



An approach to test and evaluation of military SDR platforms and waveforms: the lancers lab

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Do we really need T&E?

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We think so....



Agenda

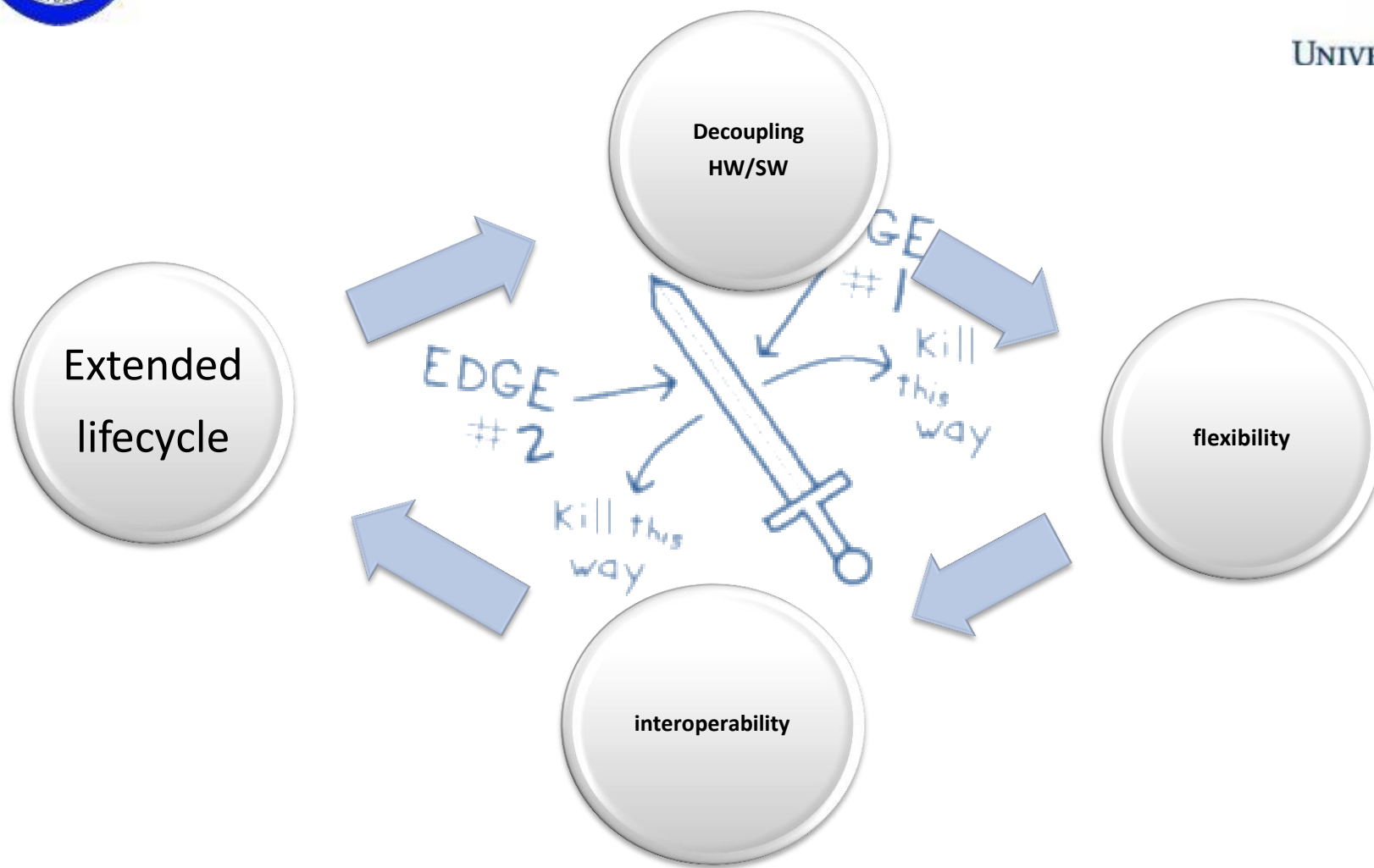


- SDR: a double-edged sword;
- V&V: not just at the end of a project;
- Certification: where we are, what we need;
- Managing the complexity: Italian SDR program Directorate;
- The LANCERS LAB;



