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ahead. RUAG

AU CONTACT
NOTRE ARMÉE, POUR VOUS

DGA

Live training challenges

With disruptive technologies

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CERBERE - Last French Army reference

2 sites : one system, one solution + multi years support

More than 3000 rooms

Open Terrain Combat Training Center (CENTAC)
- Large area with large number of actors

Urban & Industrial Combat Training Center (CENZUB)
- Restricted area with high rise buildings

1200 soldiers/site

250 vehicles

CENZUB
> Urban areas (Jeoffrecourt + Beauséjour)
> Terrain 8 km x 8 km
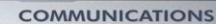
CENTAC
> Open field
> Terrain 12 km x 10 km

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CERBERE - Fixed and Large CTC

OPERATIONS CENTRE & ROLE PLAYERS

CO & DIREX

Localization

Weapon simulated effects

Simulation equipment

Tactical communications

COMPANY TO BRIGADE LEVEL

COMMUNICATIONS
C2 & TECHNICAL NETWORKS
HIGH-RATE & RELIABLE TRANSFER
DIGITAL & RECONFIGURABLE

CERBERE: Key Figures

Instrumented buildings : **200**

Com-Loc Kits (Soldier) : **2 600**

Positioning: More than **3000 rooms**

Com-loc Kits (Vehicles) : **500**

Mines: **2 275**

CCTV: **242**

Switches : **800**

TES (Soldier): **2400**

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Optical Fiber: **10 000 m**

Hand Grenades : **800**

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Building Targets: **4000**

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Live training exercises typical activities cycle

Activities Performed by the end users and supported by Industry

1- Preparation (Scenario & exercise data)

Up to Weeks elongation

- Scenario definition according to training goal
- Orbat definition based on planned units
- Simulation equipment preparation (Orbat base)

2- Trainees Welcome Equipment mounting

Up to few days

- Briefing on simulation means
- Briefing on exercises missions
- Trainees identification / Orbat
- simulation equipment distribution
- Simulation equipment installation
- Tests checks

Maintenance & Support

4- Dismounting

up to ~ 1 day

- Remove equipment
- Equipment cleaning /return
- Visual inspection
- Defect Equipment detection
- Stock re integration

