Final Project Summary — PEER Lifelines Program

Project Title—**ID Number**	*Archiving & Web Dissemination of Geotechnical Data*—**2L02/2L02a**		
Start/End Dates	5/23/02 – 3/31/04	Budget/ Funding Source	$206,906 / PG&E/CEC
Project Leader (boldface) and Other Team Members	**Stepp (COSMOS)**		

1. Project goals and objectives

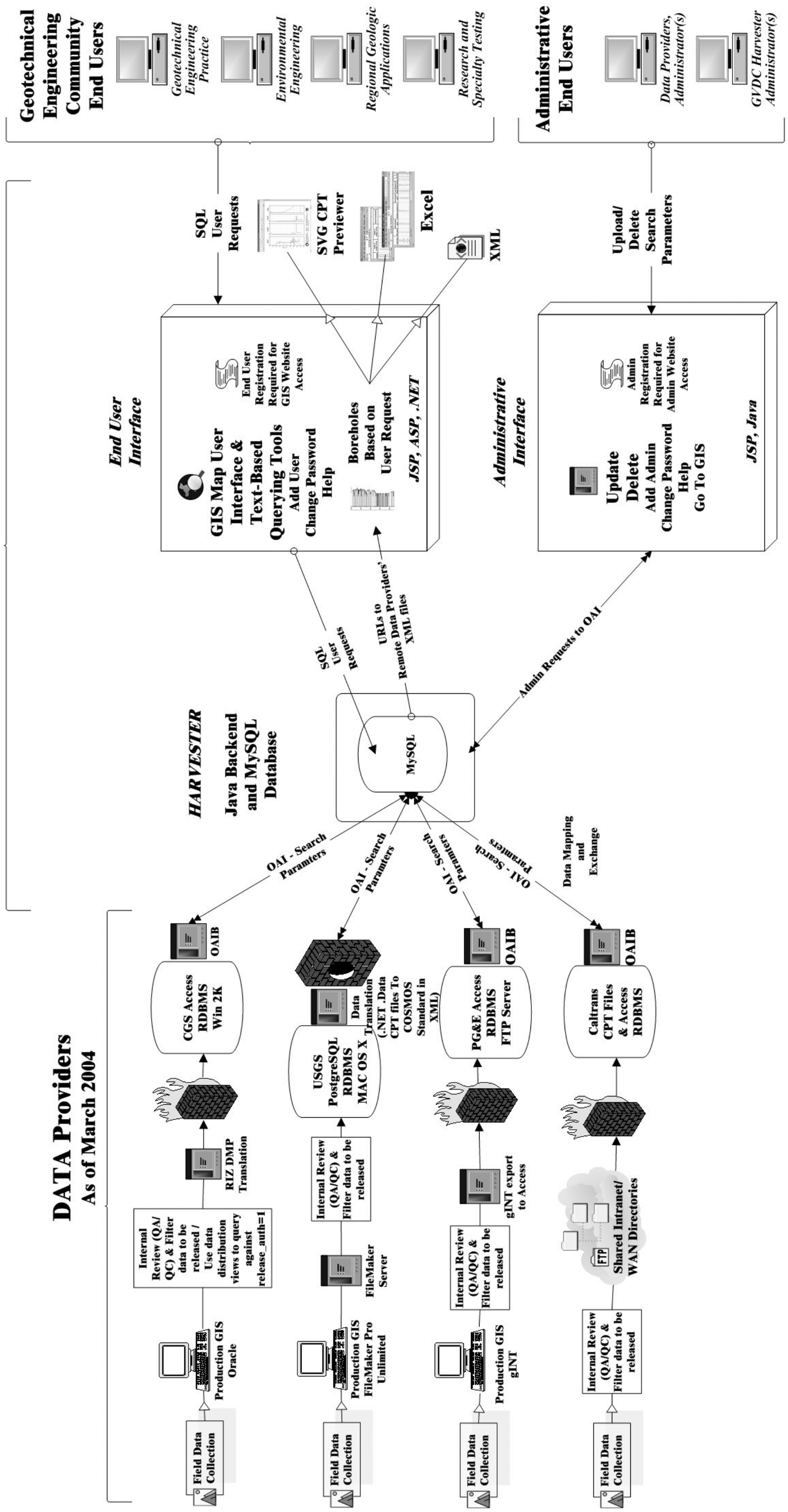
Develop a Pilot Geotechnical Virtual Data Center (GVDC) for archiving and web dissemination of geotechnical data and plan and conduct a workshop to review and obtain input and consensus of the geotechnical community.

2. Benefits of the results of this project to develop technologies and protocols to mitigate the vulnerability of electric systems and other lifelines to damage directly and indirectly caused by earthquakes. Also, benefits to develop assessment techniques to evaluate damage to electric systems caused by earthquakes and to assess fiscal impacts due to the loss of electric service to the community.

