



**Linköping University**

**RESEARCH CONFERENCES**

ESF-LiU Conference

**Images and Visualisation:  
Imaging Technology, Truth and  
Trust**

Norrköping • Sweden  
17-21 September 2012

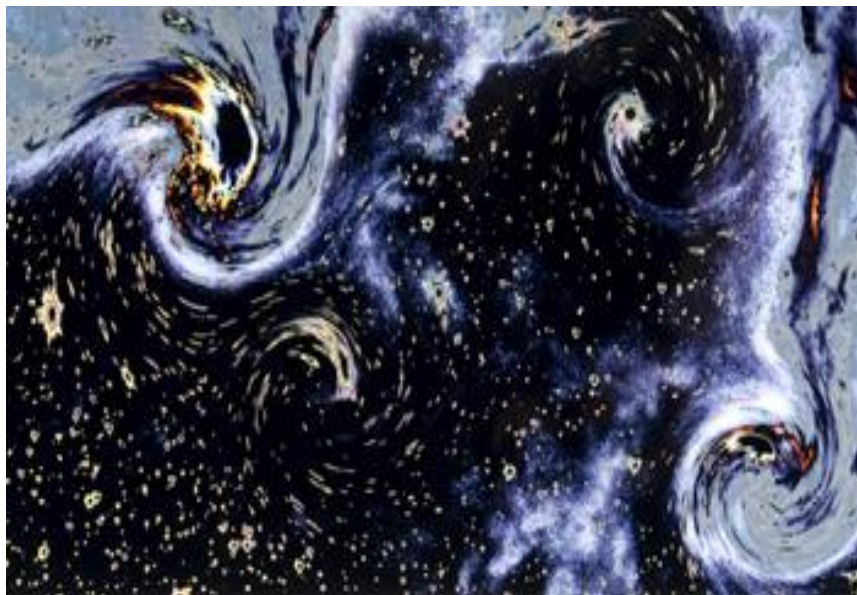
Chaired by:  
**Brigitte Nerlich**, University of Nottingham, UK  
**Andrew Balmer**, University of Manchester, UK  
**Annamaria Carusi**, University of Copenhagen, DK

[www.esf.org/conferences/12385](http://www.esf.org/conferences/12385)



With support from: UNITED KINGDOM • CHINA • MALAYSIA

**Highlights & Scientific Report**



*Image courtesy of Mette Høst*

<http://www.esf.org/conferences/12381>

**www.esf.org**



## Conference Highlights

*Please provide a brief summary of the conference and its highlights in non-specialist terms (especially for highly technical subjects) for communication and publicity purposes. (ca. 400-500 words)*

Images and visualizations are all around us, representing phenomena from the sub-atomic level to the astronomic one, tracing every move we make on this planet, from flights to academic citations and beyond. As well as images and visualizations themselves, imaging and visualization technologies are also proliferating. Paradoxically, they are becoming more and more sophisticated, while at the same time getting increasingly more easy to use by non-specialists. This leads to a proliferation of images that we can all enjoy and circulate but that are also difficult to fully appreciate and understand. We can ask where they come from, who produced them and for what purpose, but getting 'to the bottom' of the images, and the complex ways in which they are (algorithmically) produced, is quite difficult for non-specialists, in particular getting beyond the appreciation of their aesthetic beauty to a critical understanding of their meaning and function in science and society. So seeing and understanding images and visualizations in modern society is a complex issue in which trust is of the essence. This was the main topic of a keynote lecture given by Martin Kemp on the first day of the conference, which set the scene for the whole conference: 'Can we believe our eyes?' The issue of trust becomes even important with relation to modern data visualizations, as we do not only consume them passively but are overtly or covertly involved in producing them and in coordinating (in a sense, 'mapping' out) our lives according to them in various ways. Issues of trust, ethics, authority, reliability and responsibility were explored in a number of keynote lectures and small talks, from past to present and from the sub-atomic to the astronomic level. A highlight of the conference was an excursion to the University of Linköping's Visualisation Centre at Norrköping which all participants hugely enjoyed and which provided a real link between the theory and practice of imaging and visualization.



