

Informatics for All

– A European Initiative

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European Computer Science Summit

Gothenburg, Sweden, 8th October 2018

Agenda

- **Informatics for All: The Strategy**

- Background
- Content
- Recommendations

- **Discussion**

- Content & Recommendations
 - Political action & Communication action
-

- **Why this? – We need your help!**

- How can we help bring this forward in various countries?
- How can we establish political (inter-)action with national ministries?
- What can we do together/individually?
- Recruitment of members to WG on Informatics Education
- Interface between K-12 and university (entrance requirements)

Joint ACM-E and IE White Paper (2018)

Informatics for All The strategy

ACM Europe & Informatics Europe
February 2018

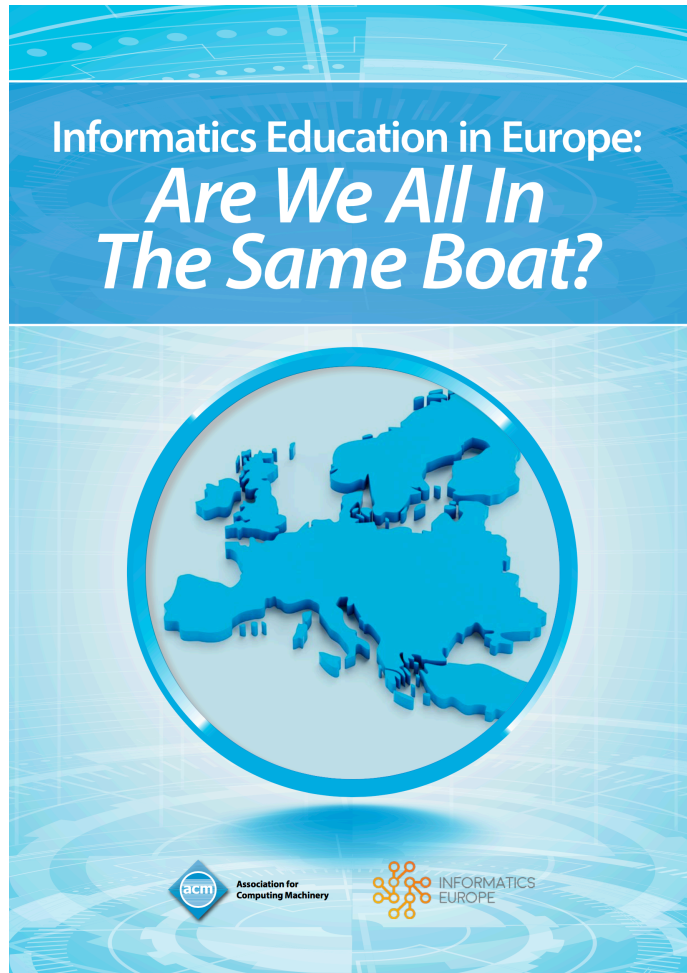


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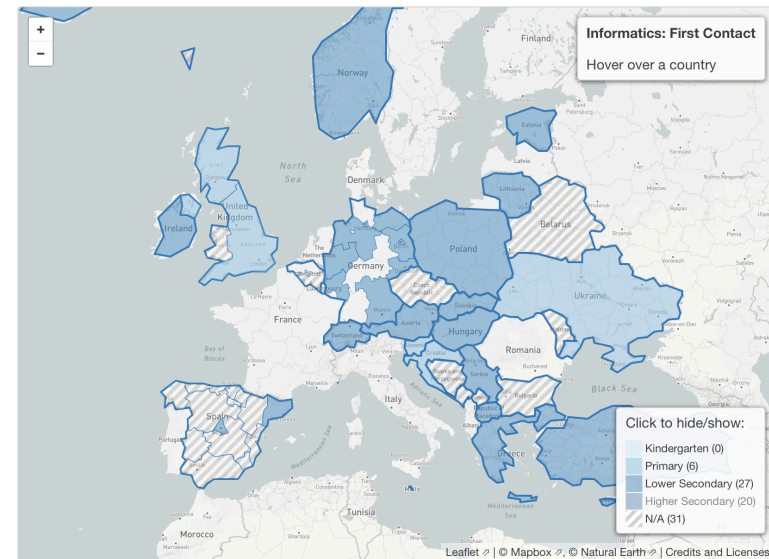
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CECE Report (2017)



Informatics: First Contact



Recommendations

- Informatics (3)
- Digital literacy (3)
- Teacher training (2)

Digital Competences in the 21st Century

Knowledge area

As subject
In subjects

Informatics

Advanced
(‘for some’, ‘for career’, in-depth)

Fundamental
(‘for all’, ‘for life’, general ‘bildung’)

As radical, novel, and defining
technology and way of working
(innovation of subjects)

Specialisation

(as subject / study programme)

Integration

(in subjects / study programmes)

Support

Technological, practical,
pedagogical, and
subject-specific

As subject-specific tool/media

Subject-specific

E-learning and collaborative tools

Pedagogical

Digital literacy (“ECDL”) – literate *consumer* of IT

Practical

Technology and infrastructure

Technological

2013
2014
2015
2016

The White House
Office of the Press Secretary

For Immediate Release

January 30, 2016

Weekly Address: Giving Every Student an Opportunity to Learn Through Computer Science For All

Weekly Address: Giving Every Student an Opportunity to Learn Through Computer Science For All



In the new economy, CS is not an optional skill,
it is a basic skill, right along with the three R's

Informatics

New aspect of 'bildung'

New basic competence for all

Art German Music ... Technology Design Geography
Economy Social science English Psychology
Geology Marketing Spanish Biology Literature
History Physics Classical history Chinese Biotechnology

Reading Writing **Informatics** Mathematics

Mathematics is (primarily) the language of science

Informatics is (becoming) a language of all subjects

CS for All

Informatics for All



Computer Science For All

JANUARY 30, 2016 AT 6:05 AM ET BY MEGAN SMITH

CS For All

Computer Science for All is the President's bold new initiative to empower all American students from kindergarten through high school to learn computer science and be equipped with the computational thinking skills they need to be creators in the digital economy, not just consumers, and to be active citizens in our technology-driven world. Our economy is rapidly shifting, and both educators and business leaders are increasingly recognizing that computer science (CS) is a "new basic" skill necessary for economic opportunity and social mobility.



HOME | ABOUT | CONSORTIUM | RESOURCES | EVENTS | CONTACT



The **CSforAll Consortium** is a hub for the national **Computer Science for All** movement that works to enable all students in grades **K-12** to achieve CS literacy as an integral part of their educational experience.



[What Is CSforAll?](#)



[What We've Accomplished](#)



[Get Involved](#)

Informatics for All

A similar joint effort
by a coalition of
the major
informatics organisations
in Europe



Informatics for All Group

Chair

Wendy Hall

ACM Europe

Judith Gal-Ezer
Andrew McGettrick

Informatics Europe

Enrico Nardelli
Michael E. Caspersen

CEPIS

Bob McLaughlin
Austeja Trinkunaite

Advisor

Bobby Schnabel

Two-tier strategy:

Informatics

- as subject (specialisation)
- in all subjects (integration)

[at all educational levels]

Specialisation

Current change in public perception of Informatics:

"a useful tool and infrastructure to facilitate numerical, administrative and industrial processes"



"ubiquitous and a driver of innovation and development in all fields (professions, school subjects and research areas)"

Integration

Like professions and scientific fields, all school subjects are gradually transformed because of Informatics.

Through digital models, subjects can be learned in novel and more engaging ways, computational approaches will open doors to new dimensions of understanding and expression and radical new ways of learning subjects.

