

User interface design for a biosurveillance system

Andrew Wadsworth¹, Wendy Edwards¹, Awais Vaid² and Ian Brooks^{1*}

¹Health Sciences Group, National Center for Supercomputing Applications, Urbana, IL, USA; ²Champaign-Urbana Public Health District, Champaign, IL, USA

Objective

INDICATOR, an existing biosurveillance system, required an updated user interface to support more data sources and more robust reporting and data visualization.

Introduction

INDICATOR provides an open source platform for biosurveillance and outbreak detection. Data sources currently include emergency department, patient advisory nurse, outpatient clinic and school absence activity. We are currently working with the University of Illinois College of Veterinary Medicine and will include veterinary data so that animal and human health data can be analyzed together.

Methods

The INDICATOR user interface must support multivariate searching, visualization and reporting. Primary users of the system are public health officials with varying degrees of technical experience. Therefore, it is critical that the INDICATOR interface be simple yet powerful. It needs to provide a clear and recognizable hierarchy of search options.

The designer met with key stakeholders, including investigators of the Champaign-Urbana public health district to determine functionality requirements. He then developed use cases and mocked up iterative designs of the user interface, refining them in response to feedback.

Results

The usability study yielded a list of user groups, specifically county health care infectious disease (ID) specialist, county health care medical professional, Carle/McKinley ID specialist and medical professionals, school district medical professional or ID specialist, other local ID specialists, veterinary medical professional or ID specialist, ID researcher, state/federal ID specialist, high-level stakeholder and system administrator.

The study also yielded a hierarchy of searchable categories, e.g., medical diagnoses, school attendance, weather, veterinary and system-generated alerts. The user starts with one high-level category, e.g., medical diagnosis, and is then able to narrow the search by specifying data source, diagnosis, syndromic group, etc. The system provides 'merge' functionality to allow comparison of disparate data sources, e.g., weather and flulike illness (Fig. 1).

The team chose Google Web Toolkit (GWT), a well-supported open source software package for the implementation. This allowed a highly interactive user interface that required only a simple web browser for the client. For example, we are able to dynamically generate and populate widgets for searching in response to the terms previously entered by the user. To represent the hierarchical search categories, we use XML files. This enhances maintainability by allowing us to add, edit and remove terms without modifying the code.

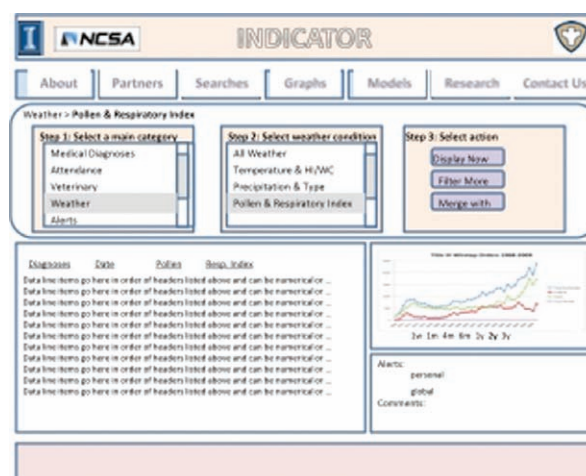


Fig. 1. User interface design for INDICATOR.

Conclusions

The focus on usability yielded a design for a simple, yet powerful user interface that supports exploration of time series and spatial data.

Keywords

Biosurveillance; user interface; usability; veterinary data; design

Acknowledgments

We would like to thank Carle Foundation, Christie Clinic and schools in Champaign County for sharing their data. We would also like to thank members of the One Health project at the University of Illinois College of Veterinary Medicine for their input.

References

1. Brooks I, Edwards W, INDICATOR: a cyberenvironment for biosurveillance and response. Syndromic 2009.
2. <http://www.ncsa.illinois.edu/News/Stories/indicator/>
3. <http://code.google.com/webtoolkit/>

*Ian Brooks

E-mail: ian@ncsa.illinois.edu