Monitoring the Evolution and Benefits of Responsible Research and Innovation (MoRRI)

Analytical report on the gender equality dimension

Angela Wroblewski, Susanne Bührer, Andrea Leitner, Cheng Fan

Sub-task 2.5, Analytical Report, Deliverable D2.3

mmmll

Executive Summary

Since the turn of the century, the topic of gender equality in science and research has been intensively discussed. Accordingly, a broad range of literature, pilot projects and empirical evidence is available which deals with gender inequalities in this area. This provides the starting point for the discussion on gender within responsible research and innovation (RRI) and the development of indicators for the gender dimension in RRI. Following the recent political and scientific discourse, gender equality is defined as a three-dimensional construct aiming at:

- integration of women in all fields and at all levels in research and innovation (reduction of horizontal and vertical segregation);

- structural change in research institutions in order to abolish structural barriers for women (e.g. through the implementation of comprehensive equality plans, quotas for women, transparent decision-making);

- integration of gender in the content of research and innovation to ensure that women's needs and interests are adequately addressed.

The goal of the dimension report on gender equality is, therefore, to outline a first set of indicators that represents gender equality in this comprehensive sense and allows comparative analyses for EU countries over time based on a literature and data review. The first set of indicators developed for the dimension report covers all three of the above aspects, although they do differ in terms of accuracy with regard to the underlying construct to be measured, comparability between EU Member States and availability in time series terms.

The first dimension of gender equality, female participation, includes eight indicators and is, therefore, well represented – especially for the university sector. The situation for female researchers in the non-university sector is covered less comprehensively. The proposed indicators include the share of female researchers by sector and an estimation of how long it will take to achieve equality in gender participation in science and research based on recent trends in female participation. The dissimilarity index represents horizontal gender segregation. Vertical segregation is indicated by the glass ceiling index as well as the number of graduates and female academic staff by grade indicators. Women's access to top management positions is covered by the share of female heads of research performing organisations (RPO). An additional indicator focuses on the project level and represents the gender composition of teams and management in EU funded projects.

Although there have been numerous pilot projects and case studies which focus on the implementation of equality policies in research funding organisations (RFO) and research performing organisations, there is less information available for a representative analysis covering several countries. Furthermore, only selective information is available on the integration of gender in research content. This is also due to the fact that administrative data do not yet by default consider gender aspects. However, recent initiatives by the Helsinki Group and the development of a monitoring system for European Research Area (ERA) goals have initiated progress in this respect.

The set of indicators covering the second dimension reveals the implementation status of equality policies in RPOs and RFOs and contains six indicators: The share of gender balanced recruitment committees in RPOs, the share of gender balanced research evaluation panels in RFOs, the share of RPOs with gender equality plans, the share of RPOs with female recruitment and promotion policies, the share of research projects with specific gender equality actions and the share of technical universities with

organisational structures for gender equality. However these indicators do not fully depict the change in organisational structures that has been supported by these interventions: They only show the extent to which organisations have implemented policies – not any corresponding change. The literature review also reveals a lack of evidence on the direct effects of equality policies and the relevance of underlying assumptions. As a consequence, indicators addressing structural change in RPOs and RFOs are interpreted as input-oriented indicators.

The third dimension of gender equality is covered by three indicators representing the share of RFOs promoting gender content in research, the share of RPOs with policies to integrate gender in research content and the share of EU-funded research projects with a gender dimension in their content.

In summary, the gender dimension in science and research is covered well by the proposed set of indicators, although there are some shortcomings which need to be considered when interpreting indicators and developments. The link between the RRI dimensions with regard to gender and their coverage by indicators will be discussed in the next phase of the MoRRI project. Another focus of the subsequent phases of this project will lie on the development of indicators that address benefits as a supplement to input-related indicators.

