Report on the Unified Reporting Database

A Specific Cooperative Agreement with the United States Department of Agriculture's Agricultural Research Service

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Summary
USDA CSREES, the EPA, Sustainable Ag Research & Education (SARE), and Regional Integrated Pest Management (IPM) Centers have systems to report the results of projects that they fund. In the past, searching through these reports required accessing separate websites, all with different reporting formats. A group consisting of representatives from these entities decided to create a unified database of reports (now called an Interagency IPM Database) using techniques that share fields of information from multiple databases. The database was created and can now be accessed at http://projects.ipm.gov/. It currently contains 295 projects and by early 2009 should house hundreds more. Reports are being submitted from multiple granting programs that focus on integrated pest management. Such information will someday illuminate gaps in IPM research and education and point to trends in IPM adoption.

Introduction
The idea for a Unified Reporting Database of IPM projects grew out of discussions among representatives of USDA Cooperative State Research, Education, and Extension Service (CSREES), Environmental Protection Agency (EPA), the Sustainable Agricultural Research and Education Program (SARE), Regional IPM Centers, and the American Farmland Trust. This consortium assembled in Burlington, Vermont, in October 2004 and is now referred to as the National IPM Evaluation Group (NIPMEG). One of the subcommittees of this group, the Reporting Subcommittee, began to investigate the possibility of creating a web clearinghouse that would display reports of projects from multiple agencies on one searchable website. IPM-related agencies with grants programs have systems to report the results of funded projects, but searching through these reports necessitated familiarity with each separate system. It was mutually beneficial to USDA, IPM Centers, and several other agencies to create a unified database of reports. Doing so would combine parts of existing database structures into one searchable database, using terms that representatives from all the agencies agreed upon. Such an interagency reporting database would make it easier to mine a mass of data (by enabling searches by pest, commodity, state, date, and other parameters), provide access to works not published in journals, document successes in IPM adoption, help researchers find collaborators (especially those working on similar projects in different geographic areas), enhance grants management by enabling quick searches of current and past funded projects, help identify gaps or redundancies in funding, open opportunities for leveraging funds, and create a clearinghouse of information to aid writers in publicizing IPM work to the general public. Ultimately, such a database would enable us to track progress and document IPM impacts. In 2008 the term "Unified Reporting Database" was renamed the Interagency IPM Database.

Approach and Procedures
The NIPMEG Reporting Subcommittee reviewed reporting websites from the following agencies:
Sustainable Agriculture Research and Education (SARE):
http://www.sare.org/reporting/report_viewer.asp
Performance Planning and Reporting System (PPRS):
http://www.pprs.info/IPM/index.cfm
Current Research Information System (CRIS):

http://cris.csrees.usda.gov/

EPA Strategic Agricultural Initiative:

http://www.aftresearch.org/sai/reports/

IPM Centers:

http://www.ipmcenters.org/research/pmcprojects/pmcprojects.cfm

The reporting committee felt that the SARE and PPRS reporting sites were the closest to their desired final product because their search methods were similar and the output pages included many of the parameters requested of the unified database. Committee members and others agreed on common terms to be displayed in a unified database of reports and decided which terms would be searchable.

Currently, all of the participating agencies have a variety of web-based systems to track funded projects. The new system does not usurp any of these individual systems, but instead uses fields of information from the existing reporting databases and places them into the unified format for a consistent display. In the perfect scenario, retyping of information would not be necessary; however, some additional programming by each agency has been required to allow this information to be exchanged seamlessly. Agencies will need to monitor their information to be sure it is accurately displayed. If any manual input of data is required, this will also be each agency's responsibility.

The Reporting Subcommittee sought cooperation from the Agricultural Research Service to construct a unified database of reports. ARS agreed to fund the Northeastern IPM Center at Cornell University for $25,000 through an interagency agreement on September 30, 2006. With these funds, the Center designated Liz Thomas as coordinator of the project. She hired Andrew Pushlar for the initial phases of the programming and Ron Stinner and the staff at the NSF Center for IPM (CIPM) for the intermediate and final phases of the database. They followed the guidelines and criteria developed by NIPMEG, including database design and the web interface.

