Disaster risk reduction: What ICTs can contribute

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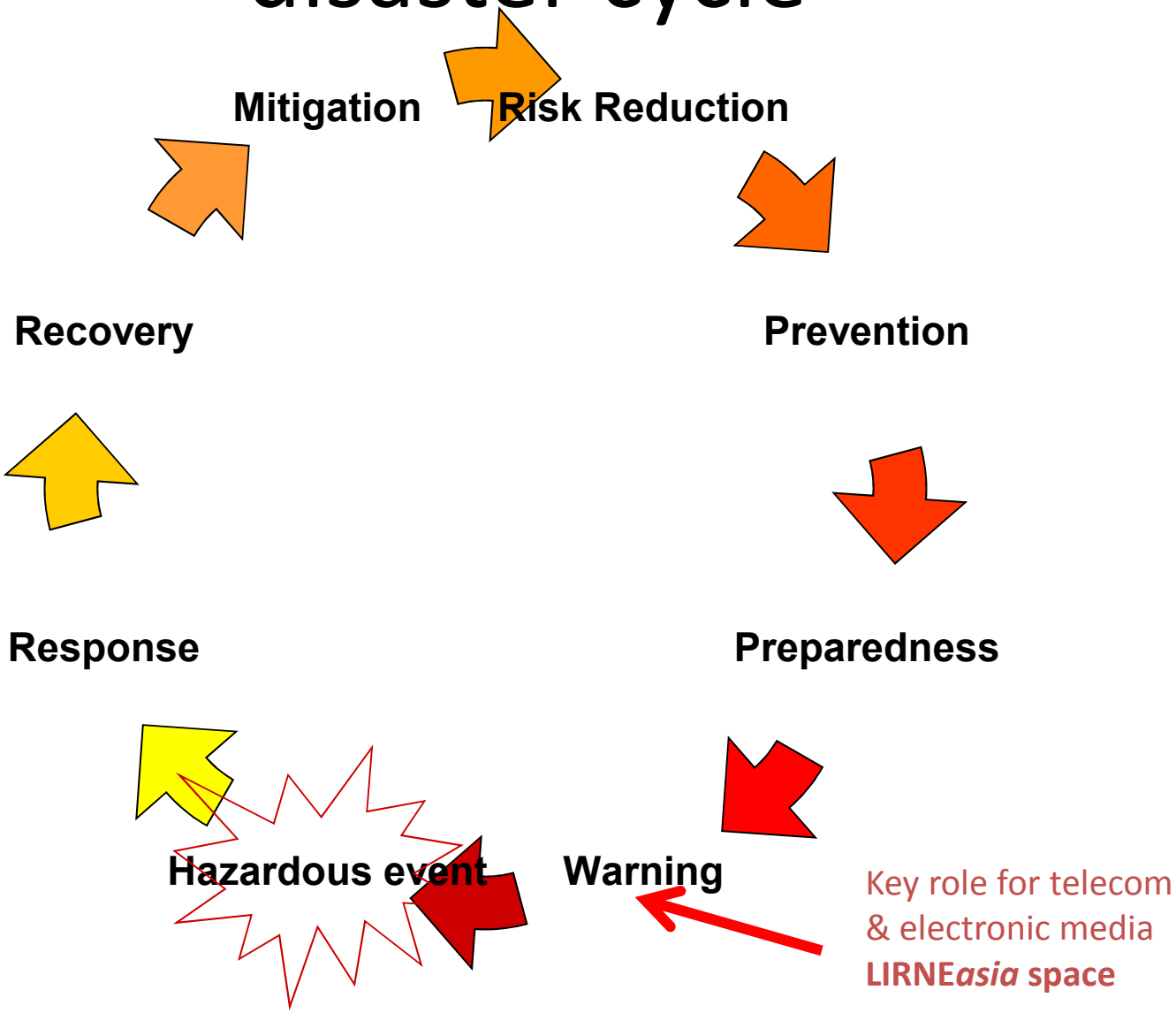
Highest contribution of ICTs in disaster cycle



Early warning is core business of government

- Early warning is a classic public good ➔ **Government must supply**
- Early warning is based on incomplete, probabilistic information and judgment ➔ **Government must take the responsibility of issuing warning/alert**
  - 75% of tsunami warnings in the Pacific are false; false warnings can be dangerous
  - Government gets hazard information from external or internal sources
  - Regional warning cannot be simply transmitted
    - Judgment must be applied before national warnings/alerts are issued for specific areas

What types of hazards?

	Warning time less than 60 mts	Warning time more than 60 mts but less than 4 days	Warning time more than 4 days
Large geographical scope	E.g., earthquake	E.g., cyclone/storm, tsunami, breach of an upriver dam in a large cascaded system	E.g., drought
Local geographical scope	E.g., local tsunami, landslide triggered by floods, single small dam failure	E.g., volcanic eruption, certain forms of floods	E.g., some forms of landslides

Risks for Bhutan

- Major economic impact from floods
- Earthquakes also a factor

ICTs may be most useful for reducing risk to lives from . . .

- Glacial Lake Outburst Floods (GLOFs)
- Dam breaks in cascaded river systems
  - If source of hazard is upstream enough from habitations to satisfy the time requirement
  - If detection and monitoring systems can be put in place
- Can discuss others . . . .

