Third ITU Workshop on Network 2030

Focus Group on Technologies for Network 2030

Title: The Relevance of Artificial Intelligence in the actuality: A Proposal for the Definition of its Scientific Statute in Computing

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Presentation Program

- Interesting facts about Mozambique;
- Research Motivation;
- Introduction: The Relevance of Artificial Intelligence in Telecommunication
- The Scientific Problem of Artificial Intelligence;
- Objectives and research hypotheses;
- Development: Life Cycle Model of AI;
- Proposed solution: The case os sientific status;
- Proposed solution: The Problem Space of Artificial Intelligence;
- Proposed solution: Comparative weight of computing topics across the six kinds of degree programs;
- Conclusion;
- Base Bibliography.

Interesting facts about Mozambique


Moçambique

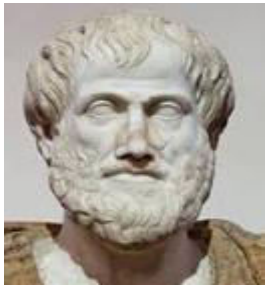

Massingir
GAZA
Limpopo
Inhambane
Inharrime
Chokwé
MAPUTO
ÁFRICA
DO SUL
Xai-Xai
ManHiça
Moamba
Nambicha
Maputo
OCEANO
ÍNDICO
Bela Vista
SUAZILÂNDIA
Maputo
Ponta do Ouro


Ponta do Ouro

Research Motivation

Research Motivation

- Our presentation has a philosophical and Academic perspective. So we will very quickly go back in time, Artificial Intelligence History, showing the positioning of the founding members of artificial intelligence as a motivation for our research



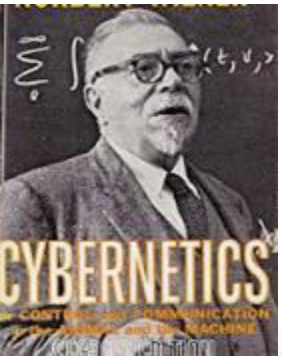
Aristotle

John McCarthy

Marvin Minsky

Herbert A. Simon

Allen Newell



norbert wiener

Arthur Samuel（左）

Oliver Selfridge

Ray Solomonoff

Claude Shannon

Research Motivation

- This research was the subject of our second Master's thesis, 2014, in Artificial Intelligence at the Eduardo Mondlane University in Mozambique (You can find on the website http://www.uem.mz at the University or on the internet google)
- On the other hand, In our first dissertation, 2010, in Artificial Intelligence at Eduardo Mondlane University, we developed a test model for cognitive software agents.
- In this first dissertation we also discussed the relationship between Software Engineering and Artifical Intelligence what today the ACM / IEEE calls RAISE Workshops.

Research Motivation

- *"the main reason the 1956 workshop at Dartmouth failed to achieve my expectation is that AI is more difficult than we thought."* (McCarthy quoted by Nilsson 2010 p.80).

- **the computer is only a way to test ideas, but first we need to understand the models we set out to build.**

- *"I think there is a disease that has spread through my profession. Each researcher thinks there is a magic path to getting intelligent machines and then they waste their time meaningless. On the other hand, each one is perfecting some particular method, so maybe someday, in the future, or maybe two generations from now, someone will come and say, "Let's put it all together" and maybe the machine will be smart. "* (Marvin quoted by Kruglinski 2007).

Introduction

The Relevance of Artificial Intelligence in the actuality

(Source: Pressman 2006)

- in the long term, revolutionary advances in computing may be guided by the human sciences "such as human psychology, sociology, philosophy, anthropology and others ...
- The influence of the humanities may help to shape the direction of computational research ...
- The development of future computers could be guided by the understanding of "brain physiology" and not by the knowledge of conventional microelectronics.

