**Project: The Landscape and Isobars of European Values in Relation to Science and New Technology (Value Isobars)**

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# Suggestions for a Value-based Governance:

# The Idea of a "European Science and Technology Value Atlas"[1]

## 1.1 The challenge for policy-makers who wants to be value informed

We believe that there should exist a forum where S&T policy makers at different levels can get reliable knowledge on values in their European context and a forum where these values can be discussed. Values have been recognised as long-term drivers for the public's responses to societal changes, at the same time values are drivers with an elusive character. Ignoring the value landscape of Europe in the early stages of research and technology development can backfire at the stage of implementation, as has been witnessed in several cases, e.g. GMO and stem cell research. However, this is not just a matter of effective policy making, but also a question of legitimate policy making. European policy makers shape the value landscape of Europe in several ways, enhancing the values of some groups and disadvantaging others, thus they need to ask themselves which values they need to take into account. Whose values? And at which stage of the policy making process?[2]

There are a few existing studies and surveys on values, including e.g. the World Values Study, the European Values Study, various Eurobarometers and national surveys.[3] There are also a number of webpages on European values although most of these are partisan. However, we see several problems for policy makers who seek to be informed by these studies in their S&T policy making. First of all, the sheer amount, the technical character and also the varying quality of these studies and surveys represent a problem for a policy maker. Secondly, few of the surveys and studies focus explicitly on values and concerns relating to new and emerging sciences and technologies. Thirdly, many of these studies, and in particular the quantitative surveys, focus on singular preferences and fail to bring out the more comprehensive value sets of the respondents in their questions and data analysis.

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[1] Corresponding authors: Silje Langvatn and Matthias Kaiser, the results reported here are the outcome of the active collaboration of all project partners in Value Isobars.

[2] This issue is discussed in further detail by WP1, see final deliverable WP 1.

[3] Compare the analysis of WP 2, see their final deliverable.

**1.2 The Value atlas proposal**

To address these kinds of problems the Value Isobars consortium has come up with the following suggestion:

- *To routinely inform the EU Commission, with DG Research in particular, members of the European Parliament, and project coordinators under FP7 or higher about the value landscape in Europe, in a way that is adjusted to the typical problems for S&T policy making. A "European S&T Value Atlas" will be suited to this task.*

The term "atlas" is used about a wide range of attempts to present information in a graphical and conceded form, including social and political cartography. We believe that complex information about values and new technologies can successfully be presented in this format, acknowledging that it will be challenging in several ways. The primary purpose of the Atlas will be to guide policy makers in the following (i) designing long term S&T policies; (ii) setting priorities and specific calls in FPs; (iii) identifying needs for engagement in public dialogue and participatory exercises; (iv) designing special formats for S&T projects in order to meet societal challenges; (v) provide guidance for identifying sensitive value dimensions in specific research areas, (vi) advice when e.g. the European Group of Ethics should discuss ethical issues in a new technology in some detail.

The proposed European S&T Value Atlas will have the advantage of providing different types of policy makers with the same information about relevant values in an accessible and non-technical form of presentation. This can provide a much needed common point of reference in discussions among policy makers at different levels and from different disciplines.

Because of the condensed way of presenting the information, the short format and the non-technical mode of presentation this policy-making tool can also be made accessible to other sectors and groups. Insofar as the scientific communities, NGOs and ordinary citizens also engage with the Atlas, it can become a policy tool that is discussed, criticized, contested and

thus improved.[4] As such the Atlas could potentially increase the transparency of the policy-making process, or at least spark debate and engagement around S&T and value issues.

**1.3 The format of the Value Atlas**

We propose thee connected ways of disseminating information through the atlas format: two-page briefings, two-page briefings gathered in an online European S&T Value Atlas, and a printed version of this European S&T Value Atlas:

### Two-page briefings

- We propose that the target group should routinely be informed by concise two-page briefings which investigates aspects of the European value landscape that has particular relevance for S&T. The briefings should present data from the relevant surveys and studies, both quantitative and qualitative.
- The findings from the surveys and studies should be presented in easily understandable graphic representations, like various types of maps, tables and charts. With the aid of experienced information designers and cartographers it is possible to present highly complex information in a striking and effective way. In addition to reducing the complexity of taking in the information, one can illustrate proportions, levels, conflicts, relations, changes and make visible division lines which can otherwise easily be ignored.
- The graphical representations should be accompanied by a short analysis of the findings, and a web-link to further background material and full references.

### Two-page briefings gathered in an online European S&T Value Atlas

- We propose a European S&T Value Atlas web-site which gathers the various two-page briefings.
- We propose that this online Atlas should cover three interrelated areas:

    1   *Values and perceptions of S&T in Europe*: This first section should contain two-page briefings present findings of central value studies and value surveys with

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[4] Our WP 3 has showed how participatory exercises can be conducted in a value-informed way. The Atlas could be used in such participatory exercises and in connection with foresight studies.

particular focus on, or relevance for S&T generally, like the European Value Survey, the World Value Survey and various Eurobarometres. This section should provide overview of historical trajectories of value changes and of value conflicts with regard to science and technology. These changes and conflicts should be analysed along different dimensions including differences between countries, different sectors (industry, wider public, policy makers) and different demographic groups. Examples of topics which should be addressed in this part include differences in technological optimism and pessimism, the regulatory regimes of various areas of S&T and the values expressed therein[5].

