Monitoring and Maintenance of the German Indonesian Tsunami Early Warning System (GITEWS)

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This article discusses aspects of and experiences with monitoring and maintenance of the geographically widely distributed components of a Tsunami Early Warning System (TEWS) in the Indian Ocean. Many of the issues, encountered during work within the GITEWS project (German Indonesian Tsunami Early Warning System, Rudloff et al., 2009) on the design and implementation of the monitoring system, are also relevant for other types of warning systems. With this article, insights and lessons learned are shared with the community.

Failure to deliver a warning has fatal consequences. Based on an analysis of the criticalness, vulnerability and availability of single components, we describe the design and implementation of a communication and monitoring architecture and development of standard operating procedures (SOP) for maintenance (Communication architecture of an early warning system, Angermann et al., 2010).

The GITEWS project is composed of several thousand integrated system components and software processes. During the establishment of the currently existing system, complexity grew and monitoring and maintenance needed further automation to capture any critical states of the whole system and to establish the correct responsive means. One means of monitoring is the use of an adapted Nagios monitoring implementation covering a large number of infrastructure assets (hosts, network components, remote sensor stations, storage) and business processes (processes and applications). This is to be extended in the future for further operational monitoring of station parameters (power voltage, battery levels) with the challenge of monitoring in on- and offline modes. An aspect of maintenance is the development of a practical and precise means of documenting all system properties. Providing a platform for continuous documentation of system changes and maintenance and enabling information-exchange/ collaboration between the different responsible institutions, departments and companies was achieved by employing a Wiki-platform.

Monitoring helps to detect system malfunction and documentation provides a means to further interpret possible causes and consequences. The documentation also serves as a knowledge base for maintenance and corrective measures. Yet, corrective and preventive measures have to be properly defined as standard operating procedures (SOP). Together with the Indonesian personnel, sets of SOP are defined for various system component failures. System component failures have a defined impact on the overall system and thus SOPs are developed with different priority levels and service level agreements (SLA). To enact the proper sequential execution of SOPs by the different responsible institutions, departments and companies, a ticketing system meeting the special needs of timely collaboration is going to be established. Together, with extended monitoring of sensor stations, the establishment of a ticketing system represents the current focus of work.