The Relevance of Artificial Intelligence in Telecommunication

- Singularity is a future period during which the pace of technological change will be so rapid, its impact quite profound, and that human life will be irreversibly transformed, and in this period the culmination of the fusion between biological thinking and existing technology will occur…;
- with distinction between humans and machines or between virtual and physical reality (Kurzweil 2005).
- The case of Tactile Internet, 6G and Network 2030 ahead

The Relevance of Artificial Intelligence in Telecommunication

Discussion time

- !? The case of Tactile Internet, 6G and Network 2030 ahead

The Problems of Artificial Intelligence

The Scientific Problem of Artificial Intelligence

- Issues such as what is AI and its scope?; what is the object of study, methods and tools?;
- Which are the disciplines of the body of knowledge?; IA is science, philosophy or engineering?, among others, arouse heated debates and do not find consensual answers;
- because, each researcher in function of its background and motivation has formulated its own definition

The Scientific Problem of Artificial Intelligence

- The lack of a "Scientific Statute" of AI is a problem dating from its inception.
- According to Gardner (1985), many skeptics position AI as a form of "Applied Engineering" and with no theoretical basis to be a "Scientific Course".

Objectives and research hypotheses

Research Objectives

General objective:

- Propose the pillars for the definition of a scientific status of Artificial Intelligence in Computing;

Specific Objectives

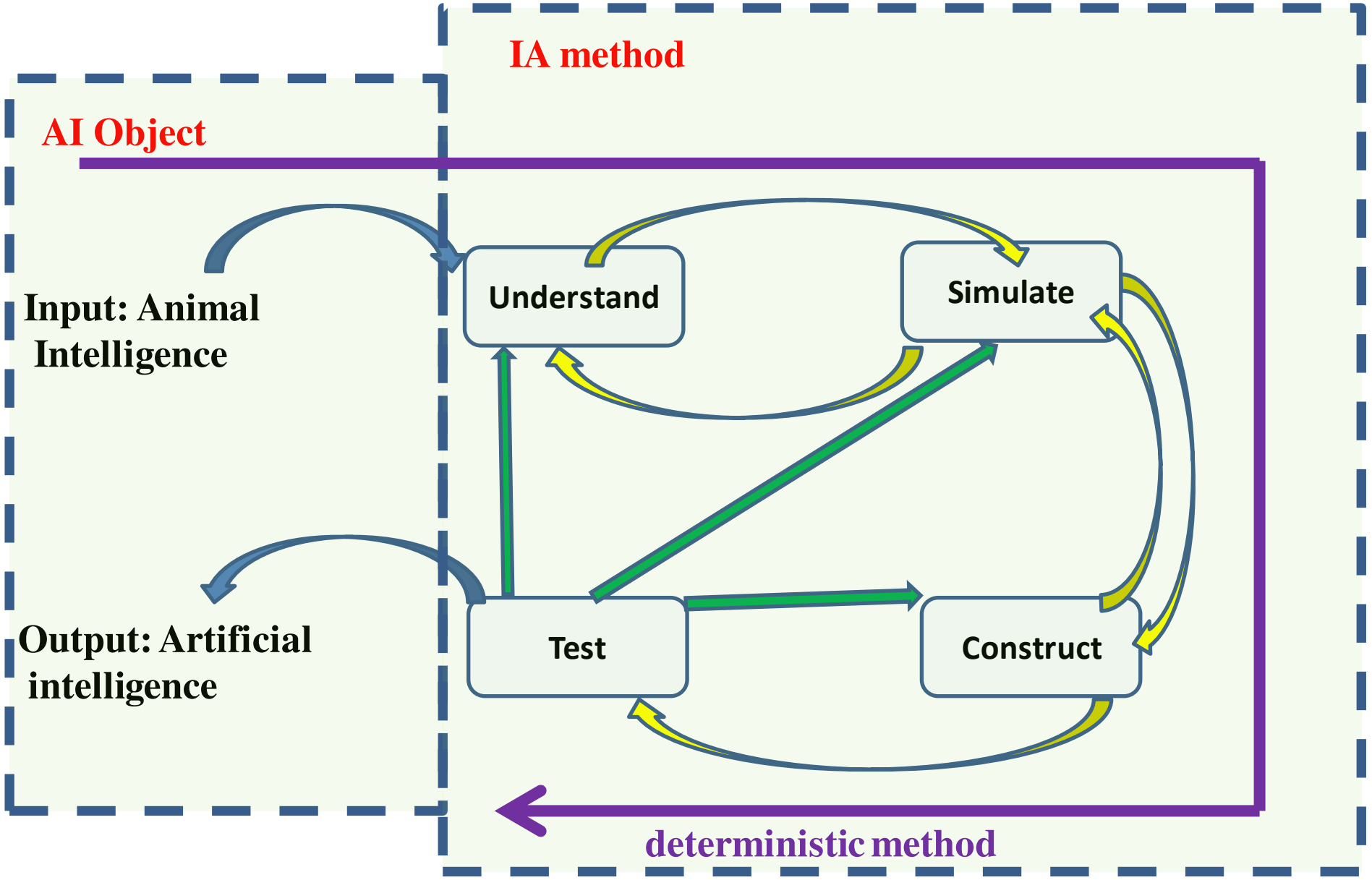
- Construct a Life Cycle Model for Artificial Intelligence;
- Building a body of knowledge for Artificial Intelligence;
- Design a Curriculum Guide Model for the Artificial Intelligence discipline.

