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Scenario Planning for Supporting of Disaster Risk Reduction Innovation Policy

H. C. Lin[1], Y. Wu[1], P. L. Huang[1] L. H. Lo[1], Y. J. Chen[1], C. T. Lee[1] and M.C. Teng[2]

1.Science & Technology Policy Research and Information Center(STPI), Narlabs, Taiwan
2.National Science and Technology Center for Disaster Reduction (NCDR), NARLabs, Taiwan

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Introduction -Foresight Project Background and Objectives

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- Starting from the end of year 2012, a cooperation project between two centers under NARLabs, Taiwan, Science & Technology Policy Research and Information Center(STPI) and National Science and Technology Center for Disaster Reduction (NCDR).
- The objectives includes:

  1.Evaluation of the effectiveness of foresight methodologies (mainly Scenario Planning) in applying for supporting of disaster risk reduction (DRR) innovation policy, preparing for long term DRR policy and S&T planning;

  2.Buidling the foresight capacity of DRR communities;

  3.Reviewing the appropriateness of cooperation framework among government ministries in DRR S&T in long term through scenario planning.

Summary of Conclusions

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- Scenario planning provides a way for system thinking of driving forces and their interactions (or cause/effect relationships) and thus helping for construction of the knowledge structure of future environment and their strategic implication for DRR management and innovations.
- Also, scenario planning helps in discovering and widening the thinking of future needs in DRR and possible application contexts of future DRR innovation.
- Especially, by using a trend-impact-consequences steps, it is easily for guiding the participants to construct a scenario in more logical way, by which also helps to identify more comprehensive portfolio of options or action from the cause/effect relationships.
- However, due to the subjective nature of the scenario planning process, experts from different background and with different experiences may have different view for the knowledge structure of future environment, thus the results should be conducted with a solid basis of research, literature review and discussion to ensure that the driving forces considered are supported by enough evidences to ensure the scenario credibility.
- The process for discussion and building of scenario is complex and time consuming, and the quality will rely on a good process design, especially supported evidences and stakeholder dialogues will help to deliver a convincing result.

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What is Foresight

- The initial definition used in the first United Kingdom Technology Foresight Program in 1984 was:

A systematic means of assessing those scientific and technological developments which, in the longer term, could have a strong impact on economic and social development.

- The key elements in this definition are: first that the process should be **systematic** (going beyond the unstructured musings of a panel); second that **science and technology** should be a central focus; third that the timeframe should be **longer term**.

Source: Luke Georghiou, Policy Research in Engineering, Science and Technology (PREST), University of Manchester

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What is Foresight

- We create our future by what we do or don't do today; it makes sense to try and understand as best we can what that future might be like before we act.
- ***Foresight is not prediction!*** It is about getting an idea about what *plausible* futures might look like.
- We are good at learning from the *past*; we need to learn from the *future* as well – we need to develop a 'history of the future' as we do a 'history of the past'.

Source: Maree Conway(2003), An Introduction to Scenario Planning, Foresight Methodologies Workshop.

Introduction- The Possible Contribution of Foresight for S&T and Innovation Policy

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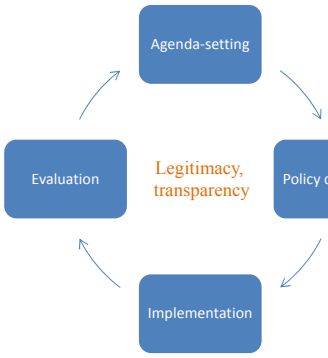
- Many countries have adopted "***foresight***" in their decision- making process.
  - Increase societal and economic well-being
  - Define priority areas for technology policy
  - Develop technology and innovation policies
  - International co-operation outreach (sustainability)

- Understanding of dynamic changes
- Risks, opportunities, system capabilities
- Visions building on diversity of views



- New ideas
- Policy options, recommendations
- Pros & cons of decision choices

- New policy configurations
- Responsiveness of the system

Source: Cristiano Cagnin & Totti Könnölä (2011)

About Scenario Planning- What are Scenarios?

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- One of many foresight methodologies.
- The RAND Institute in the USA first used them in the 1940s, followed by the Stanford Research Institute.
- By the analysis of European Foresight Monitoring Network(EFMN), Scenario planning is the third popular foresight methodology in the world.
- Scenarios are possible views of the world, described in narrative form (stories) that provide a context in which managers can make decisions.
- By seeing a range of possible worlds, decisions will be better informed, and a strategy based on this knowledge and insight will be more likely to succeed.
- Well developed and tested across government, business and education.
- Scenarios do not predict the future, but they do illuminate the drivers of change: understanding them can only help managers to take greater control of their situation.
- Japan and Finland have used scenarios to plan long-term public investment in technology and innovation programs; other countries, such as Singapore, have focused on security and risk. In the UK, the Ministry of Defense (MOD) has since the 1990s used scenario planning for campaign planning and training, and to support long-term force and capability development.

