Multidisciplinary E-Government Research and Education as a Catalyst for Effective Information Technology Transfer to Regional Governments

Bienvenido Vélez-Rivera   Manuel Rodríguez-Martínez   Walter Díaz
Rafael Fernández-Sein   Pedro I. Rivera-Vega   Mario Núñez-Molina

Department of Electrical and Computer Engineering

University of Puerto Rico Mayagüez

egov@ece.uprm.edu

ABSTRACT

The Digital Government project at the University of Puerto Rico Mayagüez consists of research and education components aimed at identifying the most pressing obstacles to the adoption of information technologies by small regional governments in Puerto Rico. The project will propose optimal technological paths designed to ameliorate if not eradicate such obstacles. The end goal is to help regional governments adopt software technology suites that are reliable, accessible, cost effective and capable of empowering citizens with closer and better governmental services.

Categories and Subject Descriptors

K.4 [**Computers and Societyt**]: Digital Government

General Terms

Design, Experimentation, Security, Human Factors, Legal Aspects.

Keywords

Digital Government, Heterogeneous Databases, Multi-lingual, Information Retrieval, Hierarchical XML schemas.

1. INTRODUCTION

Electronic government systems have an unprecedented potential to improve the responsiveness of governments to the needs of the people that they are designed to serve. To this day, this potential is barely beginning to be exploited. Significant barriers hinder the effective integration of information technologies into government practices and their adoption by the public. Government agencies often find themselves in a disadvantaged position to compete with the private sector for information technology workers, a workforce whose shortage at a national level is well recognized. The need to abide by rigid procurement practices makes it virtually impossible for agencies to keep their technology infrastructure up to date with the fast pace of technological advances. For instance, Amdahl's law, a well known technological trend, predicts that processor speed doubles approximately every 18 months. Local and regional governments are particularly affected by this state of affairs.

The Digital Government Research project at the University of Puerto Rico Mayagüez is an NSF-funded effort by a multidisciplinary group including researchers from the University of Puerto Rico-Mayagüez (UPRM) and personnel from the municipal government from the city of Mayagüez The group members combine their talents in Public Administration, Computer Science, Engineering and Social Sciences, in order to: identify significant barriers to the effective transfer of information technology into government practices and their adoption by the public, engineer novel solutions to help overcome these barriers, and test their solutions in a real municipal government environment.

2. TECHNOLOGY TRANSFER COMPONENT

This component consist of a series of annual software projects in which teams of senior undergraduate students under the direct supervision of a faculty member get involved with an agency from the city of Mayagüez, the UPRM's hosting town, in the design of web-enabled applications aimed at satisfying the highest priority information needs of this agency. Each team of students goes through all the phases of the software engineering project from requirements elicitation, to design, testing and finally deployment.

During the first two years of project we have developed applications for the three major Mayagüez agencies: Public Works, Citizens Services and Public Housing. We have already installed beta versions of applications at all three offices and have gone through at least one round of feedback and fine tuning with each agency. All these projects make extensive use of open technologies and evolving standards including MySQL, Tomcat, JSP, Selvlets and the Java Struts application development framework.

3. RESEARCH COMPONENT

3.1 Multi-lingual Document Repositories

Our group is developing an information retrieval engine supporting and XML-based query language novel in two ways. First, the engine allows the expression of queries based on virtual hierarchical XML schemas encompassing several similar concrete schemas. Current systems force the user to specify one XML query for each schema available in the database thus limiting query writeablility to the a priori knowledge that the user has of the available XML schemas. Second, our system supports the dynamic integration of new XML schemas as these are developed and made available to the public. This adaptation to new schemas will no require costly modification and recompilation of the search engine thus yielding a more available and easier to maintain system.

3.2 Heterogeneous Governmental Databases

During the second year the effort on heterogeneous databases has focused on the design and development of the NetTraveler system. NetTraveler is a middleware solution supporting the orchestration, choreography and composition of web services to assemble applications from pre-deployed components. The effort pawns research threads in peer-to-peer database-backed applications as well as in distributed query optimization.

3.3 Semantic Document Management

This component of our Digital Government project works in collaboration with the regional office of the Registry of Deeds in Mayagüez. The effort is aimed demonstrating the feasibility of current technologies such as XML, XForms and the Bussiness Process Language as building blocks upon which workflow applications can be build in a cost effective manner to automate man of the processes run at the mentioned office. We are currently working on improving BPL's support for business process that require direct synchronous or asynchronous interaction with human participants. In particular, we are interested in designing and developing plug-in's for commonly used email systems in order to allow government employees to interact with other automated workflow engine components using familiar interfaces and without requiring re-learning of new applications.

4. SOCIAL ASPECTS

Walter Diaz and Mario Núñez have completed work on a sample survey of the population of Mayagüez which is designed to permit us both to describe and model citizen access and use of Internet and other information resources as a function of their demographic characteristics, geographic location, their use of other sources of information and their usage of governmental services. This information will permit us not only to further our understanding of e-democracy issues, but also to make concrete recommendations as to strategies to increase the benefits of e-government efforts for all citizens. Related to this, we are finalizing a GIS based analysis of the location of public virtual libraries intended to facilitate citizen access to computers and the Internet in relation to the demographic characteristics of the areas in which they are located. More specifically, we are looking at variables such as median income and the percentage of homes with telephones as important determinant of household access to computers and the Internet.

Another important thrust is the computer skill inventory of Mayagüez municipal employees that will permit us to assess some of the training efforts that will be necessary so that the municipal government can reap greater benefits from its e-government efforts. This project entails a census of the 1,000+ city employees to determine their present knowledge, use and access to computers and the Internet, in addition to their own perceptions about their training and education needs with respect to these technologies

5. ANNUAL DG CONGRESS

The Digital Government Project at the UPRM organized and celebrated the first Digital Government congress in Puerto Rico during the month of May of 1004. This first edition of the congress lasted one day and included a morning of presentations of both the technology transfer and the research components of the projects. Students presented their results in front of an audience which included people from the UPRM academic community, government personnel from the city of Mayagüez and other distinguished guests and collaborators. In the afternoon, UPRM Faculty organized free workshops tuned to the technology needs of the City of Mayagüez personnel as surveyed by Walter Díaz and Mario Núñez.

The second edition of the congress will be celebrated in May 9-10 of 2005. This time the congress will last for two full days. The first day will in essence follow the agenda of the first edition. However ,the second day will include invited talks by some of the key government officials currently in charge of determining and implementing Digital Government policy in Puerto Rico. The congress will be widely advertised and will be open to the public. We will focus on attracting key people from western region cities close to Mayagüez in order to stimulate proactive collaboration and technological dissemination within a larger region.

6. ACKNOWLEDGMENTS

7. REFERENCES

[1] Caituiro, Hillary & Rodriguez, Manuel. *Net Traveler: A Framework for Autonomic Web Services Collaboration, Orchestration and Choreography in E-Government Information Systems*. IEEE International Conference on Web Services (ICWS 2004). San Diego, California, USA. July 6-9, 2004.

[2] *Rodriguez, Manuel, Smart Mirrors: Peer-to-Peer Web Services for Publishing Electronic Document. Proceedings of the 14th International Workshop on Research Issues on Data Engineering: Web Services for E-Commerce and E-Government Applications. Boston, USA , March 28-29, 2004.*