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## INFORMATION QUALITY PROGRAMS: AN INTERNATIONAL PERSPECTIVE OF THE CURRENT STATE OF CURRICULUM DEVELOPMENT

### Preliminary Summary

#### 1 Introduction

Information Quality has only recently being recognised as an important area of research by academics and practitioners. The seminal work of Wang and Strong in 1996 has catapulted this area of research to prominence. Research effort in this area has increased significantly during the last decade as evidenced by the number of research publications, the increasing number of researchers involved in IQ research and the popularity of MIT's International Conference in Information Quality, established by Richard Wang and which celebrated its tenth year in 2006. A very comprehensive timeline of Information Quality research and education has been developed by Elizabeth Pierce and her colleagues at the University of Arkansas Little Rock and is attached in appendix A

Although MIT's Information Quality program, Information Impact International (headed by Larry English) and Navesink Consulting Group (headed by Thomas Redman) have offered short executive style workshops in Information Quality for a number of years, academic program curriculum development did not begin until very recently.

#### 2 Programs & Courses in higher education institutions

The first formal academic program in Information Quality was launched by the University of Arkansas in Little Rock (UALR) in cooperation with MIT's Information Quality program. This is a Master of Science in IQ program and has had strong student demand. Subsequently a number of other programs have either been launched or are currently through academic approval tracks. These include the Master of Science in IQ at the University of Westminster in the UK and the Master of Information Quality (currently on an academic approval track) at the University of South Australia.

In order to identify the extent of curriculum development throughout the world, a comprehensive exploration of higher education websites was undertaken recently. This international educational sector scan of such programs indicates that the area is indeed at a nascent stage of development. Formal data/information quality education is confined to the United States, the United Kingdom and Australia. Most notable absentees from this list are Continental Europe and Far Eastern countries, even though substantial research activity and expertise in this area is present in these countries, particularly in Germany and Taiwan.

It appears that at present, information quality is not considered as an important teaching area in many parts of the world. As mentioned above currently only one formal program was identified as a fully operating program in the world; that of the Master of Science Degree in Information Quality at the University of Arkansas at Little Rock. This University can thus according to our search claim to be the first degree program in Information Quality in the world. At the program level, (full degree) other than those mentioned above we were not able to identify any other programs which may currently be in

preparation. This does not mean of course that other higher education institutions are not currently not involved in program development in this area. Given that generally universities are prevented to promote programs before full approval has been given and also given the heightened awareness of Information Quality it would be reasonable to expect that more programs are likely to appear in universities and colleges around the world.

Our research reveals that at course (subject) level much more activity is taking place. This is of course natural as it is much easier to develop a course and embedded into an existing program. Some initiatives include 'the quality of information' course at University of California, Berkley; 'data quality and enterprise architecture' course at the University of Canberra (Australia); 'information quality' course at the Queensland University of Technology; and 'variable information (also known as information quality)' at the University of Arizona. Apart from these, data quality is taught as a component in a few information management courses, such as 'data mining' course at the Australian National University, 'strategic security and IT-management' course at Lulea University in Sweden; 'use of information' at the University of Michigan; and 'topics in information systems' course at State University of New York at Albany. There are a few other courses available at different universities that teach information quality as an essential part of the curriculum in areas such as geographic information systems, nursing, health informatics, and library science.

Current information quality curriculum being taught around the globe generally follows information quality management stream. However, the content is generally discussed in the context of information systems rather than the entire business. As a result, these curricula lack quality assurance and control aspects of information. These courses are predominantly theoretical with minimal technical and practical components. Consequently areas like information quality assessment and data cleansing are rarely found in the available curricula. Neither are there courses available that target proprietary systems like Enterprise Resource Planning, Customer Relationship Management, Supply Chain Management systems etc. Furthermore little was found which addresses high profile specific business environments like banking, and emergency services, and security.

It appears that there has been little demand for courses at the university level. This will surely change very soon due to the significant activity in this area by industry, with a dramatic increase in industry-oriented conferences, workshops and training programs in this area. Given that typically higher education institutions are fast followers of industry demands, it would be reasonable to expect a proliferation of at the very least courses but also minors, majors and full degree programs in Information Quality.

The new imperatives for many higher education institutions is emerging as a strong expectation for them to be global in their orientation, innovative in their approach and relevant to industry/ One may thus conclude that given the practical orientation of much of the current Information Quality activity by industry as , it may be strategic for higher education institutions to seek partnerships with industry on such curriculum development to not only drive the curriculum but also absorb graduates from such programs.

Many questions in the design & development of IQ curriculum development still remain;

Some of these include, 'What are the competencies that required for producing work ready practitioners?'

