPC**

Course Corrected Fuze (SAMPRASS/SPACIDO

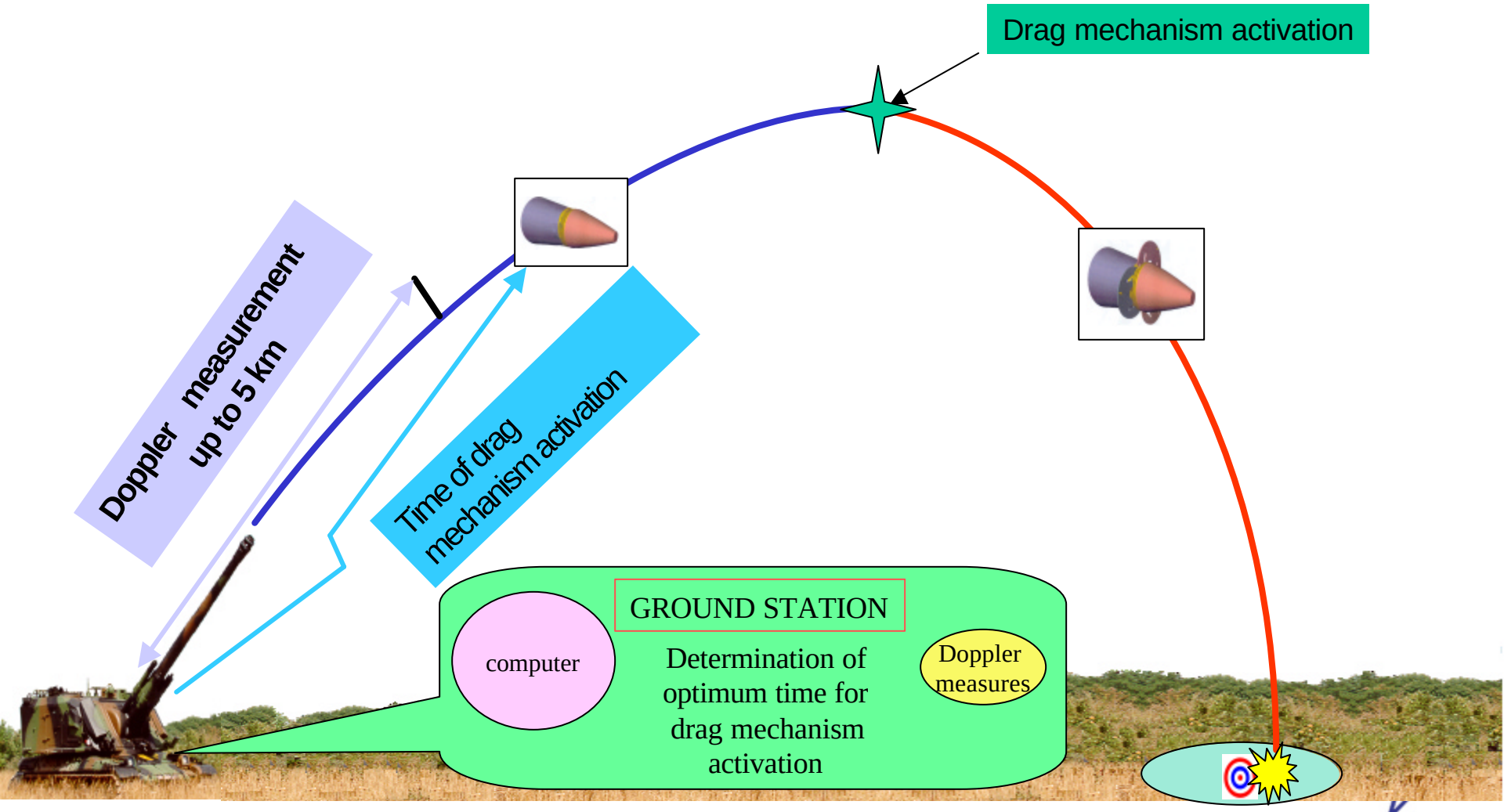


- Work started in 1998 with 2 concepts (GPS transposer -SAMPRASS- & doppler course correction -SPACIDO-)
- Firing tests completed beginning of 2002
  - *validation of algorithm, brake mechanism, shell/ground transmission (SAMPRASS) & ground/shell transmission (SPACIDO)*
  - *definition of cinenometer modification for 5 km range (SPACIDO)*
- Consistent with 52C capability
- Current risk reduction phase ; development planned in 2004 with an ISD in 2006

Course Corrected Fuze (SAMPRASS)



Course Corrected Fuze (SPACIDO)



COBRA Counter-battery Radar

- Rapidly locating guns, mortars and rockets enemy batteries
- Tube/rocket/mortar classification
- 24 hours coverage in all weathers and at long range
- Very maneuverable, quick to deploy around the battlefield, connected to ATLAS
- Fully active, two-dimensional beam-stearing radar

- **Cooperation between FR - UK - GE, program into OCCAR**
- **3 prototypes extensively tested in FR, UK and GE**
- **Industrialization-production phase contracted in March 1998**
- **Delivery to France : 10 systems from 2003 to 2005**

TRIFOM - A Common Military Requirement

Indirect fire precision attack ground to ground missile system

- ***Selective use against a wide range of high value targets located in the depth of the battlefield***
- ***Pinpoint accuracy : high efficiency, minimization of collateral damage and avoidance of fratricidal fire***
- ***Use in almost all climatic and geographic areas, high mobility, transportability by air, insensitive to jamming***
- ***Possibility to abort the mission until a few seconds before impact***
- ***Battle Damage Indication (impact direct evidence)***
  - **fiber optics missile system**

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TRIFOM - A GE-FR-IT trilateral program

- **1992-1997: "Programme expérimental" - POLYPHEME I**
  - *Proof of key technologies (imaging IR sensor, bi-directional data link using fiber optics, man in the loop, detection aids), tests and firings*
  - *Complete flight sequence at CEL, Biscarosse (16 km flight, impact on target)*
- **1998-2002: "Unité de tir expérimentale" - POLYPHEME II**
  - *range extension (60 km), improved IIR seeker, warhead optimization*
  - *canister launch test : Meppen, 09/2000, 03/2001*
  - *fiber optic spool pay off with a C22 target : CEL 10/2000, 04/2002*
  - *2 Missiles firings : Meppen 03/2002, 06/2002 (failure under investigation)*
- **2001-2002: "Prédéfinition du système opérationnel"**
  - *Warhead / fuse concept implementation and definition*
  - *Connection to C3I (SIACCON & ATLAS networks)*
  - *Physical integration on potential carriers (including MLRS)*
  - *Investigation of GMLRS launch from TRIFOM launcher*
  - *Mission planning optimization, system effectiveness assessment*

TRIFOM - Next Phase

- **Technical risks management:**
  - *large investment carried out since 1991*
  - *Needed know-how exists in European and US industry*

  -> Low risk program
- **Navy extension under study**
  - *light anti-ship capable version for GE navy*
- **Procurement policy based on international competition (following OCCAr rules)**
  - *RFI 07/2001*
  - *RFP release on international basis*
  - *Choice of prime contractor on cost/performance criteria*