
Revising the MSIS Curriculum: Specifying Graduate Competencies

Second Public Deliverable of the ACM/AIS MSIS 2016 Task Force

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The Joint ACM/AIS MSIS 2016 Task Force welcomes your feedback regarding this document and other project materials. Please visit msis2016.org to comment or send e-mail to task force co-chairs. Thank you very much in advance!

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1. Introduction

This document provides an overview of the key architectural characteristics and content of the proposed MSIS 2016 master's level curriculum recommendation. Section 2 discusses the progress of the project since Summer 2016. Section 3 describes the role of competencies as key architectural components of the curriculum, and Section 4 articulates the overall competency structure, including the distinction between pre-program competencies and those expected to be gained during the program and the distinction between core and specialized competencies. Section 5 outlines core curriculum content by describing competency areas, categories, and competencies. Section 6 describes the next steps in the curriculum development process.

This document can be used independently, but the MSIS task force strongly recommends that it be used together with the revised version of the task force's June 2015 deliverable. The June 2015 document provides important background information on the revision project, the role of MS Programs in Information Systems, assumptions underlying the MSIS degree, the overall proposed changes to MSIS 2006, and other important issues. The entire revised June 2015 document is available at msis2016.org, and its executive summary is enclosed in this document as an Appendix.

The purpose of this document is to give the IS community and its key stakeholders an opportunity to provide the task force with feedback regarding the proposed competency structure and the curriculum project as a whole. Nothing in the report is set in stone, and the task force is grateful for all comments.

2. Project Progress since Summer 2016

At the end of June 2015, the task force released its first public deliverable and the project website msis2016.org with the invitation for the IS community to comment on the task force's work. This was followed by panel presentations and feedback sessions at PACIS 2015 and AMCIS 2015, building on a successful panel at ECIS 2015. In addition, there were several presentations at various national professional meetings. Comments from these sessions have been incorporated in the revised version of the June 2015 document that is now available on the project website.

In Fall 2015, the task force conducted an industry survey and a faculty survey that provided valuable feedback for the revision process. In addition, the task force continued to present its work at professional meetings, including the MIS Academic Leadership Conference in Tucson, AZ and the China Computing Education Conference in Tianjin, China, both in November 2015. The work of the task force was coordinated with regular conference calls.

The results of the surveys and feedback from the conference presentations were essential sets of source materials for the second face-to-face meeting of the task force that was organized in conjunction with ICIS 2015 in Fort Worth, TX. The foundations of the current version of the competency structure articulated in this document were developed

at that meeting. The task force also had an opportunity to present the results immediately at the AIS SIG-ED 2015 meeting in the form of two research presentations and a panel. In January and February 2016, the task force has continued to refine the competency model and add details to it.

