



"Insights from volcanic unrest simulation exercises"



2nd VUELCO short-course: «Coping with volcanic unrest»
Roseau (Dominica), 14th May 2015



PROTEZIONE CIVILE
Presidenza del Consiglio dei Ministri
Dipartimento della Protezione Civile

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OVERVIEW ON CIVIL PROTECTION EXERCISES:

- goals
- types
- organization
- good practices



VUELCO PROJECT EXERCISES:

- Colima exercise: preparation, development, debriefing.
- Campi Flegrei exercise: “ “ “
- Cotopaxi exercise: “ “ “



SYNTHESIS AND LESSON LEARNED



INTRODUCTION TO VUELCO DOMINICA VOLANIC UNREST SIMULATION EXERCISE

EXERCISE GOALS

Exercises are essential to:

- Test existing procedures and emergency plans** (communication chain, means, emergency areas, evacuation routes, functionality of operational centers, radio- communication, displaying of forces, timing, ...).
- Improve people preparedness.**
- Improve cooperation and relationships among stakeholders.**
- Raise attention on the spot.**
- Let problems come up.**
- Judge scientists skill**
- ...**

Exercises should be repeated frequently

according to: behaviour of the volcano, socio-economic context, risk perception level, changes in political administration...

They risk to become ineffective if limited to single events!

TYPES OF EXERCISE

Table-top

- Test the command and control chain of emergency response (protocols and procedures) at national, regional or municipality scale.
- Do not involve the population

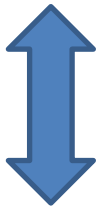


Full-scale

- Test the whole response system (roads, evacuation, communication). Usually after some TT.
- Involve the population

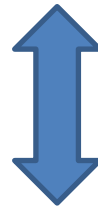


Reduced



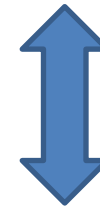
Not reduced

Announced



Unannounced

Degraded mood



No limitations

EXERCISE ORGANISATION

Things to be defined in advance:

- **Goals** ←
- **Type of exercise**
- **Scenario:** type of hazard (or multihazard) and its evolution
- **Scale:** national, regional, municipal
- **Players and observers**
- **Roles and rules** (possibly according to reality)
- **Budget**
- **Duration** (real and simulated)
- **Logistics**
- **Agenda**
- **Debriefing:** oriented to aspects that need to be analysed



POSSIBLE FORM

NAME OF THE EXERCISE

Type of exercise:

1. Table-Top
2. Full scale
3. Reduced
4. Announced
5. Unannounced

Site address of exercise:

Scheduled date:

Level of the players

Type of hazard:

Lahars, Ash fall, Health Hazard
Earthquake

.....

Time slot:

1. Day / night
2. AM / PM
3. Begin of exercise:
4. End of exercise

THEME

Objectives

General Objective :

- 1.....
- 2.....

Interim Objectives :

- 1.....
- 2.....
- 3.....

Specific Objectives :

- 1.....
- 2.....
- 3.....

Players

Lower Animation

High Animation

Private company
Operators :

Electricity
Railway company

CP of operators

Public Institutions:
Private Company:

e.g. Mayor

e.g. Regional Civil P

.....

Others

Students, Consultant, Scientists - Experts

Kinetic

Speed?

Slow?

Compressed time?



Weather	Real?	Fictitious?	If fictitious : - Direction of wind - Hygrometry - Speed wind
Communication	yes	no	If yes, who, where and when?
	yes	no	Who and since when.
	yes	no	In case roles and number of figurants should be planned
Scenario and timetable	Outline and cutting time: Phase 1:..... Phase 2: Phase 3:.....		
Logistics	Drinks, meals, blankets, etc.		
Evaluators	1....., 2....., 3.....		
Observers	1....., 2.....		
Hot feedback	What time, where and with whom? In general just after the end of the exercise or one day later.		
Cold	What time, where and with whom? In general 30 days after the end of the exercise		

SOME GOOD PRACTICES FOR EXERCISES

Organisation: based on regulations and laws of the country and goal oriented

Coordination: a steering group should be in charge of coordination and leadership

Scenario: to test the scientific response, a «hidden direction team» is necessary to define the scenario and possibly modify it timely (even in response to the reactions of the participants)

Work plan: essential to clarify goals, participants, command-chain, roles, rules, strategy, agenda...

Preparation time: at least 6 to 12 months are usually necessary to prepare a full-scale exercise. If the exercise is repeated on a fixed schedule, a shorter preparation time can be sufficient.

Debriefing: organize a hot-debriefing on the spot and possibly another one a few months later.

Communication: if media or people are involved a communication plan is essential (who tells what, when, where, by what mean, who prepare the contents).

Players: preparation should involve all players since the beginning.





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- organization
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VUELCO PROJECT EXERCISES:

- Colima exercise: preparation, development, debriefing.
- Campi Flegrei exercise: “ “ “
- Cotopaxi exercise: “ “ “



