Social Informatics: An Emerging Discipline?

Vasja Vehovar

Faculty of Social Sciences, University of Ljubljana, Slovenia
vasja@ris.org, http://vasja.ris.org

Abstract. The concept of Social Informatics emerged along with the growing role of information and communication technologies ('ICT') in the 1970s and was articulated in Rob Kling's work in the 1980s and 1990s. In recent years, the notion of Social Informatics has been rapidly expanding in various contexts. Following an overview of related activities on the University of Ljubljana website (http://social-informatics.org) we can identify three broad contexts of Social informatics. The first area is the interaction of ICT with humans at the personal, organizational and society levels. The second direction involves ICT applications in the public/social sphere, encompassing modelling, simulations and information systems through to various e-applications and information architecture. The third segment relates to ICT as a tool in social science research ranging from ICT-supported statistical analysis, computer-assisted data collection to virtual collaboration and cyber-infrastructure. Within this scope we encounter numerous research activities (i.e. journals, events, associations, research institutes, projects...) related to Social Informatics, including a growing number of university study programmes. However, the dynamics, dispersion, fragmentation and lack of common framework, as well as the increasing number of competitive concepts (e.g. e-social science) could prevent Social Informatics effectively establishing itself as a discipline with all the necessary formal attributes and well-defined boarders.

Keywords: information society, cyber-infrastructure, e-social sciences, Internet research, university programmes.

1   Introduction

There is a complex relationship between information communication technology ('ICT') and the corresponding social context. We could even say that modern societies and ICT have become intertwined – we cannot understand one without

understanding the other. One specific approach to address this interaction is the concept of Social Informatics ('SI'). Various definitions of SI exist; however, SI is typically understood as a multidisciplinary study of the social aspects of ICT. In its broadest sense, SI covers an extremely wide range of areas, from the usability of computer hardware to information privacy, from information sociology to specific web applications. In addition, the notion of SI considerably overlaps with the concepts of informatics (particularly community informatics) and the notion of information society. Various competitive concepts also exist which integrate the technical aspects of modern ICTs with social, economic, legal and ethical dimensions such as the e-social sciences and cyber-infrastructure.

In the following sections, we first describe the development of SI and then, in the third section, we discuss definitions and contexts of SI. In the fourth section we overview SI activities by making an online overview of the Social Informatics website (http://social-informatics.org). Finally, in the fifth section we investigate the prospects of SI becoming a scientific discipline.

2   The Development of Social Informatics

Informatics or information science is basically the study of information. It is primarily concerned with the structure, creation, management, storage, retrieval, dissemination and transfer of information [Wikipedia, 2006]. However, very often the label *informatics* is used with a narrower meaning, i.e. to describe applied information sciences *per se*. In any case, the term itself is relatively new. It was only in 1962 that the French *informatique*, *informatics* (English), *informatik* (German) and *informatica* (Italian, Spanish) was coined by Dreyfus to refer to the application of computers to store and process information [Fourman, 2002]. Informatics in its broader sense includes the study of applications of information in organizations, its perception among users and the corresponding interaction between users, organizations and information systems. Frequently, but not always, informatics is also perceived as a specific branch of the computer sciences. However, informatics is more problem-oriented whereas computer science is technology-oriented. There are also some regional specifics; in the US, for example, the term computer science dominates while in Europe we encounter the labels 'information science' and 'informatics' much more often.

Since the 1970s, the term *informatics* has been increasingly adopted to describe the application of information technology to various fields such as law informatics, medical informatics, organizational informatics, library informatics etc. [He, 2003]. However, if we use strict criteria to identify a scientific discipline (i.e. international associations, study programmes, occupational profiles, large conferences, professional journals, ethical codes etc.), then medical informatics was perhaps the first to fully establish itself as a new informatics-generated discipline. The other areas have either not been successful or are still in earlier development stages.