Table of Contents

List of Tables

List of Figures

List of Abbreviations

CAM	Gender Change Academy Model
CESAER	Conference of European Schools for Advanced Engineering Education and Research
EC	European Commission
EEA	European Economic Area
EFTA	European Free Trade Association
ERA	European Research Area
ERC	European Research Council
EU	European Union
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
GE	Gender Equality
GEAPs	Gender Equality Action Plans
GBAORD	Government Budget Appropriations or Outlays for R&D
HR	Human Resources
ISCED	International Standard Classification of Education
ISCO	International Standard Classification of Occupations
ITC	Information and Communications Technology
MoRRI	Monitoring the Evolution and Benefits of Responsible Research and Innovation
NPM	New Public Management
PGA	Participatory Gender Audit Methodology
PISA	Programme for International Student Assessment
R&D	Research and Development
R&I	Research and Innovation
RFO	Research Funding Organisations
RPO	Research Performing Organisations
RRI	Responsible Research and Innovation
SMoGEI	Social Model of Gender Equality Implementation
STEM	Science, Technology, Engineering and Mathematics
S&T	Science and Technology

1. Introduction - analytical and empirical aspects of Responsible Research and Innovation

This report is one of a series of six reports, each targeting a separate dimension of Responsible Research and Innovation (RRI). The six dimensions include 'citizen engagement and participation of societal actors in research and innovation', 'science literacy and scientific education', 'gender equality', 'open access to scientific knowledge, research results, and data', 'research and innovation governance' and 'research and innovation ethics'. The six reports collectively form the main output of Task 2 of the 'Monitoring the Evolution and Benefits of Responsible Research and Innovation' (MoRRI) project, and they are informed by the results of the literature review of RRI and its conceptual components, which was performed as Task 1 of the project.

The six reports emerging from Task 2 specifically address analytical and empirical issues relating to each of the RRI dimensions. Each report aims to:

- provide an operational understanding of the RRI dimension it targets,

- present existing empirical information about the RRI dimension, and

- assess data availability and specify analytical levels and degrees of aggregation of available material

The reports will provide a platform for the subsequent definition of metrics and indicators for the RRI dimensions in Task 3. The report at hand specifically focuses on the dimension of gender equality.

The report is structured in accordance with the main aims of Task 2 and also provides an outlet for the results of Task 1. In chapter 2, results from the literature review are presented. These provide a background for the following chapters. Chapter 3 is concerned with the development of an operational understanding of gender equality. The objective is to provide a functional vocabulary of gender equality by clarifying important analytical components and definitions of gender equality. This chapter includes a specification of the relationship and borderlines between the gender equality dimension and the other five dimensions of RRI. Chapter 4 considers selected existing empirical information on gender equality. It is based on a review of selected studies funded by the European Commission, along with a review of evidence from other empirically oriented studies which are considered particularly relevant for the gender equality dimension.

In chapter 5, the availability of existing data on gender equality is assessed. Following the scheme outlined in the MoRRI proposal, this chapter specifically considers the availability of data on gender equality relating first to its characteristics in terms of the intervention logic model, i.e. data describing the context, input, output and outcome of gender equality. More specifically, **context** relates to the environment and overall situation in a country; **input** to the activities carried out, measures taken, structures created or resources provided to address what is done in order to address issues of RRI and whether it is done in a systematic manner; **outputs** to the immediate or direct results of activities; and **outcomes** to the achievements (MoRRI Proposal 2014:64). Second, the availability of data is described according to the level of aggregation of these data, distinguishing data that describe the global level, the national level, the regional level, the institutional level, the programme/project level and the individual level.

Reflecting on the findings in Chapter 5, Chapter 6 considers issues relating to data gaps and assesses the overall need for primary data collection to fill such gaps.

Finally, Chapter 7 provides some initial thoughts on the development of indicators and metrics for gender equality, which will be the objective of Task 3.

2. Results of the literature review on gender equality

This chapter provides a list of the core literature on gender equality selected for review (10-15 papers were reviewed for each RRI dimension) as well as a synthesis of the literature review on this dimension. The literature review was performed in Task 1 of this project. The synthesis serves to summarize the main conceptual elements of the targeted dimension and forms the background for the subsequent chapter on the 'functional vocabulary' for the gender equality dimension.

