SEVENTH FRAMEWORK PROGRAMME

Science in Society

5.2.1.2 Gender dimension of research – influence of the perception of science on study choices

Grant agreement for: Collaborative project

Annex I – "Description of work"

Project acronym: IRIS

Interests & Recruitment in Science

Project full title: **IRIS - Interests & Recruitment in Science:**
Factors influencing recruitment, retention and gender equity in science, technology and mathematics higher education

Grant agreement no.: 230043
Date of preparation of Annex I (latest version): November 6th, 2008
First project month: May 2009
Date of approval of Annex I by the commission (*to be completed by the commission*):

List of beneficiaries

Beneficiary Number	Beneficiary Name	Beneficiary short name	Country	Date enter project	Date exit project
1 (coordinator)	University of Oslo	UiO	Norway	1	36
2	King's College London	KCL	UK	1	36
3	University of Leeds	LEEDS	UK	1	36
4	University of Ljubljana	IRI UL	Slovenia	1	36
5	Associazione Observa	OBSERVA	Italy	1	36
6	University of Copenhagen	KU	Denmark	1	36

Contents

A 1. Budget breakdown and project summary

Budget breakdown (copy of A3.2 from GPFs)

Please note that beneficiary no 4, IRI UL, is listed as no 7 in this table. We ask the EU project officer to change this so that IRI UL will indeed be listed as beneficiary no 4, as it is in the rest of this document.

Participant number in this project [9]	Participant short name	Estimated eligible costs (whole duration of the project)					Total receipts	Requested EC contribution
		RTD / Innovation (A)	Demonstration (B)	Management (C)	Other (D)	Total A+B+C+D		
1	UiO	345,600.00	0.00	24,000.00	23,657.00	393,257.00	0.00	306,857.00
2	KCL	155,200.00	0.00	2,400.00	14,118.00	171,718.00	0.00	132,918.00
3	LEEDS	168,000.00	0.00	2,400.00	15,029.00	185,429.00	0.00	143,429.00
5	OBSERVA	144,000.00	0.00	2,400.00	17,976.00	164,376.00	0.00	128,376.00
6	KU	206,400.00	0.00	2,400.00	17,188.00	225,988.00	0.00	174,388.00
7	IRI UL	120,520.00	0.00	2,400.00	20,826.00	143,746.00	0.00	113,616.00
TOTAL		1,139,720.00	0.00	36,000.00	108,794.00	1,284,514.00	0.00	999,584.00

Project summary (copy of A 1 from the GPFs)

Project title [3]	IRIS - Interests & Recruitment in Science. Factors influencing recruitment, retention and gender equity in science, technology and mathematics higher education		
Starting date [4]	01/05/2009		
Duration in months [5]	36		
Call (part) identifier [6]	FP7-SCIENCE-IN-SOCIETY-2008-1		
Activity code(s) most relevant to your topic [7]	SiS-2008-2.1.2.1: Influence of the perception of science on study choice		
Free keywords [8]		science, technology, mathematics, recruitment, retention, study choice, gender equity, girls, interests, priorities, curricula	

Abstract [9] (max. 2000 char.)

IRIS (Interest & Recruitment in Science) addresses the challenge that few young people (women in particular) choose education and career in science, technology and mathematics (STM). Women represent the greatest recruitment potential to STM; moreover, a higher participation from women may expand the ways of thinking and working within this area and contribute to gender equity. To understand and respond to this challenge, diverse causes and cures must be sought, ranging from school experiences and youth culture via higher education STM curricula and recruitment efforts, up to research department culture, PhD choice and employment patterns. IRIS aims to contribute to understanding and improving recruitment, retention and gender equity patterns in higher STM education. 1. On what priorities, values and experiences do young people base their educational choice? - How may youth's educational choice be interpreted through sociological perspectives on late modern societies? What makes many women turn away from STM? - Which considerations determine choice of PhD research topic for female and male STM students? 2. What are the success factors for efforts aimed at recruiting more (female) students to STM? - What features of STM education, in secondary school and at university level, influence recruitment of (female) students? - What are the effects of STM recruitment initiatives? 3. In what proportions, and for what reasons, do STM students opt out of STM education? - Are there differences in opt-out-rates between countries, institutions and genders? The main instrument will be a questionnaire to be completed by first-year students. All partners will contribute to instrument development, data collection and analysis, each with a specific focus. Questionnaire data will be complemented by literature reviews and smaller quantitative and qualitative studies. Central stakeholders will be brought into the work and results will be disseminated widely.

List of beneficiaries

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1 (coordinator)	University of Oslo	UiO	Norway	1	36
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5	Associazione Observa	OBSERVA	Italy	1	36
6	University of Copenhagen	KU	Denmark	1	36

B 1. Concept and objectives, progress beyond state-of-the-art, S/T methodology and work plan

B 1.1 Concept and project objectives

1.1.1 Improving recruitment, retention and gender equity

Project IRIS (Interest & Recruitment in Science) focuses on the challenge that few young people in general, and women in particular, choose to pursue an education and career in science, technology and mathematics (STM) (EU, 2004; Jacobs & Simpkins, 2006; NSB, 2006). The overall aim of IRIS is to contribute to improvement of recruitment, retention and gender equity patterns in STM educations and careers.

The Barcelona EU summit agreed to increase the EU expenditure on R&D to three percent of GDP by 2010. To reach this goal, it is estimated in the report "Europe needs more scientists" (EU, 2004) that around 700 000 new scientists and engineers will be needed. The report further remarks that increasing the number of women entering science and engineering careers would go a long way towards helping to solve the problem (ibid). The publication "She figures 2006" (EC, 2006) suggests that "EU's research capacity will be difficult to sustain and impossible to increase according to the ambitious plans that have been set, if intellectual resources are not drawn from those with appropriate abilities and attainment on a more equitable basis than they are at present."

There are large and interesting differences between countries with respect to the proportion of students enrolled in STM studies, which subjects show the weakest recruitment, how large the recruitment problem is perceived to be, etc. Especially in technology, engineering, physics, mathematics and to some extent also chemistry, the recruitment figures are low. Furthermore, the gender differences vary from one country to another, but, in most countries, the boys outnumber the girls in physics, engineering, technology and mathematics studies, while the gender balance is shifted towards the girls in subjects like biology, medicine, veterinary medicine and environmental science.

Some highly developed countries, such as the Scandinavian, are among the "world champions" in gender equity (UNDP, 2007), but have a gender-segregated labour force and a distinctly "gendered" pattern in young people's career choices (NMCE, 2006), with few girls in physical, mathematical and engineering educations and occupations. The FP7 Capacities Work Programme for Science in Society (EU, 2007) states that "the pursuit of scientific knowledge and its technical application towards society requires the talent, perspectives and insight that an increasing diversity in the research workforce will ensure. Therefore, a balanced representation of women and men at all levels in research projects is encouraged".

The issue of recruiting more women to education and careers in STM is one of quantity as well as quality: of quantity, because women represent the greatest recruitment potential; and of quality, because a higher participation from women in STM may expand the scope and ways of thinking, prioritizing and working within this area and contribute to gender equity. Schiebinger (2008) provides examples of how taking gender into account has yielded new research results and sparked creativity, opening new avenues for future research. In order to create a sustainable and knowledge-based economy in an equitable society, expertise in science and technology is needed, and the participation of both women and men is desirable.

There has been growing concern at European Union (EU) level about the under-representation of women in scientific careers, representing a considerable deficit of women's skills and knowledge (HGWS, 2002). This has prompted significant and concerted action at a trans-national level. The European Commission adopted a Communication in February 1999 setting out an action plan to promote gender equity in science (EC, 1999). Participative equity is also emphasised as an important feature of the European Higher Education Area of the Bologna Process.

1.1.2 Aims of project IRIS

In order to understand and respond to the complex challenge of recruiting more young people to STM careers and making use of and giving opportunities to both women and men, a range of issues need to be addressed. Diverse causes and cures have to be sought, ranging from school science experiences and youth culture, via higher education STM curricula and recruitment efforts, up to research department culture, PhD study choice and employment patterns.

Project IRIS aims to integrate these perspectives. In doing so, we will draw on official statistics on recruitment and participation of women and men in STM, as well as theoretical perspectives and previous analyses from fields such as science education, feminist and gender studies, sociological studies of youth culture and identity formation, models of educational choice, career guidance, and more. We will also collect quantitative and qualitative data from countries in the IRIS consortium, and we will invite the IRIS associated partner countries to use our instruments and contribute with their national data, allowing for international comparisons.

> *The objective of the IRIS project is to develop more knowledge and recommendations informed by evidence on how young people, and girls in particular, may be attracted to, and retained in, STM higher education.*

We use the abbreviation *STM*, but we do not limit ourselves to a narrow definition of the science domain. For example, recruitment patterns in engineering educations and careers should be seen as included in this study. In an academic context, mathematics education and science and technology education appear as to distinctive fields of research. The centre of gravity in IRIS will be in science and technology education, but we wish to do research on recruitment patterns in mathematics studies as well. Furthermore, the focus of IRIS is on disciplines that are challenged by low recruitment and low female participation, but for comparison, we will in many instances include perspectives and figures for subject areas that are doing better in recruiting candidates in general and girls in particular, such as medicine and biology.

Through IRIS we aim to stimulate informed discussions, and give suggestions and advice to policymakers and stakeholders concerning recruitment and retention of more young people (notably young women) to STM educations and careers at university level an in a European context, with special attention to the Bologna process.

More specifically, the project will address the following research questions:

1. What are the priorities, considerations, values and experiences on which young people base their educational choice?
   a. How may young people's educational priorities be interpreted through sociological perspectives on late modern societies? In particular; what makes many women turn away from STM, and how do these women differ in their considerations from women who DO choose STM?
   b. What are the priorities and considerations that determine the choice of research topic at PhD level for female and male STM students, respectively?

2. What are the success factors for initiatives and efforts aimed at recruiting more young people (women in particular) to higher STM education?
   a. What features of STM curriculum contents and contexts and teaching/learning strategies, in secondary school and at university level, influence recruitment and retention of young people in general and women in particular? For instance; is a curriculum with focus on applications and societal impacts of STM more attractive to women than a "pure science" or more instrumental focus, and are approaches like social or societal-oriented problem-solving and problem-based learning in groups more attractive to women than the more traditional teaching approaches in academic STM?
   b. What are the effects of career guidance and of STM recruitment initiatives from universities, business, organisations and official authorities?

3. In what proportions, and for what reasons, do STM students decide to leave their education before graduation?
   a. Are there differences in drop-out/opt-out-rates between countries, institutions, educational programs and genders?
   b. What considerations underlie students' decision to leave STM education?
   c. What are the success factors for initiatives and efforts aimed at retaining more students (female students in particular) in higher STM education?

The questions will be answered through data gathering and analysis in the five IRIS consortium countries, as well as in other countries (we have received letters from partners in more than 30 countries affirming their intention to use the IRIS instrument and contribute with data from their respective countries).

The main instrument will be a questionnaire (from now called the IRIS Q) to be completed by STM students (and some non-STM students, for comparison) towards the end of the first year of higher education. All partners in the IRIS consortium will contribute to instrument development and data analysis, each partner with a specific focus, as appears from this project description and the work packages.

For instrument development and data collection, project IRIS builds on the experiences, results and the international researcher network from the project ROSE: The Relevance of Science Education[1]. During 2003-2006, ROSE collected data from more than 40 000 15-year-old students in more than 40 countries regarding young people's interest, attitudes, values and plans related to science and technology. In addition to the experience

[1] www.ils.uio.no/english/rose

from ROSE, the Norwegian IRIS partner has, through the project *Vilje-con-valg*[2]*: Young people's choice to study, or not to study, mathematics, science and technology,* collected survey data on young people's educational choices among first-year STM students in August-September 2008. This survey will serve as a pilot to the IRIS data collection. Questionnaire items are trialled, and those that appear to give valid and reliable measures and interesting results are candidates to use in the IRIS Q to be developed. Also, experiences with sampling, implementation of data collection and coding from the national project are potentially valuable inputs to the discussion in the IRIS consortium. The Vilje-con-valg project has a separate budget from IRIS and employs two PhD candidates. Experiences from this project, as well as from ROSE, may contribute to enhancing the quality of the IRIS study. Also, a Danish and a Turkish version of Vilje-con-valg, for which separate private and/or public funding is being negotiated at the moment, is planned for August 2009. There will be no competition for resources between IRIS and Vilje-con-valg; on the contrary, the IRIS project is expected to gain from the ground-work that is being done in Vilje-con-valg in 2008. The Vilje-con-valg research questions are related, but narrower in scope than the IRIS questions. Moreover, the Vilje-con-valg questionnaire is administered in the beginning of the academic year and covers mainly influence factors on educational choice, whereas the IRIS Q is planned towards the end of the academic year and will also cover students' experiences with the study situation and teaching-learning approaches, their interests and self efficacy, equity questions and more.

The project aims to draw relevant stakeholders such as education and research authorities, educational institutions, organisations and research communities into the work and to provide research-based advice on improving recruitment, retention and equity in STM at university level.

A comprehensive summary report will describe and integrate results from all subsections of the study and report on similarities and differences between genders and countries that may shed light on the issue of recruitment to STM education in Europe and elsewhere. The results and the perspectives will be disseminated to policymakers as described in section B3, Potential impact.

B 1.2 Progress beyond the state-of-the-art

For each heading in this section, we will outline the state-of-the-art in the areas which the IRIS research questions relate to, the "baseline" form which IRIS research starts, and the research indicators that IRIS aims to produce. In the final paragraph, we will sum up the advance that the IRIS project is expected to bring about.

B 1.2.1 Young people's priorities and choices related to STM education

There exist "models" and frameworks for studying educational choice (see for instance Adamuti-Trace (2008) and Eccles (2007)); however, there is no one comprehensive theoretical framework with the capacity to give a complete understanding of girls' and boys' educational choice and the reason for why they choose study, or not to study, STM. The

[2] The title is a Norwegian pun that could be translated to Will'n'choice. It relates to what young people *want* – and what they *choose*. Furthermore, the Norwegian name gives associations of a flower (Lily of the valley) since the project is a follow-up of the ROSE project. www.naturfagsenteret.no/vilje-con-valg

perspectives described in the following paragraphs have all been invoked in attempts to describe educational choice.

Educational choices, identity symbols and late-modern youth culture

Schreiner & Sjøberg (2007), arguing from a sociological perspective on youth in late-modern societies, point to the pre-eminence that contemporary society gives to the individual and claim that modern youth evaluate education against how it may contribute to their self-development. Young people in late-modern societies feel culturally liberated; they are free to choose their own values and social identity. (Beck & Beck-Gernsheim, 2002; Ziehe & Stubenrauch, 1993). Illeris et al argue that the traditional question 'What do you want to be when you grow up?' today addresses a more far-reaching issue than before: '*Who* do you want to be when you grow up?' (Illeris, Katznelson, Simonsen, & Ulriksen, 2002). Youth studies describing different late modern youth sub-cultures refer to specific girls' and boys' cultures (Lyng, 2004; Schreiner, 2006). Warrington and Younger (2000) point out that mathematics and science subjects are socially constructed as masculine – it is therefore conceivable that STM studies are conceived as boys' cultures and tend to alienate girls. The idea of STM studies that young people get through peers, family, mass media, leisure-time activities, and the advertising material from educational institutions, is held up against their priorities and aspirations, and if it does not appear to meet their image of who they want to be, they will choose not to pursue an education and career in STM.

IRIS will investigate how these aspects of late modern youth culture – a culture which may be less pronounced in some societies than in others – come into play in youth's educational choices in a range of countries. We will point to some implications of youth's priorities and identity building in late-modern societies for STM recruitment, and we will stimulate discussions in relevant fora on how to use this understanding in recruitment and retentions efforts.

Interests, self-confidence and abilities

A number of studies conclude that when young people explain their reasons for their educational choice, they emphasise *personal interest* (Angell, Henriksen, & Isnes, 2003; Lindahl, 2003; Ramberg, 2006; Sjödin, 2001). A number of interest studies in science education shows that girls' and boys' interests are *different* (Cerini, Murray, & Reiss, 2003; Kjærnsli & Lie, 2000; Osborne & Collins, 2000, 2001; Scantlebury & Baker, 2007; Schreiner, 2006). On a general level, girls are more interested in issues to do with human health and well-being, whereas boys are more interested in things to do with e.g. technology and physics. One's perception of one's own abilities and qualifications is reported as important for educational choice. While girls in general outperform boys in many school subjects, boys do better than girls in a number of STM subjects, and girls express less self-confidence in such subjects (Kjærnsli, Lie, Olsen, & Roe, 2007). Haüssler & Hoffman (2000) found for German pupils that boys' physics-related self concept was higher than their general school-related self concept, whereas the opposite was true for girls. Bandura et al (2001) pointed to young people's self-efficacy beliefs as shapers of educational aspirations and career trajectories.

Interests and self-efficacy are also important components of educational choice models such as that of Eccles (2007). IRIS will collect comprehensive data from large youth samples in a range of countries, allowing for in-depth analyses of how these factors

influence choice for different sub-groups of students – again enabling targeted recruitment efforts to be constructed.

Women's STM research topics

Women are under-represented in research generally, and in physical, mathematical and engineering occupations specifically, and women have a lower chance than men of reaching senior levels in R&D (EC, 2006). The mechanisms behind these patterns are not sufficiently understood. Explanations vary from discrimination of women and "glass ceiling" effects, to implications of gender differences in household and family obligations, and to modern men and women making deliberate different choices due to different values and life priorities (Støren & Arnesen, 2003).

As we have seen, women have other interests and make other priorities than men. IRIS will study how such gender-based differences in preferences affect the choice of study field made by male and female students at PhD level. What topics do female PhD students in STM choose to do research on? What drives women to choose certain STM topics? We do not, as yet, know of much research on this particular topic, but the questions will be investigated through different theoretical perspectives and from empirical analysis of educational statistics and figures and through data collection within IRIS. A better understanding of the priorities of women who are already under way on the "STM track" will enable us to identify factors that contribute to retaining women in STM.

B 1.2.2 Success factors for STM recruitment

May the influence of the various factors, as described above, be modified through goal-directed recruitment efforts and career guidance? Recruitment efforts of various kinds have been launched by ministries, educational authorities, individual institutions, business and organisations in a number of countries. The various initiatives may be sorted along a continuum from (on one end of the scale) those that aim to recruit more students to existing programs, to (on the other end of the scale) those that involve changing the contents, contexts and teaching/learning approaches in order to attract more students in general and women in particular. We will look at all types of projects and initiatives in more detail.