2 *Emerging technologies in focus*: We propose that this section should gather briefings which single out specific areas of scientific research and emerging technology, like Nanotechnology, Biometrics, GMO, synthetic biology and renewable energy research. Again the idea is to bring in studies and surveys which can highlight aspects of value changes and (potential) value conflicts surrounding these areas. Each chapter should also include a textbox with a very short definition or explanation of the technology or area of research.

3 *Values in conflict*: This section should gather briefings which look at particular types of values (religious values, economic values etc.) in relation to S&T and use surveys and studies to critically assess common assumptions about how certain types of values play out in the area of S&T, like the assumption that religious values tends to stall research in certain areas. It is not enough to depict the general value landscape to understand the reasons behind why some areas become more contested than others. One has to look at specific historical experiences, specific beliefs held by certain groups etc. We believe that such a problem driven approach underpinned by data from studies and surveys will be the most useful approach for a policy-maker.

- The European S&T Value Atlas web site should also include a) a complete list of references for each of the two-page briefings b) direct links to project sites and surveys referred to in the briefings c) discussions on the methodology and data used in the

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[5] Compare the findings of WP 4 on soft law and other forms of regulation of S&T, deliverable 3 WP 4.

various briefings. To including these elements allows the policy maker to go into further detail and critically assess the data used.

- The online version of the Atlas should be possible to use on a smart phone. One could for example make a "Value Atlas application" which allows for an easy access to the various briefings, and which can send the user notifications whenever a new briefing is available.

### A booklet version of the European S&T Value Atlas

- We propose that every 3-5 years a printed booklet version of the European S&T Value Atlas should be made available to the target groups, and also be commercially available to a wider public.

- The printed version should follow the tripartite structure of the online version, and include the most recent two page briefings on each of the topics.

- The booklet version of the Atlas has the advantage of reaching a different public than the online version of the Atlas. Whereas the individual two-page briefings have the advantage of being cheaper, more targeted and quicker to update, a printed Atlas also have important advantages. One such advantage is that a booklet "fixates" the issues for a while in a way that allows for a more prolonged discussion of them: different groups can relate to the same information and discuss it together. A printed version is also more likely to be read in its entirety than an online version. Individual briefings are more likely to be produced right before an important policy decision is being made, thus they can easily be accused of being too political or partisan. An Atlas which is regularly updated allows for more continuity, and a systematic approach instead of two-page briefings being made at a whim or depending on what is on the agenda right now.

- Regular updates also allows for documentation of longitudinal trends, which provides a better knowledge basis.

## 1.4 Production and dissemination

- It is crucial that the Value Atlas is not seen as a partisan product, or as presenting the official views of the Commission or other agencies. Thus it is important that the group

working on the Atlas has the institutional independence to carry out their work with integrity. Moreover, it is not the goal of The European S&T Value Atlas to present final results, but rather to open discussions about values and remind policy makers of perspectives and complexities while giving an overview of the data is available.

- After receiving advice from one of the editors of Le Monde Diplomatique's Globalisation Atlases,[6] we propose that producing the European S&T Value Atlas will require a core group of 5-6 people: 1 editor in chief, 1 editor/text writer, 1-2 cartographer/ information graphics designer, 1 person in charge of layout, 1 person in charge of the web-site. This group can then subcontract more designers if needed, and bring in experts in the various areas the Atlas is addressing.

- This team should aim at a systematic approach to how the Atlas cover the value landscape of Europe with regard to S&T (compare the proposed tripartite structure in 1.3 above), but the team should also keep a keen eye on emerging fields of research, emerging technologies and important changes in the European value landscape.

- Getting the two-page briefings and the Atlas to the right people at the right time is a mayor challenge. We propose that the target groups should be routinely informed by the Atlas. In addition the briefings and the whole Atlas should be used when important S&T issues come up on the decision-making agenda, in connection with the ethical assessment of projects under the FPs, and in connection with attempts to engage the broader public. DG Research and the EGE may play an important role in disseminating the Atlas to these target groups.

- The Atlas and its individual briefings can be disseminated in a very quickly and affordable way because it has an A4 format. It can be attached as a pdf- attachment to an email, and the respondent can print the pages themselves. The Atlas briefings can be reached online through the European S&T Value Atlas web site, downloaded on a smartphone, sent out as letters or bought as a booklet.

**1.5 How the Atlas should approach "values"**

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[6] We would like to express our thanks to Phillipe Rekacewicz who has helped us getting a better understanding of the practicalities of producing such an Atlas. Rekacewicz has also expressed a willingness to be of further assistance in working out this concept, this will be highly valuable since he is both an experienced political cartographer and editor.

The most challenging part of making a Value Atlas is the question of how to operationalize values: What are values as opposed to preferences? Which values should the presentation focus on? Whose values? Can we take expressed values at face value? These are no doubt difficult questions and when producing this Atlas one needs to be aware of these issues continuously.[7] However, many surveys do not differentiate between preferences and values and since the Atlas aims at bringing together and present various studies and surveys on a topic it needs to take a pluralistic approach. We make the following recommendations:

- The Atlas should attempt to have a problem driven approach starting from common assumptions about the value landscape of Europe and problematize this against available data. Smaller scale qualitative studies should be brought in to deepen the issues.

- The Atlas should communicate in particular the following in connection with the various chapters: Whether data on values is missing in an area, when only data of a partisan character is available, and whether only data from commercial actors is available.

