eFFORT

Earthquake and Failure Forecasting in Real Time from controlled laboratory test to volcanoes and earthquakes

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University of Edinburgh.
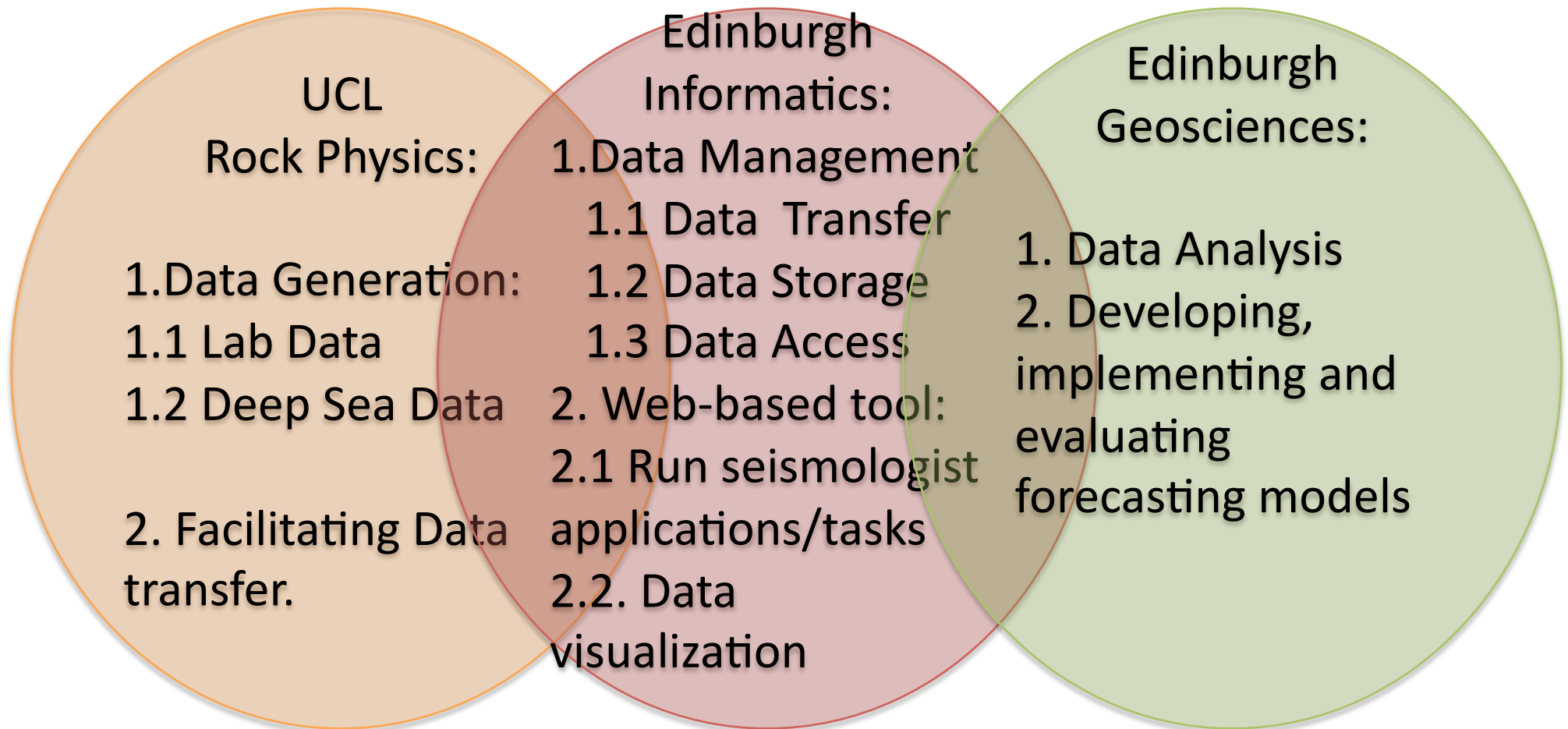Data Intensive Research.

eFFORT Introduction

- The seismologists have suggested that the brittle failure of rock samples in the laboratory is analogous to brittle failure associated with volcanic eruptions, earthquakes …

- Signals observed in the laboratory, could be used to forecast the timing of hazard events.
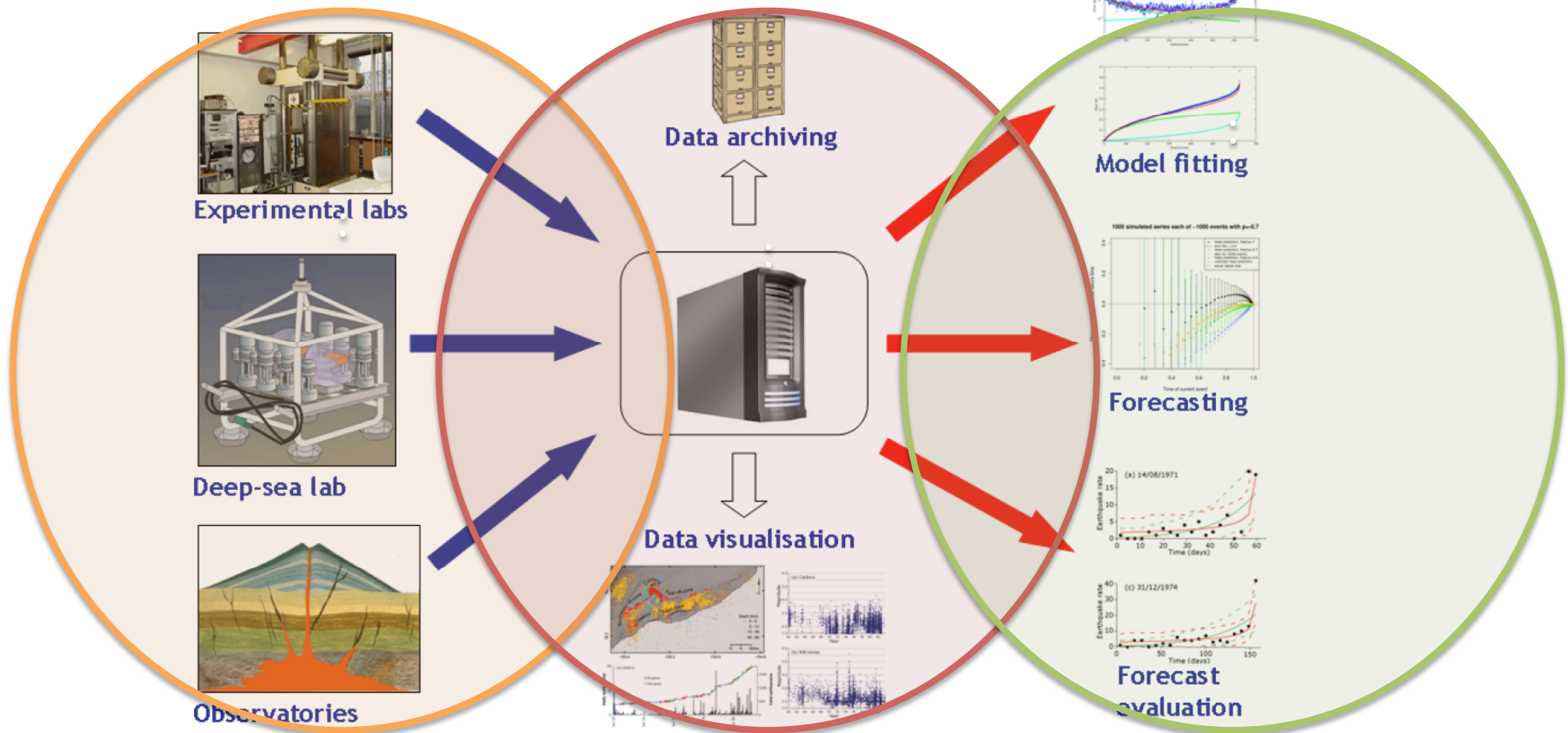
The failure forecasting project eFFORT goals:

- Determine the **predictability** of brittle failure of rock samples in the **laboratory experiments.**

- Determine how this **predictability** scales to the greater complexity, physical size, and slower strain-rates of **natural-world** phenomena.

- The project will **develop methodologies based on archive data and then apply them in "near real-time"** to a variety of synthetic, experimental and natural data.

eFFORT roles and tasks

**UCL
Rock Physics:**

1. Data Generation:
1.1 Lab Data
1.2 Deep Sea Data

2. Facilitating Data transfer.

Edinburgh Informatics:
1. Data Management
1.1 Data Transfer
1.2 Data Storage
1.3 Data Access
2. Web-based tool:
2.1 Run seismologist applications/tasks
2.2. Data visualization

Edinburgh Geosciences:

1. Data Analysis
2. Developing, implementing and evaluating forecasting models

eFFORT roles and tasks

Hazard forecasting in real-time

Experimental labs

Deep-sea lab

Observatories

Data archiving

Data visualisation

Model fitting

Forecasting

Forecast evaluation

DIR tasks for eFFORT

1. Provide an efficient implementation of data management (inter and intra site).

2. Provide a portal interface for EFFORT by using RAPID to allow data access, analysis and visualization.

DIR summary for eFFORT

- Initial Data Management tasks:
  - Linux virtual server machine:
    - Host web portal and database
    - Configuration of FTP connection
  - Several scripts to receive data from UCL and write them in a data base.
  - Scripts to read files in TDMS format:
    - Technical data Management solution (proprietary format).
- Prototype of Rapid portlet :
  - Run several python scripts provided by Geosciences.
  - Visualize the results in the web portal.

DIR "to do list" for Effort (I)

- Provide an efficient implementation of data management:
  - Chose and set up a mechanism on the server machine to receive data from Catania.
  - Adapt the send/receive scripts to transfer data in nearly real time.
  - Store each experiment's data on Edinburgh service
  - Run a daily script to check the data received
  - Record all the information related to every experiment.
  - Run statistics daily to determine how many data and files were received in the server machine

DIR "to do list" for Effort (II)

- Adapt the RAPID portlet to allow seismologists run different tasks/applications:
  - Copy the files from the server into the host.
  - Execute and monitor the task/application as it is executing.
  - Copy the results from the host to the server.
  - Visualise the result of the computation in the portal.

DIR challenges

- Storage data from different sources **nearly in real time**: Lab and Catania.

- The experiments could run during months or years:
  - Two types of data for every experiments
    - Time Driven Data: Data are captured in a specified interval (10 seconds -10 minutes). This data should be transferred as soon as they are available in the source machine.
    - Acoustic Emission Data (AE): Could happen at any time and very small intervals (micro seconds).
  - Data are write TDMs format: Need to transform to text format before to storage in the database.

- Data Movement.