Disaster Mitigation Competence Centre In General

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Outline

- Goal: e-Science for the Masses
- We are not new on Disaster Mitigation by e-Science
- Sustainability Model
- Excellence Strategy
  - Target on three common concerns of disasters: Earthquake & Tsunami; Extreme Weather; Climate Change
- Deliverables and Milestones

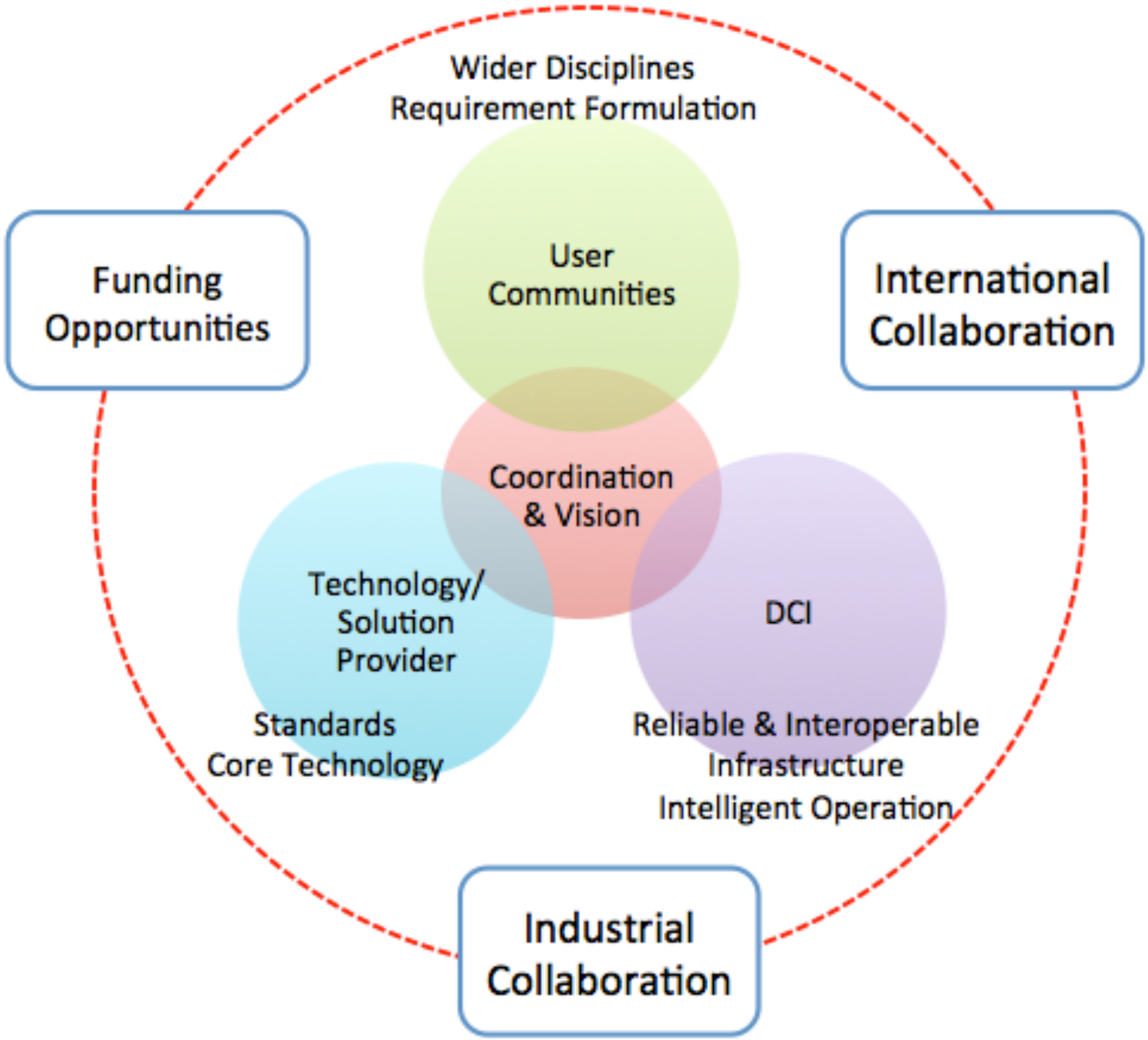
Goals: e-Science for the Masses

- Objectives: improving strategy of prevention and reduction of disasters
  - By better knowledge of the Earth's physical phenomena, we can mitigate the consequences of similar disasters in the future.
  - Advancement of prediction accuracy on target disasters
- Approaches
  - By estimating the natural hazards at a given site or by means of early warning systems, or forecasting the occurrence of the eventually generated disaster after the next strong events.
  - Buildup the close collaboration of domain experts, e-Science service providers and e-infrastructure resource centers.
  - Construct fast and accurate simulation by taking advantage of the domain knowledge and the e-Sciences
  - Conduct simulation of combined disasters scenarios to verify the effectiveness of our design on potential cases

We are NOT new to work on Disaster Mitigation Together

- Fighting for endemic disease (Avian Flu and Dengue Fever) by Drug Discovery System over the Grid from 2006.
- Building up regional seismic sensor network and faster seismic wave propagation simulation and early warning by e-Science from 2007.
- Publish the first version web portal of weather simulation for typhoon and extreme weather simulation in 2010.
- Open the first version of tsunami simulation web portal with 30 times performance improvements in 2011.
- Tsunami inversion, environmental changes and QCN earthquake sensor networking, etc. are all undergoing and integrated with EGI infrastructure.
- Regional collaborations over APGI keep going on from EGEE, EUAsiaGrid, and EGI-Inspire, and onward.