3. Competencies as Key MSIS 2016 Architectural Components

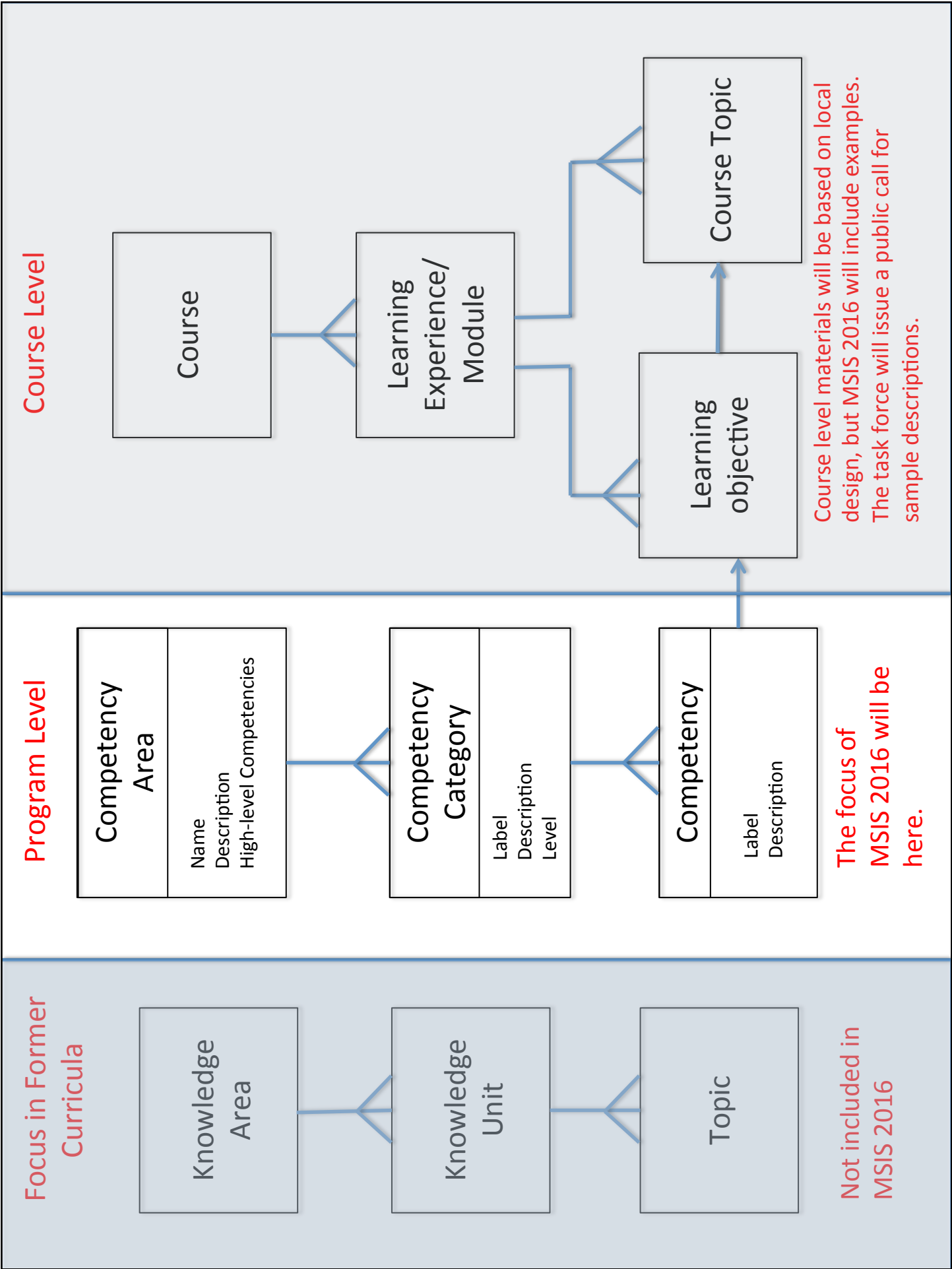
In this section, we will discuss the underlying conceptual structure of the proposed MSIS 2016 curriculum recommendation. In brief, the curriculum is specified using graduate competencies as its foundational element, instead of courses or knowledge areas, units, and topics.

Historically, most computing curriculum documents have been structured around a typically hierarchical Knowledge Area – Knowledge Unit – Topic (KA/KU/Topic) structure that together forms a Body of Knowledge. For example, the most recent Computer Science curriculum recommendation (CS2013) has 18 knowledge areas and within each 5-12 knowledge units. Each knowledge unit, in turn, is divided into topics. For example, the Information Management knowledge area has 12 knowledge units, such as Relational Databases. This knowledge unit has 11 topics, which are very familiar to those who teach IS courses in this area, including Mapping conceptual schema to relational schema, Entity and referential integrity, etc. This approach is featured in the left side panel of Figure 1.

A potential problem with the KA/KU/Topic structure is, however, that it focuses mostly on cognitive aspects of learning and leaves experiential elements out. A curriculum based on a knowledge area structure conveys relatively little on what the graduates are able to do at the time of graduation. Some observers might find this perfectly acceptable because they don't view applicable skills and attitudes as a goal of university education; for others, it is a major problem because they hold a broader view of the goals of a university degree.

