informatics for all

Update report and the way forward

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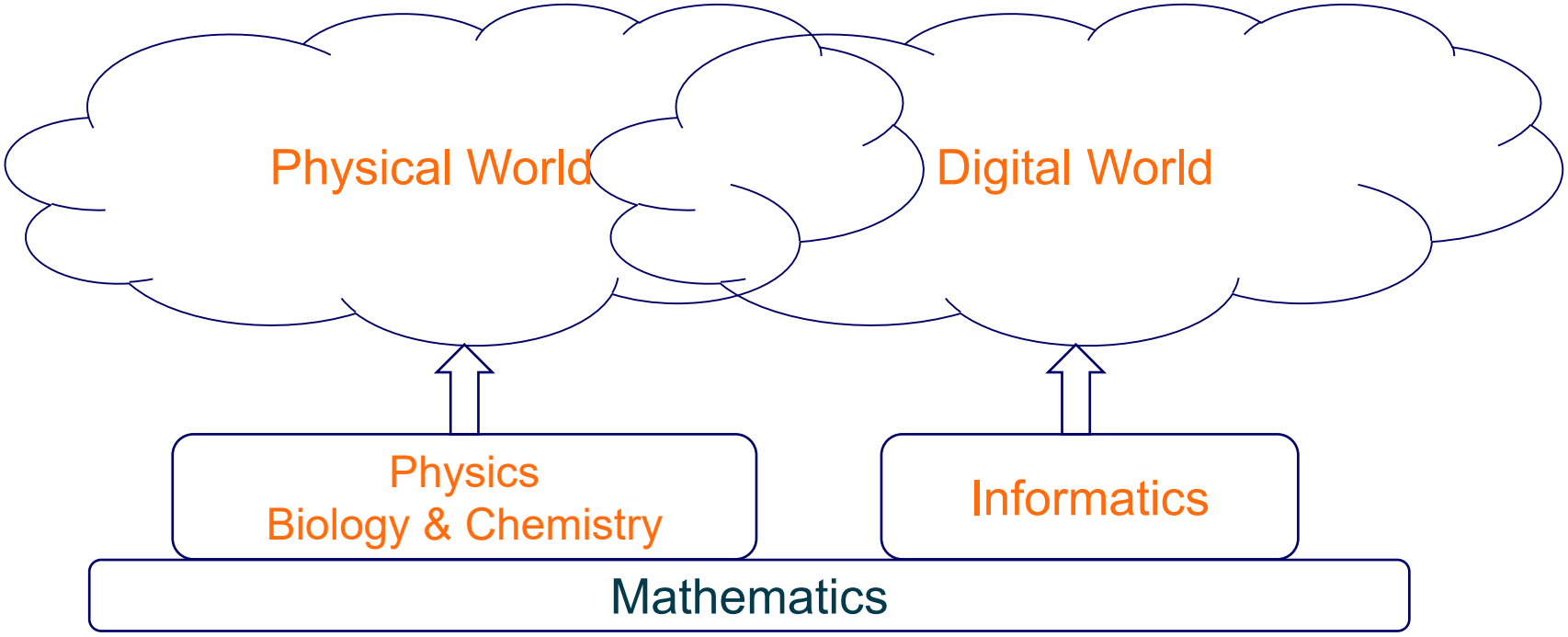
What's in a name?

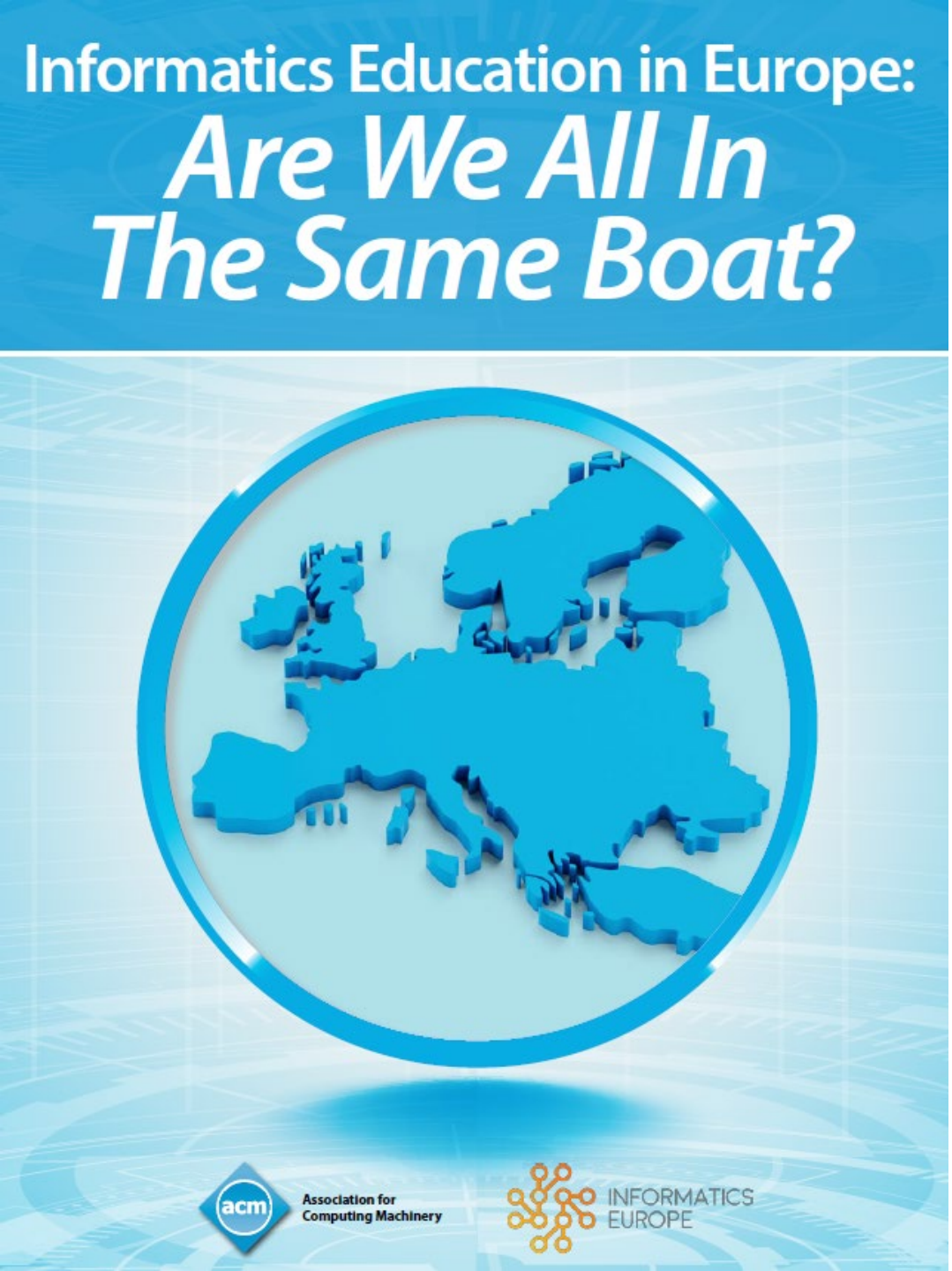
- **Informatics** is the largest common root of the various names in Europe of the discipline known in many parts of the world as "Computer Science" or "Computing"



A long journey… – first report in 2013

Informatics Education: Europe cannot afford to miss the boat

- Informatics is a **major enabler of technology innovation**, … and the key to the future of Europe's economy
- Informatics education, unlike digital literacy education, is **sorely lacking in most European countries**
- Not offering appropriate informatics education means that Europe is **harming its new generation of citizens**, educationally and economically
- Unless Europe takes resolute steps to change that situation, it will turn into **a mere consumer of information technology and miss its goal of being a major player**



2017 report

Investigation of the situation in 55 education autonomous administrative units (in 39 countries in Europe). Main outcomes:

- **Informatics** is not on par with other scientific disciplines in school
- Students can graduate from secondary school without ever being exposed to **Informatics**

informatics for all

Informatics for All
The strategy

ACM Europe & Informatics Europe

February 2018

- **All students** must have access to ongoing education in Informatics in the school system and Informatics teaching should start in **primary school**
- Informatics should be seen as **fundamental to twenty-first century education** by all stakeholders (including educators, pupils and their parents)
- Informatics courses must be **compulsory** and recognized by each country's educational system as being at least **on a par with courses in STEM**

acm Europe Council

INFORMATICS EUROPE

informatics for all

Informatics for All

A Grand Educational Challenge for Europe

- Any "digital science" (e.g. Artificial Intelligence, Data Science, Cybersecurity, …) has Informatics as its "**foundation stone**"

A **two-tier approach**

1. Teach informatics as a **specialized** subject starting in primary all the way up to secondary
2. Teach informatics as a method and language capable to offer an additional and specific way to describe and explain phenomena (**integrated** in other subjects)

- Not at all easy to implement! A thought experiment: imagine Mathematics teaching exists only at the university and plan how to introduce it into all school levels

Even for Maths now it's important…

- 2019: Revised PISA Maths framework (for 2021 test)

  computational thinking = the way computer scientists think

- «… mathematical literacy in the 21st century **includes** mathematical reasoning and **some aspects of computational thinking**.»
- «… students should possess and be able to **demonstrate computational thinking skills** as they apply to mathematics as part of their problem-solving practice.»
- «Aspects of computational thinking form a **rapidly evolving and growing dimension of both mathematics and mathematical literacy**. The PISA 2021 mathematical literacy framework illustrates how computational thinking is **both part of doing mathematics and impacting on doing mathematics**.»

Digital competence without basic education in Informatics?

