# **Современная структура Computing Curricula (СС2020)**

CC2020 TASK FORCE

CC2020 TASK FORCE (CONTINUED)

CONTENTS

EXECUTIVE SUMMARY

CHAPTER 1: INTRODUCING CC2020

1. CC2020 Expectations
2. Project Purpose, Vision and Mission
3. Project Strategies
4. Project Diversity
5. Project Stakeholders
6. Prospective Students and their Guardians
7. Current Students
8. Industry
9. Computing Educators and Curriculum Developers
10. Professional Associations, Educational Organizations, and Authorities
11. Project Background
12. Brief History
13. Project Organization and Structure
14. Overall Scope of Computing
15. Current Discipline Structure
16. Timeline of Curricular Guidelines
17. Guiding Principles
18. Four Principles
19. Constituents and Public Outreach
20. CC2020 Report Structure
21. Digest of Chapter 1

CHAPTER 2: EVOLUTION OF COMPUTING EDUCATION

1. What is Computing?
2. Early Meanings
3. Recent Undertakings
4. Landscape of Computing Disciplines
5. Early Developments
6. Contemporary Advances
7. Status of Computing Discipline Reports
8. Computer Engineering
9. Computer Science
10. Cybersecurity
11. Information Systems
12. Information Technology
13. Software Engineering
14. Data Science (Under Development)
15. Extensions of Computing Disciplines
16. Computing Interrelationships
17. Emerging Curricula
18. Computing + X
19. X + Computing
20. Other Tertiary Computing Models
21. Computing in Primary and Secondary Education
22. Computing Specializations
23. Digest of Chapter 2

CHAPTER 3: KNOWLEDGE-BASED COMPUTING EDUCATION

1. Knowledge-Based Learning
2. Learning and Knowledge
3. Learning from Knowledge Contexts
4. Knowledge and Computing Education
5. Revisiting Computing Curricula 2005
6. Intent of CC2005
7. Content of CC2005
8. Comparison Tables
9. Curricular Visuals
10. Global and Other Considerations
11. Limitations of a Knowledge-Based View
12. The Skills Gap
13. Non-Degree Certifications
14. Skills Frameworks
15. Digest of Chapter 3

CHAPTER 4: COMPETENCY-BASED COMPUTING EDUCATION

1. Competency and Competency-Based Learning
2. Competency and its Meaning
3. Previous Work on Computing Competency
4. Initial and Developing CC2020 Explorations of Competencies
5. A Competency Model
6. The CC2020 Competency Model
7. Component Definitions
8. Competency Statements
9. Component Elements
10. Creating Competency Statements
11. From Competencies to Curricula
12. Identifying and Authoring Competencies
13. Competency Specifications and Curricular Specifications
14. Digest of Chapter 4

CHAPTER 5: ANALYSIS AND VISUALIZATION OF CURRICULA

1. On Visualization
2. Some Basic Functions
3. Analysis of Competencies
4. Competency-Based Visualization Examples
5. Student Use Case
6. Industry Use Case
7. Knowledge-Based Visualization Examples
8. Computing Educator
9. Educational Authority
10. Visualization of the Landscape of Computing Knowledge Table
11. Other Visualizations
12. Challenges Concerning Competency Visualization
13. Consistent Vocabulary
14. Entity Comparison
15. Visualization types
16. Digest of Chapter 5

CHAPTER 6: GLOBAL AND PROFESSIONAL CONSIDERATIONS

1. Global Context and Computing Programs
2. Computing Nomenclature
3. Degree Names, Job Positions and Job Titles
4. Degree Names and the Workplace
5. Use of the Word «Engineer»
6. Worldwide Computing Degree Structures
7. Computing Education in Africa
8. Computing Education in Australasia
9. Computing Education in China
10. Computing Education in Europe
11. Computing Education in India
12. Computing Education in Japan
13. Computing Education in the Middle East
14. Computing Education in Latin America
15. Computing Education in North America
16. Computing Education in the United Kingdom
17. Global Economics and Computing Education
18. Innovation Spaces
19. Forces Shaping Academic Programs
20. Innovation in Computing
21. Entrepreneurship in Computing
22. Professionalism and Ethics
23. Ethics in the Curriculum
24. Professional and Ethical Work
25. Cultural Sensitivity and Diversity
26. Digest of Chapter 6

