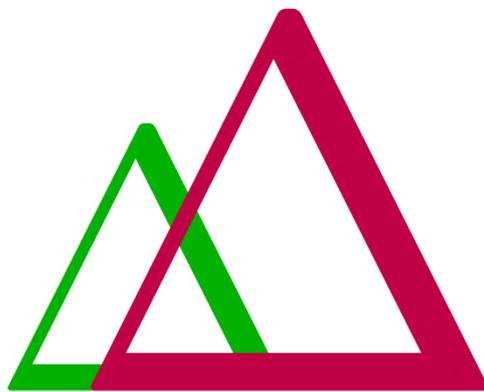# The Difference That Makes a Difference 2013

An interdisciplinary workshop on Information: Space, Time, and Identity

Abstracts Booklet

δtmδ 2013

8-10 April 2013

The Open University and the MK Gallery, Milton Keynes, UK

Programme

Registration: Mon 8 April, 09:30-10:30

Session 1: Information and Space (Mon 8 April, 10:30-13:00)
*Chairs: **Andrea Berardi** and Derek Jones*

Holger Schnädelbach (**keynote**)	Mixed Reality Lab, University of Nottingham, UK	Adaptive Architecture
Ambjörn Naeve & Carl Smith	KTH, Sweden and London Metropolitan University	Spacification: How to design and construct spaces that can enhance artistic experiences
Caitlin Bentley	ICT4D Research Centre, Royal Holloway University of London	Information as evidence: The quest for development aid results
Claudia Jacques	Planetary Collegium, School of Art & Media, University of Plymouth, UK	Space-Time Aesthetics in the Meta-Environment: A Cybersemiotics Analysis
Derek Jones	Department of Design, Development, Environment and Materials, The Open University, UK	Where is information?

Session 2: Information and Time (Mon 8 April, 14:00-17:30)
*Chairs: **Chris Bissell** and Magnus Ramage*

John Monk (**keynote**)	The Open University, UK	What is time for?
Gabriela Besler and Jolanta Szulc	Institutes of Library & Information Science, University of Silesia, Poland	Time as a constitutive element of information expressed in signs
Jan Sliwa	Bern University of Applied Sciences, Bern, Switzerland	Trying to know everything – truth as a moving target
Robin Laney	Computing Department, The Open University, UK	Difference as Meaning in Musical Narratives
David Chapman	Communication & Systems Department, The Open University, UK	Information is Provisional

Informal evening discussions (Monday evening)

Session 3: Information and Identity (Tues 9 April, 09:00-13:00)
*Chairs: **Mustafa Ali** and Hugh Mackay*

Liesbet van Zoonen (**keynote**)	Loughborough University, UK and Erasmus University, Rotterdam, The Netherlands	Identification, information and narrative
Robert Hunter	Faculty of Engineering & Environment, Northumbria University, UK	How digital discourse has affected individuals ability to mould their identity and relationship to information online.
Jan Sliwa	Bern University of Applied Sciences, Bern, Switzerland	Living in parallel worlds – two Polish nations
Paul Adams	Alcatel-Lucent, UK	Identity Shift: Where Identity Meets Technology in the Networked-Community Age
Karen Kear, Frances Chetwynd & Helen Jefferis	Faculty of Maths, Computing & Technology, The Open University, UK	"To give a better understanding of who I am": the role of personal profiles in online learning.
Robin Smith	University Hospitals of Leicester, UK	Everything Must Go: Data Brokers and the Explosion of the Information Crime Economy'

Session 4: What is information? (Tues 9 April, 14:00-17:30)
*Chairs: **Magnus Ramage** and David Chapman*

Pedro C. Marijuán (**keynote**)	Instituto Aragonés de Ciencias de la Salud (I+CS), Zaragoza, Spain	On being informational: caught into the communication flows
Barbara Osimani	Dept of Pharmacology, Università degli studi di Camerino UNICAM, Italy	Code or cause? Genetic information as influence
João Alvaro Carvalho	Departamento de Sistemas de Informação e Centro Algoritmi, Universidade do Minho, Portugal	Asking the right question: What is information? OR What is it that you are calling information?
Marek Hetmański	Marie Curie-Skłodowska University, Poland	Informational aspects of metaphors
Marcin J. Schroeder	Akita International University, Akita, Japan	Ontological Study of Information: Identity and State
Robert B. Lisek	Institute for Research in Science and Art, Poland	Presence and future of information space

Informal evening activities (Tues 9 April, 18:00-19:30)

Including a discussion of information and art through Second Life

Session 5: Synthesis and Art (Wed 10 April, 09:30-11:00)
Chair: Derek Jones

Carson Grubaugh (**keynote**)	Information Artist, New York, USA	The Art of Information

Session 6: Plenary and Panel (Wed 10 April, 11:30-13:00)
Chair: David Chapman

Luciano Floridi (**keynote**)	University of Hertfordshire and St Cross College, University of Oxford, UK	What is Information?

Adaptive Architecture

*Holger Schnädelbach (**keynote**), Mixed Reality Lab, University of Nottingham, UK*

Buildings are becoming adaptive. They adapt to their environments with the aim to be more sustainable and to provide more comfortable conditions for inhabitants. They adapt to inhabitants to make spaces more convenient, information rich and more useful in different circumstances. Adaptiveness is typically achieved through the combination of ubiquitous computing technologies and the building fabric and it finds widespread interest under various banners. In contrast to Architecture overall, *Adaptive Architecture*, a term encompassing a broad range of approaches is *specifically designed to be adaptive*. Adaptive Architecture presents an expansive, multi-disciplinary, multi-threaded and exciting research field, spanning Computer Science, Engineering, Architecture, the Arts, Social Sciences and Psychology. It includes work on media facades, teaching environments, smart homes, artistic explorations and urban installations, very much embedding human computer interaction into the built environment.

This keynote will present the Conceptual Framework of Adaptive Architecture that was developed to allow readers to step back and explore the thematic and historical links across this exciting, emerging field. With this aim, the framework discusses the motivations for creating Adaptive Architecture, before illustrating the key interlinked components that creators draw on to create adaptiveness in buildings through examples. This is followed by a brief outline of overarching strategies that can be employed in this context. One particularly interesting subset of Adaptive Architecture overall is that which is making use of personal information; making personal data, such as locative information, information about the internal state of a person or social networking data available to a building infrastructure. A recent prototype, ExoBuilding, will be used to illustrate the embodied feedback loop that emerges through this approach and the challenges that arise.

Spacification: How to design and construct spaces that can enhance artistic experiences

Ambjörn Naeve (KTH, Sweden) and Carl Smith (London Metropolitan University, UK)

This paper introduces the concept of *spacification*, by which we mean the underlying process that is involved in the actual construction of some *space* that is tailored to enhance the experience of some specific work of art. Taking inspiration from the way that mathematicians construct spaces[1] and the way they analyse their properties, our aim is to sensitise an artist to aspects of the spaces she implicitly/explicitly creates and thinks in terms of, thereby to put her in full control of her own spacification process. This is desirable since it will make it possible for her to more effectively design the dimensions of experience within which she would like to position the 'viewers' as co-creators of her artwork.