Research hypotheses

- *If Artificial Intelligence (AI) is not a subclass (or subarea) of Computational Sciences then, the AI must have an autonomous Body of Knowledge and, by this way, its own scientific status in Computing;*
- by scientific status in computing we are referred to be an autonomous discipline in computing like the disciplines: Computer Science; Computer Engineering; Information Systems; Software Engineering; Information Technology
- Therefore, Artificial Intelligence should separate itself from Computational Sciences and progress, individually.

Development

Development：Life Cycle Model of AI



Proposed solution:

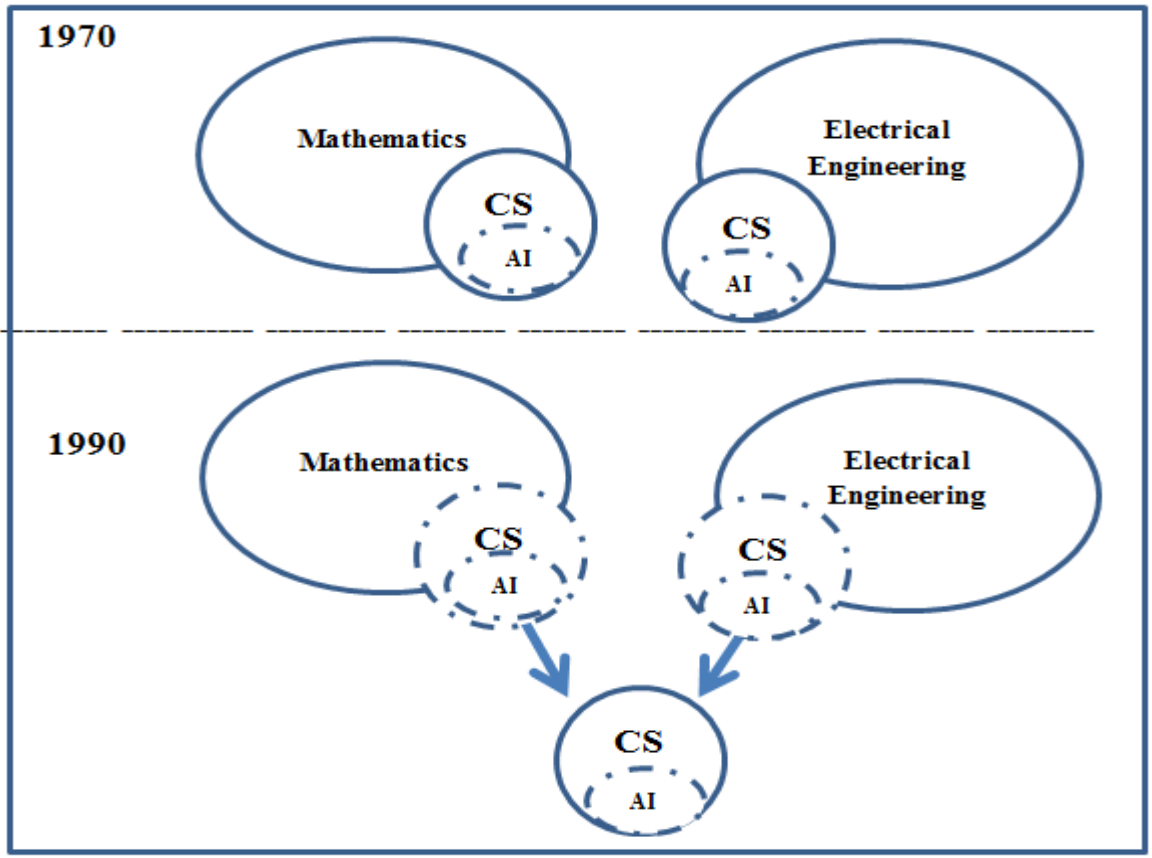
AIBOK (Artificial Intelligence body of knowledge)

