Collaborative Research on Web Dissemination of Geotechnical Data

May 21, 2002

Jennifer Swift, USC

Carl Stepp, COSMOS

Diane Vaughan, CGS

Paul Grimes, Caltrans

Loren Turner, Caltrans

Agency, Academia and Industry Collaboration

- **Phase I: Needs Workshop, October 4-5, 2001 "Archiving and Web Dissemination of Geotechnical Data"**
- **Phase II: Pilot Implementation Plan and Workshop, January 2003 "Archiving and Web Dissemination of Geotechnical Data II"**
- **Phase III: Long Term Plan for Virtual Geotechnical Data Center**

Phase I: Needs Workshop, Oct. 4-5, 2001 "Archiving and Web Dissemination of Geotechnical Data"

Project/Workshop Objectives:

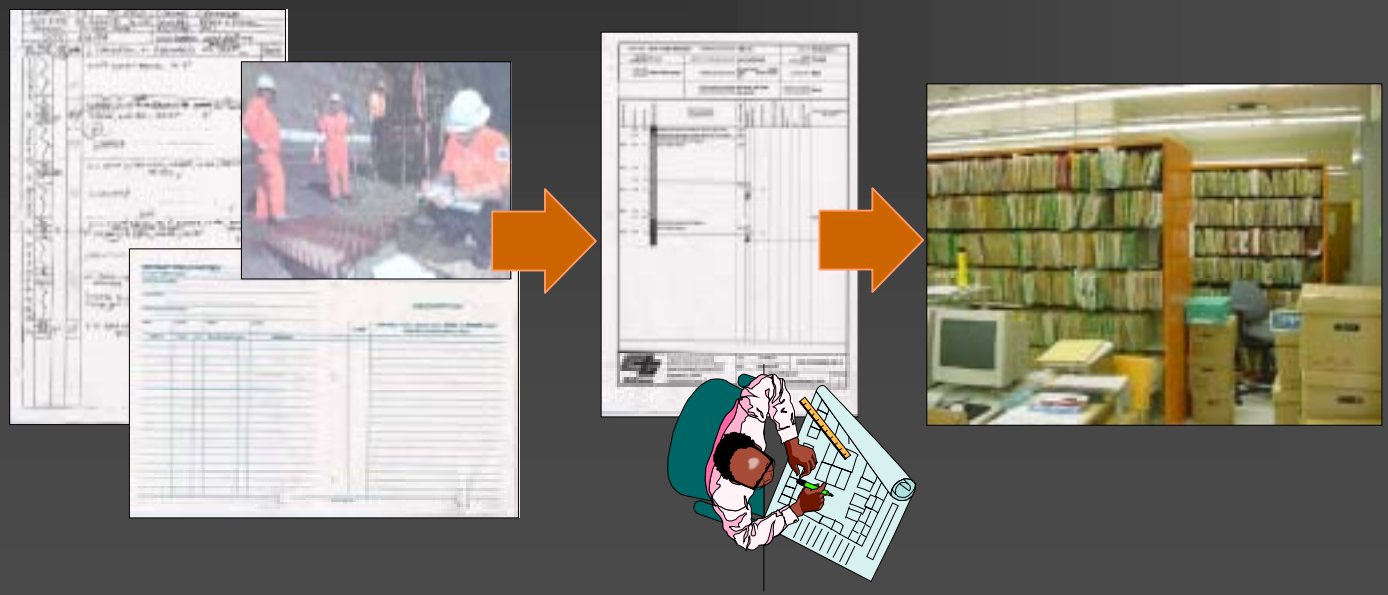
- Identify User Interest Nationally – Agency, Academic, and industrial
- Exchange Current Expertise
- Develop Consensus Vision & Action Plan to design and implement a Virtual Geotechnical Data Center

Need for a Virtual Geotechnical Data Center

- Borehole and seismic data can be used in the earthquake hazard problem
  - Direct estimation of site effects
  - Nonlinear effects of ground motion
  - Ground motion prediction – scenario earthquakes
  - Details of earthquake source
  - Liquefaction and landslide zonation
- For Caltrans and other agencies, access to geotechnical data provides a cost effective means for data distribution, real-time access, thus savings in time and resources