- When producing a chapter that addresses e.g. a particular area of technology one should try to answer the following questions prior to choosing the final framing of the chapter: Who are the stakeholders or relevant sectors here? Which values do these actors see as potentially threatened by the new technology? Which values do they see as potentially enhanced? Do the various actors hold beliefs with relevance for their value judgments? Trust among the actors is always an issue, but is it based on similar values or converging beliefs?

- When possible, the Atlas should try to highlight the values of citizens not formally organized, and try to find relevant sub-categories in this undifferentiated group.

- In addition to comparisons between nations, one should look at differences between sectors and be sensitive to different demographic aspects like gender, age, political affiliation and education.

- Aim at a bottom-up approach when searching for data and assessing the data available on an issue, be conscious of not imposing a predefined understanding of what the data can show. One approach here is to first systematically go through surveys and set up a list of its variables

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[7] This points towards the need for further research on values as presented in deliverable 6.3 of this project.

- Pick up on emerging areas of research and technology development at an early stage,

**1.6 The prototype**

The consortium has worked out a prototype of the Atlas to give an impression on how the printed version of the Atlas could look like. We decided to work out one topic from the 2nd part of the Atlas ("Emerging Technologies in focus"), and one topic from the 3rd part of the Atlas "Values in conflict".  The prototype is only meant as an example of the format of the Atlas and of how studies and surveys on values in relation to S&T can be presented in this form. There may be factual mistakes in the prototypes two chapters, the first on biometrics[8] and the second on religious values,[9] and the prototype does not represent the views of the Value Isobars consortium as such. What is conveyed, however, is that surveys and studies on values can be packaged and presented in a way which is highly useful for S&T policymaking. It is on this basis that more solid justification can be provided for policy by a greater sensitivity to the complexity of the European value-landscape.[10]

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[8] This chapter of the prototype has received input from WP 5's work on biometrics.

[9] This chapter of the Atlas has received input from the work on surveys by WP 2.

[10] It goes without saying that the publication of such an Atlas would be positive for the informed opinion formation in the broader public.

# The European
# Science & Technology
# VALUE ATLAS

**A prototype produced by the Value Isobars Consortium**

This is a prototype for a proposed European Science & Technology Value Atlas. The content is meant only as an illustration and not as an expression of the views and findings of the project. **http://www.value-isobars.eu**

# THE IDEA OF
# A EUROPEAN SCIENCE & TECHNOLOGY VALUE ATLAS

Most scientific advances integrate silently into society. Under normal circumstances there is no public debate, no controversy. Moreover, even the basis for a public debate is lacking since there is no interest and no public information. In a few rare cases scientific research becomes highly controversial and creates a public interest even before it has been carried out. Human embryonic stem cell research is one such example.

*In both cases society's values are at stake*. European policy makers shaping policies on science and technology shape the more general value landscape of Europe, enhancing the values of some groups, disadvantaging others. Which values do they need to take into account in order to make legitimate policies? Whose values? When?

## THE EUROPEAN S&T VALUE ATLAS SEEKS TO:

- Bring the value dimension to the forefront of policy makers' attention.

- Gather the most significant surveys and studies on European citizens' attitudes and values relation to science and technology.

- Present complex research material on values in a visual and easily understandable form.

- Provide reliable sources for further reading.

# BIOMETRICS
## ENHANCING SECURITY, BOOSTING ECONOMY, INFRINGING PRIVACY?

**After 9/11 the US administration turned to biometrics in the hope of enhancing national security, and European governments soon followed. However, concerns are raised about the impact on privacy and civil liberties, while economic values seems to push this high-impact technology into more and more sectors of European society.**

Which values and whose values, shape the biometric future of Europe? Governments have been the major driving force in implemeting biometrics (fig 7). Enhancing national security has been the stated goal, but biometrics is increasingly valued as a sector of economic growth. Through government implementation citizens have been familiarized with biometrics and this has kickstarted a market for biometric consumer goods in addition to the supply market. This being said, several privacy authorities and courts have voiced concerns that biometric technologies may threaten citizens' civil rights and privacy. Corporate businesses, on the other hand, have embraced biometric authentication as a way to enhance secure access and to cut cost, and for European industry biometrics seems to be a fairytale with revenues sky-rocketing the last ten years (fig 8). In most European countries the majority of citizens accept the implementation of at least some forms of biometrics. Acceptance of biometrics in Europe is now approaching the levels found in the US, but remain significantly lower than e.g. India and South Africa (Riley et al. 2009). Convenience and security seem to be

**Biometrics (biometric authentication):**
Methods for uniquely recognizing humans based upon one or more intrinsic physical trait (physiological biometrics) or behavioural traits (behavioural biometrics). Used for verifying that an individual is who he claims to be (verification mode), for discovering the identity of a person (identification mode), or both.

