Information and Computation in Society, Science, and Technology

Presented at

IOI Conference 2013

Brisbane, Australia
10 July 2013

Tom Verhoeff

Eindhoven University of Technology
Department of Mathematics & Computer Science
The Netherlands
http://www.win.tue.nl/~wstomv

The Broader Context

Society : humans acting as a group, communicating over space/time

Science : understanding 'the world' around/inside us, as it is

Technology : putting 'the world' to our use, twisting it

A Story of Information and Computation

- Society depends on them: language, writing, administration, ...

  Digitization and automation pervade society

- Science uses them: experimental data, models, ...

  Models have become more computational (state, state change)

  'It from bit': the universe as one big computation

- Technology realizes them: memories, controllers, processors, ...

  Incorporates them in almost all products

Informatics

Information & Computation: unifying concepts from informatics

Key insights:

- information and computation can be treated *in the abstract*, without having to consider specific 'carriers'
- information and computation are tightly intertwined:
  - no information without computation (cf. Game of Life)
  - no computation without information (cf. Lambda Calculus)

Conclusion

- Informatics is the fourth *Great Scientific Domain*

  (next to the Natural, Life, and Social Sciences; cf. Rosenbloom)

- Informatics changed our view on Society, Science, and Technology

- IOI coaches should inspire broader study of informatics

- Interesting recent and older literature supports broader understanding of informatics and its role: see article

- Valentina Dagiene motivated me again to write for IOI Conference

  Thanks Valentina!

Links

- Downloadable version of article:

  http://www.mii.lt/olympiads_in_informatics/htm/INFOL125.htm

- Errata and addenda:

  http://www.win.tue.nl/~wstomv/publications/ie-extra.pdf