First-responder communication

- Use non-interconnected communication channels, such as those internal to Power Company
  - Need to keep separate from public networks to avoid congestion
  - Sources of dam/GLOF hazards are likely to be in remote locations without adequate mobile coverage
- How to reach first responders
  - If there is coverage, one-touch SMS “broadcast” functionalities can be used.
    - Advantage: mobiles are almost always on the person
  - If not, TETRA may be an option

Public warning

- How to reach the general public so they can move away from danger
  - Can save lives, not livelihoods and property
- Lessons from work done for the Maldives by LIRNEasia in 2008-09
  - Maldives has higher mobile penetration and very different topography, but lessons may still be drawn

Public warning in the Maldives

- An island nation composed of groups of 26 atolls of about 1,192 islets of which 250 islands are inhabited
  - A public warning system must be able to reach **a highly dispersed** population in all of the inhabited islands
  - All inhabited islands covered by mobile; more than 100 active SIMs per 100 people
- At peak, tourists amount to 1/5th of the population

Public warning in the Maldives

- Radio/TV can be sent warning through TETRAnet or otherwise, but for warning to be received, sets have to be turned on and the links to transmitters not fail
- Satellite radio was once an option (scored high in HazInfo field trials in Sri Lanka in 2006-07), but WorldSpace went bankrupt
- Tourists unlikely to be tuned to local TV/radio channels, or even have the sets turned on
  - All tourists resorts have mobile coverage and at least some tourists are likely to keep their handsets on

The answer is mobile

But what form? Cell broadcasting or SMS?

Cell broadcasting (CB) is . . .

- The technological ability to send a single text or binary message to multiple mobile phones within a cell
- Originally designed to let network operators offer location-based services
- It is a standard feature on GSM networks as well as on IS95 CDMA networks
- Essentially, it is a timely and efficient means of pushing out a message to an entire cell area without the lag times associated with SMS, which are queued
- It is a one-to-many mode of communication, unlike SMS, which is in essence a one-to-one mode

Short Message Service (SMS)	Cell Broadcast (CB)
Messages sent point-to-point (messages directed to handsets)	Messages sent point-to-area (messages directed to radio cells)
Requires input of recipient phone numbers	Does not require input or knowledge of numbers
Only pre-registered numbers notified	All numbers within a cell notified
Effective within normal mobile coverage area	Because the return signal from the handset is not required, effective over a much larger area especially over water.
Messages cannot be differentiated by location of recipients	Messages can be differentiated by cells or sets of cells
Subject to congestion and thereby, delay	Being broadcasts, not subject to congestion
140-160 characters in length. Can concatenate up to five messages	93 characters. Can concatenate up to 15 'pages' to produce a single message of up to 1200 bytes of data
No indication that message is generated by a legitimate authority	Not possible for outsider to generate a cell broadcast so greater authenticity

What if a dedicated network (e.g., TETRA) is combined with sirens?

- Will it directly connect the sirens or will first responders have to activate the sirens?
  - Questions of reliability in both scenarios
    - 12 September 2007 in Sri Lanka
- Sirens give warning but they do not tell people what to do, CAP enabled CB can tell what precisely to do in multiple languages
- HazInfo showed that people like sirens
  - Best to have as supplement to CB

CB when there is no imminent disaster . . . [For Maldives; different for Bhutan]

- Cell information
  - Switched on in many countries, but not in Maldives when study was conducted
- Advertising
  - Advertisers can have own channel (60,000+ logical channels available)
  - Subscription options must be available
- Mobile banking
- Event management
- Service and airport information

CB in other countries

- May 2005, South Korea became first country to use CB for public warning
- Mobile Democracy Platform in Turkey allows local governments to broadcast information on a variety of civic issues
  - Citizens must activate 888 channel
- October 2005, the Netherlands became first country in Europe to *require* all operators to transmit government text warnings via cell broadcasts
- Since November 2007, NTT Docomo in Japan has offered Alert Mail, a CB service that provides warnings for earthquakes and tsunamis

CB elsewhere . . .

- USA is developing a Commercial Mobile Alert Service (CMAS) in ATIS (GSM and UMTS standardization) and TIA (CDMA standardization)
- January 30, 2009, Sri Lanka's Dialog Telekom together with the Disaster Management Centre (DMC) of Sri Lanka launched Sri Lanka's first ever mass alert warning system; the 'Disaster and Emergency Warning Network' (DEWN)
  - Emergency cell broadcasts were initially on the default Channel 50, but gradually dedicated emergency cell broadcast channels are being introduced so that trilingual messages (Sinhala, Tamil and English) can be sent

Recommendations

- Adopt CB for public warning in Bhutan
  - Networks must switch it on
- Participate in ITU-T Study Group 2 discussions to advance standardization of CB channels
- Allow use of cell broadcasting for advertising, event information, tourist information, etc.
- Explore the compatibilities of m-banking with the cell broadcast technology

A schedule will be useful

- First do a demo without buying the CB broker
  - There were glitches in the Netherlands
- Then government can mandate both operators to implement
- Need to establish "Trust Protocol Board" to discuss and establish procedures
- Coordinate with Sri Lanka and Maldives

Technology is only a part of the answer

- Need to work on protocols for communicating authoritative warnings and alerts from government authorities to telecom operators
  - Standard formats
  - Periodic drills
- Essential to get communities to think through disaster response plans
  - Training and certification
  - Periodic refreshing of knowledge through drills or table-top exercises
  - Funding must be worked out