SYNTHESIS AND LESSON LEARNED



INTRODUCTION TO VUELCO DOMINICA VOLANIC UNREST SIMULATION EXERCISE

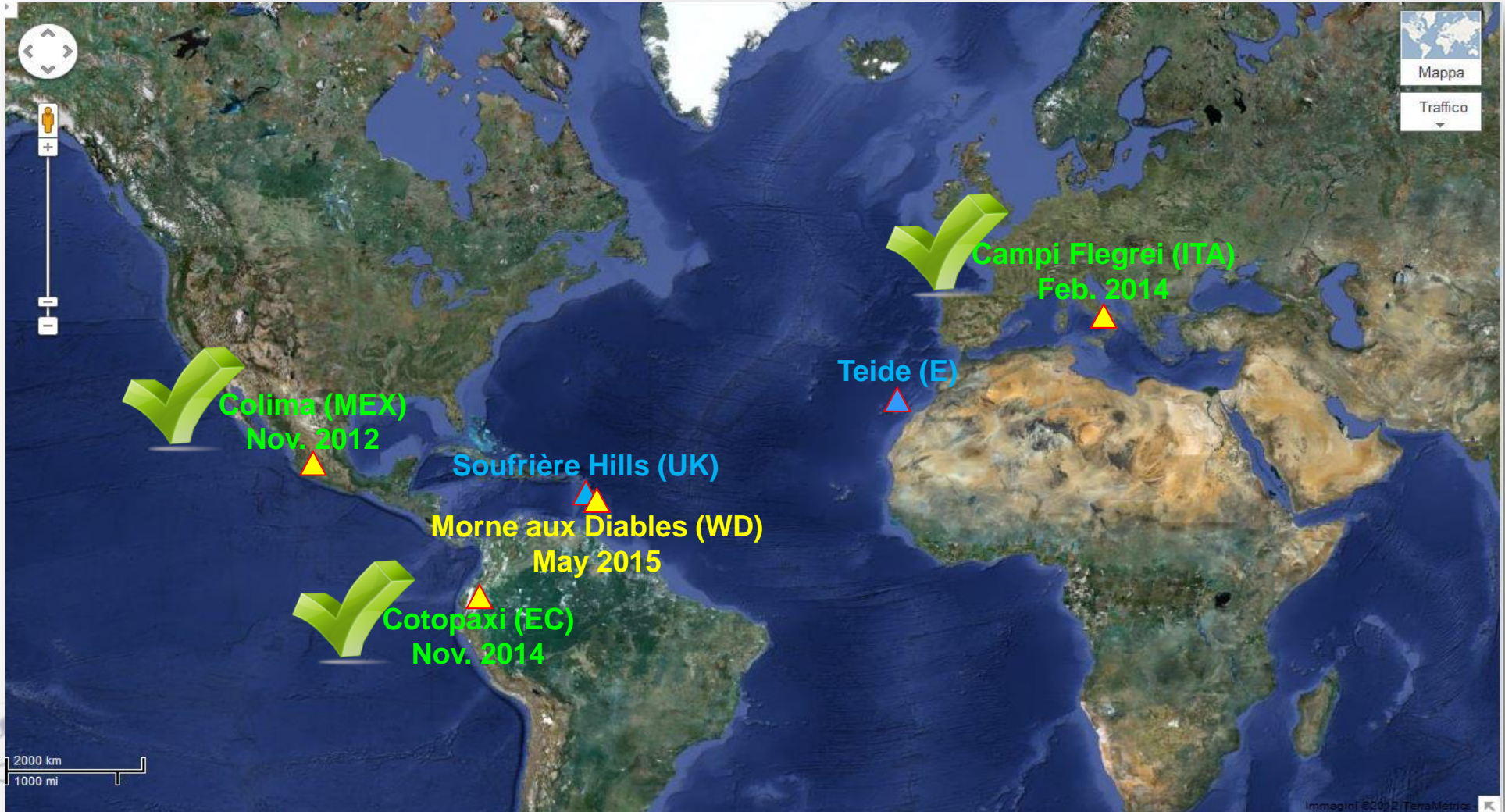


VUELCO EXERCISES

Work Package 9: *Decision making and unrest management*

Task 9.6: *Simulation of unrest and decision making*

TARGET VOLCANOES



VUELCO EXERCISES GOALS:

- Explore the applicability and helpfulness of the methods, models and procedures developed within the project (especially probabilistic models and communication protocols), to the decisional-operational chain in an unrest crisis.
(as defined by Project Annex 1: “Description Of Work” -Task 9.6)

- Other goals defined at local/national level in agreement with local authorities.