Source: Gill Ringland, Scenarios in Business(2002);UK BIS(2009)

Choice of Scenario Planning Methodology

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	Two axes method	Branch analysis method	Cone of plausibility method
Advantage	• illustrative rather than predictive • high-level (additional layers of detail can subsequently be added)	• developing scenarios around specific turning-points that are known in advance	• suits contexts with a limited number of important driver • offers a more deterministic model of the way in which drivers lead to outcomes, by explicitly listing assumptions and how these might change
Suited Time Horizon	• testing medium to long-term policy direction, 10-20 years	• shorter time horizon, up to five years	• suitable for shorter-term time horizons, a few months to 2-3 • Years, also can be used to explore longer-term time horizons

For complementing the current DRR planning methods and incorporating important factors such as climate change with long term influence into consideration, the two axes method is selected.

Source: Foresight Horizon Scanning Centre(2009)

The General Scenario Planning Process-**Two Axes Method**

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- Identify the focal question
- Environmental scanning – internal and external
- Selecting drivers of change and ranking
- Building the scenario matrix
- Developing the scenarios
- Presenting the scenarios
- Considering the strategic implications

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The Benefit of Using Scenario Planning

- Suitable for high uncertainty future
- Help for systemic thinking and considering the interactions among social, technological, economic, environmental, policy and value factors
- Can be used to develop robust options
- Easy for public communications
- Not only to develop long-term strategy, but also to strengthen organizational networks and encourage collaborative action.
- Identifying 'early warning' indicators

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Foresight Experiences Related to DRR in other Countries/Organization

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	US	WEF	UK
Report Year	2012	2011	2004
Report Title	Crisis Response and Disaster Resilience 2030 (progress report)	A Vision for Managing Natural Disaster Risk	Future Flooding
Research Theme	risk management and disaster resilience	natural disaster management	flooding and coastal area
Time Horizon	2030	N/A	2030~2100
Methodology	Scenario planning	Realistic natural disaster scenarios with backward imaging	Trend identification, scenario analysis with climate change and socio-economic scenarios

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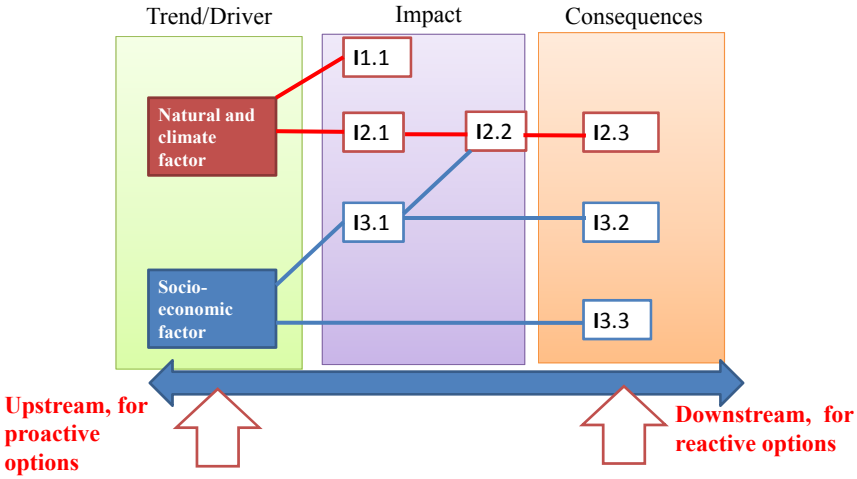
Present Research Design

Strengthen of Causal-Effect Cascades Identification during Developing Scenario by Trend-Impact-Consequences steps for Discovering Proactive Options and Comprehensive Option Portfolios



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CASE: DRR S&T AND INNOVATION POLICY

Main Disaster Trend and Disaster Risk in Taiwan

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- The natural geographical location of Taiwan is prone to disasters. According to the report entitled "Natural Disaster Hotspots: A Global Risk Analysis" published in 2005 by the World Bank listed the key finding that Taiwan may be the place on Earth most vulnerable to natural hazards, with 73 percent of its land and population exposed to three or more hazards.
- Taiwan is situated in the subtropical monsoon region. There are plum rains every May～June and typhoons every July 7～October. This special type of climate often brings about torrential rains. Also, the steep landform and short river connections often cause serious flooding. Meanwhile, since it is located at the border of the Eurasian Plate and the Philippine Sea Plate, it is considered one of the regions in the world with the most frequent felt earthquakes. Therefore, the frequent occurrences of natural disasters often result to serious damage and loss of lives and properties.
- Also, the major climate and socio-economic environment change very fast and the frequency and scale of extreme hazards are increasing, which will have high impact for our society in the future and challenging the preparation of disaster management.

http://ncdr.nat.gov.tw/Introduction.aspx?WebSiteID=873f5b27-b86d-4d5c-a356-c369768bffe9&id=43&subid=48&PageID=6

Definition of Disaster and Disaster Risk Reduction(DRR)

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- According to the definition of the United Nations Office for Disaster Risk Reduction(UNISDR):

➢ Disaster:

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

➢ Disaster Risk Reduction:

=>The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

=>Disaster Risk Reduction (DRR) aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts and cyclones, through an ethic of prevention.