The paper starts by problematizing Space, with an overview of how the concept of *physical space* has emerged[2] as an ancient historical compromise between *change* and *invariance* more than two millennia ago. Space was conceived of as a sort of container of things, an invariant background upon or within which changes took place in the form of motions, i.e., transformations that moved things around in space without destroying their identity. More than two millennia later, space was gradually identified with *the group of actions that move things around*. The essence of this modern view is that we experience two fundamentally different types of phenomena: those that can be reverted or inverted (= 'undone') and those that cannot. These complementary types of experiences shape our conception of space, and time: *Whatever can be undone takes place in Space, whatever cannot be undone takes place in Time*. (Naeve, 1997, p. 100).

Following Gärdenfors (2000), we then consider various forms of *conceptual spaces*, a term he introduces for *mental spaces* built around *quality dimensions*[3] and for the purpose of modelling different types of cognitively important tasks[4]. The types of spaces that we present include spaces of *maybe* (question spaces), spaces of *narration* (story spaces), spaces of *presence*, spaces of *behaviour* (state spaces) and spaces of *communication and exchange* (on the individual, organizational, and cultural levels). They also include spaces of *ignorance* (non-sense spaces), from which sense is cognitively constructed by disregarding non-sense (Naeve, 1997, p. 97). The quality dimensions that we use include *connectivity, combinatorics, awareness, mobility and similarity* (= semantic proximity).

Moreover, we present a method for building spaces according to various constraints on such qualities along different dimensions, resulting in a better conceptual control for the artist over the spacification process involved in designing the work and planning for how to enhance the experience of it. Finally we illustrate the workings of our method on a few artistic examples.

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[1] A very powerful experience with mathematics is that it takes you into new spaces in a reasonably controlled way where the structural patterns of behaviour (extracted from your concrete experiences of phenomena) are transformed into your "abstract sensors", which function as the quality dimensions that "sensitise" you and build up a new space for you.

[2] As a part of the atomic theory of Leukippos and Democritos

[3] The primary function of quality dimensions is to represent various "qualities" of objects. (Gärdenfors, 2000, p. 6).

[4] Prominent among these is the concept of *similarity*, which is fundamental to all processes of knowledge acquisition and learning, and which - according to Gärdenfors (2000, p. 1) --- has turned out to be surprisingly difficult to handle within cognitive science - using either one of its dominating approaches *symbolism* (based on Turing machines) or *connectionism* (based on neural networks).

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Information as evidence: The quest for development aid results

Caitlin M. Bentley, ICT4D Research Centre, Royal Holloway University of London

In the past thirty years, information in "development" is increasingly conceptualised as evidence. Bilateral donors, for example, want assurance that their contributions are being well invested because they must answer to their stakeholders and justify spending decisions (Giffen & Judge, 2010). Civil society organizations (CSOs) are also concerned about demonstrating results as they also report feeling under greater pressure to provide evidence for both private and public donors. Information, when conceptualised as evidence¬--particularly documented forms of evidence--has implications on relationships between donors and CSOs. One area for improvement for relationships between donors and CSOs is to increase transparency, harmonisation and coordination through information sharing and rigorous tracking and evaluation of results.

High level forums on aid effectiveness such as The Paris Declaration (2005) followed by the Accra Agenda for Action and recently in Busan have reified the aid effectiveness movement by establishing principles, goals and targets supposedly leading to greater aid effectiveness. The reasons for the current emphasis on aid effectiveness can be explained by previous development programming failure, redundancy of development programming, decades of corruption, mistrust and misuse of development aid funds (Copping, 2010). Notwithstanding the credo of the new public management wave that came about in the 80s which cemented accountability as comprising clearly defined responsibilities, clearly stated aims with attention to efficiency, and an overarching emphasis on results (Hood, 1995).

Many assumptions cause concern regarding these trends. Assumptions, for example, that more information means that decision-makers will comprehend more in order to use information beneficially, and there is little debate about how the structure and form of information has implications on roles and relationships of development actors. For example, Moon (2010) states that budget information necessarily provides information about decisions that were made concerning development aid implementation, but if donors collect and own this information to bolster their own positions, then there is little space to treat decision-making power inequalities between donors and recipients. Another assumption is that the effectiveness of the aid system will come to light if all bilateral donors share information in transparent and common ways, but this reinforces modernist technocratic concepts of development stripped of political, social and cultural flavours of participatory social change. A last assumption is that provided with more transparent information, citizens, tax payers, charity donors, and constituents of development aid will hold their own governments accountable, and that new technologies will enable this to happen (Avila, Chak, Górnicki, Heacock, & Kaonga, n.d.). Whilst there are cases where technologies have been used to increase transparency and fight corruption (Gronlund, 2010; Kuriyan, Bailur, Gigler, & Park, 2011), there are also cases where organisations report that constituents do not have a great desire to enforce accountability (O'Dwyer & Unerman, 2008).

In this presentation, I will explore these issues through empirical examples that highlight notions of information between donors and CSOs. These concepts of information in turn affect relationships between these actors, and ultimately reinforce particular roles and practices in development.

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Space-Time Aesthetics in the Meta-Environment: A Cybersemiotics Analysis

Claudia Jacques [de Moraes Cardoso-Fleck],
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Keywords: Aesthetics, Cybersemiotics, Information, Interface, Meta-Environment, Space, Time, User

Since the late 1980's, scholars working in such different fields as Cybernetics, Information Design, Semiotics, and Digital Media Aesthetics have relied primarily on physical narratives emphasizing embodiment to represent the architecture of digital information environments and the user-interface relationship.

In the implementation of digital interfaces, information is translated to the user through a design environment that assumes embodiment. I argue that the user's presumptive need for a language and aesthetics of physicality dictates processes and perceptions that are limiting and linear in scope, restricting information's potential and preventing a more balanced integration among user-information-interface. It also reinforces the space-time continuum paradigm when in reality digital information can be experienced independently of fixed locations and set times due to its non-space-centric, asynchronous, atemporal and non-linear properties.

As a reflective technoetic artist, information designer and educator, I call for revised transdisciplinary conceptualizations of the current spatial paradigm and the user-interface dyad through cybersemiotic analysis of space-time aesthetics in the user- information-interface relationship, which I define as Meta-Environment. Meta- Environment is a complex adaptive system that addresses the triadic relationship, interactions and processes among user, information and interface.

Through the implementation, observation and analysis of the triadic qualities and properties of Meta-Environment [physical (user) – digital (information) – digital+physical (interface)], I interrogate existing space-time representational models from an artist's perspective and explore alternatives in theory and practice.

Where is information?