Proposed solution: The case os sientific status of Artificial Intelligence in Computing

- During 1970, both ACM and IEEE-Computer Science organisms formed committees to review the computer science curriculum (ACM and IEEE-Computer Science 2001).
- The most common scenario is that Computer Science emerged from a department of mathematics in the 1970s.
- Initially, there was considerable controversy about whether computer science was a legitimate academic discipline. Proponents asserted that it was a legitimate discipline with its own identity, while critics dismissed it as a vocational specialty for technicians, a research platform for mathematicians, or a pseudo-discipline for computer programmers (ACM and IEEE-Computer Science 2006).

Proposed solution: The case os sientific status of AI

(Evolution over the years of the disciplines of computing)



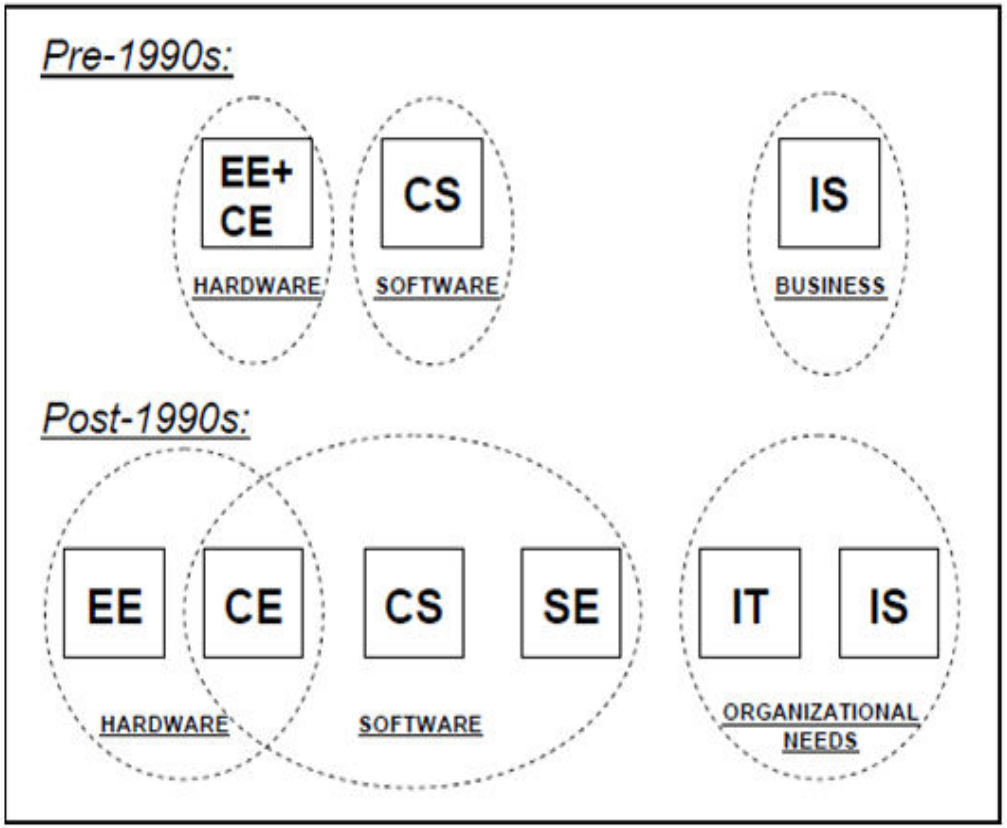
Legend:

CS – Computer Science

AI – Artificial Intelligence

Proposed solution: The case os sientific status AI

(Evolution over the years of the disciplines of computing)

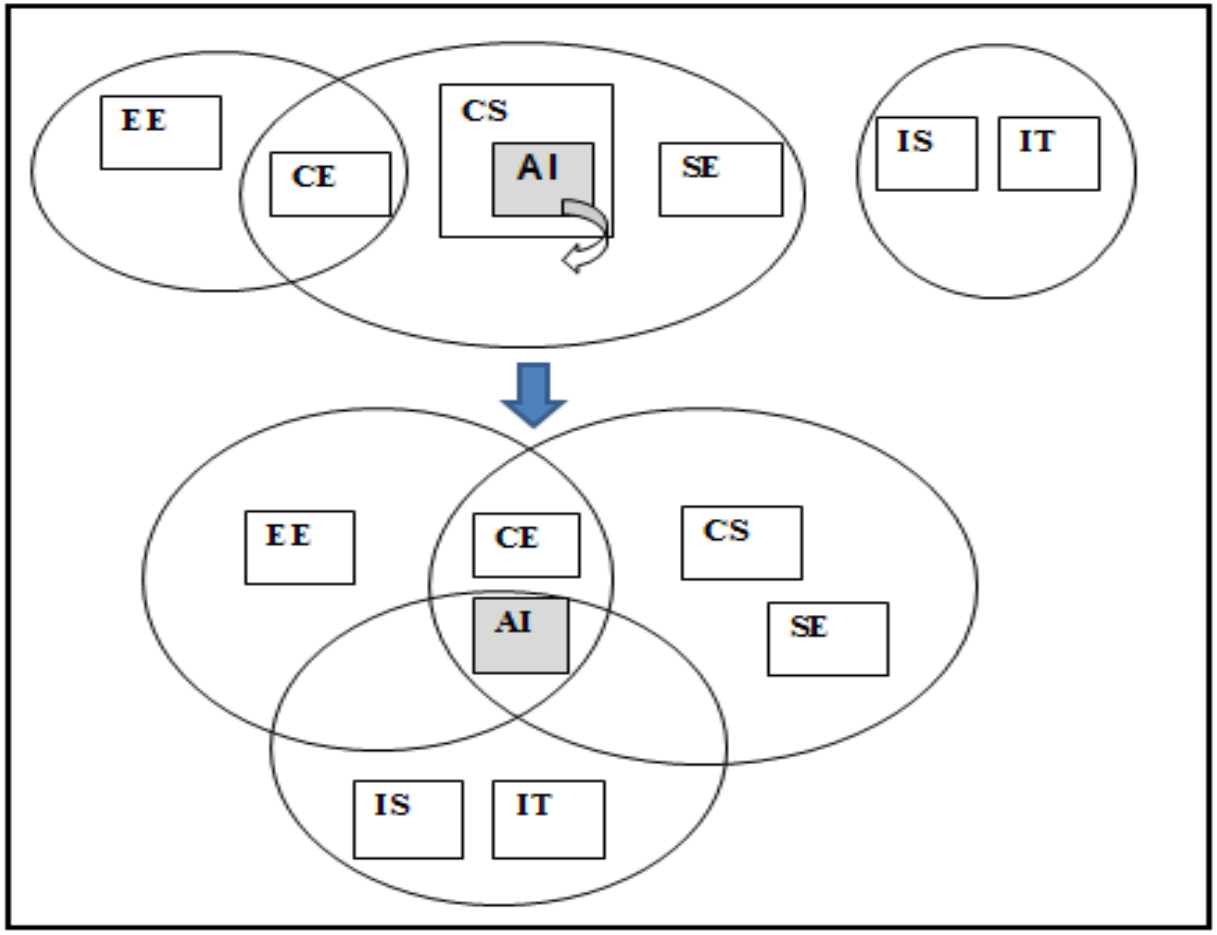


Legend:
CS – Computer Science
CE – Computer Engineering
IS – Information Systems
SE – Software Engineering
IT – Information Technology