I hereby authorize ESF – and the conference partners to use the information contained in the above section on 'Conference Highlights' in their communication on the scheme.

# Scientific Report

## Executive Summary

---

(2 pages max)

The aims of this conference were to bring together scholars from the humanities, social sciences and natural sciences to examine the challenges to science and society posed by the proliferation and growing sophistication of visual images in science, to create a framework for collaborative activities and to strengthen existing scientific activities across Europe in order to enhance the role of European research in the social study of images, imaging and visualization within the international scientific community.

The objectives of the conference were to find at least some answers for the following questions or to begin debating some of the following questions:

- What is the relation between conveying accurate information and imparting aesthetic pleasure? How is it handled in various sciences and in converging sciences?
- When does 'visual enhancement' become 'visual fraud'? Are there different problems that different scientific traditions have to address in this respect?
- How do visualizations change in meaning when moving between social and cultural spaces, e.g. from the laboratory to the morning newspaper? What consequences does this have for public understanding?
- In what ways do the issues of visualisation change as the scale of the objects visualized changes? Are the ethical and aesthetical challenges posed by visualizing the nano similar to those of visualizing the galactic? How might imaging the contours of a mountain be similar to/dissimilar to imaging the functions of the brain? And what can the scientists engaged in these different imaging enterprises learn from each other?
- How can one ensure public visual trust when using images or visualisations to disseminate knowledge of scientific advances or engage lay publics with science?

The conference brought together a good mix of scholars from across Europe, as well as the United States, Canada and Israel and started a debate that has now carried over into email exchanges and discussions on academia.edu for example. Many participants were young researchers who profited from interactions with more senior researchers such as Professor Martin Kemp and Professor Maura Flannery for example. The conference also attracted participants from a wide range of disciplines such as Science and Technology Studies, sociology, anthropology, philosophy, philosophy of science, art history, physics, nanotechnology, astronomy, media studies, biomolecular imaging, and linguistics. It also included practicing artists, such as Chris Robinson from South Carolina and Mette Høst from Copenhagen. This mixture provoked sometimes heated debates especially around epistemological issues related to the production and use of images, the influence of aesthetics on trust, the impact of technology, including visualization technology on medicine and health care and the ethics of image manipulation for popular outreach. One of the main conclusions of the conference was that the issue of trust in images needs further thought, especially in a society where health and well-being, politics and democracy, public engagement with science and much more depend on the sometimes unquestioned use of imaging and visualization technologies. Many participants expressed a wish to continue collaborating amongst particular interest groups and across the community that emerged from the conference. We therefore want to continue discussions started at the conference at a conference that will take place at the University of Nottingham next year entitled 'Science in Public 2013'.

## Scientific Content of the Conference

---

(1 page min.)

- *Summary of the conference sessions focusing on the scientific highlights*
- *Assessment of the results and their potential impact on future research or applications*

Science, technology, engineering, computing and medicine increasingly employ advanced imaging technologies (from photographs and traditional x-rays to ultrasound and scanning probe microscopy) and systematic visualizations of data to help formulate hypotheses, interpret and report findings, communicate results to stakeholders and the wider public and also to make visible all kinds of activities this wider public engages in, from tracing flight paths to tracking academic citations. Advances in visual engineering provide researchers with ways to interpret, manipulate and present data within the sciences, between sciences and between science, policy and public. They allow scientists and non-scientists to visually conceptualize and make visible the unseeable, to integrate complex information, to simulate the future and much more. Use of images and visualizations has become ubiquitous in the natural sciences and is increasing in the arts, humanities and social sciences. Furthermore, visual methods have become intrinsic to addressing many of the challenges facing modern societies, from healthcare to environmental politics.

This designing (and possibly manipulation) of understanding is based on an ever-closer collaboration between the arts and the sciences, including the information sciences and visual engineering. There are two interesting twists emerging from this collaboration. Firstly, visual technology is becoming ever more sophisticated, while at the same time becoming ever more commonplace, widely available and easy to use. Secondly, visual technology helps users cope with an increasing plethora of data, while at the same time encouraging the production of a veritable avalanche of images and visualizations of varied quality and trustworthiness.