2.1 Review of core literature relating to gender equality

The objectives of the literature review (Task 1) were to

- review the state of knowledge regarding RRI,

- define the policy context of RRI in Europe and elsewhere,

- give a comparative assessment of RRI dimensions, weighing-up the advantages, disadvantages and available options,

- conduct a preliminary assessment of the availability of empirical evidence on each RRI dimension,

- finalise the definitions and properties of the RRI key dimensions, and

- finalise the definition and properties of additional factors that may be relevant for the monitoring tasks.

In order to meet these objectives and provide useful input for Task 2 and the other subsequent project tasks (which are strongly related in terms of both topic and methodology), the approach to the literature review was designed in close cooperation with the dimension and task leaders. In a first step, the five dimension leaders were asked – based on their long-standing experience in their respective fields – to select 10 to 15 key publications in each key RRI dimension for detailed review. A review template was then designed in order to a) ensure a systematic analysis of the selected literature and b) cover all relevant aspects and information required in Tasks 1 and 2. Before it was rolled out to the individual reviewers, the template was subjected to a pre-test. The guidelines for the review process and the findings of the individual reviews are documented in the Appendix to this report.

The following key gender equality publications were selected and reviewed:

- Caprile, Maria et al. (2012), Meta-analysis of gender and science research, Synthesis report, Luxembourg, Publications Office of the European Union. Online: https://ec.europa.eu/research/science-society/document_library/pdf_06/meta-analysis-of-gender-and-science-research-synthesis-report.pdf

- Catalyst (2004), The Bottom Line: Connecting Corporate Performance and Gender Diversity, New York, San Jose, Toronto. Online: http://www.catalyst.org/knowledge/bottom-line-connecting-corporate-performance-and-gender-diversity

- EIGE (2014), Effectiveness of Institutional Mechanisms for the Advancement of Gender Equality. Review of the implementation of the Beijing Platform for Action in the EU Member States, Vilnius. Online: http://eige.europa.eu/sites/default/files/MH0213481ENC_0.pdf

- European Commission (2004), Gender and Excellence in the Making, Luxembourg, Office for Official Publications of the European Communities. Online: http://ec.europa.eu/research/science-society/pdf/bias_brochure_final_en.pdf

- European Commission (2006), Women in Science and Technology. The Business Perspective, Brussels. Online: http://ec.europa.eu/research/science-society/pdf/wist_report_final_en.pdf

- European Commission (2009a), The Gender Challenge in Research Funding Assessing the European national scenes, Luxembourg, Publications Office of the European Union. Online: http://ec.europa.eu/research/science-society/document_library/pdf_06/gender-challenge-in-research-funding_en.pdf

- European Commission (2009b), Women in Science and Technology. Creating sustainable careers, Brussels. Online: http://ec.europa.eu/research/science-society/document_library/pdf_06/wist2_sustainable-careers-report_en.pdf

- European Commission (2012), Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation, Luxembourg, Publications Office of the European Union. Online: http://ec.europa.eu/research/science-society/document_library/pdf_06/structural-changes-final-report_en.pdf

- European Commission (2013a), Gendered Innovations. How Gender Analysis Contributes to Research, DG Research and Innovation, Luxembourg, Publications Office of the European Union. Online: http://ec.europa.eu/research/science-society/document_library/pdf_06/gendered_innovations.pdf

- Gilmer, Penny J.; Tansel, Berrin; Hughes Miller, Michelle (eds.) (2014), Alliances for Advancing Academic Women. Guidelines for Collaborating in STEM Fields, Rotterdam, Boston, Taipei, Sense Publishers.

