EDUCATION AND TRAINING PANEL
(Panel Description)

Panel Chair: Craig Fisher

In this modern age of information systems and technology there are numerous problems associated with poor data and information quality in systems. Ballou and Pazer [1] demonstrated that errors in data have the potential to substantially increase the likelihood of incorrect decisions. Poor quality data impedes business processes [7] and has contributed to major disasters such as the Space Shuttle *Challenger* [3]. The diverse uses of data and the increased sharing of data that has arisen as a result of the widespread introduction of data warehouses have exacerbated deficiencies with the quality of data [8,6]. In addition, up to half the cost of creating a data warehouse is attributable to poor data quality [2].

Given the significance and pervasiveness of DQ problems, the lack of focused attention to DQ/IQ in college curricula [4], and general lack of agreement on prerequisite knowledge, skills and abilities this panel has been formed to discuss these issues. This panel asks for discussion on the preparedness of our Information Systems (IS) college students for the demands of assessing and improving information quality in our databases, data warehouses and management information systems.

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PANELISTS

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INFORMATION SYSTEMS CURRICULUM UPDATE

(Position Paper)

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This presentation will focus on two related areas, IS'2002 an updated Information Systems Curriculum, and ABET criteria for the new accreditation of information systems four-year degree programs.

CURRICULUM

IS'2002 is a revision of the widely accepted IS'97 curriculum. Both were joint efforts of ACM, AIS and AITP. Both models are based on a comprehensive body of knowledge. A level of mastery is specified for each element using modified Bloom taxonomy. From this collection a set of learning units is specified. Groups of the learning units form the courses. Figure 1 shows the courses and prerequisite structure. Table 1 shows the capabilities and knowledge expected for IS program graduates.

