Disaster Resilient Cities:
Forecasting Local Level Climate Extremes and Physical Hazards for Kuala Lumpur

General Guidance on the Communication of Geohazard Information to Land Use Planners and other User Groups

Jane Poole, Dr. Alan Thompson, and Dr. Brian Marker

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General Guidance for Geoscientists on the Communication of Geohazard Information to Different User Groups.

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Geohazards

Natural Geohazards: Physical (geological) processes which have the potential to cause harm to **people** and/or to the **things that people rely on**.

Interdisciplinary, Collaboration Dialogue, Interaction

'….not just building essential geological and environmental expertise, but also giving students a broader bandwidth that includes elements relating to economics, engineering, social science, science communication and media relations' Geoscientist

Perception

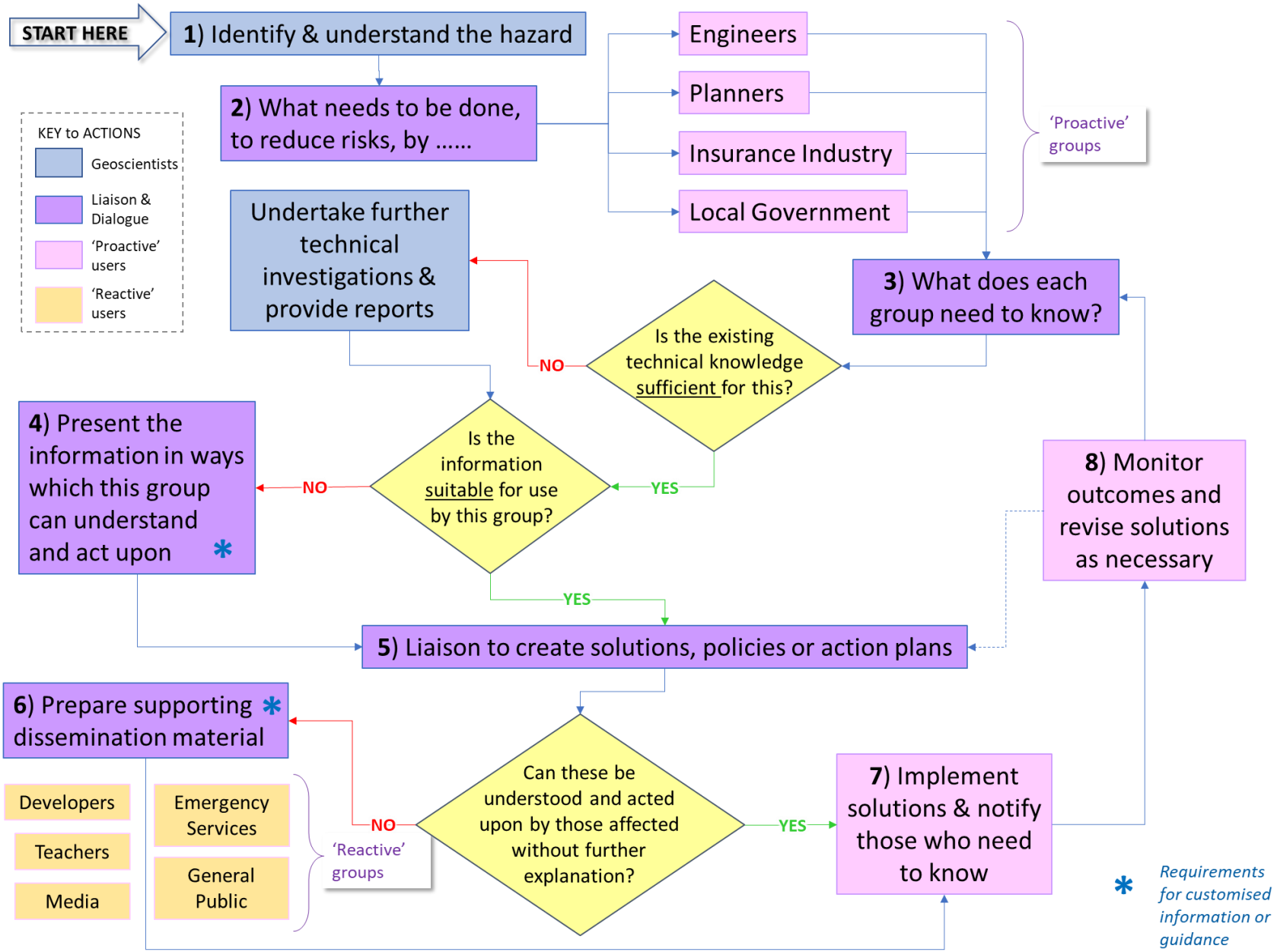
Key principles of communicating geohazard and risk information:

1. Understand the hazard(s) and be able to explain these, and the levels of uncertainty involved, in 'plain language'.
2. Identify the various different 'target audiences' who need information or guidance.
3. Engage in dialogue with each of these groups to understand their requirements for information.
4. Deliver the required information and guidance.

Sequential Stages:

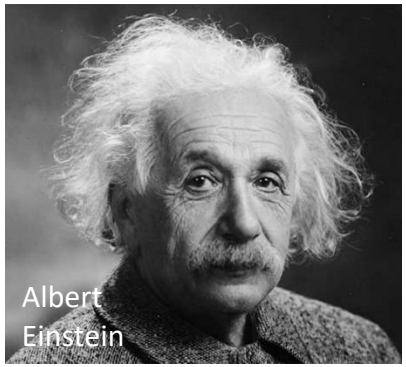
1. Identify the hazards and be able to explain them
2. What needs to be done, by whom?
3. What information is needed by each group?
4. Present information in ways that can be understood and acted upon
5. Liaison to create solutions / policies or action plans
6. Prepare dissemination material
7. Implement and notify
8. Monitor and improve

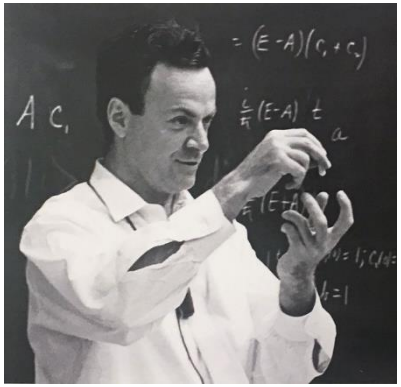
Generic Flowchart for Communication in Geo-hazard Risk Reduction



Stage 1) Identifying and Understanding the Hazard and Associated Risks

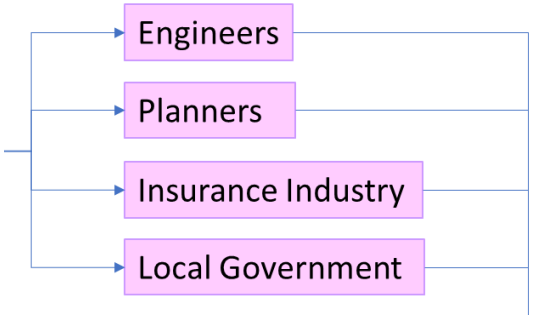
- **Fundamental requirement and starting point**.
- Includes the normal responsibilities for technical investigation and analysis that will be familiar to all geoscientists,
- **But**, it also includes being able to explain the hazard – and any uncertainties relating to it – in ***plain language***.
- *"If you can't explain it simply, you don't understand it well enough".*
- Use the '**Feynman Technique**'
  - Explain your knowledge to an intelligent child
  - Use this to identify gaps in your knowledge
  - Reassemble the information and then ***tell it as a story.***



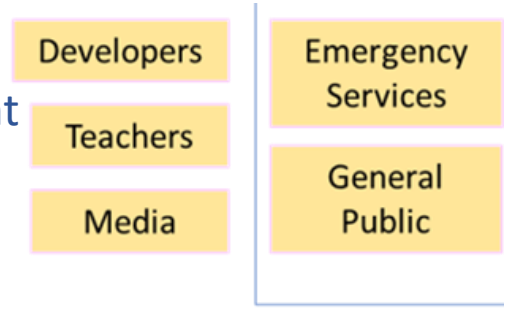


RICHARD FEYNMAN 1918-1988

Stage 2) Identifying the Target Audiences



- What needs to be done, and by whom?
- Geoscientists may know what needs to be done.
  - e.g. whether the hazard itself can be reduced in some way;
  - whether it can be avoided, by discouraging development in hazard-prone areas; or
  - whether it is likely to require emergency evacuations from existing development in response to warnings.



