ON ISSUE OF IT–SPECIALISTS' MODEL OF KNOWLEDGE

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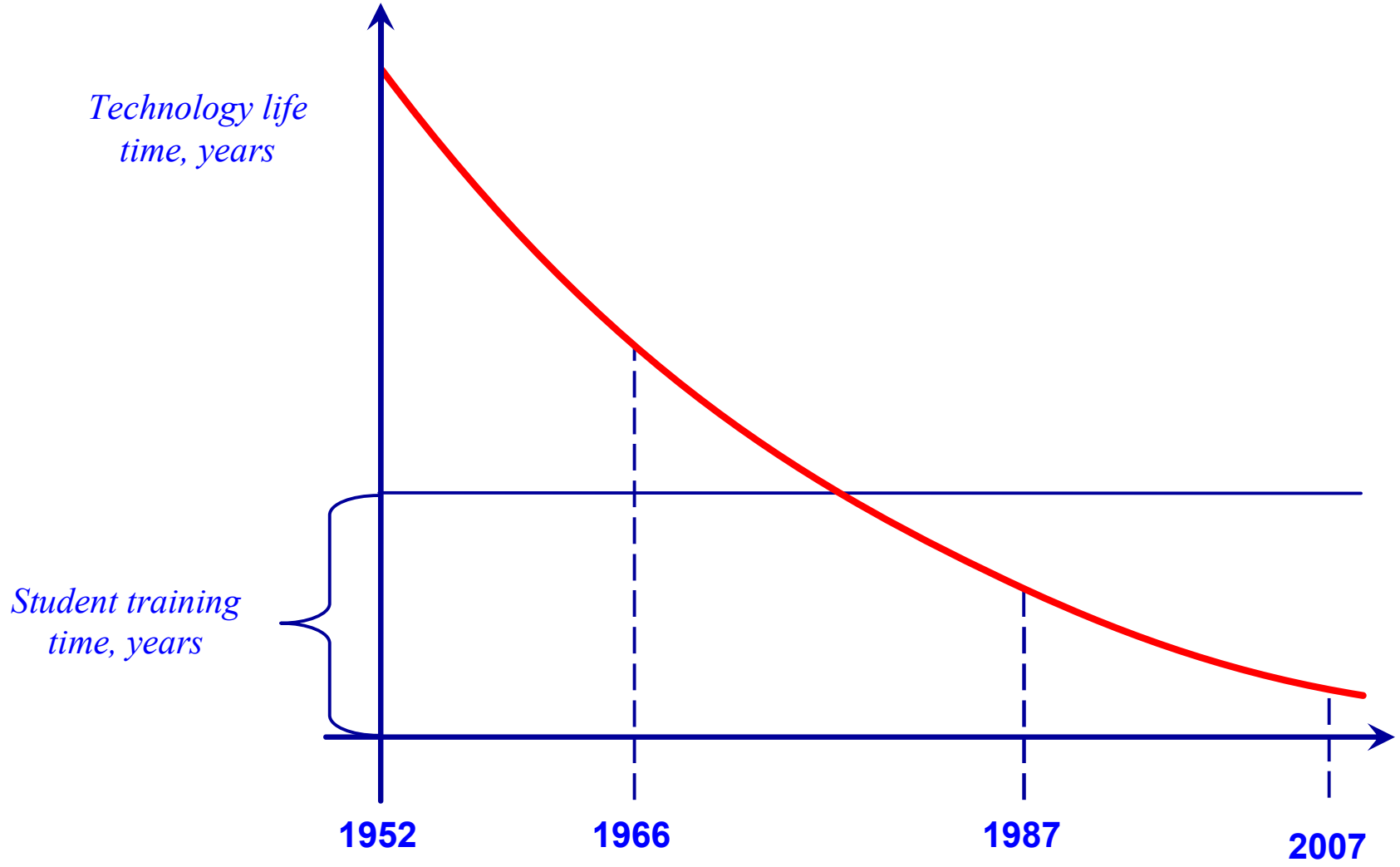
