Impact of IAIMS at UMDNJ
June 14, 2004 Site Visit

Robert A. Saporito, DDS
PI, IAIMS Grant
&
Sr. VP for Academic Affairs
Five Regional Campuses

1. Newark
2. Scotch Plains
3. Piscataway/
   New Brunswick
4. Camden
5. Stratford
Focus of IAIMS Operational Phase

• Goal 1: Build – Develop an integrated enterprise-wide information infrastructure and delivery system to meet the needs of a statewide educational, research and health-care delivery system

• Goal 2: Access – Enhance utilization of critical educational, research, clinical and administrative information resources

• Goal 3: Integrate – Foster integration of innovative information resources

• Goal 4: Coordinate – Establish the Informatics Institute to garner the research, educational, and scholarly information resources of the University

• Goal 5: Serve – Deliver state-of-the-art information services both within and beyond the University community
IAIMS Project Leadership

Principal Investigator: Robert A. Saporito, DDS, Sr. VP for Academic Affairs
Co-Principal Investigator: William J. Welsh, PhD, Informatics Institute Director
Co-Directors:
• Wayne Thompson, MS, VP for Information Services & Technology
• Judith S. Cohn, MLS, Assoc. VP for Scholarly Information/University Librarian
• David Gibson, EdD, Dean, SHRP
• Bruce Byrne, PhD, Chair, AcITAC
Implementing the Operational Phase of IAIMS at UMDNJ

• Space and facilities provided to support IAIMS goals

• University & Foundation funds invested in IAIMS Project initiatives & priorities
Informatics Institute Office
Newark, NJ
Informatics Institute Office
Newark, NJ
Bioinformatics Laboratories
2002: Sixteen workstations; little room in shared space
Bioinformatics Laboratories
2004: Forty workstations in dedicated facilities

Newark

Piscataway
Renovated Smith Library
Newark, NJ
Renovated Smith Library
Newark, NJ
Leveraging IAIMS Financial Support

- Office of Academic Affairs operating funds for the Informatics Institute have totaled $160,000

- Annual matching funds from the Foundation of UMDNJ for educational technology minigrants has expanded the program to $180,000/year

- NJ Commission on Science & Technology Grant to UMDNJ for $250,000 provides $150,000 for completion of a state-wide Clinical Trials Web site

- University operating funds dedicated to University Libraries resources increased by $1,267,000/yr

- Informatics Institute Business Plan ensures enduring entity
UMDNJ Mission Statement Revised to Reflect Emergence of the “Virtual University of the Health Sciences”

“...Providing education, research and service programs at campuses…and communities through the state, and nationally and internationally through advanced communication and information technologies, UMDNJ seeks to meet the needs of our diverse constituencies and improve the health and quality of life of the citizens of New Jersey and society at large.”

Approved by the Board of Trustees, 3/18/03
IAIMS Goal 4: Coordinate

William J. Welsh, PhD
Co-PI, IAIMS Grant
&
Director, Informatics Institute
UMDNJ Informatics Institute

Vision

A nationally renowned University-wide Informatics Institute that:

• drives our IAIMS vision and sustains it through an enduring entity

• integrates and coordinates bioinformatics and clinical/health informatics research & education throughout UMDNJ

• advances educational, research & clinical applications of informatics

• establishes partnerships with private industry and other universities
Informatics Institute Staff

- William Welsh, PhD, IAIMS Grant Co-PI & Director, Informatics Institute
- Bruce Byrne, PhD, Associate Director for Education
- David Foran, PhD, Associate Director for Research
- Frank Sonnenberg, MD, Associate Director for Clinical Informatics
- Margaret Kilduff, PhD, Informatics Specialist
- IAIMS Project Evaluator: Pamela Matheson, PhD
  Associate Dean of Planning and Assessment, NJDS
- IAIMS Project Coordinator: Laura P. Barrett, MLS
- IAIMS Project Assistant: Michael D. Greene, MBA
IAIMS Web Site

http://informatics.umdnj.edu/iaims
Informatics Institute Web Site
http://informatics.umdnj.edu/
UMDNJ and the IAIMS Consortium