STM curriculum contents and contexts

As indicated above, the interests of girls differ from those of boys. How are these interest patterns matched by the actual *content* of STM curricula and by the choice of examples, emphases and points of departure – or in short, the *context* in which the curricular topics are presented? Can the low interest for STM education, particularly among women, be partly explained by the "wrapping" in which the STM subjects are delivered in undergraduate STM courses?

There are indications that female STM students prefer to pursue more applied directions, for instance, linked to environmental issues (Schreiner & Sjøberg, 2003; Wistedt, 2001). Also, women, to a greater extent than men, emphasise context and connectedness in the presentation of teaching/learning material (Angell, Guttersrud, Henriksen, & Isnes, 2004; Osborne & Collins, 2001; Stadler, Duit, & Benke, 2000; Wistedt, 2001). IRIS will study how these preferences match the everyday reality that women meet as STM students.

Wistedt (2001) claimed that there is a need for radical experiment with the *contents* of STM educational programs, rather than recruitment campaigns to convince female students to enter existing programs. In 2006, the science curriculum for 14-16 year olds in England underwent radical reform (Qualifications & Curriculum Authority, 2005). The revised courses have a stronger focus on teaching about the nature of science and the broader social impacts of science in society; issues likely to be attractive to many women. The presence of science courses with an applied/vocational flavour has also been enhanced. This wider range of available science courses means that students are making choices about the particular context of science courses followed at age 14-16.

By taking advantage of the present situation in England, valuable insights may be gained when combined with an overview of girls' and boys' experiences and preferences within school science in a range of countries This part of IRIS is expected to yield concrete advice on how to design STM curriculum contents and contexts so as to match students' interests and learning styles, thereby contributing to better long-term recruitment and retention of STM students on all levels.

Teaching/learning strategies

Not only the science content and contexts, but also the teaching and learning approaches have an effect on young people's engagement with STM. During the last decades, much has been written about socio-cultural learning theory and the importance of language and social interaction for learning; see for instance Mortimer and Scott (2003). Also, a range of teaching/learning approaches for different school and university levels have been suggested and trialled (Kornov, Johannsen, & Moesby, 2007); (Novak, Gavrin, Christian, & Patterson, 1999) (Linn, Clark, & Slotta, 2003; Mork & Jorde, 2004). However, despite these efforts, there is evidence that school science is in most cases still dominated traditional content knowledge and "transmissive" teaching (Angell et al., 2004; Carlone, 2003; Osborne & Collins, 2001). Stokking (2000) found that physics students in the Netherlands wanted a stronger orientation of physics towards everyday life, and teaching methods that supported active participation. Labudde et al. (2000) suggested that exactly these factors would be effective for improving girls' experience of (and therefore choice of) physics. Wistedt (2001) found that Swedish university technology programmes that succeeded in recruiting and keeping female students were characterised by cooperation-based and problem-oriented methods and by rich opportunities for interaction between students and between students and staff.

IRIS will, through questionnaire and other data, be able to identify and characterise a range of teaching and learning situations that students meet and to study the reception of the various approaches by different subgroups (notably: male and female) of students. From this, we will be able to make recommendations about teaching/learning strategies that meet the needs of different sub-groups of students. A closer match between students learning needs and what they meet in STM departments will in turn be expected to increase recruitment and retention in tertiary STM education. IRIS aims to develop guidelines and trigger discussions in relevant fora concerning how to implement fruitful teaching/learning strategies in STM programs.

STM recruitment initiatives

As a response to the low and gender-imbalanced recruitment to STM, a number of nations, institutions, private trusts and educational authorities have launched particular recruitment efforts; see for instance

- www.sciencelearningcentres.org.uk
- www.helsinki.fi/luma
- www.cienciaviva.pt
  www.regjeringen.no/nb/dep/kd/dok/rapporter_planer/planer/2006/Et-felles-loft-for-realfagene
- www.science.ie
- www.discover-science.ie
- http://www.jet-net.nl/

Also, career guidance personnel in educational institutions have the potential to impact on young people's choice of STM education. There is evidence that student course choices in relation to science are based partly on occupational images of working scientists (Cleaves, 2005).The report from the High Level Group on Increasing Human Resources for Science and Technology in Europe identified the significance of careers education for science/technology recruitment, concluding that "industry and the profession are not selling careers in SET in the most attractive fashion, which is certainly an area for future attention" (EU, 2004).

IRIS aims, through questionnaire and possibly qualitative investigations, to study the possible effects of recruitment efforts and guidance that students have been exposed to, in order to identify success factors of such campaigns and to make them better suited to the various target populations in the future. Having identified such success factors, we can make concrete recommendations to stakeholders about future recruitment initiatives.

B 1.2.3 Dropping/opting out of STM education

The term "dropout" is commonly used for describing the phenomenon of students quitting their study before they pass the final examination, and the loss of students in the passage from STM studies to careers is often described as a "leaky pipeline" (Jacobs & Simpkins, 2006), with particularly women leaking out at every point. It is, however, questioned whether these are adequate terms. It gives associations to students passively falling out of the system, while there are obviously many students that make a deliberate and well-considered choice – they *opt out*, rather than drop out, of STM.

According to statistics from the OECD, one-third of students in OECD countries drop out of their study in all subjects before they complete their first degree, regardless of whether they are following university level or advanced programmes (OECD Background report, 2006). The OECD numbers hide variations between countries, and between fields of study.

Educational, social as well as individual factors are important when reasons for dropping or opting out of STM higher educations are to be understood (Osborne & Dillon, 2008).

IRIS aims to bring in all these three factors to understand why some girls and boys, respectively, are opting out of their STM studies, and to describe different patterns in different countries and in different STM disciplines. Furthermore, IRIS aims to identify success-factors for student retention in STM studies, allowing the construction of recommendations to educational institutions.

B 1.2.4 Summing up the expected contribution of IRIS

As described above, the aim of IRIS is to obtain *policy- and practice-relevant understanding* of why young people, and young women in particular, opt away from STM education in Europe and elsewhere. With basis in the current state of understanding of these issues outlined in the paragraphs above, IRIS particularly expects to bring forth new understanding of:

- How youth culture and identity formation impact on educational choices related to STM education and career for different student sub-groups in different societies
- How interests and self efficacy interact with other factors influencing educational choice for different student sub-groups (notably girls and boys)
- How (gender-based) differences in interests and priorities are related to choice of research field within STM and how institutions may work to extend the range of research fields that female STM students feel will match their interests, priorities and talents and extend the fields considered relevant in specific disciplines.
- How STM curriculum contents, contexts and teaching/learning approaches, on school as well as university level, influence educational choice and how these may be designed so as to accommodate the interests, priorities and learning styles of different student subgroups, notably girls and boys
- What the success factors are for recruitment initiatives to be effective for recruiting and retaining different subgroups of students, notably girls and boys
- Why some students opt out of STM education and careers at different stages and how the choice to leave STM is related to the factors described in the points above
- How knowledge as described in the points above may be utilised in practice for constructing efficient recruitment and retention efforts of various kinds, targeted to the desired groups of (potential) STM students

In addition to assembling and disseminating information and advice to relevant stakeholders concerning the bullet points above, IRIS aims to contribute to the theoretical understanding of educational and career choice and STM education.

In addition to the IRIS consortium, we have received letters of intent from colleagues in a number of nations who intend to find the means to administer the IRIS Q in their respective countries. The network of associated partners is expected to give IRIS a unique opportunity to collect and analyse comparable data from youth a range of different socieities, which we believe will be a valuable addition to our understanding within this field. Throughout the project, a gender equity perspective will be adopted, to shed light on which experiences and considerations are of particular importance for young women's educational and career choices. In addition, the data collection in five different European and a number of non-European countries will enable us to identify similarities and differences in recruitment and retention patterns between different societies and cultures. This is a key issue if the Lisbon Agenda is to be achieved. We need to know to what extent the problem is similar in European countries or if there are differences and, if so, what might contribute to those differences.

A key feature of the IRIS project is its comprehensiveness – in terms of age groups (from upper secondary school through PhD), subjects (natural sciences, mathematics, engineering, technology and non-STM (“control”) subjects), scientific research fields (interests, priorities, drop-out, recruitment initiatives, etc.), and nations and cultures.

The aim of IRIS is an integrated understanding of the influence factors and priorities that students (notably girls) make from school age through undergraduate studies to PhD level and beyond. The expected contribution of the IRIS project is to gain a broader in-depth and integrated understanding of how the various factors described in the previous section interact in the decision-making process of young people choosing higher education. We will contribute both to the theoretical framework in the field, for instance by developing further the model of Eccles (2007) or similar models (Bandura et al., 2001), and to gather substantial empirical data from students in a range of higher STM educations (and a few non-STM educations for comparison) in several countries. Getting an overview of similarities and differences in the nature of the STM recruitment challenge in different countries is expected to be valuable in choosing measures to reach the goals for STM recruitment (EU, 2004).

B 1.3 S/T methodology and associated work plan

In this section, we will present a detailed work plan, broken down into seven work packages (WPs). Each WP will be described in more detail in under the following headings, while this first paragraph outlines the overall ideas of the WPs and the project structure.

B 1.3.1 Overall strategy and general description

Figure 1 illustrates the overall idea of the WPs, and how these are connected and feed perspectives and empirical data into each other. WP1 and WP7 are placed outside the area of the theoretical and empirical development that will be accomplished through project IRIS, since WP1 is purely administrative, and represents the consortium management and the economy and progress reporting to the EU Commision, while WP7 represents the IRIS dissemination and the assessment of progress and results (read more about WP1 and management in section B 2.1, and WP7 and dissemination in section B 3).

WP2-WP6 represent the IRIS development of new knowledge and insight:

- WP2 sets the scene, kicks the project off, coordinates the IRIS Q development and survey and sums the project up. This is the largest WP, and it is in many ways an "umbrella" for the other WPs. WP3-WP6 feed perspectives from the respective literature reviews into the IRIS Q development process in WP2, and will in turn receive IRIS Q data from WP2. A major outcome of WP2 will be a IRIS report/book integrating all the research perspectives in a comprehensive account of the literature reviews, theoretical perspectives, empirical findings and guidelines and recommendations for stakeholders.
- WP3 also functions as an IRIS umbrella in the sense that it provides a gender equity perspective to be employed throughout the project. It will ensure gender sensitivity and awareness in the topics addressed by the project, in the data collected, as well as in the interpretations of the findings from the other WPs.
- WP4 will study social and educational features influencing educational choice at undergraduate level and the topic choice among women in research (at PhD level). The keywords of this WP is *priorities and choices*: How do young people, and young women in particular, see themselves, their surroundings and the future, and how do such views and values influence their study choice in general and an STM choice in particular?

- WP5 looks at how recruitment to STM (of women in particular) may be improved through different types of measures, both in the educational context (through different STM curricula contents, context, teaching methods, etc.) and in recruitment initiatives run by governments, educational institutions, business and industry.
- WP6 will study reasons for dropping or opting out of STM higher education and how these relate to factors described in the other WPs such as gender, priorities and interests, recruitment/retention efforts, etc.

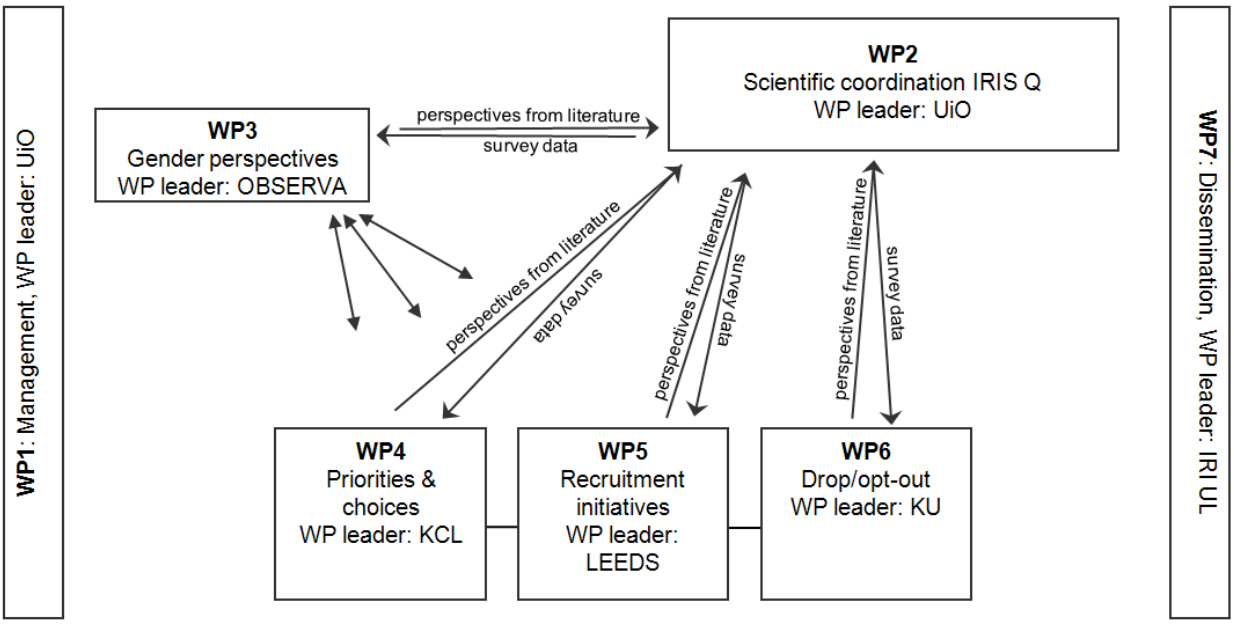

Figure 1. Model of the interrelationships between the WPs.

In order to deepen our understanding of various issues addressed in the IRIS research questions, IRIS Q data will be complemented by smaller-scale quantitative and qualitative studies in WP3-WP6. Towards the end of the project period, WP2-WP6 will sum up results and develop recommendations and guidelines for policymakers and stakeholders, and contribute in a report/book that WP2 will compile. WP7 represents the dissemination of these project outcomes (section B3).

Collecting high-quality data from the IRIS Q in all consortium countries (as well as associated partner countries) is one of the major challenges in the project and entails developing a valid and reliable instrument (the IRIS Q), adopting good sampling procedures, achieving high response rates, developing procedures for coding and analysis, and more. A significant risk in the project is that data from some countries may be of low quality in one of the respects mentioned above. The consortium will aim to diminish such problems by developing exact sampling and coding guides, and piloting the IRIS-Q in all countries. These tasks will be among the most important in the first phase of the project and will involve frequent discussions through electronic channels as well as consortium body meetings. Also, unexpected issues of scientific and/or administrative nature will undoubtedly arise as the work progresses. The consortium body, consisting representative(s) from all partners and all work packages, will be called upon to resolve such issues as soon as the issues arise.

A second risk is disagreements among consortium partners about the project, and /or partners who are for some reason unable to fulfil their obligations as stated in this

document. Problems of that kind will be dealt with in the consortium body, where all partners are committed to the contract as well as to finding solutions so as to facilitate an overall good quality of the work produced. The consortium agreement will also be instrumental in resolving any conflicts that might arise between partners.

B 1.3.2 Timing of the work packages and their components

The shadings in Figure 2 show the timing of the different activities and work in the WPs. IRIS is designed to run for a three-year period.

Activity	Activity location							Project month no. (through the three-year project period)																																					
	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Consortium management	x							■	■				■						■					■	■						■											■	■
IRIS consortium body meetings		x							■						■										■												■						
Literature review		x	x	x	x	x				■	■	■	■	■	■																												
IRIS Q development		x	x	x	x	x						■	■	■	■	■																											
Translation and preparation of IRIS Q data collection		x											■	■	■	■	■																										
IRIS Q data collection		x																■	■																								
IRIS Q data coding		x																		■	■	■																					
Processing the IRIS Q International data file		x																					■	■																			
IRIS Q data analysis		x	x	x	x	x																			■	■	■	■	■	■	■	■	■	■	■	■	■	■					
Qualitative study of "female biographies"			x										■	■	■																												
Register data review			x								■	■	■	■	■																												
Focus group study of priorities				x																						■	■	■	■														
Case study of recruitment initiatives					x							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■								
Quantitative dropout study						x															■	■	■	■	■	■	■																
Write report/book contributions		x	x	x	x	x																										■	■	■	■	■	■	■	■				
Develop recommendations and guidelines		x	x	x	x	x	x																										■	■	■	■	■	■	■	■	■		
Compile a IRIS book		x																																		■	■	■	■	■	■	■	
International dissemination seminars and conferences							x							■												■									■								■

Figure 2. Timing of the IRIS activities. The shading indicates the months in which the different activities will take place. The figure also indicates the WP(s) involved

B 1.3.3 Work package list /overview

Table 1.3a shows a summary of the IRIS WPs. The WPs are described in section B 1.3.5.

Work package	Work package title	Type of activity	Lead beneficiary	Person-months	Start month	End month
WP1	Management	MGT	1 UiO	7	1	36
WP2	Scientific coordination	RTD	1 UiO	34	1	35
WP3	Gender perspectives	RTD	5 OBSERVA	20	3	34
WP4	Priorities and choices	RTD	2 KCL	21,5	3	34
WP5	Recruitment initiatives	RTD	3 LEEDS	22	3	34
WP6	Dropout/opt-out	RTD	6 KU	16,5	3	34
WP7	Dissemination	RTD/OTHER	4 IRI UL	21	6	36
	TOTAL			142		

Table 1.3a: Work package list. Type of activity: MGT = Management of the consortium, RTD = Research and technological development, OTHER = Other specific activities

B 1.3.4 Deliverables list

Table 1.3b shows the IRIS deliverable list. The deliverables are described in more detail in section B 1.3.5.

