EDSIGCON/CONISAR 2017

Keynote Address
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Key Themes

- Rapidly changing world of work

- Foundational role of Information Systems for individuals, organizations, and societies

- Domain of practice as a central element for Information Systems

- Information Systems as a collaborating and contributing computing discipline

Key Themes

- Shaping curricula through understanding of graduate competencies

- Information Systems accreditation

- Information Systems education research

- Understanding implications and potential consequences of specification and design decisions

Initiatives that Have Informed These Thoughts

- IS 2002 and IS 2010
- MSIS 2016
- CC 2005 and CC 2020
- PACE
- Modern Database Management
- Computing Handbook, Volume II: IS and IT
- NSF-funded workshops on Implications and Potential Consequences; Computing Education Research; and Data Science Education
- CSAB Blue Ribbon Committee, Board, and Criteria Committee
- ACM Education Board and Education Council
- AIS VP of Education

"The next waves of disruptive technology —AI, robotics, virtual reality, IoT, and sharing economy platforms—will create an enormous degree of labor displacement. ...

Not all jobs will be affected, and not all affected jobs will be eliminated —as always, automation will both replace and supplement human labor— but jobs that are truly untouched will be the exception rather than the norm."

EY – Future of Work
www.ey.com/gl/en/issues/business-environment/ey-megatrends-future-of-work

So what should we tell our children? That to stay ahead, you need to focus on your ability to continuously adapt, engage with others in that process, and most importantly retain your core sense of identity and values. For students, it's not just about acquiring knowledge, but about how to learn."

Blair Sheppard, Global Leader, Strategy and Leadership Development, PwC

Important Questions About the Future

- Do we as IS educators collectively have enough expertise on issues such as
  - Artificial Intelligence
  - Machine Learning
  - Robotics (both physical and virtual)
  - Internet of Things
  - Blockchain
  - Self-learning systems based on Data Science and Analytics

  from the perspective of their uses to transform specific industries, types of firms, and individual companies

Important Questions About the Future

- Are we able to help our students understand the ongoing fundamental transformation in key areas of business?

- What is—for example—Systems Analysis and Design in this environment? Are we able to communicate the changes in Data Management to our students?

Foundational Role of IS in Organizations and Society

- Even though many other disciplines find it difficult to admit, information systems has an increasingly strong foundational role in understanding, explaining, and continuously improving how any organized human activity works
  - Business
  - Government
  - Science
  - Other organizations
  - Society

- Do we have our rightful place at the table in the relevant discussions?

- Importance of systematic, structured discussion with industry

Domain of Practice

- Information Systems needs a domain of practice / information systems environment
  - Core question for any IS program to address is: how can we use information technology-based solutions to build systems that enable a society/an organization/a group/an individual to achieve its goals better?

- Technology environment changes very rapidly

- Organizational integration capabilities are much slower to change than technology

"**Information Systems Environment** – An information systems environment is an organized domain of activity within which information systems are used to support and enable the goals of the activity. Examples of information systems environments include (but are not limited to) business, health care, government, not-for-profit organizations, and scientific disciplines." (ABET, new IS Program Criteria)

IS as a Collaborating and Contributing Computing Discipline

- We are closely connected with and dependent on other computing disciplines

- In many technical core areas of computing, the competencies our students need are driven from other disciplines

- At the same time, we contribute actively to many technical areas

IS as a Collaborating and Contributing Computing Discipline

- Our core strength is in integration of computing with other academic disciplines and domains of practice – information systems as the original "Computing + X"

- New computing disciplines force us to test our own boundaries (currently, cybersecurity and data science)

- Continued collaboration and communication is essential

Shaping Curricula Through Competencies

- As educators, we need to be proactive in determining the competencies that our graduates need at the time of graduation

- Competency = knowledge + skills + disposition/attitudes

- The competencies have to be at a sufficiently high level to be applicable across technology generations
  - E.g., MSIS 2016 includes 88 Information Systems competency categories, each with 3-10 sample competencies
  - Competencies change much more rapidly than competency categories or competency areas

Shaping Curricula Through Competencies

- Knowledge unit hierarchies are valuable, too, as long as our own notions of priorities do not drive the selection → Determine knowledge needs based on competencies

- Life-long learning as an essential competency → back to basics

- Computing Curricula 2020 (CC2020) adopting competencies as a common currency

Technology competencies are not enough – individual foundational competencies and domain competencies are also essential

