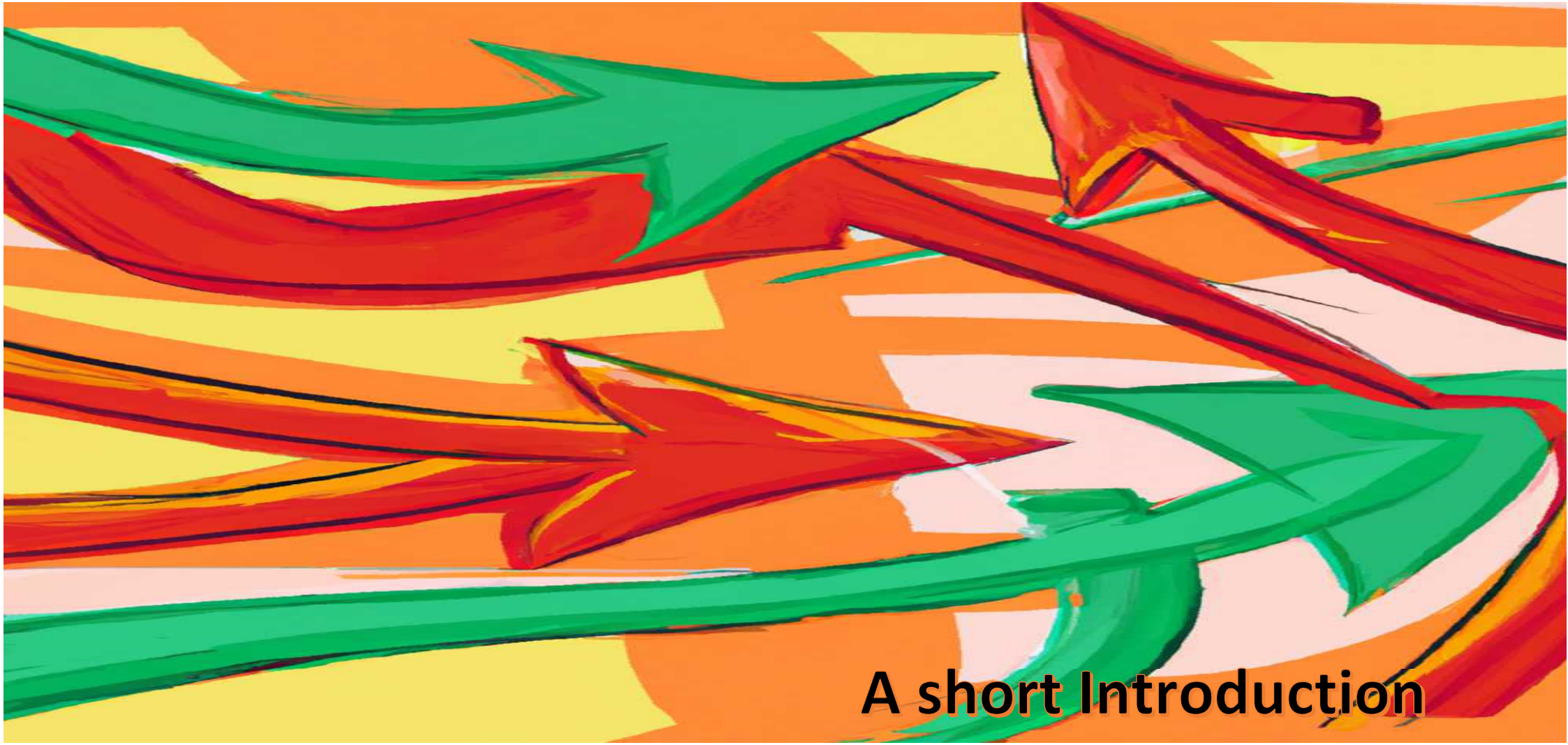
Strengthening Tsunami Warning Chains

A visual-based approach to support multi-stakeholder work processes



Warning Chain
Challenges

A multi stakeholder affair

Tsunami warning chains need collaboration from organisations at international, national, regional, and local levels. The broadcast media are crucial in disseminating warning messages.

Roles & Mandates

The institutions involved have different roles and mandates, which is reflected in the contents of their warning messages. The call for evacuation (and the activation of sirens) is usually linked to a specific decision-making body (in some cases at local level).

Warning plus Guidance

Communities at risk and the general public need not only a warning, but also guidance on what to do, backed up if necessary by official calls for evacuation.