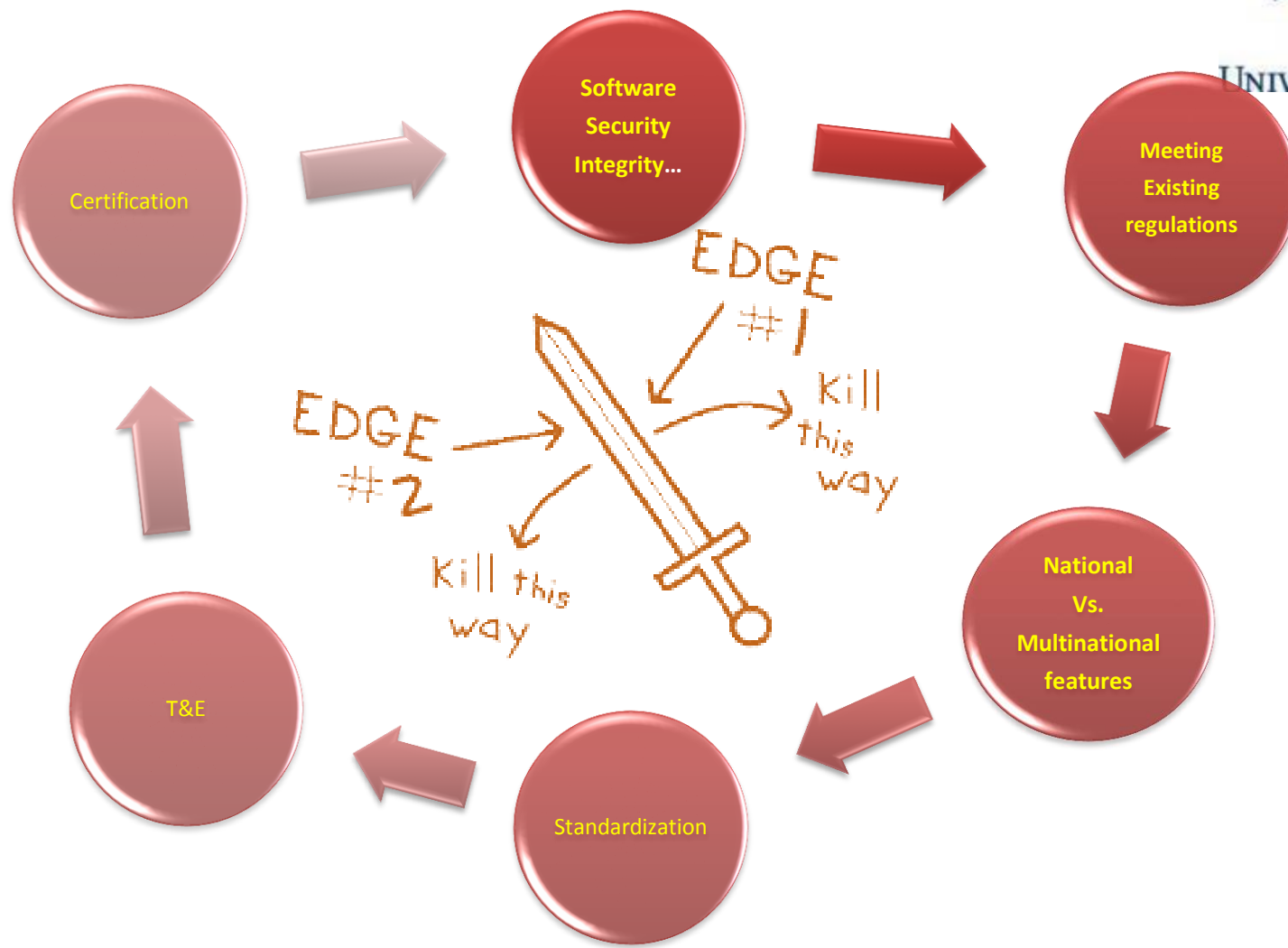


SDR: a duple-edged sword





SDR: a duple-edged sword





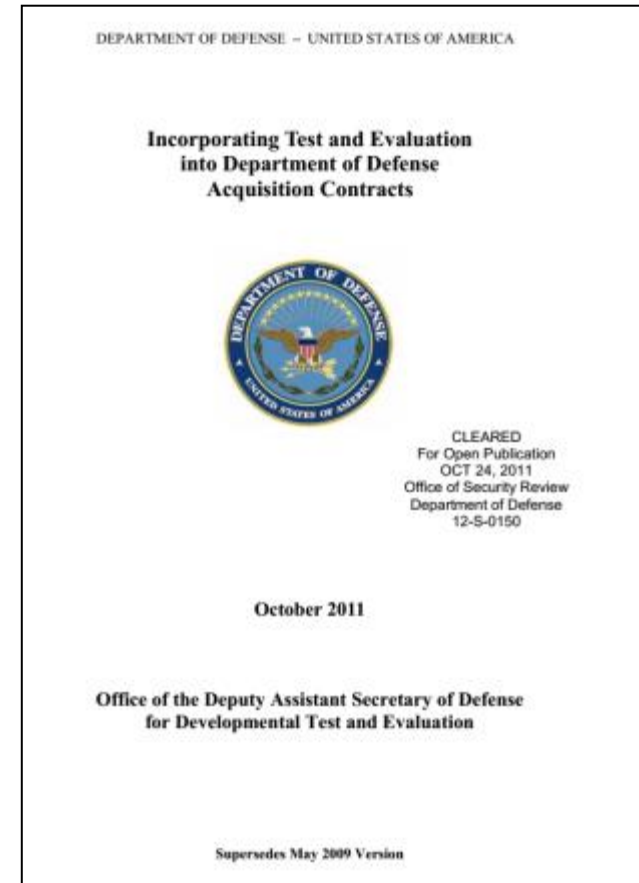
V&V: not just at the end



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if a T&E item or requirement is not in the Statement of Work (SOW), it probably will not be in the Request for Proposal (RFP), and if it is not in the RFP, it probably will not be in the contract. If it is not in the contract, do not expect to get it





V&V: not just at the end

procurement
phase

- **Content of ORDs**

- *End user expectations*

Design
phase

- **MOE & MOP**

- *Technical evidence of performances and functionalities*

fielding
phase

- **Out of the Box: interoperability and portability**

- *Community/multinational expectations*



V&V: not just at the end

procurement
phase

- **Content of ORDs**

- *End user expectations*

identify the Operational Requirements that the DUT have to meet in order to fulfil the operational expectations



Operational
Views

Cluster of
Operational
capabilities

Gap analysis
Of legacy
Systems

Operational
requirements



V&V: not just at the end

Design
phase

- **MOE & MOP**
- *Technical evidence of performances and functionalities*



DEPARTMENT OF THE NAVY
ACQUISITION AND CAPABILITIES
GUIDEBOOK

MOE

Impact on the
overall mission

Capability
Development
Document

mission duration
for dismounted
soldier

MOP

Testable
parameter
related to MOE

T&E Master Plan

Standby time on
battery

Human
Factors
(weight, size)



V&V: not just at the end

fielding
phase

- **Out of the Box: interoperability and portability**
- *Community/multinational expectations*



- **Field test**
- **Multinational test**
- **Interoperability test**



Certification

ONE PROGRAM:

