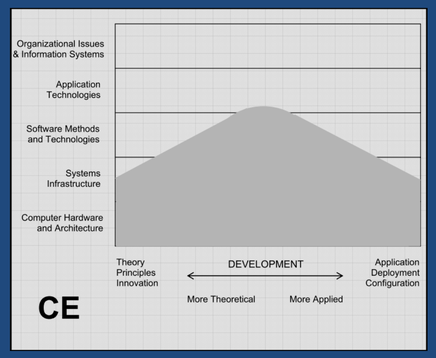
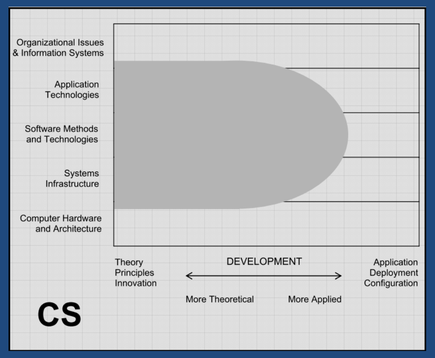
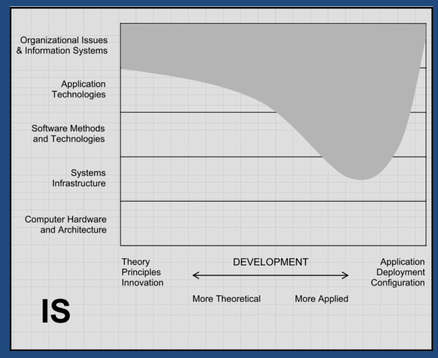
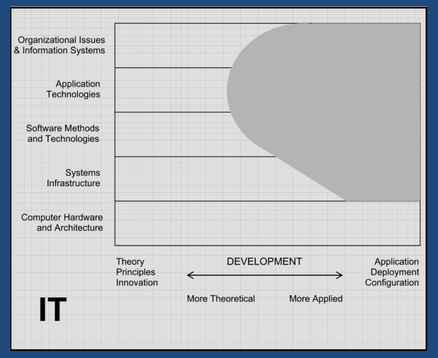
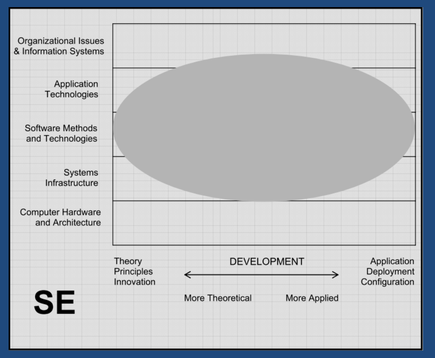
# The Computing Field

*Computing*—the goal-oriented activity that requires, benefits from, or creates computers—is a vibrant and challenging academic and professional field. The expansion and evolution of computing led to the specialization of knowledge and the emergence of several related, but quite different from each other, computing disciplines. In order to improve understanding of this family of disciplines by newcomers, but also among computing practitioners, the Association for Computing Machinery (ACM), the Association for Information Systems (AIS) and the Computer Society of the Institute for Electrical and Electronic Engineers (IEEE-CS) have sponsored a set of reports that point out the commonalities and differences between the computing disciplines. This poster provides a synthetic interpretation of those reports, highlighting the problem space scope, main knowledge areas and core performance capabilities of each of the five major computing disciplines: computer engineering, computer science, information systems, information technology, and software engineering.

| | Computer Engineering | Computer Science | Information Systems | Information Technology | Software Engineering |
|---|---|---|---|---|---|
| ***Problem Space Scope*** |  |  |  |  |  |
| ***Main Knowledge Areas*** | Computer architecture & organization<br>Computer systems engineering<br>Digital logic<br>Programming fundamentals<br>Distributed systems<br>Circuits & systems<br>Electronics | Software development fundamentals<br>Algorithms & complexity<br>Software engineering<br>Programming languages<br>Discrete structures<br>Systems fundamentals<br>Computer architecture & organization | Foundations of information systems<br>Data & information management<br>Information systems strategy, management & acquisition<br>Enterprise architecture<br>Systems analysis & design<br>Information technology infrastructure<br>Project management | Technical support<br>Programming fundamentals<br>Information management<br>Information technology fundamentals<br>Systems integration<br>Mathematical fundamentals<br>Interpersonal communication | Computing essentials<br>Software modeling & analysis<br>Software design<br>Software verification & validation<br>Professional practice<br>Mathematical & engineering fundamentals<br>Project management |
| ***Core Performance Capabilities*** | Design and implement computing systems, computer-controlled equipment and communication software<br>Maintain computing systems that involve the integration of software and hardware devices | Design & implement software<br>Develop solutions to computing problems<br>Optimize programming solutions<br>Prove theoretical results<br>Devise new ways to use computers | Improve organizational processes<br>Exploit technological innovations<br>Define information requirements<br>Design enterprise architecture<br>Secure data & infrastructure<br>Manage information systems risks | Train and support users<br>Plan, select, configure & maintain information systems infrastructure<br>Model, design, select, configure & manage databases<br>Configure & integrate business applications | Do small-scale & large-scale programming<br>Develop software systems<br>Manage software projects<br>Implement information systems<br>Define information systems technical requirements |


*Sources*

CC (2006). Computing Curricula 2005 – The Overview Report. ACM, AIS and IEEE-CS.
CE (2004). Curriculum Guidelines for Undergraduate Degree Programs in Computer Engineering. IEEE-CS and ACM.
CS (2013). Curriculum Guidelines for Undergraduate Degree Programs in Computer Science. ACM and IEEE.
IS (2010). Curriculum Guidelines for Undergraduate Degree Programs in Information Systems. ACM and AIS.
IT (2008). Curriculum Guidelines for Undergraduate Degree Programs in Information Technology. ACM and IEEE-CS.
SE (2004). Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering. IEEE-CS and ACM.



*Produced by*

Filipe de Sá-Soares, PhD – fss@dsi.uminho.pt
Department of Information Systems
Centro ALGORITMI
School of Engineering
University of Minho
Guimarães, Portugal

University of Minho
School of Engineering

CENTROALGORITMI



May 2014
Version 1.0