- Information Systems Competencies
- Domain of Practice Competencies
- Individual Foundational Competencies
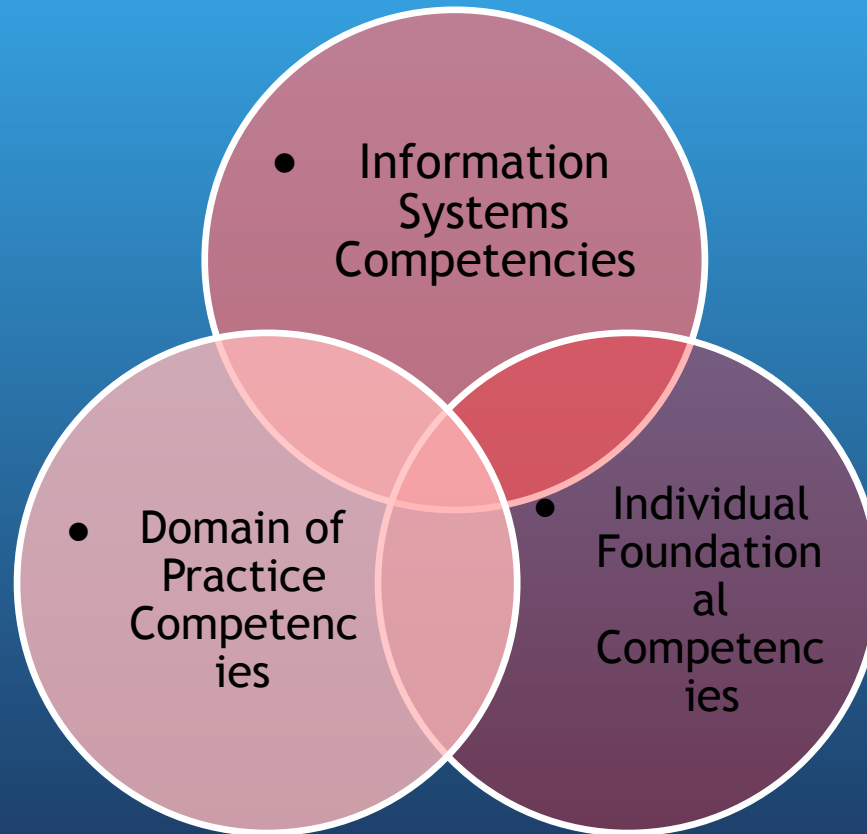
Source: MSIS 2016 (Topi et al., 2017)

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MSIS 2016: Areas Of Competencies

Specialized Competencies

Specialized Competencies consist of additional Information Systems competencies that build on the core competencies and allow the graduates to perform more sophisticated tasks and act in more specialized professional roles.

Core Competencies

| Areas of Information Systems Competencies	Areas of Individual Foundational Competencies	Areas of Domain Competencies
• Business Continuity and Information Assurance • Data, Information, and Content Management • Enterprise Architecture • Ethics, Impacts and Sustainability • Innovation, Organizational Change and Entrepreneurship • IS Management and Operations • IS Strategy and Governance • IT Infrastructure • Systems Development and Deployment	• Critical Thinking • Creativity • Collaboration and Teamwork • Ethical Analysis • Intercultural Competency • Leadership • Mathematical and Statistical Competencies • Negotiation • Oral Communication • Problem-solving • Written Communication Graduate competencies developed building on the foundation of competencies attained in prior studies and work/life experience	Core competencies in a domain of human activity such as business, government, health care, law, a field of scientific research, etc.

Areas of Information Systems Competencies with Pre-Master's Elements

- Data, Information and Content Management
- IS Management and Operations
- IT Infrastructure
- Systems Development and Deployment

- Role of Information Systems in Organizations (Foundational Understanding of IS)