This project designed and developed a Pilot GVDC for web dissemination of geotechnical data. The project created a forum that brought together active geotechnical database archiving activities and established communication and coordination among them. The project combined the efforts of the participating organizations by sharing the technological knowledge necessary to implement exchange geotechnical and related information over the internet with each other and with the public, including the earthquake engineering community, government agencies, researchers, and industry. Participants retain all rights to use any and all products or their derivatives including computer programs, algorithms or other tools developed throughout the project for educational purposes, and that these products will be made available to any interested parties at no cost, subject to the following conditions: 1) interested parties may have a copy of compiled products or source code from any types of programming developed during the project, the source code may be used and modified, but if used and modified, the interested parties agree to pass along the same rights to the interested parties' version; 2) if interested parties use and/or modify source code, credit must be given to the originator of the code.

3. Brief description of the accomplishments of the project

This project accomplished the development of a Pilot Geotechnical Virtual Data Center system that links databases of Caltrans, the California Geological Survey, PG&E, and the U. S. Geological Survey. The system uses the Extensible Markup Language (XML) and the data dictionary developed for the project (COSMOS-XML) for data exchange. Elements of the GVDC system are shown in the following figure.



Detailed overview of GVDC system architecture

4. Describe any instances where you are aware that your results have been used in industry

The project final report is in preparation. Notwithstanding, the GVDC-XML (Extensible Markup Language) data exchange protocol developed for the Pilot System has been adopted by Caltrans, CGS, PG&E, and USGS, and the University of Missouri at Rolla Natural Hazards Mitigation Institute is adopting the GVDC-XML for the purpose of developing a "sister site" that will serve the mid-America Region. The Federal Highway Administration (FHWA) and representatives of departments of transportation (DOTs) from a number of states participated in the Project Workshop, which was held on June 21 – 23. Following the presentation and discussion of the GVDC at the workshop the FHWA has expressed interest in adopting the GVDC-XML as an element of the Geotechnical Assets Management System that the Agency is developing. COSMOS has drafted a scope of work and discussions are in progress with a number of organizations, NEESinc, NGS, POSC, FHWA, to initiate a project to develop an international consensus geotechnical data exchange standard (See Section 7).

5. Methodology employed

This scope of the project includes four main tasks: 1) define geotechnical data user scenarios for a Pilot GVDC system that links the CGS, CalTrans, PG&E, and USGS geotechnical databases, 2) develop a data dictionary standard for the pilot system that is expansible to a GVDC system that links many geotechnical databases, 3) integrate these results to implement the Pilot GVDC system, and 4) plan and implement a workshop structured to obtain geotechnical community consensus and deliver a workshop proceedings that will serve as an expanded implementation plan for development of a GVDC system that will serve the needs of the broad geotechnical community. A Work Group (WG) was established to implement each of these tasks. WG leaders were identified: Loren Turner, Caltrans, for WG-1; Jean Benoit, UNH, for WG-2; Jennifer Swift, USC, for WG-3; and Carl Stepp, Project PI, for WG-4. WGs 1-3 included about ten persons each and were constituted of persons representing the four data providers, other data centers, Petrotechnical Open Standards Consortium (POSC) and COSMOS Strong-Motion VDC, PEER and SCEC, and private sector companies. The WGs met together to initiate the project and interim project meetings were held to coordinate the work, track progress, and plan the remaining efforts to complete the project scope of work. The workshop included participation by the broad community of geotechnical data developers, groups engaged in geotechnical database development, and geotechnical data users.

6. Other related work conducted within and/or outside PEER

NEESinc - Developing a system for exchange of geotechnical data within the NEESinc
Association of Geotechnical and Geoenvironmental Specialists (AGS) – Maintains the AGS geotechnical data exchange protocol, http://www.ags.org.uk/.
Open GIS Consortium, Inc. – Maintains the OGC data exchange protocol, http://www.gis.com/.
POSC – Serves the Petrochemical Industry using the XML data exchange protocol, http://www.posc.org
USC – Research under the leadership of J. P. Bardet, bardet@rccg01.usc.edu

7. Recommendations for the future work: what do you think should be done next?

The following tasks, all of which were recommended by the Project Workshop held on June 21-23, 2004, should be completed in order to implement the Pilot GVDC for the broadest benefit to the geotechnical engineering community.

1. Development a General Data Exchange Dictionary Standard that has broad international consensus. The standard could be developed by merging the GVDC-XML and the AGSML (Association of Geotechnical and Geoenvironmental Specialists) data dictionaries.
2. Migrate to the Open GIS Consortium (Open GIS Consortium, Inc.) standard, which has the potential advantage that it would open access to geotechnical data to a significantly larger user community.
3. Complete the steps required to release GVDC-XML schema to version 1.0.
    - Declare the schema to be normative.

- Establish a working group to oversee version developments.
- Develop "User Guidelines" for Data Providers.
- Provide for documentation.
- Develop training materials and hold training classes for GVDC data providers and their user base.

4. Develop a geotechnical velocity log previewer.
5. Expand the Data Dictionary to include additional geotechnical and related data types.

8. Author(s), Title, and Date for the final report for this project

Jennifer Swift, Loren Turner, Jean Benoit, Dan Ponti, Charles Real, John Bobbitt, Carl Stepp, and Clifford Roblee, "A Pilot Geotechnical Virtual Data Center", September, 2004.