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Chemical, Biological, Radiological, Nuclear and explosive

Department of Industrial Engineering and School of Medicine and Surgery

# **Evaluation and Gap Analysis tool for performance benchmarking in CBRNe Table Top Exercise emergency response management**

**PhD. Daniele Di Giovanni**  
*PhD student*

*International Master Courses in  
«Protection Against CBRNe events»*

**Dept. of Industrial Engineering**  
**University of Rome «Tor Vergata»**

**Contacts:**  
**Daniele.Di.Giovanni@uniroma2.it**  
**+390672597198**

**Although**  
**We do expect to have always “good weather”**

**Sometimes it “rains”.**





# CBRNe THREATS



**Terrorism**



**Industrial**

# CBRNe SCENARIOS



**War**



**Natural  
disaster**



# ONE OF THE FIRST REQUIREMENTS TO DEAL WITH SUCCESS EACH CBRNe THREAT AND SCENARIO: «PREPAREDNESS»



## The EU Civil Protection Mechanism

- ✓ **Response:** Facilitates cooperation in civil protection assistance interventions in the event of major disasters inside and outside the EU
- ✓ **Preparedness:** Training, exercises, exchange of experts, modules
- ✓ **Prevention:** Support MS in preventing risks or reducing harm to people, the environment or property resulting from emergencies
- ✓ The Mechanism's **tools**
  - Emergency Response Coordination Centre (**ERCC**, ex-MIC)
  - Common Emergency and Information System (**CECIS**)
  - **Training** programme
  - Civil Protection **modules**



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# Increasing Preparedness means: Efficient and specific key actor's **Training Activities**

## FIRST RESPONDER



CBRNe Science &  
Consequence Management

## DECISION MAKER

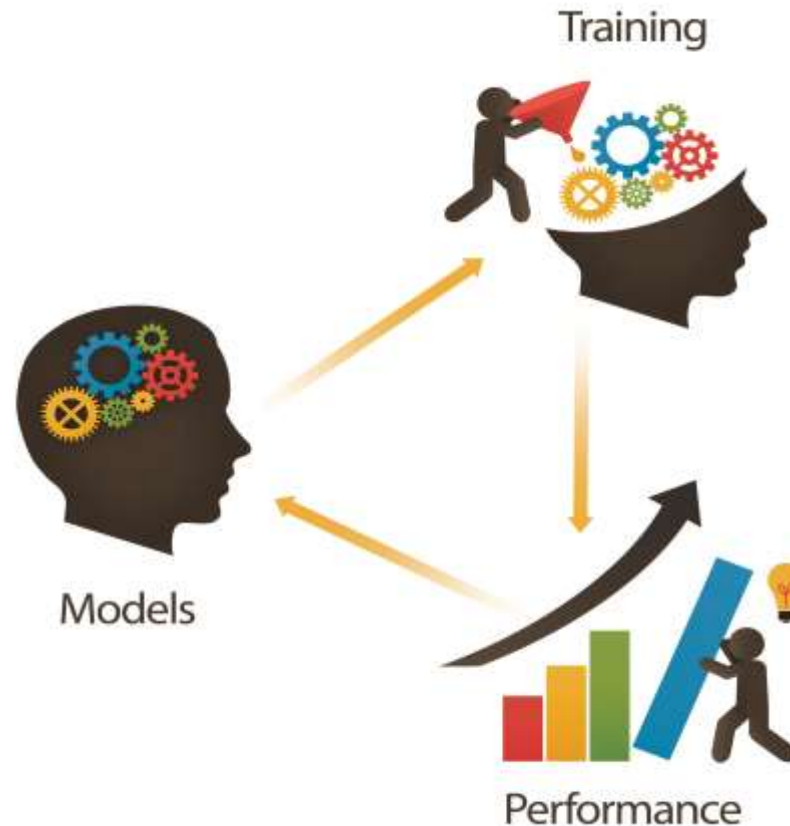


Dani

/2015

## Project objective:

# A Tool for Decision maker performance improvement





## Training instrument:

### Table Top Exercise

Table Top Exercise (TTX) is a discussion based exercise, intended to stimulate **discussion** on various issues (**assess plans, policies, and procedures**) regarding a hypothetical situation.



