Integrated People Centred Early Warning System: from science to reality

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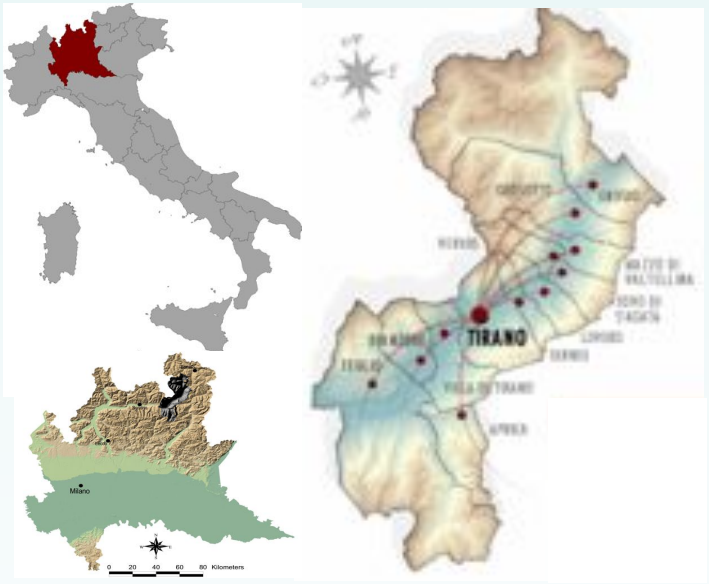
Mountain Risk Project

Study Area

Comunità Montana Valtellina di Tirano (SO), ITALIA



Recurrent landslides – flooding

1983, **1987**, 2000, 2008…

12 municipalities

29.000 inhabitants

~450 km^2

Val Pola landslide 35M m^3

Main Objective

Developing a **methodology for applying Early Warning Systems to the emergency plan** using the results of social surveys and quantitative risk assessment.

General Constraints

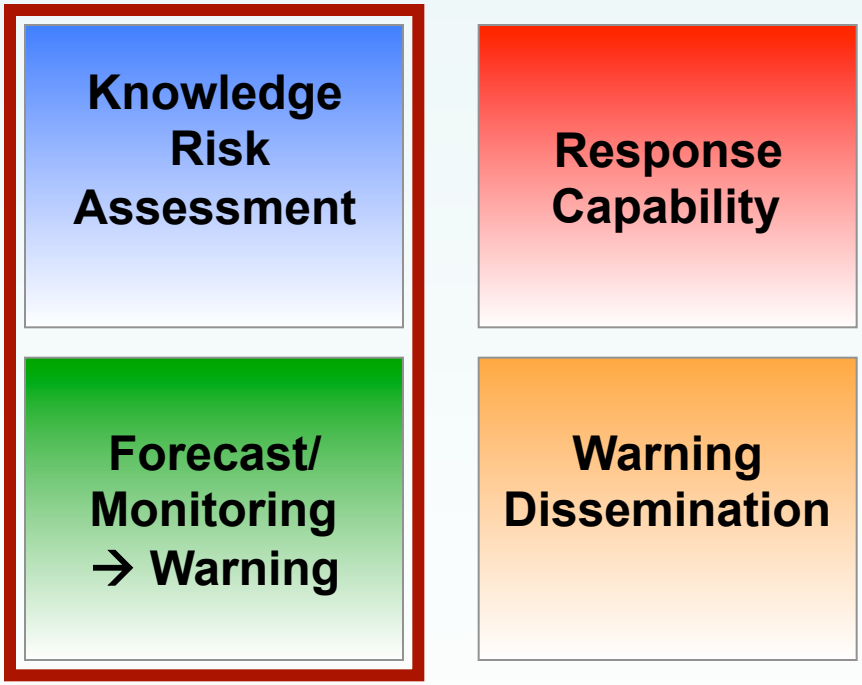
- **No budget** for instrumentation →Non structural EWS
- **Restricted time** frame - 30 months
- **Multiple scales** and detail of available data
- **Strong Interaction** with local community
- Focused on **prevention** and building **resilience**
- **Multidisciplinary** approach

Challenges of Multidisciplinary Work

- Contrasting approaches
- Different language and definitions

Early Warning System (EWS)

TRADITIONAL TECHNICAL EWS

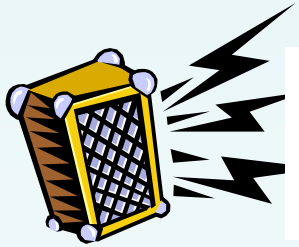


HAZARD & WARNING FOCUSED

Traditional Instrumental EWS

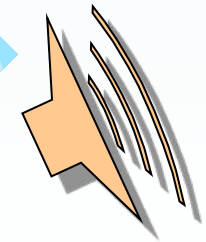
Lack of population participation =

Lack of Risk Awareness & Preparedness



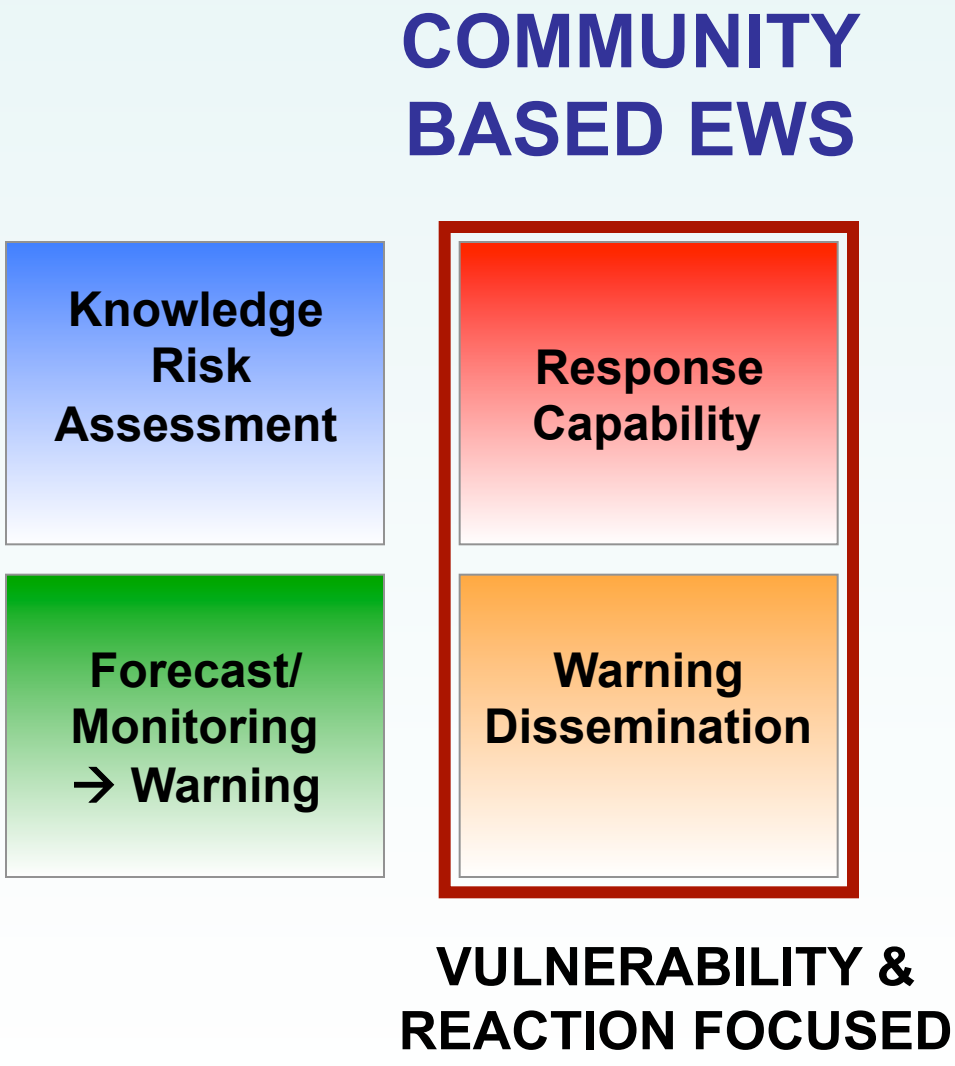
Volcanic Eruption Warning!