Time pressure

Tsunami warning chains must reliably transmit warnings in a very short time frame. With near-field threats, this is often a matter of minutes.

Redundancy

Robust warning chains include parallel flows of warnings to assure redundancy in case of failure at one point.

Coherence

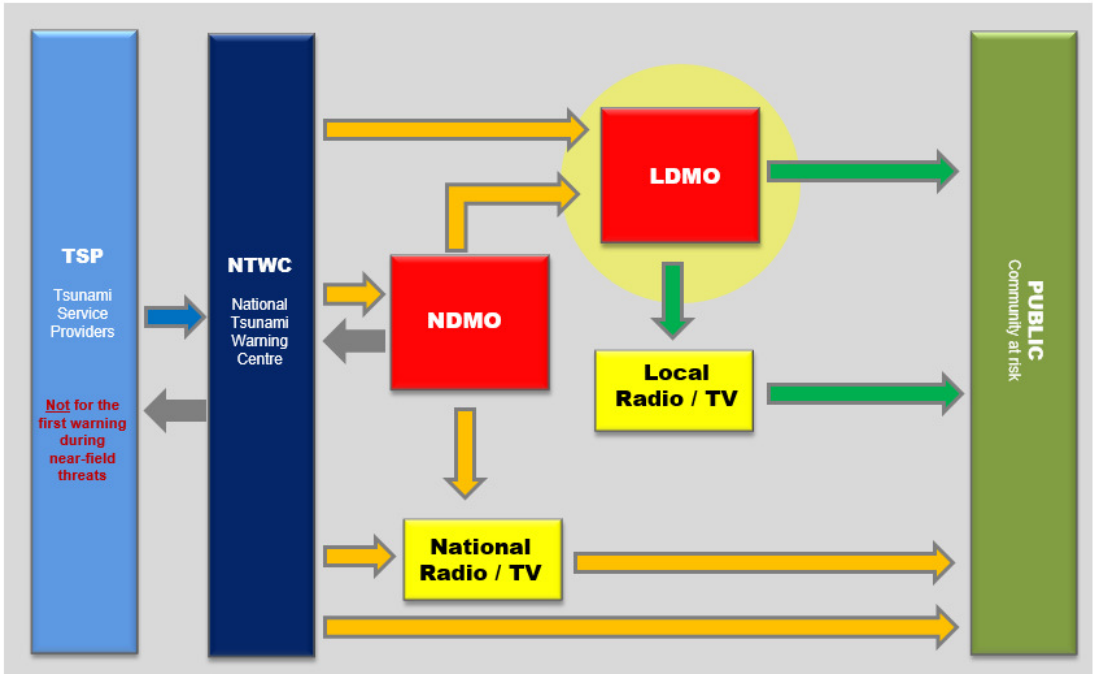
The coherence of warning message contents from multiple sources should be ensured. This involves having a clear understanding of what the siren means (warning or evacuation?).

The visual-based approach

What is it about?

A graphical representation of the warning chain

A **simplified graphical representation of the end-to-end warning chain**, including all key players, is at the heart of the approach.



Build common understanding of the warning chain

As a **visualisation tool** it supports the **development of a common understanding of the warning process** for all key stakeholders. Specific colour codes are used to visualise different **warning contents** along the warning chain

Helps to clarify roles of the institutions involved

It helps to **clarify roles & mandates** of the institutions involved, including the decision making to call for evacuation and to activate sirens.

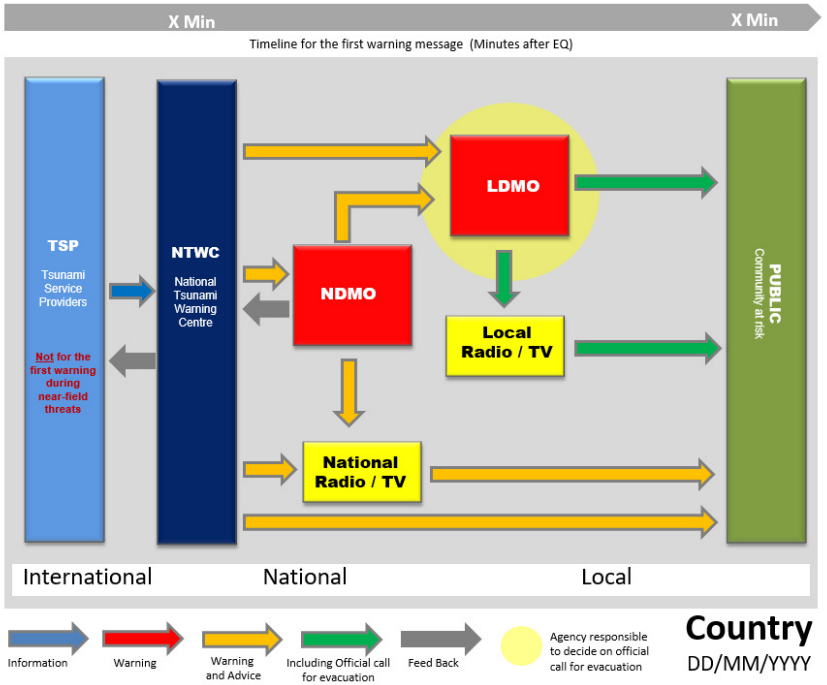
Visualisation tool to improve the warning chain