Derek Jones, Lecturer in Design, The Open University

"The single biggest problem with communication is the illusion that it has taken place"
George Bernard Shaw

Information, the word itself, has no rigorous or universal definition across disciplines. This offers the opportunity to explore domain specific approaches to such definitions that then might offer alternative ways of considering any such ideas. This paper considers information from the perspective of space by exploring how it might relate to our temporospatial environment and it does this by posing the particular question 'where is information?'

Whilst it is entirely possible to apply Shannon's definition of information to this discipline (Shannon, 1948), it would certainly not deal with the more challenging aspects of what happens after transmission, so to speak. Shaw's quote (above) alludes to such difficulties – we may have a well-defined notion of the transmission of information or data, but there are other factors that have to be taken into account to ensure the transfer of meaning, intent and a range of other less tangible elements.

In architecture this is a particular problem. The objective elements we design, create and use in our daily lives cannot be analysed or explained in terms of the effect they have on the meaning we take from them. The physical space we inhabit is only a part of the place that we may then go on to create (see Anthes, 2009 for several interesting examples).

In architecture and the design of the built environment, *information* has never had a particularly cogent definition (until recently). However, words such as perception, meaning and communication have, although these are very often ill-defined and subjective, rather than explicit and objective (Jones & Lloyd, 2013). This fundamental difficulty of dealing with the tangible and intangible provides an interesting backdrop to discussions about the relationship between objective data and subjective meaning.

In order to explore this, *perception* and *conception* will be presented as analogies to *data* and *meaning*. Existing research into the disjunctions between these two will be summarised (for exmaple Fingelkurts & Neves, 2009; Lotto, 2004; Velmans, 1998) and used to confirm that the objective elements we take for granted are less relevant that the subjective ideas we generate.

It is argued that these disjunctions can be considered by asking 'where is information?' This paper will consider information contained in objects, perception, ideas and (possibly) in itself. These final considerations will be presented as ideas and discussions with the aim of providing starting points for considering information and meaning in other disciplines, including those presented in this first session.

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What is time for?

*John Monk (**keynote**)*
Emeritus Professor of Digital Systems, The Open University, UK

In many cases our references to time are instrumental, that is they help achieve some objective but are not essential to fulfillment of our goal. The ubiquity of clocks and our constant references to time conditions us to consider the measurement of time as vital but the time it takes to bake bread, for example, is at best a guide; what matters is, "Is the crust suitably brown?"; the synchronization of activities with clocks can be replaced by effective communications and Hertz in his Prinzipien der Mechanik argued that the concepts such as mass, force, space and, of course, time do not have to be a part of the foundation of mechanics.

Lewis Mumford argued that clocks were introduced to regulate the interval between devotional practices in the monasteries; time-pieces were taken up by commerce and the trades thus time became a commodity which came to define and continues to define elements of the social order.

Commodification was supported by portrayals of time which inevitably employed analogies, a vocabulary and an arithmetic which shaped time in the image of space. Charts, such as the Gantt chart, showed how one another's time was to be spliced together in complex spatial patterns. In diagrams showing systems, connections are often shown as arrows that are often seen to be identifying a temporal sequence of operations. However, such diagrams form parts of explanations and explanations are built upon beliefs of what causes what. The explanations that emerge give some assurances about what causes what in the past or provide us with stories about what will cause what, and therefore form the basis for diagnoses, plans or predictions that give us a greater certainty about the future and the past and its effect on the present and hence the feeling we have gained information. Sequences in time are instrumental in explanations but only because, in some cases, temporal sequences are taken to be indicators of a causal sequence. Time, then, as a mere instrument may not deserve the primacy we attribute to it.

Time as a constitutive element of information expressed in signs

Gabriela Besler, PhD (habilitation), Institute of Philosophy, University of Silesia, Poland
Jolanta Szulc, PhD, Institute of Library and Information Science, University of Silesia, Poland

In literature there are different definitions of information. Some researchers believe that information is not to be defined. Others think that it should be defined in the area of a given field. Apart from these discussions, we assume that information is expressed in signs. Hence there arises the question how to understand the sign. The following conceptions of the sign appearing in the history of semiotics can be useful: Conceptions consisting of two elements: **St. Augustine** in a sign-situation considers only two elements (sign and object), one of which is present instead of the other. **Ferdinand de Saussure** states that the sign is a psychological entity which consists of its content and the acoustic image. Conceptions consisting of three elements: **Charles Sanders Peirce** believes that we do not have the ability to think without signs. **Jacques Derrida** says that each sign is a trace of another sign. What the sign refers to does not exist, because it is a trace of another sign. Conceptions consisting of four elements: **Janina Kotarbińska** explores the essence of signs as a means of interpersonal communication and mapping of reality, which amounts to the study of language signs. Conceptions consisting of five elements: **Tzvetan Todorov** suggests the text is just a picnic, to which the author brings the words and readers bring sense. The next analyses show that time must be among the constituent elements of information expressed in the sign. In the information science, for example as regards collecting, searching, processing information; information does not exist outside of time. To exemplify let us turn to an analysis of linguistic research on changes in the content and range of linguistic expressions. In accordance with these ideas we analyze the following example of information: *The Nobel Prize in Literature 1996 was awarded to Wislawa Szymborska*.

Trying to know everything – truth as a moving target

Jan Sliwa, Bern University of Applied Sciences, Bern, Switzerland

This presentation discusses the temporal and spatial aspects of the process of knowledge production and consumption, especially in the context of multidisciplinary research.

In an idealized picture of scientific research, we discover new facts, in a fair discussion among peers we come to a consensus about their meaning, what permits us to incorporate them into a common thesaurus of knowledge – like producing fresh bricks and chopping rough parts off, until they neatly fit into the a well-constructed, reasonable and consistent edifice.

The facts in our theories are as interconnected as the events in the real world are. Real world is a whole, it is not divided into mechanics, biology, sociology and astronomy. Therefore if we want to answer the "big questions", we have to seek after a theory encompassing as many fragmentary areas of knowledge as possible. Such theory in order to be formulated has to be understood – and understanding can occur in individual minds. I assume here, there is something special about human understanding, something more than detecting correlations by crunching big data. And minds are based on brains, and brains depend on bodies. Bodies live up to about 80 years. Brains need time to develop and time to acquire enough knowledge to be able to produce new ideas. They have a certain period of the optimal productivity. This sets natural limits on the amount of knowledge that can be grasped and creatively processed. In particular sciences, even if the global amount is huge, concentrating on a narrow field can make the necessary part of it tractable. The price for this is losing the broader view.

If I am interested in interdisciplinary research, in trying to solve the "big questions", the problem of capacity becomes essential – together with time. When seeking truth, I take part in multidimensional race between the producers of knowledge and its consumers. In order to build my worldview, based on the current state of knowledge, I have to take a grand tour over as many particular sciences as I am able to understand and to extract from them all the relevant information that could influence it. My brain capacity is limited – the more areas I include, the shallower is my knowledge of each of them. I am only able to skim the surface, but how should I select the relevant part? If I am interested in the development of humans, then discovering Denisovans or Hobbits on Flores, or re-scaling the C14 dating is an important fact. How deeply can I delve into the details? Not very deeply, considering the number of other facts worth knowing.