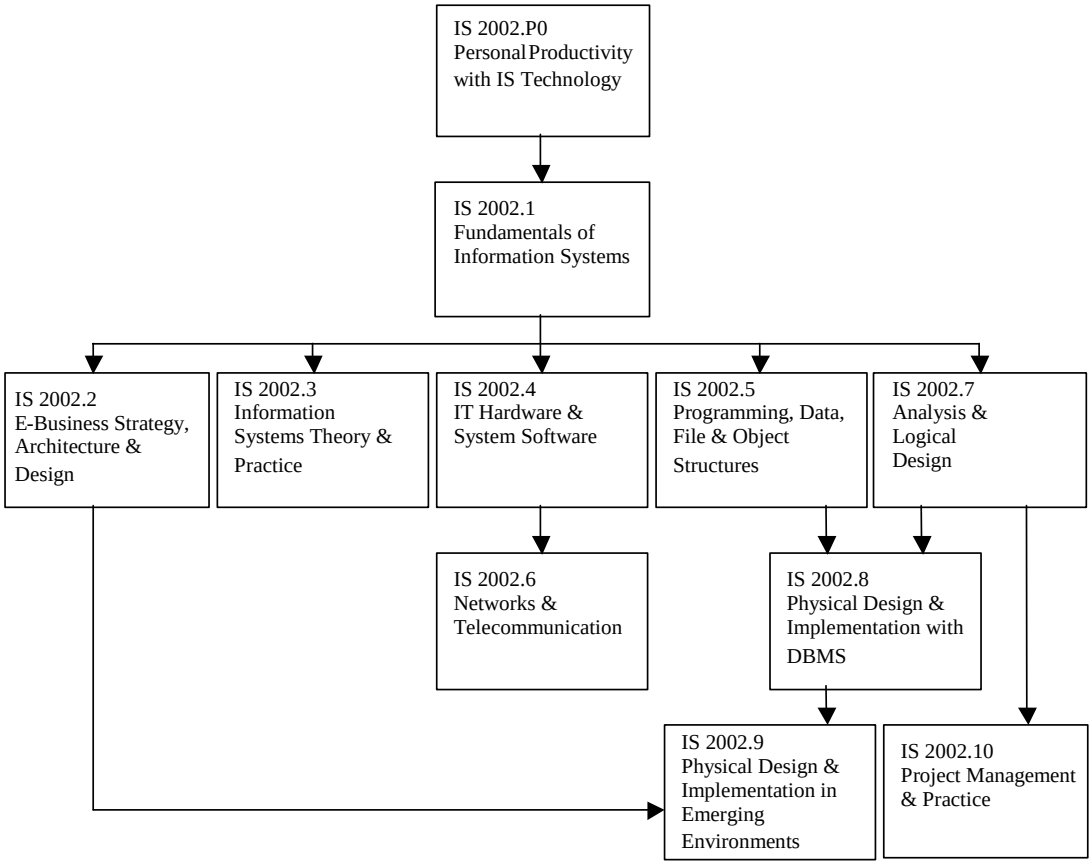

Figure 1. IS 2002 Representative Course Sequence

Table 1. Representative Capabilities and Knowledge Expected for IS Program Graduates

ANALYTICAL AND CRITICAL THINKING		
Organizational Problem Solving	**Ethics and Professionalism**	**Creativity**
Problem solving models, techniques and approaches Personal decision making Critical thinking Methods to collect, summarize, and interpret data Statistical and mathematical methods	Codes of conduct Ethical theory Leadership Legal and regulatory standards Professionalism - self directed, leadership, time management Professionalism - commitment to and completion of work	Creativity theory Creativity techniques
BUSINESS FUNDAMENTALS		
Business Models	**Functional Business Areas**	**Evaluation of Business Performance**
Contemporary and emerging business models Organizational theory, structure, and functions General systems theory	Accounting Finance Marketing Human Resources Logistics and Manufacturing	Benchmarking Value chain and value network analysis Quality, effectiveness, and efficiency Valuation of organizations Evaluation of investment performance
INTERPERSONAL, COMMUNICATION, AND TEAM SKILLS		
Interpersonal	**Team Work and Leadership**	**Communication**
Listening Encouraging Motivating Operating in a global, culturally diverse environment	Building a team Trusting and empowering Encouraging Developing and communicating a vision/mission Setting and tracking team goals Negotiating and facilitating Team decision making Operating in a virtual team environment Being an effective leader	Listening, observing, interviewing, and documenting Abstraction and precise writing Developing multimedia content Writing memos, reports, and documentation Giving effective presentations

TECHNOLOGY			
Application Development	**Internet Systems Architecture and Development**	**Database Design and Administration**	**Systems Infrastructure and Integration**
Programming-principles, objects, algorithms, modules, testing Application development – requirements, specs, developing Algorithmic design, data, object and file structures Client-server software development	Web page development Web architecture design and development Design and development of multi-tiered architectures	Modeling and design, construction, schema tools, DB Systems Triggers, stored procedures, design and development of audit controls Administration: security, safety, backup, repairs, replicating	Computer systems hardware Networking (LAN/WAN) and telecommunications LAN/WAN design and management Systems software Operating systems management Systems configuration, operation, administration

INFORMATION SYSTEMS = TECHNOLOGY-ENABLED BUSINESS DEVELOPMENT		
Systems Analysis and Design, Business Process Design, Systems Implementation, IS Project Management		
Strategic utilization of Information Technology IS planning IT and organizational systems	Systems analysis Logical and physical design Design execution Testing	Deployment Maintenance Use of IT Customer service

ACCREDITATION

Computer Science programs have been accredited by CSAB (Computing Sciences Accreditation Board) since about 1985. Currently there are over 170 programs accredited. Recently CSAB merged with ABET (Accreditation Board for Engineering and Technology) with responsibility for computing now residing with Computing Accreditation Commission, one of four in ABET. Accreditation of Information Systems programs has begun. The criteria are similar to Computer Science in all but the curriculum section. The criteria include Objectives and Assessment, Student Support, Faculty, Curriculum, Laboratories and Computing Facilities, Program Delivery, Institutional Support and Financial Resources, and Institutional Facilities. The curriculum section is based on IS-2000. A pilot review was successfully completed in 2001 and several programs will be reviewed in the 2002-2003 cycle. Work is also underway to develop criteria for Information Technology.

WHAT CAN WE TEACH ABOUT DATA QUALITY IN EXECUTIVE EDUCATION PROGRAMS?