- Lipinsky, Anke (2014), Gender Equality Policies in Public Research, Luxembourg, Publications Office of the European Union. Online: http://ec.europa.eu/research/pdf/199627_2014%202971_rtd_report.pdf

- McKinsey and Company (2007), Women Matter. Gender diversity, a corporate performance driver, McKinsey & Company Inc. Online: http://www.mckinsey.de/sites/mck_files/files/Women_Matter_1_brochure.pdf

- Müller, Jörg; Castaño, Cecilia; Castaño, González Ana; Palmen, Rachel (2011), Policy Towards Gender Equality in Science and Research, Brussels Economic Review, Vol. 54, No. 2/3, 295-317. Online: https://dipot.ulb.ac.be/dspace/bitstream/2013/108956/1/ARTICLE%20MULLER-CASTANO-GONZALEZ-PALMEN.pdf

- Rothe, Andrea et al (2008), Gender Budgeting as a Management Strategy for Gender Equality at Universities - Concluding Project Report, Munich, Frauenakademie. Online: http://www.frauenakademie.de/projekt/eu_gender-budgeting/img/FAM-GB_management_conclusion_2008.pdf

- Schiebinger, Londa & Schraudner, Martina (2011), Interdisciplinary Approaches to Achieving Gendered Innovations in Science, Medicine, and Engineering, Interdisciplinary Science Review, Vol. 36, No. 2, 154–67. Online: https://genderedinnovations.stanford.edu/ISR_07_Schiebinger.pdf

2.2 Synthesis of literature review on gender equality

The synthesis of the reviewed literature on gender equality has been conducted in order to provide a concise overview of this key dimension, its policy context, main definitions and functional vocabulary, most important claims about impacts and relationships to other key dimensions of RRI.

Since the early 1990s, the presence of women in science has gained increasing interest in political as well as scientific debate. This debate was initially supported by

calls for social justice and was embedded in the development of general anti-discrimination policies at both national and European level aimed at establishing equal rights for women in employment. Corresponding research focused on the career paths of men and women as well as on the complex interplay between the institutional arrangements and personal preferences that might serve to explain the underrepresentation of women, especially at the top levels (European Commission 2004; Caprile et al. 2012). Since the turn of the century, economic arguments have also been used increasingly to justify gender equality policies:

- In the European Commission's (EC) view, realizing Europe's ambition to achieve a **competitive knowledge-based society** will require an increase in the number of researchers (European Commission: The Wake-Up Call for European Industry 2003). In 2012, the EC again maintained that boosting innovation in the EU would mean increasing the number of researchers in Europe by at least one million, given that the key role assigned to research and innovation in striving towards smart, sustainable and inclusive growth in Europe requires that the EU makes full use of its human capital – thereby involving both men and women, a particularly important aspect in light of demographic change (European Commission 2012). In order to achieve goals like 'competitiveness', 'innovation' and a 'knowledge-based society', it is evident that the talents and potential of women have to be developed, mobilized, leveraged and used more actively, deeply and completely.

- From the science and technology perspective, '**gendered innovations**' enhance excellence in science, medicine and engineering both in terms of knowledge and personnel. They lead to gender-responsible science and technology, and seek to enhance the lives of women and men around the globe. 'Gendered innovation' is defined as the process that integrates sex and gender analysis into all phases of basic and applied research to assure excellence and quality in outcomes (Schiebinger & Schraudner 2011; European Commission 2013a).

- In the business sector's view, the reasons why **gender diversity**[1] should be taken into serious consideration lie in women's talents, the economic power of women, the changing market structure and the positive impact of women on organizational excellence and financial performance (Catalyst 2004; McKinsey 2007).

The issue of the under-representation of women in top positions both in academia and in the business sector is widely discussed in the literature reviewed. This under-representation can be illustrated in two ways: professional/educational and organizational. While 45% of doctorates are awarded to female students, only 30% of active researchers and 18% of full professors are women (European Commission 2012). Berryman (1983) introduced the metaphor of the 'leaky pipeline' to describe the normative sequence of educational and employment stages that typically comprise a scientific career: at each moment of transition from one educational/professional stage to another, the pipeline loses more women than men[2]. Remarkably, the educational and professional under-representation of women has changed at a very low pace (European Commission 2006; Caprile et al. 2012), although this issue has been discussed intensively across the EU Member States since the Beijing Platform for Action in 1995 (EIGE 2014).