Sustainability Model



Excellence Strategy: Capacity Building and Shaping the Sustainable Society

	Earthquake & Tsunami	Extreme Weather	Asia Dust Transportation	UHI & Urbanization
What Happened	Rebuild the event processes together with observation data			
Why did it happen	Explained by refined models and verified by observation data thru simulations			
What will happen	Buildup predictive analysis capability or estimate the impact of potential hazard sources			
How can we reduce the impact	1. Moving towards early warning based on fast re-modeling, simulation and feedback cycle. 2. Domain knowledge from			

Deliverables

D-Day = March 1st, 2015	PM3	PM6	PM9	PM12	PM15	PM18	PM21	PM24	PM27	PM30
Earthquake & Tsunami	**PM12**: Provide tsunami wave propagation simulation web portal to the public									
	PM19: Finish two high risk tsunami subduction zones scenario analysis in Asia Pacific region									
Extreme Weather	**PM12**: Release gWRF weather simulation web portal									
Asia Dust Transportation	**PM24**: Apply WRF/chem tracer modelling study to demonstrate the biomass-burning transport mechanism and its impact on air quality.									
UHI & Urbanization	**PM24:** Release the prototype of WRF-Noah-UCM on UHI simulation of a city in a partner country									
	PM29: Finish the design larger scale multi-hazards simulation attempting to reduce the uncertainty of climate change assessment									

Milestones for Deliverables

D-Day = March 1st, 2015	PM3	PM6	PM9	PM12	PM15	PM18	PM21	PM24	PM27	PM30
Earthquake & Tsunami		M4, M10, M12, M18								
Extreme Weather		M3, M6, M9, M12								
Asia Dust Transportation						M13, M16, M20, M24				
UHI & Urbanization										

PM29: Finish the design larger scale multi-hazards simulation attempting to reduce the uncertainty of climate change assessment

1. Earthquake & Tsunami (I)

- Background
  - Knowledge of past tsunamis is critical in identifying potential tsunami sources, understanding the focal mechanism, and developing mitigation plans
  - Tsunami wave propagation simulation is essential to disaster warning and estimation
- Tasks
  - Potential tsunami scenarios identification: Manila Trench, Sunda Trench: PH, ID, VN, TW
  - Tsunami Wave Propagation Simulation Web Portal: ASGC
  - Historical Tsunami Records Collection and Inversion Simulation to identify potential tsunami sources: PH, ID, VN, TW
  - Immersive visualization: LMU
- Simulation Web Portal
  - iCOMCOT web portal Services: http://icomcot.twgrid.org
- Milestone

1. Earthquake & Tsunami (II)

- Excellence
  - Towards Real and Complex Disaster Scenario simulation
    - Earthquake tsunami
  - Spotting potential tsunami sources for better preparedness
    - Correlation analysis between initial surface and the earthquake rupture characteristics from historical tsunamis
- Milestone
  - M4:
    - Collect historical tsunami records: PH, VN, ID, TW
    - Find local earthquake/tsunami scientists to design the disaster scenario and try the iCOMCOT system: PH, VN, ID, TW
  - M10:
    - Finish at least one forward simulation by the designed scenario.
    - Finish at least one inversion simulation by the collected historical tsunami event.
    - Result evaluation: functionality, workflow, performance, accessibility, etc.
  - M12: iCOMCOT system revision based on the evaluation
  - M18: finish two high risk tsunami subduction zones scenario analysis

2. Extreme Weather (I)

- Background
  - Understanding and simulating mesoscale weather processes such as typhoon, dynamic interactions between typhoon circulation and monsoonal flow at different scales
  - Enhance the forecasting capability in precipitation events brought by similar events
- Tasks
  - Investigate historical extreme weather event: KR, PH, VN, TH, MY, ID, TW
  - WRF (Weather Research and Forecast) simulation web portal: TW
  - Immersive Visualization: LMU

2. Extreme Weather (II)

- Excellence
  - Improve the understanding of multi-scale nature of tropical cyclones for generating local heavy rainfall events
  - Fast and accurate simulation could enhance the early warning
- Milestone
  - M3: Collect data of at least one target extreme weather event by engaging local user communities
  - M6: Investigate the first simulations of the mesoscale processes: e.g., water vapor, moisture flux, etc.
  - M9: Result evaluation
  - M12: Refine the WRF web portal

3. UHI and Asian Dust Transportation (I)

- Background
  - Understanding the impacts of long-range dust transportation in Asia Pacific region
  - Understanding the impacts of urbanization to the local weather
- Tasks
  - Finish at least one case study of long-range dust transportation in Asia (either volcanic ashes dispersion or biomass burning): PH, MY, TH, ID, TW
  - Finish at least one case study of urban heat island among partners: KR, PH, MY, TH, ID, TW
  - Buildup the modeling and simulation capability of UHI and dust transportation
  - Immersive Visualization: LMU

3. UHI and Asian Dust Transportation (II)

- Excellence
  - Provide seasonal variations analysis of CO, O_3 and PM_{10}, including the concentration, transportation path and climate impacts, etc.
  - Buildup impact analysis capability of the Urban Heat Island effect on precipitation over a complex geographic environment
- Milestone
  - M13: confirm the target case and review the data collected (at least one event for ADT and UHI respectively)
  - M16: first simulation investigation
  - M20: case analysis and refined simulation
  - M24: finish the workflow, data analysis, simulation and the web portal