Results

System Description

The Interagency IPM Project Database Application (http://projects.ipm.gov) consists of three parts: a standard webserver (Microsoft), a database that is on MS SQLServer, and Cold Fusion as middleware that translates between the web and the database. Cold Fusion is a java-based, higher level language. Cold Fusion was used because it has cross-platform compatibility (it can run on Unix, Linux, and Microsoft Windows). Cold Fusion is currently used in most of the Regional Centers' applications, as well as numerous web applications for CSREES, the Forest Service, and APHIS. It provides rapid application development and superior security. The most recent versions have advanced pdf handling capabilities. Cold Fusion is an Adobe product, as is Adobe Acrobat/Reader. The entire system could be ported to Linux relatively easily if needed, transferring the data to MySQL, with an Apache server, without the need for re-coding any of the Cold Fusion scripts.

Use of Cold Fusion allowed us to focus on any newly discovered vulnerabilities and solutions for a single language. All applications and data sit behind a CISCO router/firewall approved by USDA/APHIS for handling sensitive data. There are daily partial back-ups and weekly full back-ups that are taken off-site and stored by Iron Mountain, more than 25 miles from Raleigh.

The public view of the system allows users to search for IPM projects by multiple criteria, including project title, PI, funding agency, grantee organization, state, commodity, pest, as well as free text search and other search fields (see below).

Because at least some of the data fields are not available from earlier reporting systems, many of the data fields for specific projects are empty. The system cannot contain all of the specific information for the varied programs that could be included; therefore, every report has a field for a URL that links to the original project database, providing more complete information. The public view also contains "mouse-overs" (the pop-up boxes that appear after placing the mouse on the question marks) to more clearly define terms.

The secure administrative section of the system allows approved program managers to enter projects by hand, if necessary. For example, the Northeastern Region IPM Center staff can enter projects funded by their Center, but not by other Centers or programs. This is primarily for "catching up," since most of the recent projects in the system have been dynamically submitted, using secure web services, from the Proposal/Projects Management System in use by the Regional Centers and from CSREES IPM PPRS. The latter requires CSREES staff to click a button to send projects to the Interagency Project Database. This same mechanism can be used to update projects when reports are submitted.

In 2008 this database began to "harvest" reports from individual agency databases with the goal of displaying the reported information at both the individual agency level and simultaneously at the unified reporting database level. There are currently almost 300 projects in the system. A search on a given topic, for example alfalfa, yields the following screen:

At present, the Interagency Reporting Database contains projects from State IPM Coordinators (through IPM PPRS and CSREES staff); Regional IPM Competitive Grants program (RIPM); Regional IPM Centers internal grants programs; and the National *ipm*PIPE program.

The system has been developed so that any new agency or program can be added. The four USDA regions, five NPDN regions, and ten EPA regions are currently part of the database. Other regional groupings could be added as needed. Adding a new agency/program requires that a contact person for the agency/program be identified and trained. If the program is on a regional basis, a regional contact must also be identified and trained. SARE and NPDN are both in the system, but no contact individuals have been identified or trained for project data entry. The EPA Strategic Ag Initiative is in the system but has no projects in the Interagency Reporting Database. Tom Brennan of EPA has assured us that their database will contain the required elements and that they want to be a part of this. The web services information exchange requires application scripts on both the sending and receiving servers. For agencies not yet providing data, arrangements will need to be made with CIPM to obtain the server application.

Future Plans
Although all grant funds have been expended, some work will continue. NSF-CIPM will maintain the system but will not further develop it or provide training except on an ad-hoc basis. In 2009 the Northeastern IPM Center will enter all of its funded grants into the system and will encourage other governmental agencies to do so, specifically the EPA. In addition, Northeastern IPM Center staff will continue to teach others about the database through newsletters, links from our website, presentations, and updates to the USDA.