http://www.unisdr.org/we/inform/terminology#letter-d

Disaster Reduction System and R&D Status in Taiwan

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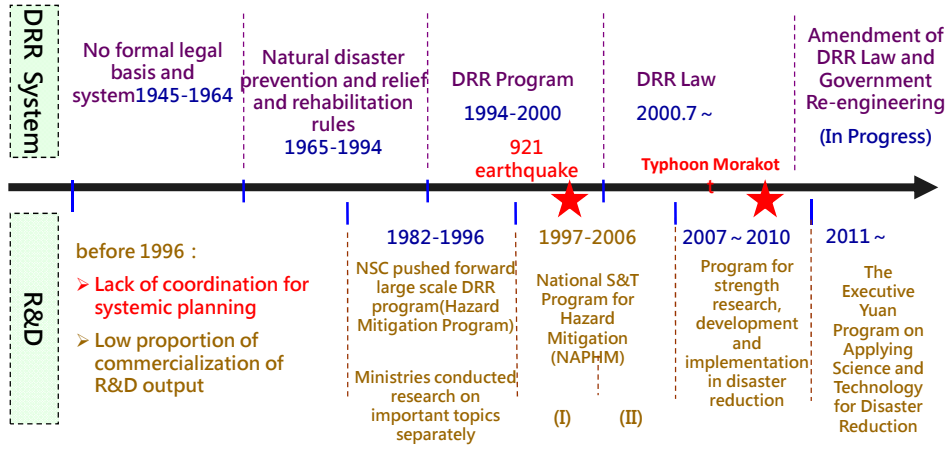

Source: NCDR, Taiwan

The Challenge of Present Decision Making Process

→reactive thinking, only for responding to catastrophe

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Scope of the Foresight Project

- Time Horizon: Year 2030
- Focus mainly on natural disasters
- From the view points of National S&T and Innovation Policy Planning for Disaster Risk Reduction

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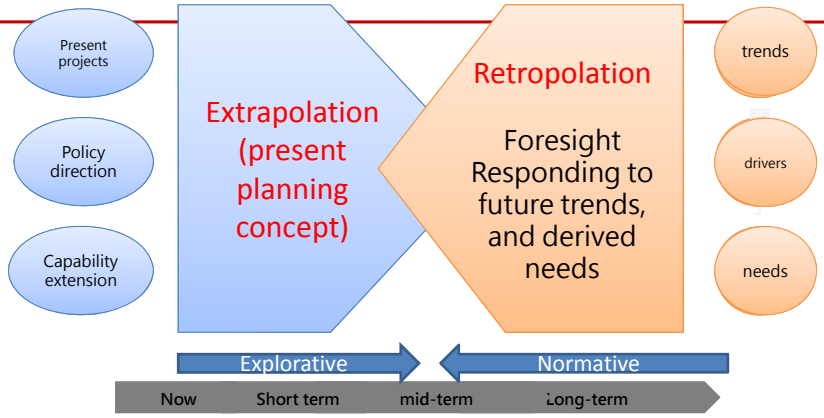
Using Foresight for Better Long Term Planning



Compensating the present planning mode with more long term view and help our disaster reduction policy/innovation policy from reactive to be more proactive and with continuity

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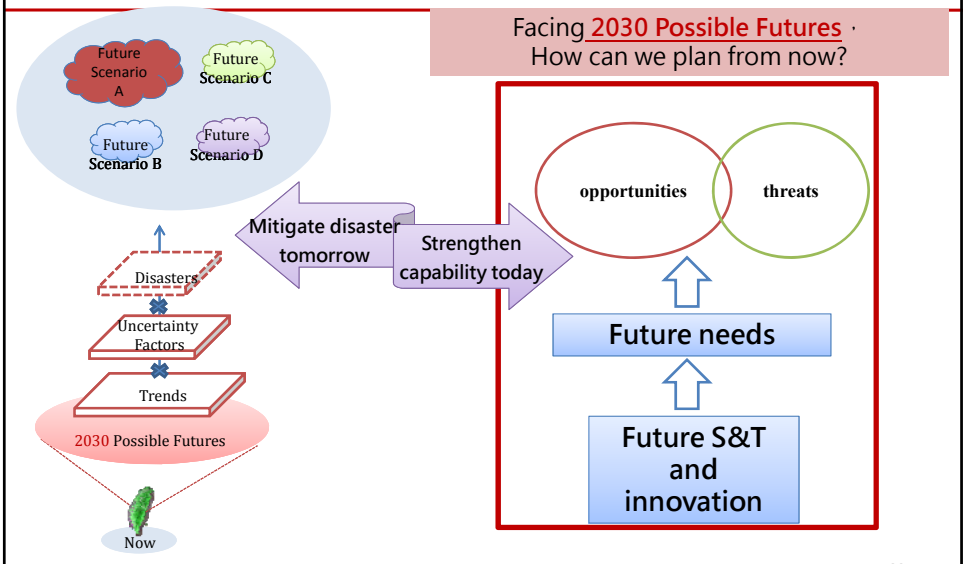
From Scenario to Future S&T and Innovation