Colima Volcano Exercise *17th – 24th November 2012*

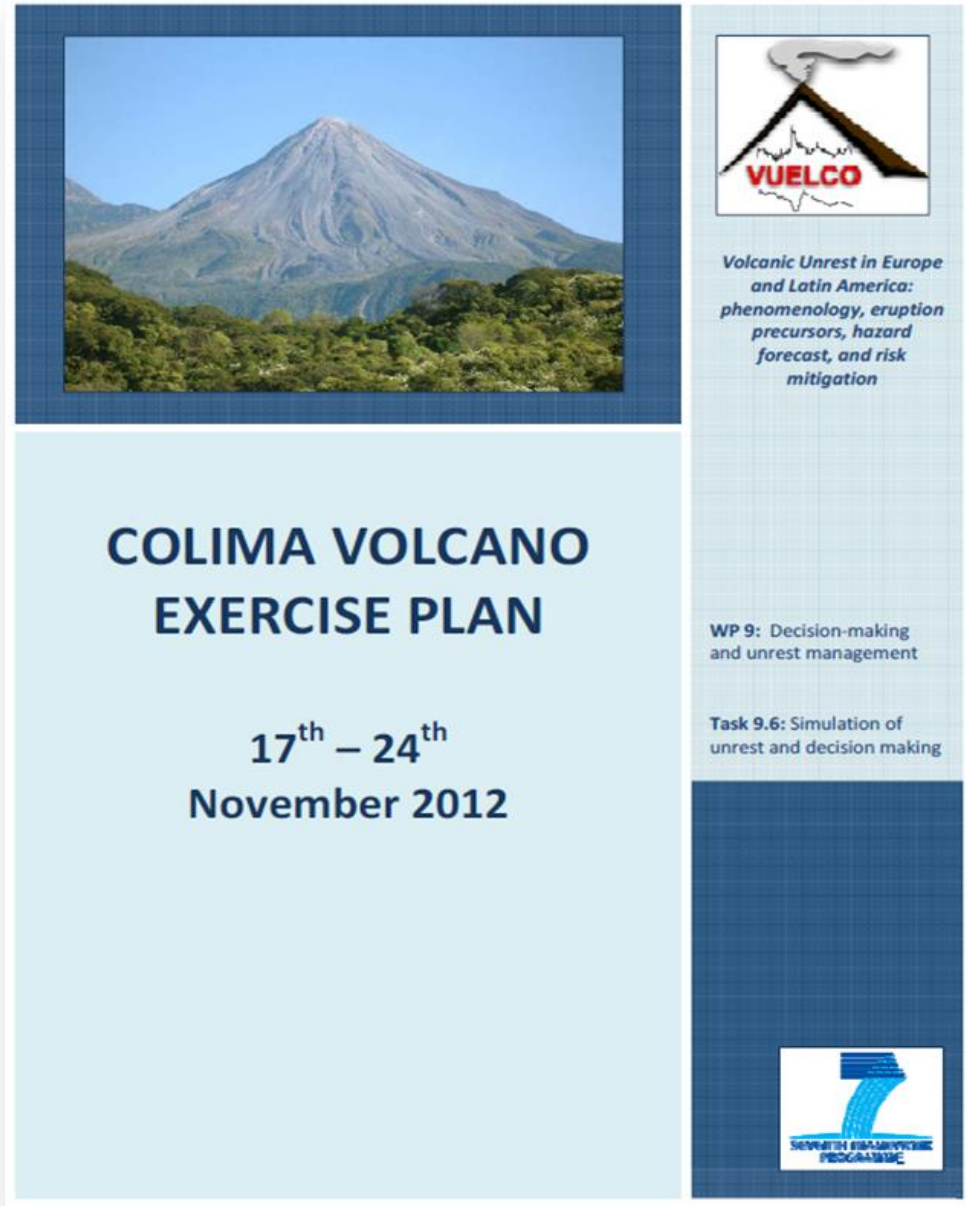


FULL-SCALE EXERCISE



(focused on scientific and civil protection aspects)

PREPARATION

- ✓ Distribution of a wide bibliography
- ✓ Distribution of the simulation plan
- ✓ Field-trip
- ✓ Involvement of Civil Protection representatives from: Colima, Jalisco, Italy



The image shows the cover of a brochure for the Colima Volcano Exercise Plan. At the top left is a photograph of the Colima volcano. To the right is the VUELCO logo, which features a stylized volcano and the word 'VUELCO' in red. Below the logo is the text: 'Volcanic Unrest in Europe and Latin America: phenomenology, eruption precursors, hazard forecast, and risk mitigation'. The main title 'COLIMA VOLCANO EXERCISE PLAN' is centered in large blue letters. Below the title, the dates '17th – 24th November 2012' are displayed. On the right side, there are two lines of text: 'WP 9: Decision-making and unrest management' and 'Task 9.6: Simulation of unrest and decision making'. At the bottom right is a logo for 'SEPARATION OF EMERGENCY PROGRAMS' featuring a blue number '7'.




Volcanic Unrest in Europe and Latin America: phenomenology, eruption precursors, hazard forecast, and risk mitigation

COLIMA VOLCANO EXERCISE PLAN

17th – 24th
November 2012

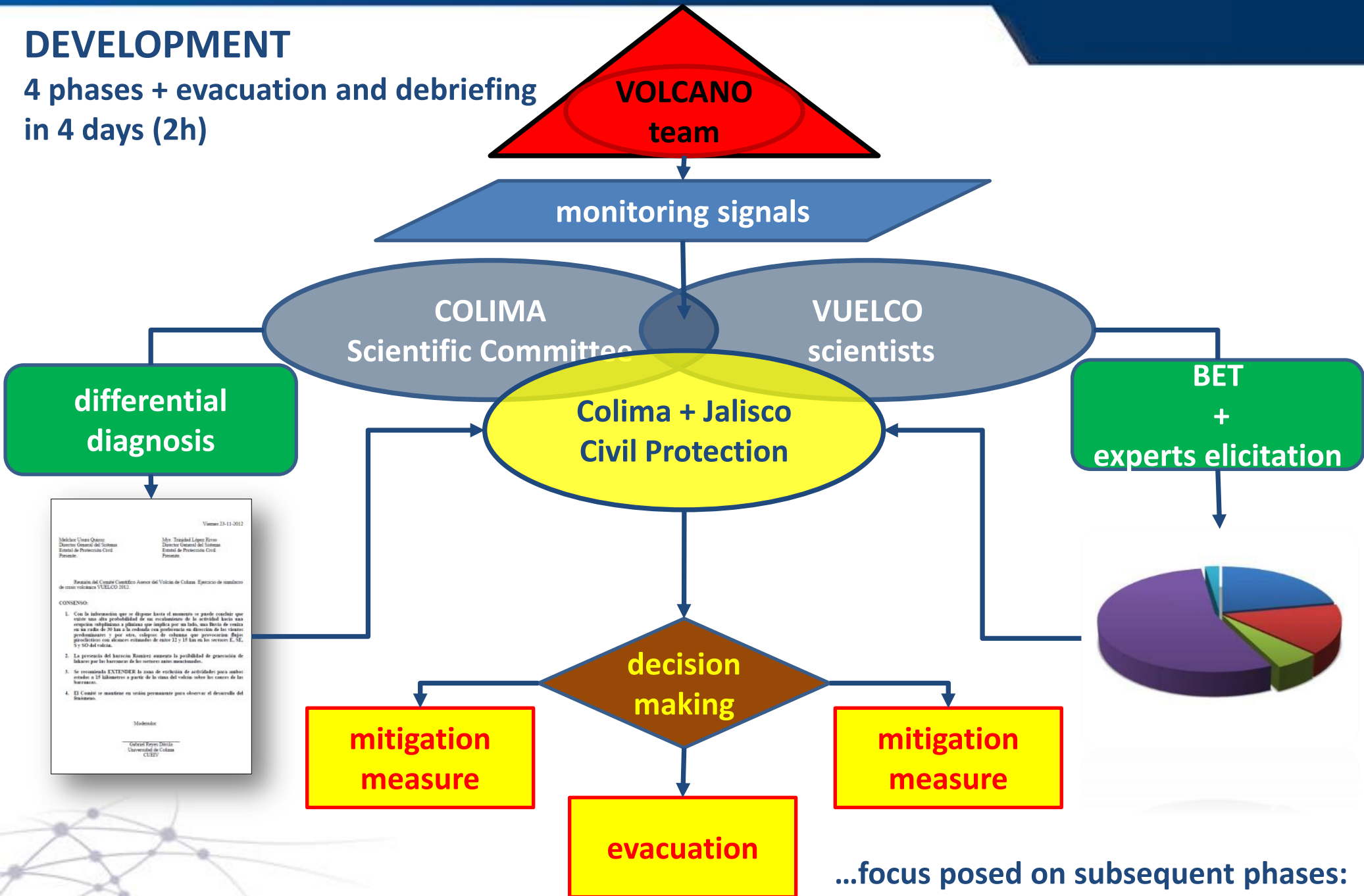
WP 9: Decision-making and unrest management