---

[1] Catalyst (2004) defines gender diversity as "recruiting, retaining and advancing women".

[2] This also conjures up the image of a pair of scissors. The scissors refer to the difference between the share of men and women in a typical academic career and represents the different career tracks of men and women: a larger percentage of men than women reach the upper levels of both academia and management (European Commission, 2009b).

The literature reviewed interprets and explains this persistent gender segregation at three levels: the individual level, the institutional level and the social/cultural level.

1. Individual level: Women's ambitions are often restrained by psychological obstacles like higher awareness of barriers or difficulties in identifying themselves with success (McKinsey 2007), for example through low assessment of self-efficacy and limiting expectations regarding their own career prospects. Furthermore, social and cultural values shape gender stereotypes, which influence degree course choice and the gender division in the labour force (Caprile et al. 2012).

2. Institutional level: In both academia and the business sector organisational and management models have historically been designed by men. The 'anytime, anywhere' performance model, a precondition for a top management job, is irreconcilable with the double burden facing women (work and domestic responsibilities). Mastering male 'codes' is viewed as the only way to rise through the ranks. This requires not only greater efforts to adapt on the part of women in making their way to the top but also the ability to promote oneself and be assertive about one's performance and ambitions. An added final handicap is that it appears harder for women to find mentors in science and research. This leads to **gendered career paths,** firstly because degree course choice remains largely gendered and, secondly, because the 'rush hour', i.e. the early stage of the scientific career in which family and career demands most often collide, clearly puts women at a disadvantage. Further career advancement after a career break is difficult (Caprile et al. 2012). Since work is organised in gendered ways, it is difficult for women to reconcile paid and unpaid work. Gender continues to be a structuring factor in the workplace in general and in research in particular. This results not only in the persistent gender pay gap but also in harassment, concentration of power and the guru/acolytes model of power relations (European Commission 2012).

3. It also leads to the **persistence of male dominance in the scientific system**. Gender discrimination in the scientific system is prohibited, but it still exists, albeit in more subtle forms than in the past. This can have an impact, for instance, on selection, hiring and promotion procedures, on the distribution of resources, or on the assessment of scientific excellence. So-called gatekeepers are established, i.e. (male) scientists or peers who control the definition of merit and the means of exercising academic power (Merton 1968). Consciously or unconsciously, similar-to-me effects (sexism and nepotism) still influence assessment and selection procedures, e.g. in the peer review of research grant applications (European Commission 2004). The evaluation system that has already been established aims to be objective and meritocratic. But its approach is not only imperfect, it may even be hindering women in establishing scientific careers. Indeed, merit and talent do not suffice alone for a successful career in science: Resources, time, social networks and encouragement – unevenly distributed between the sexes – are also prerequisites (European Commission 2004).

4. Social/cultural level: Conflicts between the **self-image of women and the image of science and technology (S&T)** are identified as key barriers to increasing female participation in male-dominated disciplines (European Commission 2006). One reason why many female students are not willing to enter the S&T disciplines is not that they have less talent than their male counterparts but that the image of S&T does not fit their (expected) self-perception. For example, the stereotyped construction of the self-image of women is that they are emotional and people-oriented. In contrast, the image of S&T is logical, rational and machine-oriented. In addition, students (both male and female) fear isolation in their chosen degree

environment, a situation that causes many female students to drop out of S&T courses[3]. This is supported by traditional gender roles (stereotyping of women and men). Women are defined as the people who take care and men as those who take charge. Evidence suggests that European women devote on average twice as much time as men to domestic tasks (McKinsey, 2007).

To better explain the complex processes of gender bias in science and research, Schiebinger identifies three interrelated political approaches, namely fixing the number of women in science, fixing the institutions and fixing the knowledge (Caprile et al. 2012). In 2007, the European Commission changed its policy approach from 'fixing the women' to 'fixing the institutions' in line with the process related approach of gender mainstreaming (Lipinsky 2014).