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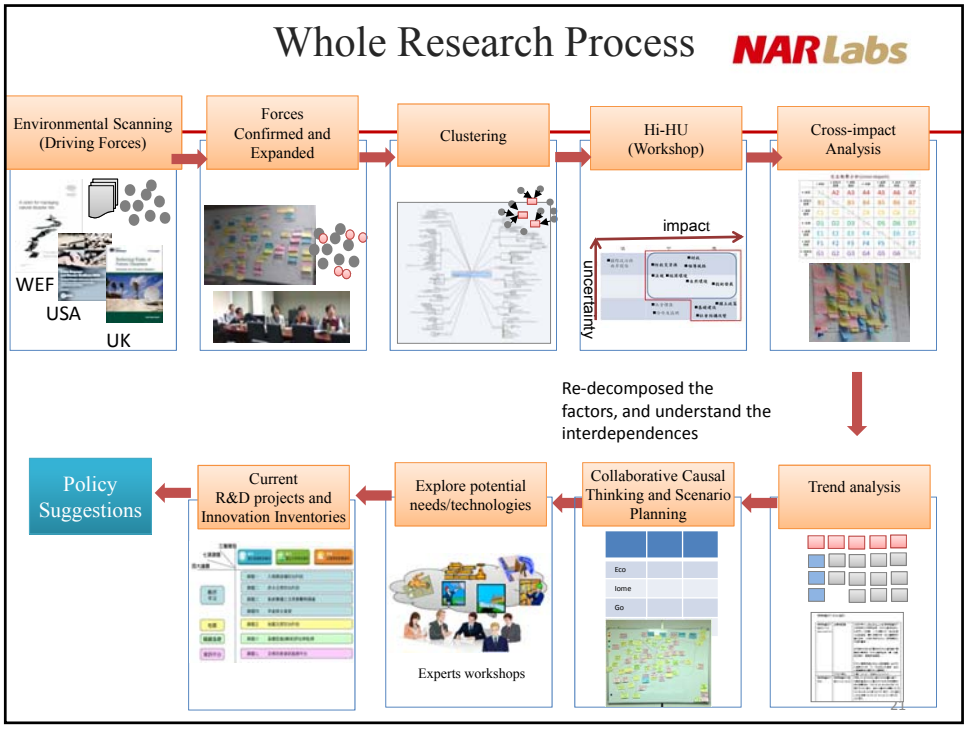
Whole Research Process
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Environmental Scanning (Driving Forces)
Forces Confirmed and Expanded
Clustering
Hi-HU (Workshop)
Cross-impact Analysis
WEF
USA
UK
impact
uncertainty
Re-decomposed the factors, and understand the interdependences
Policy Suggestions
Current R&D projects and Innovation Inventories
Explore potential needs/technologies
Collaborative Causal Thinking and Scenario Planning
Trend analysis
Experts workshops
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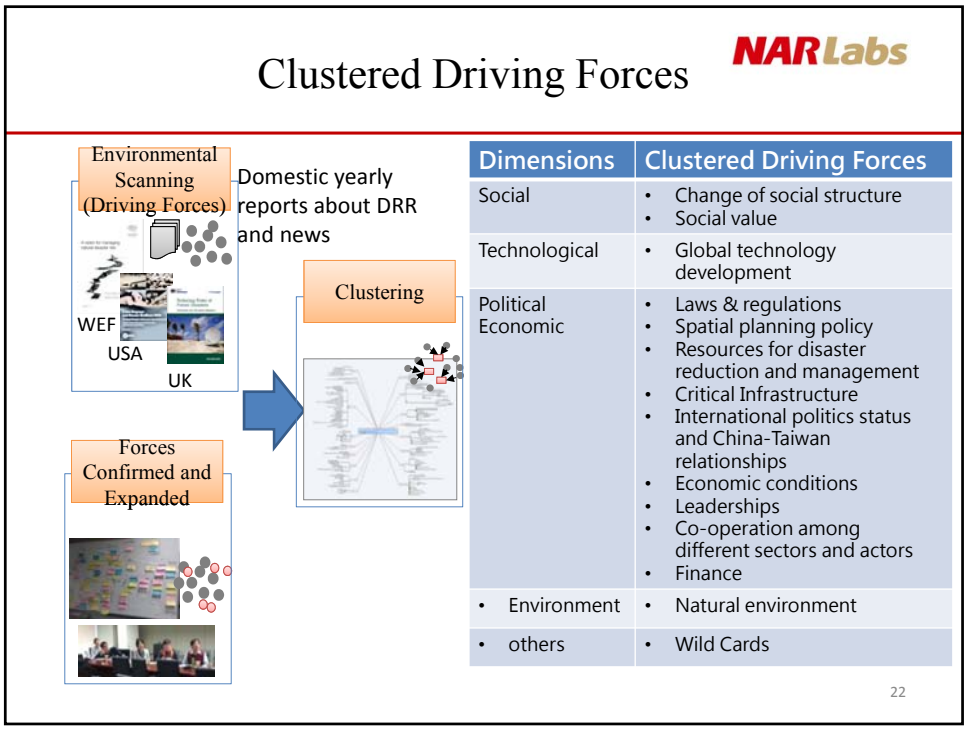
Clustered Driving Forces
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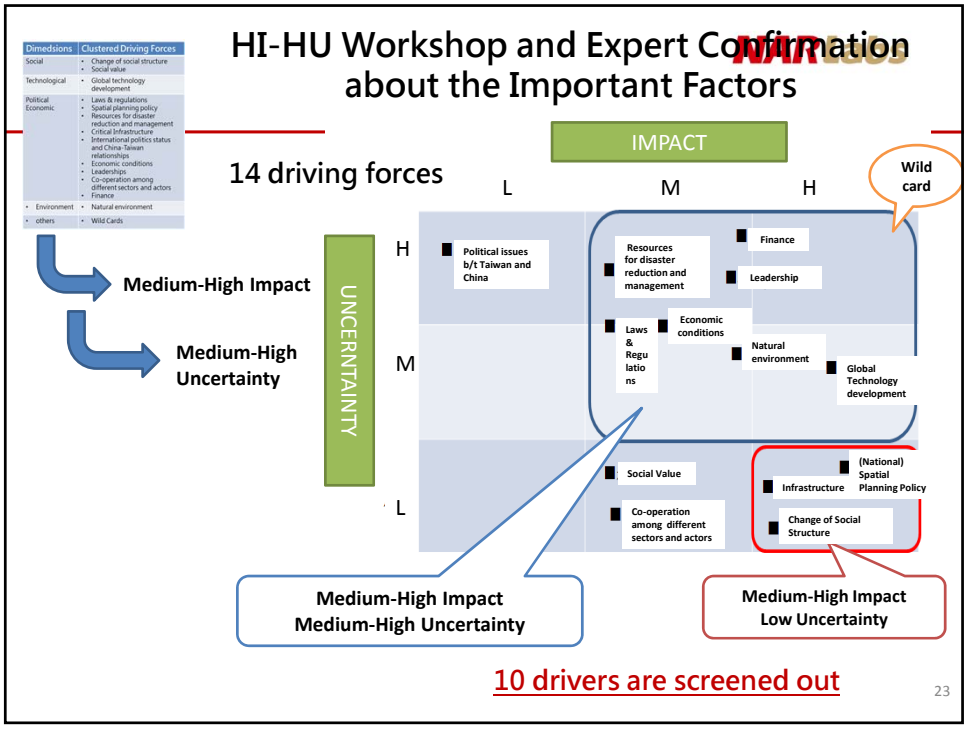
Environmental Scanning (Driving Forces)
Domestic yearly reports about DRR and news
WEF
USA
UK
Clustering
Forces Confirmed and Expanded
Dimensions
Clustered Driving Forces
Social
Change of social structure
Social value
Technological
Global technology development
Political Economic
Laws & regulations
Spatial planning policy
Resources for disaster reduction and management
Critical Infrastructure
International politics status and China-Taiwan relationships
Economic conditions
Leaderships
Co-operation among different sectors and actors
Finance
Environment
Natural environment
others
Wild Cards
22


