Flexible Data Entry
for
Information Warning and Response Systems

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The Problem: Incidence Response

- The need to collect data that can provide warnings to avert crisis situations is paramount to many modern military and civil response systems.

- Flexibility in the collection and description of new or ongoing incidents is critical for accurate and timely analysis and response.
• A Suite of Information Technologies:
  – Support the Command and Control (C2) required to detect, track, collect, and analyze a variety of incidents.
  – Provide the means for fusing information from a variety of data sources that are associated with the detection and tracking of chemical and biological attacks, both overt and covert.

• Detailed Capabilities:
  – Effective Nuclear-Biological-Chemical modeling.
  – Display and update of situation awareness.
  – Information fusion and analysis.
  – Incident detection and tracking.
IMMS System Components

• **Digital Dashboard** Command Post Software
  – A data fusion system providing a suite of applications designed to consolidate, display, and manage both day-to-day and Chemical-Biological contingencies and hazard data from sensors, reconnaissance reports, and hazard modeling.

• **Detection Network**
  – Is established by using electronic, signal-control devices that provide a communication link and a computer interface to integrate dissimilar, remotely located devices (e.g., detectors, sirens, warning lights, GPS receivers, and meteorological sensors) into a common network.

• **Warning Devices**
  – Consisting of both audio systems and light systems that disseminate alarms and critical condition information.
IMMS Digital Dashboard

- The dashboard can be configured to suit the needs of a particular operator or for a particular situation.

- Incidents (along with associated analysis data) can be displayed and tracked through the dashboard.
Incident Collection

- IMMS supports the *collection* of a variety of incidents through a tool called the Electronic Activity Report (EAR) Manager.
  
  - The EAR tool is available through the IIMS Digital Dashboard.
  
  - The EAR tool supports both standalone incident collection and collaborative collection and analysis.
Electronic Activity Report (EAR)
There are over 33 EAR categories currently defined and used in IIMS:

- Some of these have detailed fixed data entry elements.
- Some have only headers and footers for comment fields.
- Any undefined data type must be described as text in the comment fields.
Experiment Objectives

• **Situation:** Since all of the data description elements in the EAR forms cannot be realized in the design process, it would be useful to provide forms that can **adapt** to the data being collected.

• **Objectives:**
  – Allow the user to capture data about events that were not anticipated and therefore not defined in the existing data entry forms or database schema.
    • Allow EAR data fields to be extended by those users who are actually conducting the monitoring and collection.
    • Allow users to specify new data fields in a structured format instead of as a textual comment.
      – Convert EAR data element representation to XML.
Expected Benefits

• Reduced use of incident descriptions as textual remarks
  – By allowing users to add incident descriptions as XML data elements more immediate automated data analysis and interchange with other XML based systems would be enabled.

• Facilitate database schema revisions to meet incident reporting requirements

• Enhance ability of IIMS to interchange data with XML-based systems/tools
Our Approach

• Use a tool called Tracker to support the generation of incident templates.
• Use the Tracker tool to support the extension of the data-entry forms during incident reporting.
• To store Tracker-based incident reports into the IIMS Oracle Database.
Tracker Overview

- Tracker was developed as part of the DARPA Active Templates program. It was developed to support both the construction and usage of templates at different levels of the C2 structure.
- It supports template authoring with:
  - A full set of Java/Swing widgets.
  - Custom widgets, loaded dynamically by a template.
  - Scriptable values, role-based field-locking, and pictures.
- It supports template usage and extension in both a standalone and in a collaborative mode.
Tracker User Documentation

- Complete documentation.
- On-line Help.
Tracker Authoring Tools

- Text field/area, checkboxes, radios, menu, list, images, table, grid, slider, date(s), URL, external-app-call (e.g., maps), sub-templates.
- Custom Java widgets (special output reports including: text and PowerPoint).
- Easy linking of pre-defined templates.
- Easy linking of field values with other values with or external to a template.
- Action buttons (script code).
- Script-computed value fields (for supporting computations).
- Attachments.
- Database interfaces.
Tracker Collaboration

- A set of related templates can be shared among users.
- All edits are dynamically sent to all others who have that template open.

The Update Button changes color to indicate when a change has occurred.

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Tracker/IIMS Experiment Tasks

• Run Tracker as a *Dashboard Cell* and as a *standalone* application.
• Use Tracker to convert existing EARs into XML-based templates.
• Allow end users to modify an EAR during incident reporting through the use of a Tracker EAR template.
• Store Tracker-based incident reports into the IIMS Oracle Database.
• Provide information about added data elements to IIMS for possible incorporation into the IMMS database.
Tracker Version of the EAR

- We developed Tracker templates to represent many of the 33 EAR categories.
- We enabled data value pulls from IIMS database.
- Tracker templates partition parts of the EAR structure into separate templates that can be reused across templates as sub-templates.
- New data entry fields can be easily added while templates are being used to collect data.
Results

• We were not able to implement Tracker as a cell within the IIMS Dashboard.
  – Future option: if the Tracker authoring widget tools were separated from Tracker, then the authoring capabilities could be more easily integrated and used by tools like IIMS.

• We were able to demonstrate that by using a standalone Tracker, EAR data fields can be easily extended by those doing the incident monitoring and collection.

• Tracker EARs are already represented as XML.

• A database table was developed to provide the IIMS administrator with information about newly added or modified Tracker-based EAR templates and/or data fields. This table in effect specifies requirements for future EAR (and associated database schema) revisions.
• Flexibility in the collection of incident data and incident descriptions is critical for accurate and timely analysis and response by military and civil response systems.

• The importance of both the need for data and the need for dynamic flexibility in data collection is magnified when the incident is ongoing.

• Our research indicates that the provision of unstructured, flexible data entry systems like Tracker can offer the end user the ability to modify and update templates that have schema-specific structure.