Source: ACM, IEEE-CS, 2006, Adapted

Proposed solution: The case os sientific status AI

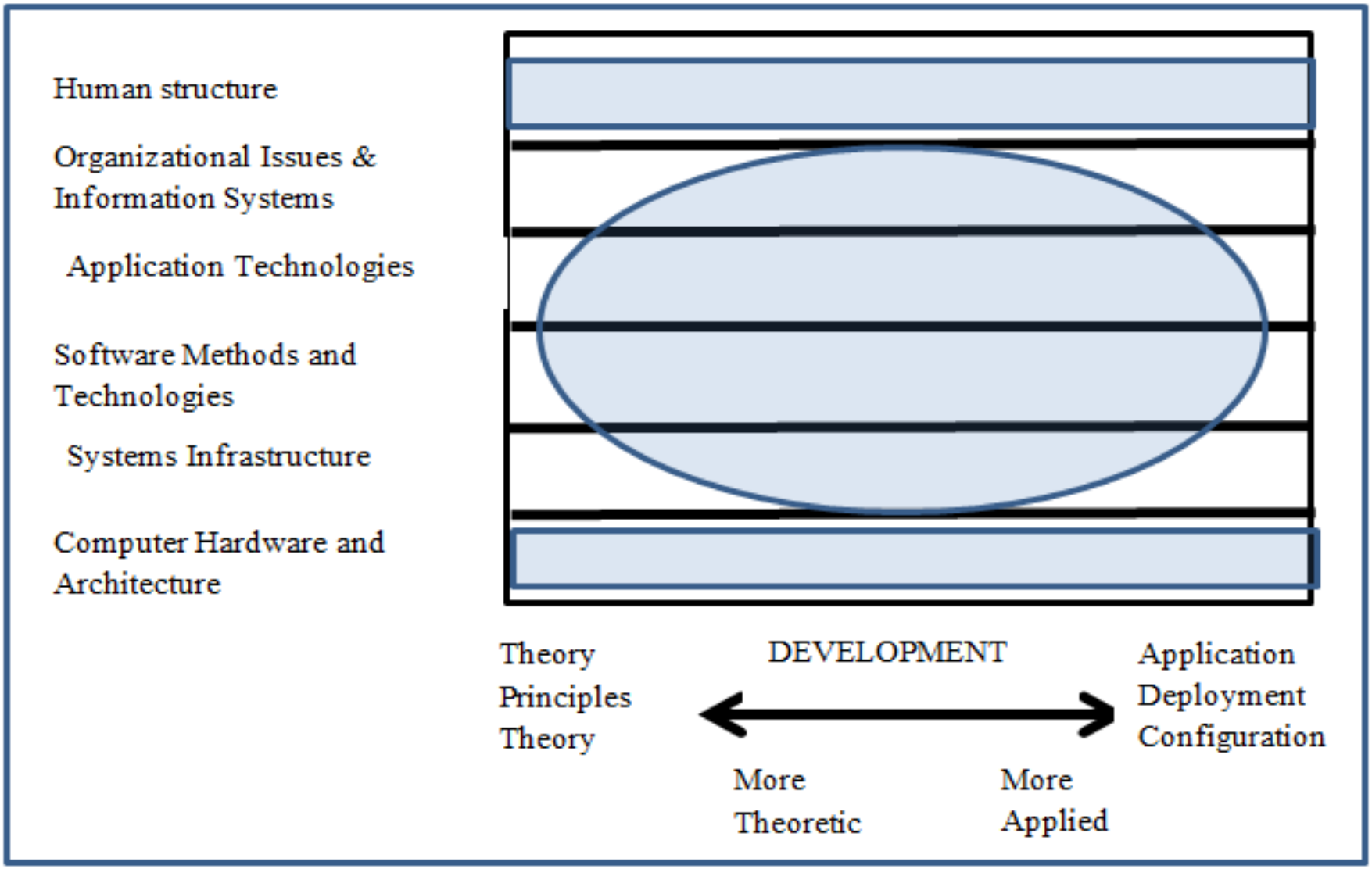
(Evolution over the years of the disciplines of computing)