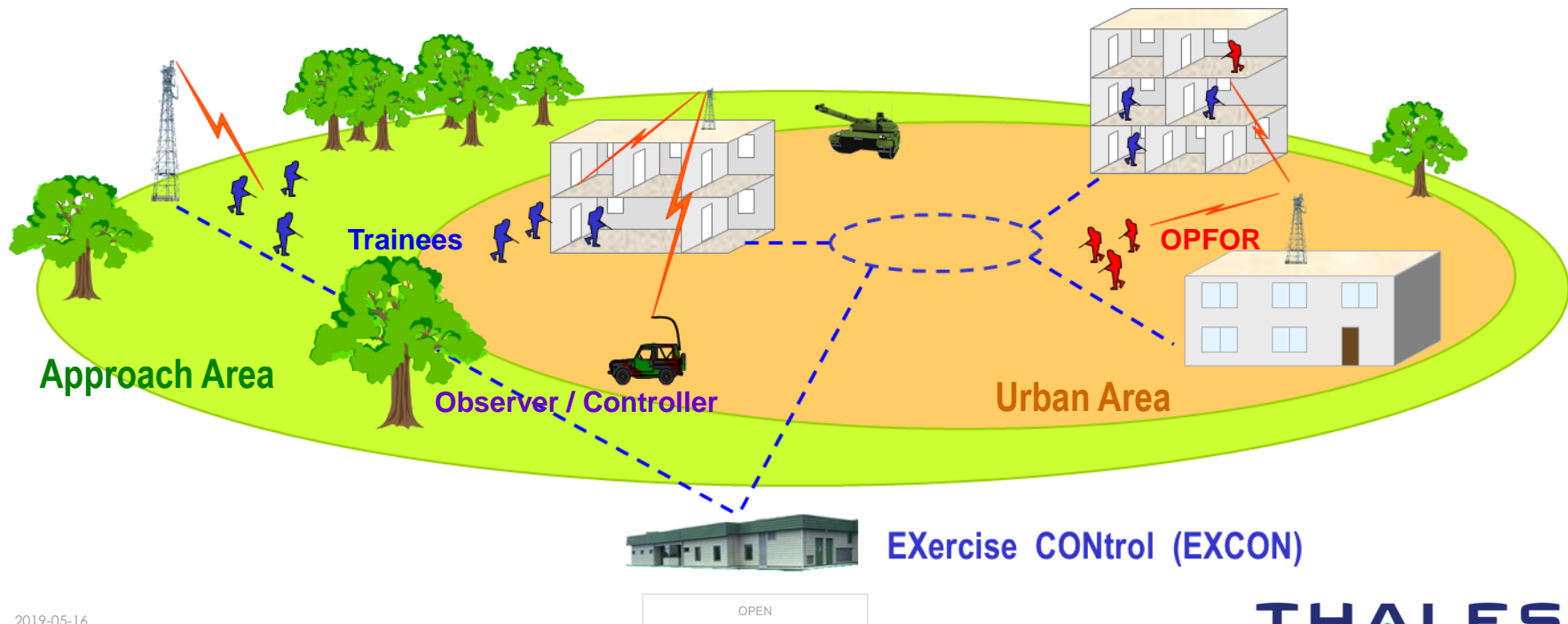**3- Exercise Execution Analysis / AAR**

Up to 96 hrs or more

- Trainees "Train as they fight" on the training field
- Exercise supervision and monitoring from EXCON / FOC
- Exercise animation (OPFOR, ART, ENG, 3D, FBS env.)

- Pedagogical Analysis, materials for AAR collection
- After Action Review
- Take home package preparation

Respective activities weight, in particular elongation, depends on the type of system

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Architecture challenges

Specifications ➜ | **Robustness** | **Common urban and open field** | **Evolutionary** | **Urban Specificities** | **Cyber Security**

Trainees

OPFOR

Approach Area

Urban Area

Observer / Controller

EXercise CONtrol (EXCON)

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Main functional blocks

Architecture key drivers

> Openness

> Minimum latency

> Cybersecurity

> Use of standards

Other issues

> Logistics

> Autonomy

> Maintenance

C2 & Excon AAR

Tactical Engagement System

Geo – localization indoor - outdoor

Technical communications

Data secured server

Battlefield devices & war effects

Tactical communications

Effects simulation

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Technologies

Indoor / outdoor localization without discontinuity

Networks, communication and transmissions

Tactical Engagement Soldier System

Battlefield effects rendering

With high level performances:

> Positioning accuracy < 2 m
- Indoor : defined by locators density

> Low latency (~ real time)

> 1200 soldiers/site

> 250 vehicles

To meet various use cases requirements

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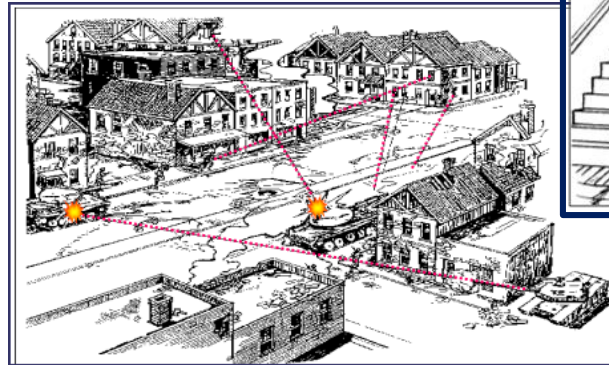
Localization challenges

Resistant to obscurants and noises

Ops compatible

Different areas to cover
- Open terrain
- Around and Inside buildings
- Underground

Day & Night

Continuous transition
From outdoor to indoor

No location ambiguity:
- Outside OR Inside
- No wall crossing

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Indoor and outdoor localization

Accurate Positioning (Indoor/Outdoor)

> Field proven solutions

> In open terrain through GNSS Integrated to COMLOC kits

> In urban terrain through fixed radio locators and TAG on players

Position accuracy linked with locators density

GNSS Located entities

> Personals equipped with COMLOC kits (Players and technical personals : FOC, ...)