HI-HU Workshop and Expert Confirmation about the Important Factors
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Dimedsions
Clustered Driving Forces
Social
Change of social structure
Social value
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Global technology development
Political
Economic
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Wild Cards
14 driving forces
Medium-High Impact
Medium-High Uncertainty
IMPACT
L
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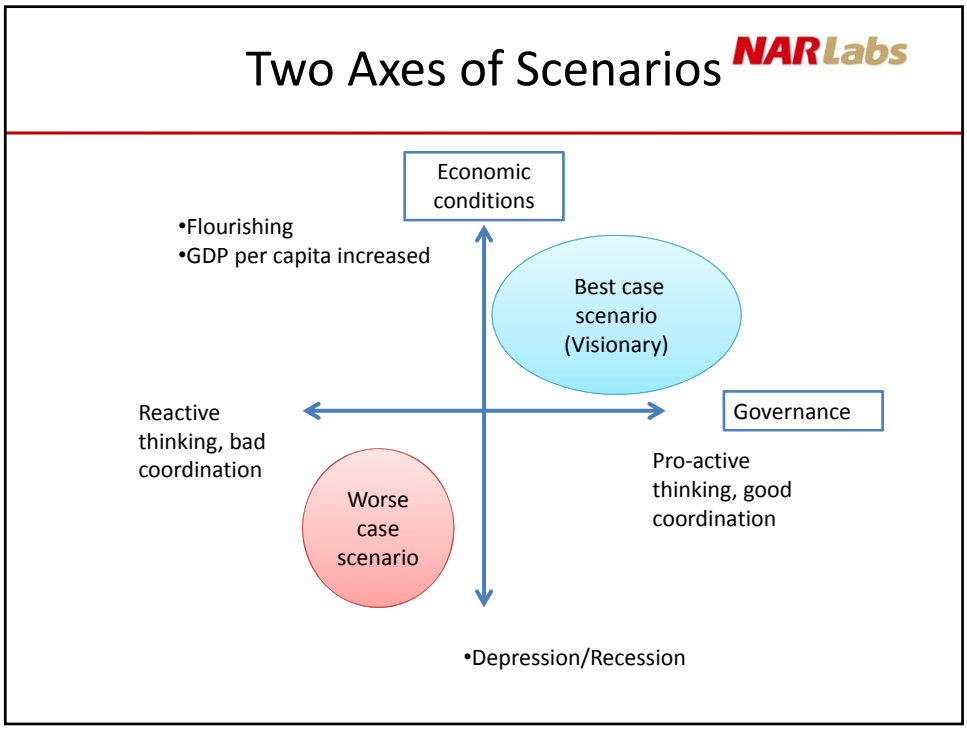
L
Political issues b/t Taiwan and China
Resources for disaster reduction and management
Finance
Leadership
Laws & Regu latio ns
Economic conditions
Natural environment
Global Technology development
Social Value
Co-operation among different sectors and actors
Infrastructure
(National) Spatial Planning Policy
Change of Social Structure
Wild card
Medium-High Impact
Medium-High Uncertainty
Medium-High Impact
Low Uncertainty
10 drivers are screened out
23


