Collaborative for Enterprise Transformation and Innovation

Gap analysis – July 28th
Industry Feedback and Academic Associations (ACM, IEEE, AIS)

State of IT

- Faced with complex enterprise integration and technology application
- Limited capability of commercial enterprise computing technology. Excel runs the business.
- Consequent high cost of implementation and maintenance
- Limitations in the expertise of computing professionals.
- Promise and innovative affordances of technology no longer sufficient
- Initiatives must be “aligned” with business strategies and goals, and demonstrate ROI
- Commodity outsourcing of has developed global markets for computing expertise, and the globalization of computing knowledge. Elimination of “friction” in applying the expertise globally => providers of computing services competing globally.
- Higher education has yet to address the fundamental issues of how academic programs and institutions must be transformed. (Spellings Report)
- Computing departments find it difficult to recruit students, do research of recognized impact and win research funding.
Needs …

Better technology certainly (in integration areas), but especially:
Interdisciplinary integrated knowledge for end-to-end capability (e.g. RFID family + BPM + 6 Sigma)
  Information systems, technology management, computer science, software engineering and information technology
  Industrial systems engineering, design, business strategy, finance, and operations management, the social sciences, law and regulatory frameworks
Target continuum of computing professionals at TRANSITION points:
  Students who will become entry-level workers
  Professionals
  Senior IT management -> problem-solvers to decision-makers
  Non-IT decision-makers!! Accenture consultants and CEOs 😐
Methodology of academic knowledge-creation (i.e. research) in computing must include reflective practice-based research and consolidating outcome of that problem-solving.

Needs (continued …)

A sustaining university-led partnership with government and industry to facilitate technology use, technology innovation, and a business literate IT workforce with more strategically relevant skills.
Faculty who want to develop these new capabilities, with support for self-education, preparation and continued development activity
University curriculum that (a) genuinely meets industry needs (b) does not quickly becomes obsolete because of changes in the field (c) is best delivered through the University (as opposed to traditional professional development channels).

Benefit: This activity will identify new areas of computing knowledge of impact and bring clear industry and societal relevance to computing.
Gaps in Curricula

Computer Science according to ACM, AIS, IEEE Curricula 2005

Organization issues and information systems
Application Technologies
Software methods and technologies
Systems infrastructure
Computer hardware and architecture

Theory, principles of innovation More theoretical More applied Application deployment Configuration

Gaps in Curricula Contd.

Evolution of Software Engineering to Enterprise Transformation and Innovation

External and business constraints
Organization issues and information systems
Application &
Software methods and technologies
Systems infrastructure
Computer hardware and architecture

Enterprise Architecture, Transformation, Innovation
Software Engineering according to ACM, AIS, IEEE Curricula 2005

Theory, principles of innovation More theoretical More applied Application deployment Configuration, Operations (ITIL)
Gaps in Professional Education

Cause: Employer shift from technology developers to technology users and integrators

Need Professional Masters (and PhD) aimed at practice
Need role based curriculum targeted at transitions
Need distance learning & flexibility - keeping current is difficult given time pressures

Need more peer interaction and field experiments to enable discovery

Gaps in Knowledge

Related to Enterprise Transformation and Innovation

“...Horizontal silos of disciplinary frameworks, standards and initiatives...”

- Service orientation, Business Intelligence, Customer feedback, Compliance (SOX, HIPAA,...)
- Porter's Five Forces, SWOT, Value Chain, Balanced Score Card, Supply Chain Model, COBIT, Six sigma, Resilience, Innovation
- Zachman Framework, TOGAF, BPEL, ...
- ITIL Incident, Problem, Change Management, ...
- Service Oriented Architectures, RFID/Sensors, Bricks, Autonomic Computing
- J2EE, XML,......
Top Ten Nations by Labor Force Size (about 50% of world labor in 10 nations)

<table>
<thead>
<tr>
<th>Nation</th>
<th>% WW Labor</th>
<th>% A</th>
<th>% G</th>
<th>% S</th>
<th>25 yr % delta S</th>
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<td>21.0</td>
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<td>15</td>
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<tr>
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<tr>
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<tr>
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<td>10</td>
<td>20</td>
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<tr>
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<td>63</td>
<td>11</td>
<td>26</td>
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<tr>
<td>Germany</td>
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<td>3</td>
<td>3</td>
<td>64</td>
<td>44</td>
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</table>

Ohio has a large service industry

Vision: Integrated education, collaborative practice and innovation-driven research

Education

Goal: Develop an institutionalized with local, regional, national and global scope to (a) discover and fill education gaps, (b) build expertise, (c) identify new areas of research, (d) build sustainable funding sources.

