NSF EPSCoR
Nevada Infrastructure for Climate Change, Education & Outreach
ERTAB Meeting

Cyberinfrastructure Component

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January 31, 2011
Outline

- Introduction
- Year 2 Review
- Challenges & Changes
- Year 3 Activities
Goal:

Facilitate and support interdisciplinary climate change (CC) research, policy, decision-making, outreach, and education by using cyberinfrastructure (CI) to develop and make available integrated data repositories and intelligent, user-friendly software solutions.
Introduction: Outputs and Outcomes

- Outputs:
  - Nevada Climate Change Data Portal
  - Software tools for climate change research, outreach and education: Software Frameworks
  - Integration and interaction across project and among CI groups within the 3-State Western Consortium: Facilitator of Collaboration

- Outcomes:
  - Strengthened CI for CC research, education, outreach
  - Increased public awareness of CC science through access to data
  - State and regional collaborations on CC
  - Widespread dissemination of CC software tools
  - Nationally recognized research in CI
Introduction: Major Activities

- Major activities included in the 5-year strategic plan:
  
  [...]  

  ▪ Years 2-3
    ▪ Build, test, and run data portal
    ▪ Research and develop software frameworks
    ▪ Contribute to the development of the data access and sharing policy

  ▪ Years 4-5
    ▪ Run data portal
    ▪ Extend data portal for school/business use
    ▪ Apply software frameworks for appropriate components
Year 2 Review: Personnel

- **3 Faculty:**
  - Sergiu Dascalu (UNR)
  - Fred Harris (UNR)
  - Shahram Latifi (UNLV)

- **2 Software developers [hired October 2009]:**
  - Michael McMahon (UNR) – data portal
  - Eric Fritzinger (UNR) – software frameworks (web services)

- **3 Graduate students:**
  - Sohei Okamoto (UNR) – PhD student, software frameworks (DSL-based)
  - Victor Ivanov (UNR) – MS student, data portal
  - Ershad Sharifahmadian (UNLV) – PhD student, data portal [since August 2010]

- **1 Undergraduate student [March-April 2010]:**
  - James Arthur (UNR) - data portal
Year 2 Review: Developments

Data Portal Stages

1. Establish initial collaborations
2. Define architecture
3. Build infrastructure
4. Collect raw data
5. Develop portal interface
Year 2 Review: Developments

Data Portal Versions

Alpha version (October 2010); 20 users

Revised alpha (December 2010); 40 users

Beta version ongoing; 100+ users
Software Framework Development: Stage 1

- The framework began as a visual programming environment
- The user would program the low-level interaction between the models using the GUI
Software Framework

Development: Stage 2

- The framework was changed to use the Silverlight framework for a platform independent, web-based user interface where the user could define workflows for model coupling
- It evolved further to utilize the growing number of web services being exposed to the world
Software Framework

Development: Stage 3

- The framework development is now focused on data consolidation, conversion, and utilization
- The runtime is capable of executing defined workflows, but is not accessible as a web service yet
- The framework has the ability to read/write NetCDF files
- The framework can access Web Feature Services and retrieve data, though the GUI for this is still in development
Year 2 Review: Developments

- **Professional Developments**
  - **Software development professionals (Mike and Eric)**
    - Attended 2* international conferences
    - Attended 3 professional development conferences or workshops
    - Successfully took 4 certification exams
    - Attended 6 project and Tri-State Consortium events
  - **Graduate students (Sohei, Victor, Ershad)**
    - Attended 5 international conferences
    - Attended 4 project and 3-State Consortium events
  - **Faculty members (Sergiu, Fred, Shahram)**
    - Attended 5 international conferences
    - Attended over 15 project and 3-State Consortium events

* Total number of participations within the subgroup
Year 2 Review: Collaborations

- Collaborations within the project:
  - Joint hands-on work (e.g., setting up data communication networks, and portal interface development)
  - Project meetings
  - Project workshops
  - Joint grant proposals
  - Additional “spin-off” projects funded
  - Co-advisement of students
  - Collaborative tools (teleconferences, skype, telephone, emails)

- In order to build and expand the data portal it is vital that input is supplied by all project components
Year 2 Review: Collaborations

- **Collaboration with Tri-State Consortium partners:**
  - Regular teleconferences part of the NSF Track II project on CI
  - Two 2010 Innovative Working Group (IWG) projects
  - Four joint workshops related to the IWG projects (held, respectively, in NV, NM, ID, and CA)
  - Joint grants proposal activities
  - Participation to international conferences
  - Joint organization of special sessions and workshops at the Tri-State Conference
  - Invited research seminar talks
Research results

- 3 peer-reviewed conference papers
  - ISSNIP-2010, Brisbane, Australia
  - IEEE WAC-2010, Kobe, Japan
  - IEEE CADS-2010, Tehran, Iran

- 1 abstract-based conference paper
  - ESCO-2010, Pilsen, Czech Republic

- 3 invited seminar talks
  - University of Alabama, Tuscaloosa
  - IEEE Section, Oklahoma City, OK
  - Glyndwr University, Wales
Year 2 Review: Research

- **Research results** [continued]
  - 7 graduate posters presented by our graduate students at 4 events
  - 2 NSF NV EPSCoR undergrad research projects funded
  - 2 IWG projects funded (collaborations with Idaho and New Mexico)
  - 3 related NSF proposals submitted (2 declined, 1 pending)

- **Other**
  - Okamoto: Passed his PhD comprehensive exam in August 2010
  - Ivanov: Getting closer to finishing his Master’s degree in CS
  - Harris: Best Paper Award CAINE-2009, Honolulu, HI
  - Dascalu: Runner-up, UNR 2010 Distinguished Teacher Award
  - Harris and Dascalu: part of a joint UNLV-UNR project team (“Losing the Lake”) led by M. Nussbaum (UNLV), recipient of a UNLV College of Education Collaboration Group Award
Changes and Challenges

- **Changes**
  - There are no major changes to the original 5-year strategic plan
  - Additions:
    - Coordinate with Track II developments on data archives and model interoperability [Ongoing activities]
    - Contribute to the development of the data access and sharing policy [Activities Year 3]

- **Challenges**
  - Defining and implementing the project’s data policy (together with all other project groups)
  - Establishing a systematic process for data portal operation and extension through participation from all other project groups
  - Achieving high usability and usage for the data portal & its related software tools
  - Ensuring the sustainability of the data portal
Year 3 Activities

Data Portal

- Constantly enrich data portal contents and interface
- Continue activities in Stage 6 [Advanced Data Services]
  - Implement database for raw data import, asset tracking, metadata, geospatial searches, individual measurement searches
  - Implement QA and QC measures
  - Import and integrate external data sources (e.g., WRCC)
  - Implement export/formatting options
- Increase collaboration with Tri-State Consortium through:
  - Metadata exchange
  - Data synchronization and replication
Year 3 Activities

Data Portal [continued]

- Research and develop new software tools for:
  - Web services access
  - Survey management/user feedback
  - Data portal access on mobile devices
  - Optimal data transmission (using a cognitive system)
- Implement accessibility features
- Work on defining systematic procedures for data curation through templates and controlled vocabularies
- Make the portal available to the general public and build/increase the portal’s user base
Year 3 Activities

Software Frameworks

▪ The Demeter Environment (Fritzinger)
  ▪ Complete Web Feature Service access
  ▪ Access Web Coverage Services
  ▪ Access Web Processing Services
  ▪ Improve graphical user interface
  ▪ Implement runtime optimizations
  ▪ Implement execution scenarios

▪ The DSL-based Environment (Okamoto)
  ▪ Finalize prototype
  ▪ Complete case studies
  ▪ Defend PhD dissertation