This has scientific, political, societal, ethical and aesthetic consequences, especially relating to truth and trust, as indicated in the title of this conference proposal.

The aims of this conference were to bring together scholars from the humanities, social sciences and natural sciences to examine the challenges to science and society posed by the proliferation and growing sophistication of visual images in science, to create a framework for collaborative activities and to strengthen existing scientific activities across Europe in order to enhance the role of European research in the social study of images, imaging and visualization within the international scientific community.

Some of the questions we asked our participants to explore were:

- What is the relation between conveying accurate information and imparting aesthetic pleasure? How is it handled in various sciences and in converging sciences?
- When does 'visual enhancement' become 'visual fraud'? Are there different problems that different scientific traditions have to address in this respect?
- How do visualizations change in meaning when moving between social and cultural spaces, e.g. from the laboratory to the morning newspaper? What consequences does this have for public understanding?
- In what ways do the issues of visualization change as the scale of the objects visualized changes? Are the ethical and aesthetical challenges posed by visualizing the nano similar to those of visualizing the galactic? How might imaging the contours of a mountain be similar to/dissimilar to imaging the functions of the brain? And what can the scientists engaged in these different imaging enterprises learn from each other?
- How can one ensure public visual trust when using images or visualizations to disseminate knowledge of scientific advances or engage lay publics with science?

The crucial topic of truth and trust was explored in a series of key-note lectures and short papers on the first day of the conference (18 September, 2012). Martin Kemp, an eminent art historian from the University of Oxford entitled his key-note presentation: 'Can we believe our eyes?' and explored issues of technology and trust from the Renaissance to the digital age. Anne Beaulieu from the University of Groningen covered issues of ethics in more detail and Max Liljefors from the University of Lund focused on the topic of 'responsibility'. Anandita Nag from Jawaharlal Nehru University, explored truth, trust and ethics within photojournalism in nineteenth century India, and how famine was constructed as geopolitical issue, while Gunnar Host and Gustav Bohlin from Linköping University itself explored the interaction between trust and rhetoric and Chris Robinson the interaction between beauty, art and scientific 'objectivity'. And finally, Lars Lindberg Christensen from the European Southern Observatory examined the tension between aesthetics and ethics in the use of astronomical images for outreach and public participation.

The second day (19 September, 2012) focused more on issues of epistemology relating to various modes of visualization from the time-honoured herbarium to the quantum dot. A key-note lecture by Maura Flannery from St John's University in New York provided a deeper understanding of the interaction between art and science with relation to the herbarium, from the very earliest example of the pressed plant in the 15<sup>th</sup> century to modern art work using similar techniques, via Mendel and Linnaeus, for example. This was followed by two talks on issues relating to realism, one by Aud Sissel Hoel from the Norwegian University of Science and Technology focusing on transformational realism and another by Ingeborg Reichle from the Berlin-Brandenburg Academy of Sciences and Humanities dealing with aesthetics and realism as pertaining to various modes of visualization. Of particular interest here were artistic representations for scientific uncertainty, for example. Image production and use in two scientific disciplines in particular were discussed, namely biology and physics, with a talk by Maria Jooa Grade Godinho from the University of Edinburgh on biological art images and a presentation by Philip Moriarty from the University of Nottingham on mapping and manipulating the quantum world. The academic sessions closed with a talk by Mette Høst who talked about visualization and art in physics, a talk that accompanied an exhibition of her visual art which had opened the conference on 17 September. The afternoon of the 19<sup>th</sup> of September was given over to an exciting excursion to the Visualization Centre, an appropriate venue for this conference.

