

Editorial

Symposium Theoretical Information Studies [†]

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Information has always been important and sometimes vital for people but now it has become the most valuable asset and the strongest moving force in the contemporary society. Natural science is a courageous human endeavor in getting information about the universe. Social science is an indispensable human enterprise in getting information about society. Information is the bread and butter of mass media. Everything in the human organism is controlled by flows of information. Information processing and communication systems, such as computers, the Internet, and cell phones, has become the core of the modern society. Thus, it is natural that our time is called the information age.

Information studies constitute the central cognitive part of the information facet of the contemporary society, which form the intertwined system of the following parts:

- Information studies
- Information technology
- Information activity

Any utilization of information technology is information activity. At the same time, there are also other kinds of information activity such as writing books or music, communication with or without technological devices, teaching and researching.

It is practical to divide the whole area of information studies into three components:

- Theoretical information studies
- Experimental information studies
- Practical information studies

At the same time, intellectual information studies also have three branches:

- Information theory
- Philosophy, methodology and logic of information and information studies
- Foundations of information studies

Practical information studies include application of information theory but also contain empirical research in the area of information, communication and information processing systems.

Experimental information studies are aimed at discovery of regularities of information functioning and structure, as well as at experimental validation of theoretical results.

Information theory constitutes the basic component of theoretical information studies but there are also other components. One of them is application of information studies to the theoretical areas of science and humanities, e.g., application to theoretical physics or to theoretical computer science.

Therefore, the areas of interest to the Symposium included (but were not confined to):

- Information theory
- Application of information theory to theoretical physics
- Application of information theory to theoretical biology

- Application of information theory to theoretical computer science
- Application of information theory to the theory of complexity
- Application of information theory to general systems theory
- Application of information theory to mathematics
- Application of information theory to theoretical linguistics
- Applications of information theory in economics
- Application of information theory to pedagogy
- Applications of information theory in sociology
- Applications of information theory in psychology
- Applications of information theory in anthropology
- Application of information theory to semiotics

People begin to understand that information is everywhere and if we can know anything about ourselves, other people and the world in which we live, this is entirely due our ability to obtain and process information. In essence, any science intrinsically depends on information acquisition and procession. For instance, the book *Physics from Fisher Information* [1] persuasively demonstrates how it is possible to deduce basic physical laws from definite regularities in the world of information. The book *The Touchstone of Life: Molecular Information, Cell Communication, and the Foundation of Life* [2] colorfully describes how all biological processes are rooted in and based on information.

In his proclamation *It from Bit*, the famous physicist John Wheeler makes even a stronger claim stating that everything in nature comes from information [3]. Moreover, it is discovered that information is the basic essence and the driving force not only in the physical universe but also in mental and structural worlds encompassing the entire reality as its unifying factor.

This situation clearly demonstrates that traditional scientific cognition (in physics, chemistry, biology, etc.) needs the concept of information and methods of information science for its development and proliferation.

Theory of information became popular with the contribution of Claude Shannon to communication technology [3]. Since that time, researchers have developed many other directions in information theory. The most notable of them are algorithmic information theory [4], semantic information theory [5] and economic information theory [6]. The most fundamental achievement in this area is creation of the general theory of information, which gives a flexible, efficient and all-encompassing definition of information comprising all other information theories in a unified system [7]. As a result, the general theory of information becomes a unified theory of information, which has been one of the most aspiring goals in the area of information studies [8].

There are also essential achievements in philosophy of information [9] and in foundations of information science [10]. New areas of information studies emerged such as evolutionary information theory [11] and information ecology [12,13]. As always, new discoveries open new problems and bring new challenges for the intellectual inquiry, scientific exploration of reality, social organization and technological innovations [14–17].

The Symposium Theoretical Information Studies was a part of the International Society for the Study of Information (is4si) 2017 Summit at Gothenburg, Sweden held at Chalmers Institute of Technology 12–16 June 2017 with the overarching theme: DIGITALISATION FOR A SUSTAINABLE SOCIETY: Embodied, Embedded, Networked, Empowered through Information, Computation & Cognition.

The goal of the Symposium was to bring together academics and researchers providing beneficial conditions for presenting and discussing recent achievements and problems of information theory and its applications to theoretical issues of science and humanities. More than 30 researchers from 15 countries and 5 continents participated in the Symposium presenting their discoveries in the area of information and discussing new achievements and critical problems in information science. The Summit in general and the Symposium in particular provided beneficial conditions for interaction of academics and other researchers with representative of information and communication technology.

The contributions that follow this note are short versions of papers presented at the Symposium. We hope they will grow into extensive studies published in the other venues representing the Summit.

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