

Towards a world-class Science & Engineering Region  
ATV's Teknologidag, 9. november 2017

# Datalogi som styrkeposition [ In4matik ]

Michael E. Caspersen  
Direktør, It-vest  
mec@it-vest.dk

Alle gode gange

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# Dataologi

New kid on the block

(sammenlignet med de "gamle" tekniske videnskaber)

"Ugens" højdespringer

PAUL S. ROSENBLUM

# ON COMPUTING

THE FOURTH  
GREAT SCIENTIFIC  
DOMAIN



# Det fjerde videnskabelige domæne

## **Teknik-, natur og sundhedsvidenskab**

Naturen kan forstås – måles og vejes  
Studie af og manipulation med naturen

## **Humaniora**

Studie af menneskets kulturprodukter og sprog

## **Samfundsvidenskab**

Studie af samfund og organisationer

## **Informatik/Datalogi/Computing**

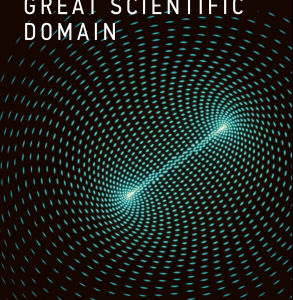
Verden (den reelle og den imaginære) er 'computable'  
Studie og konstruktion (prototyper) af  
computationelle strukturer, processer, artefakter og systemer

Rige relationer til og implikationer for  
de tre klassiske videnskabelige domæner

PAUL S. ROSENBLOOM

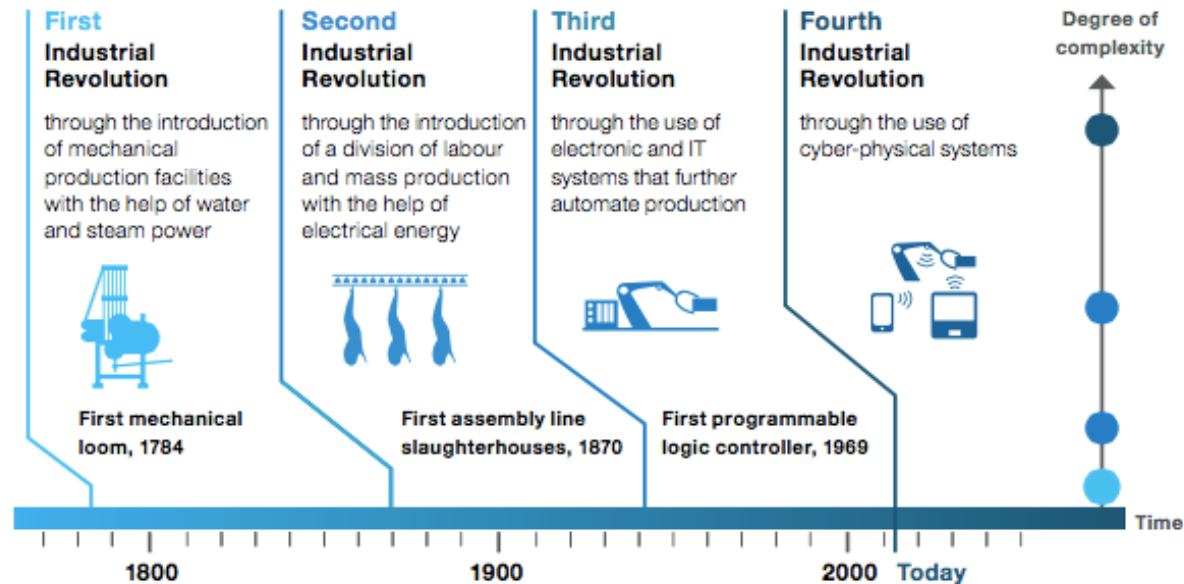
**ON COMPUTING**

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# The fourth industrial revolution



1. **Mechanical automation** of manual processes (water power and steam engine)
2. **Mass production** (electricity, division of labour)
3. **Electronic automation** of product lines (IT systems, plc, etc.)
4. **Digital automation/innovation** of complex mental processes (algorithms, AI/machine learning, big data, data science)



# Industri 4.0

tja...