Recommendations

Informatics for All
The strategy

ACM Europe & Informatics Europe
February 2018



Curriculum

- R1: All students must have access to ongoing education in Informatics, preferably from primary school...
- R2: Informatics curricula should reflect the scientific and constructive nature of the discipline...
- R3: Informatics courses must be compulsory and at least on a par with courses in STEM disciplines...

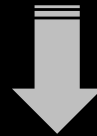
Teachers

- R4: All teachers at all levels should be digitally literate...
- R5: Informatics teachers should have appropriate formal education...
- R6: Higher education institutions should provide encouraging programs...
- R7: Ministries should [...] establish national or regional centers for PD...

Research

- R8: Intensive research of three different facets, curriculum, teaching methods and tools, and teaching the teachers is needed to successfully introduce Informatics into the school system

Informatics on a par with
courses in STEM disciplines



Informatics **at least** on a par with
courses in STEM disciplines

[Informatics on a par with Mathematics]


Two Challenges for our Community

To clarify and set direction
(outward)

To deliver
(inward)

Our Grand Educational Challenge

Expansion of Informatics (think math)

Educational level	Integration (in subjects/programmes)	Specialisation (as subject/programme)
Higher		
<p data-bbox="357 899 608 935">Secondary</p> <h2 data-bbox="260 921 1632 1021">New type of research group?</h2> <h3 data-bbox="338 1042 1555 1120">Informatics Education Research</h3> <p data-bbox="386 1092 569 1135">Primary</p>		

Curriculum ♦ Teachers (food chain) ♦ Research

Wider role of Informatics in universities

Research
Study programmes

Working Session on Wednesday afternoon

Informatics Europe

We represent over 120 university departments and research institutes to set the pace for Informatics research and education in Europe.

[Join us](#)

Keynote @ ECSS 2015

Shifting Identity in Computing:
From a Useful Tool
to a New Method and Theory of

Science

PAUL S. ROSENBLUM

ON COMPUTING

THE FOURTH
GREAT SCIENTIFIC
DOMAIN

The Fourth Scientific Domain

Technical, natural and health science

Nature can be understood – measured and weighted
Study and manipulation of nature

Humanities

Study of humankind's cultural products and languages

Social sciences

Study of society and organisations

Informatics/Computing

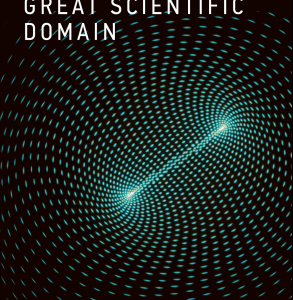
The world (the real and the imaginary) is computable
Study and construction of (prototypes for)
computationelle structures, processes, artefacts and systems

Rich relations to and implications for
the three classical scientific domains

PAUL S. ROSENBLUM

ON COMPUTING

THE FOURTH
GREAT SCIENTIFIC
DOMAIN



Computational X, for X =

Economics

Education

Psychology

History

Chemistry

(Molecular) Biology

Linguistics

Archeology

Physics

Musicology

Theology

Literature

Ethnography

Journalism

Law

Social Science

...

Computational skills

in all study programmes, e.g.:

1. Problem framing

From wicked to tamed problems

2. Data and data processes

Collect, create, analyse, manipulate, transform and visualise data

3. Modelling and simulation

Design, construct and evaluate computational models

4. Computational problem solving

Algorithmic thinking, programming, computational abstractions

5. Systems thinking

Understand, describe and define complex systems in terms of phenomena and their relations

Next steps

Wider role of Informatics in Universities

Research and study programmes

Working Session on Wednesday afternoon

PISA (OECD)

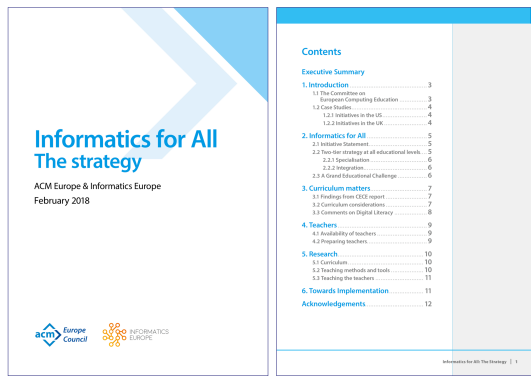
Mathematics: Computational Thinking (a hook)

Sciences: Physical, Life, Earth and Space, Digital

An event in Brussels (early 2019)

Representatives from EU, industry, academia,
teacher organisations, ...