- **But they will need to liaise with other professionals** (those with the responsibility for carrying out these actions) in order to discuss the feasibility, or otherwise, of different approaches, and so that they can tailor their inputs and advice accordingly.
- it is useful to consider the potential range of different audiences in two main categories: those who need to be ***proactive*** in risk reduction; and those who would need to be ***reactive*** to any warnings that are given.

Stage 2) Understanding the Requirements for Information

- Engineers
- Planners
- Insurance Industry
- Local Government
- Emergency Services
- Developers
- Media
- General Public
- Teachers

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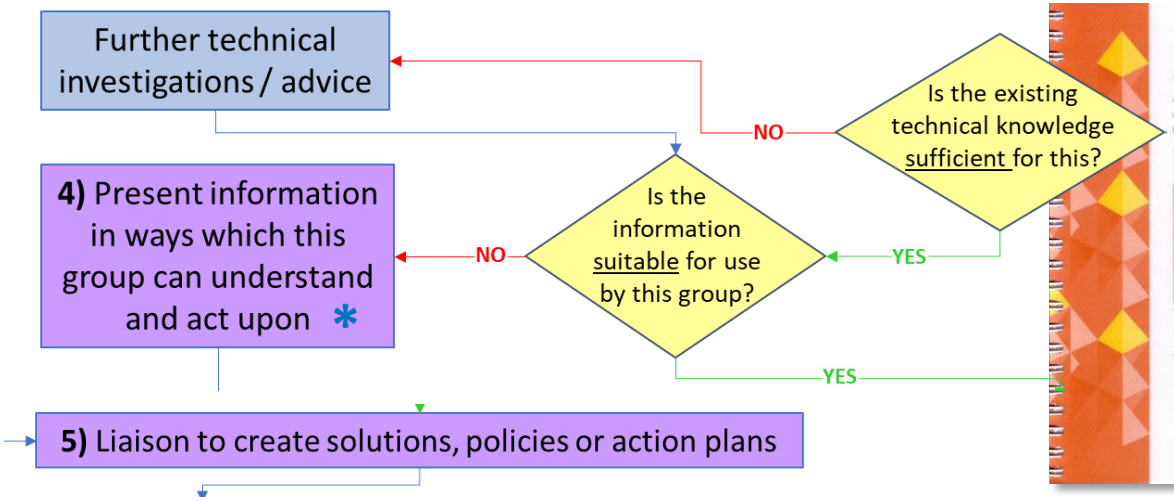
- Detailed Technical Information
- Advice on extent, nature magnitude, significance, likelihood
- Summary of Key Information
- Advice on Planning Approaches
- Guidance on types of Communication and Action Required
- Explanation on what to do in response to warnings

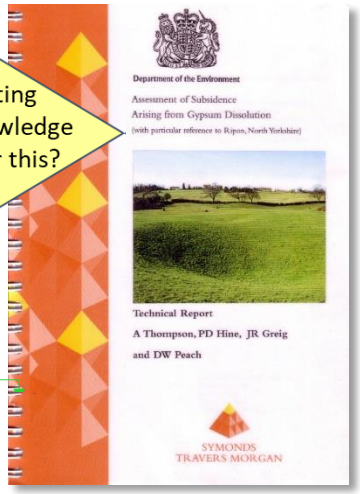
Stage 3) Understanding the Requirements for Information