• Participant, CHOP (Philadelphia), May 27-28, 2003: 14 UMDNJ personnel attended, contributing 3 presentations and 9 of the 23 posters

• Co-Sponsor, Vienna, VA, April 26-27, 2004: 8 UMDNJ personnel attended, contributing 6 of the 11 posters

• Laura Barrett continues to serve as Consortium Secretary
IAIMS / Informatics Institute Symposia

- Educational Technology Symposium, UMDNJ Master Educators’ Guild / IAIMS Symposium, Piscataway, May 3, 2002: *Technology May Be the Answer, But What Is the Question?*

- Informatics Research Symposium, Piscataway, May 9, 2003: *Genomics, Proteomics, Pharmacogenomics and Bioinformatics*

- Informatics Research Symposium, Newark, co-sponsored by UMDNJ Center for Biodefense, May 12, 2004: *The Crucial Role of Informatics in Biodefense and Counter-Terrorism*
Invited Seminars, Colloquia & Workshops

• Aventis Pharmaceuticals Corporation, Bridgewater, NJ, January 24, 2003

• MIT, Princeton and Columbia alumni event, Newark, NJ, February 19, 2003

• Loyola University IAIMS Educational Series, Maywood, IL, March 26, 2003: The UMDNJ Informatics Institute, Leveraging Education and Research to Further the IAIMS Vision

• NCBI Field Guide to GenBank and NCBI Molecular Biology Resources, February 11/12, 2004, Newark

• Medical Library Association CE Course, Integrating Molecular Biology Databases into the Health Care Informatics Environment, May 26, 2004, Washington, DC
IAIMS Goal 1 & 2: Build/Access

The Virtual University of the Health Sciences

Denise Romano
Director, IST
&
Wayne Thompson
VP for IST
IAIMS and Infrastructure

• The UMDNJ computing and network infrastructure provides an important base for enabling the integration and collaboration which supports and enhances the IAIMS vision
### UMDNJ: IT Infrastructure

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UMDNJ Wide Area Network</strong></td>
<td>Large &amp; advanced</td>
<td>Largest &amp; most advanced in state</td>
</tr>
<tr>
<td>% of buildings on switched network</td>
<td>33% of 26 buildings</td>
<td>76% of 33 buildings</td>
</tr>
<tr>
<td><strong>Network ports supported</strong></td>
<td>9,500</td>
<td>13,000</td>
</tr>
<tr>
<td><strong>Satellite locations connected</strong></td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td><strong>Cisco firewalls</strong></td>
<td>0</td>
<td>4 (2 at each of 2 Internet POPs)</td>
</tr>
</tbody>
</table>
Security

• The UMDNJ network and systems are protected by a security environment which includes:
  – Rules-based Internet firewalls
  – VPN, Citrix Secure Gateway, and Reverse Proxy Server protocols for secure access
  – Internet-based threat management such as virus/worm protection and spam control
Support Services

• Centralized support services which cross the institution and its missions include:
  – A centralized service center (help desk)
  – A comprehensive user directory (LDAP)
  – Email/calendar/task tools
  – Application development and support services
  – Remote diagnostic and update/repair services
  – Video conferencing and support services
  – Data Center, Backup, and Disaster Recovery services
External Network Collaborations

- Founding member and largest customer of New Jersey’s advanced Higher Education Network, NJEDge.Net

- Internet2 member

- I2 Services will be available to all switched network locations through NJEDge.Net

- Accommodations will be made to non-switched environments to provide applications with the bandwidth and quality of service required

- Currently planning migration from video over expensive analog telephone connections to NJEDge.Net extranet video over IP
IAIMS Goal 3: Integrate

Frank Sonnenberg, MD
Associate Director for
Clinical Informatics
Clinical Informatics

- Organize and support the development and effective use of state-of-the-art clinical information systems

- Encourage, support and participate in collaborative clinical informatics research projects among faculty

- Seek and secure external funding support for clinical informatics research
Clinical Initiatives