1. The individual level (fixing the number of women in science): This approach seeks to increase the participation of women by supporting them in education and in careers in science. The implicit assumption here is that science, medicine and technology institutions and research are gender neutral (Schiebinger & Schraudner 2011). However, this approach has proved insufficient in increasing the number of women in science, particularly in positions of responsibility, and has not helped to address the structural barriers that contribute to the well-known leaky pipeline phenomenon (European Commission 2012).

2. The institutional level (**fixing the institutions**): This second policy approach focuses on institutional change/reform, which aims to amend gendered organisational structures and practices.

   a. RFO: Gender mainstreaming in access to research funding, decision-making on funding, allowing for parental leave during a research project and/or evaluation procedure, etc. Examples of the tools applied include quota regulations and quantitative targets (management by objectives) (Caprile et al. 2012).

   b. RPO (e.g. higher education restructuring/reform): The recent introduction of New Public Management (NPM) strategies into higher education and research means that important changes have been made not so much with regard to the goals (e.g. raising the proportion of women in higher career positions), but in terms of the steering mechanisms used to achieve them. Several policy instruments, e.g. corresponding legislation or positive action (such as quota regulations), co-exist alongside more recent "mainstreaming" mechanisms[4] and new steering instruments like target/incentive-linked resource allocation. This change is also reflected in the shifting responsibilities of women's representatives and/or equal opportunities officers (Müller et al. 2011).

   According to the experts, there are three essential elements which should be considered as prerequisites by all organizations undertaking structural change. The first of these is knowing the institution, which can be achieved by developing statistics and indicators which ensure that the situation in each institution is widely known and acknowledged. The second is obtaining top level support, i.e. the support of the people in positions of power. The third element is generating effective management practices, e.g. by ensuring the availability of gender

---

[3] It is not only female students but also female faculty who feel isolated in S&T area. Gilmer et al. investigated the experiences of female academics in STEM disciplines with isolation and related factors such as department fit and communication. They also examined the strategies that women use to overcome this isolation, primarily networking and mentoring (Gilmer et al. 2014).

[4] Gender mainstreaming became an important issue in the debate on higher education sector reform at the end of the last century (Rothe et al. 2008).

expertise and raising awareness (European Commission 2012) and by introducing greater transparency both in screening procedures and in the monitoring and evaluation system (European Commission 2004, 2009).

3. Gender analysis/gendered innovation in scientific knowledge and technology design (**fixing the knowledge**): This third approach integrates a gender dimension into research and innovation content and academic curricula (Schiebinger & Schraudner 2011; Lipinsky 2014). It focuses on overcoming gender bias in science and technology by incorporating gender analysis into all phases of basic and applied research, from setting priorities to funding decisions, establishing project objectives and methodologies, data gathering, evaluating results and transferring ideas to markets. This mainstreaming of gender analysis into research ultimately creates "gendered innovations" (Schiebinger & Schraudner 2011), which could also serve to build inclusive scientific communities in which men and women assume an equal role at all levels, i.e. in decision-making, in policy setting and in defining and carrying out research. This would, in turn, lead to a change in the scientific 'sub-culture' with its male hegemony.

Lipinsky (2014) stresses the importance of the (socio-)political level and points out that governments can initiate institutional change in RPOs and RFOs by creating a **conducive legal and political environment** and by providing incentives for change. This can include incentives for research establishments to recruit female academics, funding programmes for gender equality in research or support for innovations which combine output related strategies aimed at advancing women in middle and senior academic positions (output in numbers) with input related incentives for institutional change. Similarly, and according to EIGE (2014), governments could support gender equality by providing institutional mechanisms for gender mainstreaming[5]. As components of gender mainstreaming, this report lists 'commitment', 'structure', 'involvement of civil society', 'gender awareness training and advisory services for government bodies', 'focus on legal reform in the following areas: family, employment, social security, income tax, education, positive measures to advance women, perceptions and attitudes and creation of a culture that supports gender equality', 'sufficient budget resources and professional capacity' and 'tools'. Gender budgeting, as defined by the Council of Europe, is, in turn, the application of gender mainstreaming in the budgetary process (Rothe et al. 2008). In line with EIGE (2014), Caprile et al. (2012) note that "gender policy is not only made by regulation and legal changes but mostly by leadership and a commitment to changing structures and cultures".