Del. no.	Deliverable name	WP no.	Lead bene-ficiary	*Estimated indicative person months*	Nature	Dissemi-nation level	Delivery date
1.1	Minutes of kick-off meeting	1	UiO	2	R	RE	2
1.2	Minutes of 2nd consortium meeting	1	UiO	1,5	R	RE	8
1.3	Minutes of 3rd consortium meeting	1	UiO	1,5	R	RE	18
1.4	Minutes of 4th consortium meeting	1	UiO	2	R	RE	30
2.1	IRIS Q master	2	UiO	8	O	PU	9
2.2	Handbook with guidelines for IRIS Q translation, sampling and data collection and coding	2	UiO	2	O	PU	10
2.3	IRIS Q translated versions			2			11
2.4	IRIS report/book	2	UiO	22	R	PU	35
3.1	Extract of literature review for IRIS purposes	3	OBS - ERVA	2,5	R	RE	8
3.2	Report of results from literature, register data and IRIS Q data analysis	3	OBS - ERVA	10	R	PU	32
3.3	Report from the qualitative study of women in STM	3	KU	5,5	R	PU	32
3.4	Guidelines and recommendations for stakeholders	3	OBS - ERVA	2	R	PU	34
4.1	Literature review	4	KCL	2	R	RE	8
4.2	Report presenting results from the empirical analysis	4	KCL/ IRI UL	17,5	R	PU	32
4.3	Guidelines and recommendations for stakeholders	4	KCL/ IRI UL	2	R	PU	34
5.1	Literature review	5	LEEDS	2,5	R	RE	8
5.2	Report on case studies	5	LEEDS	7,5	R	PU	32
5.3	Guidelines for schools/universities and policy makers on effective recruitment measures	5	LEEDS	1	R	PU	34
5.4	Report on IRIS Q analysis and case studies and examples of successful recruitment campaigns	5	UiO	10	R	PU	32
5.5	Guidelines and recommendations for design of recruitment campaigns	5	UiO	1	R	PU	34
6.1	Literature review regarding dropout and retention	6	KU	2	R	RE	8
6.2	Report on reasons for dropping/opting out of STM higher education programmes	6	KU	12,5	R	PU	32

Del. no.	Deliverable name	WP no.	Lead bene-ficiary	*Estimated indicative person months*	Nature	Dissemi-nation level	Delivery date
6.3	Guidelines and recommendations for tertiary STM curricula and teaching	6	KU	2	R	PU	34
7.1	IRIS web site	7	IRI-UL	5	O	PU	1-36
7.2	Minutes of first national reference group meetings	7	all	2	O	RE	6
7.3	Minutes of second national reference group meeting	7	all	2	O	RE	34
7.4	Overview report of IRIS publi-cations, conference presentations and other dissemination	7	all/ IRI UL	6	O	PU	28
7.5	Summary of guidelines and recommendations for stakeholders	7	all/ IRI UL	3,5	R	PU	34
7.6	International IRIS dissemination seminar	7	IRI-UL	2,5	O	RE	36
				142			

Table 1.3b: List of deliverables. Nature: R = Report, O = Other. Dissemination level: PU = Public, RE = Restricted to a group specified by the consortium (including the Commission Services), CO = Confidential, only for members of the consortium (including the Commission Services)

B 1.3.5 Work package descriptions

WP1: Management

Work package number	1	Start date or starting event:			1	
Work package title	Management					
Activity Type	MGT: Management of the consortium					
Participant id	1 UiO	2 KCL	3 LEEDS	4 IRI UL	5 OBSERVA	6 KU
Person-months per beneficiary:	4,5	0,5	0,5	0,5	0,5	0,5

Objectives:

WP1 is purely administrative, and represents the consortium management and the economy and progress reporting to the EU Commission. This is will be managed and led by the consortium coordinator (participant no. 1, UiO).

This WP will set up communication and management structures, lead and monitor the integration of the consortium participants and ensure the overall project progress and quality. A description of the management and decision structures is provided in section B2.

Description of work (and role of participants):

WP1 will ensure that the project is coordinated and managed in an effective way (note that the scientific coordination is placed in WP2; WP1 concerns purely administrative matters such as project budget, reporting etc).

The management model aims at complying with all requirements for efficient management, good controlling mechanism and fast response time.

All tasks in WP1 will be led by participant no. 1, UiO, with input and participation from the consortium body:

- Define, implement and control all the necessary and appropriate internal arrangements in order to ensure the efficient implementation and progress of the project
- Lead and monitor the integration of the participating units in compliance with the work programme and apply actions to ensure the achievement of the objectives and the deliverables of the work packages
- Establish appropriate reporting structures and procedures for reporting within the consortium and towards the EC
- Initiate, arrange and prepare consortium body meetings (UiO + all partners).

Deliverables (and month of delivery)

1.1 Minutes of 1st consortium meeting (2)
1.2 Minutes of 2nd consortium meeting (8)
1.3 Minutes of 3rd consortium meeting (18)
1.4 Minutes of 4th consortium meeting (30)

Table 1.3c WP1 summary – Management

WP2: Scientific coordination

WP2 sets the scene, kicks the project off, coordinates the IRIS survey and sums the project up. This is the largest WP, and it is in many ways an "umbrella" for the other WPs. WP3-WP6 feed perspectives from the respective literature reviews into the IRIS Q development process in WP2, and these WPs will in turn receive IRIS Q data from WP2.

As mentioned above, the main data collection instrument is a questionnaire (named IRIS Q). This will be developed in the first phase of the project period, and all the consortium partners will, based on different literature reviews with different thematic focus, contribute to this work. The literature reviews will consider theories, empirical findings as well as methodological aspects relevant for project IRIS.

Several of the milestones in Table 1.3l below will be crucial for the progress of the IRIS Q survey: Reports from the national piloting of a draft version of IRIS Q (milestone 4), the finalisation of the IRIS Q (milestone 5), establishment of procedures and guidelines for respondent sampling and for data collection and coding (milestone 6), and the finalisation of the national data files and the merged international data file (milestone 7 and 8).

The quality of the new knowledge and insight that IRIS aims to provide depends on the quality of the data, which in turn to a large extent depends on the quality of the IRIS Q questions that have been asked. The questionnaire development must be based on a framework that provides an account of *what* the questionnaire aims at measuring and *how* this shall be done. Such ideas and frameworks are, of course, closely related to the research aims and questions of IRIS itself. Standard textbooks in research methods (Ary, Jacobs, & Razavieh, 1996; Cohen, Manion, & Morrison, 2000; Robson, 2002) describe a whole range of different research designs and their strengths and weaknesses.

Problems associated with measuring affective characteristics as interests, attitudes, priorities, experiences, future plans, etc. are widely known and described both outside and within the community of science education researchers (e.g. Bennett, 2001; Gable & Wolf, 1993; Gardner, 1975, 1985, 1996; Mueller, 1986; Oppenheim, 1992; Ramsden, 1998). Some challenges can only be dealt with in detail after the data collection, like data analysis and interpretations, and aspects of validity and reliability. There are, however, several crucial matters concerning the methodology that we have to considered prior to and during the development of the questionnaire. These include

- clarifying the rationale and the aims of the study, and agreeing on a set of common frameworks and assumptions
- exchanging ideas with the persons concerned (students, policymakers, stakeholders, researchers, etc.)
- reviewing relevant literature
- specifying underlying ideas and defining the issues and subjects to be addressed
- deciding on methodological issues related to questionnaire format, item design, response scales, etc.
- designing and developing the questionnaire
- specifying the target population, sample size and sampling procedures
- planning and preparing the data collection and coding
- piloting the questionnaire
- addressing validity and reliability issues

The above points do not follow each other in a linear or sequential order, but need to be discussed and refined as the research develops and matures. The IRIS Q data collection cannot start before these issues clarified and the process described here is completed.

Next follows a phase of data collection and data coding, cleaning and quality checking in all participating countries. Data will be collected from first-year STM students in the IRIS consortium countries as well as in other countries in all parts of the world. The coded data files (not the questionnaires) will be sent to the WP2 leaders, who will do additional data quality checking and cleaning of the files before they can be merged into one common international data file. Then the IRIS Q data analysis can start.

Central themes in the questionnaire are accounted for in the IRIS research questions in B 1.1.2 above (e.g. priorities and considerations underlying educational choices; interests, attitudes and self-efficacy related to STM; experiences with STM education; plans for future education and career; drop-out considerations; effect of recruitment initiatives; background variables such as socioeconomic status, etc.). The WP2 lead participant (no. 1, UiO) will coordinate the questionnaire development and lead the consortium discussions on defining the target population, sample size, developing sampling procedures, data collection procedures, interesting approaches to the data analysis, reliability and validity issues, etc. Efforts will be made to collect representative student samples in each country.

When the IRIS Q has been developed by the consortium, we will invite colleagues in other countries to use our instrument (or a locally adapted version of it) to collect data in their own country. This is expected to give interesting perspectives of recruitment patterns and young people's educational priorities in different societies and cultures. We already have more than 30 letters of intention from institutions from all continents, stating their interest in taking part in the IRIS Q data collection. We believe that once the instrument and the sampling guidelines are developed by the consortium members, data collection for associated partners is not very expensive. Based on experiences from the ROSE project, with more than 40 research partners, it is not difficult to raise money for national data collection. If IRIS funding through FP7 is secured, it may also be easier for associated partners to raise money locally to participate with data collection.

The master version of the questionnaire will be in English, and all consortium participants (except the two in the UK) will translate the questionnaire to the language of STM instruction. The consortium participants will also be responsible for piloting a draft version of IRIS Q, conducting the survey and coding the data from respondents in their own country (among the two UK participants this will be participant no. 3, LEEDS' task), while the WP2 leader will coordinate the data collection in countries outside the IRIS consortium. The WP2 leader will also merge the national data into one common international data file. All the consortium participants will have access to the international IRIS Q data file for comparative analysis.

WP2 will also, in the beginning of the project period, arrange the IRIS kick-off meeting and, towards the project end, compile a report/book that summarises the literature review, theoretical perspectives, empirical findings and the guidelines and recommendations from the project. All consortium partners, and possibly researchers in countries outside the consortium, will provide contributions to this publication.

As mentioned above, Norway has in August and September 2008 collected data through the related study Vilje-con-valg, and Denmark and Turkey plan to do similar studies in 2009. IRIS participants no. 1 (UiO) and 6 (KU) will be able to take valuable experience and findings from these national projects with them into the discussions and instrument

development in the IRIS consortium. Therefore, participant no. 1 and 6 have additional person months in WP2. However, this should not be interpreted in the sense that IRIS will analyse data for the Vilje-con-valg surveys. Rather, IRIS will benefit from the instrument development, analyses and findings of the already existing national Vilje-con-valg surveys.

Work package description WP2

Work package number	2	Start date or starting event:			2	
Work package title	Scientific coordination					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	2 KCL	3 LEEDS	4 IRI UL	5 OBSERVA	6 KU
Person-months per beneficiary:	15	1	4	4	4	6

Objectives

This work package is an "umbrella" for the other WPs. It sets the scene, kicks the scientific work off, coordinates the IRIS Q study and sums the project up, and contains IRIS Q development coordination, international data processing, and the final scientific reporting. WP3-WP6 feed perspectives from the respective literature surveys into the IRIS Q development in WP2, and will in turn receive questionnaire data from WP2.

The principal objective of WP2 is to coordinate the scientific work of IRIS and to manage the IRIS Q data collection - from questionnaire development and piloting through data collection (both in IRIS consortium countries and in associated partner countries) to the final analysis and reporting. It will also sum up and coordinate the reporting from the other smaller-scale qualitative and quantitative studies in the respective WPs. A major outcome of WP2 will be a project report/book integrating all the research perspectives in IRIS in a comprehensive account of the literature reviews, theoretical perspectives, empirical findings and guidelines and recommendations.

Description of work (and role of participants):

- Develop the IRIS overall framework, including relevant theories, findings and methodology, and provide an overview of previous similar surveys to aid instrument development (all participants, led by UiO)
- Integrate experiences from Norwegian, Danish and Turkish project Vilje-con-valg into IRIS project development (UiO and KU)
- Lead the development of the IRIS Q (UiO)
- Validate IRIS Q with stakeholders in each country (all partners)
- Provide guidelines for sampling and IRIS Q administration (all participants, led by UiO)
- Translate the IRIS Q from English to the language of STM instruction in the respective countries (all partners except KCL and LEEDS)
- Coordinate the IRIS Q data collection for all consortium countries and partners and other participating countries (UiO)
- Collect data in each IRIS consortium country (all partners except KCL)
- Code and clean the national data files (all partners except KCL)
- Merge the national data files into the international data file, and clean it (UiO)
  Conduct general overall comparative data analysis and sum up findings from the project at large (UiO)
- Compile a report/book towards the end of the project (all partners)

Deliverables (and month of delivery)

2.1 IRIS Q data collection instrument, master version in English (9)
2.2 IRIS handbook with guidelines for translation, sampling and data collection and coding (10)
2.3 Translated versions of IRIS Q in the consortium countries' respective language of STM instruction (11)
2.4 IRIS report/book (35)

Table 1.3d WP2 summary – Scientific coordination

Work package description WP 3 - Gender perspectives

Work package number	3	**Start date or starting event:**			3	
Work package title	Gender perspectives					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	2 KCL	3 LEEDS	4 IRI UL	**5 OBSERVA**	6 KU
Person-months per participant:	2	2	2	2	**7**	5

Objectives

The overall objective of this work package is to achieve an European-wide overview of the relevant literature and statistics on women's participation in STM and pick out the perspectives and figures relevant for IRIS, and to provide a gender equity perspective to be employed throughout the project. It will ensure gender sensitivity and awareness in the topics addressed by the project, in the data collected, as well as in the interpretations of the findings from the other WPs. WP3 has an important function in assisting development of gender-sensitive data collection instruments in all WPs, and in interpreting the corresponding findings.

OBSERVA will not collect other data than with IRIS Q in Italy, but analyse empirical data from IRIS Q and feeds perspectives and ideas into the data collections in all the other WPs, and aid interpretation of results throughout the project. This WP will also conduct extensive analysis and reviews of existing reports, register data and statistics and combine these with data collected and analysed in the IRIS project. Valuable sources in this work will be an EU report on women in STM research which is currently (2008) under construction, and the next edition of the report "She figures" (expected autumn 2009).

Since all IRIS participants will address gender and equity issues, all partners have a few person months in this WP. All participants will feed gender perspectives into WP3, and all the empirical data analysis in the WPs will receive gender equity perspectives and ideas from WP3.

Participant no. 6, KU, has several person months in this WP, since this partner will do a qualitative study of Danish undergraduate female STM students' "biographies", portraying women that have made untypical choices. The study will describe how various personal factors and experiences in these women's lives (home background, parental occupation, school aspects, different events and happenings, friends and siblings, etc.) have influenced their choice of pursuing an STM higher education.

Description of work (and role of participants):

- Review theoretical equity and feminist perspectives and empirical findings as well as register data and reports related to gender differences and imbalances in STM education, employment, research, and career opportunities. Pick out the perspectives and information relevant to IRIS Q development and interpretation of IRIS findings (OBSERVA). Feed gender perspectives to data collection instruments, including the IRIS Q as well as other quantitative and qualitative studies in the different WPs (all participants, led by OBSERVA)
- Contributing in interpreting results of the empirical analysis in the WPs (all participants, led by OBSERVA)
- Empirical analysis of IRIS Q data with focus on gender equity issues and perspectives from feminist theories (OBSERVA)
- Qualitative study of women who have chosen STM, and the background and the factors that led them to their (untypical) choice (KU)

Deliverables (and month of delivery)

3.1 Extract of available reviews of relevant literature on women's participation in STM (8)
3.2 Report presenting the key results from the analysis of official register data combined with results from IRIS Q data analysis with focus on gender equity issues and perspectives from feminist theories (OBSERVA) (32)
3.3 Report from the qualitative study of women in STM (32)
3.4 Guidelines and recommendations for stakeholders (34)

Table 1.3e WP3 summary – Gender perspectives

Work package description WP 4 - Priorities and choices

Work package number	4	Start date or starting event:			3	
Work package title	Priorities and choices					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	**2 KCL**	3 LEEDS	4 IRI UL	5 OBSERVA	6 KU
Person-months per beneficiary:	6	**7,5**	0	8	0	0

Objectives

WP4 concerns young people's priorities and choices regarding STM education and careers. The WP has two main components, one with focus on undergraduate choice, which will be performed by KCL in cooperation with UiO; and one with focus on postgraduate choices within STM, to be performed by IRI UL. The principal objectives will be to

1. apply theories of youth's identity formation in late modern societies, together with models of educational choice, to interpret empirical data collected in IRIS with the aim of identifying important influence factors on (female) undergraduate students' educational choice
2. study the choice of research topic of female and male PhD students within STM to identify similarities and differences in women's and men's choice patterns

WP4 feeds theoretical perspectives and a review of previous findings into the IRIS Q (WP2), and analyses IRIS Q data in view of priorities and educational and research choices. A focus group study with STM and non-STM undergraduates in England will be performed to obtain quantitative data to complement and deepen our understanding of the findings from the IRIS Q. In this WP, there is also a quantitative study of the fields of research chosen by female and male students, respectively, for their PhD (data to be provided by consortium), as well as a limited interview/focus group study concerning Slovenian, female PhD students' background for their choice of research field.

Description of work (and role of participants):

Undergraduate students' priorities and choice

- undertake a literature review on young people's (particularly girls') educational choice and why they choose to study, or not to study, STM (KCL);
- review theoretical perspectives and contemporary research on late modern youth and identify the implications for understanding the educational choices made by contemporary youth (UiO)
- provide WP2 with a theoretical framework for developing IRIS Q items regarding priorities and choice (KCL and UiO)
- analyse IRIS Q data to identify young peoples' priorities and their corresponding educational choice (UiO and KCL)
- undertake a focus group study of STM and non-STM undergraduate students (girls and boys) to explore the critical features in their lives (social as well as educational) that led them to study STM. This will be a post-hoc analysis to attempt to identify the distinguishing features (parents/family; peers; teacher; achievements, activities outside the classroom; student aspirations and values, etc.) between those who have chosen to study science and those who have not (KCL)

Choice of topic for PhD research

- review literature and study register data in the consortium countries (data to be provided by all participants) and international statistics on what STM topics women and men choose in their PhD (IRI UL)
- analyse IRIS Q data relevant to the issue of topic choice (IRI UL)
- conduct a limited interview/focus group study of female PhD students' background for their choice

Deliverables (and month of delivery)

4.1 Literature review (8)

4.2 Report(s) presenting the results from the focus group/interview studies with undergraduate and PhD students combined with results from IRIS Q data analysis (32)

4.3 Guidelines and recommendations for stakeholders (34)

Table 1.3f WP4 summary – Priorities and choices

Work package description WP 5 - Recruitment initiatives

Work package number	5	**Start date or starting event:**			3	
Work package title	Recruitment initiatives					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	2 KCL	**3 LEEDS**	4 IRI UL	5 OBSERVA	6 KU
Person-months per beneficiary:	8	0	**8**	2	2	2

Objectives

WP5 is led by LEEDS and contains contributions from UiO as well as other partners. The issue of WP5 is how recruitment to STM (of women in particular) may be improved through two main types of measures:

1. Changing STM curriculum content and context and teaching/learning approaches (LEEDS); and
2. Recruitment initiatives and campaigns implemented by governments, educational institutions or business/industry organisations (UiO)

WP5 will review international research literature on students' (particularly girls') experiences of science education and the impact on science course choices. This review will inform the design of questions related to this issue for inclusion in the IRIS Q.

The LEEDS team will conduct longitudinal case studies of student cohorts from school science courses in England, following them from secondary education into higher education. A particular focus will be the impact of recent school science curriculum reform initiatives in England. These reforms have enabled greater flexibility of school science courses and an emphasis on socioscientific topics and science issues in the media. This study will identify experiences of secondary science curriculum and teaching/learning approaches that influence course choice into higher education. An important strand in our work on recruitment will be the nature, role and impact of career guidance initiatives .There is evidence that student course choices in relation to science are based partly on occupational images of working scientists (Cleaves, 2005).The report from the High Level Group on Increasing Human Resources for Science and Technology in Europe identified the significance of careers education for science/technology recruitment, concluding that: "industry and the profession are not selling careers in SET in the most attractive fashion, which is certainly an area for future attention" (EU, 2004). Work Package 5 will review such perspectives and draw upon the insights gained in the design and analysis of case studies.

LEEDS will also analyse IRIS Q data related to the WP5 topic and report findings. Analysis of such cross-national data will enable us to assess the extent to which findings arising from the in-country case studies are reflected across national contexts.

The Oslo team will (with input from all partner countries) compile an overview of recruitment campaigns and, through case studies of some initiatives, analyse their various success factors.

Description of work (and role of participants):

- examine the impact of science education experiences on students' course choices from secondary school into higher education (LEEDS)
- review theoretical perspectives and contemporary research on effects of recruitment initiatives (LEEDS and UiO)
- provide WP2 with frameworks for developing IRIS Q items regarding how recruitment to STM (of women in particular) may be improved through different types of measures (LEEDS and UiO)
- analyse IRIS Q data with the aim of identifying recruitment efforts that seem to have an effect (UiO)
- compile an overview of recruitment initiatives and campaigns implemented by higher education institutions, educational authorities, governments and organisations in Europe and elsewhere, with special attention to the recruitment of women (all participants, led by UiO).
- where applicable, study and evaluate the impacts of such initiatives and campaigns, and possibly perform a case study of a few such initiatives (UiO)

Deliverables (and month of delivery)

5.1 Literature review (8)
5.2 Report on case studies conducted within school science and higher education (32)
5.3 Guidelines for schools/universities and policy makers on effective activities within science education likely to enhance the recruitment of girls to science courses (34)
5.4 Report on IRIS Q analysis and case studies and examples of successful recruitment campaigns (32)
5.5 Guidelines and recommendations for development and design of recruitment campaigns (34)

Table 1.3g WP5 summary – Recruitment initiatives

Work package description WP 6 - Drop-out/opt-out

Work package number	6	Start date or starting event:			3	
Work package title	Drop-out/opt-out					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	2 KCL	3 LEEDS	4 IRI UL	5 OBSERVA	**6 KU**
Person-months per participant:	1	2,5	1	1	1	**10**

Objectives

Denmark is the leader of WP6 with contributions from all project partners. The relatively large contribution from KCL in this WP will be to see the priorities of students deliberately opting out of their STM study in connection with their priorities and expectations when they chose their study in the first place.

The aim of WP6 is to expose the reasons students have for dropping/opting out of STM higher education programmes. Focus will be on gender differences and if and how these are related to the institutional and instructional patterns within STM higher education, e.g. the relation between the students' prior knowledge and educational experiences, their priorities connected to the STM choice, their expectations to their STM study, their experience of the STM programme and the instructional patterns, etc.

In addition to making a literature review, WP6 will conduct a quantitative study within the countries involved in IRIS and a qualitative study in Denmark. The quantitative study will follow drop-outs/opt-outs within a five-year period from ten selected STM programs in the IRIS consortium countries, focusing on gender differences. In addition, a qualitative study will be performed on reasons for not completing an STM education at 5 STM programs in Denmark.

Description of work (and role of participants):

- Review research literature on reasons for dropout/opt-out among young people from STM higher education programs (KU)
- Review how curricula and instructional patterns and approaches (contents, contexts, emphases, teaching models, etc.) in STM undergraduate tertiary education influence students' motivation to pursue STM (KCL)
- Conduct a quantitative study of dropouts/opt-outs within a five year period at ten selected STM higher education programs in Denmark, Norway, Italy, UK and Slovenia focusing on gender differences. The study will build on existing register data and in the extent possible enabling the analysis to follow students' study behaviour (choice of study programme, leaving or changing study programmes, completion or non-completion). The quantitative study will cover both the transition from upper secondary school to higher education, and study behaviour within higher education. (KU)
- Conduct a qualitative study on reasons for not completing an STM higher education at five selected STM programs in Denmark. The study will focus on how the students experience the meeting with STM-studies, and how it affect their reflections on staying at the study programme, or leaving to another programme (KU)
- Provide relevant background information for the development of IRIS Q items for, to the degree that this is applicable, addressing the issues of dropout/opt-out (KU)
- Analyse IRIS Q data related to the issues of dropout/opt-out (KU)
- Discuss implications of findings and provide suggestions and advices to tertiary STM curricula and teaching (KU)

Deliverables (and month of delivery)

6.1 Literature review regarding dropout and retention at STM programmes with particular emphasis on the gender issue (8)

6.2 Report(s) from the qualitative and quantitative studies of reasons for dropping/opting-out of STM higher education programmes (32)

6.3 Guidelines and recommendations for tertiary STM curricula and teaching (34)

Table 1.3h WP6 summary – Drop-out/opt-out

Work package description WP 7 - Dissemination

Work package number	7	Start date or starting event:			8	
Work package title	Dissemination					
Activity Type	RTD = Research and technological development					
Participant id	1 UiO	2 KCL	3 LEEDS	**4 IRI UL**	5 OBSERVA	6 KU
Person-months per participant:	3	2	2	**8**	3	3

Objectives

In order to emphasise the importance of dissemination, we have singled out the dissemination to a separate WP. The objective of WP7 is to coordinate and lead dissemination of the IRIS results. All partners will contribute, notably to dissemination and exchange seminars in their own countries, but IRI UL will lead and coordinate the dissemination activities at the European level.

Target groups will involve policymakers, curriculum developers, researchers in STM and STM education, teacher organisations, organisation for science journalism and communication, international organisations and European associations representing secondary and higher education institutions, students, staff, relevant actors in business and industry as well as those working with labour market and human recourses.

For all partners, WP7 will contain national and international conferences/seminars, contact with stakeholders through national reference groups, and contributions to IRIS publications. WP7 will also translate research outcomes into guidelines and recommendations with concrete advice on recruitment, retention and gender equity efforts, to be used by policymakers, curriculum developers, educational administrative authorities, actors in business and industry, etc. when designing recruitment and retention measures.

IRIS will establish and maintain a web site, for exchanges within and beyond the consortium, where project description, contact information and all products, background articles, presentations etc. will be available. Also the many associated partners in a wide variety of countries will be a valuable asset in dissemination of results. Among these partners, there are also organisations for science journalism and communication. (See more about IRIS dissemination in section B3.)

Description of work (and role of participants):

- Establish and maintain an IRIS website (IRI-UL)
- Arrange or attend at least two national seminars with reference groups in all IRIS consortium countries; one midway in the project and one towards the end (all participants)
- Arrange one international seminar or major dissemination event towards the end of the project with stakeholders on the European and/or international level (all participants, led by IRI UL)
- Make presentations at national and international research conferences, and make an overview and summary of all these (all participants)
- Develop guidelines and recommendations informed by evidence (all participants)

Deliverables (and month of delivery)

7.1 IRIS web site (1-36)
7.2 Minutes of the first national reference group meetings (6)
7.3 Minutes of the second national reference group meeting (24)
7.4 Overview report of IRIS publications, conference presentations and other dissemination (35)
7.5 Summary of guidelines and recommendations for stakeholders (35)
7.6 International IRIS dissemination seminar (35)

Table 1.3i WP7 summary – Dissemination

B 1.3.6 Efforts for the full duration of the project

Project Effort Form 1 – Indicative efforts per beneficiary per WP

Project number (acronym): 230043 – IRIS

Workpackage	WP1	WP2	WP3	WP4	WP5	WP6	WP7	TOTAL per Beneficiary
Beneficiary 1 UiO	**4,5**	**15**	2	6	8	1	3	**39,5**
Beneficiary 2 KCL	0,5	1	2	**7,5**	0	2,5	2	**15,5**
Beneficiary 3 LEEDS	0,5	4	2	0	**8**	1	2	**17,5**
Beneficiary 4 IRI UL	0,5	4	2	8	2	1	**8**	**25,5**
Beneficiary 5 OBSERVA	0,5	4	**7**	0	2	1	3	**17,5**
Beneficiary 6 KU	0,5	6	5	0	2	**10**	3	**26,5**
TOTAL	***7***	***34***	***20***	***21,5***	***22***	***16,5***	***21***	***142***

Table 1.3j Project effort form 1, showing the number of person months for each beneficiary in each work package.

Project Effort Form 2 – indicative efforts per activity type per beneficiary

Project number (acronym): 230043 – IRIS

Activity Type	1 UiO	2 KCL	3 LEEDS	4 IRI UL	5 OBSERVA	6 KU	TOTAL ACTIVITIES
RTD/Innovation activities							
WP 2: Scientific coordination	15	1	4	4	4	6	34
WP 3: Gender perspectives	2	2	2	2	7	5	20
WP 4: Priorities and choices	6	7,5	0	8	0	0	21,5
WP 5: Recruitment initiatives	8	0	8	2	2	2	22
WP 6: Drop-out / Opt-out	1	2,5	1	1	1	10	16,5
WP 7: Dissemination	1,5	1	1	4	1,5	1,5	10,5
Total 'research'	33,5	14	16	21	15,5	24,5	124,5
Demonstration activities							
There are no demonstration activities in IRIS							
Consortium management activities							
WP 1: Management	4,5	**0,5**	**0,5**	**0,5**	**0,5**	**0,5**	**7**
Total ' management'	4,5	**0,5**	**0,5**	**0,5**	**0,5**	**0,5**	**7**
Other activities							
WP 7: Dissemination	1,5	1	1	4	1,5	1,5	10,5
Total 'other'	1,5	1	1	4	1,5	1,5	10,5
TOTAL BENEFICIARIES	39,5	15,5	17,5	25,5	17,5	26,5	142

Table 1.3 k Project effort form 2 shows project effort, in person months, broken down to beneficiaries and type of activity. RTD stands for " Research and technological development". There are no demonstration activities in IRIS. "Other" activities in the case of IRIS means dissemination of results and recommendations.

B 1.3.7 List of milestones

Table 1.3l shows the IRIS milestone list. The milestones are actions or deliverables needed in order to start a next phase or activity, and are described in more detail in the WP descriptions below. Among the milestones in the table, we have place all consortium body meetings and the first national and international dissemination seminars, since important decisions related to the further development of the project will be discussed and decided on here.

List and schedule of milestones				
Milestone no.	**Milestone name**	**WPs nos.**	**Delivery date from Annex I**	**Comments/means of verification**
1	Kick-off meeting	1	2	Minutes of meeting
2	National reference group meetings	7	6	Minutes of meetings
3	IRIS Q piloting	2	7	Minutes of pilots
4	Consortium body meeting	1	8	Minutes of meeting
5	Final version of the IRIS Q master	2, 3, 4, 5, 6	9	IRIS Q master version
6	Finalisation of the IRIS Q guidelines for data collection procedures	2, 3, 4, 5, 6	10	Final version of data collection guidelines
7	Finalisation of the national IRIS Q data coding	2	14	National IRIS Q data files complete
8	Finalisation of the international IRIS Q data file	2	16	IRIS Q international data file complete
9	Consortium body meeting	2	18	Minutes of meeting
10	End of first reporting period	1	18	Project report to EC
11	National reference group meetings	7	30	Minutes of meetings
12	Consortium body meeting	1	34	Minutes of meeting
13	IRIS international dissemination seminar	7	35	Completed seminar
14	IRIS final report (book) ready submitted to publisher	2,7	35	Completed manuscript
15	End of first project period	1	36	Project report to EC

Table 1.3 l: List of milestones. Please note that consortium body meetings in addition to those scheduled here are likely to be needed – these will be arranged as the need arises. Also, dissemination will, through the whole duration of the project, take place through a range of channels. Mentioned in this milestones list are only specific IRIS dissemination seminars arranged by the consortium.

Milestones in the project will also include relevant conferences and seminars where IRIS is discussed and results are disseminated. Examples include:

- **ESERA conference (European Science Education Research Association)** has biannual conferences, one is in 2011.
- **The International Network on Public Communication of Science and Technology (PCST),** a network of individuals from around the world who are active in producing and studying PCST. The PCST Network hosts international conferences, electronic discussions, and other activities to foster dialogue among the different groups of people interested in PCST, leading to cross-fertilization across professional, cultural, international, and disciplinary boundaries. The next PCST-conference will take place in New Delhi, India, in December 2010.

- **ESOF – Euroscience Open Forum** – is the biennial European meeting dedicated to scientific research and innovation created by Euroscience. Its next conference is in Turin in July 2010
- **IOSTE,** International Organization for Science and Technology Education, has a conference in September 2010.
- **ECER**, The European Conference on Educational Research, and **NARST**, National Association of Research in Science Teaching, hold annual conferences
- **EARLI**, European Association for Research on Learning and Instruction, has biannual conferences. The 2011 conference will be held in August at the University of Exeter, UK.
- Seminars for higher education administration and policymakers, for STM companies and interest organizations, etc – see details in section B 3.2.

B2. Implementation

B 2.1 Management structure and procedures

B 2.1.1 Overall management structure

The goal of the IRIS project management is to enable scientific, organisational and financial success. This requires efficient organisational and administrative structures that can deal with obligatory reporting and duties as well as possible unplanned issues that might arise, such as internal disputes, change in consortium membership and financial and technical issues. The management structure for IRIS has been designed to meet the complexity of the project while ensuring that decision-making is performed in and organized an efficient manner with a high level of integration between partners. We adopt a principle of collective responsibility in terms of decision-making, performing research and administrative tasks, assessing progress, and disseminating results. In the management structure we aim at flexibility, but with clear lines of authority and responsibility for specific tasks.

We have chosen to place the responsibility for organisational and financial administration and project leadership on one partner, UiO, to facilitate efficient management and integration of all parts of the project. Management of IRIS has the following purposes:

- communication with the European Commission
- to facilitate the integration of the consortium
- to ensure that all partners are involved in decision-making
- to provide an efficient decision-making and communication structure
- to keep the project performing with regard to time, quality and budget
- to prevent conflict and provide resolution of disputes

While UiO is responsible for ensuring the overall progress and reporting from the project, the **consortium body**, constituted by all IRIS workpackage leaders, which again represents all IRIS consortium partners, is collectively responsible for the scientific progress of the work. The IRIS **General Assembly** will be the highest decision-making body of IRIS, dealing with important strategic and legal matters (see figure 2 and paragraph B 2.1.2). We plan a work distribution that avoids excessive interactions and meetings, but at the same time ensures the necessary communication between the partners in the consortium.

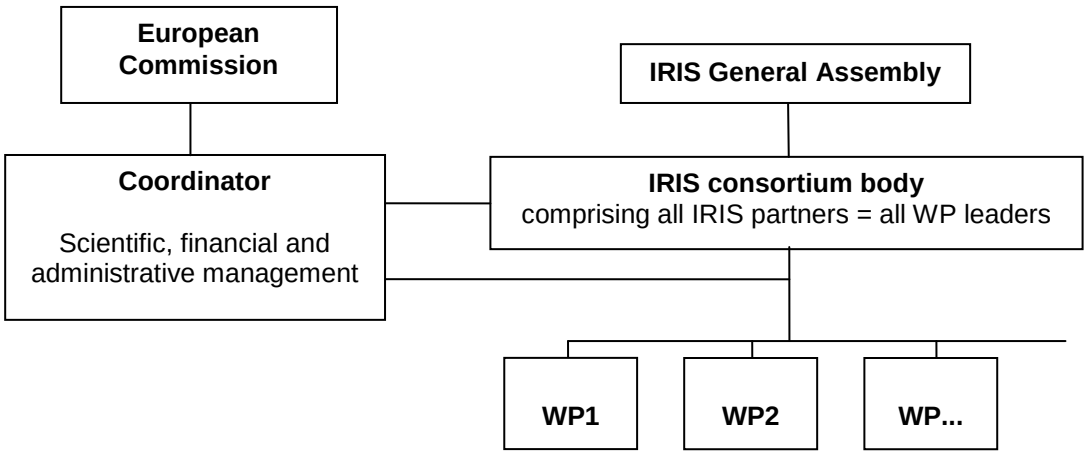

Figure 2. Management structure..

B 2.1.2 The consortium body and General Assembly

The General Assembly is the highest decision-making body in the project, as described in the IRIS Consortium Agreement. The General Assembly consists of one representative of each beneficiary and will meet at least once every 12 months. Details of procedures for these meetings will be described in the Consortium Agreement. Decisions to be taken by the General Assembly include for instance changes to Annex 1 and the consortium plan (including the budget), entry or withdrawal of partners (beneficiaries) in the project, etc.

The consortium body, constituted of all IRIS workpackage leaders, which again represents all IRIS consortium partners, will be responsible for the practical, day-to-day measures to be taken in order to secure a steady progression and a high scientific quality for the IRIS work.. It will be responsible for the integration and coordination of the activities and deliverables between the different work packages. The consortium body as a whole is active in the government of the project and will be called upon by the IRIS coordinator at short intervals to report on progress, offer views or make decisions concerning the progress and scientific management of the project. Much of this contact may be through electronic media; however, meetings will also be necessary, and will be arranged when the need arises. Four meetings are planned; however, extra meetings for (parts of) the consortium may be arranged if it is practical for the research purposes. The consortium body is a forum for resolving discussions and dealing with unexpected problems that might arise concerning the scientific progress the project (note that severe conflicts or problems concerning the overall governing of IRIS will be treated in the General Assembly).

Each IRIS partner will be responsible for the internal coordination of the activities at their institution, bringing forth any issues needing attention to the consortium body. They will bring forward the policy of their organisation regarding issues to be decided upon by the consortium body, and they will be responsible to identify a local project manager who will take care of administrative and financial issues.

To save resources, much of the communication between partners is expected to take place electronically. Some of the consortium body meetings will be held in connection with events in the WPs that include all partners, for example international conferences, meetings to decide on scientific and methodological issues (notably in connection with the IRIS Q), etc. If these meetings are not frequent enough, necessary meetings will be held in addition (either virtually or in person). Individual WPs may schedule meetings that may or may not coincide with the consortium body meetings.

Issues to be addressed by the consortium body may include the following:

- The aims and methods of the IRIS project, its general policy and work programme
- The development of cooperative activities across work packages
- The planning of dissemination activities to the EU as well as throughout Europe and internationally
- The evaluation of project progress as demonstrated by deliverables
- Assessment of progress reports
- Maintenance of work plans
- Coordination of IRIS with EU activities in Science in Society
- Connections to other, related projects
- The resolution of possible minor disputes between partners
- Ethical issues and the promotion of gender equity

The consortium body is scheduled to meet at least four times during the project period, and General Assembly meetings will, when possible, be arranged concurrently with these . The first consortium body meeting will kick the project off. We will develop a common understanding of the work and plans for the project and discussing how the WPs and deliverables will be related to each other, and discuss the organisation of the dissemination seminars events. Our second network meeting is scheduled to project month no. 8, and the main objective of this meeting to make last and final agreements on issues related to the IRIS Q data collection (questionnaire format, item design, response scales, target population, sample size, sampling procedures, code book, piloting, etc.). The third meeting is scheduled in concurrence with the first comprehensive project review, and will also address issues such as integration of findings from the reserach in the various workpackages, planning of dissemination activities, etc. The fourth meeting is planned to be held in the period of final reporting and dissemination from the project.

B 2.1.3 Coordination

Associate professor Ellen K. Henriksen is the Coordinator and the official contact point with the EU Commission. Henriksen, together with researcher Dr. Camilla Schreiner (UiO) will be the IRIS project leaders, and lead the scientific, administrative and financial management. UiO and the involved departments have considerable experience in scientific and administrative management of large international research projects.

The Coordinator receives the financial contribution to the project and allocates it between the members of the consortium. The coordinator reviews and transmits any reports required by the grant agreement to the Commission. The Coordinator reports to the consortium requests from the Commission.

The Coordinator supports the operational management of the project as a whole by monitoring its activities on a regular basis, making sure the consortium is carrying out its work and bringing any issues that need resolution to the attention of the consortium body. The Coordinator has the responsibility of making sure that the consortium respect all obligations regarding financial activities and contractual aspects, as described in the grant agreement.

B 2.1.4 The WP leaders

All IRIS partners lead at least one work package. The leader of each of the work packages has responsibilities for the technical and scientific management of the work package. The work package leader may delegate responsibilities for budget and technical support to others at their institution. The WP leader reports to the consortium body on coordination and scientific activities and to the coordinator on progress and economy (activity reports, financial reporting, etc.).

B 2.1.5 Consortium management activities

The consortium management will involve the following activities:

- *Partnership management*: Enactment of the consortium agreement and the running of the consortium's operational structures, to manage and strengthen the relations between the partners. It also includes information management and flow. A web site will be established to

    - function as an instrument for the project management in order to keep all partners updated about progress and work and to facilitate contact
    - communicate to the public and distribute information about the project in general.
- *Financial management:* Financial planning, budgeting, transference and management, reporting, accounting, auditing.
- *Activity planning and reporting*: Includes plan updates and periodic management reports, both internally and to the EU Commission.
- *Gender issues, ethical issues and issues related to sustainable development:* Shared responsibility as these issues affects all partners equally, monitored by the IRIS management.
- *Scientific management*: Activities that lead, monitor and guide the scientific coordination developments.
- *Risk management*: Scientific, management and financial risks will be the responsibility of the project coordinator, in close co-operation with the consortium body and, where necessary, the General Assembly. Well developed lines of communication within the project are the best practice for risk management.
- *Management of disputes and conflict resolution:* Disputes that may arise in the consortium should be solved using speedy and pragmatic negotiation. Conflicts that may occur in this type of consortium would include insufficient productivity, missed deadlines and perhaps even cultural clashes. It will be the responsibility of the work package leaders to identify such conflicts as early as possible and take steps to initiate conflict resolution. If necessary, the coordinator and the consortium body will be brought in, and if a conflict escalates to a level where it threatens the overall progression of the project, it will be brought to the General Assembly. We aim, as far as possible, at a "flat" and democratic decision-making structure, but in cases where the consortium body meeting cannot come to an agreement, the IRIS General Assembly will make the final decisions (naturally in agreement with the EC contract and the consortium agreement).
- *IPR management*: There are no particular issues in regards to intellectual property apart from copyright issues.

B 2.1.6 Structures for resolving conflicts and controlling changes

The individual partners and WP leaders will notify the coordinator as soon as a situation or an issue arises which will affect the performance of the work assigned to them. Such issues may relate to suggestions for improvements or modification of methods; changes in time table or task allocations, potential delays, conflicts between partners, etc. The project coordinator wil be responsible to resolve such issues by drawing in individual consortium members involved in the work package in question, or by involving the whole consortium body or, in the last instance, the General Assembly. The consortium agreement gives guidelines for handling such issues. In general, any potential conflict between partners will be solved by the project coordinator after necessary consultation with all partners affected.

B 2.2 Beneficiaries

This section presents short CVs of the staff members we already at this stage know will be involved in the proposed project, and brief descriptions of the legal entities.

Partner no.:	1	Short name:	UiO	Country:	Norway
Full name:	**University of Oslo**				
Presentation:	The **University of Oslo (UiO)** is Norway's largest and oldest institution of higher education, founded in1811 when Norway was still under Danish rule. Today the University of Oslo has approx. 30,000 students and 4,600 employees. Four Nobel Prize winners indicate the quality of the research at the University. The University of Oslo has been involved in over 50 projects in the 6FP, with experience in providing the necessary infrastructure to cope with large scale network projects. The University of Oslo has a strong and diverse group of **science education** researchers, distributed between several faculties and centres (see below) but with extensive collaboration across units. UiO-based science educators are responsible for large international projects including PISA, TIMSS and ROSE. The PISA+ study (project on learning and teaching strategies in schools) and CAMP (Classroom analyses from multiple perspectives) are examples of multidisciplinary and cross-national collaborations. With approximately 235 staff members, the **Faculty of Education** at the University of Oslo is Norway's largest and most progressive institution for the educational sciences in Northern Europe. The faculty was formally constituted on 1 January 1996 and today consists of two departments and one institute: The Institute for Educational Research, The Department of Special Needs Education and The Department of Teacher Education and School Development. In addition, the faculty hosts two departments: InterMedia and the Network for IT-Research and Competence in Education (ITU). The **Faculty of Mathematics and Natural Sciences** was established in 1861, and is the largest educational and basic research science faculty in Norway, with about 1200 scientists and almost 5000 students. Mathematics and the natural sciences affect our view of the world and the way we think, and they form the premises for technological development, material wealth and standard of living. The Faculty has strong ambitions to increase recruitment of youth of both genders, and has several scientific positions dedicated to science education research. The faculty is also a partner (together with the Faculty of Education) in the newly establishes "National Research school in science education", which aims to employ and educate Ph.D candidates. The **National Centre for Science Education** is located at the University of Oslo. The centre is a national resource centre for science education from kindergarten to adult education and teacher training. Its main objective is to enable pupils and teachers to consolidate competence and motivate interest in natural science. This shall be achieved by developing and improving content and methods through research, experiment and development projects. Furthermore, the centre contributes to actions aimed at increasing the recruitment to scientific and technical studies. The centre aims in its work to seek contact with societies of science education on a national, Nordic and international level. The Centre hosts the "Vilje-con-valg" project which will serve as a pilot study to IRIS. Interesting UiO-based groups for collaboration on the IRIS project include **Centre for technology, innovation and culture,** which is about to launch the project "Women in science", the aim of which is to study the participation and opportunities of women in science departments in higher education institutions, and **Centre for gender research**, which encourages cross-disciplinary studies related to gender and has gender in relation to STM as an area of interest.					

UiO staff CV	
Associate professor **Ellen Karoline Henriksen** Department of Physics, University of Oslo	Tel: +47 22857886; Fax: +47 22856422; Email: e.k.henriksen@fys.uio.no **Background: Academic Degrees and positions** PhD from the University of Oslo, Norway, in 1999 in Science Education (title of thesis: "Museums and scientific literacy. The case of an exhibition on radiation and the environment"). Senior lecturer, then associate professor, in Physics education at the Department of Physics, University of Oslo, since 1999. **Relevant research and international cooperation** Participated in the project "Physics education in Norway" (2000-2004), mapping students' background for educational choices and their interests and experiences related to physics teaching. Has led the Department's recruitment committee for several years and is a member of the faculty's recruitment committee. Recent and ongoing research projects include 1) "Physics 21 – modelling in physics education"; 2) a study of the implementation of the new school physics curriculum in Norway; and 3) "Vilje-con-valg" (2008 -), a study of Norwegian STM students' educational choice, which will serve as a pilot to the IRIS study Teaching in Physics education courses and in-service training for teachers. Supervision of Master- and Ph.D-students. Referee for ESERA conference, NorDiNa (Nordic Science Education journal), etc. Editor of report from the 7th Nordic research symposium for science education, 2002. Some experience with EU-funded projects through the ESPERE project, led from Max Planck institute for Chemistry in Mainz **Relevant Publications** C. Angell, P.M. Kind, E.K. Henriksen and O. Guttersrud: An empirical-mathematical modelling approach to upper secondary physics. *Physics Education*, in press C. Schreiner, E.K. Henriksen and P.J.K. Hansen: Climate education – empowering today's youth to meet tomorrow's challenges. *Studies in Science Education* 41 (2005), 30-50. C. Angell, Ø. Guttersrud, E.K. Henriksen and A. Isnes: Physics: Frightful, but Fun. Pupils' and teachers' views of physics and physics teaching. *Science Education* 88 (2004), 683-706. Henriksen, Ellen Karoline; Angell, Carl; Lavonen, Jari; Isnes, Anders. Why choose physics - in Norway and Finland*? Journal of Baltic Science Education* 2004;1 Henriksen, E.K. and Jorde, D: High-school students' understanding of radiation and the environment - can museums play a role? *Science Education* 85 (2001), 189-206. Isnes, A.; Angell, C.; Henriksen, E.K. Physics education: Who comes and why? Psillos, D. (ed.): Science Education Research in the Knowledge Based Society. *Third International Conference of ESERA* (ISBN 960-243-578-X) Aristotle University of Thessaloniki. 2001-08

UiO staff CV	
Researcher **Camilla Schreiner** Norwegian Centre for Science Education, University of Oslo	Tel: +47 22857814, Fax: +47 22854409, Email: camilla.schreiner@naturfagseneret.no **Relevant degrees and positions** PhD in Science Education, from the University of Oslo, 2006: "Exploring a ROSE-garden: Norwegian youth's orientations towards science - seen as signs of late modern identities". Master degree in geophysics, Engineering education in computer science. Researcher at the Norwegian Centre for Science Education, University of Oslo. Position financed by NHO (Confederation of Norwegian Enterprise), NITO (The Norwegian Society of Engineers and Technologists), The Norwegian ministry of education and The Norwegian Assembly of Faculties of Mathematics and Natural Sciences. Position devoted to research on recruitment to STM. • Principal researcher and organiser on the project ROSE (The Relevance of Science Education), see www.ils.uio.no/english/rose • Leader of the Norwegian Researcher School in Science Education, see www.uv.uio.no/forsk/forskerutdanning/rdid-skolen • Member of the The Norwegian Board of Technology, established by the Norwegian Government, see www.teknologiradet.no • Supervisor for national recruitment champagne administered by the The Norwegian ministry of education, November 2007-April 2008 • Project leader for Vilje-con-valg, an ongoing research project of Norwegian STM students' educational priorities and choices (this will serve as a pilot to IRIS), see www.naturfagsenteret.no/vilje-con-valg • In the advisory board for project Intize, for enhancing young peoples' interest in mathematics, at Chalmers University of Technology and the University of Gothenburg see www.intize.org • Partner in the EU-funded projects ESPERE, led from Max Planck Institute (2005) **Relevant publications** Schreiner, C. (2006b). Har realisten gått ut på dato? [Has the scientist become dated?], P2-akademiet (Vol. XXXVII, pp. 77-91). Oslo: Transit Schreiner, C. (2008). Noen realist som passer for meg? Ungdoms valg av utdanning og yrke [A scientist who suits me? Young preoples' educational choice]. KIMEN, 8(1). Schreiner, C., & Sjøberg, S. (2004). Sowing the seeds of ROSE. Background, Rationale, Questionnaire Development and Data Collection for ROSE, UiO Schreiner, C., & Sjøberg, S. (2005). Et meningsfullt naturfag for dagens ungdom? [A meaningful school science for today's youth?]. Nordina(2) Schreiner, C., & Sjøberg, S. (2007). Science education and youth's identity construction - two incompatible projects? In D. Corrigan & J. Dillon & R. Gunstone (Eds.), The Re-emergence of Values in the Science Curriculum (pp. 231-248): Sense Publishers Schreiner, C., & Sjøberg, S. (2008). Hvorfor velge matematikk når man kan velge noe meningsfullt? [Why choosing mathematics as long as one can choose something meaningful?]. In E. Newth & S. R. Jørgensen (Eds.), Matematikk med din glede [Mathematics and joy]. Oslo: Gyldendal Schreiner, C, Henriksen, E.K & Hansen, P.K. (2005) Climate education – empowering today's youth to meet tomorrow's challenges. *Studies in Science Education* 41 (pp. 3-50). Sjøberg, S., & Schreiner, C. (2005). Naturfag og teknologi i skole og samfunn: Interesse og rekruttering [Science and technology in school and society: Interests and enrolment]. In M. Raabe & O. Raaum & P. O. Aamodt & N. M. Stølen & A. M. R. Holseter (Eds.), Utdanning 2005 - deltakelse og kompetanse (pp. 191-213). Oslo: Statistics Norway. Sjøberg, S., & Schreiner, C. (2006). How do learners in different cultures relate to science and technology? Results and perspectives from the project ROSE. (Invited foreword). APFSLT: Asia-Pacific Forum on Science Learning and Teaching, 7(1), Sjøberg, S., & Schreiner, C. (2007). Perceptions and images of science and science education. In M. Claessens (Ed.), Communicating European Research 2005 (pp. 149-156). Dordrecht: Springer

UiO staff CV	
Professor **Svein Sjøberg** University of Oslo	Tel: +47 22 85 41 55 or +47 22 23 80 67 Email: svein.sjoberg@ils.uio.no **Background: Academic Degrees and positions** Professor in science education at Oslo University. Honorary professor at the Department of Science Education, Copenhagen University and Professor II at the Faculty of science and mathematics, Tromsø University. Educated as a nuclear physicist (cand. real, Oslo University, 1970), later also in education (MA. in education, Leeds University 1975, dr. philos, Oslo University 1982). **Relevant research and international cooperation** Has been involved in curriculum reforms and the writing of textbooks for all levels. Has twice won H.M King Olav's gold medal for scientific dissertations. Research in cognitive development in science, gender and science education and international comparative research. Board member of IOSTE (International Organization for Science and Technology Education(since 1994 (President 2002-04) and Member of the Advisory Group on the Science and Society action plan of the 6th Framework Programme of the EU FP6 (2002-06). Honorary doctor of Linköping University Sweden, 2004. Awarded the "International price for outstanding contribution to physics education" by ICPE (International Committee for Physics Education), a sub-group of IUPAP (International Union of Pure and Applied Physics) in 2005. Current research interests: Social, cultural and ethical aspects of science education, science education and development, gender and science education in developing countries. Critical approach to issues of scientific literacy and public understanding of science. Organizer of two comparative projects on pupils' interests, attitudes, perceptions etc. of importance to science teaching and learning: SAS (Science And Scientists) and ROSE (The Relevance of Science Education (2002 ---) Member of editorial boards for several international journals. Member of review committees for educational research and national programmes for the promotion of S&T in several countries. **Relevant Publications** Sjøberg, Svein; Schreiner, Camilla (2007). Perceptions and images of science and science education. I: Communicating European Research. Dordrecht, The Netherlands: Springer Publishing Company. Sjøberg, Svein; Schreiner, Camilla (2006). Science education and youth's identity construction -- two incompatible projects?. I: *The Re-Emergence of Values in Science Education.* The Netherlands: Sjøberg, Svein (2007). Science education: An interdisciplinary field. I: *The Culture of Science Education. Its History in Person.* Rotterdam/Taipei: Sense Publishers Sjøberg, Svein; Schreiner, Camilla. How do students perceive science and technology?. Science in Schools 2006;1(1):66-69 Sjøberg, Svein (2008). Constructivism and learning in Baker, E.; McGaw, B. & Peterson P (Eds) (2008) *International Encyclopaedia of Education* 3rd Edition, Oxford: Elsevier (in print) Sjøberg, Svein & Schreiner, Camilla. (2006). How do learners in different cultures relate to science and technology? Results and perspectives from the project ROSE (the Relevance of Science Education). *APFSLT: Asia-Pacific Forum on Science Learning and Teaching,* 7(1), Foreword Schreiner, Camilla & Sjøberg, Svein. (2005). Empowered for action? How do young people relate to environmental challenges? In S. Alsop (Ed.), *Beyond Cartesian Dualism Encountering affect in the teaching and learning of science*. Dordrecht: Springer

Partner no.:	2	Short name:	KCL	Country:	UK
Full name:	King's College London				
Presentation:	**King's College London (KCL)** is one of the top 25 universities in the world (*Times Higher 2007*) and the fourth oldest in England. A research-led university based in the heart of London, King's has 19,700 students from more than 140 countries, and 5,400 employees. King's has an outstanding reputation for providing world-class teaching and cutting-edge research. The College is in the top group of UK universities for research earnings and has an annual income of approximately £400 million. An investment of £500 million has been made in the redevelopment of its estate. King's has a particularly distinguished reputation in the humanities, law, social sciences, the health sciences, natural sciences and engineering, and has played a major role in many of the advances that have shaped modern life, such as the discovery of the structure of DNA. It is the largest centre for the education of healthcare professionals in Europe and is home to five Medical Research Council Centres - more than any other university. From undergraduate to doctoral study, the **Department of Education and Professional Studies** has a proud history of educational research which has contributed to improving practice, debates on public policy and addressing the concerns of professional communities. Fundamental to our activities is a strong and dynamic research culture with 40 academic staff and 13 full-time Professors. Our department is small and friendly enough for staff to know each other and their students and to work across research groups, yet large enough for each group to have a strong core. The **Science and Technology Education Group (STEG) i**s internationally recognised as a centre of excellence in science education. Since the 1970s, staff including Paul Black, Rosalind Driver, Rick Duschl, Michael Shayer and Philip Adey have made major contributions to science education research and to science education in schools. The Chair of Science Education is currently held by Professor Jonathan Osborne, Past President of the National Association for Research in Science Teaching and the Head of the Group is Dr Justin Dillon, President of the European Science Education Research Association. **STEG's** research is organized into six themes: • Learning Science in Informal Contexts • Argumentation, Scientific Literacy and the Science Curriculum • Cognitive Acceleration through Science Education • Teaching Enquiry and Assessment for Learning • ICT and Science Education • Science and Environmental Education Recently Professor Jonathan Osborne and Dr Louise Archer were awarded £950,000 by the ESRC to examine student aspirations and career choices. The study, which will run from January 2009 until December 2013, will include a four year longitudinal study with a random stratified cohort of children from the age of 10 to 14.					

KCL staff CV	
Senior Lecturer **Justin Dillon**	Tel: +44 20 7848 3096; Fax: +44 20 7848 3182 Email: justin.dillon@kcl.ac.uk **Background: Academic Degrees and positions** PhD from King's College London, UK, in 2007 in Education (title of thesis: "Professional Development in the Science Department and the Role of the Head of Department"). Lecturer, then senior lecturer, in science education at the Department of Education and Professional Studies, King's College London, since 1989. President, European Science Education Research Association (ESERA). Editor, International Journal of Science Education. **Relevant research and international cooperation** Project Director, King's contribution to the 'Permanent European Resource Centre for Informal Learning (PENCIL)' project. (EU €4.1m). Project Director, 'Thinking Beyond the Urban Classroom' research project (AstraZeneca Science Teaching Trust, £65,862). Co-Investigator, 'What Can the Matter Be?' research project (EPSRC, £68,300). Extensive experience of teacher education in the UK and elsewhere. Invited keynote speaker US NSTA and IOSTE conferences (both 2008). Experience of EU-funded projects TEMPUS, Comenius, Socrates, etc. involving Bulgaria, Denmark, France, Germany, Italy, Lithuania, Romania, etc. **Relevant Publications** D. Corrigan, J. Dillon and R. Gunstone (eds) *The Re-emergence of Values in the Science Curriculum*. Rotterdam: Sense Publishers. (2007). J. Dillon and M. Maguire (eds) *Becoming a Teacher* (3rd edition), Milton Keynes: Open University Press. (2007). J. Dillon, M. Grace and C. Oulton Some critical reflections on the teaching of controversial issues in science education, *Development Education Journal*, 10(3) (2004) 3-6. D. Jorde and J. Dillon (Eds) *A Handbook of Science Education in Europe*. Rotterdam: Sense. (in preparation). J. Osborne and J. Dillon *Science Education in Europe: Critical Reflections*. London: The Nuffield Foundation. (2008). S. Kendall, J. Murfield, J. Dillon and A. Wilkin *Education Outside the Classroom: Research to Identify What Training is Offered by Initial Teacher Training Institutions.* London: DfES. (2006).

Partner no.:	3	Short name:	LEEDS	Country:	UK
Full name:	University of Leeds				
Presentation:	The **University of Leeds** is among the top ten universities for research in the UK and is internationally acknowledged as a centre of excellence in a wide range of academic and professional disciplines. Our size and international reputation enables us to offer one of the widest ranges of academic courses in the UK. During the current academic year there are over 30,500 students attached to 700 undergraduate and 474 postgraduate degree programmes. A further 31,382 men and women are enrolled on short courses with the University. The **School of Education** is one of the largest in the UK and is an internationally recognised research centre. Our courses are informed by our cutting-edge research, as well as by current educational policy. Our teaching has been highly rated (24/24 by the Teaching Quality Assurance agency) and students can tailor most programmes to pursue their own professional interests. We offer over 30 courses, from undergraduate (BA) and postgraduate (MA, MEd, MSc, PGCert) to research degrees (MPhil, PhD, EdD) and PGCE teacher training. We are proud of the support we offer students to help them thrive within our academic community and get the most from student life. The **Centre for Studies in Science and Mathematics Education (CSSME)** was established in 1971 to promote research and related teaching in science education. It is one of the leading international centres for work in this field and attracts students and researchers, including Visiting Fellows, from all over the world. Members of the Centre are drawn from a number of academic departments within the University of Leeds and from schools and colleges. The Centre offers courses of initial teacher training for graduates preparing to teach at primary or secondary level and prepares students for research degrees (MPhil, PhD and EdD) and Masters Programmes in science and mathematics education. The Centre is part of the National and Regional network of Science Learning Centres for England, as part of the White Rose Consortium. We have also been designated a Marie Curie training site. The international research review journal **Studies in Science Education** is edited from the Centre. The Centre has an international reputation for **policy studies in science education**. This area of work seeks to employ insights from the domains of historical, philosophical and policy studies to examine and critique the many reforms which currently impinge on the science curriculum. Recent projects include the international Relevance of Science Education (ROSE) collaboration (Professor Edgar Jenkins), an analysis of the introduction of Applied Science courses in England (Professor Jim Donnelly), and a study of teachers' experiences of reformed school science education courses for 14-16 year olds (Dr. Jim Ryder).					

LEEDS staff CV	
Dr **Jim Ryder**	Tel: +44 113 3434589; Fax: +44 113 3434683 Email: j.ryder@education.leeds.ac.uk **Background: Academic Degrees and positions** I am a Senior Lecturer in science/physics education, co-ordinator of the physics Postgraduate Certificate in Education (PGCE) teacher training course and a member of the Centre for Studies in Science and Mathematics Education (CSSME). I have a PhD in condensed matter physics and have taught science/physics in secondary schools in the UK. I supervise doctoral students and teach related sessions within the Postgraduate MA in Science Education at Leeds. **Relevant research and international cooperation** My research interests focus on teaching/learning about the nature of science and physics teacher education. I have conducted studies into the assessment of students' ideas about the nature of science at both secondary school and university level. I have also investigated the experiences of students and teachers as they engage in teaching/learning about the nature of science. In addition, my research has examined the development of expertise amongst physics teachers in the early years of their career. Recent projects include an analysis of student learning within a novel school science education course for 14-16 year olds and a national study of teachers' experiences of reformed school science education courses. **Relevant Publications** Ryder, J. & Leach, J. (forthcoming). "Teaching about the epistemology of science in upper secondary schools: An analysis of teachers' classroom talk". Science and Education. Ryder, J., Hind, A., and Leach, J. (2005). "Teaching about the epistemology of science in school science classrooms: Case studies of teachers' experiences." in: K. Boersma, M. Goedhart, O. de Jong and H. Eijkelhof (Ed.) *Research and the Quality of Science Education*. Dordrecht: Kluwer Academic Publishers. Leach, J., Hind, A. and Ryder, J. (2003). "Designing and evaluating short teaching interventions about the epistemology of science in high school classrooms". Science Education, **87(3)**, 831-848. Ryder, J. (2002). "School science education for citizenship: Strategies for teaching about the epistemology of science". Journal of Curriculum Studies, **34(6)**, 637-658. Ryder, J. (2001). "Identifying science understanding for functional scientific literacy". Studies in Science Education, **36**, 1-44.

LEEDS staff CV	
Professor **James Donnelly**	Tel: +44 113 3434608; Fax: +44 113 3434683 Email: j.f.donnelly@education.leeds.ac.uk **Background: Academic Degrees and positions** **Qualifications** BSc (Hon Chemistry) University College London 1971 PGCE University of Newcastle upon Tyne 1972 MEd (Distinction) University of Leeds 1982 PhD (Chemical education and the chemical industry in the nineteenth and early twentieth centuries) University of Leeds 1989 **Posts held since graduation** Whitehaven Grammar School 1972-6 (teacher of chemistry) Whitcliffe Mount School 1976-83 (Head of Chemistry) University of Leeds 1983-89 (Research Fellow, Assessment of Performance Unit) 1989 (Senior Research Fellow) 1989-94 (Lecturer) 1994-2002 (Senior Lecturer) 2002-4 (Reader in Science Education) 2004 to date (Professor of Science Education) **Relevant research and international cooperation** Leadership of several research projects funded by the UK Economic and Social Research Council dealing with science curriculum reform. Co-ordinator, national evaluation of the 21st Century Science curriculum reform project Chair, Royal Society subgroup on the state of the nation reports, 14-19 education. Participated in the Marie Curie EST Centre in Science Education at CSSME, University of Leeds **Relevant Publications** Bell, J. and J. Donnelly (2005). 'Creating applied science in schools.' *School Science Review* **86**(317): 111-8. Bell, J. and J. Donnelly (in press). 'Vocationalizing school science education.' *International Journal of Science Education*. Donnelly, J. (1999). 'Interpreting differences: the educational aims of teachers of science and history, and their implications.' *Journal of Curriculum Studies* **31**: 17-41. Donnelly, J. and E. W. Jenkins (1999). *The Expertise and Deployment of Science Teachers at Key Stage 4*. Leeds, CSSME. Donnelly, J. and E. W. Jenkins (2001). *Science Education: Policy Professionalism and Change*. London, Paul Chapman/SAGE. Donnelly, J., Ed. (2002). *The Supply of School Mathematics and Science Teachers: Undergraduate Attitudes and Mathematics Teacher Deployment*. Leeds, CSSME. Donnelly, J. (2004). 'Humanizing science education.' *Science Education* **88**(5): 762-84. Donnelly, J. (2005). 'Reforming science in the school curriculum: a critical analysis.' *Oxford Review of Education* **31**(2): 293-309.

LEEDS staff CV	
Proffessor **Edgar W. Jenkins**	Tel: 44 (0)113 2672486 E mail: e.w.jenkins@education.leeds.ac.uk **Background: Academic Degrees and positions** Undergraduate (first class honours, chemistry) and research degrees (with distinction) at University of Leeds. Postgraduate Certificate in Education (with distinction). Fellow, Royal Society of Chemistry; Fellow, Royal Society of Arts. School teacher of chemistry and biology and Head of Science; Lecturer, Senior Lecturer, Reader in Science Education, Professor of Science Education Policy, Head of School of Education, Director of the Centre for Studies in Science and Mathematics Education, University of Leeds. Currently, Emeritus Research Professor. Sometime Editor *Studies in Science Education* and *International Journal of Technology and Design Education,* Editorial Board membership of *Science and Education, Canadian Journal of Science, Technology and Mathematics Education* etc. Editor of UNESCO volumes *Innovation in Science and Technology Education.* Member of the Education Committee of the Royal Society (2000-2006) and of Society working parties concerned with science, technology and mathematics in higher education. Member of International Scientific Committee for IOSTE 2008. **Relevant research and international cooperation** A substantial volume of work concerned with the construction and realization of science education policy for schools. This has ranged from policy studies relating to the national curriculum in science in England and Wales to commissioned work as a consultant for UNESCO and the European Union/ Eurydice Unit. I was responsible for overseeing the ROSE project in England and a member of the international ROSE Advisory group. I am also a member of the Comité d'Evaluation of UMR-STEF at Cachan, France. Successful supervision of numerous doctoral and Master's degree students in science education. **Relevant Publications** *Science education: policy, professionalism and change,* (with J.F.Donnelly), (London: Paul Chapman) 2001. *Guidelines for Policy-making in secondary school science and technology education,* (Paris: UNESCO) 2003 Important but not for me: students' attitudes towards secondary school science in England, *Research in Science and Technology Educationi*¸23 (1) 41-57. The student voice and science education, *Studies in Science education*, 42, 49-88. Educational reform and the take-up of science post-16 (with J.F.Donnelly). In: D.Montagu (ed.) *Increasing up-take of science post-16*, (London: Royal Society). *Science Teaching in Schools in Europe: Policies and Research* (Expert consultant) (Brussels: Eurydice European Unit) 2006.

Partner no.:	4	Short name:	IRI UL	Country:	Slovenia
Full name:	Inovacijsko-razvojni inštitut Univerze v Ljubljani				
Presentation:	The University of Ljubljana possesses a rich tradition. It ranks as a very large university, with more than 63,000 graduate and postgraduate students. Approximately 4000 higher education teachers are employed in the 22 faculties, 3 arts academies and one university college. The university was founded in 1919 on the basis of centuries of educational tradition, remaining the only Slovenian university for half a century. The University is based in Ljubljana, the capital of Slovenia, a relatively large Central-European city with over 300.000 inhabitants. Students account for more than one-seventh of the population, giving the city a youthful and lively character. The University of Ljubljana has set itself seven strategic objectives by which it desires to contribute towards higher quality, cohesion and a reduction in the time between creating, obtaining, transferring and applying knowledge. These objectives are: increasing the scope and quality of research and development work, introducing study programmes in line with the Bologna process principles, strengthening and enhancing international cooperation, increasing the flow of knowledge into practice, establishing a comprehensive system of quality monitoring and assurance, development of supplementary activities, and strengthening mutual cooperation among autonomous members. To this end the University had in the year 2007 also set up an innovation and development institute and service for technology transfer – Innovation and research Institute IRI UL, a non-profit research and development institution with significant participation also from leading Slovenian industry. The mission of the IRI UL is to identify the research and development needs of the Slovene economy and competencies of researchers at the University of Ljubljana. The task of IRI is also to develop and manage research and development projects; to protect the intellectual property of the University of Ljubljana; to establish the entrepreneurial partnership between the industry and the University and to transfer the research and development outcomes into commercial applications for public use and benefits. IRI UL operates as a supporting network for transferring knowledge and innovation. Therefore IRI will establish a long run and reciprocal partnership between University of Ljubljana, Slovene industry and public institutions in order to foster research and development activities. Regarding the referring facts, the IRI UL is understood as one of the most ambitious projects of the University of Ljubljana. IRI UL is established in order to perform interdisciplinary, scientific, research, development and technical projects. Therefore it is important that it has access to the intellectual capital of the University of Ljubljana in order to effectively manage and develop national and international research and development projects at the highest level. Ambitious management of the IRI UL possesses the valuable experiences in leading and managing these projects as well.				

IRI UL staff CV	
Associate professor and scientific advisor Dr. **Slavko Dolinšek**	University of Primorska, Faculty of Management (associate dean for R & D) University of Ljubljana, Faculty of Mechanical Engineering, (researcher) IRI University of Ljubljana Email: slavko.dolinsek@guest.arnes.si Tel: + 386 40 626 902 Prof. Dr. Slavko Dolinšek finished his PhD in the field of automation and production cybernetics. He did his postdoctoral studies at the University of California - Berkeley, and also finished the international MBA study. Since 1998 he is a professor of "Manufacturing technologies and systems" at the University of Ljubljana and "Technology management" at the University of Primorska, and he is currently taking a position as the chief executive for IRI (institute of Research and Innovation), established from University of Ljubljana. For several years he has been working as a researcher in various basic research projects established by Slovenian governmental institutions, and in applicative research projects for the Slovenian industry in the field of production engineering (TQM, technology and knowledge transfer, technology and production management, rapid tooling and rapid manufacturing). He has been intensively involved in the research of practical industrial problems, and consultancy in production engineering and management. At the last five years published more than 100 scientific and professional papers and is also a member in many institutions, boards and groups: • Senior editor of international journal IJSS (ISSN 1740-8849), • LwG (learning with Games) member of International scientific Committee, • THERMEC (Proc & Manuf. Advanced Materials) member of Scientific Committee, • TMT (Trend in Manufacturing Technologies) member of Scientific Committee, • Member of the Management board of Slovenian association for quality (SZK), • Member of the project group SLORITS – Regional Innov. and Tech. Tr. for Slovenia, • Member of the project group IN-Prime – Reg. Innovation System of Primorska, • Member of the project group "University incubator of Ljubljana", • Leader of the research group at the RTCZ (Regional technological center Zasavje), • Member of the professional board of TIA (Technological Agency of Slovenia), • Member of the managing board of TPM Slovenia (Technological Platform Manufuture), • Member of MB and chairman of the N&R WG of TP RM (technological platform on RM). National coordinator and partner at some international projects: • GEM - Global education in Manufacturing, 5. FP EU, IST 2001-32059, • LSADCT – Laser Sintered Tools for Aluminum Die-Casting, Eureka E!3372, • Custom-fit - A knowledge-based manufacturing system, established by integrating Rapid Manufacturing, IST and Material Science to improve the Quality of Life of European Citizens through Custom-fit Products, IP 6 FP, IST-NMP-1, No. 507437-2, • VM - Virtual Manufacturing, Slovenian-Croatian project of bilateral scientific cooperation, 2007-2008 • ROSE – Relevance of Science Education - Slovenian-Norwegian project of bilateral scientific cooperation, 2007-2008

IRI UL staff CV	
Natasa Glodez	Natasa Glodez, graduated at the Department of Pedagogy and Department of English at the Faculty of Education, University of Maribor, Slovenia. In her diploma paper she covered the area of teachers' and special educators' burnout and with empirical findings contributed to the development of this specific field. She published an article about teachers' and special educators' burnout in the School counsellors magazine. Natasa became a postgraduate student studying pedagogical science. At present she is finishing her MA thesis with the emphasis on emotional, social and moral characteristics of gifted children from different environments. Her article about emotional intelligence with gifted children has been published in the School counsellors' magazine. She has been working as an English teacher and school counsellor for six years. During this period she has been involved in different projects. In association with University of Exeter, Institute for pedagogical science and National school for leadership in education she has been educated and trained to become a national teacher trainer for citizenship and currently runs workshops for teachers who are interested in broadening their knowledge in that field. Also her article about teaching citizenship through English as a second language has been published in Whole school approach to citizenship by Institute for pedagogical science. Being a team leader at her school she is working on implementing European language portfolio for children. She speaks English fluently and understands German, Croatian and a bit of French. She is competent in using the SPSS programme for empirical research. **Relevant Publications** ROLSTÅDAS, Asbjørn, DOLINŠEK, Slavko. Global education in manufacturing: basic framework, industrial survey and possible implementation. *Managing global transitions*, 2006, vol. 4, no. 3, pp. 261-278 PISKAR, Franka, DOLINŠEK, Slavko. Implementation of the ISO 9001 : from QMS to business model. *Ind. manage. data syst.*, 2006, no. 9, vol. 106, pp. 1333-1343. CERINŠEK, Gregor, DOLINŠEK, Slavko, OLIVIERA, Manuel. Using critical incident technique with serious games as the next step in organizational competence development. Conference Learning with Games, Sophia Antipolis, France, 24th - 26th September 2007. pp. 41-47. DOLINŠEK, Slavko, TRUNK ŠIRCA, Nada, LESJAK, Dušan, ŽIŽMOND, Egon. Some governmental measures and youth perception related to the engineering education in Slovenia. V: *Proceedings of the XII IOSTE symposium*. Penang, Malaysia: School of educational studies: University Sains Malaysia, 2006, pp. 431-437. DOLINŠEK, Slavko, ISTENIČ STARČIČ, Andreja, KOPAČ, Janez. Education for manufacturing - from discipline to the competency based approach. *International IMS Forum, Cernobbio, Italy, 17-19, May 2004: global challenges in manufacturing*. 2004, pp. 1354-1362.

IRI UL staff CV	
Anita Trnavcevic	Anita Trnavcevic is currently employed as associate professor at the University of Primorska, Faculty of management in Koper, Slovenia. She started her career as teacher in 1982, became the head of Hospital school in 1987. In 1996 she took a position at the National School for Leadership in Education. Since 2000 she has been working at the UP, Faculty of management Koper. She has also been engaged in the project of transforming the College into Faculty. Currently, she is involved in some European projects and networks, such as an international ENIRDELM network as well as in Slovenian research projects. She also provided consultancy to international agencies. The areas of her research work are marketisation of public education, policy analysis and qualitative methodology. Within these areas she focuses on questions of equity, participation and quality.

IRI UL staff CV	
Advisor and researcher **Tina Hribar Trifunović**	Institute for Innovation and development of University of Ljubljana (IRI UL) Contact data: tina.hribar@iri.uni-lj.si Mobile: + 386 40 61 91 33 Tina Hribar Trifunović graduated at the department of Sociology at the Faculty of social sciences, University of Ljubljana, Slovenia. In her diploma thesis »Alternative(s) in education – "educare"« she studied and analyzed different ways that this alternative system can benefit the public school system in Slovenia. Her experiences regarding her work as a volunteer in a non profit organization (where she held the position of national youth coordinator for character development for many years) serves as valuable background for her professional work in the field of education and research. Professional experiences: Faculty of Social Sciences: • 2006: She has been working for the past two years at the Faculty of social sciences as employment advisor. IRI UL: • 2008: she joined the research team at IRI UL as advisor and researcher and is currently working on national and European projects such as (CERIM and CRP).

Partner no.:	5	Short name:	OBSERVA	Country:	Italy
Full name:	Observa				
Presentation:	**Observa – Science in Society** (www.scienceinsociety.eu) is a non-profit organization which promotes the study and discussion of the interaction between science and society, stimulating dialogue among researchers, policy makers and citizens. Observa **plans, supervises and evaluates initiatives** aimed at citizens involvement in science, technology and environment issues. Among them are the *First Italian Science in Society Forum* (2005) and the *Festival "Science and Society meet in Architecture*" (2007 and 2008). It also **conducts research studies on the public perception and media representation** of science, technology and environment related issues and institutions. With its *Science in Society Monitor*, based on a representative sample of more than 1000 interviewees and published on Il Sole 24 Ore, Observa regularly surveys the relationship between citizens and science in Italy. Its yearly publication *Science in Society Facts and Figures* summarizes data and information to help understand the state and transformation of research and innovation in our society. Both initiatives are supported by the Foundation Compagnia di San Paolo. In 2008, Observa also published the first edition of *Women and Science. Italy and the International Context*, a collection of data and information on women in science and on science for women, realized in cooperation with UNESCO office in Venice. **Observa participated in several European projects**, such as *Biopop* (a pilot study on innovative approaches to public communication of life sciences by students and young researchers); *Esconet* (the European Science Communication Workshops), *Decide* (Deliberative Citizens' Debates in European science centres and museums) and the ongoing *Macospol* (Mapping Controversies on Science for Politics). It has established **collaborations with several national and international organizations**, including the European Commission, UNESCO, CERN, University College London, University Pompeu Fabra Barcelona, Austrian Academy of Science, YEBN. In line with its mission of fostering an informed debate on science in society issues, keeping a balanced and independent point of view, Observa is not affiliated to any private or public organization. Activities are funded through specific projects, members' contributions and donations.				

OBSERVA staff CV	
Dr. **Valeria Arzenton**	Tel: +39 0444 305454; Fax: +39 0444 305454 Email: v.arzenton@observanet.it **Background: Academic Degrees and positions** Degree in sociology at the University of Trento (IT) in 2001. Her final thesis was about the meaning of the 'New Economy and Service Society' in the context of recent transformations in contemporary society. Master's in e-business management at CUOA Foundation Business School, Vicenza (Italy) She is curently responsible for 'science in society' research activities at the Association Observa – Science in Society. **Relevant research and international cooperation** Her main research interests are in the area of sociology of science, in particular public communication of science and the role of public participation in the governance of techno-scientific innovation. Her work focused on food safety and biotechnology issues, with specific attention to public perception of food-related risks. She took part in several european projects, cooperating with CERN; biotechnology associations (ANBI in Italy, YEBN in Europe), University Pompeu Fabra Barcelona, European Commission Currently, she is interested in gender issues in science. She performed a study on researchers' perceptions on gender differences in research and she is in the editorial team of "Women and Science 2008", a book published in cooperation with UNESCO Office in Venice. **Relevant Publications** Arzenton V. et al (eds), *Women and Science 2008. Italy and the International Contex*t, Vicenza: Ergon Edizioni, 2008 Arzenton V. et al (eds), *Science in Society Fact and Figures*, Vicenza: Ergon Edizioni, 2005; 2006, 2007, 2008, Arzenton V. et al: "Women and science: can we break the glass ceiling? A research into gender differences in European scientific research", in Da, La rivista per superare le barriere culturali", Anno VIII, n° 3, December 2007. Arzenton V, Neresini F., Ravarotto L., *Safety at Table. Public Perception of Food Related Risks in Veneto Region*, Vicenza: Ergon Edizioni, 2005. Arzenton V, "GMO, not in my dish" Bucchi M. and Neresini F.(eds), *Cells and Citizens. Biotechnology in the public sphere*, Milano: Sironi Editore, 2006. She also contributes to the Italian newspapers' supplements *TuttoScienze - La Stampa* and *Nova24-Il Sole 24 Ore*

OBSERVA staff CV	
Professor **Massimiano Bucchi**	Tel: +39 0444 305454; Fax: +39 0444 305454 Email: m.bucchi@observanet.it **Background: Academic Degrees and positions** Ph.D from the European University Institute, Florence – Italy, in 1997in Social and Political Science. He received several awards and recognitions including the RAI television prize for research in mass communications (1996), the Mullins award for the best Sociology of Science graduate paper (1997), the Lelli prize for the best Sociology dissertation discussed in Italy (1998). He is associate professor in Sociology of Science at the Faculty of Sociology, University of Trento, Italy and Observa Steering Committee's chair. He has been consultant for several public and private agencies, such as Rai (Italian Public Television) and Cern and served as evaluator for EC projects submitted under the 5th and 6th framework programme of DG Research (1999, 2001 and 2006). **Relevant research and international cooperation** His main fields of interest include public communication of science, representation of science and technology in the mass media, and the role of citizens in the governance of technoscientific innovation. He has carried out research and given seminars at several research institutions, such as Sussex University, ETH Zurich, University of Wisconsin, University of California Berkeley, Royal Swedish Academy of Sciences, University of Edinburgh, University of Tokyo, Museu da Vida Rio de Janeiro. He is member of the International Public Communication of Science and Technology (PCST) Scientific Committee. **Relevant Publications** Her published several book, such as: Bauer M, and Bucchi M. (eds.), *Journalism, Science and Society: Science Communication Between News and Public Relations*, New York: Routledge, 2007 Bucchi M, *Choosing the world we want. Citizens, Politics and technoscience*, Bologna: il Mulino, 2006 Bucchi M (eds), *Sapere Fare Potere. Verso un'innovazione responsabile. Le lectures della Fondazione Giannino Bassetti, 2002-2005*, Cosenza: Rubbettino, 2006 Bucchi M. and Neresini F.(eds), *Cells and Citizens. Biotechnology in the public sphere*, Milano: Sironi Editore, 2006 Bucchi M, *Science in Society. An Introduction to Social Studies of Science*; London and New York: Routledge, 2004. Bucchi M, *Science and the Media, Alternative Routes in Scientific Communication*, London and New York: Routledge, 1998 He also published several articles in international journals such as Public Understanding of Science, Nature, History and Philosophy of the Life Sciences and The British Journal of History of Science and he cooperate with several italian newspapers' supplements, such us TuttoScienze – La Stampa; Nova24, Il Sole24ore.

Partner no.:	6	Short name:	KU	Country:	Denmark
Full name:	University of Copenhagen, Department of Science Education				
Presentation:	**The Department of Science Education (DSE)** is an independent unit of the Faculty of Science at the University of Copenhagen. The Department does research, development work, communication and teaching within the field of science didactics and science education (including mathematics). It has activities on all educational levels, but mainly within upper secondary and tertiary education. With a staff of 12 on March 2008 DSE is the largest Danish actor in science education research. **Research at DSE** The research is concentrated on three areas: • *Didactical design of science education*: Learning theory, design tools, design aspects, educational practices, and motivational aspects. • *Relationships between science as a research profession and a school/university subject*: Curriculum development and implementation, approaches to teaching and subjects, epistemological aspects of science education, science study patterns. • *In- and pre-service teacher education at tertiary and upper secondary level*. Research is carried out both within the formal educational system and informal learning settings such as museums and science centres. **Development work at DSE** The development work at the Department is carried out by consultants and researchers in cooperation with academic and administrative staff of the Faculty of Science at large. The purpose is to provide research based support of the quality development of the science study programmes at all levels: the Department works with individual courses and modules, with entire study programmes as well as with faculty-wide projects. **Teaching at DSE** The Department has among its purposes to bring didactical and pedagogical knowledge to faculty staff and students as well as courses for PhD.-students within science didactics. In particular, the Department is in charge of the pedagogical training of newly appointed assistant professors. Furthermore, ad hoc workshops and short courses to a variety of users are presented. Some of these activities are open to students and staff from other universities. **Presentation and imparting of research and development results** DSE has as a major commitment to communicate and impart knowledge about science education. This is done through • NAFADISE - a series of seminars for all with interest in science education, especially concerning university level. • DidakTips – a collection of papers dealing with actual and practice oriented pedagogical problems. • A collection of research papers. • MONA – a peer reviewed journal for teachers in science and mathematics at all educational levels throughout Denmark. DSE has a solid experience with evaluation of and research in education at all levels, and it has a widespread international network. It is at present coordinating research projects between different Danish institutions and is involved in international projects as well.				

KU staff CV	
Associate professor **Lene Møller Madsen**	Tel: +45 35320459; Fax: +45 35321010 Email: lmmadsen@ind.ku.dk **Background: Academic Degrees and positions** PhD from the University of Copenhagen, Denmark 2001 in Geography Researcher in environmental science (2001-2005) at Forest and Landscape, Ministry of Environment. Post-doc, then associate professor at Department of Science Education in science education at higher education (2005-). **Relevant research and international cooperation** Recent and ongoing research projects include 'research and teaching' and 'spatial thinking'. The first focus on discipline differences between research and teaching within research-based universities. The second is situated within the discipline of geography and finds that gender seems to plays an important role for learning strategies and raises questions on how learning strategies are related to teaching practice. Teaching in 'science education' courses in higher education and 'introduction to University Pedagogy' for assistant professors and PhDs. Supervision of Master students. Some experience with EU-funded projects through the 'LandEconet' project, led from Institute of Terrestrial Ecology, Monks Wood, UK. Visiting fellow at University of Bristol (2004) and Cheltenham & Gloucester College of Higher Education (1998). **Relevant Publications** Winsløw, C. and Madsen, L.M. Interplay between research and teaching from the perspective of mathematicians. *Proceedings of the 5th congress of European research in mathematics education* (Cerme), Larnaca, Cyprus, in press. Madsen, L.M. Geographical Information Systems and the reshaping of geography learning. For the symposium on '*Learning and professional development through computers*' at the EARLI (European Association for Research on Learning and Instruction) in Budapest, august 2007. Holm. C., Laursen, K.B., og Madsen, L.M. *Midtvejsevaluering af "Naturvidenskab for alle – Naturvidenskabeligt grundforløb" under DASG*, Institut for Naturfagenes Didaktik, Københavns Universitet, 2007. [Midterm evaluation of the project 'Science for all' under Danish Science High Schools] Madsen, L.M. and Winsløw, C. GIS as an artefact in geography education: some future challenges. *Proceedings of the London Conference: Changing geographies: innovative curricula.* Edited by Simon Catling and Liz Taylor. Herodot and International Geographical Union, Commission for Geographical Education. (2007), 207-212. Madsen, L.M. (2006): Informing teaching practice: using knowledge of students' perception of GIS and their GIS-learning strategies. *Papers of the Applied Geography Conferences* 29 (2006), 360-369. Madsen, L.M. and Adriansen, H.K. Knowledge constructions in research communities: The example of agri-rural researchers in Denmark. *Journal of Rural Studies* 22 (4) (2006), 456-468.

KU staff CV	
Associate professor **Jens Dolin**	Tel: +45 35320420; Fax: +45 35321010 Email: dolin@ind.ku.dk **Background: Academic Degrees and positions** I have a M.Sc. in geography and physics from University of Copenhagen and a Ph.D. in science education from University of Roskilde (2003). I have been an upper secondary teacher for many years, gradually moving into pre- and in-service teacher training and educational research. **Relevant research and international cooperation** I have done research in teaching and learning science (with focus on dialogical processes, forms of representation and the development of competencies), general pedagogical issues (bildung, competencies, assessment and evaluation) and organizational change (reform processes, curriculum development, teacher conceptions). I have during the last years been leader for a number of cross institutional research projects (Validation of PISA in a Danish context, Motivation and Learning, Potentials and Barriers for School Development and others) and for the doctoral school for pedagogical research at University of Southern Denmark. I have been engaged in the development and implementation of the new science curriculum for the Danish Upper Secondary School. I am member of the executive board of ESERA (European Science Education Research Association) and have been member of the PISA Science Forum 2006 which formulated the Science Literacy Framework for the PISA 2006 science test, and I have participated in international working groups about science education (i.e. arranged by the Nuffield Foundation, IPN in Kiel and others) and am peer-reviewing international and national journals. **Relevant Publications** Jens Dolin (2007). Science education standards and their assessment in Denmark. In D. Waddington, P. Nentwig, S. Schanze (eds.). Standards in science education. New York/Berlin: Waxmann. Jens Dolin (2007). PISA – An Example of the Use and Misuse of Large-Scale Comparative Tests. In S. T. Hopmann, G. Brinek, M. Retzl (Eds.). PISA zufolge PISA –PISA According to PISA. Wien/Berlin: LIT Verlag. Jens Dolin (2006). A Comparative Analysis of the PISA 2006 Science Framework and the Danish Goals for Science Education in compulsory school. University of Southern Denmark. Jens Dolin (2005). Teacher reactions to organisational development. Paper presented at the ECER2005 Conference in Dublin, 7.-10. September 2005. Jens Dolin (2004). Changing aims in compulsory physics education – from qualifications to competencies. Paper presented at GIREP2004, Ostrava, 19th of July 2004. Jens Dolin (2001). The Use of Multiple Representations in Physics Education. Paper presented at the Third International Conference in ESERA (European Science Education Research Association), Thessaloniki.

KU staff CV	
Associate professor **Lars Ulriksen**	Tel: +45 35320338; Fax: +45 35321010 Email: ulriksen@ind.ku.dk **Background: Academic Degrees and positions** PhD from the Roskilde University, Denmark in Educational Studies. Thesis about the construction of professional teachers in vocational training programs. Assistant professor, then associate professor at Department of Educational Studies, Roskilde University in Educational Studies (1995-2005). Associate professor at Danish Educational University in teaching and learning at higher education (2005-2007). Associate professor at Department of Science Education in science education at higher education (2007-). **Relevant research and international cooperation** UNIPÆD-project – a research and development project at Roskilde University with particular emphasis on students' experiences of studying. Expectations of university studies. The meeting between students, teachers and university within physics at the universities of Copenhagen and Roskilde. Interests and learning environments at htx (technical upper secondary school). Teaching at teacher training programmes for assistant professors and PhD-supervisors at various Danish Universities. Teaching and supervising undergraduate, master- and PhD-students. Some experience with EU-funded projects through the LEONARDO-project led by AMU-center Randers, Denmark. **Relevant Publications** Ulriksen, L & Holmegaard, H.T. (2007): "Rigtige piger går ikke på htx, men piger er glade for at gå der." In *MONA*, 2 (nr. 2), s. 29-46. Ulriksen, L. (2006): "The Implied Student." Paper presented at the NFPF/NERA congress, Sweden, March 2006. Rump, C. & Ulriksen, L. (2005): "Should Physics Be Fun?". Paper presented at the 11th biennial conference for European Association for Research on Learning and Instruction (EARLI), Cyprus, August 2005. Ulriksen, L. (2003): "Børne – og ungdomskultur og naturfaglige uddannelser." in Busch, H. et.al. (eds.): *Inspiration til fremtidens naturfaglige uddannelse. En antologi.* Uddannelsesstyrelsens temahæfteserie nr.8 – 2003. København: Uddannelsesstyrelsen, Undervisningsministeriet. (Available at the website: www.fremtidensnaturfagligeuddannelser.u-net.dk/notater.htm) Ulriksen, L. (2003): "Hvad skal de studerende lære i fysik? Et lærerperspektiv." i Andersen, N.O. & Laursen, K.B. (red.): Studieforløbsundersøgelser i naturvidenskab – en antologi. København: CND-KU skriftserie nr.2003-05, Københavns Universitet. Illeris, K., Katznelson, N., Simonsen, B. & Ulriksen, L. (2002): Ungdom, identitet og uddannelse. Frederiksberg: Roskilde Universitetsforlag.

B 2.3 Consortium as a whole

The composition of the IRIS consortium is designed to represent expertise in a variety of research areas and research methodologies. The work packages allow for a variety of themes, tools and models for gathering, developing, spreading and evaluating knowledge within fields as recruitment, interest, attitudes and gender. The consortium and the deliverables are developed to allow the researchers to work together to explore in depth the mechanisms in young peoples' priorities related to choice of higher education, as well as to allow for the transfer of perspectives across national boundaries. We will use the consortium to learn from each other, critically reflect on practices and existing policies and to export ideas across national boundaries. We believe the composition of the consortium provides a unique balance of expertise within the field, in geographical distribution in Europe and in coverage of essential topics within recruitment, retention and gender issues in STM upper secondary and higher education.

The issues to be addressed by the call, and which we have concretised in the aims of this project and in the work packages, are by nature interdisciplinary. They require a consortium of partners that individually, as well as a group, cover a wide field of expertise. To be concrete, the issues to be addressed requires

- expertise in SMT teaching and learning at different levels, from secondary school to (in particular) tertiary education.
- theoretical and empirical background in gender studies, in particular related to STM issues
- background in issues related to science in society, in particular sociology of science, and with special emphasis on issues related to challenges in tertiary education
- experience, qualifications and contacts related to public and media presentation and dissemination of results and perspectives to policymakers in industry as well as in the education system

The institutions and persons in the present IRIS consortium have been selected to cover the kind of qualifications, experience and contacts indicated above. The persons and institutions also have the needed overlap in experience and interests that are required for productive communication and cooperation.

Some details about the consortium partners in relation to the above points (details are given in CVs).

UiO: University of Oslo, Norway, represented by three science educators, coming from two different faculties (Faculty of Science and Mathematics and Faculty of Education) and the third from the National Centre for Science Education. This research group are pioneers in science education research in Scandinavia, and have for a long time worked on science teaching and learning at all levels of the education system. Social and cultural aspects of science education have been central to their activities, and gender aspects of SMT education have been a central concern, also for their internationally oriented activities. The research group has been active in national as well as EU and OECD policies and activities related to science and society issues. The applicants hold key positions in international SMT education organizations and experience from organizing and running the ROSE project. Together, this research group is in a good position to draw on its international network to organize and coordinate the IRIS project. They also have wide experience in public discussions, dissemination and working with policymakers.

KCL: King's College, London is represented by the Science and Technology Education Group from the Department of Education and Professional Studies. This university is ranked among the top universities in the world, and the science educators are widely known and influential internationally. The researcher in the IRIS consortium holds the position as president of a major international association for science education research (ESERA). He is also a key person in national as well as international advice and recommendations regarding SMT education in schools as well as tertiary education. The issues related to this call (like gender, interest, recruitment and social aspects of SMT) have been the important issues for this group for a long time.

LEEDS: The University of Leeds, England, is represented by three researchers from the Centre for Studies in Science Education at the School of Education. This research group has, for more than 35 years, held a special role in the international development of policy and research in SMT education. Many of the worlds' leading SMT educators and policymakers have spent years in this group, taking academic degrees (Master or PhD level), often trough international exchange programmes like the Marie Curie site program. They have also established the most influential international journal in the field, and have been responsible for the UNESCO series on Innovations in Science and Technology education. This research group is actively involved in SMT policies at the national as well as international level, and gender and recruitment has been an issue in much of their efforts.

KU: University of Copenhagen, Denmark, represented by three researchers from the Department of Science Education at the Faculty of Science. This department has a key role in recent Danish policies regarding the recruitment of more scientists, in particular women. Their special field of expertise is related to teaching science at the tertiary level. Gender studies have been an important concern for this research group for a long time.

OBSERVA – Science in Society, Italy, is a non-profit organization which promotes the study and discussion of the interaction between science and society, stimulating dialogue among researchers, policy makers and citizens. Observa plans, supervises and evaluates initiatives aimed at citizens' involvement in science, technology and environment issues. It also conducts research studies on the public perception and media representation of science, technology and environment related issues and institutions. Observa has participated in several European projects, and has established cooperation with several national and international organizations, including the European Commission, UNESCO and CERN.

The two IRIS applicants from Observa have backgrounds in sociology, in particular Sociology of Science. They do research, and are active in issues related to public communication of science and the role of public participation in the governance of techno-scientific innovation. In 2008, Observa also published the first edition of *Women and Science. Italy and the International Context*, a collection of data and information on women in science and on science for women. The applicants have won several awards for research in mass communications.

IRI UL: The University of Ljubljana, Slovenia, is represented by two researchers from the newly established Innovation and Research Institute. This university is by far the largest and most prestigious institution for tertiary education and research in Slovenia. The mission of IRI UL is identify research and development needs in Slovenia and develop and manage research and development projects. This unit is one of the most ambitious projects of the University of Ljubljana. The researchers involved (including the chief executive) have a wide international network in management and administration of in the fields of

entrepreneurship, production engineering, technology and knowledge transfer. With the strong expertise in technological and industrial management, including the recruitment to SMT, with special focus on gender, this group adds valuable competencies to the consortium.

In conclusion, the IRIS consortium covers the whole area of fields and competencies required for the present call. The composition reflects the interdisciplinary nature of the proposal. Seen a whole, the consortium also covers highly different target groups and audiences and has contacts inside as well as outside an academic community. These range from scientific communities in higher education, future scientists and technologists in their studies, future teachers in teacher training as well as teachers in schools and in-service training. Some of the consortium institutions are in S&T-education area, while others are in the social sciences and in public administration. Each of them has wide national and international networks and a strong profile in media and public debate. Several of the persons behind the application are heavily involved as leaders in international SMT professional organizations. They are also involved as advisors and evaluators of SMT policies at a national as well as international level. Details appear in the descriptions of the institutions as well as the CVs of those involved in this application.

But an even wider network, in particular for the collection and analysis of additional, relevant data is constituted by what we call the *associated partners*. More than 30 countries have submitted letters of intention for participation. These letters were included in the Appendix to the original IRIS project proposal. These associated partners will not be directly involved in the initial stages of the project, but they will be invited to use the instrument(s) developed by the IRIS consortium to collect data in their respective countries. No funding for data collection in these associated partner countries will be provided through IRIS; however, in WP2 and possibly other WPs, the IRIS consortium may spend time importing data from associated partners into the IRIS Q data file and performing some cross-national analyses and comparisons. The associated partners may also, individually and as a group, analyse their own data and make international comparisons. In each of these countries, these partners will be the key persons and institutions to disseminate results, to raise public debate and to influence policymakers in institutions as well as on the national level.

B 2.4 Resources to be committed

All consortium partners will commit significant organizational, professional and technical resources to the project. These include well established infrastructures and professional networks at the respective institutions. Organizational resources include office facilities with networked computers, conference rooms, and research space appropriate to the work to be carried out by each IRIS partner. Partners also have access to library facilities, research databases and so forth.

In addition to the head researchers described in section B2.2, each IRIS partner institution has access to professional and research expertise along with other human resources to help accomplish the aims of IRIS. This includes assistants and PhD students, post-docs etc. With most IRIS partners, the work to be conducted in IRIS fits in with the general research portfolio at the institution, so that significant synergy effects may be expected.

The project costs of IRIS are mainly personnel and travel and arrangements expenses. There will also be some expenses associated with data collection. There are, however, costs related to the project that will be covered by sources outside the requested EU contribution.

The purpose of IRIS is to bring together research groups with experience relevant to IRIS' aims and to create synergy effects across the partner institutions on a European level. For this purpose all partners bring with them on-going relevant research activities or scientific knowledge produced at their institutions into the consortium activities. These research activities have their funding from other sources such as universities, diverse funding bodies and grants as well as other EU funds.

For instance, at the coordinator institution, the University of Oslo, the Vilje-con-valg project is already established and will serve as a pilot for the international IRIS study. The Vilje-con-valg project already has two PhD students, financed by UiO and industry, respectively. There will be considerable interaction between Vilje-con-valg and IRIS. Moreover, the three persons in the scientific staff working with IRIS in Oslo have 50 percent and 100 percent, respectively, of their time for research (the other 50 for teaching), and will spend a large proportion of this research time on IRIS. Thus, considerable resources in addition the EU funds we apply for are available for the project. In Denmark a similar situation may arise since this IRIS partner is also planning to make a national pilot and apply for additional national funds for a PhD scholarship.

Partners in the IRIS consortium are generally interested in working with IRIS as a part of their on-going portfolio, and interactions of the kind described above are found with most research partners in the network. For instance, in 2008, OBSERVA published the first edition of *Women and Science. Italy and the International Context*, a collection data and information on women in science and on science for women which will be an important platform for their work in IRIS.

The joint mobilisation of resources between the EU Science in Society program and the partner institutions in the consortium will bring considerable added value to STM recruitment and retention research in Europe.

B 3 Potential Impact

B 3.1 Strategic impact

The lack of competent workforce in the STM area is challenging the development of a range of Western societies. Development in STM is seen as an engine in the welfare state and as crucial for finding new and more sustainable solutions for how we can live our lives in a more sustainable way. The overarching goal of the IRIS project is to increase the recruitment of young people in general and the proportion of girls in particular in STM educations and careers. As will be apparent from the above sections, the project seeks to develop knowledge of direct relevance to policymakers and stake holders in business, industry and the educational sector and thereby to contribute to a long-term improvement of the recruitment to and the gender balance in STM. The project as it is described here, will gather data on an international level, which will yield opportunities for international comparisons and for learning from each other.

The STM recruitment challenges are common to most European (and OECD) countries (e.g. EU, 2004). This means that some rethinking of the ways STM is communicated and taught in university curricula needs to be done across the European context. At the same time, Europe is still in the dawn of the Bologna Process, an educational reform developing the European Higher Education Area (EHEA) with students, higher education staff and policy-makers from 46 countries (including all the IRIS countries). IRIS will yield adequate recommendations and guidelines for creating an STM higher education that appears as attractive and meaningful for male and female students of Europe. Recruitment, retention and gender equity in STM EHEA and research is what project IRIS is about.

The consortium consists of institutions from five different European countries. Moreover, the large number of associated partners enables an even wider international (indeed global) perspective on the issues. Most partners are already involved in national, European, OECD and UNESCO initiatives in STM education, in particular related to recruitment and gender.

The development of IRIS and its work packages will also bring in other actors as part of the process: In each country, there will be meetings and seminars with representatives from national educational and research authorities as well as for the relevant interest groups in the STM sector in education and industry. Consortium representatives in each country will have two national conferences as the programme progresses, one as part of the planning, one towards the end of the project period. There will also be an international seminar or a major dissemination event for dissemination of results, discussions of conclusions, recommendations and possible impacts. In addition, there will be communication of results and participation in discussion through relevant channels such as journals and conferences through the whole duration of the project. Empirical results and theoretical perspectives emerging from IRIS are likely to get a wide audience and a direct impact on debates and on policies in national as well as international contexts.

The recent concerns for recruitment to science and technology careers in Europe have forced educators and policy makers to take a critical look at the way science is taught. Action must be taken so that our students have the best possible offerings in STM education.

The members of the IRIS consortium are all key players within STM education in Europe, and have been purposely chosen to participate and contribute in IRIS. We recognise the need for improving the understanding of recruitment, retention and gender patterns in STM higher education and how these can be improves to meet the European societies' need for such competency.

The member of the IRIS consortium network are also chosen to work together because we have experience on working with research and development projects at the secondary and tertiary level of STM education. We recognise and applaud the many research projects going on at the primary and lower secondary level for improving the science teaching. However, understanding the subject choice of students at secondary and tertiary levels requires *different* models and methods from those at lower levels. A deeper understanding of success factors for recruitment, retention and gender balance in STM and of how STM recruitment initiatives and teaching can be contextualised to meet the priorities of young people of Europe is what is needed for bringing about changes.

The IRIS project is committed to integrate recruitment perspectives into senior secondary and tertiary STM teaching and communication. The work packages are designed to accumulate and develop our common knowledge. We intend to study models of STM recruitment at two levels: A first level of investigation aims at setting the scene and summing up. In WP2 and WP3 we work together to reveal gender patterns, national policies, curricula frameworks and recruitment designs across European traditions. This exercise can provide us with an overview of "what is" and "what might be" within the scope of European recruitment efforts in STM. A second level of investigation allows for in depth studies of three related but distinct areas within the recruitment issue: Young peoples' priorities and choices, reasons for dropout and success factors for recruitment initiatives (WP4, WP5 and WP6). Output and deliverables from all WPs will be disseminated from WP7. This work package will make intense effort to establish contact with national and international networks of policy- and curriculum-makers, stakeholders in secondary and tertiary education, researchers, teacher organisations as well as organisation for science journalism and communication for gathering at seminars and conferences.

In sum these levels will enlarge our possibility of understanding, describing and disseminating the IRIS concepts. We recognise the fact that recruitment patterns and educational systems vary within Europe. Innovations that are appropriate within one cultural context may be so specific that they are not exportable to others. If this is so, we are interested in understanding these mechanisms. On the other hand, it may be possible to move across cultural boundaries with good recruitment practice if we make small adjustments based on our knowledge of local education settings. This is what our project is all about – taking good ideas and understanding mechanisms of exchange to other cultural settings and nationalities. We believe that it is time to accumulate many of the good ideas and allow them to flourish in multiple settings.

Several outcomes will be "produced" in this project:

- A network for the advancement in secondary and tertiary STM education
- Translatable guidelines for recruitment
- Tools and methods that translate research outcomes into guidelines for practices
- Models for dissemination and exchange across institutional and national boundaries
- Identification of prioritised specific domains for future policy and research actions within the field of STM higher education

B 3.2 Plan for the use and dissemination of foreground

As deliverables become available, it will be the job of the scientific coordinator to ensure that these are disseminated within and between work groups as well as to the EU as contracted. Deliverables from all WPs will be disseminated in WP7 through invited and open conferences and seminars for reference groups involving policymakers, curriculum developers, researchers in STM and STM education, teacher organisations, organisation for science journalism and communication, international organisations and European associations representing secondary and higher education institutions, students, staff and relevant actors in business and industry.

The different thematic focuses of the WPs imply that for some WPs, there are target groups that are of particular relevance. For example, WP5 (recruitment initiatives) will be of particular relevance for governments, educational institutions and authorities, and actors in business and industry who develop and carry out different recruitment initiatives and campaigns. Results, perspectives and recommendations from WP6 (drop-out/opt-out) will be of particular relevance for educational institutions and authorities.

Results from IRIS will naturally be published in reports, books, journals, etc. Furthermore, we will develop guidelines and recommendations with concrete advice on recruitment, retention and gender equity efforts, to be used by policymakers, curriculum developers, educational administrative authorities, actors in business and industry, etc. when designing recruitment and retention measures.

Dissemination of results and perspectives will be integrated in the project already from the inception. The issues at hand are already *hot topics* among policy-makers and in media and public debate, and many of the actors in the consortium already have a high level of participation in such debates on a national as well as European level. When the project progresses, such debates will increasingly take the form of dissemination of results and perspectives from IRIS.

The project will at an early stage establish a web site, where all products, background articles, presentations etc. will be available. Experiences from the ROSE project have shown that such pages are widely used by an international audience.

Dissemination will also take part in professional conferences and through professional network channels. For example, UNICA is a network of 41 universities from the capital cities of Europe, with a combined strength of over 120,000 staff and 1,500,000 students. Its role is to promote academic excellence, integration and co-operation between member universities throughout Europe. Another network is HUMANE, which was set up in 1997 with the aim of grouping all heads of university administration in Europe in an informal network devoted to professional development and best practice. Moreover, the Thematic Networks within the Socrates-Erasmus programme were created to deal with forward-looking, strategic reflection on the scientific, educational and institutional issues in the main fields of higher education. A Thematic Network is a co-operation between departments of higher education institutions and other partners (e.g. academic organisations or professional bodies), thus representing a highly interesting arena for dissemination of IRIS results. One example of a thematic network is the EUCEET (EUropean Civil Engineering Education and Training), which involves leading high education institutions, companies, etc. from 29 countries as well as research centres, professional associations, and trans-European associations in the field of civil engineering education. A final example to mention here is the Bologna Follow-Up Group (BFUG), which is composed of the representatives of all member states of the Bologna Process plus the European Commission, with the Council of Europe,

the EUA, EURASHE, ESIB and UNESCO/CEPES as consultative members. Also networks of industrial and other private bodies are of interest; for instance, the European Round Table of Industrialists has a conference this autumn (2008) on: "Inspiring the next generation: How to harness the potential of mathematics, science and technology to drive Innovation and Competitiveness in Europe". The conference is attended by 45 CEOs of leading European companies who are likely to be very interested in the IRIS project. The above mentioned networks, and other similar channels, all represent possible arenas for disseminating "best practice" advice from IRIS and raising discussions regarding recruitment and retention (of women in particular) to STM studies.

As described above, there are several types of audiences and professionals that have an interest in findings and perspectives. Among these are STM teachers' associations, STM professional researchers' associations, politicians and policy-makers in education, research and technology, as well as those working with labour market and human recourses. In addition, there are several groups with gender issues as focus, in education, research and labour market. The members of the consortium are active, or have contacts, with most of these different environments, at a national as well as international level, and will be active in using IRIS results and perspectives in these contexts.

One of the associated partners is EUSJA (European Union of Science Journalists' Association.) This union organizes science journalists in 23 European countries, and they express strong interest in dissemination of the results and perspectives of IRIS. Each and one of the many member organisations in EUSJA have web sites and other ways of communicating with the public and the media in addition their own personal writing in the general press and programs in radio, TV etc.

In addition to dissemination of results to media, stakeholders, interest groups and our network, IRIS will communicate results and perspectives through national and international research conference presentations and through articles in peer-reviewed, international journals in science education, gender studies, sociology/youth research and so on.

User groups of the results from IRIS study are science educators, gender researchers, sociologists, educational institutions, educational authorities, politicians, business and industry, labour associations and organisations with an interest in recruitment issues. Efforts will be made to draw these stakeholder groups into the work with IRIS nationally and on the European (and the international) level, through national reference groups as well as EU and other relevant forums. Also, the international network of associated IRIS partners is a valuable resource for discussion and dissemination of IRIS results. Dissemination will also take place in more open publicly available media.

B 4 Ethical Issues

An ethical issue of concern in the project is the idea of collecting non-anonymous information from the questionnaires (to enable follow-up of drop/opt-outs in WP6) and in the qualitative studies (e.g. focus group study in WP4). We plan to handle this by asking respondents to kindly leave their contact details on the questionnaire, and explain that by doing so, they agree that we may get in touch with them for follow-up interview. Thus, students wanting to be anonymous may ensure this by simply not giving their contact data. We will be in touch with official survey and protection of privacy authorities to ask for acceptance of such a procedure. All personal information collected through IRIS will be kept strictly confidential, and no respondent will in any way be recognizable in the publications from the project.

Stakeholder institutions in STM education may agree that by enlarging the national and international total number students in STM, this may give a larger number of students to each institution. But on the other hand, institutions compete in the same student market. The project management has to be aware of this tension between the institutions and stimulate openness, so that the institutions can learn from each other. There will be "winners or losers" when we describe more and less successful institutions in terms of the recruitment and retention rates and initiatives.

Informed consent: *Does not apply*
Data protection issues: *Does not apply*
Use of animals: *Does not apply*
Human embryonic stem cells: *Does not apply*

	YES	PAGE
Informed Consent		
• Does the proposal involve children?	no	
• Does the proposal involve patients or persons not able to give consent?	no	
• Does the proposal involve adult healthy volunteers?	no	
• Does the proposal involve Human Genetic Material?	no	
• Does the proposal involve Human biological samples?	no	
• Does the proposal involve Human data collection?	no	
Research on Human embryo/foetus		
• Does the proposal involve Human Embryos?	no	
• Does the proposal involve Human Foetal Tissue / Cells?	no	
• Does the proposal involve Human Embryonic Stem Cells?	no	
Privacy		
• Does the proposal involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)	no	
• Does the proposal involve tracking the location or observation of people?	no	
Research on Animals		
• Does the proposal involve research on animals?	no	
• Are those animals transgenic small laboratory animals?	no	
• Are those animals transgenic farm animals?	no	
• Are those animals cloning farm animals?	no	
• Are those animals non-human primates?	no	
Research Involving Developing Countries		
• Use of local resources (genetic, animal, plant etc)	no	
• Impact on local community	no	
Dual Use and potential for terrorist abuse		
• Research having direct military application	no	
• Research having the potential for terrorist abuse		
I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**yes**	

B 5 Consideration of gender aspects

Since the project in itself concerns gender issues in STM education, we consider that the demands concerning these issues are met through the proposed research questions and approach. The consortium as a whole is generally well gender balanced.

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