Caltrans' Motivation

- Currently a paper-based organization
- Need for more efficient information system



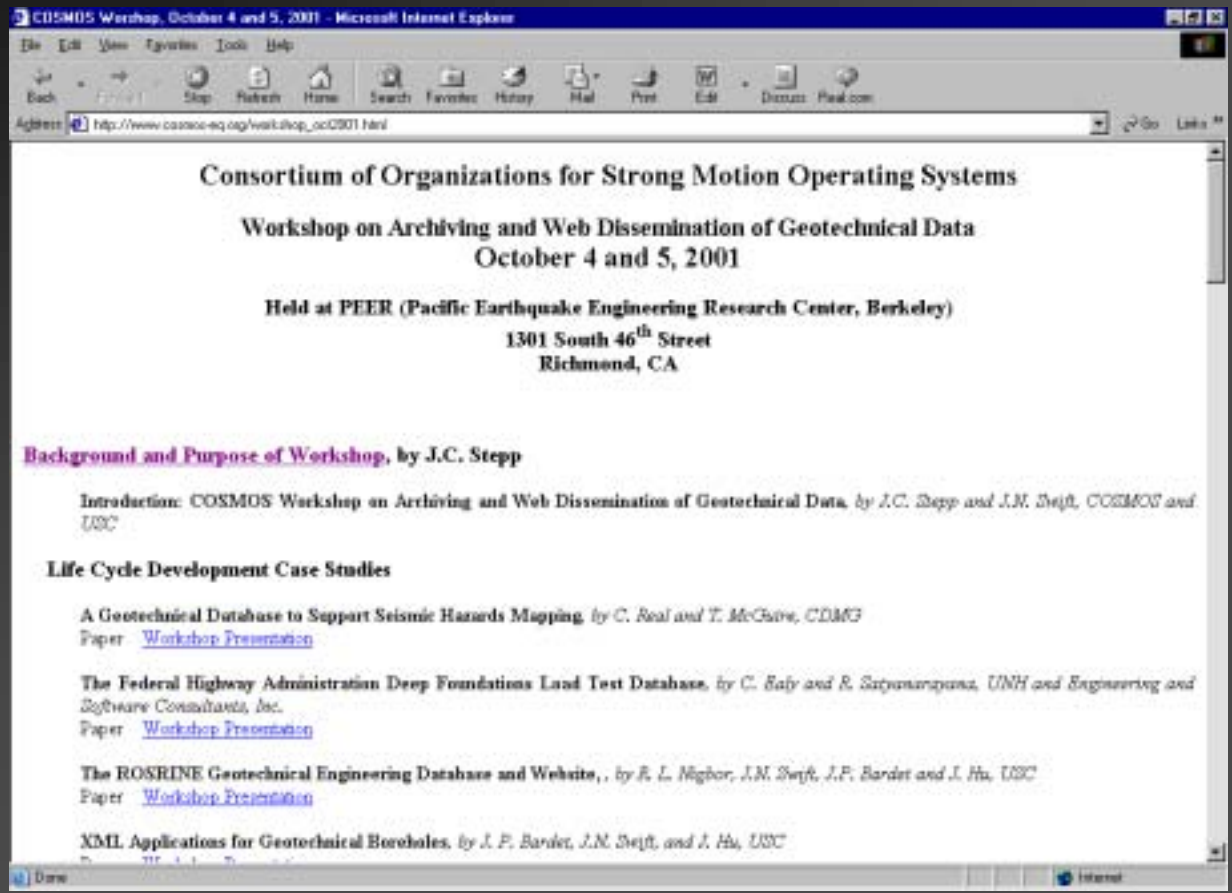
October 4-5, 2001 Workshop @ PEER, Berkeley: http://peer.berkeley.edu/

- 35 Attendees: Users, Providers, Developers, IT
- Plenary Themes
  - Life Cycle Development Case Studies
  - Data Dictionary and Data Formatting Standards
  - Information Architecture
  - Data Quality Assessment Criteria
- Breakout Themes
  - Archiving and web Dissemination Formats
  - Implementation Action Plan
  - Long-Term Funding & Support