CHAPTER 7: CURRICULAR DESIGN – CHALLENGES AND OPPORTUNITIES

1. Transforming to Competencies
2. Distinguishing Competency from Knowledge
3. Curricular Dynamics
4. Conveying Computing Competencies
5. Knowledge Transfer
6. Skill Transfer
7. Disposition Transfer
8. Need for Local Adaptation
9. Industry Engagement for Workplace Competencies
10. Professional Advisory Boards
11. Work-Study and Cooperative Programs
12. Internship Programs
13. Institutional Resource Requirements
14. Attracting and Retaining Academic Educators
15. Need for Adequate Laboratory Resources
16. Program Quality Assurance and Accreditation
17. Accreditation Overview
18. Benefits of Program-Specific Accreditation
19. Quality Assurance
20. Global Recognition
21. Digest of Chapter 7

CHAPTER 8: BEYOND THE CC2020 REPORT

1. Technology Trends for CC2020 and Beyond
2. Current and Emerging Technologies
3. Existing Computing Areas with No Endorsed Curriculum
4. Emerging Computing Areas
5. Public Engagement and the CC2020 Project
6. CC2020 Project Website
7. Relating Curricula and Competencies
8. Project Dissemination
9. The Role of Competency in Future Curricular Guidelines
10. Recent Curricular Development
11. Future Curricular Development
12. Competency Advocacy
13. Future Activities
14. Digest of Chapter 8

ACKNOWLEDGMENTS

APPENDIX A: POSTER EXPLAINING CC2005 CURRICULAR VISUALS

APPENDIX B: COMPUTING SKILLS FRAMEWORKS

1. Skills Framework for the Information Age
2. Skills and the European Competency Framework
3. Skills and the I competency Dictionary
4. Task Dictionary
5. Task Dictionary Chart
6. Examples of Task Evaluation Diagnostic Level and Criteria
7. Skill Dictionary
8. Skill Dictionary Chart
9. Skill Proficiency Level
10. Skills via Enterprise Information Technology

APPENDIX C: PRELIMINARY DRAFT COMPETENCIES – EXAMPLES

1. Initial CC2020 Explorations of Competencies
2. Drafting Competencies
3. Strategy for Generating Competencies
4. Draft Competencies by Discipline
5. Computer Engineering Draft Competencies
6. Computer Science Draft Competencies
7. Information Systems Draft Competencies
8. Information Technology Competencies
9. Software Engineering Draft Competencies
10. Master’s in Information Systems Draft Competencies

APPENDIX D: COMPETENCY-BASED COMPUTING CURRICULA

1. Competency in Computing Baccalaureate Education
2. The CC2020 Definition of Competency
3. The Anatomy of Competency Specification
4. The Competency Statement’s Role in a Competency Specification
5. Knowledge, «Knowing What,» as a Component of Competency
6. Skills, «Knowing How,» as Components of Competency
7. Dispositions, «Knowing Why,» as a Component of Competency
8. Structuring Competency Statements for Competency Specification
9. Developing Competency Statements and Specifications
10. Elaborating Competency Statements
11. Competency in Computing Education
12. Competency in Future Curricular Guidelines
13. Summary

APPENDIX E: FROM COMPETENCIES TO CURRICULA

1. Competency in Future Curricular Guidelines
2. Stakeholders
3. Competency Targets
4. Outcome Expectations and Learning Specifications
5. Identifying and Authoring Competencies
6. Free-form Narratives vs. Semi-formal Specifications
7. Eliciting competencies
8. Hierarchical Structure of Competencies
9. Deriving Semi-formal Specifications from Free-form Narratives
10. Authoring Free-form Narratives from Competency Components
11. Using Competency Specifications as a Foundation for Curriculum Specifications
12. Existing Models
13. Building Curricular Guidelines by Based on Competency Specifications
14. Building University-level Curricula Based on Competency Specifications
15. Specifying Program Outcomes as Competencies from Pedagogical Requirements
16. Competencies and Stakeholder Value
17. Assessing Competencies
18. Summary

APPENDIX F: REPOSITORY DEVELOPMENT

1. Repository Development

APPENDIX G: ADDITIONAL VISUALIZATIONS AND ANALYSES

1. Use Case-Based Analysis
2. Case 1: Question from Prospective Student
3. Case 2: Question from Industry
4. Case 3: Question from Teacher
5. Case 4: Question from Educational Authority
6. Comparison of Competency Specifications
7. Various Visualizations of Knowledge
8. Visualizing Full Curricula