### 1 Types of biometrics and their revenues
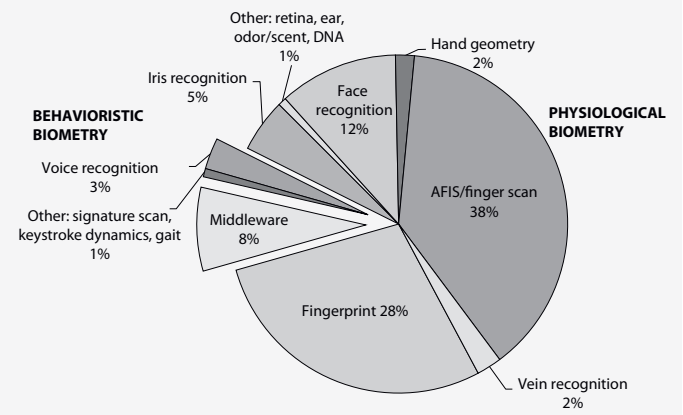


Source: Based on data from the International Biometric Group (2011)

the main rationale for citizens' acceptance. However, large groups of European citizens remain seriously concerned.

### Beyond a trade-off between security and privacy?

Although several studies have shown that increased familiarity with biometric technologies makes citizens more
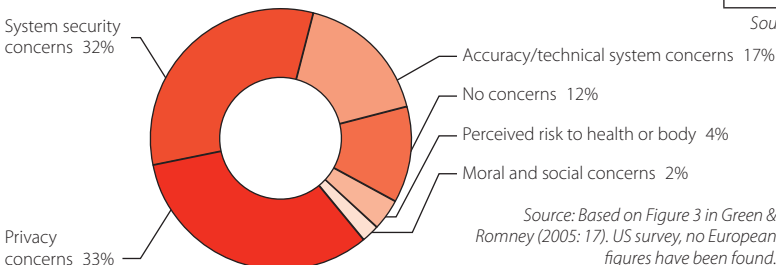
## SECURITY

### 2 Citizens' top security concerns



Individual threat concerns
# 1 Bankcard fraud
# 2 Identity theft
# 3 National security
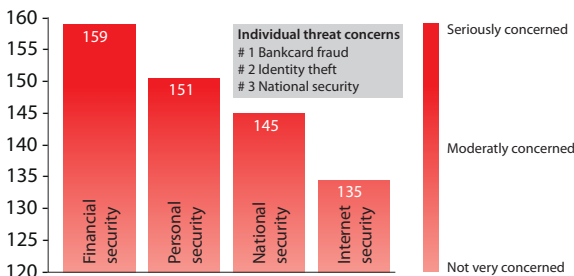
Source: Based on data from Unisys Security Index- Global Summary (2011:3)

### 3 Citizens' concerns with biometrics



System security concerns 32%
Accuracy/technical system concerns 17%
No concerns 12%
Perceived risk to health or body 4%
Moral and social concerns 2%
Privacy concerns 33%

Source: Based on Figure 3 in Green & Romney (2005: 17). US survey, no European figures have been found.

### 4 Performance and costs

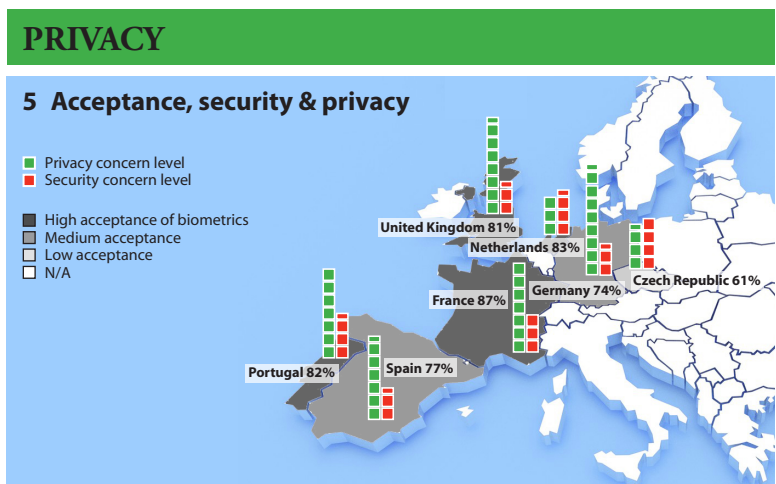| TYPE OF BIOMETRY | FACE | FINGER | IRIS | DNA |
|---|---|---|---|---|
| **UNIVERSALITY** Each has the characteristic trait | HIGH | MEDIUM | HIGH | HIGH |
| **PERFORMANCE** Stability of trait over time | LOW | HIGH | HIGH | HIGH |
| **ACCEPTABILITY** | HIGH | MEDIUM | LOW | LOW |
| **RESISTANCE TO CIRCUMVENTION** Resistance to circumvention | LOW | MEDIUM | HIGH | HIGH |
| **COSTS** | MEDIUM EXPENCES | MEDIUM EXPENCES | HIGH EXPENCES | VERY HIGH EXPENCES |

Source: Based on Table 1, Jain et al (2004:11) Cost estimates by the Value Isobars consortium.