In parallel with my knowledge gathering, new knowledge is produced and spread. Old knowledge is revised. Under the same title a very different content may be stored. If I observe the evolution of the Neanderthal, not in prehistory but in our books, I see at first a brute caveman, but currently a red-haired man I could take for a modern human. I may read a book named "The Maya", presenting a society of peaceful priests-astronomers. A few years later, a book with the same title will tell a story of brutal warriors and human sacrifices. Both books are separated by the deciphering of the Maya script. I know it now, but it needed periodic scans of my acquired knowledge, and every scan needs time.

Moreover, I have to choose the sources I trust, regarding their quality and objectivity. If I use the generalizations produced by other scientists, I have to rely on the broadness and quality of their analysis. If I read a book, even a brilliantly written one, combining many areas of science, and the knowledge of the author in some of them is superficial or obsolete, his conclusions may also be flawed.

To summarize: we have two basic processes – knowledge production and knowledge consumption. Both occur in time and space. The space to be crossed is currently not so much the geographical one. It is rather the distance between languages and cultures (still not everybody uses English), and even more the distance between the particular sciences and between the specialists and the interested

laymen. In order to cross the barriers between the sciences, knowledge has to be extracted and presented in a manner readable to intelligent non-specialists.

These processes can be compared to astronomy: (constantly evolving) stars and galaxies are emitting light, travelling with a finite speed, which is gathered by telescopes, permitting an observation by humans. The experience of an individual observer is predetermined by his position and limited by the duration and direction of his observation. This causes "relativistic effects" in our communication. We often attach different meanings to the same words and our opinions are biased by the scope of our knowledge, by the sources we trust, by our personal experience.

The goal of this presentation is not to formulate accomplished theories or to give solutions, but rather to inspire a fruitful discussion.

Difference as Meaning in Musical Narratives

Robin Laney, Computing Department, The Open University, UK

An on-going controversy in musicology is the role of music in carrying meaning or conveying information. Yet at the same time, few would argue that it is capable of conveying and/or inducing emotion. Similarly its role, in for example film, in strengthening or undermining a visual and/or spoken narrative is generally accepted and has a rich historical context.

But what about music divorced from other media, and the conveying of meaning other than emotion? In what sense does programme music convey meaning independent of information supplied from other sources, for example a suggestive title such as "The flight of the bumblebee" (Rimsky-Korsakov)? How many listeners would identify the topic of this piece without prior knowledge of the title? On the other hand, how many listeners would disagree if asked if the piece was 'busy'? Music then, might support a narrative, but at an abstract rather than a concrete level. This abstraction might be seen as generalising any information content as opposed to simply weakening it. Our example might convey to listeners 'this is what its like to be busy', whether you are a bee or a person caught in a train of thoughts.

Byron Almén (2008) focuses on the ways in which music can carry a narrative, drawing on the work of a range of academics in a number of disciplines, and demonstrating his overall approach with several pieces of extended analysis. Whilst a full description is out of scope here, one of the key ideas is the notion of cultural units in hierarchical relationships to each other that can interact to subvert or reinforce the relationship. The key to meaning then is not so much in the cultural units themselves as in their differences and the way these differences change. By cultural unit he means a range of things from the motif level to larger structural detail, for example themes constructed of multiple motives. Arguably it is at the larger levels of structure that his arguments most apply. However it is interesting and simpler to consider just the role of motifs.

In the Western art tradition it is common for a piece to be generated from a small number of motives and the parsimony of this is valued within the tradition (Samuels 2011). Whilst this aids coherence (without which meaning becomes limited through arbitrary combinations of events), it also makes a necessity of a process of applying differences, if interest is to be sustained. But human listeners are predisposed to interpret (sonic) differences over time in their surroundings as meaningful (Clarke 2005). In a sense a composer is knocking at an open door if they wish to convey meaning, but the abstract nature of their medium leaves wide scope for interpretation. Structuring a work in terms of a hierarchy of motives, and playing with this hierarchy through developing motives and their relationships, opens up the possibility of a narrative reflecting interactions between society, individuals and their environment. In particular trajectories of struggle (including, for example, between social classes as well as romantic strivings), which may end in success for one of some imagined actors, possibly as the expense of another.

What are the key differences that occur between motifs? How do these change as a piece progresses through time? Are there levels of abstraction at which listeners converge in their narrative interpretations? The first two questions are central to the work of musical analysts. Almén gives us a rich starting point for the latter: his evidence is based within a traditional humanities context, leaving open the role of more empirically based work, including within an information theoretic framework.

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Information is Provisional

David Chapman, Senior Lecturer, The Open University

According to the veridicality thesis of Luciano Floridi, information has to be true (Floridi 2011, Chapter 4). If it is not true it is not information. Floridi presents his case for the veridicality thesis for carefully specified *semantic information*, but his semantic information is a good match to a common, everyday concept of information. The name of the winner of Tour de France, for example, would qualify as *bona fide* semantic information, as would the answer to the question: "did Lance Armstrong take drugs?"

We are left, therefore, with the disturbing discovery that what we thought was information in 2005 now turns out not have been information after all. Where, then, are we ever going to find information? Or how will we ever know whether we have information?

Floridi's veridicality thesis is an addition to the General Definition of Information (Floridi 2011, p84):

> σ is an instance of semantic information if and only if σ consists of data, the data are well-formed, and the well-formed data are meaningful

That is to say, information is data with meaning (and it has to be true). This formulation is widely recognised and quoted (compare 'the difference [=data] that makes a difference [=meaning]), but some authors qualify it further by time and space (Holwell 2011, p72):

> data plus meaning in a particular context at a particular time

This presentation accepts and justifies the veridicality thesis, but argues that a consequence is that information, like truth, is constrained in time and can only ever be provisional.

One of the strands in the many narratives exploring the nature of information that developed in the years following the publication of Shannon and Weaver's "The Mathematical Theory of Information" in 1949 was in the field of semiotics. Recent interest in information has tended to neglect that narrative, yet the insights of the semioticians are important to an understanding of information (see, for example, Monk 2011). Provisionality is key to Derrida's *différance* (Derrida 1976), and the temptation to play with 'the difference that makes a différance', and the other three combinations formed by paradigmatic interchanges, is difficult to resist. This presentation will not resist that temptation.

Finally, the presentation argues that the provisional nature of information is not trivial: it has real consequences.