• University Hospital EPIC Implementation
  – Replacing the Front End of Healthquest
  – Implementing Inpatient and Outpatient Physician Order Entry
  – Implementation of ED Tracking
  – Migration off Logician
  – Implementing Clinical Documentation

• Enterprise Electronic Health Record

• Enterprise Clinical Data Repository
Enterprise EHR

• An enterprise EHR fulfills IAIMS goals
  – provide best practices in patient care
  – train clinicians
  – utilize clinical data for education and research

• Balances business requirements with the University’s vision for the three faculty practices

• Universal recognition of the benefits of an EHR
  – Capture and storage of clinical and demographic data
  – Discrete data elements facilitate analysis and research
  – Document management and clinical images
  – Enhance communication among providers
Goal: Develop and implement “best practices” features of outpatient EHR

University-wide project to implement HEDIS effectiveness of care guidelines
– Involves all 3 faculty practices
– Guidelines to be built into routine workflow
– Data on implementation and outcomes to be retrievable for analysis
Goal: Develop confidential, enterprise clinical data repository

- Clinical data repository to combine data from diverse systems in multiple practice locations
- Data standards being developed across practices to ensure consistency of data collection
- Separate data repository being planned for clinical informatics and outcomes research
Goal: Conduct interdisciplinary health services research, including the development of critical pathways

Examples:

• Tobacco Registry
• Clinical Guidelines Project
• Micro-CME Project
Tobacco Registry

• Collaboration with School of Public Health, NJMS and RWJMS

• Standardized recording of tobacco use “vital sign”

• University-wide registry of tobacco use assessment

• Analysis of use rates and quit rates

• Coordination with State of NJ tobacco cessation programs
Clinical Guidelines Project

• Basic informatics research on guideline representation and text analysis

• Integration of clinical guidelines into EHR workflow

• Standardized collection of data necessary to trigger the most important guidelines

• Coordination with faculty practice quality improvement efforts.
Micro-CME

- Link knowledge resources to decision support in the EHR
- Automated logging and granting CME credits in small increments for knowledge resource viewing by clinicians
- Assessment of Micro-CME use and effects on clinical knowledge in specific areas
IAIMS Goal 3: Integrate

The Virtual University of the Health Sciences

David Foran, PhD
Associate Director for Research
Research

- Identify resources, tools and talent throughout the University and recommend how best to integrate and coordinate to address future needs

- Reach out to departments, institutes, and units across UMDNJ campuses to identify promising research projects and aggressively pursue funding

- Promote research collaborations in informatics with government, academic and corporate partners

- Foster and facilitate student/mentor relationships in informatics-related research
Research Collaborations

• Develop and implement strategies to foster research collaborations across, disciplines, schools, & campuses

✓ Seminars/Workshops (Rutgers, RWJMS, NJMS, CINJ, RWJUH)
✓ Productive Collaborations (CINJ, RU, Telcordia, Merck, J&J, RWJMS, NJMS, Princeton)
✓ Develop relationship (Centers Applied Genomics/Biodefense)
✓ Invited session on imaging and informatics, Federation of American Societies for Experimental Biology (FASEB), Convention Center, Washington, DC
✓ Scientific Session Chair – National Conf. Association for Pathology Informatics Symposium, University of Pittsburgh School of Medicine, Pittsburgh, PA
✓ Biomed 2004, Innsbruck, Austria
✓ Invited presentation. Grand Rounds, University of Pennsylvania School of Medicine. Philadelphia, PA
Research Projects

- Reaching out to other Departments, Centers and Institutes in order to identify promising interdisciplinary research projects and to mobilize the necessary personnel and resources to aggressively pursue funding to support these efforts. Collaborative projects with academia and the private-sector.

  ✓ Biomedical Imaging
  ✓ Molecular Design including Drug Discovery and Nanobiology
  ✓ Clinical Information Systems
  ✓ Cancer Tissue Arrays
  ✓ Decision Sciences
  ✓ Pattern Recognition
Research Projects


✓ Establishing and Informatics & Imaging Core for Tissue Analytics. Cancer Institute of New Jersey. $205,457. Funded.