Although AFIS/finger scan clearly dominates the biometric market, there is as of today no single biometric technology which singles itself out as the most convenient, cheap, secure and acceptable. In particular there seems to be a trade-off between security performance on the one hand and costs and user acceptability on the other hand.

accepting, many citizens with knowledge about the technology remain sceptic. The resistance has often been interpreted as a heightened concern with privacy. However, the data for Europe do not show a clear connection between high average level of privacy concern in a country and high resistance to biometrics (fig 5). A study from 2010 found that the citizens most concerned about biometrics do not perform a trade-off between security and privacy. These citizens see biometrics as privacy invading without being security enhancing. Statistical regression analyses show that a negative attitude to biometrics correlates most closely with lack of trust in the political institutions (fig 6).
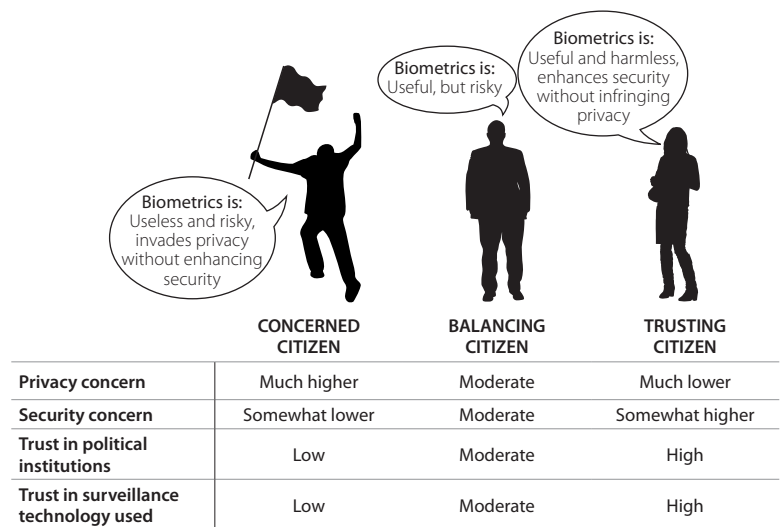
The Special Eurobarometer 359 showed that those most likely to be worried about data protection and privacy in general are middle aged, female and white-collar workers. However, some authors have commented that young Europeans are not necessarily less concerned with privacy, but understand private information as a form of social capital and as a way to get access e.g. to social networking sites (Lovejoy et al. 2009).

What are major concerns with a biometric technology like finger scanning? A US study found that privacy and system security were clearly the main concerns (fig 3). Biometrics is a technology developed to enhance security, but has itself created new security hazards. Small error rates become significant with large-scale employments. Biometrics also raises concerns about identity theft through attacks on data banks, and fear that government may be building up digital dossiers on their citizens. Loosing control over your biometric information is not like loosing a pin code, because it cannot be replaced. Thus valuing security should yield no automatic endorsement of biometric technologies. Governments often frame the implementation of biometrics as a way to enhance national security. However, European citizens worry more about financial security than personal security, and national security only comes third on this list (fig 2).

## PRIVACY

### 5 Acceptance, security & privacy



- 🟩 Privacy concern level
- 🟥 Security concern level

- ◼ High acceptance of biometrics
- ◼ Medium acceptance
- ◻ Low acceptance
- ◻ N/A

United Kingdom 81%
Netherlands 83%
Germany 74%
Czech Republic 61%
France 87%
Portugal 82%   Spain 77%

Source: Figures on acceptance level are based on Logica CMG (2006: 6), figures on privacy concern level are based on Eurobarometre 225 (2008: 72), figures on security concern level are based on Eurobarometer 225, table 16a (2008:102)

### 6 Three approaches to biometric surveillance technology



Biometrics is: Useless and risky, invades privacy without enhancing security

Biometrics is: Useful, but risky

Biometrics is: Useful and harmless, enhances security without infringing privacy

CONCERNED CITIZEN — BALANCING CITIZEN — TRUSTING CITIZEN

| | CONCERNED CITIZEN | BALANCING CITIZEN | TRUSTING CITIZEN |
|---|---|---|---|
| Privacy concern | Much higher | Moderate | Much lower |
| Security concern | Somewhat lower | Moderate | Somewhat higher |
| Trust in political institutions | Low | Moderate | High |
| Trust in surveillance technology used | Low | Moderate | High |

Source: Based on findings from Pavone et. al. 2010.

**A vague legal line?**
Feb. 2011: The EU Parliament Assembly's Committee on Legal Affairs and Human Rights presents a report stating that the legal framework for biometric data is too vague and does not protect citizens sufficiently. They call for standardisations of biometrics and supervisory bodies."

**The "creepy" line**
June 2011: Google announces that it's real time facial recognition technology will be withheld. They are afraid that this biometric technology in combination with mobile tracking "will be used against citizens".
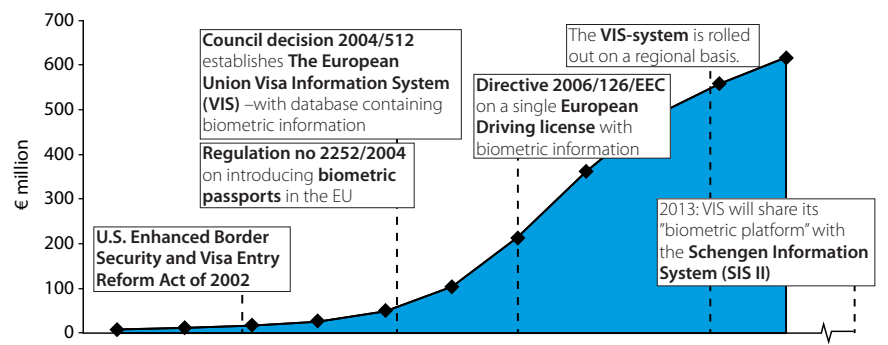
## ECONOMY

### 7 Who uses biometrics for what?

**Governments 67%**
**Civilian**:
• National ID/Passport
• Drivers license
• Border Crossing
• Welfare disbursement
**Law enforcement:**
• Corpse Identification
• Criminal Investigation
• Parenthood determination
• Missing children

**Commercial agents 34%**
• Physical access control
• Computer log-on
• Attendance control
• Mobile phone
• Consumer ID
• E-commerce
• Internet banking
• Smart Card

Source: Based on Anil, Hong & Pankanti (2000).