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Identification, information and narrative

*Liesbet van Zoonen (**keynote**), Professor of Communication and Media Studies, Loughborough University, UK and Professor of Popular Culture, Erasmus University Rotterdam, Netherlands*

Narratives of mistaken identity and identity theft have been staple ingredients of both folklore and media culture. Currently, it seems there is a renewed interest in these issues, due to increased state and commercial surveillance, and to the ever expanding online networks of unknowns people are eager to engage with. As a result, a range of stakeholders (governments, security, commerce, education, activism, consumers themselves and so on) are wondering how much information is sufficient to identify and authenticate people.

The technologies answering this question have – as yet - been based on distinct units of information that people need to provide: a password, pincode, ID-card, passport, fingerprint, vein scan, voice or implant. But the lengthy dominance of modern identity management by such memory-based, token-based and biometric/body authenticators may be coming to an end.

The susceptibility of these technologies to fraud and theft has brought up a need for more secure means; a return to narrative is one of the answers, as the inclusion of personal questions (Which street did you grow up in?) in contemporary password settings, for instance, and the movement towards life logging, demonstrate. The latter in particular suggests identification and authentication are oscillating between telling stories and giving information: from telling the right story about oneself, as in pre-modern times; to the high tech information of, for instance, biometrics; to the creation of hyper-personalized online data-narratives.

Yet, narrative may have its own problems in the context of identification, because it privileges 'known' and desirable narratives over uncommon ones, and tends to draw from stereotypes rather than from individualities. A case in point is the current excitement about predictive policing based on data mining. Reports are that crime rates in high crime areas have dropped spectacularly as a result, but forget to say that these techniques, like profiling, tend to include innocent people as would-be thieves and terrorists as well. On the other hand, trusted traveller schemes show how everyone can build up a narrative of reliability that would diminish the recurrent need to provide passenger information. All of that is, of course, not neutral in terms of class, gender, and ethnicity.

The point I'd like to make is that we cannot think of identities in terms of information alone; such information is always organised through narratives that are sometimes inclusive, sometimes exclusive, sometimes both. In moving away from 'information' to narrative, current movements in identification and authentication technologies run the risk of turning these dimensions of inclusion and exclusion into forms of systemic control that may make sense in terms of efficiency, but not in terms of safeguarding our multiple identities and human rights.

How digital discourse has affected individuals ability to mould their identity and relationship to information online.

Robert Hunter, Faculty of Engineering & Environment, Northumbria University, UK

With the amount of traffic online predicted to grow rapidly in coming years it may be assumed that this digital space may also become one of the primary arenas for opinion forming and debate. Today this digital discourse, composed of social media, blogs, mailing lists, comment sites and the rise of the citizen journalist, has enabled people from all walks of life to contribute to the on-going discussion of world events. This space and freedom to gather the information that they wish also allows them to construct not only their view of the world but also an identity which the world views of them.

My PhD intends engage with the effect that this is having on the roles of individuals distinct from the 'creator-consumer' binary and their approach to information. An aspect which is of particular interest to this research is the manner in which information supporting almost any conceivable position can be found, distributed, and used as evidence to back-up an argument or to align oneself with a particular standpoint. In this situation the relationship between information and identity becomes central. Individuals are able to build themselves new roles within the discourse based on their relationship to information whether that is as expert, learner, active participant, a more passive objective guise, or a composite which exists across these categories. We can ask then as a consequence of the adoption of these roles how do individuals continue to affect not only their identity but those of others and role information has for themselves and others within the discourse.

If individuals are shaped by their interactions with information, and information consequently by those interactions in-turn, the question then arises that in relation to things which can be judged objectively one of these sets of evidence must be incorrect and if that is so how can it be that users cannot separate the 'fact' from the 'falsehood'? Is it the case that with such apparent growth in the amount of available information it has now become simply too difficult for individuals to critically evaluate what is presented to them? Or is it that the role of information is so vital to creating and legitimising an online identity in the eyes of others that individuals shape the information around them to fit their own constructed selves and maintain legitimacy of the identities which they have established?

As a part of my research I intend to critically investigate these ideas and attempt to understand whether a consequence of this role information has in shaping and maintaining an identity is creating conditions in which all information becomes, for the individual, effectively subjective.

Living in parallel worlds – two Polish nations

Jan Sliwa, Bern University of Applied Sciences, Bern, Switzerland

When thinking about information, a rational person sees characters giving words and words giving sentences. Words and sentences have commonly understandable meanings, what permits them to encode messages conveying information between humans.

Not all persons act rationally, not all messages have conveying true information as their primary goal. In many cases words serve rather to manipulate and mislead people than to inform them - all the more, because we rarely exchange messages concerning pure facts, without any emotional judgment. When groups of people tend to select only information sources confirming their own opinions, such groups evolve into distinctive informational clusters, and information exchange between them becomes more and more difficult until it almost ceases. Pro- and anti-abortionists, animal protectors and researchers in biology, smokers and non-smokers can serve as examples.

Being of Polish origin, I follow the political developments there with great interest. In the last few years the political scene has degenerated into a battlefield of two opposing groups. The rest – about half of the population – has been observing that fruitless conflict and started to despise politics in general. The basic difference regards the attitude towards the current and the previous government, but the conflict disastrously aggravated after the air crash at Smolensk in April 2010, that killed 96 high-rank officials, including the former president Lech Kaczynski.

An external, unconcerned observer will be surprised to see how the same event, by different choice of words, different accents, differently selected pictures can support two opposite views. The discussion within a group is based on repeating the common opinions and chanting the battle cries, between them consists mostly of insults, enrobed in more or less diplomatic expressions. Many words, like "left", "right", "socialism", "fascism" are used as weapons, in a way devoid of any meaning. Extracting public opinion from the discussions on the Internet forums is difficult, especially because most of them are populated by party militia and paid trolls.

Such opinion divergences are observed between warring or permanently opposed countries, like North and South Korea, with populations subject to intense propaganda, having no direct communication. Inside one nationally and linguistically homogenous society, in peacetime such antagonisms are rare. Its outcome is difficult to predict. Following it can serve as an instructive example of how information can be used rather for identity building than for a semantically significant communication and – hopefully – how this embroilment can be eventually resolved.

The goal of this presentation is not to formulate accomplished theories or to give solutions, but rather to inspire a fruitful discussion.

Identity Shift: Where Identity Meets Technology in the Networked-Community Age

Paul Adams, Alcatel-Lucent, UK

Each and every day, the thousands of mouse clicks, location updates and channel changes made by consumers, using the proliferation of smart devices, presents an interesting constellation of user behaviours that is a virtual treasure trove to advertisers seeking to break through the proverbial clutter and intercept prospects at precisely the right time and with the right offer.

Way back in 2007, the market research firm Yankelovich, estimated that a person living in the 30 years prior saw about 2,000 ad messages per day, compared with up to 5,000 at the time of the study. Today, that has increased exponentially with more messages competing for a consumer's limited attention, through a myriad of new media channels by way of new online, mobile, IPTV and augmented reality options. Technology is now indispensible in shaping how users consider, purchase and consume goods and services.