✓ NetTriage: Next Generation Decision Support. NIH/NLM. NJMS, CINJ, Telcordia, RWJMS. Final round, but not selected for funding. Will submit to DARPA.


✓ Decentralized Information Sharing for Investigative Research & Discovery. NSF. Rutgers, NJMS, CINJ, U Penn, Lawrence Livermore. $1,350,653. Pending.

✓ Systems Biology of the Regulation of Signal Transduction Pathway. NIH. Princeton, Rutgers, CINJ, RWJMS. $2,500,000. Pending.

✓ Decentralized Mining of Oncology Data Sets. NIH. RWJMS, NJMS, CINJ, Rutgers, Arizona Cancer Institute. In preparation.
Student Involvement in Research

✓ Graduate Students
  • Short and long term cross-disciplinary projects
  • Lab rotations
  • MS and PhD Theses

✓ Medical Students
  • MD, PhD program
  • Special designation in research
  • Research Fellowships

✓ Residents
  • Rotation in Medical Imaging and Informatics

✓ Fellows
  • International fellowship in medical informatics

✓ Continuing Medical Education
  • Web-based training and education
IAIMS Goal 3: Integrate

The Virtual University of the Health Sciences

Bruce Byrne, PhD
Associate Director for Education
Education

• Graduate Programs
  – Enhance education in Informatics

• Faculty Development
  – Support faculty as they acquire IT skills that will enhance their ability to teach

• Mini-grants
  – Garner the talents of our faculty to create innovative instructional technology projects
Graduate Programs

• Bioinformatics
  • Students with background in *biomedical sciences*
  • 18 Credit Hour *Certificate*
  • Bundled into traditional GSBS degrees
  • *6 new courses* available for PhD or Masters students

• Biomedical Informatics
  • Students with a *wide variety of backgrounds*
  • Certificate, Masters, and Doctoral *degree programs*
  • Specializations bioinformatics/biotechnology, imaging, decision support, E-healthcare and healthcare management systems
  • 26 Masters- and 15 Doctorate-level courses

• MSN. Nursing Informatics Program
  • Post-baccalaureate program for *nurses*
  • Joint Program with New Jersey Institute of Technology
Informatics Institute and GSBS

• Courses
  – Six new regularly-offered courses on two campuses

• Participation and Outcomes 2002 – 2004
  – 83 students
  – 140 seats
  – 18 participating instructors
  – Awarded
    • First two Certificates with PhD (2004)
School of Health Related Professions

• Courses
  – 26 Masters- and 15 Doctorate-level courses

• Participation and Outcomes
  – 205 students in degree and certificate programs
  – Awarded 1999-2004
    • 2 PhD in Biomedical Informatics
    • 78 Masters in Biomedical Informatics
    • 14 Certificates
School of Nursing MSN in Nursing Informatics

• Courses
  – 13 Masters-level courses

• Participation and Outcomes
  – 25 students in MSN program, Spring 2004
  – Awarded 25 MSN in Nursing Informatics degrees awarded to date
Infrastructure Development

• Bioinformatics Laboratories Newark and Piscataway
• New Platforms: The Linux Environment
• Integration with Enterprise
  – Facilities
    • Scientific servers
    • SGI workstations
    • Software suite
    • Library
  – Policies
    • Account integration
    • Security
IAIMS Goal 3: Integrate

The Virtual University of the Health Sciences

Laura P. Barrett, MLS
Chair, Educational Technology Subcommittee, AcITAC
Faculty Development