It serves as a basis for joint discussion among stakeholders on **necessary adjustments to the warning chain** to ensure redundancy and feasibility in the limited warning time available

How does it work?

Use the template as a starting point

The starting point is an **editable template** that includes an exemplary warning chain and the actors that are typically involved



Adjust it to the set-up of your national warning chain

As each country has its own particular set-up, the template needs **to be adjusted** to represent the respective national warning chain

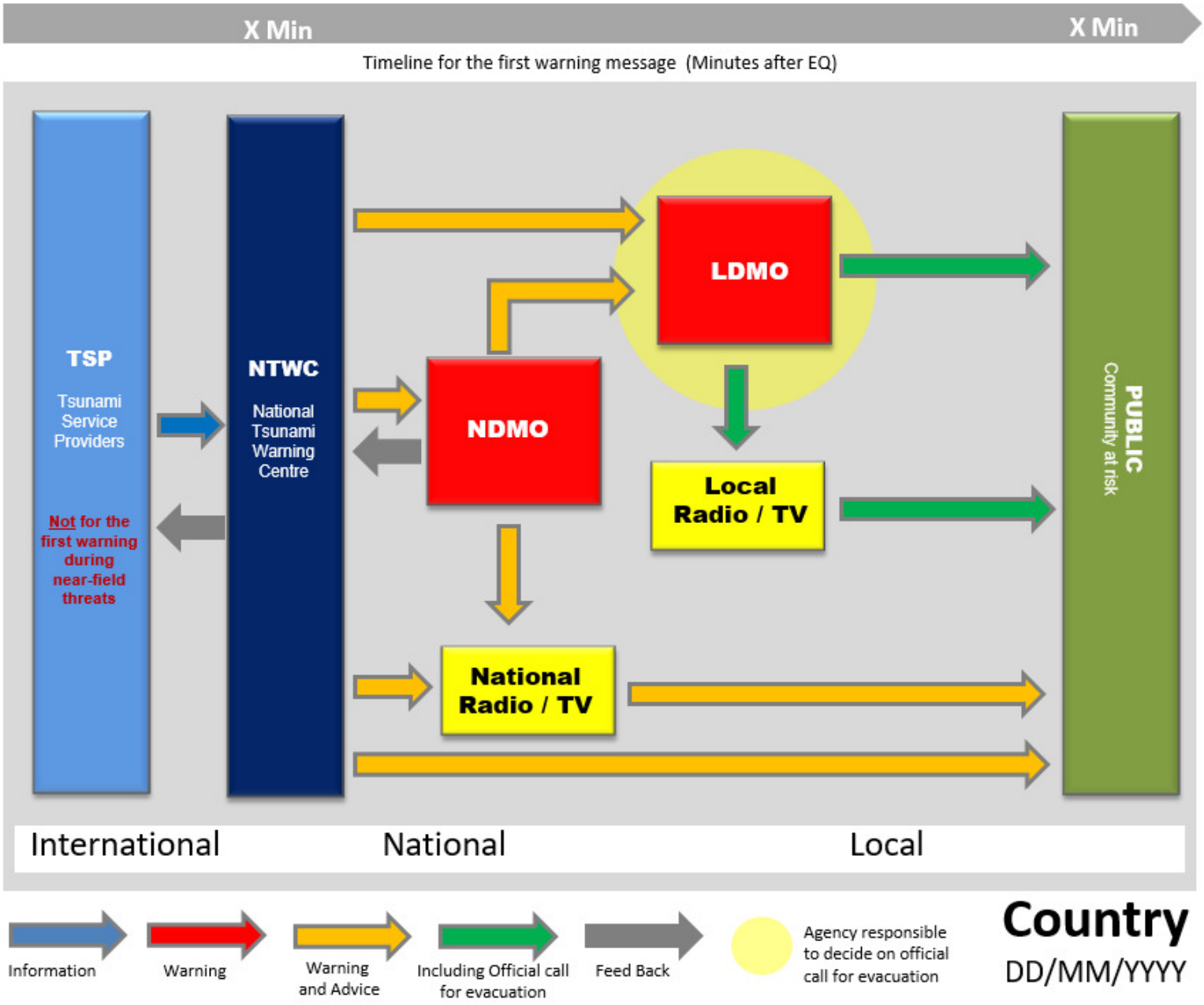
Review and verify it with all stakeholder involved