Many colleagues are beginning to answer such curriculum questions. Please see a paper developed by Markus Heilfert who

has provided a preliminary summary for the key requirements of information quality competences for information systems graduates and another paper by Tereska Karran, Charles Poulter and Patrick Lees from the University of Westminster who are also well advanced in planning of their new Master of Science in Information Quality program in the UK. Craig Fisher also has provided or classification of the Competencies for the Course in Data Quality in Information systems developed at Marist College in New York.

Furthermore, questions such 'What is the most appropriate level at which to begin in the development of academic IQ programs? Should one start with undergraduate programs? or Graduate? Or both?. 'How about research Honours and research Masters programs for producing the next generation of IQ researchers and academics?'

### **3 List of some of the Questions that the IQ Community will need to answer**

1. What are the competencies that required for producing work ready practitioners
2. What is the demand, both current and future, for IQ education? Who will be the main target markets for IQ education? For what career paths will IQ education prepare people?
3. Why a specialized course or program in information quality? Why not simply include data quality in existing courses, e.g. testing in programming courses, db normalization and dictionaries in data management courses, inspections, systems, and acceptance testing in systems analysis & design courses?
4. If indeed a specialized course or program is needed, where is it best housed within the University structure? (e.g. CS/IT within an Engineering/Technical School, MIS within Business School, etc.)
5. What do we see as the viable forms of IQ education? (One course, or if more than once course should we be focusing our attention on a track (say, three courses), a certificate (say, 5 courses), a B.S. degree, a M.S. degree, or a Ph.D. degree)
6. What background (i.e. prerequisites) should students have to pursue the various forms of IQ education?
7. How much of the education should be hands-on? How much theory? What types of real customer/client interactions can be brought into the classroom?
8. What is needed to encourage IQ education programs?
9. What will be the state of IQ education 3 to 5 years from now?

Appendix A – Historic Timeline of IQ Education & Research

Date	Event Description
1988	MIT TDQM Program initiated by Stuart Madnick and Richard Wang, beginning a journey with key research publications in the DQ/IQ field from key members including Yang Lee, Diane Strong, Peter Kaomea, Ward Page, James Funk, Leo Pipino, Beverly Kahn, Arie Segev, Bruce Davidson, Mostapha Ziad, Liz Peirce, G; Shankar, John Talburt, Harry Zhu, and Terry Wong, as well as others such as those at SUNY Albany and Marist College.
1990	Wang & Madnick published the Polygen data model in the VLDB conference, and a theory of data source tagging in the International Conference on Information Systems (ICIS)
1992	MIT officially established Total Data Quality Management (TDQM) program with Honeywell and Fujitsu as the founding sponsors, followed by D&B, Firstlogic, Peacehealth Corporation, Georgia Division of Public Health, US Naval Supply systems Command, and many others during the 1990's.
1994	Yang Lee, Richard Wang, and Jesse Jacobson co-founded Cambridge Research Group to help establish the DQ/IQ field through publication of DQ assessment tools, the International Conference on Information Quality (ICIQ), and the UALR-MSIQ program with generous donations and staff support.
Early 1990's	Larry English founds Information Impact International, a company whose mission is to provide quality education and consulting in information management.
March 1995	The Data Quality Journal published by James Hurysz releases its first issue. This Journal would remain in existence until 2002.
October 25-27, 1996	First International Conference on Information Quality (ICIQ) held at MIT, Cambridge, Mass. ICIQ is now in its 12 <sup>th</sup> year.
1997	Thomas Redman founds Navesink Consulting Group. Among its many IQ services, Navesink Consulting Group creates the Data Quality College, a series of seminars focuses on data quality issues.
September 1999	Omar Khalil, Diane Strong, Beverly Kahn and Leo Pipino author the paper entitled "Teaching Information Quality in Information Systems Undergraduate Education" in Informing Science, Vol. 2, No. 3. This article identifies the gap between the needs of organizations for high-quality information and the skills of university graduates from Information System program.
September 2001	Craig Fisher offers the first undergraduate course on Information Quality to IS seniors at Marist College, Poughkeepsie, NY. This course would become a regularly offered elective and form the basis for the book "Introduction to Information Quality".
October 29-31, 2001	Europe's launches its own annual Data Management and Information Quality Conferences in London, UK.
July 15-17, 2002	The MIT-IQ program offers its first three day workshop entitled MIT-IQ for Executives.
November 8-10, 2002	WooYoung Chung, Craig Fisher, and Richard Wang present their work on "Redefining the Scope and Focus of Information-Quality Work: A General Systems Perspective" at ICIQ .