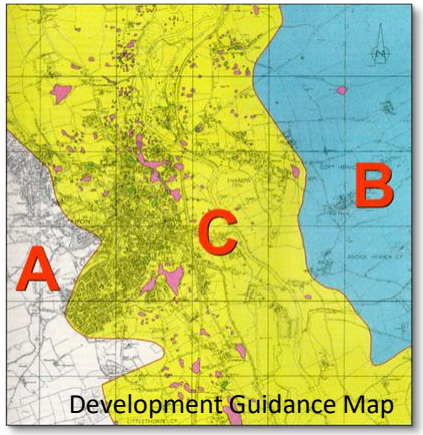
Types of Information / Guidance	"Proactive" User Groups				"Reactive" user groups			
	Engineers	Planners	Local Government	Insurers	Emergency Services	Developers	General Public	Media
Detailed technical information (including historical + monitoring data) on the nature, timing, causes, behaviour and spatial distribution of specific hazards *	✓			✓				
Simplified but clear and comprehensive advice on the nature, significance, magnitude, probability and spatial extent of the hazards **		✓	✓	✓				
Simplified summaries of key information on hazards, solutions and actions required**							✓	✓
Detailed technical input / comments on appropriate engineering solutions**	✓							
Clear, reasoned advice on appropriate planning approaches, including both forward planning policies and development control procedures**		✓						
Clear understanding of the need for rapid communication and the types of action required by emergency workers in response to warnings**								
Customised advice to provide an understanding of their full range of responsibilities**			✓		✓	✓		✓
Straightforward explanations on what to do in response to warnings**			✓				✓	
General guidance on responsible communication of hazard and risk information**	✓	✓	✓	✓	✓	✓	✓	✓

- Geoscientists need to liaise and **engage in dialogue** with each of the identified groups in order to understand their requirements for information.

Stage 4) Present Information in Ways Which this Group can Understand and Act Upon
Stage 5) Liaising to create Solutions, Policies or Action Plans

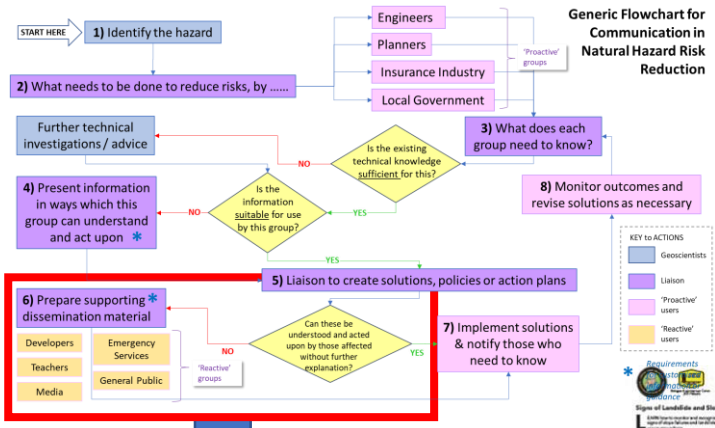






- Once appropriate information is in place, geoscientists can liaise with the various proactive users to develop one or more effective solutions.
- e.g. engineering designs and plans (produced in collaboration with engineers) to guard against the effects of known hazards; or
- policies for the spatial location and control of new development (produced in liaison with local planning authorities); or
- action plans (e.g. for emergency warnings and other responses) produced in collaboration with local authorities and the emergency services.