> Vehicles equipped with COMLOC kits

> Other simulation devices such as IED, …

Entities located with urban location system

> Personals (Players, technical personals)

> Vehicles (Outdoor close to walls)

> Other simulation devices such as IED, …
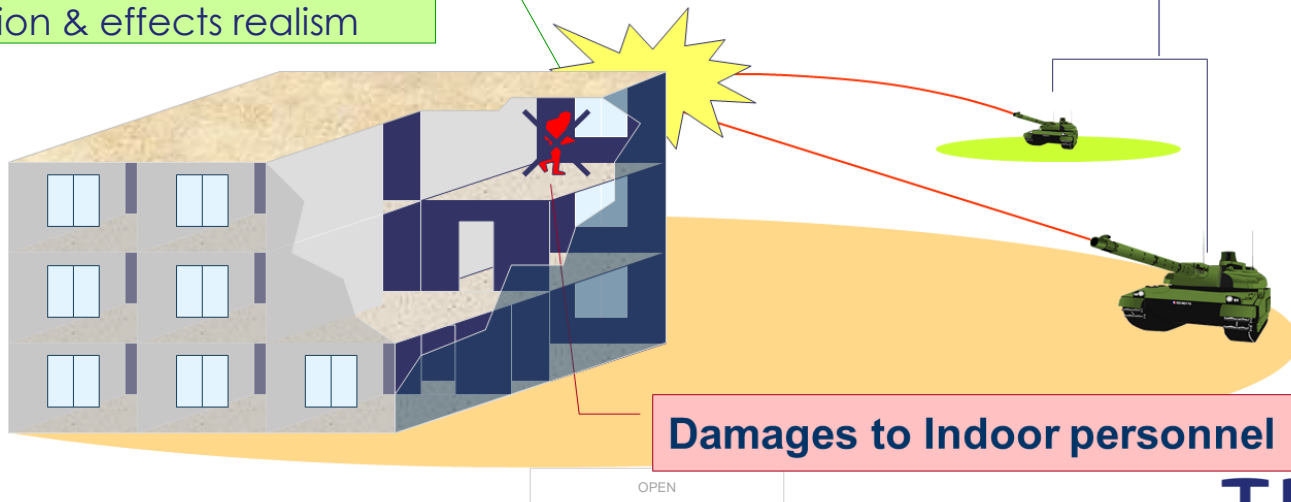
Data fusion between GNSS and indoor tracking system

INDOOR & OUTDOOR POSITION TRACKING

HIGH PRECISION

NO TRACKING INTERRUPTIONS

FULL REAL-TIME

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Tactical Engagement Simulators challenges

Firing realism challenge

A challenging conciliation
Building « level of instrumentation » versus Realism of Effects

Safety first

Building instrumentation
Hit detection & effects realism

Precision Gunnery
from medium to close range

Damages to Indoor personnel

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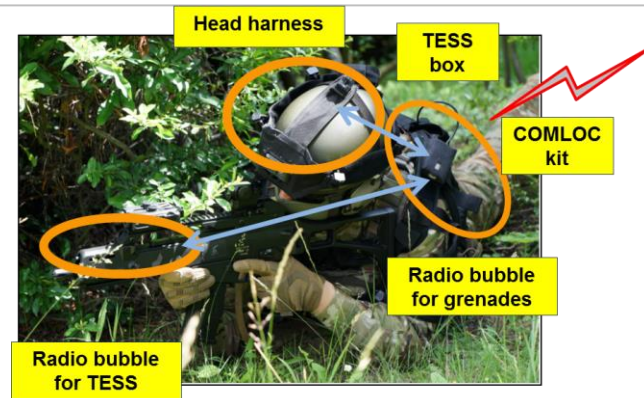THALES

TES equipment

Soldiers are equipped with :

> Soldier one way laser TES for firing simulation

> Communication and localization kit for data exchanges with EXCON

> TES radio cell allows also data exchanges with:
- Hand grenade simulators,
- Explosive, explosive belt (Suicide bomber) simulators