Two Axes of Scenarios
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Economic conditions
•Flourishing
•GDP per capita increased
Best case scenario (Visionary)
Reactive thinking, bad coordination
Governance
Pro-active thinking, good coordination
Worse case scenario
•Depression/Recession

Detailed Skeleton of Scenario(Parts) and the Possible Parameters

		Scenario A (worse case)	Scenario B (visionary)
Trends	Aging society and birth rate declining	The ratio of aging People is increasing, also for the workforce	
	Aging of Traditional Infrastructure	Most of the infrastructure has reached its useful life and the function is under deterioration	
	ICT Technologies, Wearing Devices and Cloud Computing are Highly Disseminating	Technology development is high and can be highly applied in every area	
Uncertainty Factors	Economic Growth Condition	•Depression/Recession •GDP per capita decreased	•Flourishing •GDP per capita increased
	Income Inequality b/t Regions	•Worsen	•Improved
	Infrastructure	•Aging without repairing	•Renewing and build with Intelligence
	Disaster Governance	•Public sector pay less attention to disaster prevention (less budget) •Inefficient in legislation/ enforcement	•Public sectors stress the importance of disaster prevention
	Land Use Planning	•Lack of planning	•Well-planning (sustainable)
	Private Sector	•Passive; lack of awareness	•Active; well-prepared
	Public-Private Partnership	•Lack of coordination b/t public and private sector	•Good coordination b/t public and private sector
	Urbanization	•Aging population concentrate in urban area / where with high risk of disaster	•People living density is according to the environment load and considering of environmental symbiosis
	Important Industry Distribution	•High concentrated in disaster prone area	•Clustered but not in high density

Collaborative Causal Thinking for Building Scenario Narrative from Skeletons -from Economic Globalization Perspective (Worst Case)

Global

- Innovation become the main drivers of global main source of competitiveness
- The economic landscape is changing, and developing countries decide the pace of the world economy, while the multi-polar world especially the network operation ability such as the regional and bilateral free trade agreements become the main keys to victory.
- The medium class is arising and the education and medication are improved
- Before 2030, China promote economic growth by the force of domestic demand, and become one of regional or global leadership in some basic research and innovation area.
- The economic globalization give more accessible resources and funding for global disaster risk reduction.
- Globalization and the extreme weather/climate change has much more impacts on the industry supply chain and logistics
- The catastrophe happen in one country affects the economics, food security and energy security of other countries through the globalization effects.
- Globalization of economic activity and transport increases the transnational dissemination scope and frequency of biological pathogens.

Taiwan

- Most of the companies in Taiwan are still S&M sized companies.
- Taiwan is gradually marginalized due to the rise of China, the free trade agreement behind schedules, and is unable grasp the opportunity to compete in the global industry, a hence the economic growth in poor condition.
- Taiwan's industrial competitiveness is affected, drags dow Taiwan's technological development and innovation momentum, and has worsen brain drain problem, not just for industries but for disaster prevention-related research ta
- The worsen of Taiwan's economic growth led to the long- government fiscal imbalance.
- Due to long-term government fiscal imbalances, and from competes of health care budget needs, impacting to the l term investment on the renewing and replacing of critical infrastructure.
- The poor economic growth results in the long term input of DRR resources from private sectors and people decreasin
- Taiwan's industry concentrated in a specific area, and the extreme weather happens in that specific area and affect economic condition much severely.
- Internationalization of some important Taiwan manufactu get huge loss because of lacking knowledge about international disaster risk and preparing for catastrophe insurance .
- The industrial transformation process resulting in continued structural unemployment because of the technological change of production.

Global Mega-trend → Domestic Trends and Factors → Implication for DRR R&D and Innovation

Further confirmed the causal thinking by literature reviews

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The Implication for DRR R&D and Innovation by Considering the Worst Case Scenario - from Economic Globalization Perspective

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- **Implications:**
  - Economic condition is critical since it will affect availability of different kind of DRR resources.
  - Under the Globalization trend, industry should start to pay attention to the international disaster risk, and the government can provide more international DRR services to industry for their decision making.
  - Since the fiscal budget of government for DRR is limited and competed, it should pay more attention on the DRR resource allocation rationality and accountability.
  - Proactive thinking and action become more and more important because of they can be more cost effectiveness than the reactive actions under limited budgets.
  - Public-private partnership is necessary.