### 8 Government implementation and growth in biometric revenues



Council decision 2004/512 establishes **The European Union Visa Information System (VIS)** –with database containing biometric information

The **VIS-system** is rolled out on a regional basis.

Directive 2006/126/EEC on a single **European Driving license** with biometric information

**Regulation no 2252/2004** on introducing **biometric passports** in the EU

2013: VIS will share its "biometric platform" with the **Schengen Information System (SIS II)**

**U.S. Enhanced Border Security and Visa Entry Reform Act of 2002**

€ million: 700, 600, 500, 400, 300, 200, 100, 0

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2013

The Global European Market Size.

Source: Based on Market Aspects" in "Biometrics in Europe – Trend report 2006" (Unisys, 2006: 25-35, 50-1). The figure illustrates the estimated European Biometrics marked size (Unisys 2006) and the implementation of the most relevant EU laws and regulations

# RELIGIOUS VALUES
# AN OBSTACLE TO SCIENTIFIC RESEARCH IN EUROPE?

Austria is the technological pessimist nr 1 in Europe, with low support for biotechnology, GM food and nanotechnology. Is this because they are Catholics?

Religious values and arguments regularly come up in debates about science and research in Europe. Theories like biological Darwinism are regularly challenged by creationists. However, it is the life sciences which have attracted most religious controversy e.g. attempts at constructing immortality, reproductive cloning, human enhancement technologies regenerative medicine and particularly research on human embryonic stem cells (hES). What precisely are the religious values and arguments which have come up in debates about stem cell research?
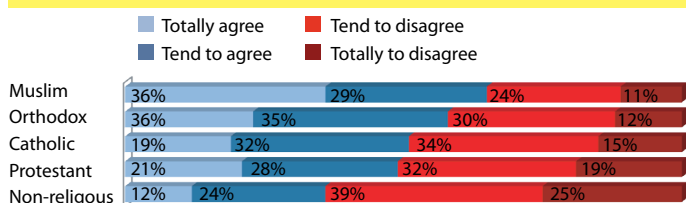
This has been suggested:

1. The sacred value of human life – duty to respect and protect human life.

2. The value of compassion, love for others – duty to prevent and alleviate human suffering.

3. The value of justice – duty to protect and promote distributive justice (Knowles 2011:1).

Religion encompasses faith, doctrines, beliefs, traditions, practices, value judgements and value practices. Most religions also have some kind of formal authority. Among the larger religions in Europe we find that Judaism and Islam have the most permissive official stance on stem cell research, whereas Orthodox and Catholic Christianity are the most restrictive. Judaism and Islam put great weight on the value of compassion and the duty to alleviate human suffering and balance the possibility of significant medical advances against the possible damage to embryos. A similar balancing seems permissible to many Protestants. Orthodox and Catholic religions do not accept this kind of utilitarian calculus, but strongly affirm the absolute sanctity of life. However, at heart is also the question of when full human life begins (fig 2).

Within each of the main denominations there are various sub-groups with differing positions. Moreover, lay religious

## 1 Human embryonic stem cell research is ethically objectionable

Legend:
- Totally agree
- Tend to agree
- Tend to disagree
- Totally to disagree

| | Totally agree | Tend to agree | Tend to disagree | Totally to disagree |
|---|---|---|---|---|
| Muslim | 36% | 29% | 24% | 11% |
| Orthodox | 36% | 35% | 30% | 12% |
| Catholic | 19% | 32% | 34% | 15% |
| Protestant | 21% | 28% | 32% | 19% |
| Non-religous | 12% | 24% | 39% | 25% |

Source: Eurobarometer 73.1 (2010)

## 2 Official religious position

**Least permissive** → **Most permissive**

### Greek Orthodox & Roman Catholic Churches

The formal authorities have come out in favour of stem cell research using adult stem cells. Research on human embryonic stem cells (hES) is condemned as immoral and illegal.

The official position is that a human person begins at conception and the human embryo has the same moral status as human persons and that sanctity of life should be affirmed at all stages of the development. Consequently, research on human embryos, including hES derivation and subsequent use is unethical, and if it involves the wilful destruction of embryos, it is homicide.

### Protestant Churches

Protestant denominations have no one voice that speaks for them. Positions vary from country to country on the moral status of the embryo and therefore, on the morality of embryo research in general.

The Anglican Church and the Protestant Church of Germany are sharply divided on the ethics of hES research. Less conservative protestant churches believe that the embryo has a potential human status, reflecting its gradual development from basic cells to a fetus.

Thus some embryo research may be allowed prior to the "primitive streak" stage (around 14th day after fertilization) The life of the embryo before that is weighed against the possible benefits of serious medical conditions which could possibly be treated.

### Islam

Among Islamic countries Iran took the lead in hES research in 2003. In Iran, Turkey, Singapore and other Islamic countries, embryo research policies are influenced by the religious belief that full human life with its attendant rights begins only after the ensoulment of the fetus. This is generally believed by Muslim scholars to take place at 120 days after conception (although a minority belief indicates ensoulment takes place 40 days after conception).