Flood Warning!



Tsunami Warning!

Early Warning System (EWS)



Community Based EWS

Efficient in small communities – low governamental and scientific presence

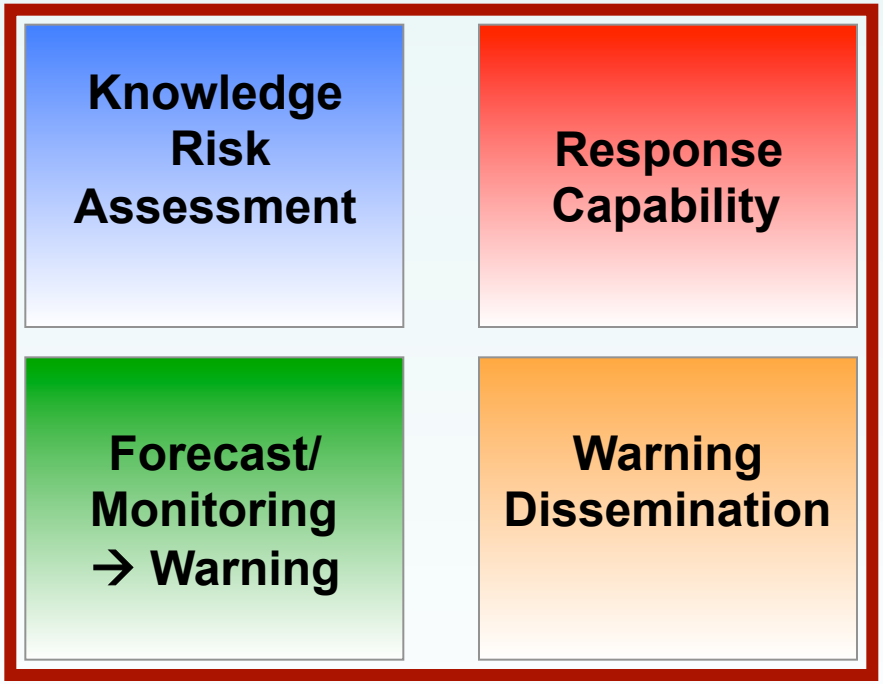
Monitoring by volunteers

Feasible in big cities?,
- in communities with high reliance on the state?

(Villagran, Marroquin – from 1997)

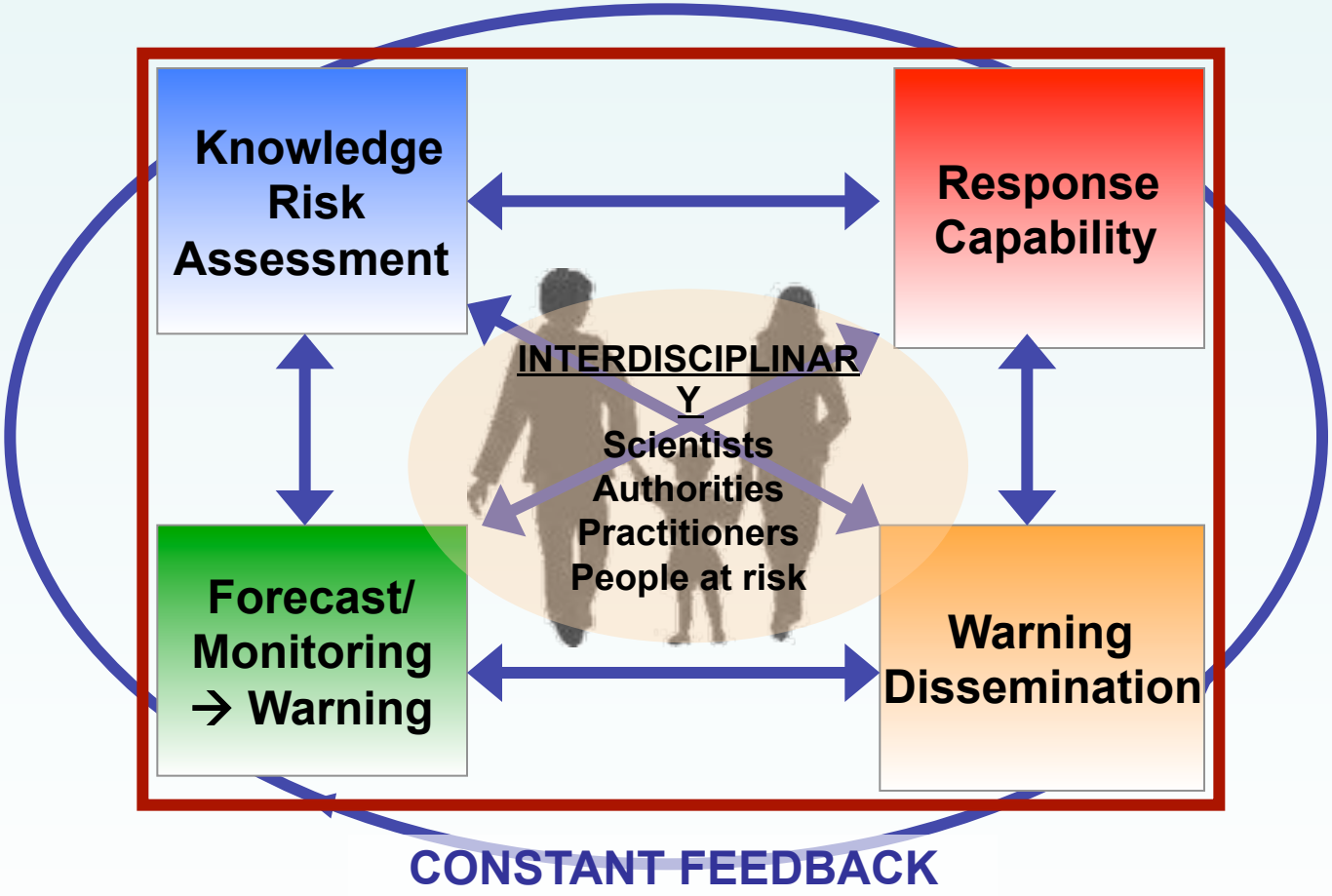
Integrated People Centred Early Warning System (IEWS)

Only effective if it generates an appropriate reaction!!!