Examples

Need	S&D and Innovations
Better and more cost effectiveness DRR resource allocation	●Resource allocation decision support system ●DRR innovation outcome and benefits
Alternative DRR resources	●Good public-private partnership design and platform technology ●Cheap IT intelligence system with DRR function for personal and government use ●Catastrophe insurance mechanism research
Robust critical infrastructure	●Durable material with disaster reduction function ●Effective renewing technology for infrastructure ●Infrastructure DRR function ●Intelligence sensor technology for infrastructure ●Distributed critical infrastructure
Disaster prone area designation and industry location(foreign/domestic)	●International DRR cooperation networks in monitoring and responding for Industry ● Research on possible disaster prone area and their designation regulation

Conclusion
Strength and Weaknesses of Scenario Planning from this Case Study

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- Scenario planning provides a way for system thinking of driving forces and their interactions (or cause/effect relationships) and thus helping for construction of the knowledge structure of future environment and their strategic implication for DRR management and innovations.
- Also, scenario planning helps in discovering and widening the thought of future needs in DRR and different possible application contexts of future DRR S&T.
- Especially, by using a trend-impact-consequences framework, it is easily for guiding the participants to construct a scenario in a more logical way, by which also helps to identify more comprehensive portfolio of options or action from the cause/effect relationships.
- However, due to the subjective nature of the scenario planning process, experts from different background and with different experiences may have different view on the knowledge structure of future environment, thus the results should be conducted on a solid basis of research, literature review and discussion to ensure that the driving forces considered are supported by enough evidences to ensure the scenario possibility.
- The process for discussion and building of scenario is complex and time consuming, and the quality will rely on a good process design, especially supported evidences and stakeholder dialogues will help to deliver a convincing result.

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Importance of the Lessons Learned

- To deal with the uncertain and changing environment, this research uses scenario planning as main methodology to discover the possible "history of future", and uses them as context for discovering the need and the innovation related to DRR.
- For building a scenario, driving forces related to DRR are discovered through environment scanning with international reports and domestic policy reports with related themes, and these forces are clustered and prioritized through HI-HU matrix. Also, cross impact analysis and trend analysis are also used to understand the relationship or interactions among driving forces.
- Due to the time limitation and difficulty of convening a group of people for more than one workshop, we have built an internal team organized by two centers to develop the scenarios, but for avoiding the intellectual purity of the work-team, later we have engaged a wider participants with a mixture of experts such as academics, NGOs, business professionals, policymakers to comment on the scenario prototype and think out the derived needs and associated innovation and S&T. By using scenarios as background, they help to generate dialogue around possible risks and priorities with these key stakeholders and partners.
- For forming a proper scenario, the two axis method of scenario planning is selected because of the long term perspective it can deliver. Also, morphology analysis is used to present the possible parameters of factors, and subsequently a scenario narrative is formed through collaborative causal thinking, especially by using "trend-impact-consequence" steps for easily construction of the scenarios systematically.
- For convincing the workshop participants the possibility of the scenarios, the built scenario are further supported by evidences by our literature research.

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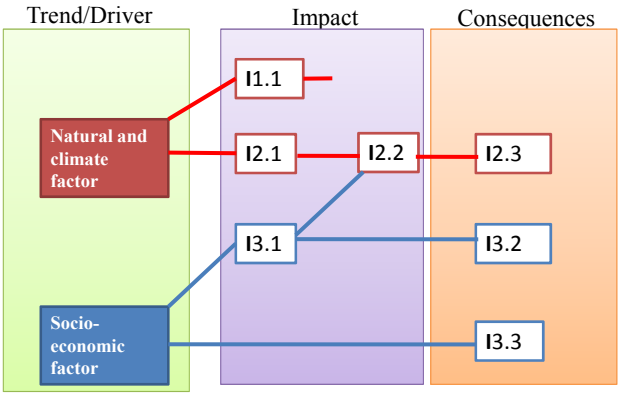
Policy Implications of this Case Study

- In the past, prospective DRR innovation policy is usually planned through applying the realistic natural catastrophe scenarios occurred in some places of the world with current socio-economic status of Taiwan for discovering the needs and associated innovations.
- Through this case study of scenario planning, the current scenario planning exercise does help to give an opportunity to step away from previous linear thinking process. When this method is used in applying for supporting of disaster risk reduction innovation policy, we found that it provides a good way for building future possible contexts in preparing for long term DRR innovation policy. Especially, the future socio-economic trends are highlighted, which are usually neglected in previous linear type of DRR planning process.
- Also, by applying the scenario planning methodology, it provides a way for system thinking of the future trends/uncertain factors of both natural hazard and socio-economic ones and their synergy impacts if the interactions there between are realized, thus provides a comprehensive thinking logic for DRR innovation planning.
- Meanwhile, not only the megatrends affecting the whole world but also the local factors and their trends/uncertain factors are highlighted for building a scenario with local context, for discovering innovations not only for international markets but also for domestic needs.
- In generally, the scenarios formed by this exercise help the stakeholders and participants of the workshop to identify proactive actions that can be done from now to help in reducing the impacts of future disaster, and identify reactive actions that can be taken in response to the disaster, thus forming a comprehensive actions and DRR innovation portfolios against the future scenarios,.
- The scenario also provides a good communication material for consensus building among stakeholders, which also help them in noticing emerging trends, factors from this exercise, and think their implication for DRR management and innovation, thus help in building foresight capacity among DRR community. Therefore, the scenario planning exercise not only help to develop long-term strategy, but also help to strengthen organizational networks, dialogue among stakeholders and encourage collaborative action.