# Civilisation 4.0

Nomader, jægere og samlere

...

1.0 Landsbysamfund (agerbrug, redskab)

2.0 Bysamfund (skriftsprog, tidlig videnskab)

3.0 Industrisamfund (teknik og naturvidenskab)

4.0 Globalt, digitalt kreativt samfund (informatik)



# It er ikke bare "endnu en teknologi"

Andre teknologier strækker vores fysiske formåen

It strækker vores mentale formåen  
og giver radikalt nye muligheder

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# Det fjerde trin i sproglig udvikling

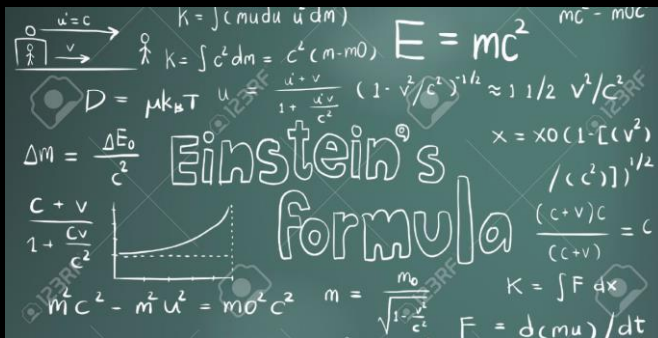
## 1. Talesprog



## 2. Skriftsprog



## 3. Matematisk sprog



Det tog menneskeheden 150 år at blive enige om tegnet for lighed (1557 - 1700)

## 4. Computationelt sprog



4

# Det fjerde 'R'

Reading  
wRiting  
aRithmetic  
algoRithm

Der er it i alting  
undtagen i bestyrelser  
og uddannelser



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

# Informatik og CT

Nyt vidensområde i skolen

Nye basiskompetencer for alle

Tysk Musik ... Teknologi Design Innovation  
Datalogi Samfundsfag Programmering Engelsk  
Naturgeografi Afsætning Spansk Biologi Virksomhedsøkonomi  
Historie Fysik Oldtidskundskab Kinesisk Kemi Bioteknologi

Læsning Skrivning **Informatik** Matematik

Matematik er (især) teknik- og naturvidenskabens sprog  
**Informatik er (snart) alles sprog**

# **Informatik**

**– det 21. århundredes matematik**

# **Programmering**

**– det 21. århundredes skrivning**

# Andres vurdering af Informatik i DK



Professor  
Michael Kölling

King's College, UK  
Vice-Dean of Education  
Central aktør i CAS

The new Danish high school curriculum has the potential to influence the future of the country, both intellectually and economically, and is widely recognised as world-leading in an area that is now recognised as a problem in many other countries.

The initiative in Denmark was not only several years ahead of its equivalents elsewhere; it is also considered one of the best designed approaches in existence.



Professor  
Mark Guzdial

Georgia Tech, USA  
Advisor på  
K-12 CS Framework

Many countries are in the process of establishing nationwide computing curricula.

The effort in Denmark is notable for having a set of articulated principles for what belongs in the curriculum.

The paper by Caspersen and Nowack describing these principles is referenced as model in discussions of computer science curricula for schools.



## 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.



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



# Tostrengt strategi:

## **Informatik og CT**

- som fag/udd. (specialisering)
- i alle fag/udd. (integrering)

[ På alle uddannelsesstrin ]

To udfordringer for "standen"







**At afklare og sætte retning**  
(udad)

**At levere**  
(indad)

# Our Grand Educational Challenge

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## Expansion of Informatics (think math+)

Educational level	In subjects (integration)	As subject (specialisation)
Higher		
Secondary		
Primary		

Conceive I4All ♦ Curriculum ♦ Materials ♦ Teachers (food chain) !



# Datalogi

– ikke bare en styrkeposition, men  
den 4-foldigt særlige essens af vores tid

4. videnskabelige domæne

4. civilisationsform

4. sprogform

4. 'R'