Focus on **Risks Management** rather than just on hazards warning

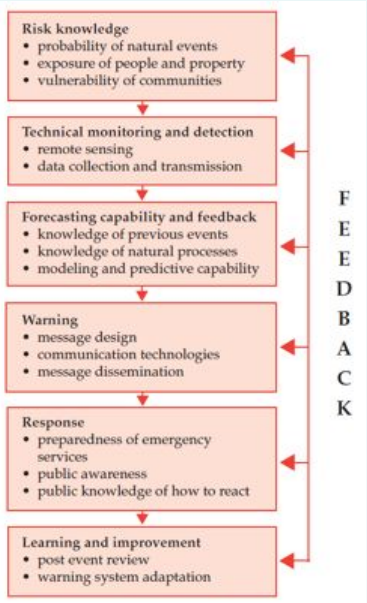
Integrated People Centred Early Warning System (IEWS)



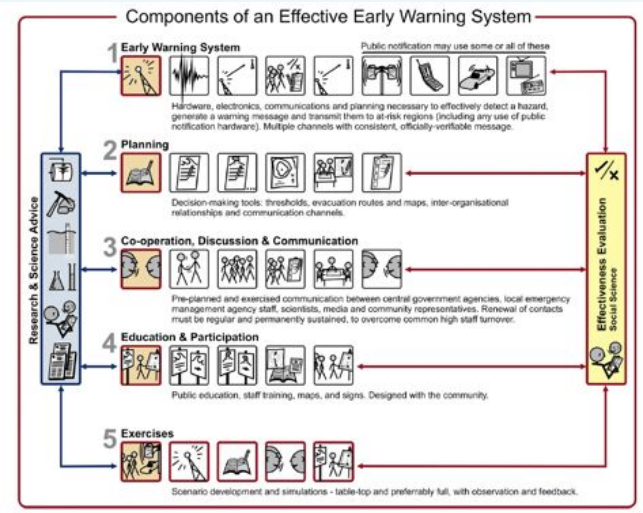
Smith, 1996; Zschau & Küppers 2002; EWC II 2004; Dysktra, 2005; Basher, 2006; Villagran, 2006; Echelon, 2007

EWS models:

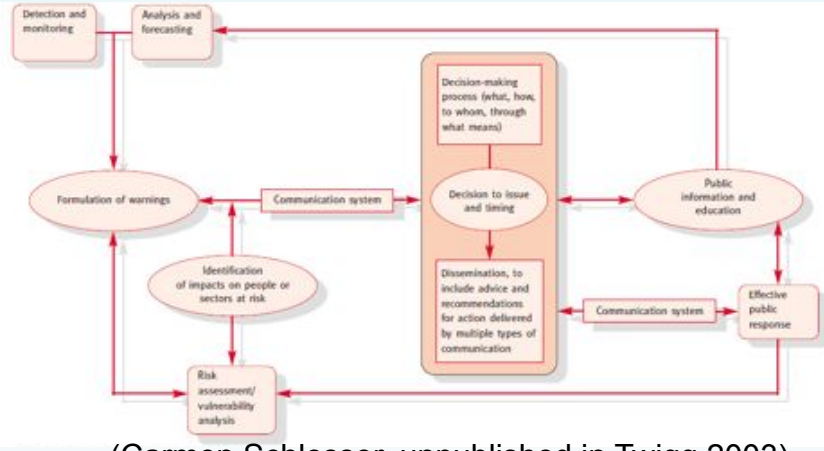
elaborated mostly by scientific community



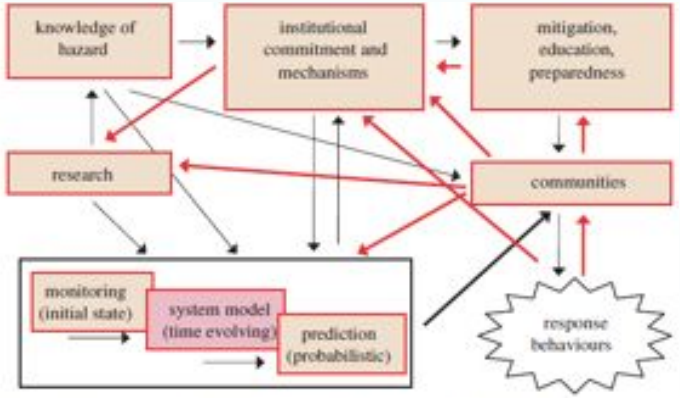
(Parker, 2005)



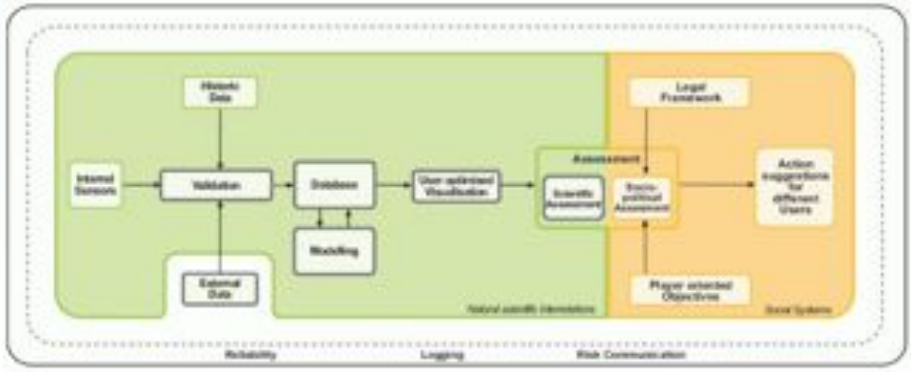
(Leonard et al., 2008)



(Carmen Schlosser, unpublished in Twigg 2003)

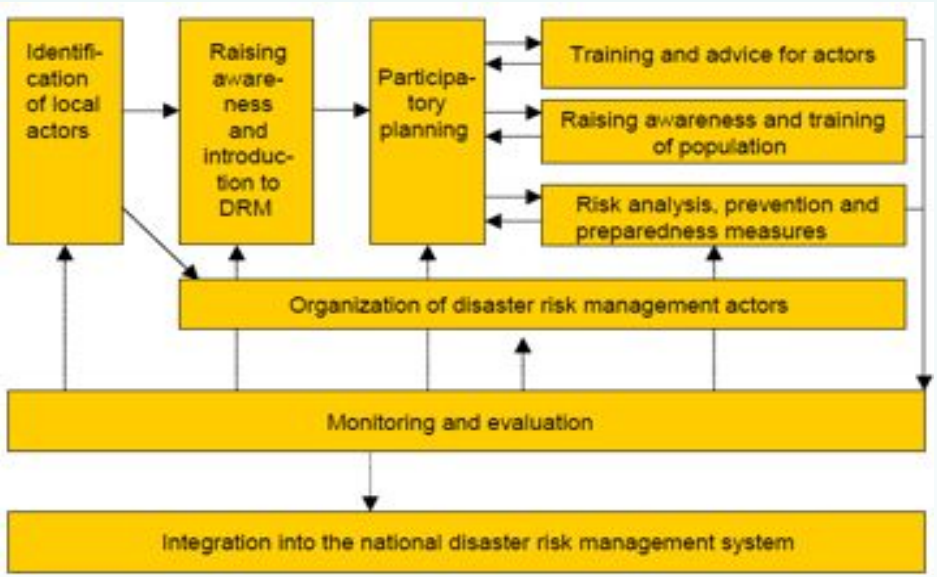


(Basher, 2006)