Policy Implications of this Case Study (continue)

- During the exercise of scenario planning and discovery of proactive and reactive action, we found that the sustainability and disaster risk reduction are indeed represent two sides of the same coin. It is very interesting finding that since not all natural hazards can be easily controlled or predicted/reduced by state of art or innovation, the proactive actions and innovation which can used for enhancing the social system resilience is therefore highly important.
- However, for a complete a risk management planning process like DRR area, scenario planning as normative method should be deemed as one kind of perspective methodology that helps to widening the thinking of context of future environment and the associated actions. Other activities such as explorative methods are still important to gain integrated perspectives.
- About the research limitation, this research is just a pilot study for applying in the DRR area, but for a practical policy use, more stakeholders should be engaged for gaining more collective intelligence into the scenario planning process.

Potential Contribution to Future Applications



- By using scenario planning, more socio-economic factors can be considered and incorporated into the decision making process of S&T and Innovation long term policy .
- By identification of causal effect cascades in scenario planning, it helps to identify the cross interaction of natural and climate factors with social economic factors, and proactive options or comprehensive portfolio of options can be easily recognized.

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References

[1]BaltCICA;"Manual for scenario workshop: How to involve stakeholders in climate change adaptation", Retrieved 10/15/13 World Wide Web, http://www.baltcica.org/documents/manual_for_scenario_workshop.pdf

[2] Cagnin C. and Könnölä T., "Challenge of global foresight: lessons from IMS scenario and road-mapping process" in *Papers presented atthe 4th International Seville Conference on Future-Oriented Technology Analysis,* OR:FTA, 2011.

[3]Conway M.; "An Introduction to Scenario Planning", *Foresight Methodologies workshop*, 28 September 2003, Retrieved 10/15/13 World Wide Web, http://fr.slideshare.net/mkconway/introduction-to-scenario-planning

[4] Earth Observatory; "Natural Disaster Hotspots: A Global Risk Analysis", Retrieved 10/15/13 World Wide Web, http://earthobservatory.nasa.gov/Newsroom/view.php?id=26455

[5] Federal Emergency Management Agency, U.S. Department of Homeland Security; "Crisis Response and Disaster Resilience 2030: Forging Strategic Action in an Age of Uncertainty-Progress Report Highlighting the 2010-2011 Insights of the Strategic Foresight Initiative", Retrieved 10/15/13 World Wide Web, http://www.fema.gov/library/viewRecord.do?id=4995

[6] Foresight Horizon Scanning Centre; "Scenario Planning Guidance Note", 2009, Retrieved 10/15/13 World WideWeb, http://www.bis.gov.uk/assets/foresight/docs/horizon-scanning-centre/foresight_scenario_planning.pdf

[7]Georghiou L., "Third Generation Foresight - Integrating the Socio-economic Dimension", *Policy Research in Engineering, Science and Technology (PREST), University of Manchester, 2001,* Retrieved 10/15/13 World Wide Web, http://www.nistep.go.jp/achiev/ftx/eng/mat077e/html/mat077oe.html

[8] Government office for Science; "Foresight Reducing Risks of Future Disasters: Priorities for Decision Makers Final Project Report", Retrieved 10/15/13 World Wide Web, http://www.bis.gov.uk/assets/foresight/docs/reducing-risk-management/12-1322-reducing-risks-of-future-disasters-summary.pdf

[9] Great Britain.,& Great Britain.; "*Strategy survival guide*". London: Cabinet Office.(2004)

[10] Jonathan N. M., "Scenario Analysis: A Tool for Task Managers", Retrieved 10/15/13 World Wide Web, http://siteresources.worldbank.org/EXTSOCIALDEV/Resources/3177394-1167940794463/ScenarioAnalysisMaack.pdf

[11]KISTEP; "The 4th Korean Technology Foresight (2012~2035) Report", South Korea, 2012.

[12] Litchfield M.; "The value of scenario planning", Retrieved 10/15/13 World Wide Web, http://www.slaw.ca/2012/11/21/the-value-of-scenario-planning/

[13]Martino J. P.; "Technological Forecasting for Decision Making", *McGraw-Hill*, pp.177-187, 1993

[14]Office of Science and Technology; "Foresight Future Flooding, Flood and Coastal Defense Project of the Foresight Programme Report", UK, 2006.

[15]Start, D. and Hovland, I., "Tools for policy impact: A handbook for researchers", *Overseas Development Institute*, 2004.

[16]UN Millennium Project; Environmental Scanning-Futures Research Methodologies- V1.0, 1999.

[17]World Economic Forum; "A vision for managing natural disaster risk", 2011, Retrieved 10/15/13 World Wide Web, http://www3.weforum.org/docs/WEF_VisionManagingNaturalDisaster_Proposal_2011.pdf

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