Stage 6) Preparing Supporting Dissemination Material

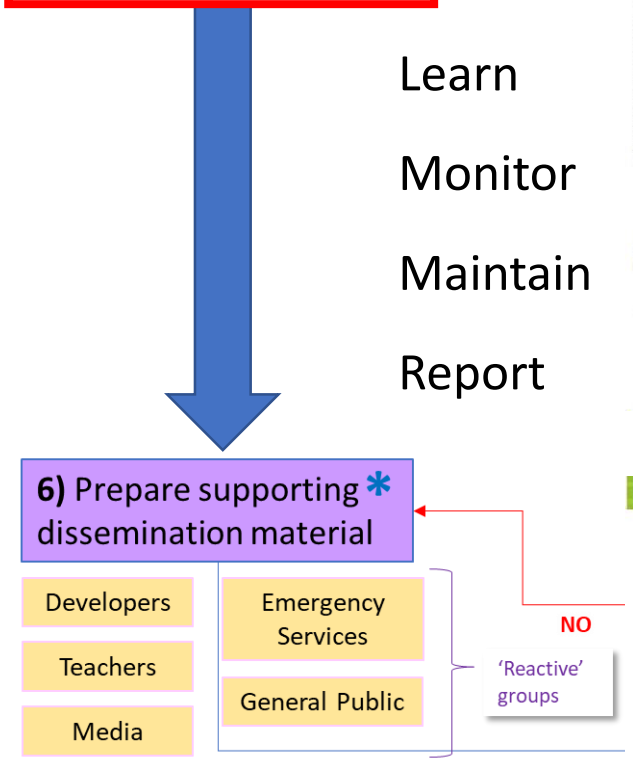


Learn

Monitor

Maintain

Report

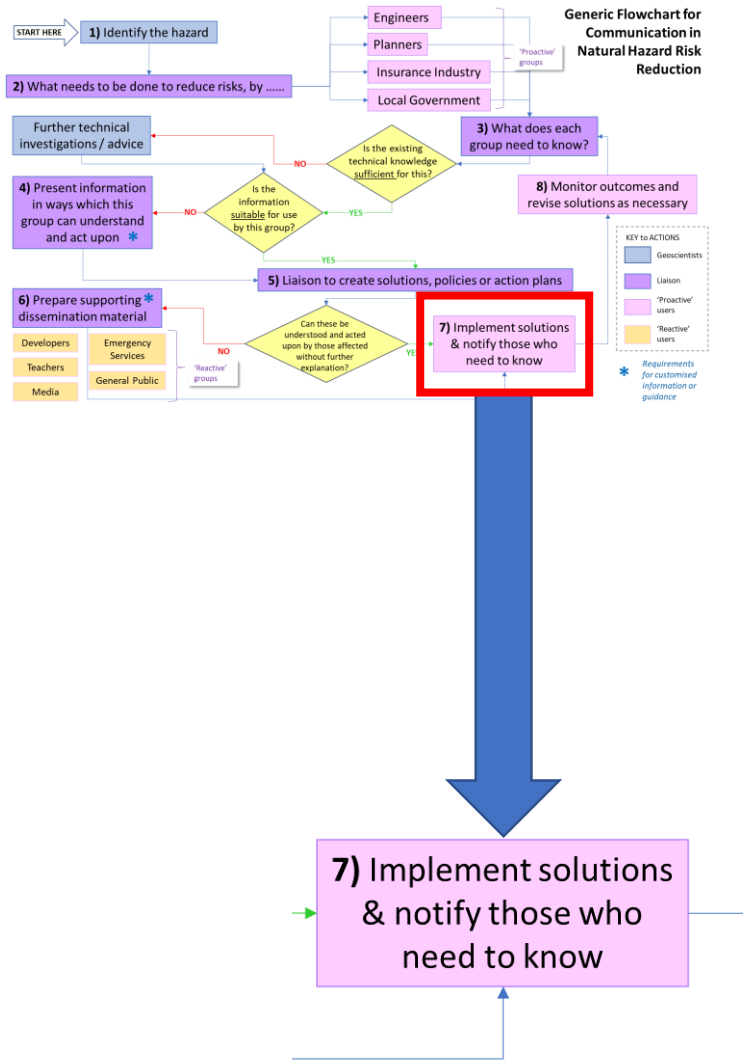


- Where Stage 6 is required, as it often will be, geoscientists will again have an important role to play in helping to produce reliable but suitably targeted material.

ongoing dialogue:

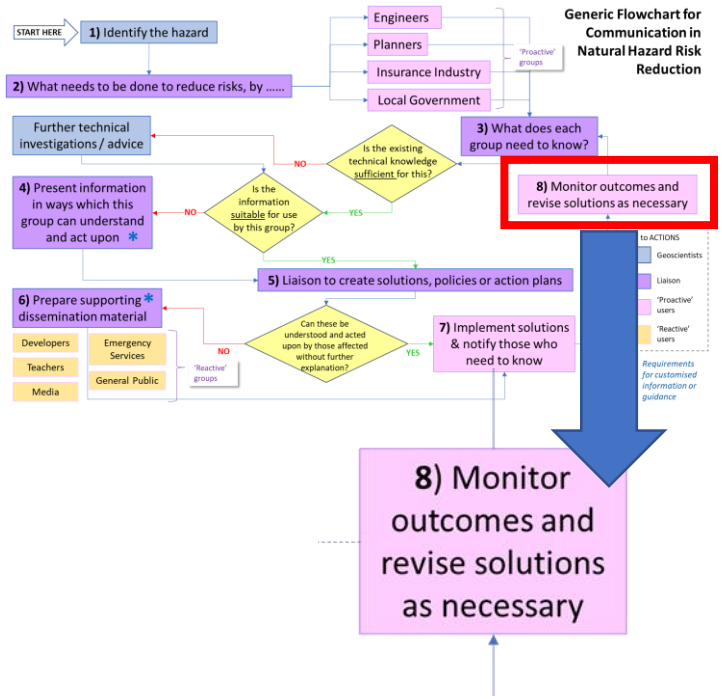
- community engagement
- landslide processes

Stage 7) Implement Solutions & Notify Those who Need to Know



- Building the engineering structures,
- Publishing and adopting planning policies, and
- Publishing action plans.
- By this stage of the process, geoscientists will probably have limited direct involvement, though they may periodically be asked by the media to comment on the background to particular procedures or in response to future hazard events.

Stage 8) Monitor Outcomes and Revise Solutions as Necessary

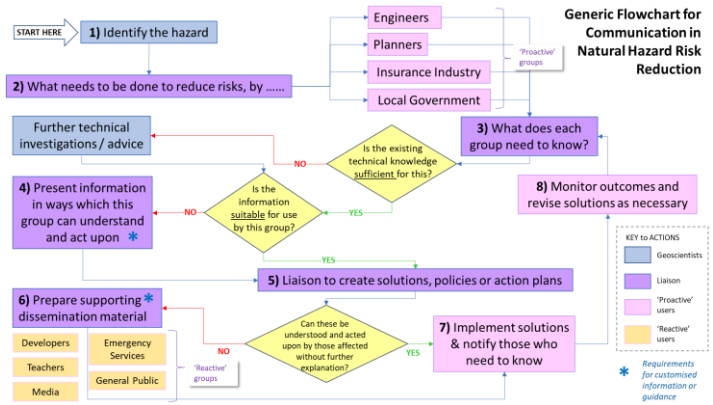


- To ensure that the approaches, policies and procedures for dealing with geohazards are working correctly, and in order for them to remain relevant and appropriate in a rapidly changing world, there is a need for:

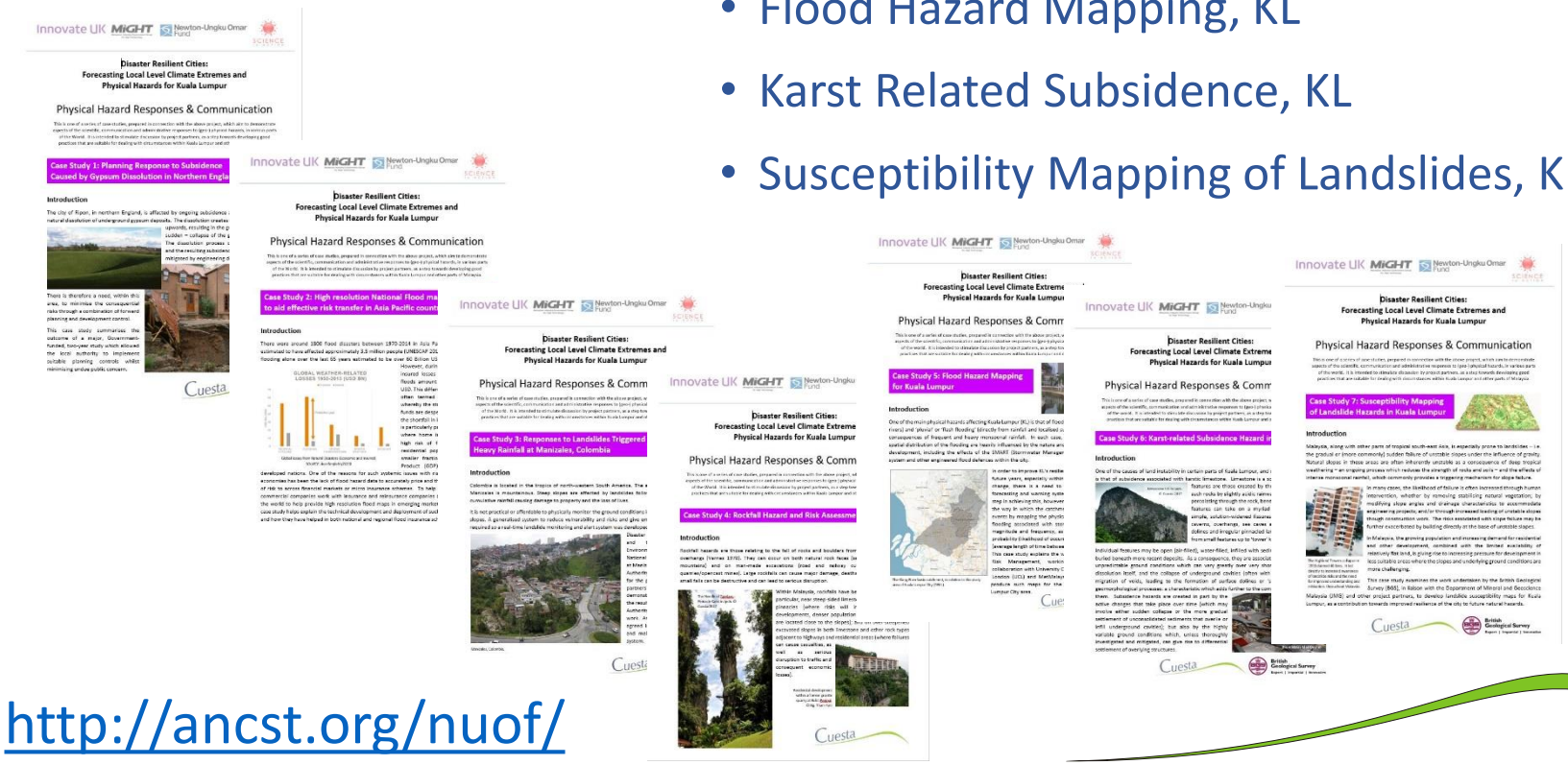
- ➢Ongoing monitoring;
- ➢Feedback;
- ➢Continuous improvement.

- ***Natural Resources Wales***: Flood Risk, Technical Advice Note.
- Relatively simple approach: geomorphology, geology, historical data: flood levels, aerial photos, LiDAR, 2D modelling - to identify **zones most at risk of flooding**.
- Individual Flood Risk Assessments must be completed prior to development within areas most at risk of flooding – those identified on the flood risk map. **Those individual more detailed models and assessments feed back to refine and improve the data**.

Case Studies: Landslides and Rock Fall, Subsidence, Flood Risk



- Subsidence due to Gypsum Dissolution, UK
- High Resolution National Flood Maps, Asia
- Responses to Landslides Triggered by Heavy Rainfall, Colombia
- Rockfall Hazard and Risk Assessment
- Flood Hazard Mapping, KL
- Karst Related Subsidence, KL
- Susceptibility Mapping of Landslides, KL



http://ancst.org/nuof/