Task 9.6: Simulation of unrest and decision making



DEVELOPMENT

4 phases + evacuation and debriefing
in 4 days (2h)



...focus posed on subsequent phases:

EXERCISE PHASES:

A. Analysis and interpretation of precursory signals.

B. Elaboration of scenarios and advice-giving.

Possible scenarios defined:

1. Effusive
2. Explosive (sub-Plinian, Plinian)
3. Mixed (dome growth and destruction)
4. Flank collapse
5. Eruption stop

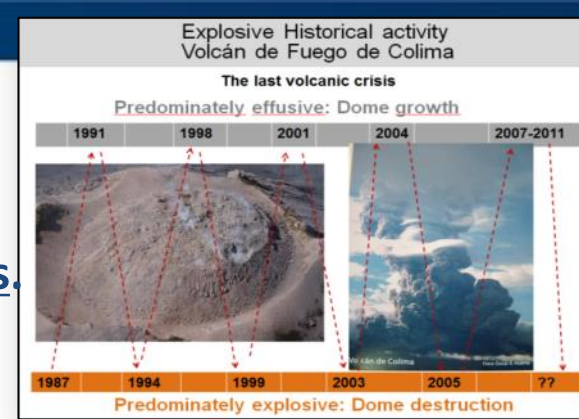
C. Decision making.

D. People and media communication.

Meeting with population + press conf.

E. Evacuation of an exposed village.

200 people



F. Debriefing.

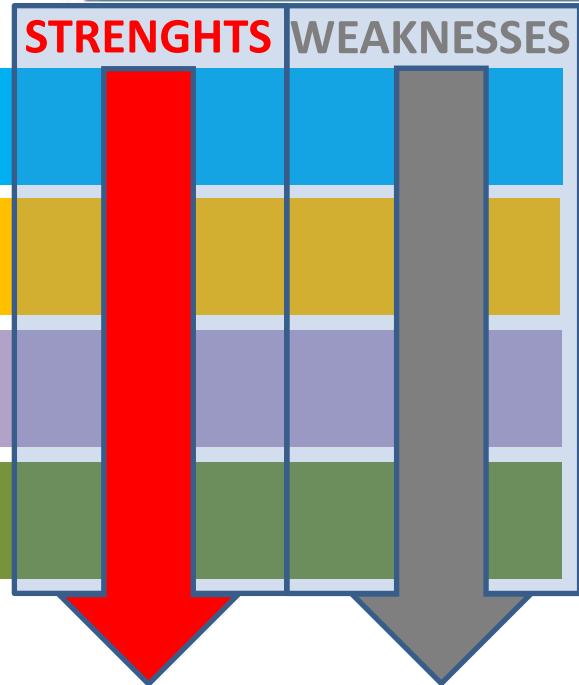
via email after 2 months

GENERAL ASPECTS

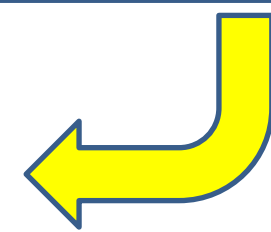
SCIENTIFIC PROCESS

COMMUNICATION SCIENTISTS-CIVIL PROTECTION

CIVIL PROTECTION ASPECTS



**SUGGESTIONS
FOR**



- Colima monitoring and surveillance system.
- Colima Civil Protection system.
- Scientific Advisory Committee management and advice-giving.
- Organization and development of the next exercises.

2nd VUELCO EXERCISE

CAMPI FLEGREI caldera *Exercise: 9th – 15th Feb. 2014*



TABLE-TOP REDUCED SIMULATION
(focused on scientific aspects)

PREPARATION

- ✓ Distribution of a summary report on volcanic hazard
- ✓ Distribution of the simulation plan
- ✓ Field- trip and visit to volcanic observatory.
- ✓ One day briefing session.
- ✓ Involvement of Civil Protection representatives from: Italy (national and regional), Dominica, Spain (Canary Island) and Argentina.



Volcanic Unrest in Europe and Latin America: phenomenology, eruption precursors, hazard forecast, and risk mitigation