MSIS 2016: Information Systems Competencies
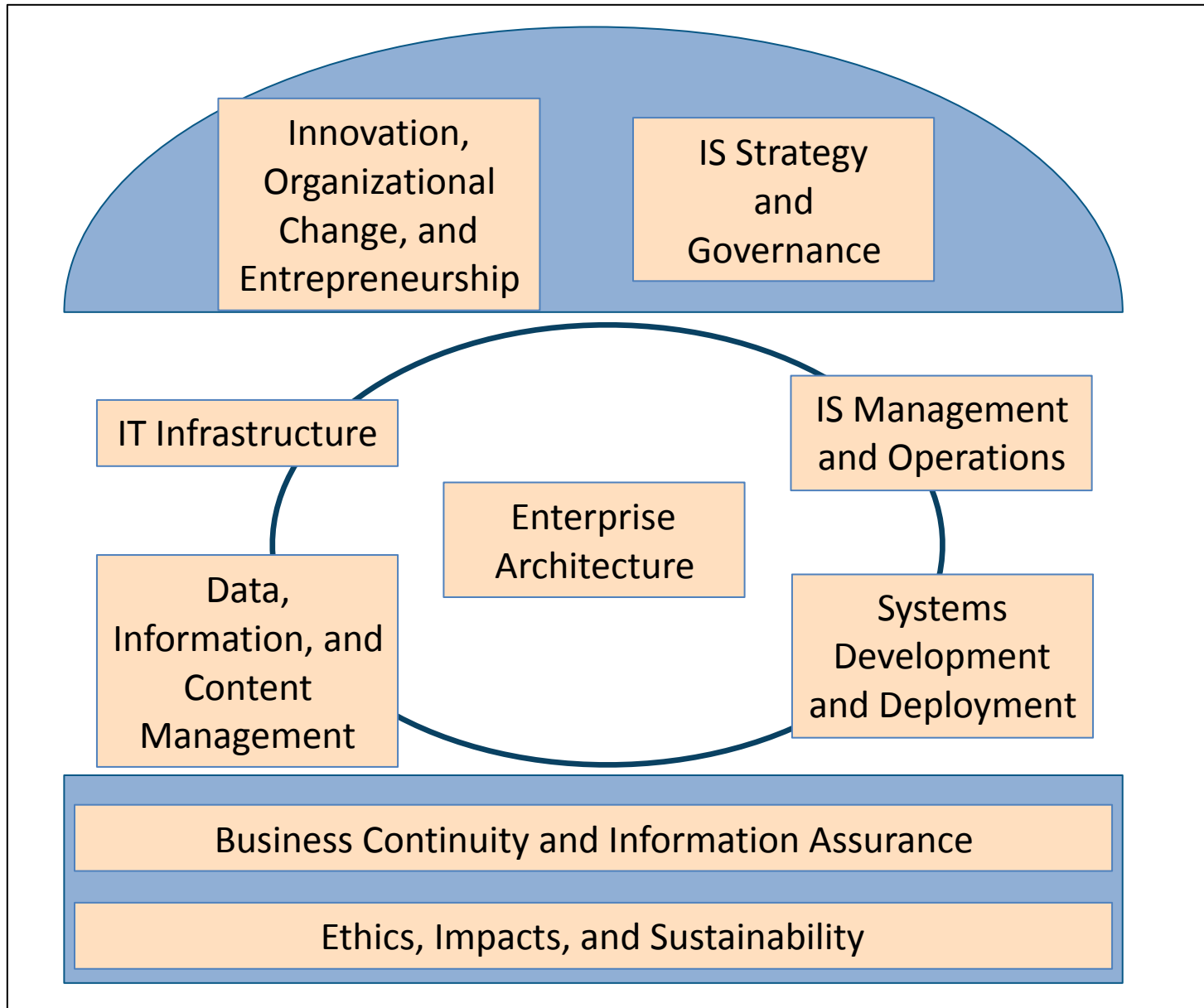
Accreditation

- Program level accreditation can be an excellent tool for programs to build a structure, justification, and legitimacy for self-evaluation

- Currently, there is no IS-focused society representing IS accreditation within ABET → who is going to fill the void?

- What is the IS community's role in Cybersecurity programs?

- When is time ready for Data Science accreditation? When it is, what is the role of computing in that process?

Information Systems Education Research

- Multiple views on what constitutes Information Systems Education Research, such as:
  - Sharing new pedagogical approaches and methods based on personal experience
  - Sharing new pedagogical methods based on systematic data collection
  - Developing and testing pedagogical theories and building new learning experiences based on them

- Are we seriously developing a solid theory- and evidence-based foundation for IS education?

Information Systems Education Research

- Departments have an essential role in providing support to faculty members who focus on this area

- Societies' role in providing support for IS education research
  - Conferences
  - Journals
  - Community
  - Training

- Collaboration with computing education research in general is essential

Understanding Implications and Potential Consequences

- Increased need for each individual to consider the impact of their specification and design decisions, regardless of their role in the organization
  - Given increased automation, who is actually making decisions?
  - How are the organization's values built into its systems?
  - If a machine learning algorithm is embedded in an organizational system, who is ultimately responsible?

Key Implications Research Themes— Essential Also for Education

- Better approaches for addressing value conflicts and ethical dilemmas

- Barriers to and enablers of data, algorithm, and decision quality

- The tensions between human expertise and computer-based automation and their impact on human knowledge and skills

Markus & Topi, 2015

Conclusion

- Information Systems at the intersection of computing and various domains of practice is in a very strong position to thrive

- We need to learn to articulate and communicate our value proposition better—continued focus on enabling individuals, organizations, and societies to achieve their goals better

- We have a key role in shaping the world through the opportunities emerging through data science & analytics and cybersecurity

Conclusion

- We need to continue to focus on quality and take all dimensions of competency development seriously

- We have a unique role in helping organizations and societies understand implications and potential consequences of technology

- Collaboration among IS educators and within the entire broader computing education community is essential

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Expressions of Gratitude!

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