• Priorities identified from faculty needs assessment surveys
• Plans developed by the Educational Technology Subcommittee (ETAC) of AcITAC, composed of the Academic Deans of the Schools
• Development of Web-based, interdisciplinary cases identified as goal of program
• Faculty training initiated
• Software selected and acquired
• Work teams established
Faculty Educational Technology
Minigrant Program Growth

http://informatics.umdnj.edu/iaims/minigrants

<table>
<thead>
<tr>
<th>Pre-IAIMS Program:</th>
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</thead>
<tbody>
<tr>
<td>2001-2002</td>
<td>6 grants awarded</td>
</tr>
<tr>
<td>2002-2003</td>
<td>3 Foundation grants awarded</td>
</tr>
<tr>
<td>2 yr. TOTAL</td>
<td>9 grants</td>
</tr>
<tr>
<td></td>
<td>$135,000</td>
</tr>
</tbody>
</table>

| IAIMS Program initiated 5/2002  |                              |
| 2003-2004                       | 10 grants awarded by IAIMS   |
|                                 | & Foundation of UMDNJ       |
| 2004-2005                       | 7 grants awarded by IAIMS    |
|                                 | & Foundation of UMDNJ       |
|                                 | 7 proposals under review    |
| 2 yr. TOTAL                     | 24 grants                   |
|                                  | $360,000                    |
Educational Infrastructure

• University-wide software licenses
  – Instructional Design & Development
    • WebCT
    • Trivantis Lectora
    • Artesia TEAMS
    • DxR
    • AXS EyeSpy
  – Web Design & Maintenance
    • Macromedia Dreamweaver MX
    • Macromedia Contribute2

• Hardware
  – Sun WebCT server
  – Sun V880 Image server
IAIMS Goal 5: Serve

Judith S. Cohn, MLS
Associate VP for Scholarly Information/
University Librarian
University Libraries Progress Report

• Resources
  • Clinical and patient care
  • Research
  • Image banks

• Services
  • Collaborative teaching
  • Support of PDAs
  • Group licensing

• Infrastructure
  • Deploy Open URL technology
  • Fully wireless libraries
  • Federated searching
  • Renovated facilities

• Initiatives
  • Enhanced inter-library cooperation with Rutgers
  • Statewide collaborations
University Libraries

Resources

• Clinical & Patient Care
  – eMedicine, InfoPoems/InfoRetriever, MDConsult,
    Up-To-Date, EBM databases

• Research / Full-text Journals
  – Nature Publishing, Wiley InterScience, ScienceDirect,
    Journals@OVID, NORD, Reprotox, Springer, Highwire, Annual
    Reviews

• Education
  – 170 full-text e-books available: STAT!ref, Books@OVID,
    PubMed, MDConsult, AccessMedicine

• Image Banks
  – Anatomy.tv, Images.md
University Libraries
Services

- Library informatics skills being integrated into the curriculum of the UMDNJ schools at several levels
- Clinical point of care programs for the PDA have been licensed for University-wide access
- Group licensing arrangements facilitated among 20 affiliated hospital libraries
  - 25 participating institutions
  - Full-text journals and e-books
- Virtual reference services under investigation for live Web-based assistance using QandANJ service model
University Libraries
**Infrastructure**

- Major renovation of the Smith Library (Newark Campus) was completed in Spring 2003
  - 16 seat electronic training classroom
  - 64 public access workstations
  - All public services integrated on main level

- Planning and implementation of Open URL Technology underway – server ordered & license signed with SFX

- All 4 of the campus libraries (Newark, New Brunswick, Stratford and Camden) are fully wireless environments

- New Web sites for University and Campus Libraries deployed

- Federated searching model for searching eBook collections being developed and studied
University Libraries

Initiatives

• Developed a written agreement with Rutgers University Libraries enabling improved and more equitable access for UMDNJ constituents on the central campus

• Collaborating with the New Jersey State Library and partners in New Jersey academic libraries to obtain funding to provide access to high-end databases for incubator companies

• HealthyNJ outreach to community partners enhanced through formal collaboration with Newark Public Library and inclusion of substantial Spanish language content

• The three research libraries, UMDNJ, Rutgers and NJIT, are developing a more collaborative service model
Evaluation

Pamela B. Matheson, PhD
IAIMS Project Evaluator
Baseline Evaluation Update
IAIMS Operational Phase