This fact, in conjunction with the importance articulated in the Quar'an of preventing human suffering and illness, means that the use of surplus in vitro fertilized embryos for stem cell research is relatively uncontroversial. What remains controversial in the Muslim world is creating embryos for the purposes of research.

### Judaism

All major Jewish denominations – including the Reform, Conservative, Orthodox and Reconstructionist movements – support both embryonic and adult stem cell research as long as it is for medical or therapeutic purposes.

Orthodox Jews believe that when the embryo is "as water" up to the fortieth day. After that time and before the fetus emerges from the woman's body it is a potential life and has great value. It gains full human status, however, only once it emerges from the woman's body.

Since embryos used in hES research are outside of the body, according to the Jewish faith it is possible to use excess embryos fertilized in vitro for research. The Jewish religion places great emphasis on preventing and alleviating suffering. This leads to a deep belief in the morality of and value in pursing medical research

Sources: Knowles (2011), Pew Forum (2008), Euro StemCell (2011)

**Catholic**
Moderate Trust in Religious Leaders
Strongly believe in God
High Religious Attendance
Prioritises science over Faith
Moderate engagement with science
Moderate support for Regenerative Medicine

**Protestant & and Non-Religious**
Low Trust in Religious Leaders
Believe in some kind of Spirit
Medium to No Religious Attendance at all
Prioritises science over Faith
High engagement with science
Most positive towards Regenerative Medicine

**Orthodox**
High Trust in Religious Leaders
Strongly believe in God
Low-Moderate Religious Attendance
Prioritises faith over Science
Moderate Engagement with Science
Lower support for Regenerative Medicine
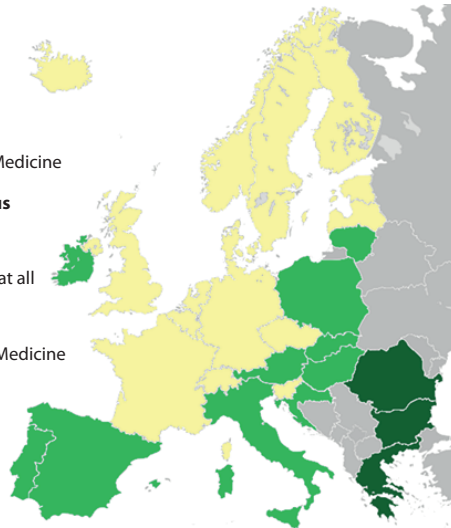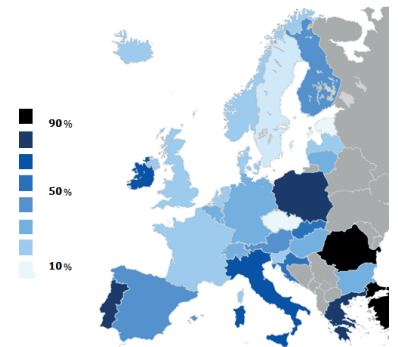
Source: Based on Eurobarometer 225 (2010)

## Online resources
European S&T Value Atlas
www.value-isobars.eu

4 Permissive and restrictive policies on human embryonic stem cell research

**Permissive:** Allows for various hESC derivation techniques, including therapeutic cloning
**Flexible:** Allows derivations from fertility clinic donations only
**Restrictive:** From prohibition, to allowing only research on imported hESC lines lines
No specific legislation or no data
Human genome sequencing centre.
● Not always hESC research.
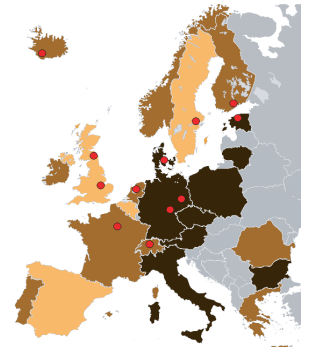
Sources: StemGen (2011), MMMNet (2011) and NordForsk (2007)

5 Percentage of persons who "believes in a God"

90%
50%
10%

Source: Special Eurobarometer 225 (2005:9)

people do not necessarily adhere to the official positions. The Special Eurobarometer 225 shows that in Europe Muslims are in fact the group least likely to see human embryonic stem cell research as ethically permissible (fig 1). This survey also found that non-religious citizens and Protestants were the most accepting, notice however, that 49% of Catholics also found it acceptable.

The cluster analysis in figure 3 shows that there is a clear pattern where countries with a majority of protestant or non-religious citizens also tend to prioritise science over faith, have a high engagement with science and a more positive view on regenerative medicine. However, figure 4 and 5 show that the level of prioritisation of science, level of religiosity and dominant religion does not clearly predict a country's policies on stem cell research. Denmark is predominantly protestant, highly secular and with a high optimism about technology, yet they have restrictive stem cell policies. Austria is not an orthodox country and does not report very high levels of beliefs in God, but it is still the most pessimistic country and has restrictive policies on stem cell research.
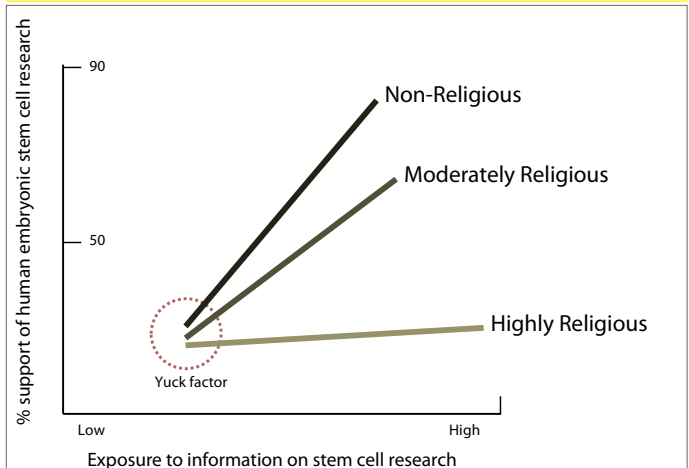
There are clear differences in attitudes between non-religious and different denominations citizens on specific questions like stem cell research. Some surveys have found that non-religious and highly religious people tend to differ in how exposure to information affects their attitudes (fig 6).

