Defining the expected competences for IS graduates will be significantly expanded in this edition of the model curriculum, which will provide a number of unique benefits. Industry partners will better understand the skills and abilities of graduates, thereby more efficiently placing students in correct jobs and reducing the amount of post-hiring training required before employees become fully engaged. In addition, the competence perspective allows students to know what to expect in terms of desired outcomes providing insight into course selection and career trajectories. The competence perspective is designed to bridge the gap between the knowledge acquisition focus of a typical graduate educational program to include a skills and capabilities focus desired by industry professionals in the workplace. Improved coordination between IS programs and industry partners should lead to more efficient hiring processes and better prepared students who can immediately contribute to the success of the corporate IT function.

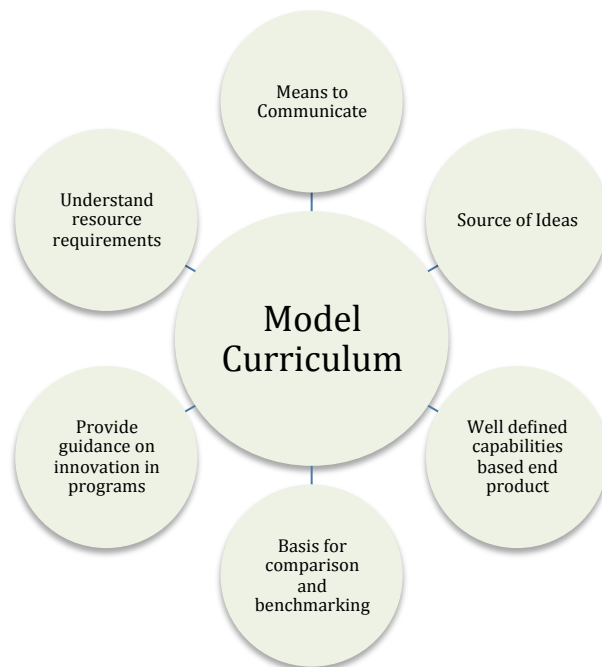Figure 2 depicts the role and importance of the IS model curriculum.

Figure 2. Model Curriculum Role and Importance

6 Current Status – Review of Global IS Master's Program Practices by Region

The earlier MSIS model curricula have focused mainly on degrees in business schools in the U.S. However, the work of the preliminary review task force (Topi et al. 2013) and an increasingly strong global orientation of AIS and ACM incentivized both organizations to include a global perspective in the revision task. Therefore, the members of the task force represent all three AIS regions: Region 1, the Americas; Region 2, Europe, the Middle East, and Africa; and Region 3, Asia and the Pacific.

As an initial exercise, the group described the MS program(s) in IS at their home universities. This lead quickly to the realization that the programs differed fundamentally based on the following factors:

- How much and what topics have students studied before entering the master's program?
- What, how much, and in what ways do the students study for an IS master's degree?
- What is the structure of the IS master's degree, specified as a balance between elements such as courses, industry projects, thesis, exchange periods abroad, and others?
- Do the students continue directly to master's studies after a bachelor's degree or are they expected to have work experience before?

Consequently, the task force launched a process to gather detailed information of programs around the world. In the United States, Germany and Australia this was relatively easy as there was previous work carried out for this purpose. At the time of writing this report, we have gathered data about 260 master's degree programs in IS, offered by over by over 230 universities in 33 countries. The countries covered include Australia and New Zealand, several Asian countries, almost all European countries, and the United States. Our aim is to cover all programs on all continents. To this end, we will also be utilizing the AIS Education Survey database.

6.1   Students Entering the Programs

In general, entering a master's program requires a bachelor's degree. Some programs are designed to enable a university's own undergraduates to continue on to complete a master's degree. These integrated programs were very prevalent in Europe before the Bologna process and in some countries in Asia, and they are becoming more common in the U.S.

In Europe, a typical IS master's entry requirement is to have at least 90 ECTS credits in IS or a closely related field in the three-year bachelor's degree. The degree can also be obtained at a University of Applied Sciences. Significant work experience in IS (for more than seven years) is also considered qualifying in some countries such as UK and Ireland. These two options may necessitate bridge studies.

In Asia, most programs have specified a bachelor's degree in IS or a related discipline as an entry requirement. These programs are also flexible in considering candidates who lack such qualifications but have relevant experience. This supports the buildup of the ICT professions, which is much needed because most Asian economies face ICT personnel constraints.

In Australia and New Zealand, entering a master's degree in IS requires an equivalent three-year bachelor's degree, which may not necessarily be in IS/IT or a shorter sub-degree plus substantial work experience in IS/IT. Because of IS/IT personnel constraints, Australia recruits students with a bachelor's degree from Asian countries and therefore, it has been supportive of intermediate degrees and bridge studies.

Students who enter master's degree programs in North America are all required to have a four-year bachelor's degree but they come from a variety of disciplinary backgrounds. That is, the entering students are not required to have any kind of background in IS or related subjects, although in many cases some bridge courses extending the undergraduate experience are needed.