Experience shows that this is **the most important and usually also the most time-consuming part of the process**. The clarification of responsibilities and the agreement on a short and also practicable solution are the main focus here.

Ensure that it is consistent and easy to understand

A good visualisation of the warning chain should be **self-explanatory**. Make sure that flows and colour codes are consistent. If an external person can read the warning chain correctly, everything is ok

The Warning Chain Template



Colour Codes & Definitions

Information from TSP

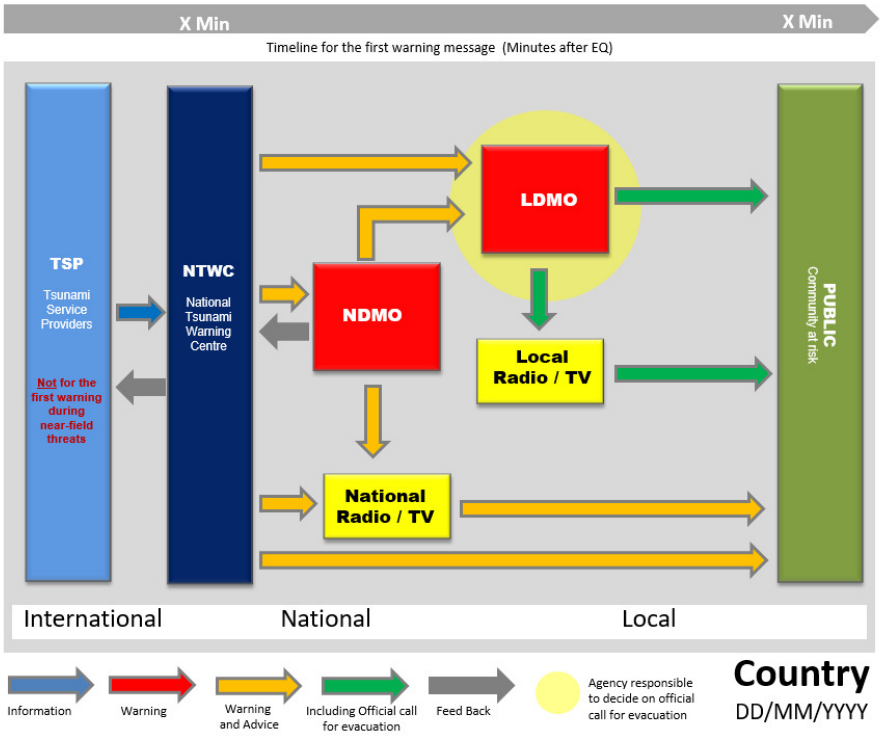
Threat Information
by TSP to NTWC

Warning only

Warning by NTWC
- no advice attached -

Warning plus Advice

Warning message that include an **Advice**. Ideally this is issued already **by NTWC, based on an agreement with the NDMO**. Content of advice usually relates to the respective warning level.



Official Call for Evacuation

Warning / Advice messages that include an **Official Call for Evacuation** **issued by the mandated authority** in case it is required. This implies a separate decision making process by the respective authority and issuing a specific message which includes warning information and a call for evacuation if required.

Feedback Loop

Feedback Information to confirm the receipt of warning messages and to inform about the situation

A **yellow circle** marks the agency responsible to decide on official call for evacuation

X Min **Timeline** **X Min**

The **Timeline** indicates the targeted deadline to send out the **first warning message** by NTWC and the time when it should arrive at the community at risk

Particularly important **in case of a near-field threats**!

Consolidating the warning chain

Check these aspects

Consistency

Are the flows consistent?
Decision making? Colour codes?

In line with time?

Does the proposed **time line** match calculated Minimum ETAs from hazard assessment? Does the time line allows enough time for community response?

