A framework and guide for using value chain approaches to understand, improve, measure, and design early warning systems

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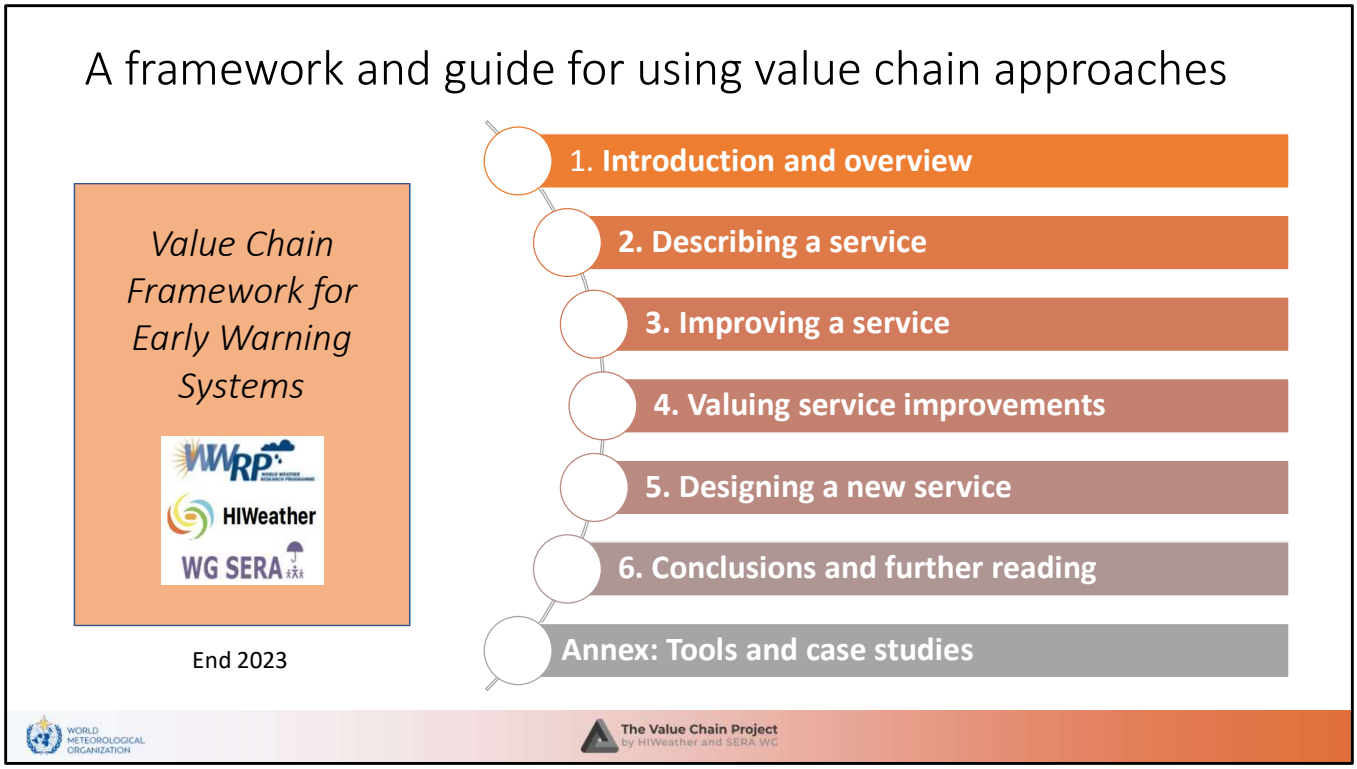
The Value Chain Project by HIWeather and SERA WG

- The writing team comprises members of the WWRP Value Chain project.
- People come from 8 organisations in 7 countries.
- Members bring expertise in weather and climate, warning communication, economics, sociology and risk.



- We are preparing a guide for how to use value chain methodologies to understand, improve , value, and design early warning services.
- Can be applied more broadly to services from any public good institutions.

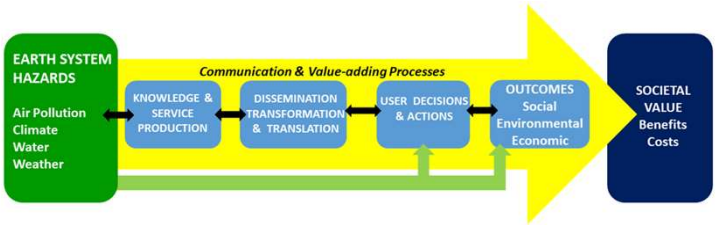
- It will be a WMO document in the WWRP series (but it won't look like the picture!), hoping to have a final draft by the end of this calendar year, for WMO review.

- We hope to put the information into a website to get greater reach.