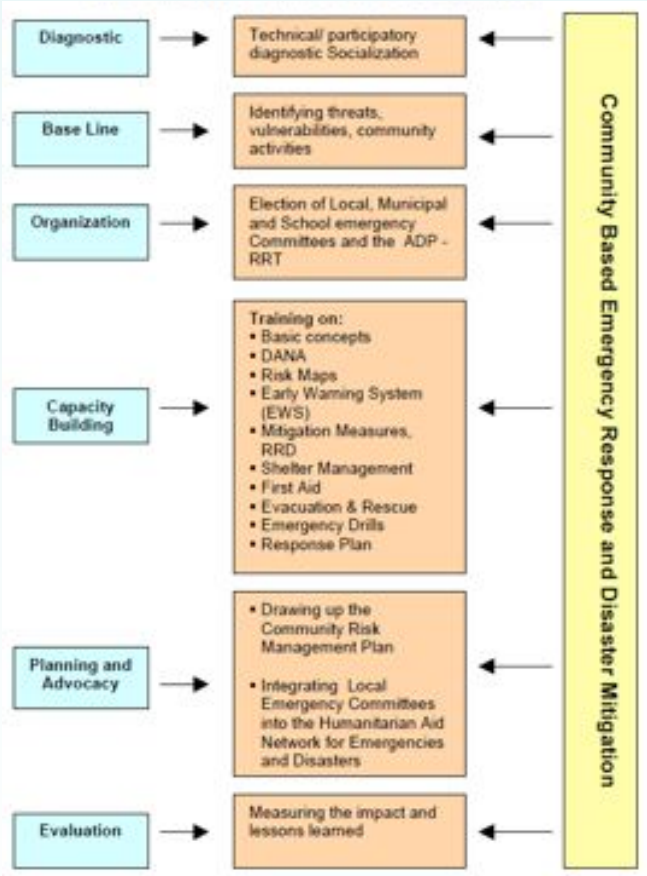


(Bell et al., 2009)

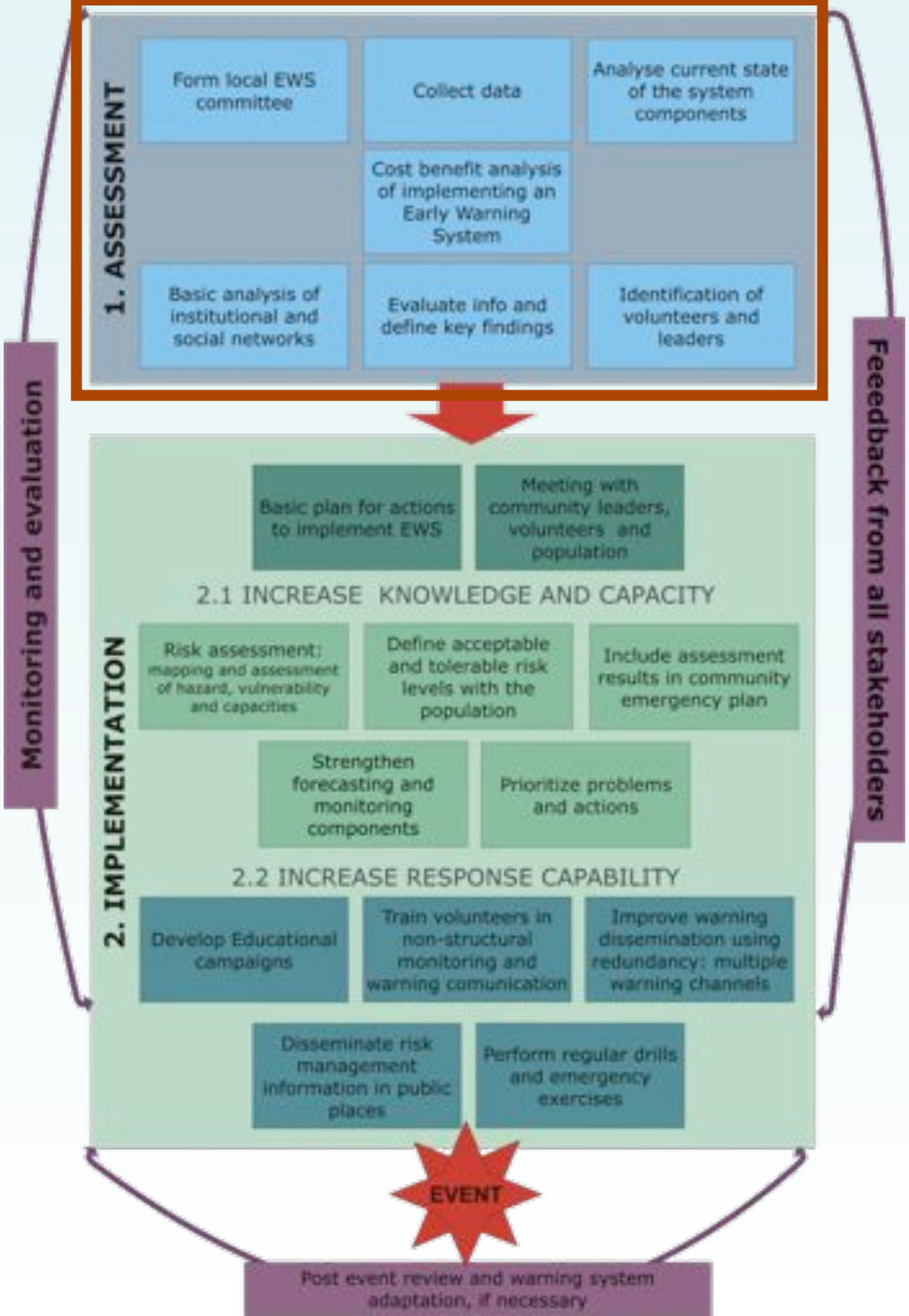
Risk management methodologies:
elaborated by international organizations



Community Based Disaster Risk Management (Bollin, 2003) – GTZ



Community Emergency Response and Disaster Mitigation (CERDM) model (Interiano, 2010- World Vision)