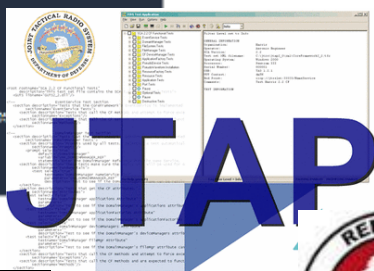
- Unique reference architecture (JTRS SCA);
- Portability guidelines;
- Complete set of T&E tools;

Latest Standard Releases

Complete SCA 4.0.1 Specification
[Download](#)

Complete JTRS Standards API Release 1.3.3
[Download Part 1](#)
[Download Part 2](#)

JTRS Portability Guidelines
[Download](#)

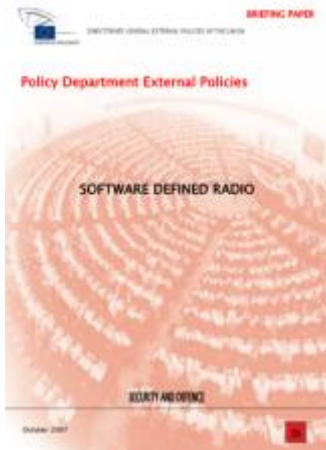


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SDR standardization and certification: Europe



*“Rather than allow the US to exploit SDR technology (...) the EU should seek to compete as an equal partner able to develop **its own secure system** for European requirements”*

Pullinger S: Software defined radio (2009)

*“The existing procedures within the JTRS program **are not suited for international application** for various reasons.”*

SDRF-08-P-0007-V1.0.0 - Test and Certification Guide For SDR based on SCA

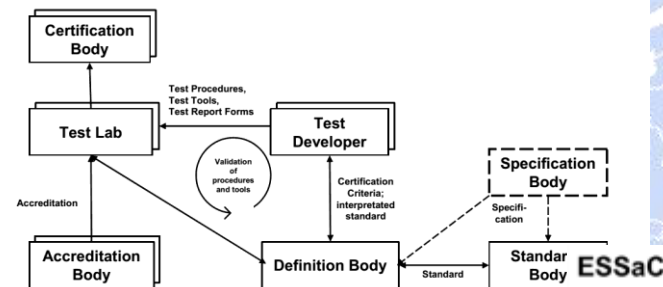




SDR standardization and certification: Europe



- Several programs:
 - National
 - Coalitional
- Multiple models for standardization and certification;
- Need for a common standard:
 - Certification body;
 - Standardization body;
 - Mutual recognition of test labs;



Final Results
ESSaC Consortium
WinComm Europe / Brussels / June 2011



Italian MoD & SDR



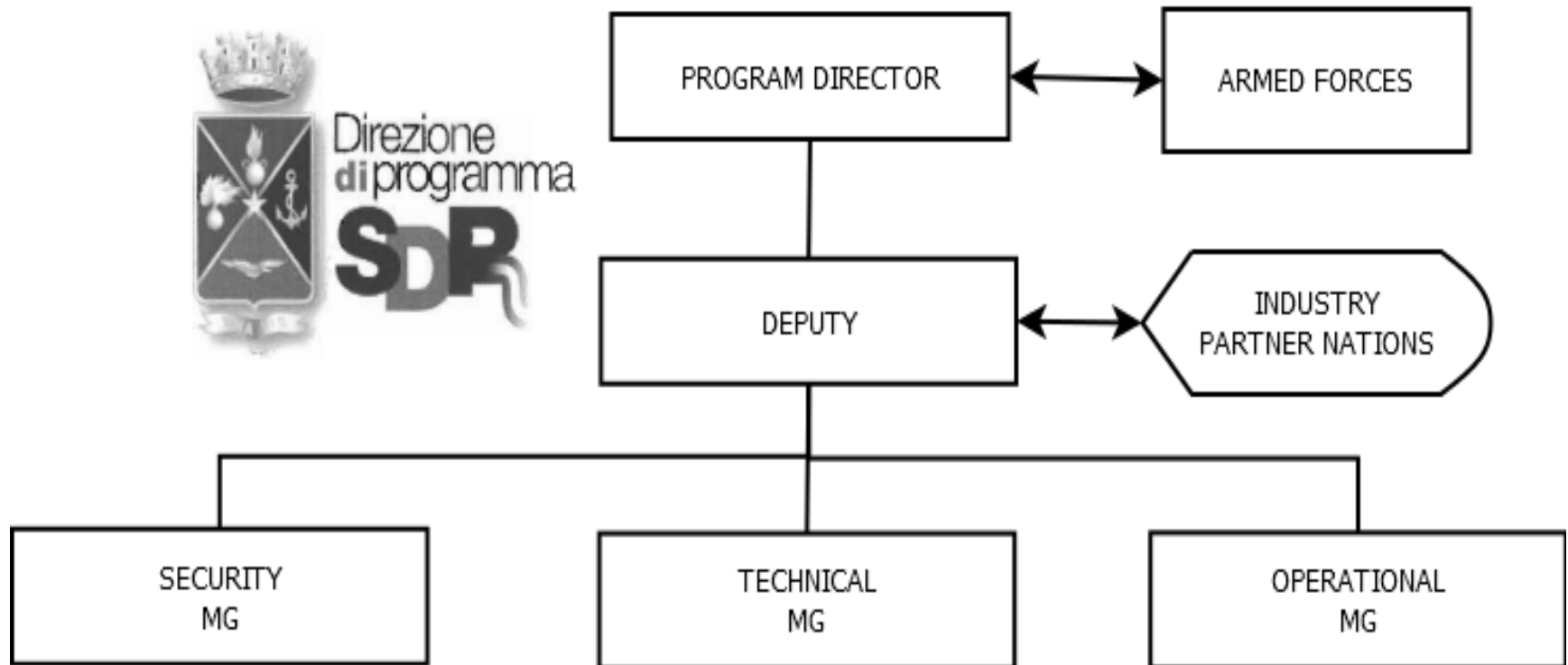
SDR is one of the pillars of Network Enabled Capability (NEC)

- First **R&D program** on SDR in 2002
- Part of **ESSOR** from 2007;
 - ESSOR architecture;
 - HDR Waveform
 - NTE;
- Part of **COALWNW** program
 - Wide Band coalition waveform
- **National program (SDR-N)** in 2007
 - Complete family of PTFs based and legacy WFs on ESSOR-SCA;
 - Some PTF already available to MoD;





Italian SDR Program Directorate





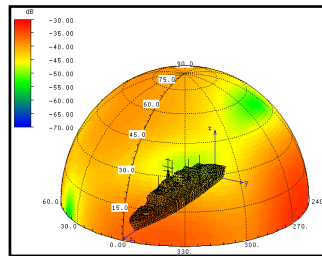
Italian T&E Capability: The facility



In 2011 Italian MoD decided to develop a national T&E capability for SDR Product at CSSN-ITE

CSSN ITE has a **proven experience** in T&E and experimentation of Technologies related to:

- Telecommunications;
- Remote sensing (RADAR, optoelectronics)
- EMC testing



SDR

- Support to MoD in definition of ORDs;
- Trials of SDR products delivered by Industry;
- Support to ESSOR and COALWNW working groups
- Support to NATO Capability Team (LOS/BLOS)



Italian T&E Capability: lab Mission



Mission: T&E of SDR product with TRL 5-6

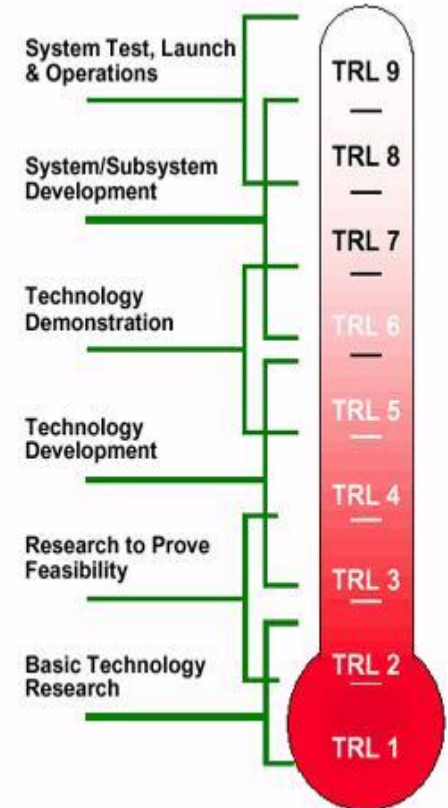
Platforms (HW+OE): reference to a specific standard (ESSOR SCA);

Waveforms:

- **Analysis of documentation and design** in procurement phase
- Evaluation of **base waveforms** versus a given reference
- Evaluation of waveforms versus a legacy standard (**interoperability**).

Complete systems:

- Performance (PTF+WF)
- Interoperability different SDRs and with legacy platforms
- reconfigurability, power consumption, performance in co-sited environment, etc).



FUTURE: CERTIFICATION OF SDR PRODUCTS

(accreditation by competent body)



Italian T&E Capability: Lab assets



Modeling and simulation: Matlab/C++, EM propagation simulator

RF instrumentation:

- spectrum analyzers;
- channel simulator;
- signal generator;
- complete set of legacy military radio

Development platforms and tools:

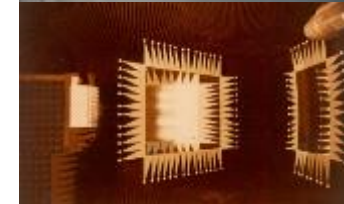
- USRPs (Prismtech Spectra expected)

Operational platforms and tools:

- National SDR products expected for testing
- ESSOR NTE expected

External assets:

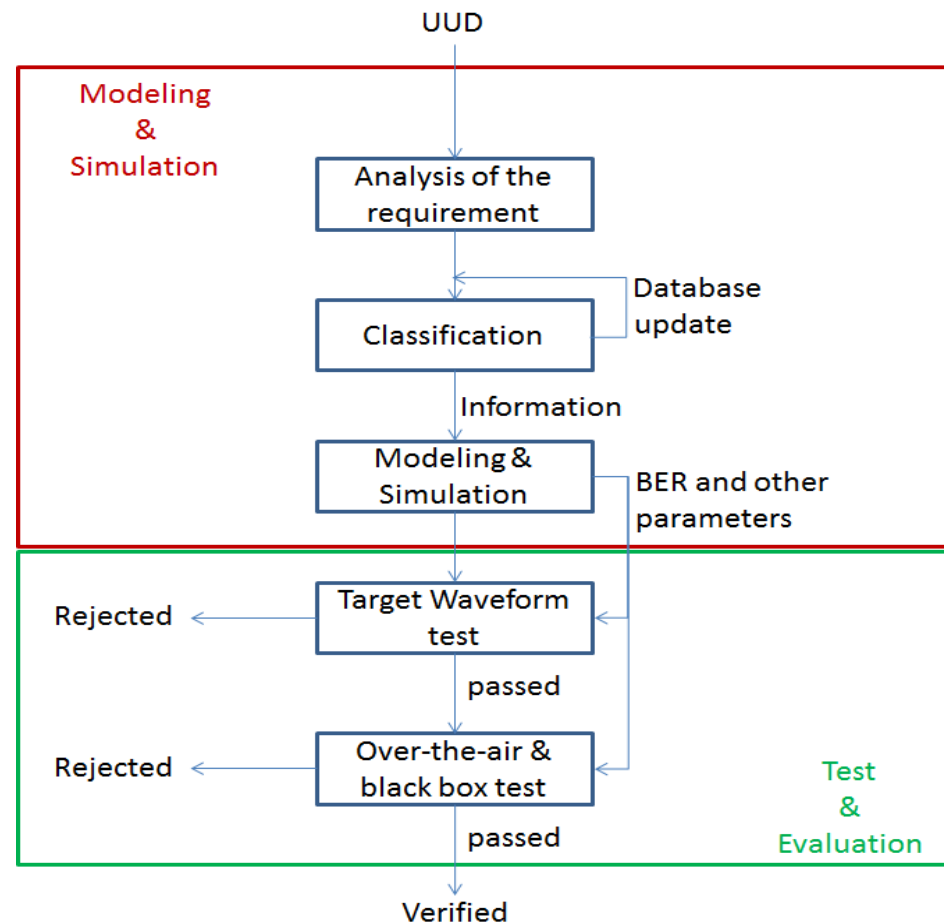
- Other labs of CSSN ITE (anechoic chambers, compact range, mobile labs)
- land sea and air platforms provided by Italian Navy for testing in complex scenarios;





Italian T&E Capability: Workflow

T&E model

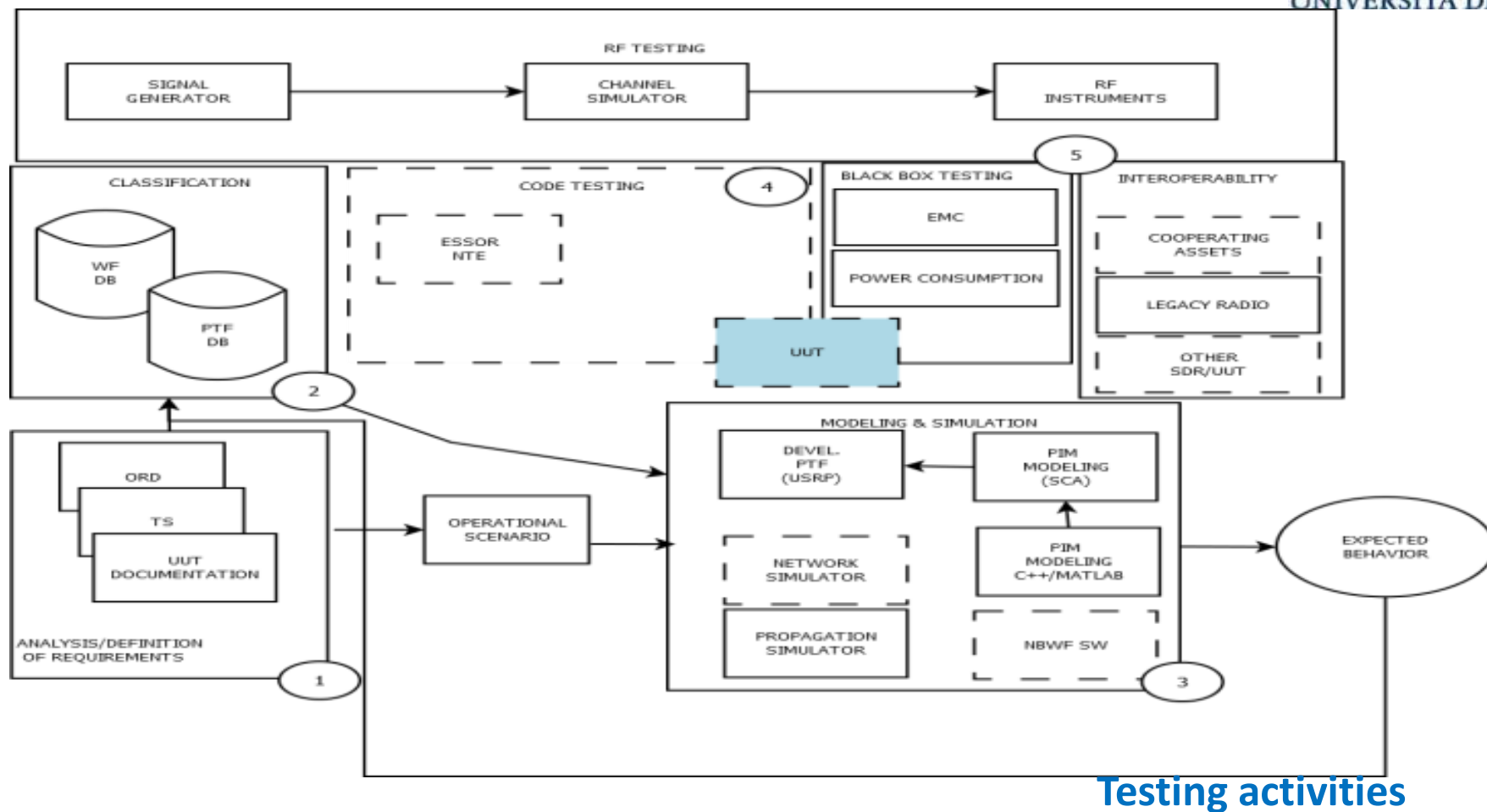




Italian T&E Capability: Workflow



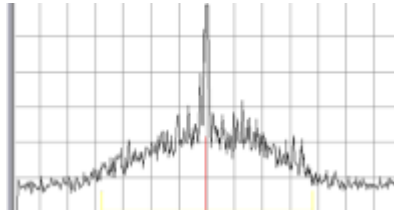
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Current work

SCA WFs

- STANAG 4285,
- STANAG 4539,
- MIL-STD-188-110 A/B
- simplified version of TETRA

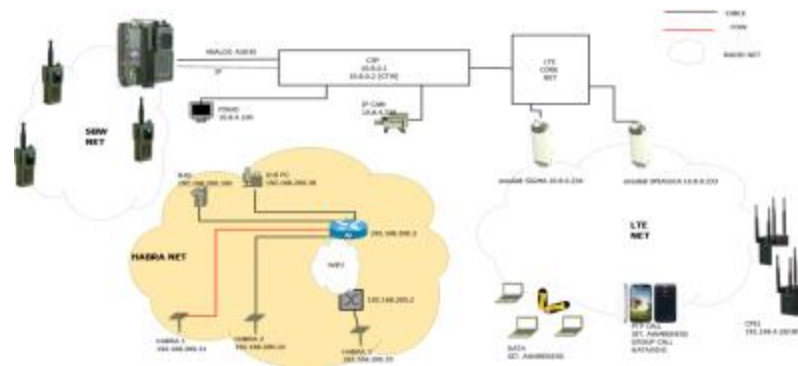
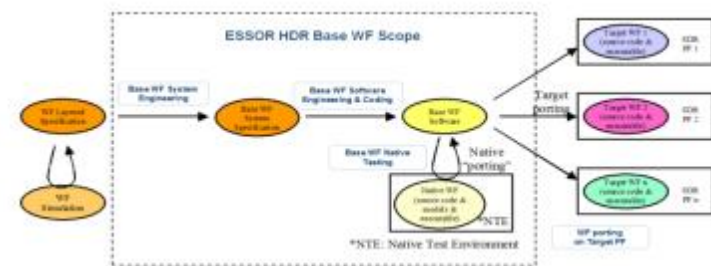


Interoperability

- Legacy WFs;
- Emerging tactical technologies

ESSOR- SCA

- NTE investigation





conclusions



- **T&E should be:**
 - **Planned** from the very beginning of procurement;
 - **Managed** consistently with the entire program;
 - **Performed** by technically skilled and operationally experienced personnel;

Italian Approach

- Consistent planning and management through a dedicated directorate;
- technical skills and facilities to build up T&E capability identified;
- Future expectation: to be part of a multinational certification network





Questions?



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