

Principles of Effective Warning Systems
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A warning system is an organized process for detecting a hazard and rapidly disseminating information about the threat and appropriate protective actions. In most cases, warning transmission occurs in multiple stages from the original source, through intermediaries (e.g., newsmedia, and state and local emergency managers and public health officials), to end users (e.g., households and businesses). Intermediaries and end users critically evaluate the information they receive from authorities and will challenge it, supplement it with additional information, or ignore it if they consider it inadequate. Accordingly, warning system designers should attend to the following lessons, learned from fifty years of research and operational experience, about the principles of effective warning systems.

Recommendations Related to Warning Message Effects

1. Identify the actions that those at risk should take (e.g., sheltering during tornadoes) and also actions that might seem reasonable but actually are dangerous (e.g., evacuation during tornadoes).
2. Identify the incentives and disincentives for each protective action, as well as the constraints that prevent people from taking them.
3. Develop programs for overcoming constraints to protective actions (e.g., providing evacuation buses for those without personal vehicles) and publicize these programs.

Recommendations Related to Warning Receivers

4. Recognize that "the public" is heterogeneous. Households, businesses, government agencies, and non-governmental organizations vary in size, demographic composition, hazard knowledge, and emergency response resources.
5. Identify the ways that population segments differ from each other in their perceptions of the credibility of different sources, their access to different warning channels, their reactions to warning message content, and the constraints they face when implementing protective actions.

Recommendations Related to Warning Message Content

6. Recognize that actions are triggered by *changes* in threat conditions. Develop systematic procedures for evaluating the need to change a threat condition and recommending specific actions that should be taken at each threat condition.
7. Be as specific as possible about the nature of the threat, the population at risk, and the expected time of impact so warning recipients will *personalize* the risk and *prioritize* response to it.
8. Recommend specific protective actions that will provide protection and be feasible for implementation by all segments of the population at risk.
9. Explain to those who are *not* at risk that they are not at risk and why they do not need to take protective action.

10. Use terminology in warning messages that is consistent across time for a given hazard and does not conflict with terminology used for other hazards.
11. Let people know when the threat has ended so they know when and how to resume normal activities.

Recommendations Related to Warning Message Timing

12. Disseminate warnings in time for people to implement protective action, even if there is a high level of uncertainty about the threat. Describe the uncertainty and explain why it exists.
13. Do not withhold information because of concern about "panic" (which is commonly anticipated but almost never occurs). If authorities withhold information, people will seek it from other, less reliable, sources.
14. Repeat the warning message at regular intervals to be sure that those at risk will receive, notice, and understand it.
15. Update information when conditions change significantly. Call attention to the new information and explain why it has changed.

Recommendations Related to Warning Channels

16. Use multiple channels to disseminate messages. Consider the relative advantages of mass media, loudspeakers, telephones, face-to-face communication, and even the Internet.
17. Identify the communications channels that different segments of the population monitor routinely to ensure that all demographic groups receive timely warnings.

Recommendations Related to Warning Sources

18. Identify in advance which organizations (and individuals within those organizations) will be responsible for communicating with those at risk.
19. Recognize that no single source has complete credibility regarding all aspects of the threat and protective actions, so procedures should be established by which information from different sources will be combined to ensure that messages are accurate, complete, specific, timely, and consistent.
20. Recognize that source credibility can be established initially by credentials such as agency mission and educational degrees, but is enhanced by following objective ("transparent") procedures that are prepared in advance rather than improvised during an incident, by publicizing endorsement by external experts ("peer review"), and establishing a satisfactory record of performance over time.
21. Explain that warnings are based on best available professional practices, not unattainable ideals of instantaneous dissemination and perfect accuracy.

Recommendations Related to Training

22. Provide training about the hazard and protective actions if those at risk must respond to situations with which they are unfamiliar, even though few people will take advantage of this training before an incident.
23. Adapt the scope of the training effort to the training motivation and capabilities of each target audience, especially end-users such as households and small businesses.
24. Emphasize the common elements of emergency preparedness for all hazards because this will enhance the transfer of training from one situation to another.

25. Design training to promote creativity rather than just rote response because improvisation will be necessary in actual emergencies.

Recommendations Related to Technology Development

26. Actively promote continued evolution of the warning system to accommodate change in knowledge about the hazard, communication technologies, and the response capabilities of the population at risk.

Recommendations Related to Evaluation

27. Conduct careful pre-implementation evaluations to ensure that all new emergency response technologies meet user needs and are compatible with other systems in use.
28. Conduct post-incident assessments of all plans, procedures, staffing, training, facilities, and equipment so revisions can be made to improve response to future incidents.

For further reading:

Lindell, M.K. & Perry, R.W. 1992. *Behavioral Foundations of Community Emergency Planning*. Washington DC: Hemisphere.

Lindell, M.K. & Perry, R.W. in press. *Risk Communication: Hazard Awareness and Disaster Warning for Multi-Ethnic Communities*. Beverly Hills CA: Sage.