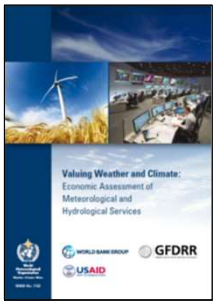
- This talk will briefly summarize what you will find in the guide.

1 Introduction and overview

- Value is created when information supports decisions and actions that result in *improved* social, environmental and/or economic outcomes
- Value-generating processes can be represented and analysed using Information Value Chains (IVCs)
- This framework and guide for using value chains to understand, improve, measure, and design early warning systems builds on foundational work.
- Intended users
  - Service providers
  - Authorities
  - User communities
- Step-by-step guide



From WMO/World Bank 2015



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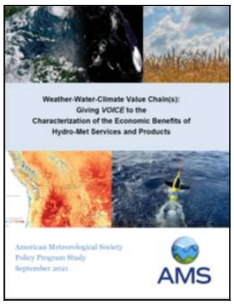
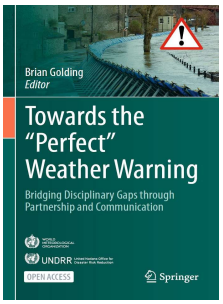


Lazo & Mills 2021



Golding 2022

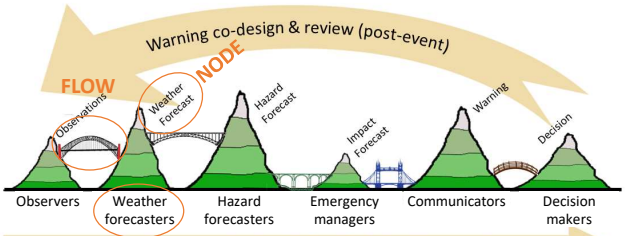
- What is a value chain approach? As an **idea** it is:
  - A <u>way of understanding a service</u>, to change thinking from solution to better understanding of first/last mile needs/problems
  - A <u>tool</u> to understand and support the co-production of value
  - A <u>concept</u> to support engagement, deliberation and problem solving
  - An <u>information organising framework</u> that enables actors to see their particular contribution to the generation of value
- It can also be a more tangible **thing**:
  - The people, processes, and information flows that combine to produce a service
  - The people, processes, and information flows that operated to observe, predict, warn, and respond to a high impact event (the "warning chain")

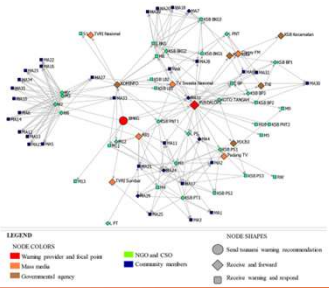
- The **value** comes from decisions and actions that are based on **information** flowing through the chain → information value chain.
- Builds on foundational work (recommend the three resources)

- Users for the guide include
  - **Service providers** (NMHSs and partners) - how improve their services, what potential improvements would be most valuable
  - **Authorities** (governments, funders, inquiries) - what went wrong when the service fails, also whether they are getting value from their investment
  - **User communities** (public, industries) – want the most effective services, participate in service design and feedback

2 Describing a service

- Use a simple case (i.e. characterize a service) to introduce value chain concepts
- What is valued – social, economic, environmental benefit
- Components – nodes, actors, flows
- Structure – linear, cycle, network
- Approaches for gathering information – workshops, surveys, interviews, lit review, etc.
- Construct the value chain – bottom-up, top-down





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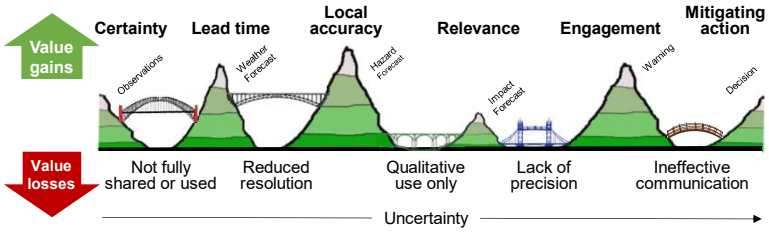
The Value Chain Project by HIWeather and SERA WG

- The guide starts with the simplest case, which is to understand an existing service.
- Usually the first step in most value chain studies, especially if the goal is to improve the service or evaluate changes in it.
- Doesn't require much in the way of time or resources to produce useful information.
- Can be done in a group (everyone understands their role better), or even by 1 or 2 people
- Components
    - **Nodes** are the basic building blocks, the places where information is produced or used
    - **Actors** are the people, with their different perspectives and skill sets and relationships; the same actors often participate in several parts of the value chain
    - **Flow** is the movement of information, data, resources, etc.
- Structure is useful to help understanding and planning
    - **Linear** – simplest (too simple?), emphasises dependencies amongst the nodes, good for a fast process like a warning
    - **Cyclical** – more people-centred, emphasis adaptability over time, feedback loops and continuous improvement
    - **Network** – acknowledges complexity, multiple interactions, alternate paths
- Bottom-up construction of VC is organic, people involved in a discussion, everyone can be heard, the structure may suggest itself
- Top-down construction - start with a structure and "fill it in". A survey approach can work.
- The framework provides tools and workshop activities for gathering information and understanding the nodes, actors and information flows