APPENDIX H: GLOSSARY AND NOMENCLATURE

1. CC2020 Report Definitions
2. Definitions/Nomenclature on a Global Scale

APPENDIX I: SUSTAINABLE COMPUTING AND ENGINEERING COMPETENCE IN CHINA

1. Adaptable and Sustainable Competencies
2. Agile Education for Sustainable Competencies
3. Factors Affecting Agile Computing and Engineering Education
4. Open Education Ecosystems for Agile Education
5. Service-Oriented Computing Education

APPENDIX J: CONTRIBUTORS AND REVIEWERS

REFERENCES

1. References for Report
2. Additional references not Cited

# **Современная структура Information Systems (IS2020)**

The Joint ACM/AIS IS2020 Task Force

Foreword

Acknowledgements

Executive Summary

1. Introduction
2. The IS discipline
3. The IS profession
4. The IS education context
5. Motivations
6. Motivations for revising IS2010
7. Changes in technology and data
8. Changes in organizations
9. Implications for individuals and society
10. Summary of revisions in the core IS competencies
11. Changes in the IS program core
12. Introduction of IS competency realms
13. Move from courses to competencies
14. Competency model
15. Motivations
16. Defining competencies
17. Knowledge
18. Skills
19. Dispositions
20. Tasks
21. Describing competencies
22. Competency realms and competency areas
23. Architecture of the information systems curriculum in IS2020
24. Key concepts
25. Process for deriving and designing courses from competency specifications
26. Curriculum guidelines
27. High level competency realms
28. Individual Foundational Competencies
29. Domain of Practice Competencies
30. IS competency realms
31. Foundations competency realm
32. Data/Information competency realm
33. Technology competency realm
34. Development competency realm
35. Organizational Domain competency realm
36. IS Integration competency realm
37. Guidelines for different educational contexts
38. Computing or Engineering School
39. Business School
40. Information School
41. Linking IS2020 with MSIS2016
42. Resource requirements
43. Use of the model curriculum
44. Use of the model curriculum report
45. Requirements definition
46. Program design
47. Competency identification
48. Living document and sustaining the process
49. Proposed Community Management and Governance Structures
50. Living Document Community Foundation Goals

LIST OF REFERENCES

APPENDIX 1 – Program Level Career Tracks and Competency Areas

APPENDIX 2 – Competencies and Skill Levels by Competency Areas

APPENDIX 3 – Competencies, Knowledge-Skill Pairs and Dispositions by Competency Area

1. Foundations Competency Realm
2. Competency Area – Foundations of Information Systems
3. Data/Information Competency Realm
4. Competency Area – Data/Information Management
5. Competency Area – Data/Business Analytics
6. Competency Area – Data/Information Visualization
7. Technology Competency Realm
8. Competency Area – IT infrastructure
9. Competency Area – Secure Computing
10. Emerging Technologies
11. Systems Development Competency Realm
12. Competency Area – Systems Analysis and Design
13. Competency Area – Application Development and Programming
14. Competency Area – Object-Oriented Paradigm
15. Competency Area – Web Development
16. Competency Area – Mobile Development
17. Competency Area – User Interface Design
18. Organizational Domain Competency Realm
19. Competency Area – IS Ethics, Sustainability, Use and Implications for Society
20. Competency Area – IS Management and Strategy
21. Competency Area – Digital Innovation
22. Competency Area – Business Process Management
23. Integration Competency Realm
24. Competency Area – IS Project Management
25. Competency Area – IS Practicum

APPENDIX 4 – Details of the Development of IS2020

# **Современная структура Enterprise Information Technology Body of Knowledge (EITBOK)**

Part 1: The Enterprise Perspective

What is the Enterprise Perspective?

1. Enterprise Architecture
2. Strategy and Governance
3. Change Initiatives
4. Interoperability
5. Security
6. Quality
7. Disaster Preparedness
8. Operations and Support
9. Ethics

Part 2. The Life Cycle Perspective

What Makes Up a Life Cycle?

1. Requirements
2. Acquisition
3. Construction
4. Transition into Operation
5. Maintenance and Control

Appendices

1. Glossary
2. Structuring the Enterprise IT Organization
3. Enterprise IT Skill Frameworks
4. Key Standards
5. Common EIT Roles
6. Enterprise IT Maturity Assessments