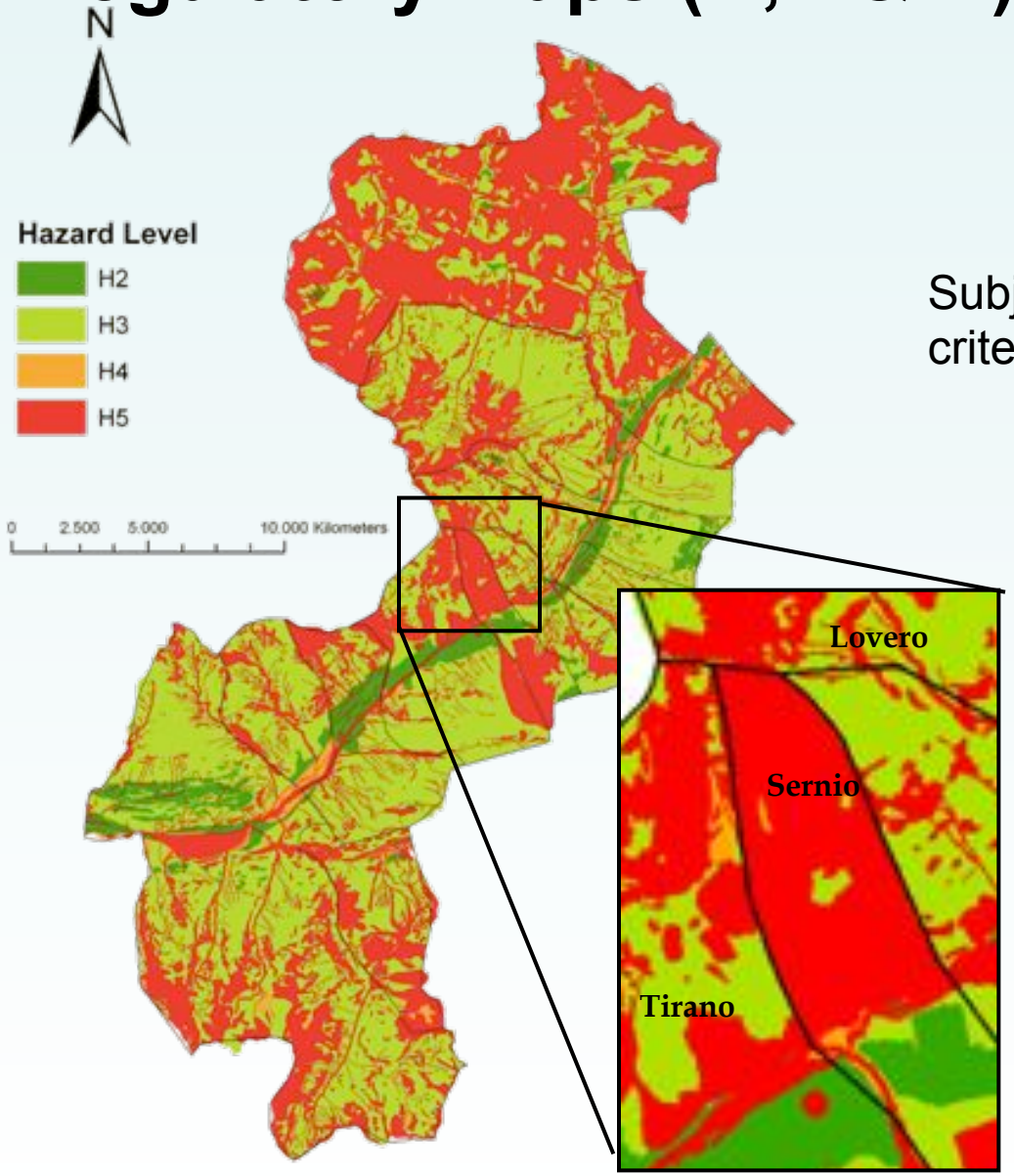
Methodology to implement Integrated Early Warning Systems

Flexible and sustainable

Science “vs” Reality

Assessment

Regulatory Maps (H,V & R): biased, not rigorous



Subjective application of standardized criteria at Municipality Scale

FACTS:

- No scientifically rigorous
- Not possible to change it since is legally binding

Assessment

Forecasting: regional, not local

Regional Homogeneous Zones and regional rainfall thresholds

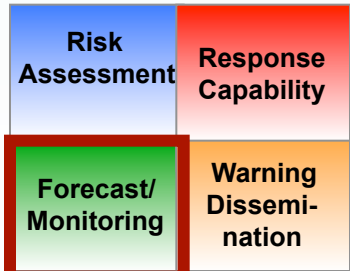
Aree omogenee	A	B
PMA min (mm)	350	750
PMA max (mm)	1250	1950
S0 min (mm/12h)	30,00	35.00
S0 min (mm/24h)	40,00	50.00
S1 min (mm/12h)	35,00	45.00
S1 min (mm/24h)	50,00	65.00
S1 min (mm/48h)	65,00	85.00
S2 min (mm/12h)	60,00	70.00
S2 min (mm/24h)	80,00	90.00
S2 min (mm/48h)	130,00	145.00

FACTS:
- Strong microclimate variations in short periods of time *(Luino, 2008)*

Monitoring: limited, private

Only specific large active landslides

FACTS:
- Presented mostly small landslides
- Not possible to instrumentally monitoring all high hazard zones

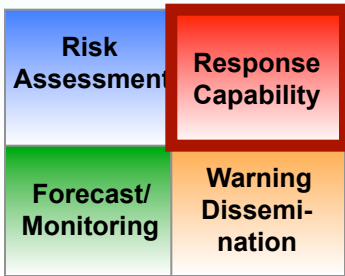


Response Capability and preparedness of Local Population

Mayor responsible by law (Art. 12 Law 265, 1999) for risk communication and preparedness education for the population

FACTS:

- No preparedness activities nor communication campaign developed



Emergency Response Tool

Real time emergency plan:

Dynamic GIS, DSS (Decision Support Systems), and ICT (Information & Communication Technology)

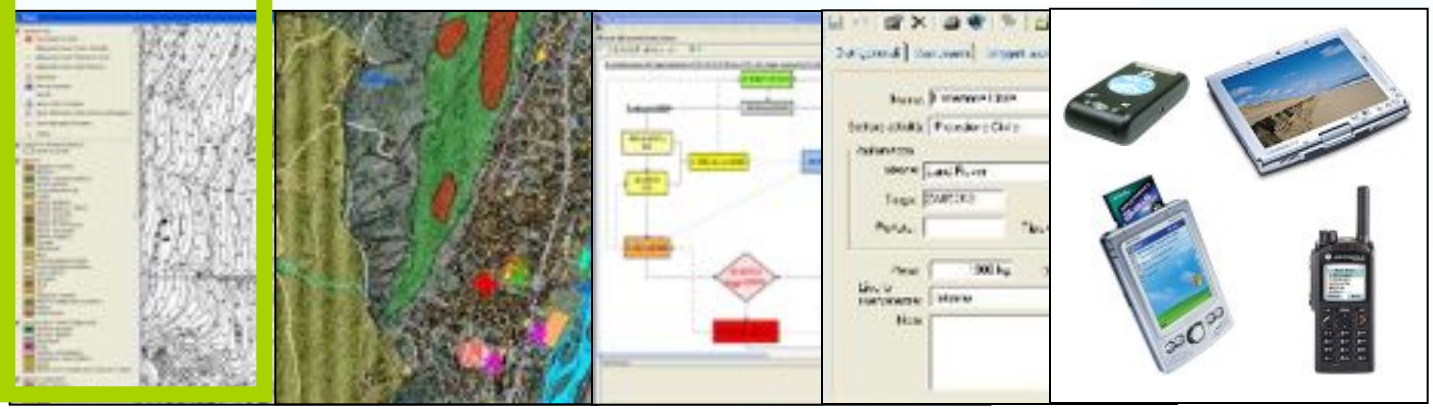
Incomplete Database →
Responsibility of each municipality