Most Europeans have a fairly high level of technological optimism – across religious differences. (EB 341, fig. 32). Some authors have concluded that *general* attitudes towards science and technology have little significance in predicting attitudes towards *specific* techno-scientific subareas (Daamen et al. 1990). One would suggest that we have to look at

*particular* historical experiences and trajectories to explain the resistance e.g. to hES. One such factor is the question of abortion, i.e. a question with a long trajectory of religious controversies, which have played out differently in various countries.

Pardo et al. (2011) argues that the strong scepticism towards biomedical research in Austria must also be understood on the basis of the brutal eugenics program of the Nazi regime. This experience has created "ripple effects" both in Austria and Germany, with a restrictive attitude spreading also to other areas of biotechnology.

6 Effect of information on support for stem cell research

% support of human embryonic stem cell research

90

Non-Religious

Moderately Religious

50

Highly Religious

Yuck factor

Low                    High
Exposure to information on stem cell research

"Yuck factor" = Repugnance felt when one first hear about research involving human embryos.
"Highly religious" = Top 25% of respondents on the index range for "strength of religious belief".
"Non-religious" = bottom 25%.

Source: Nisbet 2005

# REFERENCES

## CHAPTER ON BIOMETRY

**Figure 1 Types of biometrics and their revenues**
Source:  Based on data from the International Biometric Group (2011)


**Figure 2 Citizens' top security concerns**
Source: Based on data from Unisys Security Index- Global Summary (2011:3)

**Figure 3 Citizen's concern with biometrics**
*Source*: Based on Based on Figure 3 in Green & Romney (2005: 17). US survey, no European figures have been found.


**Figure 4 Performance and costs**
Source: Based on Table 1, Jain et al (2004:11) Cost estimates by the Value Isobars consortium.

**Figure 5 Acceptance, security and privacy**
Source: Figures on acceptance level are based on Logica CMG (2006: 6), figures on privacy concern level are based on Eurobarometre 225 (2008: 72), figures on security concern level based on Eurobarometer, 225 Table 16a (2008: 102)


**Figure 6 Three approaches to biometric surveillance technology**
Source: Based on findings from Pavone et. al. 2010.

**Figure 7 Who uses biometrics for what?**
Source: Based on  Anil, Hong & Pankanti (2000).


**Figure 8 Government implementation and growth in biometric revenues**
Source:  Based on Market Aspects" in "Biometrics in Europe – Trend report  2006" (Unisys, 2006: 25-35, 50-1). The figure illustrates the estimated European Biometrics marked size (Unisys 2006) and the implementation of the most relevant EU laws and regulations

## CHAPTER ON RELIGIOUS VALUES

**Figure 1 Human embryonic stem cell research is ethically objectionable**
Source: Eurobarometer 73.1 On the Life Sciences and Biotechnology (2010) Report: "Europeans and Biotechnology in 2010. Winds of Change?" Gaskell et al. Figure 33 (2010: 90)

**Figure 2 Official Religious Positions**
Sources: Knowles, L. (2011) "Religion and Stem Cell Research"
http://www.stemcellnetwork.ca/index.php?page=ethics (Accessed November 5, 2011) Pew Forum (2008) "Religious Groups' Official Positions on Stem Cell Research"
http://pewforum.org/Science-and-Bioethics/Religious-Groups-Official-Positions-on-Stem-Cell-Research.aspx (Accessed November 5, 2011)

**Figure 3 Cluster analysis: Importance of religion, science and support for regenerative medicine**
Sources: Eurobarometer 73.1 On the Life Sciences and Biotechnology (2010)

**Figure 4 Permissive and restrictive policies on human embryonic stem cell research**
Sources: StemGen (2011), Nordforsk (2007) & MBBNet (2011) http://stemgen.org/mapworld.cfm (Accessed November 16,2011) http://mbbnet.umn.edu/scmap.html (Accessed November 15, 2011) "Stem Cell Research in the Nordic Countries Science, Ethics, Public Debate and Law." NordForsk Policy briefs 2007-2

**Figure 5 Percentage of persons who "believe in a God"**
Sources: Special Eurobarometer 225 (2005), No. 225, p.: 9 Special Eurobarometer (2005) 225 "Social values, Science & Technology.

**Figure 6 Effect of information on support for stem cell research-Religious and Non-religious citizens**
Source: Nisbet, Matthew C. (2005) "The Competition for Worldviews: Values, Information, And Public Support For Stem Cell Research" in International Journal of Public Opinion Research. Vol.17, No.1.