• The evolution of UMDNJ into the Virtual University of the Health Sciences

• Hypothesis driven

• Task completion
Hypotheses

• Hypotheses relate to:
  – Clinical information systems & patient care
  – Instructional technology & education
  – Bio-informatics curriculum & graduates
  – Informatics-related collaborations & grants
  – Global impact on IT access and integration
Status of Baseline Data Collection

• Databases & data collection well underway
• Finalizing baseline report by hypothesis
• University-wide census completed
  – Analysis of data
    • By unit/school, primary role, activities
  – Preponderance of staff / administrators among respondents; follow-up planned for other constituents
Highlights of Survey Findings

– Census finds widespread use

– All technologies surveyed were rated positively
  • 1\textsuperscript{st} - ease of access 3.6 (SD=.91)
  • 2\textsuperscript{nd} - satisfaction at 3.5 (SD=.86)
  • 3\textsuperscript{rd} - frequency of use at 3.4 (SD=.87)

– Opportunities for Improvement:
  • Videoconferencing, developing websites, clinical trials database, and bioinformatics-related software
Units/Schools

Mean ratings of three dimensions by Units

<table>
<thead>
<tr>
<th>Units</th>
<th>Mean</th>
<th>Satisfaction</th>
<th>Ease Of Access</th>
<th>Frequency of Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>3.7</td>
<td>3.6</td>
<td>3.5</td>
<td>3.4</td>
</tr>
<tr>
<td>GSBS</td>
<td>3.5</td>
<td>3.4</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>NJDS</td>
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<td>3.2</td>
<td>3.1</td>
</tr>
<tr>
<td>NJMS</td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
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<tr>
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<td>3.0</td>
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<td>2.9</td>
<td>2.8</td>
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<td>2.7</td>
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<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>UH</td>
<td>2.5</td>
<td>2.5</td>
<td>2.4</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Legend:
- **Satisfaction**
- **Ease Of Access**
- **Frequency of Use**
Mean ratings of three dimensions by Primary Role

- **FACULTY**
  - Satisfaction: 3.30
  - Ease Of Access: 3.30
  - Frequency of Use: 3.30

- **STAFF**
  - Satisfaction: 3.70
  - Ease Of Access: 3.70
  - Frequency of Use: 3.70

- **STUDENT**
  - Satisfaction: 3.90
  - Ease Of Access: 3.90
  - Frequency of Use: 3.90
Activity

Mean ratings of three dimensions by Primary Activity

- Administration
- Comp/Lib srvs
- Teaching
- Others
- Patient Care
- Research
- Learning
- Support Services

Mean:

- Satisfaction
- Ease Of Access
- Frequency Of Use
Opportunity to Learn More

• Digital images/Photography

• Developing a Website

• Using a course Website
Progress on Hypotheses

- Positive changes noted in clinical systems/patient care
- Opportunities for enhancing technology in education and measuring progress
- Degree/certificate program growth
- Institute fully functional and very productive
- UMDNJ is well on its way to “Virtual University of the Health Sciences”
IAIMS Retreat Outcomes

The Virtual University of the Health Sciences

Robert A. Saporito, DDS
PI, IAIMS Grant & Sr. VP for Academic Affairs

William J. Welsh, PhD
Co-PI, IAIMS Grant & Director, Informatics Institute
Governance & Management

• Originally proposed:
  – Establish & convene Institute Internal Steering Committee

• Recommended modification:
  – Institute Internal Liaison Committee will meet in third year of grant, and will fulfill a key communications/ advocacy function between the Institute and Schools and Units of the University; steering and Advisory functions are being fulfilled currently by the IAIMS Co-Directors and AcITAC, respectively
Governance & Management

• Originally proposed:
  – Establish & convene Institute External Advisory Board

• Recommended modification:
  – Institute External Advocacy Board will meet in third year of grant, and will fulfill a key communications/advocacy function for the Institute with the private sector and government
Education

• Originally proposed:
  – Seminar series and Ed Tech weeks

• Recommended modification:
  – Ongoing support of interdisciplinary, team-based faculty projects designed to create Web-based clinical case simulations
  – Continued symposia sponsorship