Development Case Histories

- Web-Based Archive & Data Dissemination
  - CGS (CDMG): Geotechnical Database for SHMP
  - NGES: Federal Highway Administration Deep Foundations Load Test Database; Standards for Lab Tests
  - UCB/BYU: Kocaeli Liquefaction Site Data
  - USC: Lateral Spread Case History Database
  - KU (Japan): Kobe Subsurface Info for Seismic Hazard
  - UCSB: Downhole Data and COSMOS Database
  - ROSRINE: EQ Site Data for Site Response
  - USGS CPT Data
- Automated Data Processing
  - USGS Geologic Site Database and Data Acquisition for Stratigraphic Model Development
  - Fugro on San-Francisco-Oakland East Span Seismic Safety

Phase I Workshop Website & Proceedings



Consortium of Organizations for Strong Motion Operating Systems

Workshop on Archiving and Web Dissemination of Geotechnical Data
October 4 and 5, 2001

Held at PEER (Pacific Earthquake Engineering Research Center, Berkeley)
1301 South 46th Street
Richmond, CA

Background and Purpose of Workshop, by J.C. Stepp

Introduction: COSMOS Workshop on Archiving and Web Dissemination of Geotechnical Data, *by J.C. Stepp and J.N. Swift, COSMOS and UNH*

Life Cycle Development Case Studies

A Geotechnical Database to Support Seismic Hazards Mapping, *by C. Real and T. McGuire, CDMG*
Paper Workshop Presentation

The Federal Highway Administration Deep Foundations Load Test Database, *by C. Baly and R. Satyanarayana, UNH and Engineering and Software Consultants, Inc.*
Paper Workshop Presentation

The ROSRINE Geotechnical Engineering Database and Website,, *by R. L. Nigbor, J.N. Swift, J.P. Bardet and J. Hu, USC*
Paper Workshop Presentation

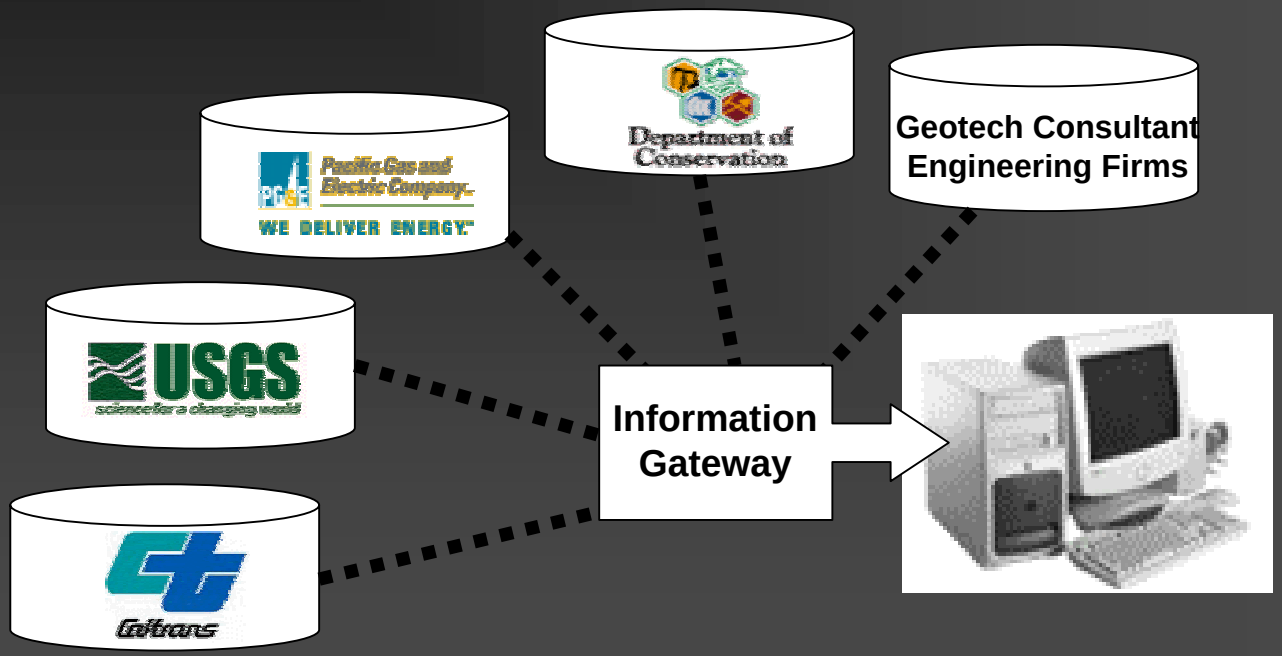
XML Applications for Geotechnical Boreholes, *by J. P. Bardet, J.N. Swift, and J. Hu, USC*