FACTS:
- Excellent scientific tool
- Efficiency administratively dependent on updating

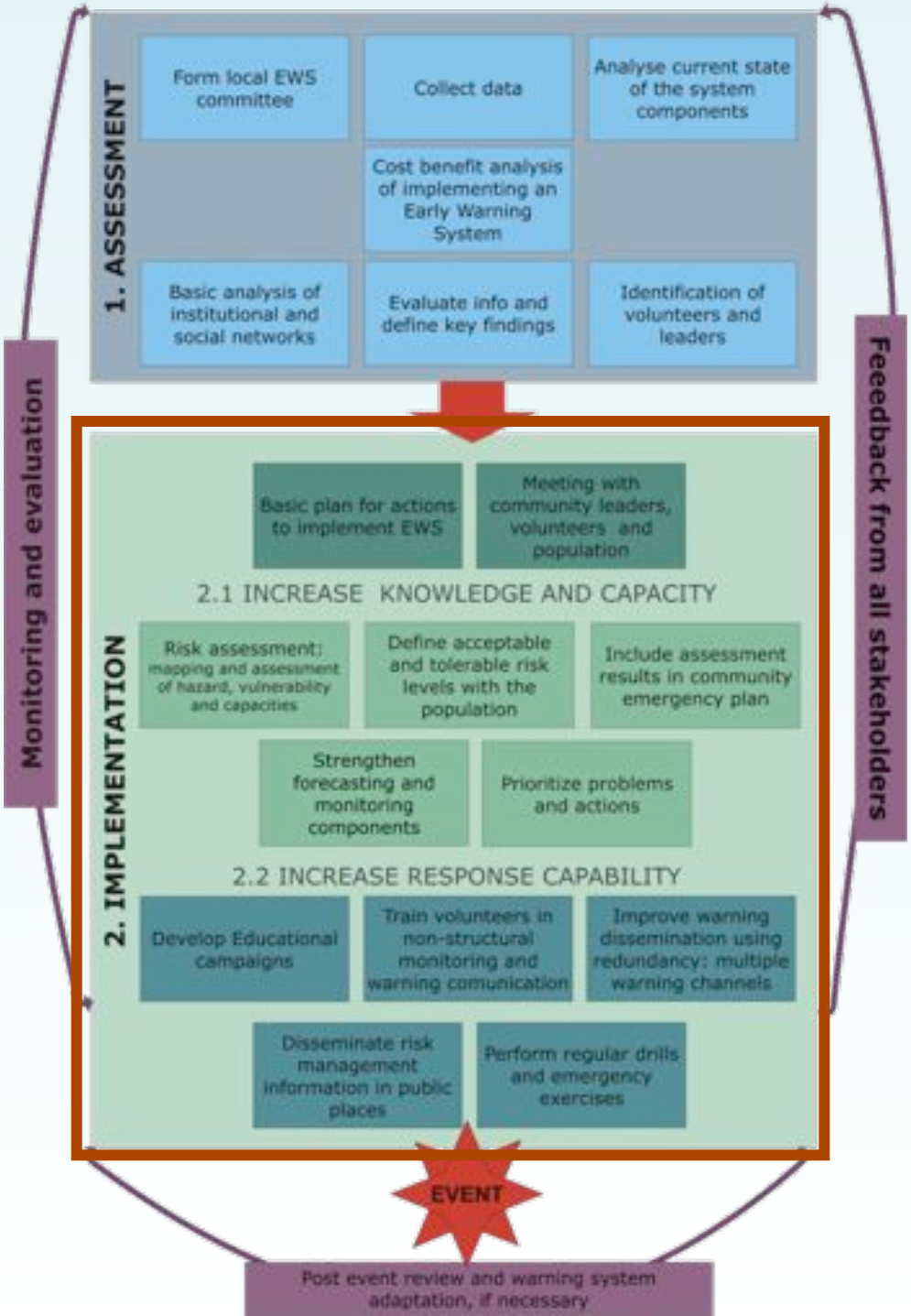
PETer 4

Local Authorities	Scientists - Mountain Risk	Local Authorities

DATA PROCESSES PROCEDURES ACTIONS COMMUNICATION



Risk Assessment	Response Capability
Forecast/ Monitoring	Warning Dissemi-nation

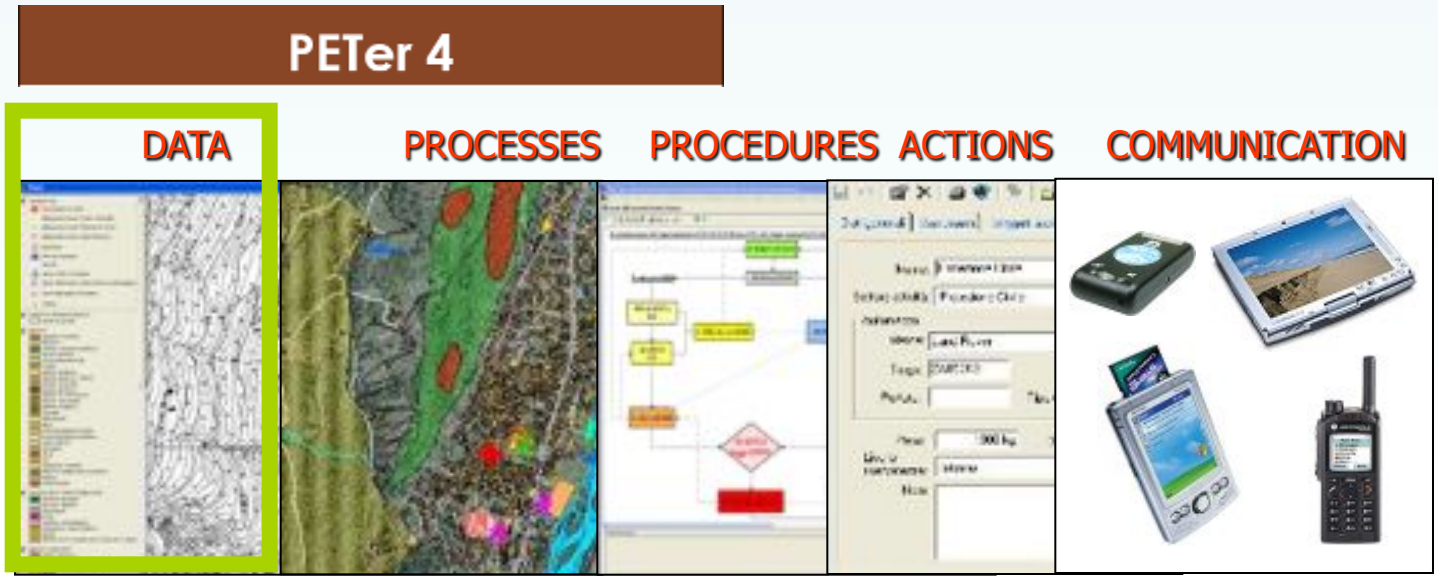


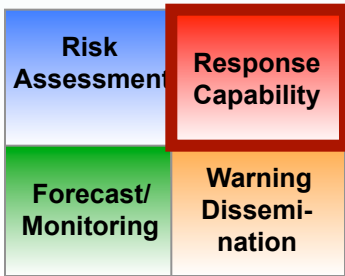
Methodology to implement Integrated Early Warning Systems

As scientist,
what can we do to improve current situation?