	This paper classifies IQ skills into three categories: Technical, Adaptive, and Interpretive.
May 19-23, 2003	The MIT-IQ program offers its first week-long workshop entitled "IQ-1: Principles and Foundations"
January 2004	International Association for Information and Data Quality, a not-for profit, vendor-neutral professional society of people passionate about improving information and data quality was chartered.
June 7-8, 2004	CAISE sponsors the Workshop on Data and Information Quality in Riga, Latvia. A second DIQ workshop is held by CAISE in 2005.
June 18, 2004	SIGMOD sponsors the International Workshop on Information Quality in Information Systems (IQIS) in Paris, France. IQIS 2004 is followed by IQIS 2004 and IQIS 2005.
April 2005	Diane Strong, Craig Fisher, David Feinstein, and Herbert Longenecker publish their article "Teaching, Learning, and Curriculum Development to Support Managing Information as a Product" in the AMIS Monograph on Information Quality. This article explores various strategies for incorporating IQ into an IS or Business UG Education.
August 27, 2006	University of Arkansas at Little Rock launches the first Master of Science in Information Quality. 25 students enroll.
Fall 2006	At Northeastern University, Dr. Yang Lee teaches the Honor Seminar: HNRU302 Topics in Research and Inquiry: Focus on Analysis, Information Quality: Technology and Philosophy
January 2007	The International Journal of Information Quality published by InderScience releases its first issue.
January 2007	University of South Australia, School of Computer and Information Science announces plans to launch a Master of Science in Information Quality
March 2007	University of Westminster in the UK announces plans to launch a Master of Science in Information Quality
April 2007	The ACM Journal of Data and Information Quality begins accepting submissions.

Appendix B – List of identified educational initiatives in Information Quality

(This table has yet to be finalized)

Educational Provider	Program Name	Course Name	Training workshop
University of Arkansas	Master of Science – IQ		
University of Westminster	Master of Science - IQ		
University of South Australia	Master of Information Quality		
MIT Into Quality Program			3day Certificate Course
University of Nebraska at Omaha		Information and Data Quality Management	
University of Berkeley		The Quality of Information	
University at Albany, State University of New York		Information Quality and Reliability  impact of information quality on organizational effectiveness	
Marist College, New York		Data Quality in Information Systems	
The University Of Michigan-Dearborn		Information for Manufacturing	
University of Illinois at Urbana-Champaign		IQ: Information Quality: Principles and Practice  Information Quality: Principles and Practice	
Kelley School of Business		Data Auditing	
Queensland University of Technology		Information Quality Pg  Information Quality UG	
The University of Wollongong		Techniques for ensuring information quality	

**Appendix B – List of URLs of identified programs and courses in Information Quality**

[http://www.albany.edu/business/graduate/grad\\_mis\\_dis.html](http://www.albany.edu/business/graduate/grad_mis_dis.html)

<http://www.athabascau.ca/html/syllabi/nurs/nurs328.htm>

[http://datamining.anu.edu.au/student/math3346\\_2005.html](http://datamining.anu.edu.au/student/math3346_2005.html)

<http://www.euroeducation.net/euro/ukle0035.htm>

<http://www.dental.pitt.edu/informatics/curriculum/intro/dim.html>

[http://www.ise.canberra.edu.au/un6979/u6969-2006-summer/extension\\_studies\\_summer\\_2006\\_Unit\\_Outline.htm](http://www.ise.canberra.edu.au/un6979/u6969-2006-summer/extension_studies_summer_2006_Unit_Outline.htm)

<http://www.isqa.unomaha.edu/ugcrs.htm>

<http://www.nursing.iupui.edu/LifelongLearning/default.asp?LifelongLearning/CertificatePrograms/Informatics/ConsumerHealthInformatics.htm>

<https://portal.student.ltu.se/stuka/kurs.php?kurs=A0003N&lang=eng>

<http://rosetta.sims.berkeley.edu:8085/sylvia/f04/view/290-10.complete>

<http://www.si.umich.edu/rieh/syllabi/useinfo05.htm>

<http://www.sir.arizona.edu/syllabi/spring/sp07/622/>

<http://technologize.ualr.edu/msiq/>

<http://www.uwosh.edu/newlearning/oa/courseinfo.php>

<http://www3.lehigh.edu/academics/catalog/html/grbusinessc.html>

[http://www.yorku.ca/fes/programs/grad/course\\_desc/6189.pdf](http://www.yorku.ca/fes/programs/grad/course_desc/6189.pdf)

[http://sis.berkeley.edu/catalog/gcc\\_list\\_crse\\_req?p\\_dept\\_name=School+of+Information&p\\_dept\\_cd=INFO](http://sis.berkeley.edu/catalog/gcc_list_crse_req?p_dept_name=School+of+Information&p_dept_cd=INFO)

[http://www.courses.qut.edu.au/cgi-](http://www.courses.qut.edu.au/cgi-bin/WebObjects/Courses.woa/wa/selectUnitFromCourseDetails?structureID=all&courseID=3773&idunit=10958)

[bin/WebObjects/Courses.woa/wa/selectUnitFromCourseDetails?structureID=all&courseID=3773&idunit=10958](http://www.courses.qut.edu.au/cgi-bin/WebObjects/Courses.woa/wa/selectUnitFromCourseDetails?structureID=all&courseID=3773&idunit=10958)