It's interesting to reflect that nearly three-quarters of US smartphone users have searched for content after seeing an advertisement, and that in 2011, the average US shopper consulted 10.4 sources prior to purchase, twice as many as just a year before, whilst over two-thirds of smartphone owners use their device while shopping in-store.

We are also witnessing significant changes in how younger people consume content, with 8-18 year-olds managing to pack an astounding 10 hours and 45 minutes of media into just over 7.5 hours of entertainment time by consuming more than one medium simultaneously.

In the face of this new reality, the concerns from privacy advocates are deafening. To separate hype from hysteria, Alcatel-Lucent, a global telecommunications leader, surveyed more than 5,000 consumers across the United States – from teenagers to empty nesters – to better understand how these individuals view their digital footprints and the networked age is shaping the relationships between consumers and the companies attempting to serve them.

We have provided this research to offer guidance to technology leaders seeking to learn:

- The full construct of consumer identity, as seen through a consumer's eyes, and the dangers to companies falling victim to a one-size-fits-all approach or media hype
- Why consumers can't be trusted to know what they want at all times and the potential blindside that awaits companies
- Why technology brands no longer need to earn the consumer's love and the far more important intangible currency that is up for grabs

"To give a better understanding of who I am": the role of personal profiles in online learning

Karen Kear, Frances Chetwynd & Helen Jefferis, MCT Faculty, The Open University, UK

Users of social networking sites such as Facebook or LinkedIn create personal profiles with information about themselves, including images. The profile information the member makes public, either to selected contacts or more widely, is used to portray a chosen identity. At the UK Open University (OU), students have the opportunity to interact online using forums, ranging in membership from the student union (with up to ¼ million users) to tutor-group forums (around 20 students). Members can present themselves to other participants by uploading an image and/or completing their profile page with information about themselves.

Schwammlein and Wodzicki (2012) suggest that members of a 'common-bond' online community (such as Facebook) use different self-presentation tactics to those in a 'common-identity' community (such as a module forum). The reasons for participation are different in these two types of online environment: in a common bond community participants aim to forge connections with other people as individuals; in a common identity community participants join a group with a common purpose. On Facebook 'the amount of information in profiles is weakly associated with the number of friends' (Lampe et al., 2007), but what is the significance of profile information in common-identity communities such as module forums? Do members of module forums choose to create an identity via profile information and an image, and if so, why (or why not?).

A small-scale study was carried out to investigate learners' use and perceptions of profiles in OU online forums and also in public social networking sites. Data were gathered from two tutor groups on the Level 1 Computing and IT module *My Digital Life*. The methods used were: an online survey; online focus groups via web conferencing; and observation of students' profiles at two points during the module presentation. The findings suggest that some students find personal profiles and photos helpful when using online forums for study. However, other students do not feel the need for these facilities, have privacy concerns, prefer to focus on the forum postings, or are simply confused about how to use a profile facility. These findings are broadly in line with recent literature which suggests that participants in forums may not find it helpful to share personal details as they might on a social networking site (Tanis & Postmes, 2007). We will discuss our findings, together with the implications for practice in supporting students online.

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Everything Must Go: Data Brokers and the Explosion of the Information Crime Economy

Robin Smith, University Hospitals of Leicester, UK

A dark market has emerged since the global depression sparked by the 2008 banking crisis. This market trades in the asset that establishes a number of essential individual rights within the open society, namely personal information. The explosion in activity by a new breed of 'data brokers' has seen cyber-crime become a mainstream concern for economic policy-makers, unable to cope with this asymmetric threat to personal and national security matters.

As the real economy has continually struggled since 2008 opportunities to monetise personal information through both commercial and criminal activity has seen an explosion in the numbers of actors prepared to perpetrate information crime and disorder across our networked world.

'*Data brokers*' have emerged within the information economy as a rapacious and destructive force. These agents seek to collect information about individuals from a variety of sources and then offer that information to other companies or to individuals. Data brokers scrape public information like names, home addresses and purchase histories, credit card activity and other such sensitive items. These brokers are good at connecting online public records to quasi-private information trawled from multiple online sources, including website interactions, cookies, and mobile activity, with the goal of creating detailed profiles. Then they sell it. The data is then used in marketing, advertising, and in investigations. It has led to many accusations that they facilitate Spam-as-a-Service for many companies.

A myriad of stories are emerging detailing the destructive nature of data brokerage and the impact on both individual information privacy rights and the national information economy. This paper explores three case studies to illuminate the threats and opportunities to raise awareness about this new risk to personal freedom.

This paper also explores the explosion in this part of the information economy and considers the following key questions;

1. What ideas or opportunities are driving the future uses of personal information to protect against monetisation?
2. What are the key challenges within the personal data ecosystem and how do we address them? Is it incomplete or inadequate privacy legislation?
3. Who's in a unique position to protect information privacy and ensnare data brokers in security controls?

The paper posits a number of risks to monitor to protect the individual and key national infrastructure from further damage from this most aggressive predatory force.

On being informational: caught into the communication flows

*Pedro C. Marijuán (**keynote**), Instituto Aragonés de Ciencias de la Salud (I+CS), Zaragoza, Spain*

A change of perspective in the development of information science is proposed. Tentatively it would be based in the considerations that follow.

1. AN OUTDATED QUESTION: *What is information?* Like similar obnoxious questions along the history of science, what they should produce when successful is not a neat and crisp response but the booming of a new discipline or a fertile new branch of technology. Think of flogiston, energy, electricity, heredity, ether, quantum, gene, and so many others. That kind of disciplinary flourishing is not happening with information science today, notwithstanding a barrage of theoretical and applied developments during last decades and an impressive high tech "revolution" in most of the information processing arenas. Disciplinarily, most of information science keeps anchored in frameworks established during the 50's and 60's… and still trying to answer the what question, on and on—how many "definitions" of information might be counted today?

2. THE DISCIPLINARY CONUNDRUM: Universalist approaches to information, those that purposefully transcend the boundaries of a particular discipline (which have always established their own notion of information, either implicitly or explicitly), have a difficult time when trying to conceptualize this most protean "something". Indeed, in a wider sense, anything contains, processes, uses, or transforms information. Should information science be conceived as the new "science of everything"? Obviously not, but attempts to establish its conceptual core and a feasible methodology conduce to very dense and conflicting relationships with basic disciplines: physics, biology, neurosciences, philosophy… Herein we will consider, first, that information is indefinable per se; and second, that a consensus or "normative" notion has to be established on how information should be conceived, related to the preconceptions, goals and subjects to be addressed by the putative science.