Prior IS model curricula have always included some type of a representation of an IS Body of Knowledge, but none of the IS curricula have been structured around the BoK structure in the same way as the other computing curricula. Instead, the IS curricula have been represented mainly through courses (both core and specialized) with learning objectives and topics, as specified in the right side panel of Figure 1. This approach has been used in IS 2002 (Gorgone et al., 2002), IS 2010 (Topi et al., 2010), MSIS 2000 (Gorgone and Gray, 2000), and MSIS 2006 (Gorgone et al., 2006). The main challenge of this approach is that it typically presents a course specific view without providing a detailed program level representation of expected graduate capabilities. Some of these curricula—particularly IS 2010—dedicates significant attention to the specification of program level graduate capabilities at a high level of abstraction, but even this document never maps the course level with the program level to analyze or demonstrate how the courses contribute to the way in which students achieve the program level objectives. An illustration of IS 2010 high-level capabilities is included in Section 5, where they are mapped to MSIS 2016 competency areas.

Figure 1. Curriculum Architecture Model Options



From the beginning of the project, the MSIS 2016 task force has followed a third and increasingly commonly used model, illustrated in the middle panel of Figure 1. Instead of specifying a body of knowledge or a set of courses, this curriculum specification identifies a set of graduate competencies. In this context, we use the term competency to refer to graduate ability to use their knowledge, skills, and attitudes to perform specified tasks successfully. Using more refined language, Lockoff et al. (2010, p. 21) defines competencies as follows:

“Competences represent a dynamic combination of cognitive and metacognitive skills, demonstration of knowledge and understanding, interpersonal, intellectual and practical skills, and ethical values.”

We are aware of the complex discussion associated with the term competency (see, e.g., Hoffman, 1999; Paquette, 2007). In this context, it is not our intent to contribute to that conversation but to simply specify competency as an integrative concept that brings together graduate knowledge, skills, and attitudes.

The MSIS 2016 curriculum specifies high-level *competency areas*. The competency areas are, in turn, divided into *competency categories*, and the actual competencies are specified under the categories. Competency areas and competency categories are much more stable and less technology-dependent than the competencies themselves. In addition, there will be much more local variation in the competencies than at the higher levels. Therefore, the competencies should be seen as current examples with a relatively high likelihood of changes and local variations, whereas the areas and categories provide longer-term guidance with a higher level of stability.

Each competency area has a name, a brief (paragraph long) description, and three to five high-level dimensions. Each category is specified with a name and a brief description, as is each competency within a category. A more detailed description of this structure is provided in Section 4.

4. Overall Competency Structure

4.1 Big Picture

Overall, an MSIS program develops four types of competencies: Computing Competencies, IS Management Competencies, Individual Foundational Competencies, and Domain Competencies. The first two are, in practice, so closely intertwined that it is easier to discuss them together. Figure 2 presents an overview of the MSIS competency area structure. The rest of this section discusses its elements at a more detailed level.

4.2 Computing and IS Management Competencies

Computing and IS Management Competencies together form the core of the MSIS competency specification: the competencies included in this element are distinctively Information Systems competencies. This is unlike Foundational Competencies and Domain Competencies (see 4.3. and 4.4, respectively) that are, in practice, shared as

Figure 2. MSIS 2016 Proposed Competency Areas

Specialized Competencies

Specialized Competencies consist of additional Computing and IS Management 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

Core Competency Areas for Computing and IS Management

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

Individual Foundational Competencies

Analytical and critical thinking
 Creativity
 Collaboration
 Ethical analysis
 Leadership
 Mathematical competencies
 Negotiation
 Oral communication
 Problem solving
 Written communication

 Graduate competencies developed
 building on the foundation of
 competencies developed in prior
 studies and work/life experience

Domain Competencies

Core competencies in a domain
 of human activity such as
 business, health care, law,
 government, an area of scientific
 research, etc.

Competency Areas with Pre-master's Competencies

Data, Information and Content Management
 IS Management and Operations
 IT Infrastructure

Role of Information Systems in Organizations (Foundational
 Understanding of IS)
 Systems Development and Deployment

outcomes with many other program types. Most of this document will be dedicated to providing a more detailed review of the competency areas, categories, and competencies within this integrated element. Computing and IS Management are presented together within the same element because the computing and IS management components of the competencies themselves are often so strongly intertwined that it is very difficult, if not impossible, to separate them from each other. The list of the competency areas is included in Figure 2. These areas, categories, and competencies are specified at a significantly more detailed level in Section 5.1 and illustrated in Figure 3 and Tables 1 and 2 within Section 5.