(Position Paper)

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Considering the enormous potential impact of data quality on many organizations, the data quality should be an important topic in executive education programs. In this position paper, I set forth a proposition that, in order to effectively educate executives about the consequences of data quality management, data quality researchers must vigorously adapt organization theories and epistemologies in their research.

To illustrate my argument, consider the example of Business Process Reengineering (BPR). During the past decade or so, management researchers such as Hammer, Champy, and Davenport made the term, BPR, as an everyday vocabulary of the top management in many organizations. Undoubtedly, the dramatic cost savings of BPR drew the attention of these executives.

However, I argue that the efficiency gains—no matter how dramatic they may be—are only part of the reason why BPR became an important component in executive education. Indeed, BPR represents a fundamentally new way of organizing. It challenged the conventional Tayloristic framework in which executives would conceptualize the organizational structure. Hence, understanding this new framework of organizing principles fell right into the purview of executives' responsibilities. Consequently, BPR took a vital place in executive education.

For this reason, in order to effectively educate executives about data quality, we need to actively research the complex interaction between data quality and organizational structure. For example, accessibility of "clean" and timely data could affect the efficacy of diverse governance mechanisms or it could alter the social dynamics surrounding organizational decision-making such as power, politics, and social networks. However, little systematic research has examined such implications of data quality on organizational structure. Hence, I recommend that future research should be conducted to expand our knowledge of organizational implications of data quality.

RECOMMENDATIONS FOR INFORMATION QUALITY EDUCATION

(Position Paper)

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In our previous work, we developed recommendations for information quality education, e.g., [1, 2]. While we acknowledged the need for introducing information quality concepts into the curriculum taken by all management majors, we primarily addressed the curriculum for IS majors. These analyses focused on IS curriculum models and how information quality concepts might be introduced in these models and thus into the recommended curricula for all IS majors.

At WPI, we are now adding an emphasis on introducing information quality concepts across the management curriculum. We are starting with basic concepts that provide a foundation for thinking about information quality. Specifically, we are focusing on developing students' understanding of three data-related issues. First is the role of information in organizational decision making. In management classes, we teach decision making, e.g., how much inventory to order, without considering how to determine which data are relevant to that decision, whether those data are sufficiently accurate for the decision method being used, and how to find, access, and manipulate these data. Second is how information flows in an organization. Students need to understand information production processes to understand the sources of information quality problems and how to solve them. Third is the dynamics of data. Students need to understand that data, in reflecting the operations of a firm, are constantly changing, so that the decision of how much inventory to order, for example, must be frequently made and reexamined as the firm performs its operations. It is our premise that understanding these three core concepts about information in organizations will provide the foundation students need for understanding the sources of information quality problems and for developing organizational programs for information quality improvements.

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A NEW COURSE: DATA QUALITY IN INFORMATION SYSTEMS

(Position Paper)

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This course will help the students explore and understand data quality (DQ) and information quality (IQ) problems in information systems, databases and data warehouses. The student will be able to recognize and use DQ and IQ Concepts in Information Systems projects; e.g., recognize patterns of Data and Design Deficiencies in Systems; suggest appropriate DQ and IQ improvement plans in light of known deficiencies; perform information quality assessments within organizations; apply data cleansing techniques to data warehouses and experience the influence of data quality indicators on decision making. A combination of current literature review and hands-on projects will be used to develop knowledge and ability to meet objectives.

The projects included a Total Quality Management (TQM) case analysis, a real Data Warehouse Cleansing project [3], a Data Quality Information (DQI) exercise [1] and an Information Quality Assessment (IQA) project. The Data Warehouse Cleansing project followed the creation of a data warehouse from 5 homeless shelter databases in Albany, NY. The IQA project was based on MIT's TDQM information quality assessment approach [2]. This IQA project was conducted with the UNIX Services Development organization at IBM, Poughkeepsie, NY.

The course has been offered twice as an IS Special Topics upper level elective. In Fall 2000, ten students completed the course while sixteen students completed the course in Fall 2001. In the Spring of 2002 Marist College approved the course to be an official course and it will be published as IS 428, Data Quality in Information Systems, in the next printing of the course catalog.

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