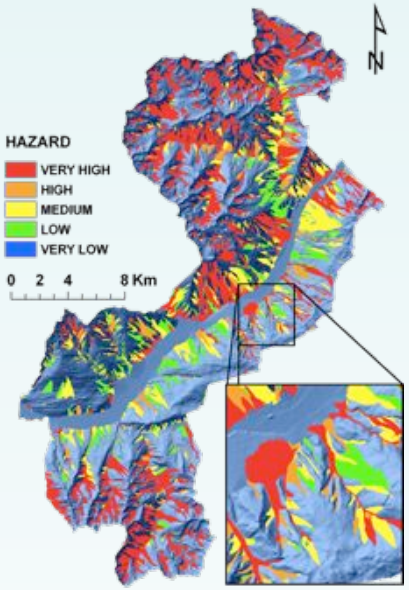
Updating the Emergency Response Tool

Team work with local authorities to update and communicate to population



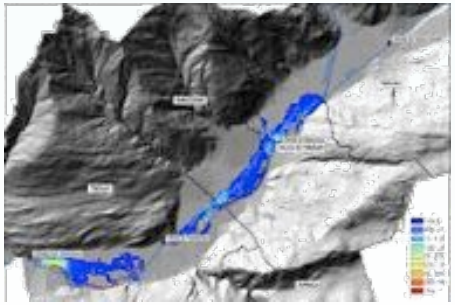


Produce high quality scientific products



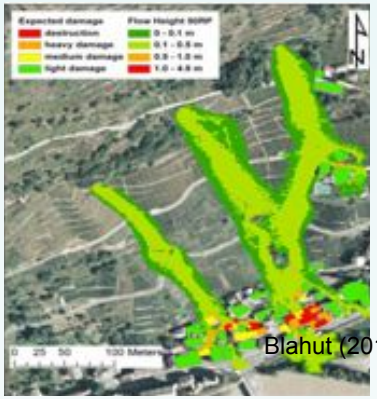
Blahut (2010)

Hazard



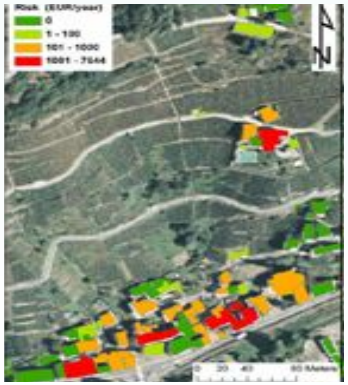
Poretti (2010)

Modelling



Blahut (2010)

Risk Estimation

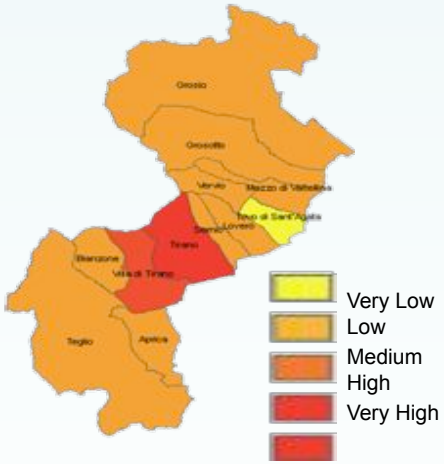


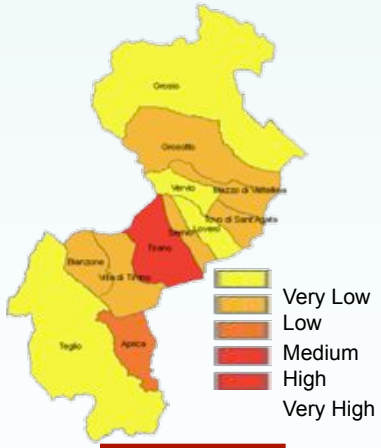
Blahut (2010)

Vulnerability

A. Quantitative Vulnerability **(Italian Census 2001)**

B. Qualitative Vulnerability - Reaction Capacity/Resilience **(Quantitative Survey)**



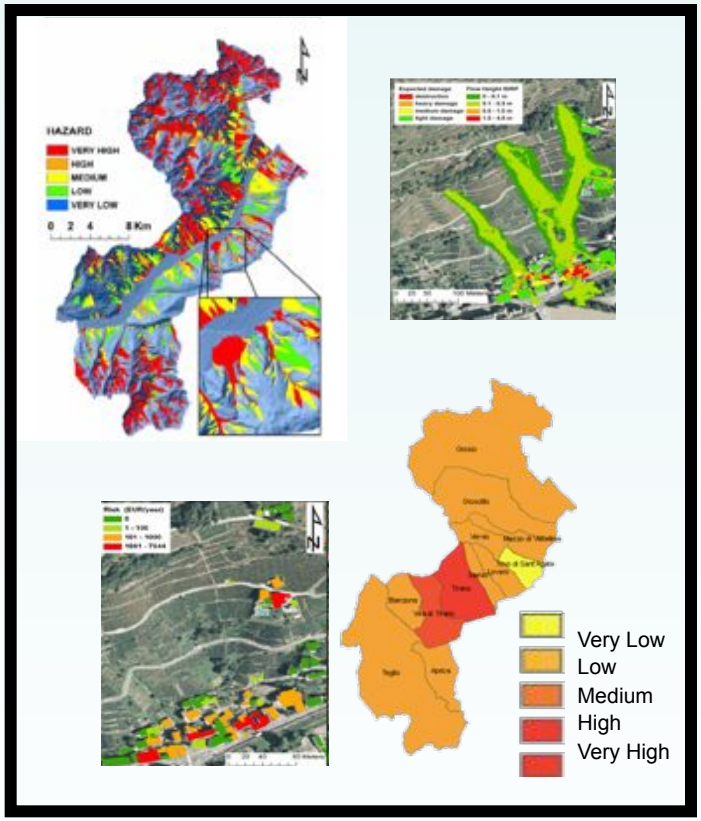


Risk Assessment | **Response Capability**

Forecast/ Monitoring | **Warning Dissemi-nation**

Translate them into simple language and share them

Putting research into practice



Local Authorities:

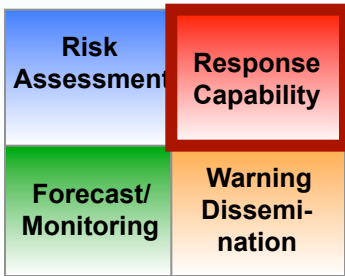
Comunità Montana Valtellina di Tirano

PROTEZIONE CIVILE NAZIONALE

Long term change

What can we do NOW to increase the effectiveness of EWS?