Vehicles are equipped with :

> Vehicle 2 way laser TES for firing simulation (GFE)

> Communication and localization kit for data exchanges with EXCON

Buildings are equipped with :

> Laser wall targets

> Environment and Effects simulation equipment
- (Light effects, Sounds, smoke)

Head harness

TESS box

COMLOC kit

Radio bubble for grenades

Radio bubble for TESS

Designator targets

Laser targets

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Technical Communications challenges

Continuity
From Outside to Inside

Performance integrity
Maintained from few to thousand players

EXCON

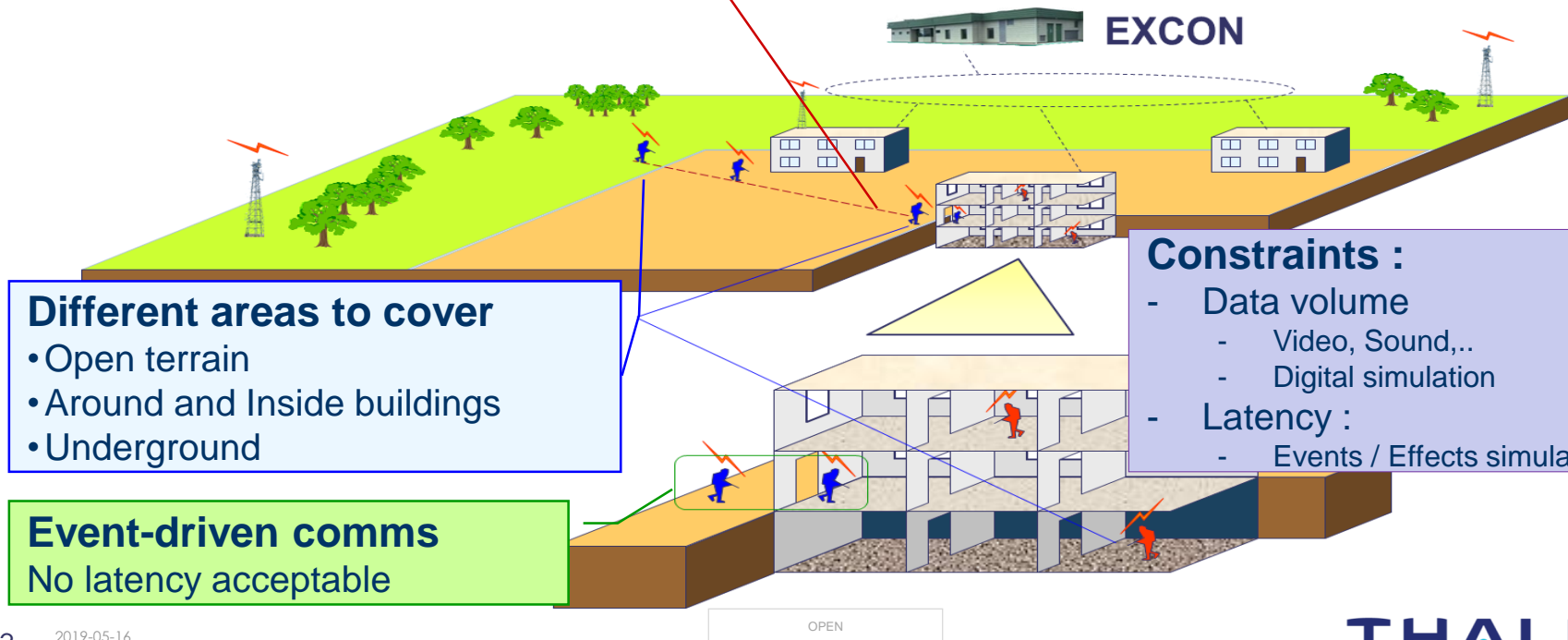**Different areas to cover**
- Open terrain
- Around and Inside buildings
- Underground

Constraints :
- Data volume
  - Video, Sound,..
  - Digital simulation
- Latency :
  - Events / Effects simulation