WP 9: Decision-making and unrest management

Task 9.6: Simulation of unrest and decision making

**CAMPI FLEGREI CALDERA UNREST
SCIENTIFIC SIMULATION
9th - 13th FEBRUARY 2014**

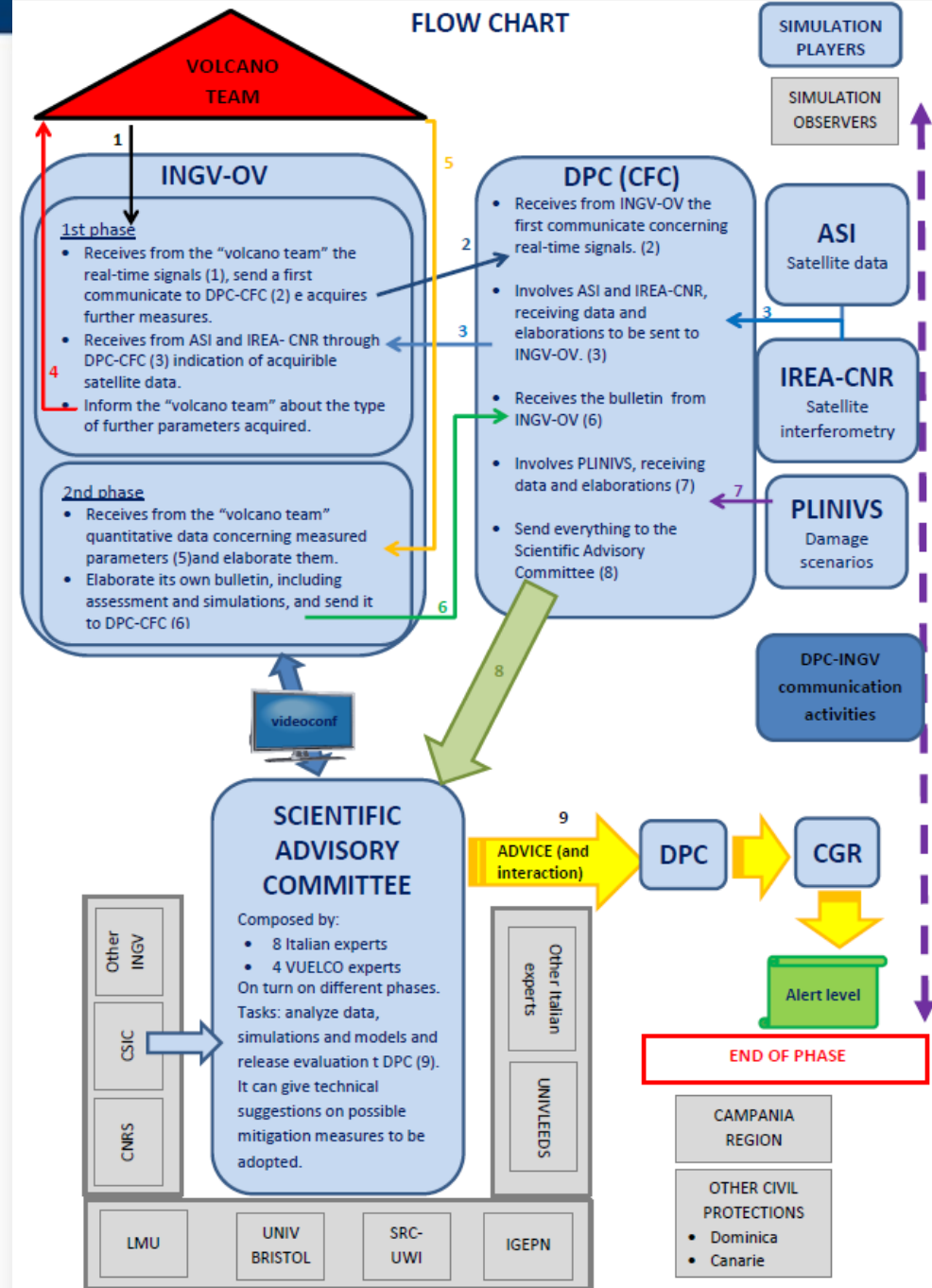
SIMULATION PLAN



DEVELOPMENT

4 phases + debriefing in 3 days (in 2 cities)

- Volcano team released volcano signals.
- INGV communicated what they can observe with monitoring networks (possible degraded mood) and delivered a bulletin.
- SAC evaluated the ongoing situation, on the basis of the bulletin delivered by the INGV-OV. After an initial analysis of the report, they had a videoconference with INGV-OV in Naples, in order to ask for further details. After that they had the time (a couple of hours) to discuss and to elaborate a written report to DPC.
- Following the release of the advice from the SAC, an interaction phase occurred, during which DPC had the opportunity to ask the SAC more information and/or evaluation regarding the advice released.
- This process was repeated across 4 subsequent meetings, each time simulating increasing monitoring signals.
- [Probabilistic models were included in INGV report (BET) and provided by CSIC (HASSET). In the third phase, after releasing the advice, the DPC asked the SAC for further information. To answer some of these questions, the SAC decided to perform an elicitation].



		VOLCANO	INGV-OV	SCIENTIFIC COMMITTEE	DPC - CGR
LUN 10/02	15	Signals outcome 1	Start of 1 st phase-release of 1 st comm.		
	16				
	17				
	18		Release of 1 st INGV bulletin		
MAR 11/02	8			Start of 1 st phase works	
	9			Videoconference	
	10	Signals outcome 2	Start of 2 nd phase-release of 2 nd comm.		
	11			Releasing of advice n.1	Alert level definition-end of 1 st phase
	12			Lunch	Lunch
	13		Release of 2 nd INGV bulletin		
	14		Lunch	Start of 2 nd phase works	
	15		Videoconference		
	16	Signals outcome 3	Start of 3 rd phase-release of 3 rd comm.		
	17				
	18			Releasing of advice n.2	
19		Release of 3 rd INGV bulletin		Alert level definition-end of 2 nd phase	
MER 12/02	8			Start of 3 rd phase works	
	9			Videoconference	
	10	Signals outcome 4	Start of 4 th phase-release of 4 th comm.		
	11			Releasing of advice n.3	Alert level definition-end of 3 rd phase
	12			Lunch	Lunch
	13		Release of 4 th INGV bulletin		
	14		Lunch	Start of 4 th phase works	
	15		Videoconference		
	16				
	17				
	18			Releasing of advice n.4	
19				Alert level definition-end of 4 th phase	

SHIFTED PHASES

To optimize the short time available, 4 working-phases were shifted between Naples and Rome.



HOT-DEBRIEFING

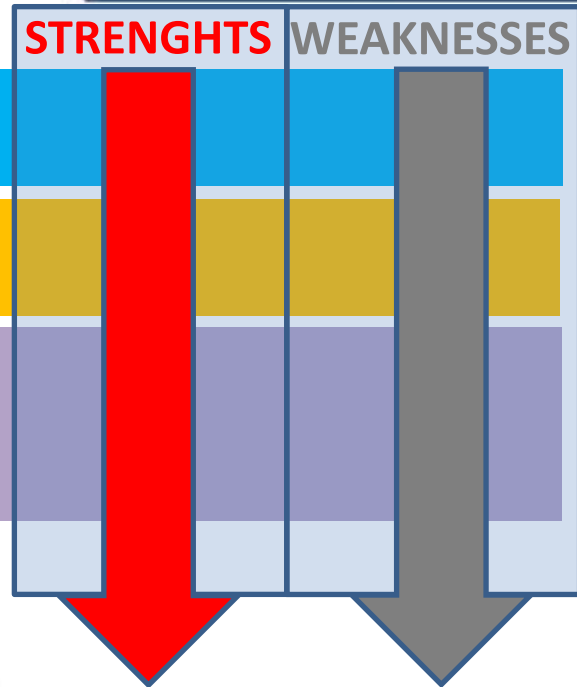
Half day debriefing session on site.