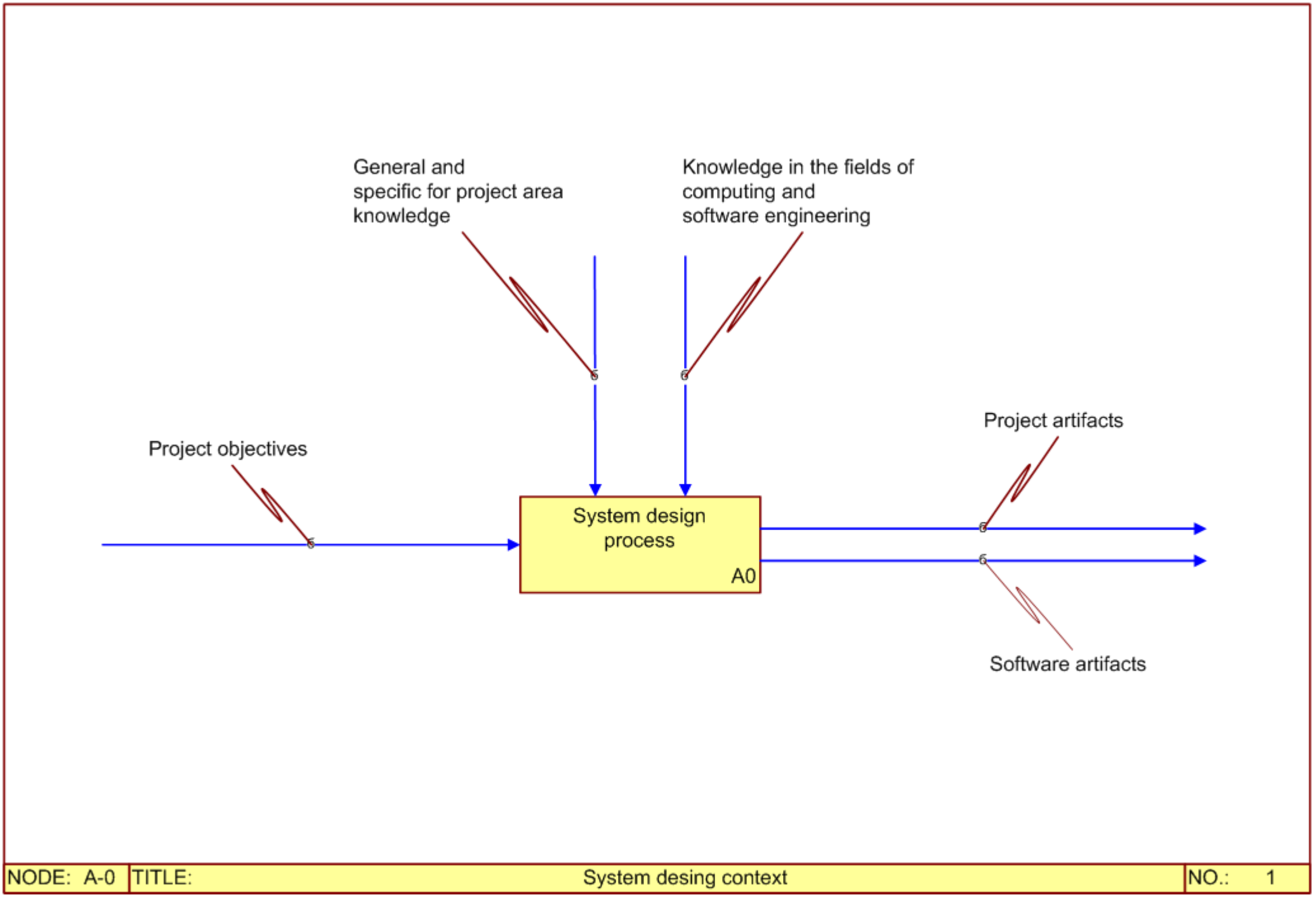
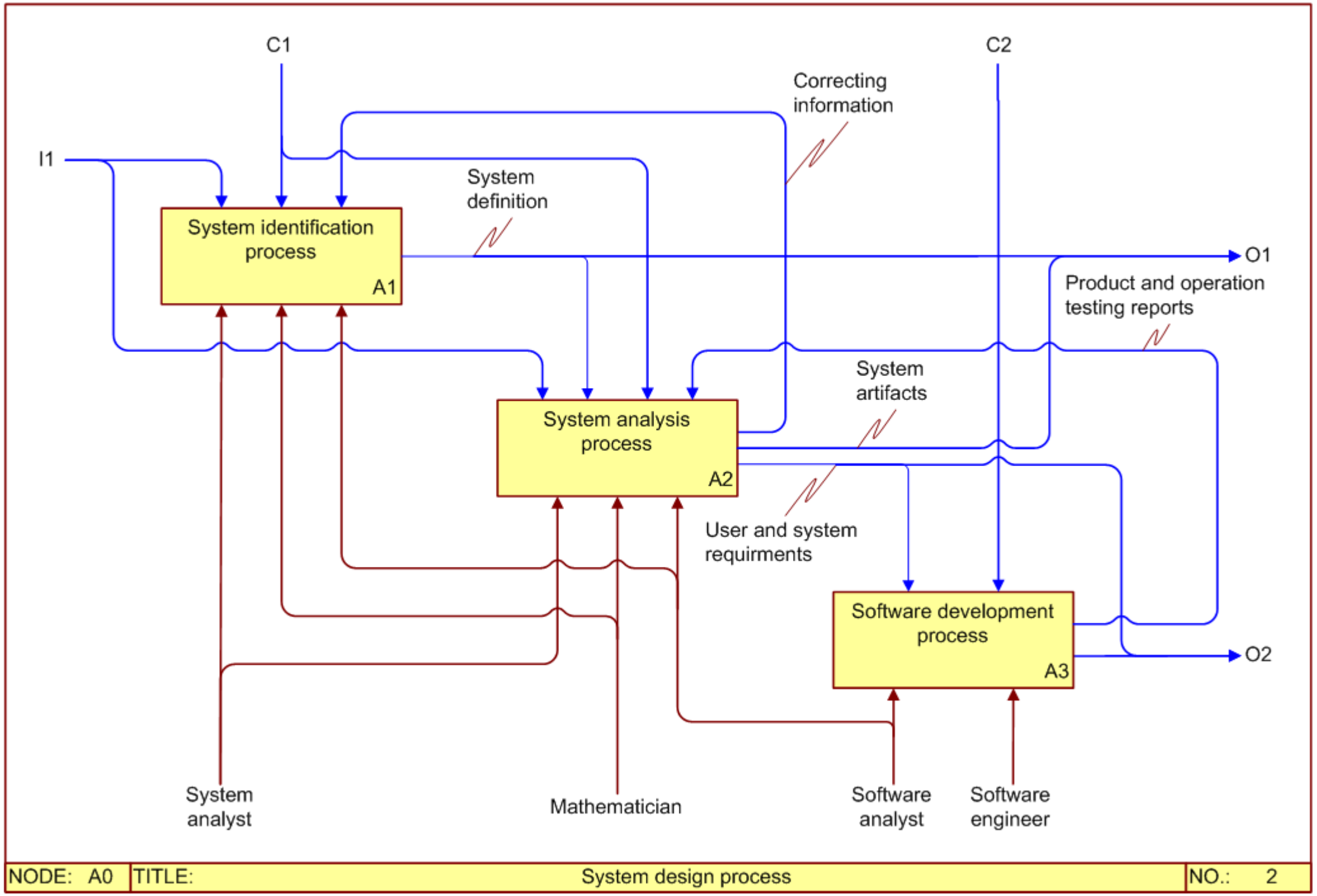