3 Improving a service

- Why should the service improve?
- What contributes to losses of value and gains in value?
- Identify gaps and weaknesses – case studies, consultation, focused studies
- Consider the options
  - Theory of change – start with desired outcomes
  - Factors and constraints – expertise, cost, timing, sustainability
  - Decision methodologies
- Design the evaluation framework – what will be measured, baseline, data collection, analysis through the chain



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- Different drivers for improving a service influence the approach you take
  - Existing service not meeting everyone's needs
  - Opportunities to take advantage of new capabilities
  - New organisations, partnerships or relationships necessitate changes
- Change can be incremental or transformational
- Important to understand what generates value (things to enhance) and what loses value (things to reduce)
  - Not everything is within our power to change
- Start by identifying the gaps and weaknesses
  - Case studies can be quite useful here – the VC case study template could be used
  - VC gives greater emphasis to the flows
- Then consider what could be done to improve the service
  - Start with the end in mind – theory of change approach
  - Consider what improvements are even possible given the available time, resources
  - Decision methodologies like cost/benefit analysis (big project), multi-criteria analysis could be applied to decide between competing options
- The evaluation framework is based on the elements of the value chain, not just the end
  - Need to understand the baseline
  - Currently there is no universally accepted methodology of connecting the quality measures for each part of the chain to the value of decisions taken by warning users
  - Qualitative and quantitative approaches can be used
  - Benefits may take some time to accrue as users adapt to changes

4 Valuing service improvements

- Purpose of valuation study – whole service, particular improvement(s), propagation of value, overall benefit
- Value a service – light touch, refer to WMO (2015)
- Measure improvements – metrics and indicators
- Measure propagation of value – Weather Service Chain Analysis
- Value outcomes and benefits of improvements – economic valuation, counterfactual analysis
- Characterize and quantify uncertainty – sensitivity analysis, propagation of uncertainty, data limitations, rarity of extreme events

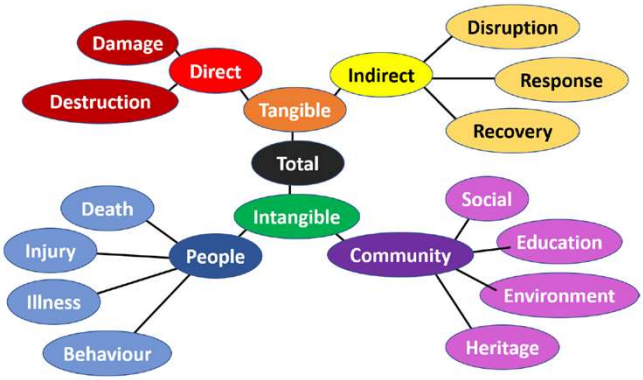

Figure 5.2 Sources of economic costs of natural hazards (adapted from Deloitte, 2016)

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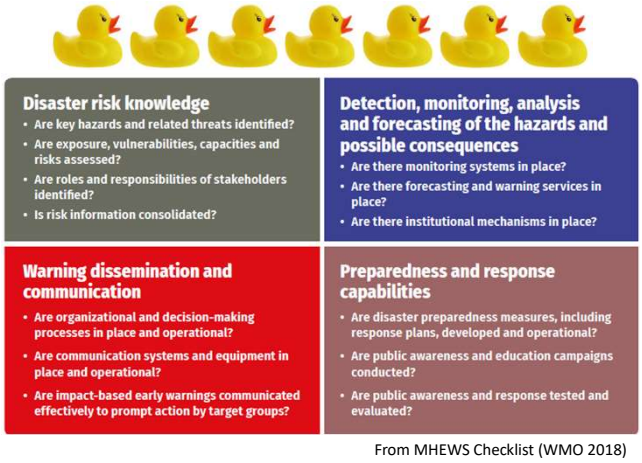
- Focus on measuring the value of service improvements that have been implemented
- "Valuation" can refer to more than economic value – also social and environmental value
- How was value increased in different parts of the chain, how did it flow through?
- Application of valuation methods
    - Qualitative – e.g. expert elicitation
    - Quantitative – need to convert everything to a common unit (usually money)
    - Semi-quantitative – e.g. multi-criteria analysis considers other things that can be measured but not easily costed
    - The data you have (or can get) may dictate your approach
- Many metrics and indicators can measure different parts of the chain
- Weather Service Chain Analysis (Adriaan Perrels & colleagues) specifically designed to measure the propagation of value
- To measure the benefits of improvement(s)
    - Economic methods – willingness to pay, economic modelling, benefits transfer, etc
    - Counterfactual analysis – hypothetical "what would have happened without the improvement"
    - Big caveat - Factors beyond the warning quality can significantly influence outcomes. Includes changes in risk behaviour in response to changes.
- Important to acknowledge and characterize the uncertainty in the analysis
    - How does uncertainty flow through the value chain?
    - How does it impact the assessed user/community benefit?

5 Designing a new service

- Drivers for a new service – supply side, demand side
- Advantages of using a value chain approach – outcome driven, design and evaluation, involves partners and stakeholders, etc.
- Prepare – consider why, who, what, how; what exists elsewhere, budget and other constraints
  - Does the expected benefit justify the effort and expense?
- Design the warning system – establish partnerships, joint design, technical requirements, skill development
- Plan evaluation & continuous improvement



From MHEWS Checklist (WMO 2018)

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- The most complicated use case, where all of the value chain approaches come into play, is designing a new service.
- Many of the same drivers for improving a service also apply to designing a new service
  - Unmet needs
  - New capabilities, technologies, opportunities

- Value chain approach is extremely useful
  - Helps articulate the benefits of change and how it would be measured
  - Compare alternative approaches
  - Assess what's already there / establish a baseline
  - A process for people to think more broadly and analytically
    - Establish what the linkages are, how the transfer works, what would be the outcome
    - Do all this thinking ahead of time to avoid wasting money on something that is unlikely to work!
  - Understand who the users and partners are, what capabilities they bring

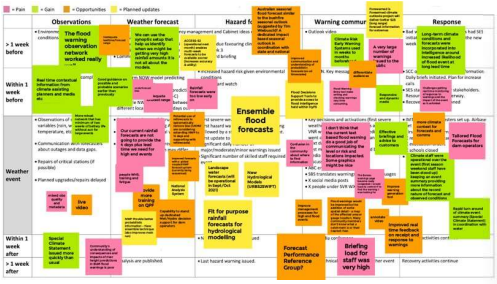
- Some excellent resources exist on designing warning systems, especially since Early Warnings for All initiative was established
  - WMO has a great checklist of all of the things to consider
  - Warning Research Centre at University College London
  - Red Cross
  - UNDRR resources

6 Conclusions and further reading

- Concluding remarks with resources from the (grey) literature

A Tools and case studies

- Value Chain Construction & Analysis worksheet (from Lazo & Mills 2021)
- VOICE (Value of Information Characterization & Evaluation)
- Value Chain exercises – individual and group activities
- Warning value chain case study questionnaire and guide
- Case studies to illustrate successful use of value chain approaches in hydrometeorology / warning context



- The appendix includes
  - Tools and activities for using value chain approaches
  - Case studies (with excerpts appearing in the chapters to support concepts with relevant examples)

VOICE – Value of Information Characterization and Evaluation (adapted from Lazo and Mills 2021)

Process	Observations	Modelling	Forecasting	Dissemination	Communication	Perception/ interpretation	Mandates	Preparedness & response	Decisions (*ex ante*)	Outcomes (*ex post*)	Economic valuation
Suggested features (modify as required)	· Ground stations · Satellites · Radar · Vehicles with built-in obs systems · Social media · Phone calls · Traffic	· Climate models · Numerical weather prediction · Nowcasting · Hazard models · Impact models · Statistical post-processing	· Climate / seasonal outlooks · Weather forecast · Watches & warnings · Relevant hazards · Potential impacts	· Internet · Television · Radio · Telephone · Smartphone · Newspapers · Sirens · Word of mouth · Indirect (actions of others)	· Format · Content · Detail · Uncertainty · External sources/ noise · Language	· Threat · Impacts · Probability · Reliability/ trust	· Laws & regulations · Compliance · Institutional frameworks · Accountability / responsibility / liability · Financing · Insurance	· Risk mgmt · Plans · Community awareness · Training/ education/ exercises · Triggers · Incident mgmt · First-order responses	· Run/hide · Buy/sell · Sunglasses/ coat · Defer/ reschedule · Substitute · Ignore	· Live/die · Happy/sad · Cold/hot · Profit/loss · Attributes (immediate/ lagged, acute/ chronic, secondary/ tertiary, derived/ induced…)	· Reduction in economic impacts of weather · Willingness to pay for information · Increased profits in production processes
Agent/actor											
Objective											
Resources											
Constraints											
Information characteristics											
Value added											
Other process characteristics											

Summary

The **Value Chain Framework for Early Warning Systems** will provide guidance and tools for using value chain approaches to

- understand an existing service
- improve a service
- measure value of service improvements
- design a new service

Complete draft late 2023, review and release in 2024.

For more information contact beth.ebert@bom.gov.au or valuechain@bom.gov.au