GENERAL ASPECTS

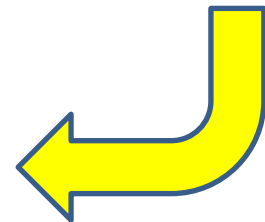
SCIENTIFIC PROCESS

COMMUNICATION AND INTERACTION BETWEEN SCIENTISTS AND CIVIL PROTECTION

- Structure, composition and activities of the Scientific Advisory Committee.
- Advice contents and releasing procedures.
- Better definition of alert levels.
- Organization and development of the next exercises.



SUGGESTIONS FOR



...LESSON LEARNED...

4 groups of scientists + 1 group of civil protections



Questions for scientists:

- Completeness and adequateness of information and data to define possible scenarios.
- Usefulness of probabilistic forecasting models for scientific analysis and advice releasing?
- Effectiveness of Scientific Advisory Committee functioning and of advice releasing modalities?

Questions for civil protection representatives:

- Main differences between Italy and your Country, regarding the organization of support given by the scientific community to the civil protection.
- Communications flow among the different groups
- Usefulness of probabilistic hazard assessment into scientific advise?



3rd VUELCO EXERCISE

COTOPAXI Volcanic Unrest Simulation Exercises
Quito (Ecuador)
13th November 2014



TABLE-TOP REDUCED SIMULATION
(focused on scientific aspects)

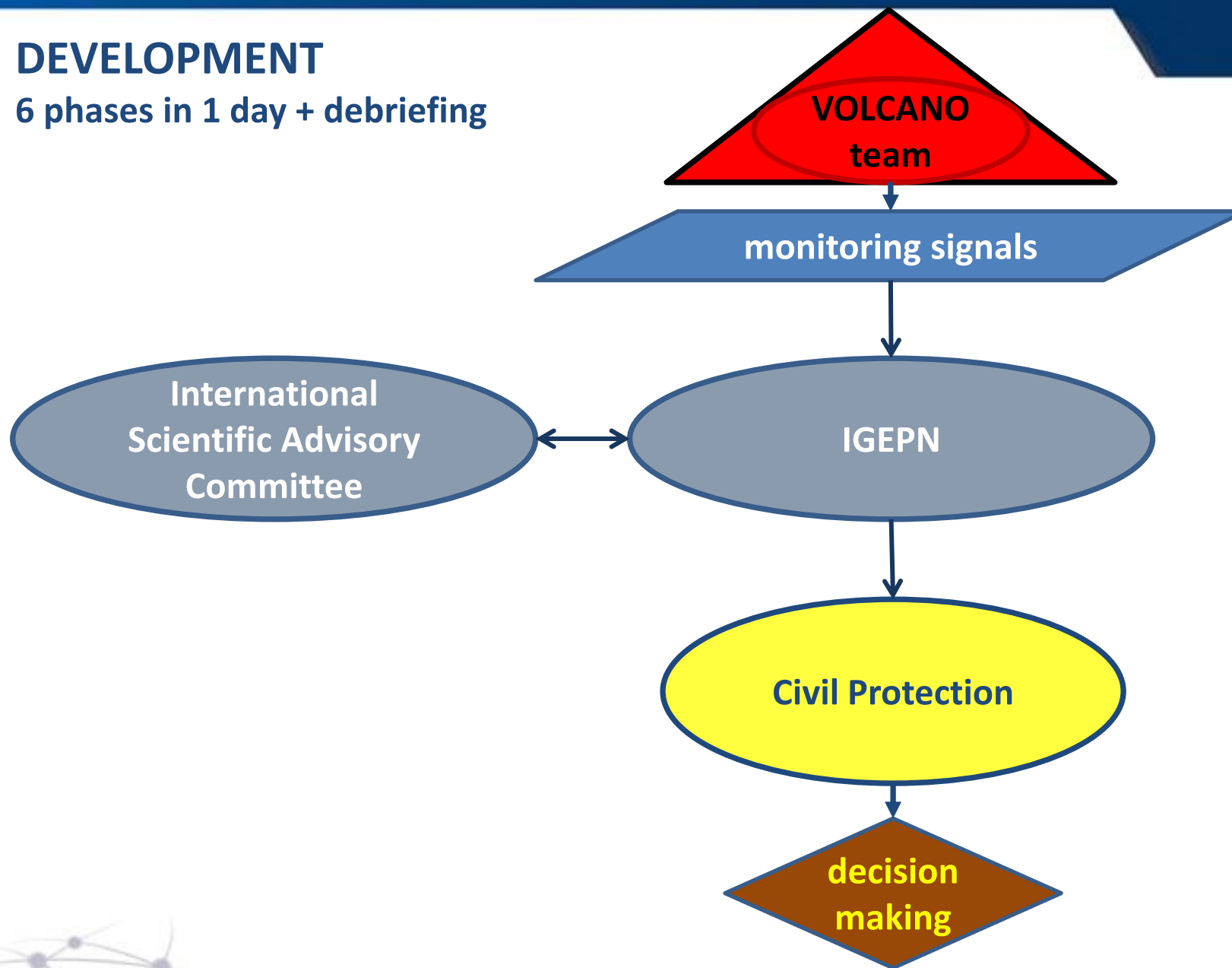
PREPARATION

- ✓ Distribution of a document on eruptive scenarios.
- ✓ Field- trip and visit to volcanic observatory.
- ✓ Summer-school.
- ✓ Involvement of Civil Protection representatives from: Ecuador (national, regional, local), Italy.