L'apprenti sorcier

from Fantasia (W.Disney 1940)
music by Paul Dukas

- Those who fall in love with practice without science are like a sailor who drives a ship without using rudder or compass, who never can be certain where the ship is hailing (Leonardo da Vinci, *Treatise on painting*)

HOW? – The «specialization» path

- Other sciences explain the
  - Physical world (matter)
  - Living world (life)
  - Social world (cognition & relation)

(a set of layered scientific domains)

- Informatics is a discipline of FUNDAMENTAL value, since it's **the science explaining the digital world**
- The 4th big domain of science (computation)

HOW? – The «integration» path

- Informatics is a discipline of TRANSVERSAL value, since it's the only scientific discipline whose abstractions (i.e., models) can be **mechanically and automatically** executed (scenario building and phenomena simulation)

- Through digital models subjects can be learned in novel and more engaging ways

- Computational approaches open doors to new dimensions of understanding and new ways of learning subjects

Brussels workshop February 2019

- More than 50 participants
- Country presentations:
  - Denmark, England, France, Germany, Israel, Poland, Portugal, USA
- Action plan
  - Enlarging the coalition
  - Fostering research and networking
  - Repository of resources
  - Contacts with other international organizations (including EC)
  - Develop national communities/networks of teachers

Rome Declaration: March 2019

- call upon all European national and international institutions
- *to exercise their moral suasion power so that the principles of Informatics are included as part of school curricula at all levels*
- *to fund research on Informatics education methods, materials, and teacher training, to teach Informatics both as a distinct subject and across all subjects*
- https://www.informaticsforall.org/rome-declaration/
- About 100 signatures
- Translation into French, German, Hebrew, Italian, Polish, Romanian, Russian and Spanish, other languages in preparation

Informatics for All: areas of intervention

- **Policy & Awareness**
  - Informatics education is fundamental for all (Rome Declaration)
  - Enable common people to understand what Informatics really is

National workshops & communication

- **Curriculum**
  - Develop fine-grained schools national curricula for all levels (possibly a European curricular framework)
  - Develop effective learning materials

European research & field trials

- **Teachers**
  - Appropriately educate teachers at all levels
  - Provide all teacher appropriate support (tools and content)
  - Sharing best practices and (national) community building

Support teacher education efforts in member states

- **Research**
  - Understand what to teach
  - Understand when to teach
  - Understand how to teach

European cooperative research & networks

National workshops (1)

- Austria, TU Wien, Oct 3rd 2019
- https://www.ocg.at/de/informatiktag2019
- Presentation of Informatics for All coalition and the goal of having informatics education or all pupils of all grades in all school types within Europe
- 120 teachers mostly from secondary schools participated
  - lectures in the morning
  - workshops after lunch
- Representatives from ministry of education were present.
- Report available https://zli.phwien.ac.at/informatiktag-2019-2/

National workshops (2)

- Italy, Univ. Milan, Feb 8th 2020
- 250 participants
  - Lectures by peers + hands on labs

https://aladdin.unimi.it/convegni_scuola/2020primociclo.html

COME INSEGNARE INFORMATICA NELLA SCUOLA DEL PRIMO CICLO

SABATO 8 FEBBRAIO 2020

Dipartimento di Informatica-Giovanni Degli Antoni-Università degli Studi di Milano
Via Celoria 18, Milano

PROGRAMMA

9:15-9:30 Registrazione dei partecipanti
9:30-9:40 Saluti e introduzione
9:40-10:00 Enrico Nardelli - *La situazione europea e internazionale (Informatics for All)*
10:00-10:30 Mattia Monga - *La proposta CINI di Indicazioni Nazionali*
10:30-11:15 Resoconto di esperienze da insegnanti della scuola primaria e secondaria di primo grado:
• Sebastian Aced Lopez - *Dai digital natives ai digital naives*
• Emanuele Miliani - *MiColLego: quando la scuola fa squadra*
• Maurizia Gai - *Maestra, come si comanda?*
11:15-11:45 Pausa caffé
11:45-13:30 Resoconto di esperientze da insegnanti della scuola primaria e secondaria di primo grado:
• Martina Palazzolo - *Diventare allenatori dei giochi Bebras per imparare informatica*
• Davide Bosi - *È solo un gioco? Imparare attraverso il coding*
• Eleonora Capannolo - *Con gli ologrammi raccontiamo la storia dell'origine dell'universo*
• Elisabetta Pagani - *Il pensiero computazionale in classe prima: un obiettivo multidisciplinare*
• Ubaldo Pernigo - *Numeri, geometria, strumenti informatici: proposte laboratoriali per l'insegnamento della matematica nella secondaria di I grado*
• Diana Bitto - *Archeologia dell'Informazione*
13:30-14:30 Pausa per il pranzo
14:30-17:30 Laboratori (in sessioni parallele):
• Michael Lodi, Davide Bosi - *Informatica creativa con Scratch*
• Diana Bitto - *Laboratorio di Archeologia dell'Informazione*
• Dario Massarenti, Sara Capecchi - *L'informatica? È un gioco!*
• Violetta Lonati (ALaDDIn) - *Laboratorio di Algomotricità WikiPasta*
• Carlo Bellettini, Anna Morpurgo (ALaDDIn) - *I quesiti Bebras e l'informatica*

La giornata di formazione è organizzata da:
www.informaticsforall.org

THANKS !!!

http://informaticsforall.org