Joint ACM-E and IE White Paper (2018)



Two-tier strategy:

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- as subject (specialisation)
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[At all Educational Levels]

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New basic competence for all

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Specialisation

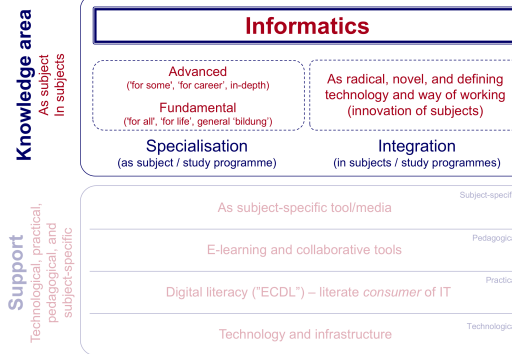
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"ubiquitous and driver of
innovation and development in all fields
(professions, school subjects and research areas)"

Digital Competences in the 21st Century



Integration

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gradually transformed because of Informatics.

Through digital models, subjects can be learned
in novel and more engaging ways,
computational approaches
will open doors to
new dimensions of understanding and expression
and radical new ways of learning subjects.

CS for All Informatics for All

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informatics organisations
in Europe

acm Europe

INFORMATICS EUROPE

Next steps

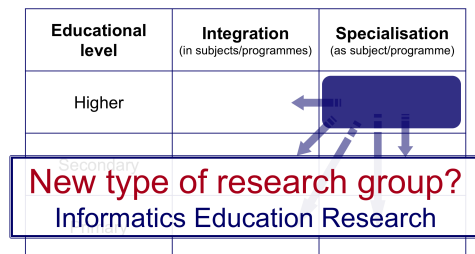
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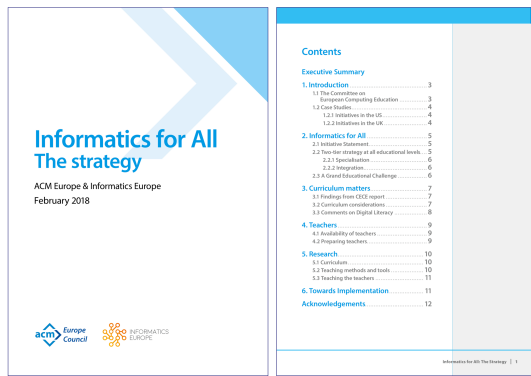


Curriculum ♦ Teachers (food chain) ♦ Research

Discussion

- **Content & Recommendations**
 - Curriculum
 - Teacher Education
 - Informatics Education Research
 - Two-tier strategy at all educational levels
- **Political action and communication actions**
 - National level
 - European level
- **We need your help!**
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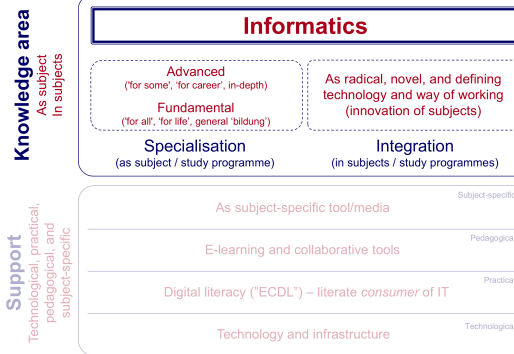
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CS for All

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Next steps

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Higher		
Secondary		

New type of research group?
Informatics Education Research

Curriculum ♦ Teachers (food chain) ♦ Research