DEVELOPMENT

6 phases in 1 day + debriefing



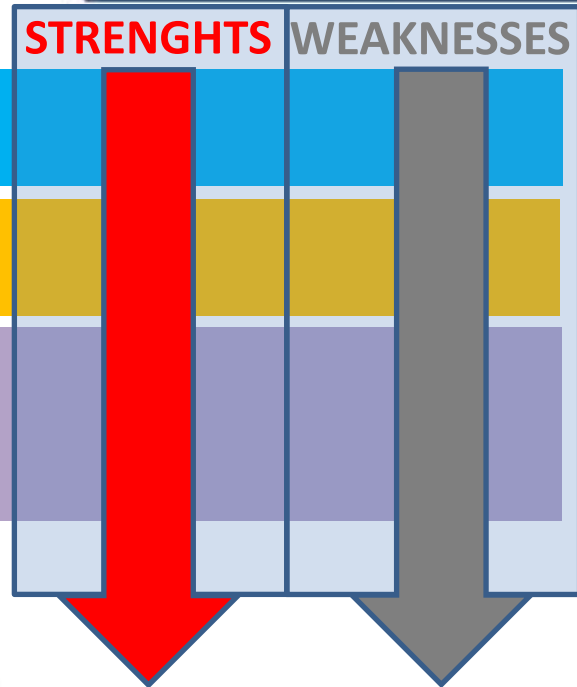
HOT-DEBRIEFING

GENERAL ASPECTS

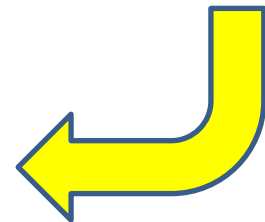
SCIENTIFIC PROCESS

COMMUNICATION AND INTERACTION BETWEEN SCIENTISTS AND CIVIL PROTECTION

- Improvement of monitoring system.
- More consideration to probabilistic models.
- Advice contents and releasing procedures.
- Improvement of facilities at national operational room.
- Organization and development of the next exercises.



SUGGESTIONS FOR



...LESSON LEARNED...



**COTOPAXI VOLCANO
EXERCISE
13th NOVEMBER 2014**

DEBRIEFING REPORT

WP 9: Decision-making
and unrest management

Task 9.6: Simulation of
unrest and decision making





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- organization
- good practices



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- Colima exercise: preparation, development, debriefing.
- Campi Flegrei exercise: “ “ “
- Cotopaxi exercise: “ “ “

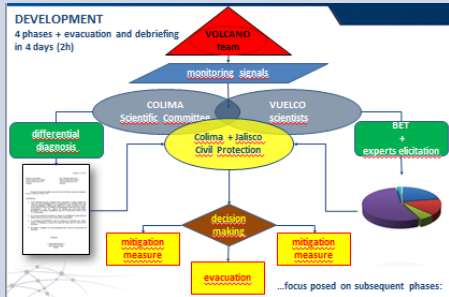
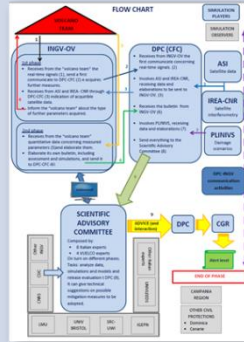
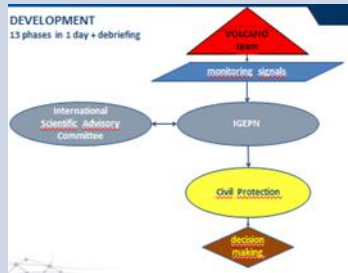


SYNTHESIS AND LESSON LEARNED



INTRODUCTION TO VUELCO DOMINICA VOLANIC UNREST SIMULATION EXERCISE

SYNTHESIS

VOLCANO	COLIMA	CAMPIFLEGREI	COTOPAXI
TYPE	<ul style="list-style-type: none"> Full-scale 	<ul style="list-style-type: none"> Table-top reduced 	<ul style="list-style-type: none"> Table-top reduced
PREPARATION	<ul style="list-style-type: none"> Bibliography on VH Workplan Field-trip 3 Civil Protection inv. 	<ul style="list-style-type: none"> Report on VH + brief Workplan Field-trip + Volc Obs. 5 Civil Protection inv. 	<ul style="list-style-type: none"> Report on scenarios ... Field-trip + Volc Obs. 4 Civil Protection inv
DEVELOPMENT	<ul style="list-style-type: none"> 5 ph. in 4 days (2h) 	<ul style="list-style-type: none"> 4 ph. in 3 days 	<ul style="list-style-type: none"> 6 ph. in 1 day 
DEBRIEFING	<ul style="list-style-type: none"> Cold 4 themes 	<ul style="list-style-type: none"> Hot 3 themes + questions (1/2 day) 	<ul style="list-style-type: none"> Hot 3 themes (1/2 day)

LESSON LEARNED

- Goals
- Type of exercise
- Scenario
- Scale
- Players and observers
- Roles and rules
- Budget
- Duration
- Logistics
- Agenda
- Debriefing

can be very different according to your needs and goals

The essential is:

- think about them;
- know what your needs and goals are;
- inform participants.

**COMING
SOON**

COMING
SOON



DOMINICA VOLCANIC UNREST SIMULATION EXERCISE

PREPARATION

- ✓ Distribution of a summary report on volcanic hazard and of a selected bibliography
- ✓ Distribution of the exercise plan
- ✓ Field- trip.
- ✓ Involvement of Civil Protection representatives from: Dominica, Caribbean, Italy.



*Volcanic Unrest in Europe
and Latin America:
phenomenology, eruption
precursors, hazard
forecast, and risk
mitigation*

DOMINICA EXERCISE PLAN

**14th – 15th
May 2015**

WP 9: Decision-making
and unrest management

Task 9.6: Simulation of
unrest and decision making



**TABLE-TOP REDUCED
(focused on scientific aspects)**

GOALS

- ❑ Explore the applicability and helpfulness of the methods, models and procedures developed within the project (especially probabilistic models and communication protocols), to the decisional-operational chain in an unrest crisis.

(as defined by Project Annex 1: “Description Of Work” -Task 9.6)

- ❑ Other goals defined at local/national level in agreement with local authorities.