Consulting Practice

Applied Research
Collaborative for Enterprise Transformation and Innovation

“Enable enterprise transformation with innovations and dissemination of advanced knowledge for service intensive processes”

CERCS-CETI

Successors to CERCS

Accelerate Creation and Diffusion of Emerging Service Knowledge

Discovery
Creation of NEW knowledge

Learning
Imparting knowledge

Innovation
Giving knowledge value

Value to business

Value to student & professional

Value to the IT community
Knowledge Clusters & Conceptual Relationships

Organization (business related) modules

Organization Related Skills
Environment dimension
- "preurship (new business models, etc.)
- Policy, Compliance & regulations

Business dimension
- Business plan
- Accounting, budgeting
- Innovation, application of technology, disruptive technologies, ...

Business process (operations) dimension
- Developing capabilities - internal, external value chain, human resources, cross cultural, ...
- Process and product design tools

Execution dimension
- Enabling tools and methods – enterprise systems, collaborative tools
- Customer satisfaction, quality, continuous improvement
Integrative IT Modules

- Role related skills (Business process)
- Organization related skills (applied knowledge)
- Integrative IT skills (applied technical skills)
- Technical skills

IT & Integrative Skills

- Environment dimension
  - Compliance requirements – SOX, HIPAA, etc.
  - Portal architectures: Enterprise Knowledge Infrastructure, one stop etc.

- Business dimension
  - Service Level Management current and future IT Service catalog
  - Project portfolio – new and on-going IT Infrastructure projects

- Business process (service delivery) dimension
  - Chargeback (COBIT, etc.)
  - Enterprise systems, warehousing, mining

- Execution dimension (Service support)
  - Service support
  - Architecture monitoring (security, availability, ....)

- Capacity, Availability and IT Infrastructure maintenance.

Integrative Graduate Capstone

- Graduate level – practice that enhances state-of-art
- Professional and traditional student
- Six month cycles

(Integrative IT Modules and Integrative Graduate Capstone Diagrams)
IBM Governmental Programs Study

**What Is Needed, What Is Not?**

**"COLD" Jobs**
IT jobs in the United States that have been most affected by global resourcing include:

- Application Development
- Application Maintenance
- Packaged Application Tools
- Transcription Services
- Contact and Call-Center Staff
- Specialized Business Process Outsourcing Services

**"HOT" Jobs**

Demand is rising for new IT jobs in areas including:

- Business Analysis
- Security Analysis
- Vendor Management
- Service Management
- System Integration
- Data Mining
- Business Intelligence
- Database Administration
- Network Engineering
- Network Architecture
- Internet / Web Architecture
- Web Services

IBM Governmental Programs Study
Pilot Track of MengP

Initial pilot tracks to include Enterprise Architecture
Integrates IT, ISE, Public Policy and Business Modules
Desired by local companies (including multi-nationals)
Major users of IT in the Midwest

Reflective Practice Examples

- LEAN ITIL implementation (OSUMC)
- Chargeback for services (City)
- Architecture Pattern Mining (McGraw Hill)
- NCR.com Portal Redesign (NCR)
- Kansei Wireless Sensor Network Testbed Development and Integration Platform (DARPA)
- Pervasive Patient Tracking (OSUMC-James, Motorola Inc.)
- IT Service Architecture Analysis (Central Ohio Transit Authority)
- AHAS 1.5 UCI Request Web Service (Applied Computer Sciences)
- Eclipse-based tools for shop-floor analysis and visualization (IWSE)
- Pervasive Productivity Management of small Ohio farms (OSU Agricultural Extension)
Good Practice Skills Key to Project Success

“I found the students that participated in our project enthusiastic and intellectually qualified to perform the necessary research in the space of Knowledge Management”

“Quality of project deliverables are effectively managed by the program directors through gateway reviews of work performed by the students before it’s delivered to the corporate project sponsor”

"The final deliverable for our project resulted in a major redesign of our ITIL incident management process and successful negotiations with our vendor to acquire a suitable technical solution”

-Dale Miller, Ohio Health

CETI Research Objective: ACE Knowledge Consolidation Through Practice

Adaptive Complex Enterprise (ACE)
- Enterprise Architecture Research
- Acknowledges complexity
- Embraces variation as needed

ACE Practice & Field Research
- Develop ACE as a business-social-IT framework for relating other major proven frameworks – to integrate and apply Business, Systems Engineering, and IT knowledge more effectively.
- Develop measurement centered and analytic ways to reason about complexity and dynamically evolving business-IT systems.

ACE Knowledge Sharing
- Portal – like HBR, SEI etc.
- Adaptive Complex Enterprise architecture knowledge
- Companies are willing to share – tools, methods, models

ACE Research
- Enterprise architecture representation, monitoring and governance
- Model-driven orchestration
- Autonomic computing
## LEVERAGED RELATIONSHIPS

<table>
<thead>
<tr>
<th>Local Enterprises</th>
<th>National &amp; International</th>
<th>University Collaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Columbus Dispatch</td>
<td>iSMF, HDI</td>
<td>Center for Resilience</td>
</tr>
<tr>
<td>Ohio Health</td>
<td>SEI</td>
<td>Glenn Institute for Public Policy</td>
</tr>
<tr>
<td>OSU Hospital and Clinics</td>
<td>Open Source Foundation</td>
<td>School of Law</td>
</tr>
<tr>
<td>OIT</td>
<td>National Science Foundation</td>
<td>School of Human Ecology</td>
</tr>
<tr>
<td>NCR</td>
<td>DARPA</td>
<td>Center for Information Assurance</td>
</tr>
<tr>
<td>McGraw Hill Nationwide</td>
<td>NIST</td>
<td>Platform Laboratories</td>
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<tr>
<td>Mettler Toledo</td>
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<td>Ohio Super Computing Center</td>
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<td>Progressive Medical</td>
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</tbody>
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### Ohio

- Columbus Technology Council: Enterprise Architecture Group
- Ohio IT Alliance

### Industry Experts and Faculty

## FORUMS

### Enterprise Architecture CIO Group

#### Special Interest Group Research
- ITIL – CMDB, Autonomic Computing

### Workshops and Certifications
- Applied Enterprise Architecture
- Enterprise Systems and J2EE (Nationwide)
CETI PARTICIPATION LEVELS

- **Industry Advisory Board**: Strategic participation and direction. $$ directed to specific projects. Knowledge access and discounts.
- **Project Sponsor**: Single project participation. Knowledge access discounts.
- **CETI Forums**: Access to maintained knowledge base, self-assessments, best practice results, and participation in special interest groups.
- **CETI Workshops**: Learning and certification.

Who we are:

- **Significant Combined Capabilities & Experience**
- **Faculty**
  - Dr. Rajiv Ramnath – Director of Practice
  - Dr. Jay Ramanathan – Director of Research
    - Senior Research Scientist, Former CEO, Concentus Technology Corp., former Associate Professor of Computer Science
  - Dr. Joseph Fiksel – Director, Center for Resilience
  - Dr. Shahrukh Irani – Associate Professor, Industrial and Systems Engineering
  - Dr. Furrukh Khan – Director of Technology
    - Advanced Enterprise Technology (.NET, Web Services), Microsoft research partner
  - Dr. Robert Mathis - former Director, Ada STARS program
  - Dr. Alan Cline - 30 yrs experience in Software Engineering consulting and education
  - Mr. Vickrem Scharma - former Director of E-services, Lucent Inc., 18 yrs experience in the telecom sector
  - Dr. Bruce Weide - Professor, Dept. of Computer Science and Engineering.
  - Dr. Anand Desai - Associate Professor, John Glenn Institute of Public Policy and Public Management
  - Dr. David Landsbergen - Associate Professor, John Glenn Institute of Public Policy and Public Management
  - Ms. Bettina Bair – women in computing
### Risks

- Progress to date has been accomplished by leveraging everything. Inability to institutionalize \(\Rightarrow\) no scalability and perhaps no sustainability.
- Resources – additional CF, MS graduate students, industry PhDs, space, laboratories
  - We must devote time to development of sustainable programs
- Managing industry expectations – as we learn from them
- Getting industry to engage and share
- Finding a sustainable focus until resources are in place
- Long-term research must have active RF engagement
- Need high-level buy in from Chairs and Deans to support growth and remove inter-departmental barriers
- Can industry and NSF help?

### References contd.

The Library of Babel?!
References – contd.

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