Within this context Social Informatics (SI) has also emerged as another potential discipline related to informatics. Historically, the first activities appeared in the early 1970s when computerization started to be observed in a broader social context. In the late 1970s, a critical and explicit SI discourse was advanced by computer scientists

in the US, including: Kling (1980), Mowshowitz (1976) and Weizenbaum (1976) [Kling, 2003]. At the very beginning, SI sought to discredit the technological determinism that was dominating the field of computer applications. SI researchers addressed social aspects in computer science with simple issues like 'What kinds of impact does computerization have on personal privacy?' and 'What is the ability of voters to get more complete information through online sources?' [Kling, 1999].

In the US the term SI is closely linked to the University of Indiana where the concept of Social Informatics [CSI, 2005a] was formally introduced. According to [Jackewitz, Janneck, Krause, Pape and Strauss, 2003] the English term 'Social Informatics' was finalized by Kling in 1997. The term 'emerged from a series of lively conversations in February and March 1996 among scholars with an interest in advancing critical scholarship about the social aspects of computerization, including Phil Agre, Jacques Berleur, Brenda Dervin, Andrew Dillon, Rob Kling, Mark Poster, Karen Ruhleder, Ben Shneiderman, Leigh Star and Barry Wellman' [CSI, 2005b]. Before that, different labels like 'social analysis of computing', 'social impacts of computing' or 'behavioural information systems research' had been used.

Perhaps the oldest formal use of the term SI can be identified in the programme of Social Informatics at the Faculty of Social Sciences of the University of Ljubljana in Slovenia. The undergraduate four-year study programme within the Department of Sociology started in 1985 and was at the very outset labelled a programme of Social Informatics (in Slovenian '*Družboslovna informatika*'). Besides courses from social sciences (i.e. sociology as well as political, communication and organizational sciences) half of the courses were from 'technical' disciplines: Mathematics, Statistics, Informatics, Computer Science, and Survey Methodology. A strong emphasis on social science methodology was one of the key specifics of this programme. As a consequence, the corresponding perception of SI was also strongly related to the role of ICT as a social-science research tool [Social-informatics.org, 2006]. After 20 years, as part of EU Bologna reform redesigns in 2005 this became an independent study programme at the first (undergraduate) level. In addition, the programme now articulates much more strongly another dimension of SI – the role of ICT in contemporary societies. At the same time, the master's programme (i.e. the second level) of SI was also established with three modules: Information Society, Applied SI, and Social Science Methodology.

We encounter another early introduction of SI in Norway where the Ministry of Education established SI as a discipline at the University of Oslo [Norwegian Parliament, 1984-5] in the mid-1980s. SI was originally called socio-informatics and defined by Stein Bråten in *Dialogens vilkår i datasamfunnet* as a "scientific domain between psychology, sociology and informatics" in 1982 [Roggen, 1998].

We should also mention SI developments in the former Soviet Union, where the importance of the relationship between ICT and society was recognized early on. As a consequence, the first scientific paper – as recorded in the ISI Web of Science database – explicitly related to SI comes from the former USSR Academy of Science: 'On the shaping of Social Informatics' [Ursul, 1989].

With the expansion of the Internet in the mid-1990s we can observe entirely new momentum in the development of the SI concept; the multiple directions taken and corresponding activities are discussed in the next section.

3   Social Informatics: Definitions and Practices

According to Rob Kling, Social Informatics (SI) is defined as the 'interdisciplinary study of the design, uses and consequences of information technologies that takes into account their interaction with institutional and cultural contexts' [Kling, 1999]. SI refers to the body of research that examines the social aspects of computerization, including the roles of information technology in social and organizational changes, the uses of information technologies in social contexts and the ways that the social organization of information technologies is influenced by social forces and social practices [Kling, Crawford, Rosenbaum, Sawyer and Weisband, 2000].

A similar concept of SI originating in the organizational aspects of ICT was elaborated by [Dahlbom, 1996] and in the June/July 2005 issue of the American Society for Information Science and Technology Bulletin with guest editor W. David Penniman from the University of Buffalo [Penniman, 2005].

Another approach of this type defines SI as 'a body of rigorous empirical research that focuses on the relationships among people, ICTs, and the social structures of their development and use' [Lamb and Sawyer, 2005].

A somewhat more informatics-oriented definition [Ohta, Ishida and Okada, 2001] describes SI as 'an interdisciplinary study to explore the function of information within a social system and to design a system for exchanging information within a society. Focusing on information, SI researchers observe various aspects of human behaviour and social systems, and examine various information networks in the society, including an economic information system, a management information system, a political information system, an administrative information system, a life information system, and so on.' According to this approach, SI consists of three main theories: a social system theory, an information system theory and a theory of the semantics of social information.

Also close to the above definition is the understanding of SI as a 'complex interdisciplinary approach, which consolidates/integrates the knowledge from mathematics and physics, computer sciences, management and humanity sciences. SI considers the problems of receiving, transformation, investigation, and modelling and explores the informational flows in large social systems and their models' [Makarenko, 1998].

In addition to the above definitions, the notion of SI appears in various other contexts which can be observed on the SI website [Social-informatics.org, 2006], which systematically collects evidence of research and educational practices relating to the concept of SI. The SI-related areas recorded on this website are presented in Fig. 1. They are roughly structured in three directions: (1) ICT's interaction with society; (2) ICT applications in the social sciences; and (3) ICT as a tool in social research. While the first branch (ICT and society) – particularly (1b) and (1c), which are circled in Fig. 1 – closely overlap with Rob Kling's initial definition, this is somewhat less clear with the other areas. In part, the second branch (ICT applications) – particularly (2a) and (2c) – seems to be closer to the understanding revealed in [Ohta, Ishida and Okada, 2001] and [Makarenko, 1998]. On the other side, the third branch (ICT as a research tool) is closer to the understanding of SI at the University of Ljubljana described above.
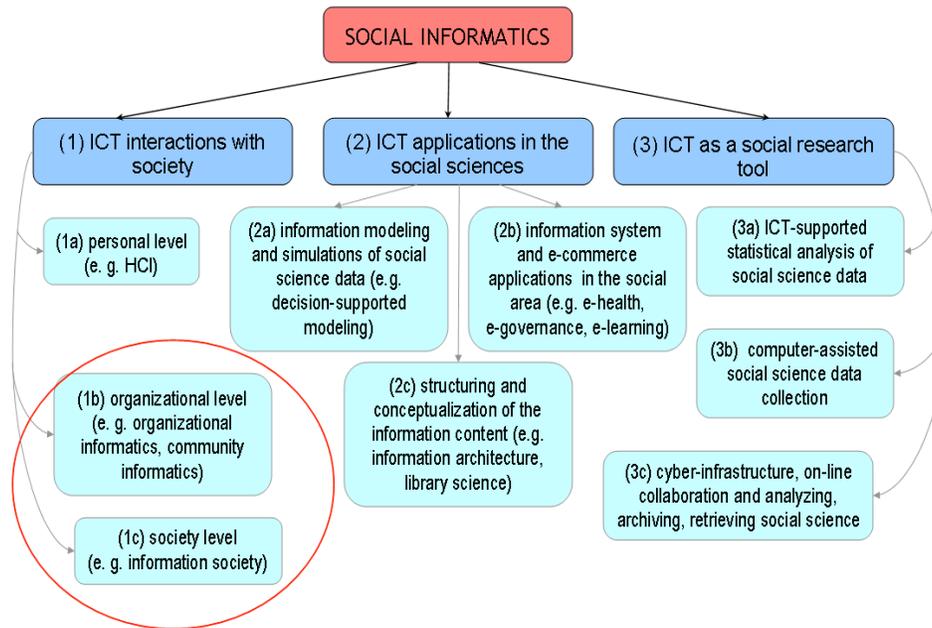
Fig. 1. The broad areas covered by Social Informatics

Let us briefly comment on the three areas and nine sub-areas shown in Fig. 1.

In relation to 1) Interaction between ICT and humans

The social aspects of computerization can be further observed at three levels:
1. *interaction with ICT at the personal level* relates to the individual's experience with ICT (e.g. HCI – human computer interaction, cognitive aspects, physiological issues etc.);
2. *interaction of ICT at the organizational (micro) level* relates to the socio-organizational aspects of implementing ICT applications. In part, it also overlaps with ICT managerial aspects;
3. *interaction of ICT and society at the macro level* relates to general changes in society due to ICT, i.e. societal change and issues related to the information society; national, regional and global aspects are incorporated here.

According to the definition of SI found on the University of Indiana's Social Informatics homepage [CSI, 2005a], SI predominantly relates to (1b) and (1c). Within this context, the notion of Community Informatics may be understood as a subfield (1b) of SI [Bieber, Gurstein, Civille, White, Silver and Kolko, 2002]. More specifically, Community Informatics ('CI') can be defined as 'the study and the practice of enabling communities with ICTs' [JCI homepage, 2006]. CI thus relates to building up communities, developing information, and providing access to

technology [Stoecker, 2004]. However, SI includes broader social aspects and less problem-solving attributes, making the differences between SI and CI similar to those between biology and medicine [Bieber, Gurstein, Civille, White, Silver and Kolko, 2002].

We should also add here that while, in principle, SI covers the area of human-computer interaction (1a) this has already become a large and independent scientific field, which can hardly be squeezed under the SI umbrella even though it fits into the majority of SI definitions.

In relation to 2) Applications of ICT in social sciences

These applications can be further structured in three directions:
1. *computer modelling of social science data*, including computer simulations in the area of the social sciences, together with decision-making models, intelligence and knowledge discovery applications;
2. *information systems and e-business applications in the social sciences*, including applications in the public sector, social services etc. In particular, this relates to the corresponding e-business models of e-government, e-health, e-learning etc.;
3. *structuring and conceptualization of the information content*, i.e. the information architecture for web sites and other ICT applications in areas related to the social sciences.

With respect to this second branch, a parallel with other substantial applications of informatics can be drawn. Similarly as, for example, how medical informatics actually relates to ICT applications in medicine, SI should relate to ICT applications in the social sciences; this includes visualization, modelling, organizing and analyzing social science data, as well as developing corresponding ICT applications and solutions. According to this analogy, ICT modelling tools for social science data (2a) and the corresponding ICT applications (2b) would represent the **core meaning of SI**, and not the ICT interaction with society (1b and 1c). We should also add here that the number of substantial areas in the social sciences is extremely broad, ranging from communication, political and library sciences to sociology, public administration, social welfare studies, social science methodology and military studies. Perhaps the most typical example of these specifics is the German notion of '*Sozialinformatik*' as the application of informatics to the social care system [Sozialinformatik, 2006].

The third sub-segment (2c) relates to structuring of the content on the web and it is rapidly articulating itself as a new independent discipline and a new profession of information architecture [Morrogh, 2003]. Although it initially emerged from the library sciences, it is now expanding across various social and communication sciences, as well as across informatics. The information architecture in fact provides a prototype case of a SI subfield, nested deeply within the definition of SI, (i.e. the interaction of ICT and the social sciences), but having been developed entirely outside of the notion of SI.

In relation to 3) The use of ICT as a tool for studying social phenomena

This direction covers a wide range of areas from data mining to computer-assisted data collection. Of course, this partly overlaps with various other scientific

disciplines, but also with some other areas of SI, particularly (2 in Fig. 1). We can break this segment up into three sub-areas:

1. *computer (intensive) methods for the statistical analysis of social science data*, which includes various statistical packages and specific tools: analysis of large social networks, bootstrapping, Gibbs sampler, data mining, data fusion etc.;
2. *computer-assisted data collection* in quantitative (i.e. survey data collection) and in qualitative empirical social research (e.g. virtual ethnography, online focus groups). In particular, web survey methodology stands here one of the most popular ICT applications in social science empirical research [WebSM, 2006];
3. *ICT tools for manipulating, organizing, analyzing and presenting* social science data, including platforms for co-operation and virtual collaboration in the social sciences. This also relates to all infrastructure applications that simplify the search for and access to data archives and bibliographies, online analytical tools (e.g. tabulation), as well as the new forms of scientific collaboration supported by modern ICT (e.g. grid technologies).

The majority of ICT tools in (3a) are closely related to statistical computing and social science methodology so they overlap with survey methodology, marketing research, social science methodology, applied statistics and official statistics. Similarly, computer-assisted data collection (3b) has successfully positioned itself as an independent subfield in the area of social and marketing research. ICT has also changed the infrastructure, communications and the process of scientific work, i.e. the ways in which we organize data, human potential and computer resources (3c). We have already mentioned the notions of cyber-infrastructure and the e-social sciences, which here provide two examples of alternative/competitive concepts. In part, of course, these also overlap with (2a) and (3a).

To further illustrate the above three-category (nine-sub-category) structure, we checked the ISI Web of Science portal for scientific papers related to the keyword search 'Social Informatics'. In January 2006 only 33 bibliographic units were found in response to this specific search request [Web of Science, 2006]. Most papers were at the 'ICT interaction with society at the macro (society) level' (1c), 'modelling and simulation of social science data' (2a) and in 'information systems and e-commerce in the social area' (2b). The weakest component was the notion of SI as a research tool and platform (3a-c).

4   Establishing a Discipline: Formal Activities

Let us now briefly overview activities related to SI where, in the last few years, we can observe a true explosion of appearances of the term Social Informatics.

- Thematic Journal: The *Social Informatics Magazine* (*Revista de Informatica Sociala*) published by the Social Computer Science Laboratory at the West University of Timisoara has since June 2004 appeared twice a year and it contains scientific papers in Romanian, English and French languages [Social Informatics Magazine, 2006].
- Special issues of established journals: Special issues of the *American Society for Information Science and Technology Bulletin* [Bulletin, 2005] and *Information Technology & People* [IT & People, 2005] were devoted to SI in 2005.

- Social Informatics Fair: *The Social Informatics Fair* in Kyoto was held in September 2005 with the aim to become a regular event [Fair, 2005].
- Social Informatics Associations: The Japan Association for Social Informatics [JASI, 2006] and the Japan Society for Socio-information Studies [JSIS, 2006] are already formally arranged as professional organizations.
- Blogs: Various blogs related to SI are appearing: the *Subject Tracer™ Information Blog* by Marcus P. Zillman, which monitors Social Informatics resources [Zillman, 2006], while the *Social Informatics* [SI blog, 2005a], the *Blog on Steve Sawyer's publication* [SI blog, 2005b] and *CiteULike* are devoted to academic papers and discussion [CiteULike, 2006].

In addition, at the beginning of 2006 we can find various research units/institutes that explicitly include SI in their names:

- Social Informatics Research Laboratory, University of Electro-Communications, Tokyo, Japan [SI research laboratory, 2005];
- Social Informatics Research Unit (SIRU), University of York, UK [SIRU York, 2006];
- Social Informatics Research Unit (SIRU), University of Brighton, [SIRU Brighton, 2004];
- The Social Informatics Research Group, Napier University, UK [SI research group, 2006];
- The Social Informatics Cluster, University of Edinburgh, UK [SI cluster, 2006];
- Institute for Social Informatics, Copenhagen, Denmark [ISI, 2005]; and
- Center for Social Informatics, Indiana University, [CSI, 2005a].

Similarly, we can currently (early 2006) find at least 12 university programmes of SI in seven countries:

- *United States:* University of Indiana, USA [Indiana University, 2006], University of Toledo University, [Toledo University, 2005], Bradley University in Illinois, [Bradley University, 2006];
- *Japan:* Kyoto University, [Kyoto University, 2005], Chuo University, [Chuo University, 2001];
- *Ukraine:* Kiev National Taras Shevchenko University, [Taras Shevchenko University, 2000], Kharkov National University of Radio Electronics, [Kharov University, 2005], National Technical University of Ukraine, [National Technical University, 2005];
- *Germany:* Berufsakademie Stuttgart, [Sozialinformatik, 2006];
- *Taiwan:* Yuan Ze University, [Yuan Ze University, 2005];
- *Romania:* West University of Timisoara, [Grosseck, 2004]; and
- *Slovenia:* University of Ljubljana, [Social-informatics.org, 2006].

Of course, the above lists may not be exhaustive particularly because units with slightly different names were not included, e.g. 'Socio-Informatics' in South Africa [University of Stellenbosch, 2006], in Japan [Keio University, 2002] and in Germany [The International Institute for Socio-Informatics, 2006]. Of course, all other activities and institutions from overlapping areas - without an explicit mention of the term 'Social Informatics' - were also excluded. The full lists covering all related areas and those of indirect relevance are shown on the SI website [Social-informatics.org, 2006].

If we structure the above activities into the categories in Fig. 1 we could say that, roughly speaking, in the US they typically follow the initial Rob Kling understanding (1b and 1c, Fig. 1). In part, this is also true for institutions and activities in Japan; however, very often in Japan they overlap with the understanding of SI as ICT applications in the social sphere (2a-2c, Fig. 1). This is also true for a large part of SI-related organizations and activities in Europe. With respect to the third variation, i.e. ICT as a tool and infrastructure (3a-3c, Fig. 1), we can find it articulated at the University of Ljubljana [Social-informatics.org, 2006].

5   Conclusions

Information and communication technologies (ICT) form an essential aspect of modern societies. Within this context, Social Informatics (SI) represents a specific approach to addressing the relationship of ICT and contemporary society.

SI is a relatively new concept, which started to emerge in the 1970s in close connection to the computer sciences. With the rise of the Internet in the 1990s the notion of SI rapidly expanded. How SI is understood varies across countries, scientific fields, and areas of application and terminological backgrounds. Nevertheless, the main stream of understanding follows the initial concept of Rob Kling who defined SI in a broad context where the design, use, configuration and consequences of ICT are studied in their interaction with society. However, no explicit separation of SI has been drawn yet from neighbouring areas of informatics or from ICT applications in the social sciences.

We can observe a considerable expansion of formal SI activities in recent years with respect to publications, events, research units and study programmes. At the same time, the number of contexts where SI appears is also rapidly broadening. Unfortunately this expansion is often fragmented, separated and isolated, with little or no cohesive power. Obviously, with the growth of SI-related activities we miss a stronger definition and more formal bonds, which could constitute a profession and scientific discipline: international associations, regular conferences, explicit journals, codes and standards etc. A danger thus exists that SI will continue to remain on the periphery because it lacks a clear operational definition and more coordinated formal activities.

We have structured the notion of SI in three segments and nine sub-segments. The overall range in which SI can appear is thus very broad, spanning from the interaction of ICT with society, ICT applications in the social sciences to the understanding of ICT as a tool in the social science research. Of course, due to rapid ICT-generated changes the quest to more precisely define areas covered by SI is becoming increasingly complicated.

To summarize, despite the expansion and ever greater articulation of SI there is a danger that SI will not established itself as a discipline because some areas are continuously moving under the umbrella of other fields (e.g. computer-assisted survey data collection to social science methodology). On the other hand, some areas have already become independent outside of SI (e.g. human-computer interaction or business informatics), while others are on their way to becoming independent (e.g. e-social sciences, information architecture). Even within the very core segment of SI,

the community informatics is perhaps better-organized discipline with much more clear profile than SI. Similar is true for the area of information society.

On one hand, SI seems to be gaining momentum and a critical mass of activities, which could support attempts to fully formalize it as a discipline. However, on the other hand, we face an even sharper increase in its fragmentation, which might render such an undertaking very difficult, particularly because of the abundance of competing concepts addressing the relationship of ICT and modern societies.

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