Legend:
CS - ComputerScience
AI – Artificial Intelligence
CE – Computer Engineering
IS – Information Systems
SE – Software Engineering
IT – Information Technology

Source: Author, Master Dissertation 2014

Proposed solution: The Problem Space of Artificial Intelligence



Source: ACM, IEEE-CS, 2006, Adapted

Proposed solution: Comparative weight of computing topics across the six kinds of degree programs

Knowledge Area	CE		CS		IA		IS		IT		SE	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Programming Fundamentals	4	4	4	5	**5**	**5**	2	4	2	4	5	5
Integrative Programming	0	2	1	3	**2**	**4**	2	4	3	3	1	3
Algorithms and Complexity	2	4	4	5	**4**	**5**	1	2	1	2	3	4
Computer Architecture and Organization	5	5	2	4	**5**	**5**	1	2	1	2	2	4
Operating Systems Principles & Design	2	5	3	5	**3**	**5**	1	1	1	1	3	4
Operating Systems Configuration & Use	2	3	2	4	**3**	**5**	2	3	3	5	2	4
Net Centric Principles and Design	1	3	2	4	**3**	**4**	1	3	3	4	2	4
Net Centric Use and configuration	1	2	2	3	**4**	**5**	2	4	4	5	2	3
Teoria de Linguagens de Programação	1	2	3	5	**3**	**5**	0	1	0	1	2	4
.....	...	...	...	...	...	...	...	...	...	...	...	...
Philosophy of Mind (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0
Conputational Anthropology (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0
Computational Sociology (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0
Computational Psychology (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0
Computational Linguistics (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0
Computational Neuroscience (Human Structure)	0	0	0	0	**5**	**5**	0	0	0	0	0	0

Source: ACM, IEEE-CS, 2006, Adapted

Proposed solution: Comparative weight of non-computing topics across the six kinds of degree programs

Knowledge Area	CE		CS		IA		IS		IT		SE	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Organizational Theory	0	0	0	0	1	4	1	4	1	2	0	0
Decision Theory	0	0	0	0	3	3	3	3	0	1	0	0
Organizational Behavior	0	0	0	0	3	5	3	5	1	2	0	0
Organizational Change Management	0	0	0	0	2	2	2	2	1	2	0	0
General Systems Theory	0	0	0	0	2	2	2	2	1	2	0	0
Risk Management (Project, safety risk)	2	4	1	1	2	4	2	3	1	4	2	4
Project Management	2	4	1	2	4	5	3	5	2	3	4	5
Business Models	0	0	0	0	4	5	4	5	0	3	0	0
Functional Business Areas	0	0	0	0	4	5	4	5	0	3	0	0
Evaluation of Business Performance	0	0	0	0	4	5	4	5	0	0	0	0
Circuits and Systems	5	5	0	2	5	5	0	0	0	1	0	0
Electronics	5	5	0	0	5	5	0	0	0	1	0	0
Digital Signal Processing	3	5	0	2	3	5	0	0	0	0	0	2
VLSI design	2	5	0	1	2	5	0	0	0	0	0	1
HW testing and fault tolerance	3	5	0	0	3	5	0	0	0	2	0	0
Mathematical foundations	4	5	4	5	4	5	2	4	2	4	3	5

Source: ACM, IEEE-CS, 2006, Adapted

Design a Curriculum Guide Model for the Artificial Intelligence discipline

Design a Curriculum Guide Model for the Artificial Intelligence discipline

- We implemented some research results in the Department of Mathematics and Informatics (DMI) of the university eduardo mondlane.

Conclusion

Conclusion

- we conclude that AI is not Mathematics, Philosophy or Engineering but rather a course of "boundaries", all together are necessary and play a prominent role in the purposes of AI.
- The problem space of the AI and the Mapping of weights of non-traditional computing topics with AI came to confirm our hypotheses. In addition, the AI is not a subclass of CS because both have different objects of study.
- In this context, we also conclude that Artificial Intelligence can not continue with the only computational (mathematical) vision if it is to achieve its true purposes.
- We must create conditions to unite the various multidisciplinary efforts in a single movement. Thus, as a first step, we understand that AI should become an autonomous discipline in computing.

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