Can it be shortened?

Warning chains should be **as short as possible** - especially for near field threats. Each step in the warning chain takes time and is a possible point of failure.

Redundancy

Robust warning chains **include parallel flows of warnings to assure redundancy** in case of failure at one point. Does the community at risk receives the warning from multiple sources? Are the contents of messages from different sources well aligned?

Is it feasible in real life?

Is the proposed flow of the warning chain feasible in the time available? Are all institutions **24/7**? Do they have sufficient human resources to operate the warning chain?

Agreed by all actors involved?

Are all key actors considered and properly represented? Is the outline of the warning chain fully understood and accepted by all stakeholder involved?

Operating the Warning Chain

SOPs are necessary to operate the warning chain

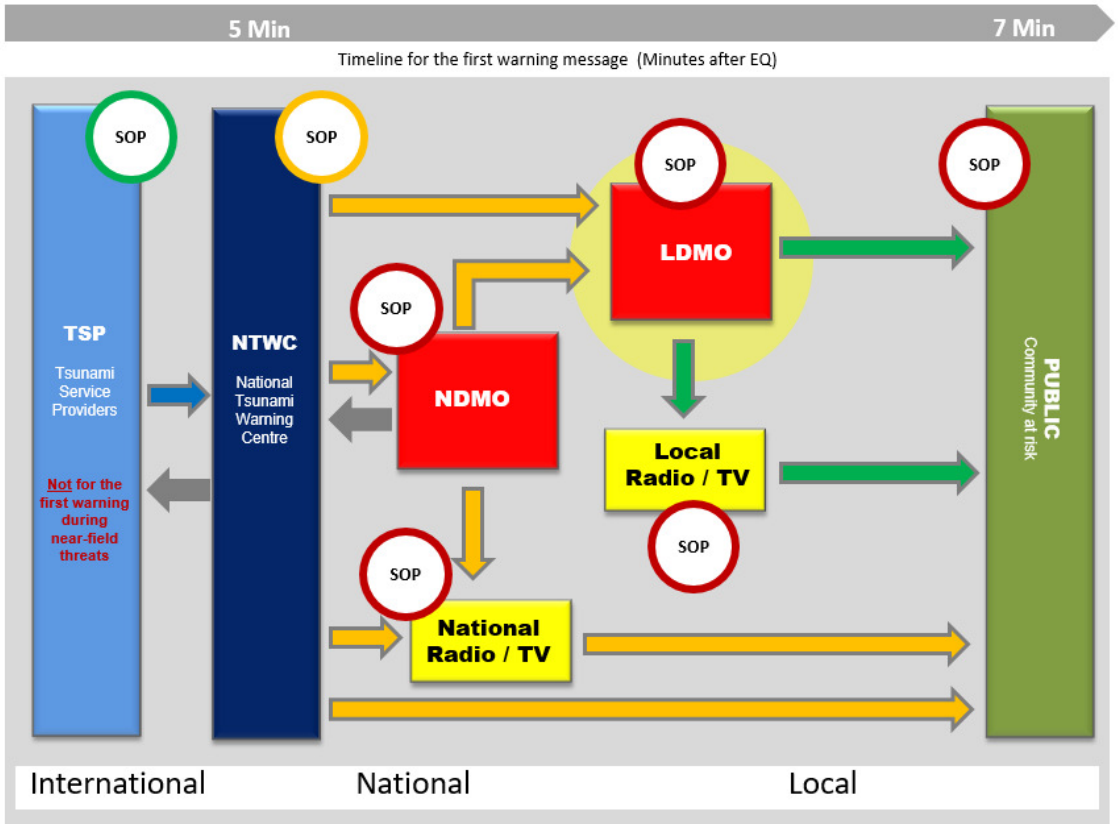
SOPs are needed at institutional levels. They must be **integrated** and **timeline-driven**.

Ensure that SOPs are functional at all levels

The warning chain is only as strong as its weakest link. Developing solid SOPs **requires the cooperation** of the stakeholders. Pay specific attention to SOPs at the **local level**.

Visualise the status in the warning chain graphic

The visualization of the status of SOP development helps to **monitor the functionality** of the warning chain and shows **where action for improvement is needed.** A simple set of colour codes provides a quick overview.