4.3 Individual Foundational Competencies

Individual Foundational Competencies are those competencies that are necessary for all knowledge professionals in a variety of professions, such as communication, collaboration, and problem solving. The specific competencies chosen for this curriculum document are based on the collection articulated in IS 2010. This list has been modified by separating from each other competencies that were presented together in IS 2010. The list of these competencies is included in Figure 2 and specified at a more detailed level in Section 5.2.

4.4 Domain Competencies

As discussed in the task force's first deliverable, the MSIS is a professional practice master's degree that always integrates computing and IS management with a specific domain of practice (such as business, health care, legal environment, government, K-12 education, higher education, etc.). MSIS 2016 will not articulate a set of competencies for any single domain of practice to avoid the impression of giving one domain a priority status, but it will provide links to sample competency specifications for several domains.

4.5 Prerequisite Competencies vs. Program Competencies

Most computing curricula are targeted to the undergraduate level and thus, for them, the qualifications of the students entering a degree program are typically defined as a secondary education (e.g., high school) degree. As a master's degree, MSIS has to consider additional dimensions of the incoming student background. The first requirement for incoming MSIS students is an earned bachelor's degree. In most contexts, a bachelor's level requires about 120 semester credit hours or 180-240 ECTS credits (3-4 years of full-time work). This is, however, just a basic technical requirement.

In addition, for an MSIS degree to achieve its objectives regarding graduate competencies, it is important that incoming students have already acquired a certain set of prerequisite competencies related to Computing and IS Management. In earlier versions of the MSIS curriculum, these have been specified as prerequisite courses. In the case of MSIS 2006, these courses included *IS Fundamentals* and *Programming, Data, Files, and Object Structures* (both specified as IS 2002 courses). In MSIS 2016, the task force has moved to a model that specifies a set of prerequisite competencies. Many of them are

within the same competency areas that include competencies specified for MSIS graduates, but to be gained at an earlier stage. Specifically, the prerequisite competencies are included in the *Data, Information, & Content Management*, *IT Infrastructure*, and *Systems Development and Deployment* areas (Figure 2; see also Section 5 for details).

As for the Individual Foundational Competencies, MSIS 2016 does not make specific assumptions regarding the competencies that incoming students have. It does, however, assume that the undergraduate/first cycle degree requirement has given students competencies in oral communication, written communication, leadership and collaboration, negotiation, analytical and critical thinking, creativity, ethical analysis, and problem solving (as specified, for example, in IS 2010). As a master's degree, MSIS 2016 will be building on these competencies, strengthening them and bringing them to a level that is compatible with master's level expectations.

Please note that MSIS 2016 will not take a stand regarding the way in which the prerequisite competencies can be acquired. Clearly one way to get them is to have an undergraduate degree in Information Systems or in a related applied computing discipline. It is also possible that an incoming student has acquired the required competencies through work experience (which, of course, needs to be verified with appropriate testing). Finally, the prerequisite competencies can be achieved by taking bridge courses before the actual graduate program starts. Whichever mechanism is used, it is essential that the competencies are attained in a way that allows the student to fully use the prerequisite competencies as part of the master's level study process—the master's program should be built on the assumption that all students have the prerequisite competencies and are able to use them.

4.6 Core Competencies vs. Specialized Competencies

As indicated in Figure 2, Specialized competencies consist of additional Computing and IS Management competencies that build on the core competencies and allow the graduates to perform more sophisticated tasks and act in more specialized professional roles. It is typical for MSIS programs to include career tracks that require the development of specialized competencies within a specific area of expert knowledge, such as security or analytics.

5. Competency Specifications

This section will provide detailed descriptions of the nine competency areas for Computing and IS Management (overview in Figure 3; details in Section 5.1) and the Individual Foundational Competencies (Section 5.2).

5.1 Specifications of Competency Areas, Competency Categories, and Competencies for Computing and IS Management

The task force has benefited significantly from the following sources when developing the competency structure proposed in this section: