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# ICT Critical Infrastructures and Society

## Introduction to the HCC10 Conference Proceedings

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**Abstract.** For 40 years, the academics and business executives who have attended the Human Choice and Computers international conference series have discussed human choices and social responsibility in relation to information and communication technology (ICT). At this 2012 conference, the focus is on ICT critical infrastructures, and the challenges they pose to governments, businesses and people. Several topics have emerged as relevant in this conference: ICT developments at international and national levels; sustainable and responsible innovation; dilemmas involving ICT, peace and war; and the implications of ICT and social media for citizens' involvement and citizens' rights. What should national computing associations be doing to explore these serious issues? How should the International Federation for Information Processing (IFIP) itself respond? Responses are needed that are flexible and durable enough to face the challenges of the coming four decades.

**Keywords:** citizens, computing, democracy, human choice and computers, information and communication technology (ICT), infrastructure, innovation, involvement, peace, policy, responsibility, rights, social media, sustainability, war.

## 1. Introduction

The Human Choice and Computers (HCC) conferences have been organised by the Technical Committee 9 (TC9)<sup>1</sup> of the International Federation for Information Processing (IFIP) ever since 1974. This series of conferences has offered an important setting in which to discuss the impact of information and communication technology

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<sup>1</sup> The IFIP Technical Committee 9 (TC9) is dedicated to the study of the relationship of Computers and Society <http://www.ifiptc9.org/>.

(ICT) on society. The conference subjects have ranged from the ways in which ICT affects people's lives at home and in the workplace, to the impact that they have had on communities and institutions. The gatherings have offered fora where academics and practitioners have been able to discuss technology from a social, and even societal, perspective [3].

TC9 concentrates on developing an understanding of how ICT innovation is associated with change in society, and having an influence on the shaping of socially responsible and ethical policies and professional practices. By holding its meetings in international locations, it acts globally. In particular, its last two conferences in 2008 and 2010 in South Africa and Australia reconfirmed this international reach. They stretched TC9's panorama geographically and thematically. Issues such as social dimensions of ICT policy [1] and ethical and governance dimensions of privacy, surveillance, sustainable development, and virtuality [3] were tackled. HCC10, which takes place in the Netherlands on 27-28 September 2012, is the tenth in this conference series. Some forty contributions bring a wealth of output and range to this conference. The attendees, and the countries they come from, cover cases and investigations from as far afield as Africa, Australasia, Europe, the Far East and Middle East, Latin America, and North America.

## 2. Overview of HCC10<sup>2</sup>

Today, ICT critical infrastructures provide a basic foundation to society, increasingly regardless of location. Governments, businesses and individuals are more and more dependent on these pervasive ICT infrastructures that underpin diverse methods of governing, controlling and assuring security and safety in all spheres of human life. How people produce, trade and consume goods and services, and how people communicate, interact and collaborate in their political, professional and private lives are all affected by these technologies and infrastructures.

The Internet, mobile networks, and even social media, have become new critical infrastructures. Many documents of long-term importance are stored on ephemeral media and in digital formats. Major key data and communication centres exist in a limited number of locations around the globe. Human dependence on these infrastructures extends from business and commerce, finance, healthcare and public health, to the provision of services – public or private, and the organisation of communities. It also includes the continuous provision of such basic utilities as electricity, gas and water.

This reliance poses immense challenges in terms of sustainability, long-term provision, societal organisation, innovation, democracy, and the competences and resilience of human beings. New methods, tools and techniques, and ways of thinking, and particularly acting, will be needed to tackle these challenges. They may be required at many levels of society from policy-making to interactions occurring in people's local communities. ICT may facilitate new democratic activities of

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<sup>2</sup> This overview is based on two sets of ideas: the first expressed in the description of this conference and the second in a call for a workshop held by IFIP's working group 9.2 at Middlesex University, United Kingdom, on 4 February 2012.

engagement [6],[9], but dependency or over-dependency on these technologies may also be problematic [2],[5].

### **3. HCC10's Conference Themes**

HCC10 discusses the impact that these ICT critical infrastructures are having on society as well as the ways in which members of various social groups are responding to them. The conference reflects on the main challenges that governments, organisations and individuals are already facing, and are likely to face in the decades to come. The focus is dual: it is both on strategic directions, and on the effects on people's everyday and routine activities – reactions that can be very different in the various parts of the globe. The conference also explores how to mitigate risks and reduce some of the potentially more negative outcomes of these developments.

A number of specific topics are covered. They include: national and international policies; sustainable and responsible innovation; ICT for peace and war; and citizens' involvement, rights, and the implications of social media. Each of these HCC10 conference themes is explained below in more detail.

#### **3.1 National and International Policies**

The Organization for Economic Co-operation and Development and the European Union (EU) and its countries, international organisations such as the International Telecommunications Union, United Nations and World Bank, individual nations, and regional and municipal authorities, are all coming together to shape the character and foundations of ICT critical infrastructures. They are attempting to manage the development and deployment of more efficient, inclusive, resilient, and secure ICT critical infrastructures. As society is increasingly recognising, it can be hugely beneficial to explore the implications of successes as well as errors and failures in this field. Different perspectives on policies are emerging in both general and detailed forms as a result of these conference proceedings.

These HCC10 conference papers describe applications introduced in a range of countries worldwide (e.g., Dubai, India, Mexico and the United Kingdom), several of which are developing countries and/or emerging economies. The focus is on governance-related issues, and the domains covered are in government and the public sector. The types of applications involve eGovernment generally, identity mechanisms, a portal for foreign trade, and ration cards. While some of the initiatives have been applied in practice in the countries concerned, others are either in transition or on hold. The final paper in this section [8] reminds us that – while it is always important to examine the grassroots and immediate implications of any development – it is wise to keep an eye on the bigger picture: hence, a multi-dimensional analytical framework is presented.

### 3.2 Sustainable and Responsible Innovation

Globalisation and competition have rendered the topic of ICT innovation a major concern for any local, regional or national economy. Governments around the world are proposing policies to foster innovation in their digital industries and spread the successful adoption of these technologies. Not only national needs, but also the implications that innovations have for different countries, must be borne in mind at the international level. More in-depth discussion is also needed on the societal, social and ethical values underpinning the innovations that societies aim to pursue.

HCC10 considers the innovations on which governments, organisations and society should focus, and which criteria should drive research and investment in innovation. HCC10's perspective is that technology is not neutral. Thus, it is important to discuss the explicit and implicit social and ethical aims, together with the real outcomes of innovation policies. The debate focuses on how economic, societal and environmental sustainability are to be taken into consideration in all investments in ICT critical infrastructures. The more specific subjects covered include environmentalism, green ICT and sustainability; the role of innovation in the economics of communities; healthcare; future post-Turing era challenges; and the role that can be played by education, training and skills development to forge sustainability and responsible innovation.

It is important to bear in mind a general overview of Green IT, and its argument that it is closely associated with innovation. New directions in ICT, especially in distributed computing are important, with a focus on what this means for e-waste management. Two corporate-related examples of energy management are introduced: one based on data mining and the other on a balanced scorecard. There are also community-based environmental concerns and innovative approaches to handling energy management through ICT.

How to encourage and attract responsible innovation is one of today's major societal and economic challenges. Three examples, two from Canadian cities and one from a European country's national research network, offer ideas for innovators that could be transferable to other social and geographical settings.

Responsible innovation is particularly vital in the field of healthcare. Three illustrations are introduced from different clinical areas: healthcare generally, home healthcare and chronic care. A range of ethical concerns is covered.

Various aspects of responsible innovation in the educational, research and corporate worlds emerge. The emphasis is very much on ethics and how they can be taught, researched, introduced and implemented in various educational, employment and social settings. Ultimately, the solutions range from some more technical and technological approaches to infrastructures, to law, philosophy and behavioural change.<sup>3</sup> The stakeholders concerned involve policy-makers at international or national levels as well as local inhabitants. They include people of all ages, from the eldest in our societies to young high school attendees.

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<sup>3</sup> This section of the conference has an affinity with the 2012 IFIP WG9.2 Namur Award ceremony. This international award for an outstanding contribution with international impact to the awareness of social implications of information technology is to be given in 2012 to Prof. Stefano Rodotà of Italy.

### **3.3 ICT for Peace and War**

Information is a vital element of post-modern society, and its safety and security is crucial. ICT critical infrastructures are fundamental to human beings' attempts to live in peace. On the one hand, cyber security is a key factor in the maintenance of international and national security, and in guarding many of the interests of citizens. On the other hand, cyber warfare can refer to politically – or otherwise – motivated hacking to conduct sabotage and espionage against specific nation states. Countering the latter is important; but questioning undue interference by states is also an important exercise. There are many implications of ICT critical infrastructures for people's current understanding and experiences of building peace in a world that is coping with many separate, yet often interlinked, wars and numerous other forms of violence and aggression.

HCC10 introduces these themes in a section on ICT for peace and war. This section of the conference proceedings explores how social media are used for a number of different purposes. Initially, three applications are introduced from two countries: one that is used for social engineering, another for measuring consumer trust, and another for modelling crowd control. Later, questions are raised about the relationship between war, violence and video or ICT-based games and the need for more in-depth investigation of the effects these can have on the young (and not so young) people who play them. The section ends with a proposal for agendas for research, discussion and action that cover all of these areas of concern.

### **3.4 Citizens' Involvement, Citizens Rights' and ICT**

The Internet can enable citizens' participation in democratic social structures and governments. ICT critical infrastructures, such as eGovernment and social media platforms, can foster public debate and people's emancipation. Some countries have been successful in implementing social media interfaces so as to be more attentive to the views of their citizens. Events, in particular in 2011 during the so-called Arab Spring, have reinforced a positive belief that people can use ICT critical infrastructures to defend their rights and interests, and even to organise themselves against oppressive regimes. However, it is also known that governments have used these very same tools to monitor and control their citizens [6],[9].

The extensive diffusion of social media environments that has taken place over the last five years in particular, warrants greater attention and is receiving it in many academic and broadcasting circles. Social media tools, especially social networks, are disrupting the way people interact in society, in both their private and professional lives. The boundaries between private and public are blurring, with consequences for people's identity, privacy and security.

HCC10 discusses numerous aspects of this debate. The conference covers the necessary interrelationship between the technological and institutional infrastructures that are required to understand the outcomes of citizen participation mediated by ICT. This section of the book deepens the discussion on the implications of social media for society. It explores several instances of citizens' social media use in a number of countries including Brazil, China, Iran, Japan and South Africa. Examples of social

media use in crisis situations, and what kinds of approaches are needed to support people in these circumstances, are also highlighted. This section also investigates how virtual relationships affect the social tissue of societies. It questions the ethics of organisations that use social media to investigate the personal lives of their employees, and profiling techniques to increase their sales and improve their brands. It discusses how society may be organised to defend citizen privacy and security. It also covers citizen's relationship with upskilling and decision-making.

#### **4. Implications for International Computing Associations**

This HCC10 conference topic stimulated the desire to bring together a number of TC9 representatives to take part in a panel discussion on how ICT infrastructures are perceived by their national computing societies. The aim is to debate ICT-related critical infrastructures, and various possible ways of handling their challenges. Prospective panellists represent computing associations in Canada, Japan, and South Africa. From Europe, the Dutch, German, Finnish, and Hungarian computing associations will offer their views. A representative of the international computing association, the Association for Computing Machinery (ACM) will also make a contribution. Participants have been invited to submit a short description of the problems posed by ICT critical infrastructures from the perspective of either their own country or computing society. As a result, TC9 members will be able to share their perceptions of a range of different infrastructural problems, face these concerns together, and search for solutions. These stakeholders will add their voice to those of policy-makers, industrialists, and civic society.

#### **5. Current and Future Reflections**

This book of HCC10 conference proceedings will be published in time for the conference. The proceedings are not, however, intended to pre-empt the conference's discussions and outcomes. These conversations will extend far wider than the book's contents. Indeed, the conference is intended to be a dynamic, fluid and interactive forum for debate. It is organised so as to place the emphasis on brainstorming, ideas exchange, discussion and dialogue.

These conference proceedings record the contributions delivered to the HCC10 programme committee as of July 2012. They offer a picture of the current state of thinking on ICT critical infrastructures from a number of stakeholders in terms of assumptions, attitudes, empirical evidence, and policies. The conference will highlight the main similarities and differences between the contributors' opinions. However, the conference will not privilege or prioritise specific methods or methodologies. Indeed, the techniques used by the authors of papers in this volume are diverse. Many of the papers are case study-based and delve in-depth into the experiences of countries, societies, and communities. Others are based on literature searches, questionnaire surveys, or assessments of software applications. Other papers are either position papers or reflection papers.

Among the outcomes of the conference is likely to be a growing awareness of new directions for international non-governmental organisations, such as IFIP and its technical committees and working groups, in relation to ICT infrastructures and society. New ideas and perceptions could also arise for civic society. These may affect how policy-makers, business executives, researchers and teachers interact in the future. Such collaborative approaches will help them in various ways: to analyse historical circumstances and contexts that have affected ICT infrastructures, to overcome any persistent barriers, to prepare for new challenges, and to promote improved foresight into future developments.

Such envisioning is particularly necessary to face not only the challenges of this second decade of the twenty-first century but also at least several further decades to come. Flexible yet durable, resilient, responses are needed.

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