1. Rapid change of paradigms ⇒ shortening of technology life time

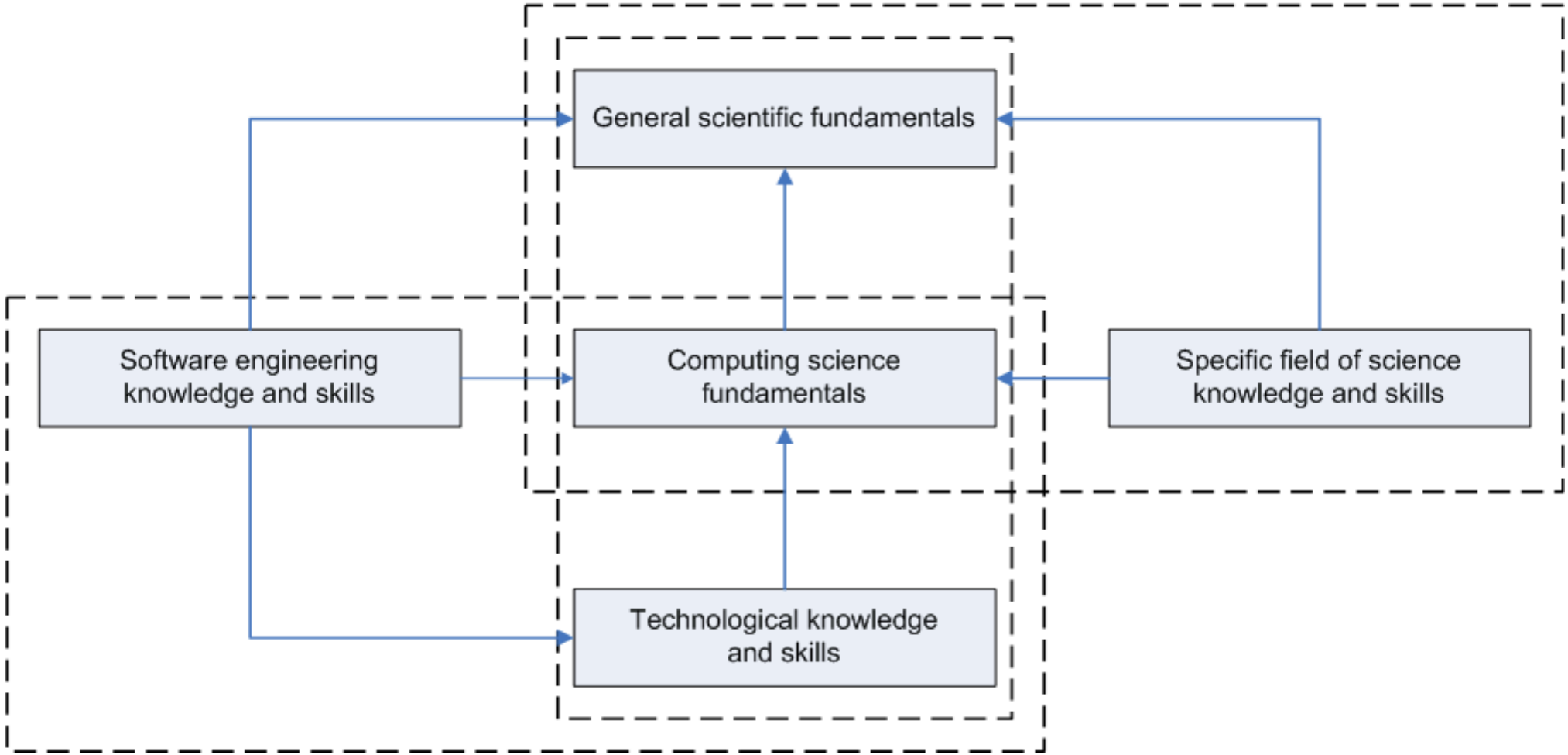
2. Technology-oriented education ⇒ lack of mind flexibility

3. Stringent specialization ⇒ low competitiveness on labor market


General and
specific for project area
knowledge
Knowledge in the fields of
computing and
software engineering
Project objectives
Project artifacts
System design
process
A0
Software artifacts
NODE: A-0
TITLE:
System desing context
NO.: 1


C1
C2
Correcting information
I1
System definition
System identification process
A1
O1
Product and operation testing reports
System artifacts
System analysis process
A2
User and system requirments
Software development process
A3
O2
System analyst
Mathematician
Software analyst
Software engineer
NODE: A0
TITLE:
System design process
NO.: 2

IT-body of knowledge structure



A *Knowledge and understanding of*:

A1 Fundamentals of mathematical sciences (Calculus, Algebra, Geometry, Differential equations, Probability Theory and Mathematical statistics) and Physics to represent formally, model and analyze natural, social, economical and ecological processes to be computerized.

A2 Fundamental concepts, principles and theories of Discrete Mathematics and Mathematical Logic to understand basics of computer science.

A3 System analysis and modeling techniques related to computer science and software applications.

A4 Essential facts and theorems of Algorithm Theory and Algorithm Complexity.

A5 Programming paradigms, their fields of application and corresponding programming languages.

A6 Organization of computer system, its architecture and operating system functions, basics of computer networking, principles and architectures of distributed systems, network programming and web-programming in particular.

A8 Principles and techniques of information management, human – computer interaction and fundamentals of artificial intelligence.

A9 Essential facts, concepts and theories related to software engineering.

A10 Social, professional and ethical responsibilities of computer science professional.

B *Intellectual (thinking) skills - able to*:

B1 Formulate, analyze and solve problems related to computer science and software development and/or software application in particular.

B2 Be creative in the solution of problems including modeling and design.

B3 Integrate and evaluate information and data from a variety of sources.

B4 Identify and analyze criteria and specifications appropriate to specific problems and planning strategies for their solution.

B5 Design a computer-based system, component or module to meet specified requirements.