In sum, in countries where there are sufficient numbers of applicants with bachelor's degrees, the universities focus on the nature of the degree and the qualifications of the applicant. In countries building up the ICT work force, the entry requirements tend to be more flexible.

6.2   Length of Program and Amount of Student Work

Typically IS master's programs require one or two years of full-time study, suggesting significant differences between program requirements. Some schools also offer part-time options for working professionals. In addition to the on-site study, distance education appears often as an option.

Doing comparisons based on the amount of student work was challenging. However, in Europe, the introduction of ECTS credits gives considerable comparability. A typical European two-year master's degree is 120 ECTS credits corresponding to 3200 hours student work, with one-year degree half of that. Also three-semester degrees exist. In France, the MIAGE degrees emphasize three possible modes of attendance: (1) full time followed by internship after the academic year; (2) apprenticeship, where periods at university are combined with periods in industry; and (3) continuous, where students work for a company and attend courses during their free time.

In Asia, programs are typically between one to two years in duration for full-time students and twice as long for part-time students. There are plenty of programs taught in the evenings and during weekends. The workload required for one credit varies. For example, in Singapore one credit is 32.5 hours but in reality, students spend about 50% more time. While the calculated workload is 1400 hours, the real requirement can be even 2800 hours.

The length of degrees in Australia and New Zealand (ANZ) is either 1.5 or two years, where two years is more popular as it aligns better with migration requirements. Regarding student working hours, New Zealand universities follow a standard model in which a typical student workload per year is 1200 hours. However, among Australian universities, the credit system varies significantly. The workload for Australian master's degree students may range from 900 hours to 1600 hours, where 1200 hours of workload is most common.

In North America, one credit hour is most often equivalent to 15 classroom contact hours, with the assumption that students will work externally for two hours for each hour in the classroom (leading to a total work requirement of 45 hours per one credit hour). The credit hour requirements for programs range from 30 to 53, which equates to 1350 to 2385 hours of total student work; most programs are between 30 and 36 credit hours. This range of credit and associated work hours is represented in programs lasting 12 to 24 months for full-time students.

If we take into consideration the amount of IS studies prior to entering the program and add to that the workload of the program, the potential for variation in terms of IS knowledge and skills by a master's degree holder is considerable.

6.3   Degree Structures

A master's degree in IS consists usually of a number of core courses in IS and some electives in the domain of practice. In North America and in Asia, the degrees are usually course-based.

In Australia, ACS mandates that the master's degrees in IS/IT should include a cornerstone project unit, which is often a practical component rather than a research thesis. The project often requires supervision and liaison with industry or real problems. In France, the MIAGE degree emphasizes professional training, including always internships and possibly projects with industry. In Germany, several programs include a 6 or 12 ECTS project in addition to the thesis. The Bologna process has significant increased the popularity of exchange periods in Europe, as the credits can be included in the degree. Employers also appreciate international experience.

In North America and Asia, a thesis is an option for students interested in a research career. In Europe, the thesis is an essential part of the degree, usually worth 30 ECTS credits. To support the independent work required, usually a course in research methods and a seminar is required. In the seminar, each student presents the research carried out so far.

7 Using Competence-Based Approach to Understanding and Specifying Curricula

7.1 Degree Profiles, Competences and Learning Outcomes

In all continents[123], there is much ongoing work related to curriculum development. The general trend appears to be moving from traditional content-based curricula – where a Body of Knowledge is the main guiding tool and available resources set the constraints – to competence-based approaches where the degree programs should be organized in view of their results.

> "Competences represent a dynamic combination of cognitive and metacognitive skills, demonstration of knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values." (Lockoff et al. 2010, p. 21)

Instead of *competence*, Bowden (Bowden 2004) uses the term *knowledge capability* that he defines as

> "the ability: to work out what are the key aspects to be dealt with in each new situation; to relate those aspects to the knowledge already acquired and/or to knowledge the graduate knows to have access; to determine what the underlying task or problem in that situation might be; to design a process or solution to deal with the situation; and then to have the ability to follow through and complete the task to solve the problem, either alone or with others."

As discussed earlier, competences that a master's level IS degree program develops can be divided into four categories. The subject area competences are associated with either computing/IT or management and organizational practices related to computing/IT. The competences associated with the degree's domain of practice are the third category. The fourth category includes individual foundational competences. Throughout a degree program, competence development proceeds in an integrated and cyclical manner.

To understand what kind of competences are expected of a MS, one view is given in the Framework of Qualifications for the European Higher Education Area (www.ehea.info). According to it, qualifications that signify completion of the second cycle (i.e., master's level) are awarded to students who:

> • have demonstrated <u>knowledge and understanding</u> that is founded upon and extends and/or enhances that typically associated with the first cycle (i.e. bachelor's level), and that provides a

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