The third day of the conference broadly covered issues around visualization, publics and policy, which linked back up with some topics, such as trust, discussed on the first day. This was particular the case for Annamari Carusi's (University of Copenhagen) key note lecture entitled 'Errors, lies, fictions and other (mis)representations: Why trust scientific images'. This was in a sense the core lecture of the conference as it tried to explore in detail how visibility and trust are co-produced in various scientific contexts. And whereas the second day explored aspects of images used in biology and physics, Liv Hausken (from the University of Oslo) studied the persuasive power of brain imaging and Rita Elmkvist Nilsen (from the Norwegian University of Science and Technology) the agency of brain mapping (especially with relation to brain plasticity). Homing in on more medical issues Sky Gross from Tel Aviv University analysed cultural-religious issues around images and brain death, while Jen Tarr from the London School of Economics looked at visualizing pain, especially by patients (dancers) themselves and what this pain mapping meant for them. Mapping in a more literal sense was the focus of a paper by Camilla Casonato from the Polytechnic University of Milan, focusing again on truth and trust regarding maps from mappa mundi to satellite imagery. This talk provided an in-depth understanding of the immense amount of work involved when using maps in public engagement, especially with relation to

landscape conservation. Overall mapping issues from brain images to satellite images framed discussions in the morning. Medical and mapping themes continued to be explored in more depth in the afternoon in papers by Fionagh Thomson from Newcastle University (on virtual bodies and the diagnostic gaze), Kathrin Friedrich from the Academy of Media Arts in Cologne (on grey scale in medical images), Gitte Lindvang Samsøe from Aalborg University (on the ethics of imaging technology and images in medicine, especially the issue of visual 'enskillment'), Manuela Perrotta from the Norwegian University of Science and Technology (on skilled visions in biomedical research), and Dolores and David Steinman from the University of Toronto (on truth and consequences of integrating computer simulations and medical imaging and the issue of colours in these matters). In addition to these medical themes two other topics were explored, that of scientific images and contemporary scientific practice (Vincent Israel-Jost, Université de Lorraine) and the use of Google earth and the visualization regress (John Turnbull, University of Oxford). The day closed with a discussion of the conference and forward look chaired by Brigitte Nerlich and the ESF rapporteur Adam Bzoch.

The papers at the conference covered a wide range of topics, from an even wider range of theoretical and methodological perspectives. Most papers were however framed by research within the social study of science and/or art history, the history of philosophy and the history of medicine.

There are, one can argue, various red threads that ran through these papers.

1. Images and bodies: visual representations of various aspects of human and animal bodies, from the brain to arteries and from unicorns to monsters, the epistemological challenges posed by such images, the problems they pose for public participation in science and the issues around their use in medical practice.
2. Images between bodies: issues around the use and interpretation of images between practitioners, such as radiographers and radiologists, doctors and patients, novice scientists and mature experts, scientific communities and lay communities.
3. Maps and mapping: from brain images using fMRI for example to landscapes using GIS and google maps, from the quantum level to quasars, again the issue of how these maps function within and across expert and lay communities, how they are produced and interpreted (one quote stuck out (Perrotta): 'Landscape is all that is not in the map' - so landscapes pose a challenge to 'mapping' but provide opportunities for community engagement)
4. Scales of images and issues of beauty: the issue of the aesthetic quality of images of various scales and what makes a 'good' image, who decides when it is 'good' and for whom, and in what context
5. Images and colour: this was a recurring topic, especially the issue of why grey-scale images seem to be 'better' or more trustworthy than colour images, as well as the issue of 'false' colour; a debate about this topic carried over into an lively email discussion after the conference which is still on-going
6. Images, context and co-production: this was a strong thread running through the conference, that images can only be understood, both by lay people and experts in contexts; collaborative interpretation in context should not be replaced by machines and technology; the issue of reading images and using them was also important, especially as some practitioners focus on use rather than 'reading'
7. Images and ethics: issues around truth and trust were discussed with relation to astronomical images used for public outreach and how engaging publics depends on images that attract attention, but images that are still, as far as possible, representations of astronomical phenomena 'out there' (an 'ethical' balance between beauty and truth has to