http://www.cosmos-eq.org/workshop_oct2001.html

Phase I Workshop Findings

- **Need & benefit is very high & timely**
- **Common vision is achievable**
- **Existing technologies are sufficient**
- **Institutional barriers can be managed w/ proper architecture**

General concept of web-based virtual data dissemination center



Funding Scenario Phases

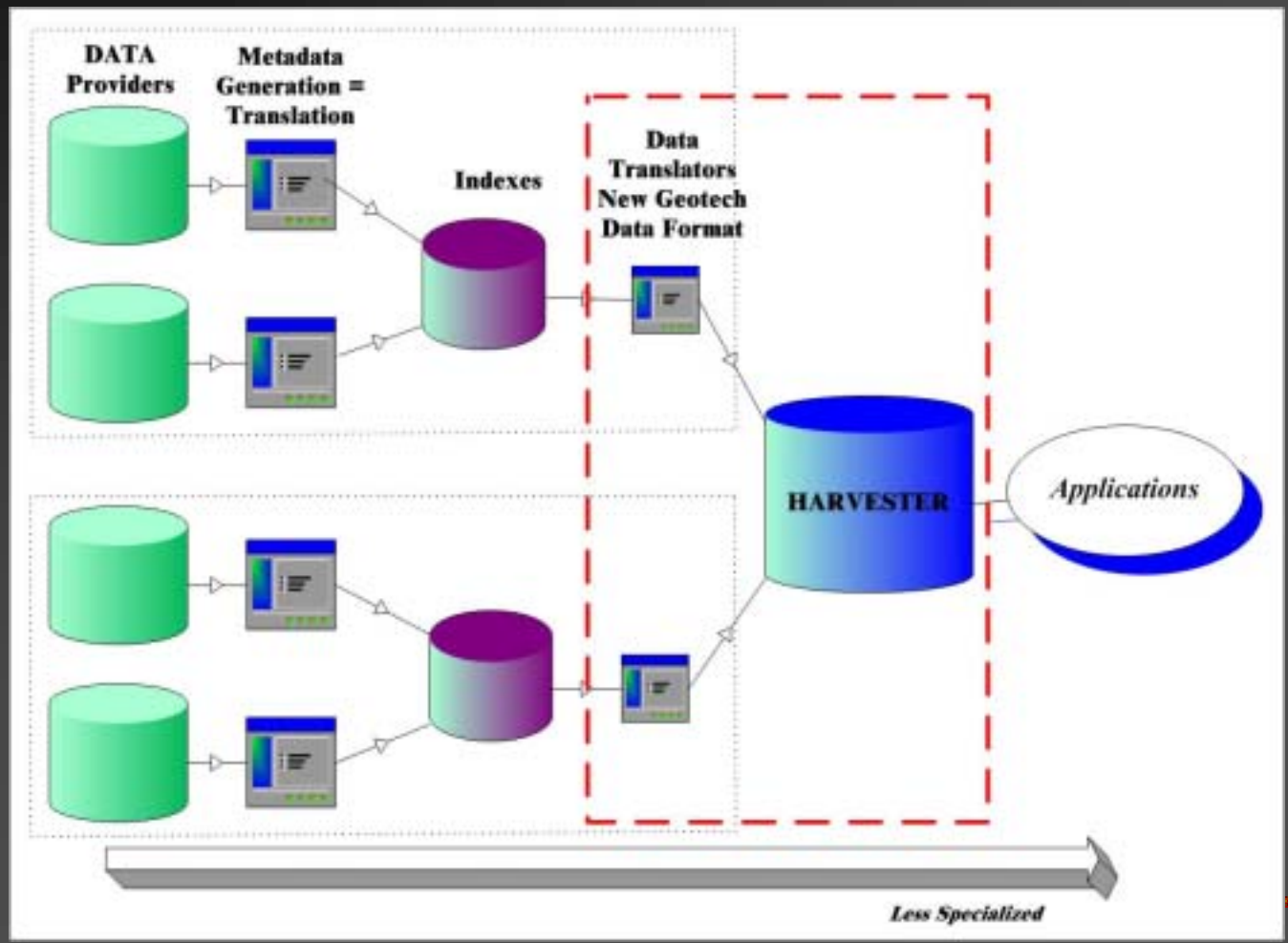
1. **CDMG, Caltrans, USGS & PG&E - development of virtual system and conversion of their data into common format – funded for May 2002 – March 2003** → **CA Pilot**
2. Planning phase could be funded by broad coalition of State and Federal Agencies – Phase III → **Consensus**
3. Long term could be supported though a combination of Agencies and user license fees – Phase III → **Maintenance & Upgrading**

Phase II
Scope of Short-Term Project

- Define geotechnical data user scenarios for a pilot virtual geotechnical data center system
  - linking CDMG, Caltrans and USGS geotechnical databases, PG&E participating in User Scenario study
- Develop a data dictionary standard for the pilot system
  - expansible to a larger system that could link multiple databases
- Integrate these results to implement the pilot system
- Plan and implement a workshop structured to obtain geotechnical community consensus
  - deliver a workshop proceedings that will serve as an expanded implementation plan for development of a web-based system for archived and linked dissemination of geotechnical data

Short Term Objective

Possible Pilot Harvesting Architecture for 4 data Providers:



Summary of Objectives

- **Phase II Short Term Activities**
  - **Establish 3 Working Groups**
    - **User Scenarios Work Group (USWG)**
    - **Data Dictionary Work Group (DDWG)**
    - **Virtual Data Center Work Group (VDCWG)**
  - **Design “Pilot VDC”**
    - **Initially linking CT, CDMG, USGS, PG&E**
    - **To be developed at USC**
  - **Workshop in Jan ’03 for Plan Review**
- **Phase III Long Term Plan**
  - **Install Pilot VDC**
  - **Extend to other organizations, dB’s, regions**

Phase II Working Group Participants

- Caltrans
- CEC
- CGS (CDMG)
- City of LA BOE
- COSMOS
- Earthsoft, Inc.
- Engineering and Software Consultants, Inc.
- FHA
- GCA (gINT)
- Geovision, Inc.
- LADWP
- NEESgrid
- PEER
- PG&E
- POSC
- UCSB
- UI NCSA
- UNH
- USC
- USGS
- UW, Seattle

Caltrans - Related Projects & Objectives

- Applications aimed at automated processing and graphical delivery of geotechnical data over the Internet
  - Innovative web technologies
  - Web-based GIS tools
  - Integration with GPS

Caltrans - Related Projects

- CPT (Cone Penetration Test) Data
  - Consists of detailed information about test locations and contain hundreds or thousands of numerical entries such as depth, resistance, angles, etc.
  - Allows users easy access to existing CPT data at previously tested locations
- Real-time Landslide Deformation Monitoring (under development)
  - Will provide positioning data from high precision GPS sensors installed on active landslides
  - Will utilize web-enabled GIS for graphical presentation of spatial deformation data

CGS – Related Projects & Objectives

- SHMP WebMap Project – Designing and Implementing a GIS Mapping Website for Data Dissemination and Interactive Mapping
  - *Geotechnical Data - Borelog database reporting and dissemination (XML)*
- SHMA, ’90 – Identify seismic hazard zones and assist cities and counties in protecting public health and safety from the effects of:
  - Liquefaction
  - Earthquake-induced landslides
  - Strong ground shaking