Existing SOP and functional

Existing SOP, which needs still to be improved

SOP not yet existing

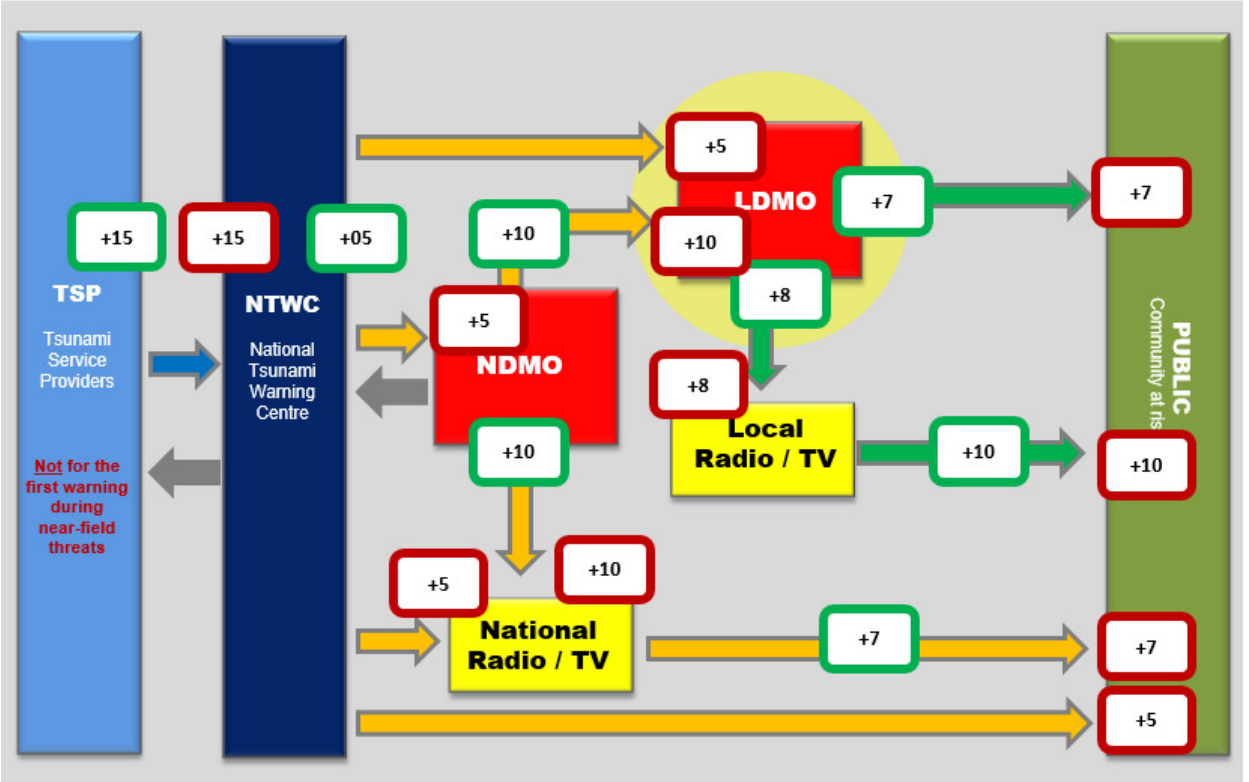
Performance Evaluation

Document the actual timelines…

The graphic can be used to document observed times of receipt and transmission of warning information along the Tsunami Warning Chain

…for the entire warning sequence

It is recommended to document the flow for all outgoing NTWC warning messages with a separate copy of the graphic for each NTWC message sent



Applicable for Exercises or Incidents

Suitable to evaluate end-to-end tsunami exercises or any real tsunami incident where a warning was issued. All time data should be based on the information provided by the participating institutions and should result in a joint evaluation.

Our Experiences

Succesfully applied in the IOTWMS

National warning chain graphics have been developed and are now used in 24 countries around the Indian Ocean rim

Proven to be easy and effective to use

The visual and thus universal language facilitates a common understanding. It helps to focus the discussion on the essentials and at the same time documents any progress that has been made.

Suitable for application in other ocean basins

Since the challenges of developing tsunami warning chains are likely to be similar around the globe, the approach should be applicable in other regions without any problems. First countries in NEAMTWS are testing it already.

Applicable also for other hazards

Warning chains are a core element of any Early Warning System for natural hazards. This visual approach has already been adapted to hydrometeorological hazards and successfully applied in some countries in Europe and Latin-America.

Acknowledgement

This brochure gives a short overview of the visual approach to support multi-stakeholder work processes to strengthen tsunami warning chains, which has been developed and put into practice in the IOTWMS over many years.

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