3. THE SCIENCE OF "INFORMATIONAL ENTITIES": A consensual notion of information as "*distinction on the adjacent*" has been advocated by this author. The *distinction* term refers to the subject receiving the information, how he/she/it may create inner streams of relationships following his/her/its perceptual/motor operations upon the impinging signaling flows. The *adjacent* term refers to the physical contact to be achieved, and the need of counting with sensory elements or with excitatory surfaces to be impinged upon by the incoming signals. The internalized communication flows with all the distinctions performed en route will guide the inner generative (and degradative) processes of the concerned informational entity, as happens in living cells, organisms, individuals, enterprises and institutions, and societies at large. All of these are genuine informational entities, *structurally always in the making*, which are present in "Nature" and which deserve be studied by a well developed information science. As an essential part of their study, an integrated scheme of the informational dynamics in each one of those genuine info entities has to be elaborated—to reiterate: cells, organisms, individuals, markets-enterprises, societies. In all of these realms, it is the collective action of communicating, self-producing entities ("informational" ones, for short), connected in multiple, flexible ways, what makes possible the unfathomable complexity and adaptability emerging at all functional scales.

4. A NEW SCIENTIFIC CULTURE: Apart from claiming a bunch of theoretical and applied developments nowadays scattered on maths, computer science, engineering and other disciplines (e.g., network science), and implanting some more order and mutual cohesion upon them, information science should care on topics barely addressed in their interrelationships. For instance: communication limits, social bonding maintenance, meaning and life, knowledge accumulation and knowledge recombination, adaptability, structures of collective intelligence... Some of these themes are also closely linked to the information revolution and to the social and cultural problems of our times. The way our societies have expanded the whole system of knowledge is paradigmatic—a Babel Tower of

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more than 6,000 scientific and technological disciplines, impotent to guide society. Information science should contemplate the whole system of knowledge *in action* and contribute to new forms of social cognition dynamics and to a more sophisticate cultural synthesis in these global "instantaneous" times of information overload… Whether physics itself (or at least some paradoxical topics in quantum decoherence, measurement, vacuum generativity, and cosmology) may participate or not in this essential approach to information becomes an open question, indeed.

Code or cause? Genetic information as influence

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The notion of biological "information" has been at the center of a vivacious debate in which different tools coming from various disciplines (linguistics, semiotics, information theory) have been used in order to make sense of a family of intuitions concerning biological heredity, species-specificity and sexual reproduction.

The connection between the concept of information and genes has been inaugurated by Francis Crick with his formulation of the so called "Central Dogma" and the "Sequence Hypothesis". However, historically the use of the term "information" in biology traces back to Weismann (Maynard Smith; 2000:181-182) and is also present in the work of scientist-philosophers such as Erwin Schroedinger and Jacques Monod.

The actual philosophical debate around the adequacy of the information paradigm in representing genetic phenomena focuses on its epistemological status (metaphor, model or description of the real state of affairs) as well as on its heuristic validity. As it is usually the case, the camp is divided by detractors, supporters and scholars assuming a somewhat intermediate position with regard to the of the notion of information in biology. The latter divides themselves in those who legitimate only some notions of the term information in connection to biology, while others consider any notion legitimate as long as it is used consistently (Godfrey-Smith 2007, Godfrey-Smith and Sterelny, 2008). These last suggestions betray a certain polysemy associated with this term. Indeed, by serving the purpose of explaining different phenomena, the term information assumes different meanings 1) the systematic correspondence between nucleotide triplets and amino acids, as well as between amino acid sequences and proteins (Crick, 1954); 2) the cybernetic phenomenon of regulatory mechanisms (Monod, 1971) 3) the teleosemantic dimension of genetic information (i.e. deriving its "semantic properties" from a history of natural selection: Shea 2007, 2012, Jablonka 2002) 4) the "transmission sense" of information, which intends to capture the transmission of genetic traits from one generation to the next (Bergstrom and Rosvall 2009, 2012).

In order to unravel this "amiable jumble" once and for all, some scholars propose to do without the notion of information and to substitute it with that of causality (Boniolo, 2008, Boniolo 2003, Wilkins forthcoming, Weber 2006). However this deflationist move poses on its turn the no less problematic question of the status of causality; furthermore, the reduction of the notion of information to that of a pre-theoretical notion of efficient cause not only obscures the vast historical and theoretical debate on causation, but also fails to consider the whole set of semantic properties intuitively associated with the notion of information and which apparently motivated its introduction in molecular biology (and presumably explains its success).

This paper draws on the notion of causation as influence, developed by David Lewis (2000) and further elaborated by Waters (2007), through the notion of "actual difference maker", as well as by Woodward (2010), by means of the concept of causal specificity. The influence account of genetic causality is based on a counterfactual analysis of causation which connects different values of the causal variable with different values of the effect variable. Thus, the diversity of proteins and amino acid sequences is accounted for in terms of "atomic" differences in the DNA sequence.

Also epigenetic phenomena, such as methilation, splicing, or even gene sharing, which are often brought into play in order to oppose the distinction between genes and environment in developmental biology, are parasitic to this mechanism in that the different proteins which they contribute to produce out of the same DNA sequence, rely on a systematic correspondence between nucleotide sequence (that of the mature RNA) and type of protein expressed. In all cases, the mechanism at the basis of cellular differentiation is grounded on the linear order of bases, which means that each base contributes to the production of a specific amino acid in virtue of the place which it occupies in the codon. This phenomenon strongly resembles the combinatorial-recursive

mechanism of verbal language and thus explains the success of the notion of information for the description of genetic mechanisms.

The final part of the paper tests the influence account through the notion of genetic error.

Asking the right question: What is information? OR What is it that you are calling information?

João Álvaro Carvalho, Departamento de Sistemas de Informação e Centro Algoritmi, Universidade do Minho, Portugal

Information is, nowadays, a pervasive term. It can be heard or read in many different contexts and in the discourse of several different scientific and technical fields.

It is sensible to admit that, in these different contexts and fields, the term might be being used to refer to different things. After all, the objects of interest of those different fields is quite disparate.

It is also sensible to expect that, within one same field, there is a consensus on defining information. This would be especially likely in fields where information is a central concept. Reality shows that there is divergence in what concerns information within one same field. Even in fields where information is a central concept as in the case of the field of information systems.

Looking into definitions of information presented in textbooks, research articles and other documents from the information systems area, it becomes clear that authors aren't referring to the same thing.

The odd thing is that this is seldom a problem. Unless someone poses the question "how do you define information?" and expects to obtain a well-formulated answer, there aren't normally communication problems. Communication seems not to be affected by the existing lack of consensus on such a central concept.

For several years I have been teaching a course on fundamentals of information systems. When time comes to address information, my first concern is to make students realize that they are using the term "information" to refer to different objects. As an attempt to keep students challenged, I set up a classroom exercise that I named the "information suitcase". This name comes from one of the versions of the exercise where I take to the classroom an actual suitcase with many different objects (another version, easier to carry, involves only images). Students are shown the objects, one at a time, and for each object they are asked whether they consider it as information. Three alternative answers are allowed: yes; no; I have doubts.

One first striking result is the difference in the figures that aggregate the answers. From respondents that considerer everything to be information to others to whom only a few objects are information.