B6 Analyze the extent to which a computer-based system meets the criteria defined for its current use and future development.

B7 Evaluate designs, processes and products and make improvements.

B8 Take a holistic approach in solving problems and designing computer-based systems, applying professional judgments to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.

B9 Plan and conduct research.

***C Practical skills - able to*:**

C1 Deploy appropriate theory, practices, and tools for the specification, design, implementation, and evaluation of computer-based system.

C2 Specify, design and implement computer-based systems.

C3 Evaluate systems in terms of general quality attributes and possible tradeoffs within a given problem.

C4 Apply the principles of effective information management, information organization and information retrieval skills to information of various kinds, including text, images, sound and video.

C5 Apply the principles of human-computer interaction to the evaluation and construction of the wide range of materials including user interfaces, web pages and multimedia systems.

C6 Identify and analyze risks and safety aspects that may be involved in the operation of computing equipment within a given context.

C7 Deploy effectively tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.

C8 Operate computing equipment and software systems effectively.

C9 Recognize and be guided by the social, professional, and ethical issues in the computer technology.

D *Transferable skills - able to*:

D1 Make succinct presentations to a range of audiences about technical problems and their solution.

D2 Communicate effectively (in writing, verbally and through diagrams and drawings) also using more than one language.

D3 Work effectively as a member of a development team.

D4 Evaluate psychological characteristics of a person to reach understanding and agreement within a team, create auspicious conditions for team members' interrelations in the process of joint development.

D5 Understand and explain the quantitative dimensions of a problem.

D6 Gain experience, transfer techniques and solutions from one project to another.

D7 Organize self learning and development including time management and organizational skills.

D8 Keep abreast of current developments in the discipline to continue one's own professional development.

D9 Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.

	A										B									C								D								
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
Calculus	X		X								X	X	X	X				X	X																	
Algebra and Geometry	X		X								X	X	X	X				X	X	X																
Discrete mathematics	X	X	X								X	X	X	X				X	X														X			
Differential equations	X		X								X	X	X	X				X	X																	
Probability and Statistics	X		X								X	X	X	X				X	X																	
Numerical Analysis	X		X								X	X	X	X				X	X														X			
System theory and mathematical modeling	X		X								X	X	X	X				X	X														X			
Mathematics electives	X		X								X	X	X	X				X	X														X		X	X
Math. Logic and Algorithm theory	X		X								X	X	X	X				X	X																	
Programming					X						X	X	X	X	X	X	X	X	X	X	X					X							X				
Data Structures and Algorithms				X							X	X	X	X	X	X	X	X	X	X	X												X				
Methods of optimization and operations research				X							X	X	X	X	X	X	X	X	X	X	X												X				
Object-oriented Programming					X						X	X	X	X	X	X	X	X	X	X	X					X											
Computer Organization						X					X	X	X	X	X	X	X	X	X	X	X				X		X						X				

	A										B									C								D								
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
System Programming						X					X	X	X	X	X	X	X	X	X	X	X				X		X						X				
Operating Systems						X					X	X	X	X	X	X	X	X	X	X	X				X		X						X				
Human-Computer Interaction								X			X	X	X	X	X	X	X	X	X	X	X			X	X	X	X										
Databases and Information Systems							X	X			X	X	X	X	X	X	X	X	X	X	X		X		X	X	X						X				
Computer Networks							X	X			X	X	X	X	X	X	X	X	X	X	X				X	X	X										
Intelligent systems								X			X	X	X	X	X	X	X	X	X	X	X					X	X						X				
Software Engineering									X		X	X	X	X	X	X	X	X	X	X	X	X			X	X							X	X	X		X
Coursework											X	X	X	X	X	X	X	X	X							X		X	X	X				X	X		X
CS electives				X							X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									X	X
Undergraduate project											X	X	X	X	X	X	X	X	X									X	X	X	X	X		X	X		X
Capstone project											X	X	X	X	X	X	X	X	X									X	X	X	X	X		X	X		X
Human Sciences										X																		X	X	X	X	X					X

LOGICALLY CONNECTED PROFESSIONAL-ORIENTED COURSES (called "tracks")

1. *Computer Hardware, Networks and Operation Systems*
2. *Programming and Algorithms Fundamental*
3. *System Analysis and Modelling*
4. *Databases and Information Systems*
5. *Web-oriented Systems*
6. *Software Engineering*
7. *Artificial Intelligence Introduction*