#### CBRNe Table Top Exercise process

**TTX**  
preparation  
activities

*Before TTX*

**TTX**

*During TTX*

**TTX**  
Reporting/data  
collection

**Performance  
qualitative  
evaluation**

*After TTX*

**Limit identification:**

1. **Qualitative evaluation.**
2. **Data reporting**



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NATO SELECTED

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[www.mastercbrn.com](http://www.mastercbrn.com)

[Daniele.Di.Giovanni@uniroma2.it](mailto:Daniele.Di.Giovanni@uniroma2.it)

27/03/2015



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# Our experience



## CBRN – Integrated Response Italy

Strengthening CBRN-response in Europe by enhancing on-site  
cooperation between safety and security organizations:  
an Italian pilot



Scuola Superiore  
Sant'Anna  
di Studi Universitari e di Perfezionamento



VIGILI DEL FUOCO  
Corpo Nazionale



With the financial support of the Prevention of and Fight against Crime  
Programme European Commission - Directorate-General Home Affairs

<http://cbrn.netseven.it/>

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## Preparedness lack identification:

### GAP Analysis:

A 'gap analysis' consists in the comparison of the actual performance with the expected one. It is devoted to the identification of the gaps between these two levels, in order to reveal areas that can be improved.

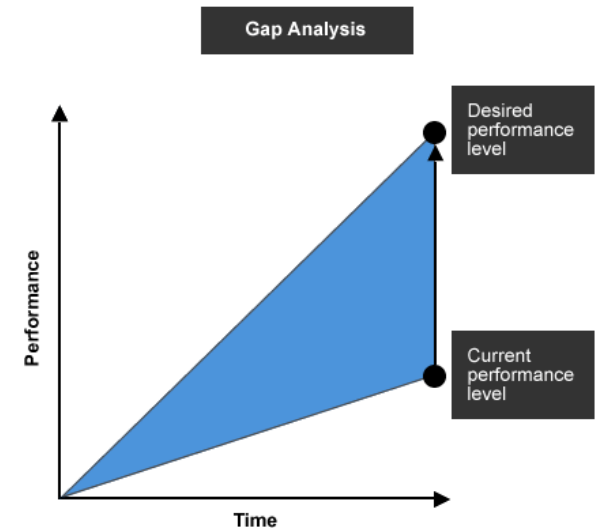


TABLE TOP EXERCISES



GAP ANALYSIS



**PERFORMANCE  
IMPROVEMENT**

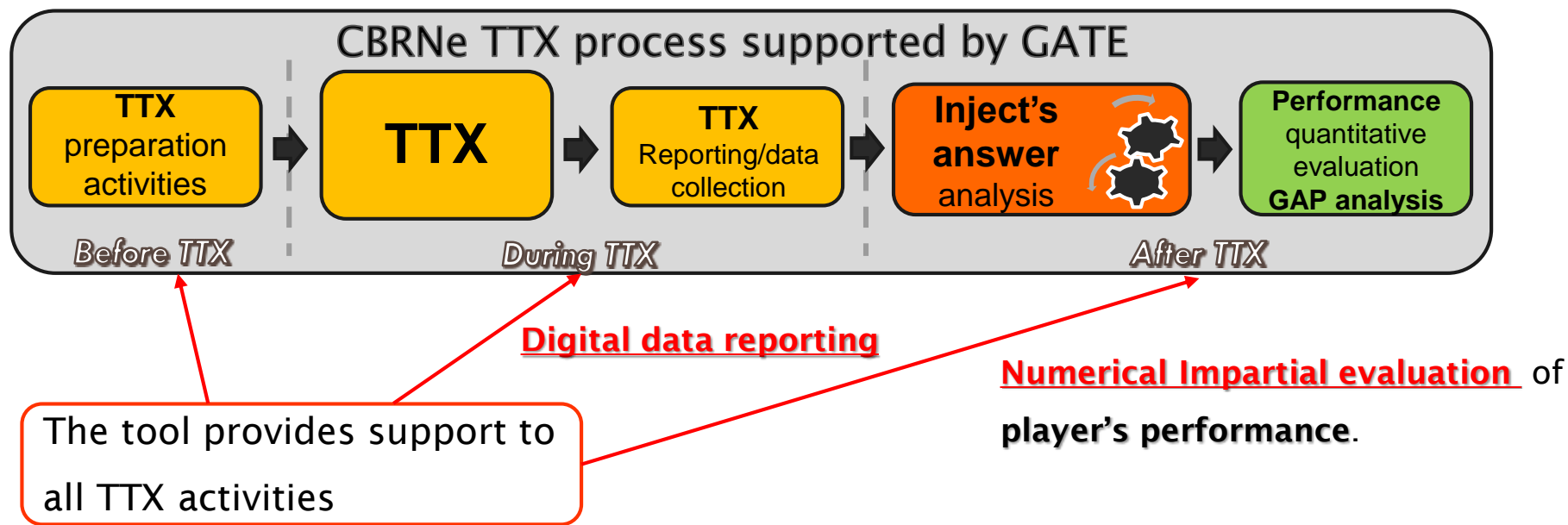


# **A Tool for CBRNe TTX analysis**

# GATE

## GAP ANALYSIS FOR TTX EVALUATION

It's a gap analysis tool for data collection and **performance benchmarking in CBRNe TTX**, a set of **algorithms specifically developed...**





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# Tool Architecture - Introduction

*Before TTX*

Software  
Module 1

## “Checklist Logic”

**Module 1** allows to verify the compliance to all the **prerequisites** for TTX and TTX evaluation process.



*During TTX*

Software  
Module 2

## “Chat Logic”

**Module 2** allows to display injects and player's answers during TTX, recording them as a report and as an input file for module 3.

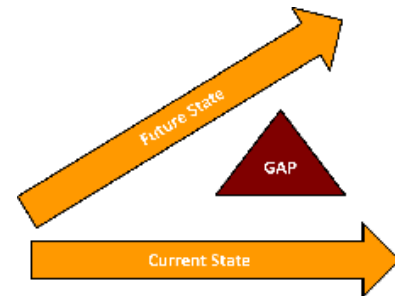


*After TTX*

Software  
Module 3

## “GAP analysis approach”

**Module 3** allows to perform a **gap analysis** by checking a complete set of report documents produced during TTX activities and phases



# Tool Architecture:

## MODULE 1- TTX organization support



**A sequence of questions to answer**  
 In order to verify that each pre-exercise activity has been done

### Traffic light logic

**Red light:** a «mandatory»

**Yellow light:** a «non mandatory»

**Green light:** all requirements are complied



TTX EVALUATION AND GAP ANALYSIS	
Pre-evaluation check requirements	
1. Knowledge areas interested in the TTX screenplay match with the areas considered in this analysis tool	YES
You can continue this evaluation process	
PRE EXERCISE REQUIREMENTS	
2. Training/briefing	
2.1. Each player has been properly informed about TTX objectives	YES
2.2. Each player is aware of his/her team role in the screenplay and his/her role within the team	YES
2.3. Each player is aware of the role of the facilitator assigned to his/her team	YES
2.4. Each player has been informed about roleplayers, agencies involved in the screenplay and about their expertise and capabilities	YES
2.5. Each player has been informed about the importance of a correct document management and trained on documental drafting	YES
2.6. Each player received a manual/instruction paper for the ongoing exercise	YES
3. Plot - screenplay	
3.1. There is matching between expertise of players and the plot developed	YES
3.2. A list of injects has been prepared	YES
3.3. A list of expected answers for each inject has been provided	YES
4. Accommodation/equipment	
4.1. Rooms and other structures are adequate to team's needs	YES
4.2. Communication, elaboration and other equipment is adequate to team's needs	YES
4.3. All equipment has been tested and is ready to use before the start of exercise	NO
WARNING! Evaluation process can not be completed	



# Tool Architecture:

## **MODULE 2** - support during TTX



### Chat logic

#### Main features of **Module 2**:

- Intuitive Management of injects and player's answers.
- Searching function to display previous facts and information
- Recording data with a precise time reference



## Tool Architecture – **MODULE 3** «How it works»

The tool supports the evaluator in the **analysis of each single player answers**, inject per inject.



### INPUT

- **“TTXInfo”**: information about **TTX organization and structure**
- **“Players-info”**: information about **Player’s background and expertise**
- **“Inject”**: **solicitations and answers** given per single inject

### OUTPUT

- **“Results”**: final individual and cumulative evaluation of player’s answers to all injects

# Tool Architecture – **MODULE 3** «How it works»

The tool collects the evaluations for each inject and allows to weight the influence of:



- **Answer accuracy**

**Give back a final weighted average grade!!**



**Quantitative evaluation**

Area	Tool output		Evaluator report
	final grade (pure)	final grade (knowledge weighted)	
Op/tech	short of expectations	short of expectations	according to the expectations
CMS	beyond the expectations	beyond the expectations	beyond the expectations
Media	expectations	expectations	according to the expectations
Report	according to the expectations	beyond the expectations	beyond the expectations