At another level it is interesting to discuss why some particular objects are considered, or not, as information by different respondents.

Besides demonstrating that students aren't using the term information in the same way, the exercise lays the basis for exploring different uses of the term in the information systems area. These different uses of "information" are typically related to different aspects of cognition and communication processes.

The experience acquired in these classroom debates led me to avoid the question "what is information?", substituting it for "what are you calling information to?".

The preference for the second question is an indication that I was led to admit that no consensus on the use of information in the information systems field will ever be achieved…

Informational aspects of metaphors

Marek Hetmański, Marie Curie-Skłodowska University, Poland

From the general perspective of Lakoff and Johnson's cognitive theory of metaphors, I focus on Bateson's conception of metaphoric statements. I want to consider relationships between conceptual metaphors and information understood as: (1) their content, (2) being communicated by them, and (3) the quantitative measure of their cognitive value. Information and metaphors are interconnected in very different ways. Metaphors are more than merely linguistic ways of suggestive expressions or rhetoric impact, they are above all the conceptual, verbal and behavioral means by which humans conceive the world, act toward it and communicate with each other. They also reflect (e.g. as similes, allegories or analogies) the ontological relational structure of both physical and socio-cultural worlds. Through metaphoric thought and action, people gain yet another way by which they recognize informational phenomena.

I propose to analyze the metaphoric-informational entanglement by differentiating (in Bateson's meaning) between the following levels of ontological structures: (1) mapping and imaging; (2) comparing; (3) discovering; (4) conveying and communicating; (5) explaining and predicting. In all of the above cases, the informational processes emerge and depend on the cognitive and practical engagement of people. I am particularly interested in considering the last three cases where information is not merely extracted or generated but also actively discovered and creatively expanded.

As held by cognitive theory, metaphors used in scientific or political discourse discover new features of the target by ascribing to it the attributes borrowed from the source. In this way, new knowledge about the informational phenomena is revealed and discovered. The word "information" used in the informational metaphors (associated both with target and source) reveals many hidden features and latent aims of those who use them. One can also analyze and evaluate the metaphors as the messages (the news) by measuring their informational quantity according to the probabilistic account; the more sophisticated metaphor, the more information it carries. I aim to present case-studies concerning the metaphors used in the cognitive science and communication studies, which will demonstrate the value of proposed cognitive conceptualization.

Ontological Study of Information: Identity and State

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Information was defined by the author in his earlier publications in terms of the categorical opposition of the one and many, as an identification of a variety, i.e. as that which makes one of the many, either by selection of one out of the variety (many), or by a unifying structure on the variety (Schroeder 2005). These two manifestations of information, selective and structural, have dual character, as one presupposes the other, although for different, but corresponding varieties. The definition is formulated in terms of the categorical opposition which makes it possible to avoid any direct ontological commitments for the concept of information, since the reference to the category of the many leaves open the question of the mode of existence. The variety in consideration can have potential character and then the selective manifestation of information brings actual existence to its selected element, but alternatively coexisting elements of the variety may be subject of the selection. Similar ramification of ontological status can be considered for the structural manifestation. Moreover, in the earlier publications the author was using extensively the dual character of manifestations in order to describe the dynamics of information in processes such as biological evolution, feedback control mechanisms or computation (Schroeder, 2012). In this context, ontological matters become more complicated as the two different varieties are involved. The issues related to ontology of information are interesting not only for the philosophical reasons. The author provided mathematical formalism for the concept of information whose conceptual framework is based on the theory of closure spaces (Schroeder, 2011). The formalism is more general than, but similar to the existing formalisms of theoretical physics. Interpretations of the latter formalisms frequently involve epistemic concepts (e.g. measurement, observer, etc.). This, and the fact that that information is being associated with the concept of knowledge, makes the reflection on the ontological status of information and its role in epistemology one of most urgent tasks. On the other hand, it is important for further development of the theory of information formulated by the author to have a clear view of the status of the concepts involved in its interpretation. Experience gained in the foundations of quantum mechanics shows that two concepts, highly relevant for the study of information, require special attention in the context of ontological status, that of identity (in quantum mechanics related to the issue of identical particles) and of a state. The present paper is focused on these two concepts within the framework of the study of information.

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Presence and future of information space

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The paper deals with the problem of intense processing of huge amounts of information from innumerable sources, whose interpretation is clearly beyond human processing abilities. In this approach, an automatic analysis of Internet documents, its descriptions and next an extraction of appropriate data is of crucial importance for decision makers. I am presenting research and tools that I developed for analyzing big data collections: advanced search engine and tools for data extraction, which make use of knowledge domains and contextual models of analyzing and describing documents. I am also showing how the increasing of data processing tempo and limited access to information induces formation of new social groups and conflicts. Finally, I am focusing on the future scenarios connected with self-improvement AI systems. The future will be more complicated because part of the players will be super-intelligent autonomous programs. Therefore long-term future of machine intelligence and AI is related with the increase of social conflicts. Self-improvement of AI is a golden rule leading to the accelerated growth of system intelligence. Research on optimization, super-compilation and self-rewriting of programs is being conducted. The paper is also presenting my attitude towards defining self-improvement techniques in machine learning.

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The Art of Information

Carson Grubaugh, Information Artist, New York

These days, pretty much anything can be labeled as Art. Carson Grubaugh will argue that the open nature of the Fine Arts creates the perfect safe zone for those who wish to undertake intellectual projects that do not easily fit defined academic rubrics. He will then present his own work, which explores many issues in the field of information.

This session will also host other activities and presentations relating to the art project that will run throughout the conference and the artwork inspired by the conference theme through the Call for Art.

What is Information?

*Luciano Floridi (**keynote**), Research Chair in Philosophy of Information, and UNESCO Chair in Information and Computer Ethics, University of Hertfordshire;*
Faculty of Philosophy and Department of Computer Science, University of Oxford.

The information society has its scientific roots in the thirties but it became a reality only thanks to the enormous military funding available during WWII and the Cold War. Its development acquired its momentum in the seventies, when PCs started to be sold like ordinary commodities, but it finally became a macroscopic and global phenomenon only at the end of the eighties, when the Internet and then the World Wide Web transformed first computers and then other information technologies (smart phones, tablets etc.) into terminals. This explains why philosophers have just recently begun to address the new challenges that arise from the world of information. The result of their investigations has been the emergence of a new and vitally important area of research, what I defined the philosophy of information (PI). In this presentation, I shall outline what information is and explain three important transformations that are changing our understanding of the world and of ourselves: hyperhistory, enveloping the world, and the fourth revolution. I shall conclude by sketching what the philosophy of information is.

Special Issue of *Kybernetes*

Revised papers arising from the workshop may be submitted to a special issue of *Kybernetes: The international journal of cybernetics, systems and management sciences*, to appear during 2014. A full call for papers will be available at the workshop.