Event-driven comms
No latency acceptable

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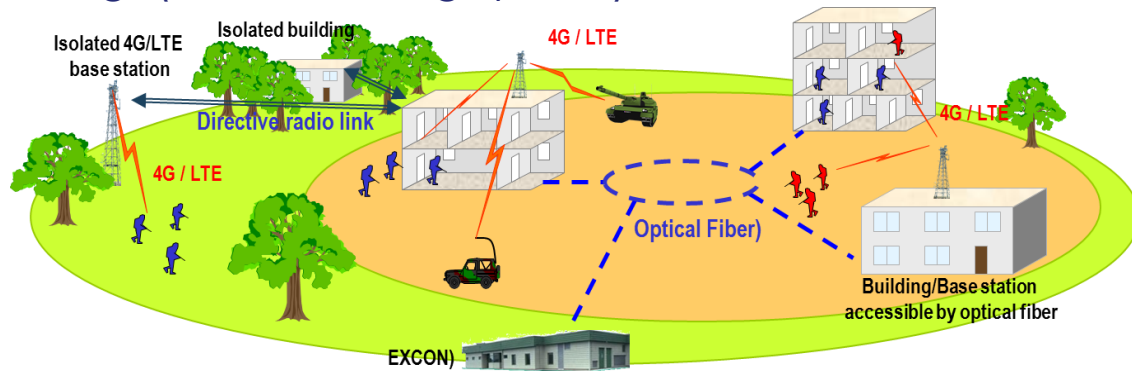THALES/ Template : 87204467-DOC-GRP-EN-002

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Technical Communications : Infrastructure & radio networks

Communications between site infrastructures :

> EXCON and radio base stations in the field (Radio network BS or tactical BS)

> EXCON and instrumented buildings (Urban training system)

➡ Two main solutions

> Optical Fibre network

> wireless directive links (LOS)

Isolated 4G/LTE base station

Isolated building

4G / LTE

Directive radio link

4G / LTE

4G / LTE

Optical Fiber)

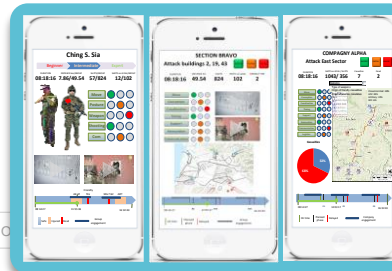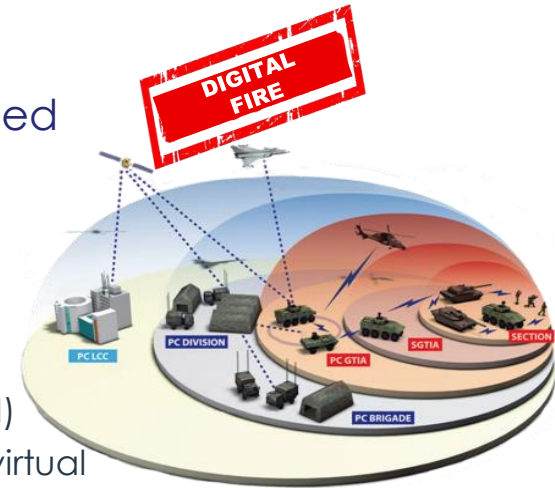Building/Base station accessible by optical fiber

EXCON)

Radio network linking EXCON and players instrumentation

> 4G / LTE technology network

> Low latency & high transfer rates

> Advantages of civil technology : Mature and solution using COTS

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Considered next steps

> Digital firing to overcome the present limitations of laser based system

- No shoot through leaves
- Impossibility to use mortars or missiles with the right ballistics

> Battlefield extension

- Present exercise terrains are too small for modern weapon systems (FBH)
- Combined use of AR technology and digital firing to get REDFOR in a virtual surrounding environment with Helos&UAV

> LVC connection

- Connection to training simulators and CGF (OPOSIA / EDITH)
- Real and virtual worlds need to be consistent!
- Embedded simulation

> Trainee centric Training

DIGITAL FIRE

AIR INTEGRATION

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