**Qualitative evaluation**

# **A case study – CBRNe Master TTX analysis**



# CBRNe Master TTX – Introduction

Organized by “**Protection against CBRNe events**” Master Course (University of Rome “Tor Vergata”) and the **Italian National Fire Corps (V.V.F.F.)**,  
**Italian Ministry of Home Affairs and Italian Ministry of Defense**

12<sup>th</sup> October 2013, Department of Industrial Engineering

## R-SCENARIO

### port



Explosions and fire on a carrier ship with 5 containers of suspicious materials

## PLAYERS

Students were divided into 4 Team, each one acting as “**Comitato provinciale per l'ordine e la sicurezza pubblica**”

## STAFF ROLES

IC (Incident Commander), Police (Superintendent), Public Health (118), Prefecture and other Stakeholders from COC (Centro Operativo di Controllo)

# CBRNe Master TTX – testing GATE's **Module 3**

Process  
to test:



TTX standard  
reports



Module 3



Evaluation and  
statistics

= ?

Testing activities main GOAL  
was:  
**TOOL CALIBRATION**

**CBRNe Expert\* evaluation**  
\*Italian National Fire Corps;  
Italian Ministry of Home Affairs;  
Italian Ministry of Defense.





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## CBRNe Master TTX – testing **Module 3**

### ***“Comparison between Tool and evaluator Q. Evaluation”***

Area	Tool output		Evaluator report
	final grade (pure)	final grade (knowledge weighted)	
Op/tech	short of expectations	short of expectations	<b>according to the expectations</b>
CMS	beyond the expectations	beyond the expectations	beyond the expectations
Media	short of expectations	short of expectations	<b>according to the expectations</b>
Report	according to the expectations	beyond the expectations	beyond the expectations

The deviations can be ascribed to the **emotional involvement** of the evaluator in the organized TTX and to the **difficulty** for the evaluator to **simultaneously consider all the concomitant factors** that can influence the response to the specific injects



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# CBRNe Master TTX – Conclusions

## ***“Conclusions”***

A gap analysis tool for performance benchmarking in CBRNe Table Top Exercise emergency response management was developed

### **GATE strength points**

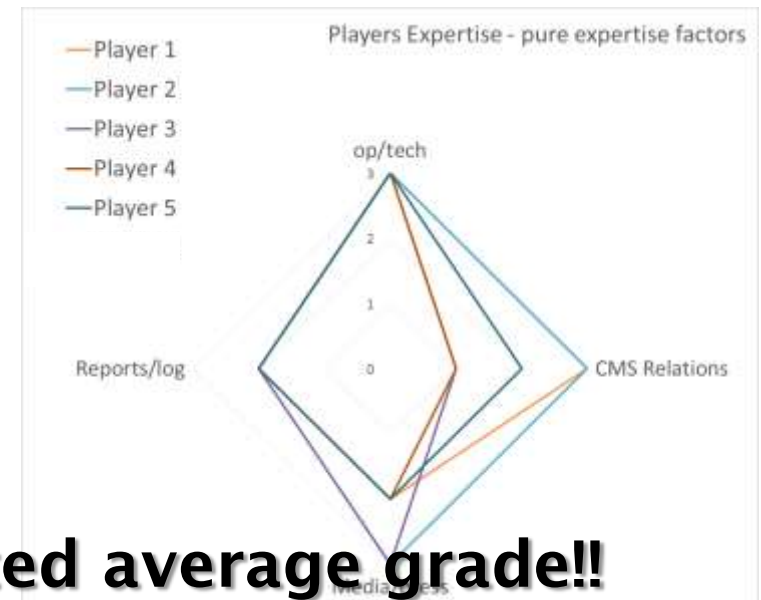
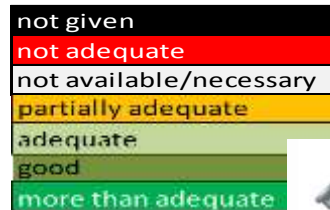
- ✓immediate, user-friendly;
- ✓Support each phase of Table Top Exercise process
- ✓**flexible**: it will be set for evaluation of TTX in other fields
- ✓it is **versatile**, it is **modular** and can be easily **implemented**
- ✓its use is oriented to specific competence free users



## Tool Architecture – **MODULE 3** «How it works»

The tool collects the evaluations per each inject and allows to **weight the influence of:**

- Answer accuracy
- Reaction time
- Players CBRNe background and expertise



**Give back a final weighted average grade!!**



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