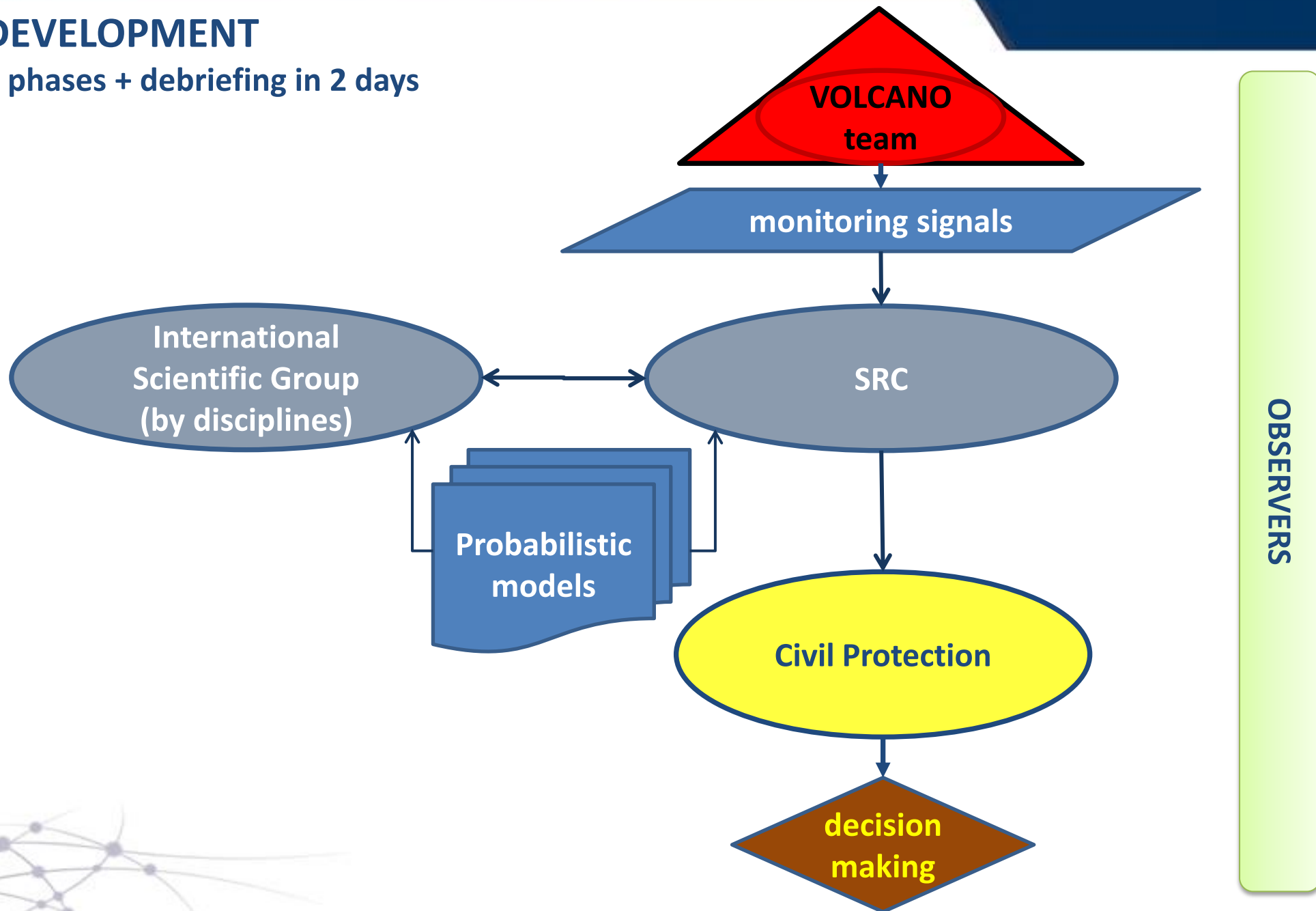
(as defined in the workplan)

To test:

- The Communication of scientific information from the monitoring scientists to the Office of Disaster Management (ODM) of Dominica.
- The ODM response mechanisms for volcanic emergencies.
- The emergency protocols of the SRC (the regional monitoring entity) in dealing with volcanic emergencies.
- The Regional Response Mechanism for volcanic emergencies.

DEVELOPMENT

3 phases + debriefing in 2 days



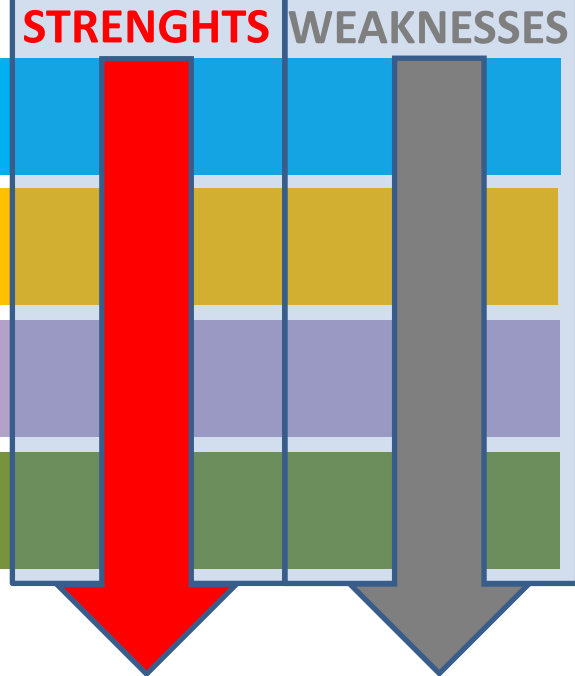
HOT-DEBRIEFING

GENERAL ASPECTS

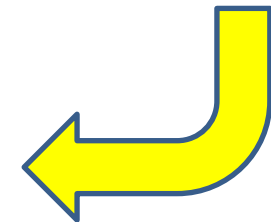
SCIENTIFIC PROCESS

INTERACTION SCIENTISTS-CIVIL PROTECTION

CIVIL PROTECTION ASPECTS AND PUBLIC COMM.



SUGGESTIONS FOR



- ...
- ...
- ...
- ...

Thank you



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