→ Involve the local community and other actors!!!



Know Them!

Interviews Local Level

Understand the root causes of vulnerability and risk perception

Preliminary results

Root causes

Loss of traditions: Socio Economical Reasons

abandoning of small vineyards →

environmental degradation

Channels neglected

→ mass movement

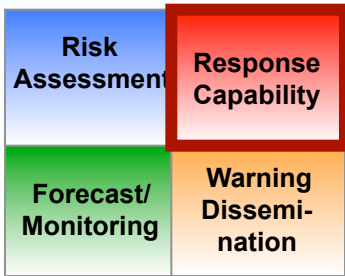
Know Them!

Comprehensive Survey Regional

Risk perception, preparedness, information needs, willingness to participate in education, etc.

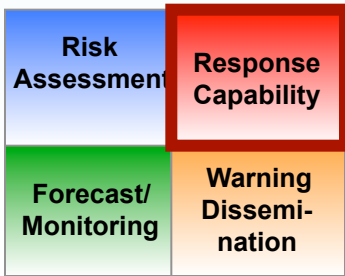
648 compiled

Population with **Previous Experience**		**88.3%**
Risk Perception Level		2.2 / 5 **LOW**
Preparedness Level	Authorities	3 / 5 **Moderate**
	Local Population	2,5 / 5 **LOW**



How to increase the response capability?

Improving preparedness and resilience with education



Are they willing to be involved?

Population **willing to receive** future Information	**67,30%**

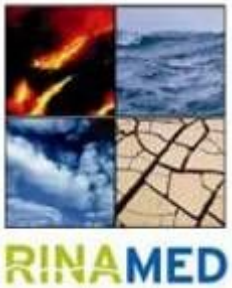
Community's perceived information needs

Evacuation plan and emergency procedures	3.89/5
Who you should **contact in case of an emergency**	3.76/5
What you can do to be less vulnerable	3.69/5
Possible consequences of a future event	3.37/5

Increase response capability

Support and collaborate with current initiatives

Not to repeat,… but to share & link



Educational activities

Collaborative educational activities

IREALP – local partner initiatives

Activities at school

	Classes	No. students
Primary School	16	**253**
Secondary School	19	**368**
TOTAL		**620**

Educational activities

New initiatives

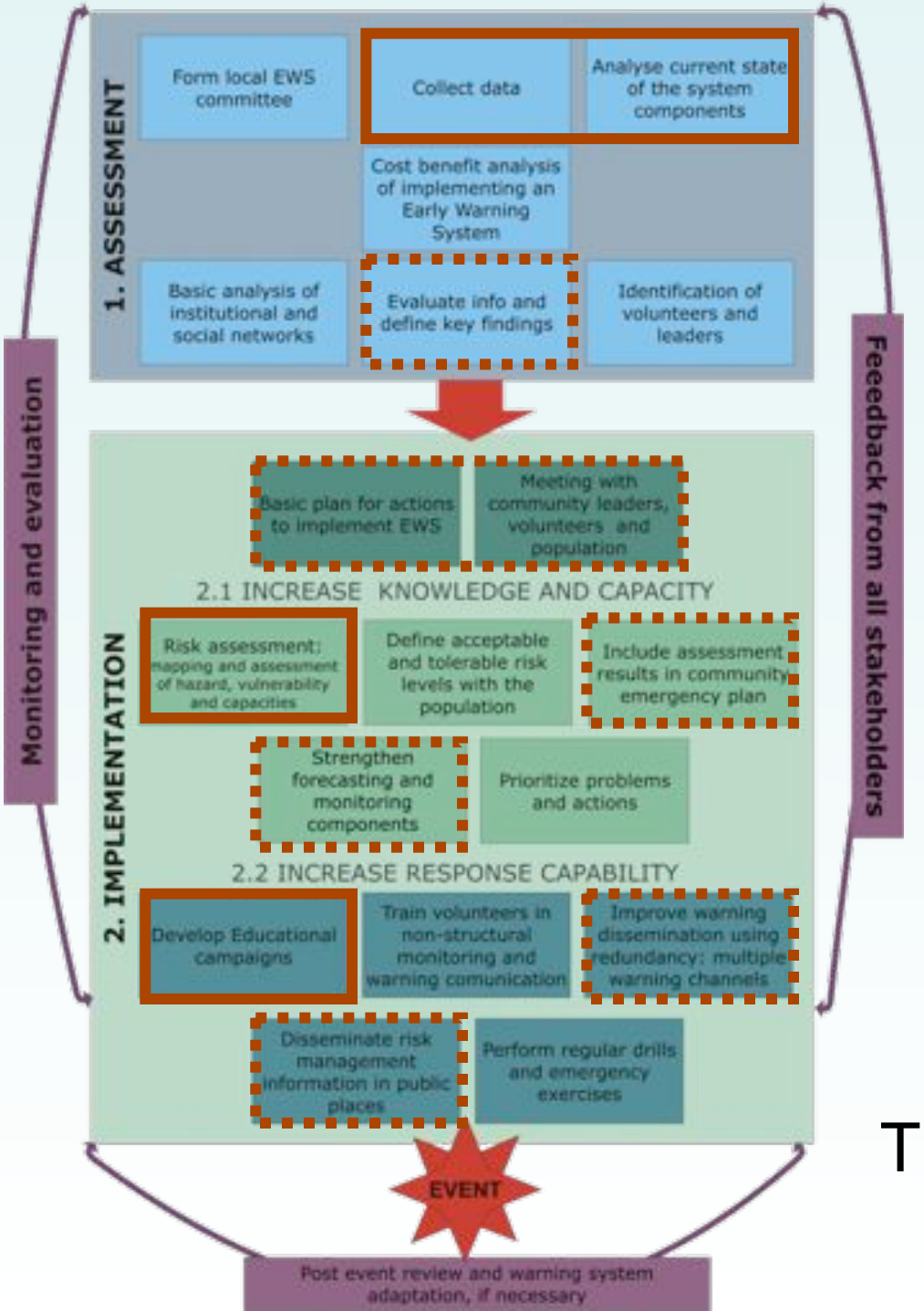
Universal language - visually friendly

Design of Risk Communication Campaign

A. Integral web site
- Scientific results,
- Emergency plan

B. School activities

Small scale but meaningful efforts!



Methodology to implement Integrated Early Warning Systems

Scientist

?... Other actors

- Scientist: Partial Implementation
- Participation of practitioners: essential for completing cycle
- Participation of local stakeholders essential for sustainability

This is just the beginning!

Conclusions

- EWS is extremely complex and dynamic:
  - **Developing an effective** EWS: not to create new standardised systems, but to **connect already existing initiatives** within a interdisciplinary, participatory and multi hazard approach.
  - An integrated EWS is not an individual task, but the result of combining efforts of all stakeholders. **Governments, scientists, practitioners and local communities** have to step up to the challenge of **working together** and link all efforts to achieve an effective disaster risk reduction.

THANK YOU FOR YOUR ATTENTION

Inputs, suggestions, feedbacks…

email: cargalon@gmail.com