- be maintained, whatever that may be)
8. Images and epistemology: here the issue of ‘representation’ is crucial and was discussed in particular by Annamaria Carusi (and also Philip Moriarty); what is the relation between an image and reality, between an image and our knowledge of reality, especially with relation to phenomena that are by definition invisible, i.e. below the wavelength of life for example; do numbers do a better job of representing scientific ‘facts’ than (colourful) images; when does artistic interpretation enhance knowledge and when does it obscure it; have representational practices changed over time (Chiara Ambrosio) and what does this mean for our understanding of images and facts?
  9. Images and rhetoric: especially important here was Kemp’s exploration of the issue of the ‘rhetorics of irrefutable precision’ and the granting precision to uncertainty
  10. Images, authority and expertise
  11. The difference between traditionally produced ‘images’ and algorithmically produced data visualization: a less explored topic but one that is of increasing importance in modern society, and this includes trends to see open access to data (visualizations) as a panacea for democracy; the thorny issue of the sheer amount of visual data (“data bottleneck”, Krause); the issue of responsibility regarding images that are produced in ‘distributed’ ways, such as in the context of biometrics and drone warfare
  12. Images and the construction of social facts: social scientists have long discussed the so-called ‘social construction’ of science (and reality); at this conference much more concrete issues related to social construction of the self through brain imaging and social construction of famine in India for example, were discussed in detail
  13. Developing a new language to talk about images. This was a wish often expressed during the conference, but a topic that needs much further and deeper exploration.

The conference brought together a good mix of scholars from across Europe, as well as the United States, Canada and Israel. Many were young researchers who profited from interactions from with more senior research such as Professor Martin Kemp and Professor Maura Flannery for example. The conference also attracted participants from a wide range of disciplines such as Science and Technology Studies, sociology, anthropology, philosophy, philosophy of science, art history, physics, nanotechnology, astronomy, media studies, biomolecular imaging, and linguistics. It also included practicing artists, such as Chris Robinson from South Carolina and Mette Høst from Copenhagen. This mixture provoked sometimes heated debates especially around epistemological issues related to the production and use of images, the influence of aesthetics on trust, the impact of technology, including visualization technology on medicine and health care and the ethics of image manipulation for popular outreach. One of the main conclusions of the conference was that the issue of trust in images needs further thought, especially in a society where health and well-being, politics and democracy, public engagement with science and much more depend on sometimes unquestioned imaging technologies.

## Forward Look

(1 page min.)

- *Assessment of the results*
- *Contribution to the future direction of the field – identification of issues in the 5-10 years & timeframe*
- *Identification of emerging topics*

The rapporteur pointed out that the ESF is to be transformed into a new organization called ‘Science Europe’ and we are not clear yet what its remit may be.

The conference demonstrated that despite the fact that issues around images and visualizations are becoming increasingly popular, there are still many issues, especially those indicated in the



title of the conference, which need more in-depth study, especially from an inter- and cross-disciplinary perspective.

Two routes forward were identified. Firstly, participants were keen to participate in a workshop or stream of papers as part of a conference to be held at the University of Nottingham in July 2013: 'Science in Public 2013'. As Professor Nerlich will be part of the organizing team for that conference, she will ensure that this stream or workshop will be part of the conference and continue some of the work started at the ESF conference. Secondly, Dr Chris Toumey and Professor Chris Robinson from the University of South Carolina have approached the MIT journal Leonardo and will, in cooperation with the organizers of this conference, try to edit a special issue of short papers or 'transactions', selected from the papers given at the conference.

Media

<http://ing.dk/artikel/131758>

- Is there a need for a foresight-type initiative?
- 

## Atmosphere and Infrastructure

▪ *The reaction of the participants to the location and the organization, including networking, and any other relevant comments*

The majority of the participants were very pleased with the conference, the organization and the congenial and happy atmosphere that pervaded the whole event. At the end everybody knew everybody else, networks were formed, links established and many conversations were started. There were some misgivings about the location, not in terms the town itself, which was lovely, but in terms of actually getting there and the expense of getting there. There were also problems with taxi drivers who overcharged passengers and basically exploited them. This should be dealt with at the level of the town council and the ESF should also advise future participants about his possible pitfall.

The support we got from Caroline Nsenda was superb and we would like to cordially thank her for this.

---

**Date & Author:** Nottingham, 1 October, Brigitte Nerlich

---