CGS – Purpose of WebMap Project

- **External Users**
  - Facilitate public access to Seismic Hazards Mapping data
  - Demand for GIS data to integrate with desktop GIS
- **Internal Users**
  - Provide a cost effective means for data distribution
  - Real time release of zone maps

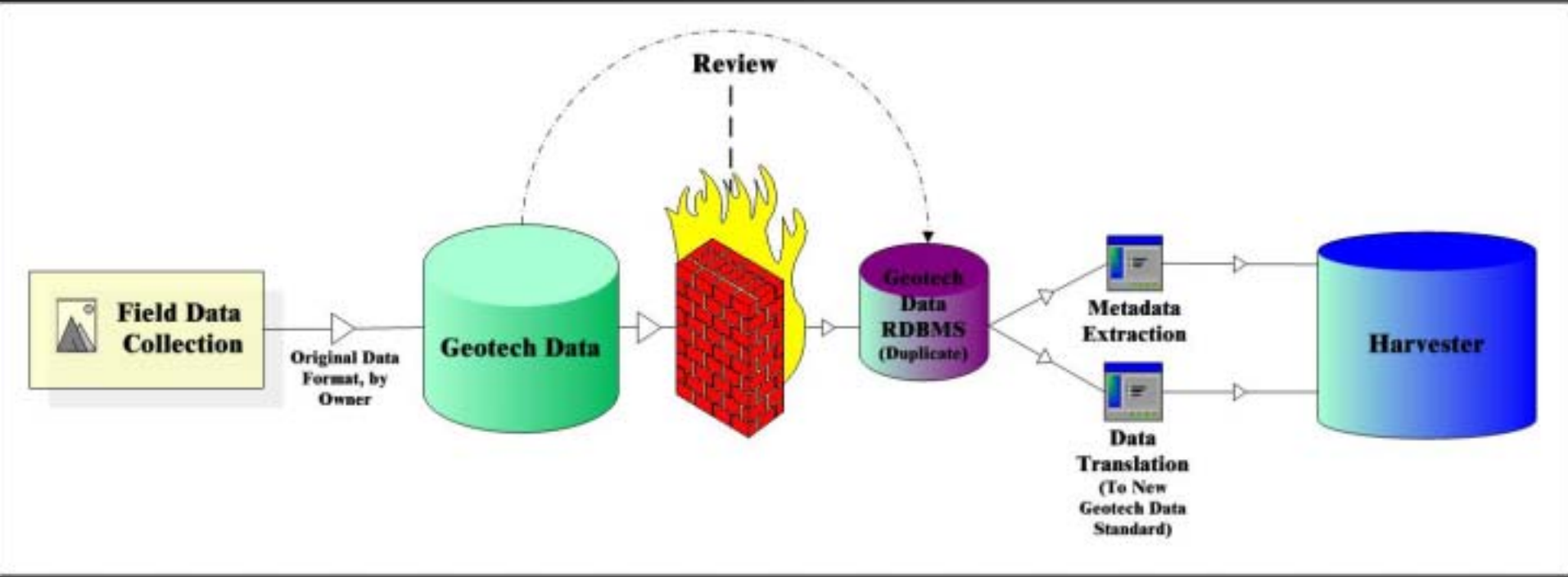
USGS – Projects & Objectives

- Geologic Site Database and Data Acquisition for Stratigraphic Model Development
  - Purpose: Input into development of detailed 3-D stratigraphic and structural models of Quaternary basins in California
  - *Currently LA and Santa Clara Valley*

USGS Primary Data Inputs

- Geotechnical Boring Logs
- CPT Logs
- Oil and Water Well Lithology Logs
- Oil and Water Well Electric Logs
- Outcrop and Core Descriptions
  - *e.g. sedimentological information*
- In-situ Measurements (e.g. s-wave, SPT)
- Seismic reflection profiles
- Gravity/mag/EM profiles
- Sample Analyses

Schematic of Caltrans, CGS or USGS participation in Phase II



Conclusion - Phase III Geotechnical VDC