**Informatics as Science**

The current approaches to computer science education fail to teach the science of computing. As a result, they fail to inspire the very best and brightest young minds to enter the ﬁeld. Computer science involves questions that have the potential to change how we view the world. How to characterize Informatics as a science, or, to put it in a more provoking manner: is Informatics a science rather than ‘just’ engineering? The question is a common one, as there is apparently no generally accepted answer yet. It is crucial for the ’image’ of the discipline that the question be answered, as it is important for our future students to know that they will study a ﬁeld of the same intellectual level and methodological rigor as any other scientiﬁc discipline. Answers are often based on individual perspectives and computer science is concerned with information in the same sense that physics is concerned with energy. CS is devoted to the representation, storage, manipulation and presentation of information in an environment permitting automatic information systems.

Three classical examples are:

Computer science is the study of the phenomena surrounding computers.

A. Newell, A.J. Perlis, H.A. Simon (1967)

28My favorite way to describe computer science is to say that it is the study of

algorithms.

D.E. Knuth (1974)

... each of these [questions] is a special case of the general question, ‘What can be

automated’? and the answers will involve algorithms and their [..] implementation.

COSERS report (1980)

These are good working deﬁnitions for computer science but not satisfactory ones for the

(broader) ﬁeld if Informatics. They do not tell us whether Informatics is science (seen as

the study of natural phenomena) or engineering (seen as the development and study of manmade artifacts) or perhaps both, and what the kernel as a science is. What are the truly

fundamental questions Informatics is addressing in our eternal quest for understanding ‘life’,

‘matter’, or ‘energy’ and for mastering and recreating the world around us? In order to

answer it we need a, still lacking, philosophy of informatics. Ultimately the question is of

course: what does it teach prospective students, and will they care about it!? Most certainly

they will, if they can relate to the answer and if it can bring a broader perspective than the

continuing technological hypes do. It is a very important aspect of the whole image of the

ﬁeld.

6.1 The Information Dimension

The ‘phenomena’ that need to be understood in the eﬀective use of (networked) computers and

all other information processing media are so complex and extensive that this is now the ﬁeld

of highly skilled and specialized scientists. With the expanding views of what computers are

or might be in the future, and the ever expanding range of applications in which (networked)

computers and media are leading, computer science now is an extensive and fulﬁlling ﬁeld of

science of tremendous impact.

... informatics: the science of processing information through computer programs.

At the heart of cell phones, airlines and airplanes, ﬁnancial transactions, company

management, publishing of any kind, the internet and world wide web, industrial

plant control and all other devices and processes that make today’s world run, lie

algorithms and data structures devised by computer scientists.

From: ’Why study computer science’ (ETH Z¨urich)

The computer-centric view does not quite capture the essence behind the phenomena that

manifest themselves in Informatics. For the ﬁeld of Informatics we need to delve deeper to

ﬁnd the deep motives that drive it as a science, making computer science a discipline with a

broader scope of concern and placing it well within the domain of the Natural Sciences. It

leads back to the views that were already expressed in the early days of computer science and

that involve the deep appreciation of the concept of information.

Information ist der Urstoﬀ des Universums.

A. Zeilinger (2005)

29I consider computer science, in general, to be the art and science of representing

and processing information and, in particular, processing information with [...]

computers.

G.F. Forsythe (1967)

The ultimate purpose of physics is the intellectual one of understanding the physical world [...] Similarly we may expect that some day the agreed ultimate purpose

of computer science will be to understand the behavior of information and the laws

which govern its processing.

G.F. Forsythe (1967)

ACM Curriculum Committee on Computer Science (1965)

Here ‘information’ is appreciated as a crucial and foundational concept in understanding the physical, i.e. the natural or man-made world around us. Just like physical objects have mass and energy, they must admit to descriptions in suitable frameworks in the ‘information dimension’ to be fully captured and understood. This applies to everything, from ‘real’biological systems (cells) to administrative systems up to the virtual constructs created byand in our imagination (virtual stores, games) and even our cognitive processes.