As a consequence of all the above, a **broad policy mix** has been developed to support women and overcome gendered structures. This includes both the provision of career support for women (mentoring, coaching, training, networking, leadership programmes) as well as institutional measures (provisions to facilitate a work-life balance, e.g. flexible working hours, childcare facilities). Empirical evidence (European Commission 2006) shows, however, that simply offering work-life balance options is not enough: The organisational culture (as evidenced in communication regarding such practices and, in particular, in the reactions of supervisors and peers) must also be truly supportive of such policies. This includes the need for a reflection on organisational norms, including the (often implicit, mostly incompatible) traditional notions of the 'ideal worker' and the 'ideal mother'. These normative beliefs are heavily influenced by gender stereotypes which are similar across cultures and which

---

[5] The BPfA (Beijing Platform for Action) points out that the main task is to support government-wide mainstreaming of a gender equality perspective in all policy areas. The essential conditions for effectiveness are location at the highest level in government, sufficient resources and process management inter alia (EIGE 2014).

relate to the 'separate spheres' of home (i.e. care, children) and work (i.e. career). While such norms appear extremely resistant to change, the good news is that in reality these spheres increasingly overlap and are no longer defined by one gender (European Commission 2009b). Furthermore, experts contend that insufficient process management is an important factor that affects the slow progress towards gender equality. While many reports and conferences express commitment to gender equality, this does not always lead to corresponding efforts and/or the implementation of policies in this direction. There is evidently a lack of management commitment to sustainable and significant change in which planning, decision-making, implementation and evaluation follow the customary process cycle (European Commission 2006).

Although numerous initiatives have been introduced in this field, there is a lack of evidence regarding the direct effects of the corresponding interventions. The literature on this topic identifies several **shortcomings in gender equality policy design** (Müller et al. 2011; Caprile et al. 2012):

1. The lack of a more thorough theoretical foundation of projects and research which implement and evaluate gender equality policies (i.e. an unclear link between statistics and gender inequality). Most of the evaluation studies that have been conducted are descriptive and lack explicit theoretical references. This lack of an explicit theory is a further handicap to tackling structural and cultural change.

2. The lack of an unambiguous definition of gender equality, i.e. an open discourse on the dimensions gender equality entails, how progress towards gender equality can be measured and what constitute the indicators of success.

3. The lack of common quality standards for evaluation. Indeed, a common evaluation framework could also prove useful for addressing the related problem of detecting structural change. This also points to the need to make the normative component of many evaluation studies explicit.

4. The need for research into the long-term effects.

5. The gaps between policy implementation and changes in societal values.

The literature also reveals several **gaps in research and data**. Some of these gaps are the result of insufficient statistics or measurements, e.g. lack of gender-disaggregated data (EIGE 2014), lack of knowledge on specific disciplinary career paths, advancement and obstacles (Müller et al. 2011) and lack of information on non-normative scientific careers (Caprile et al. 2012). Others relate to the discussion of 'scientific excellence' and the need for new, unbiased measurements (European Commission 2004; Husu 2004). The problems of defining and measuring excellence have not been solved. Experts agree that scientific excellence is not 'a universal fact' but rather a social construction and, as such, it is open to many kinds of biases. Following this logic, the spectrum of activities and achievements included in the definition of scientific excellence must be broadened to include, for example, other dimensions of scholarly practice, such as education, participation in committees, administrative tasks, external consultancy and contribution to public debates (European Commission 2004).

3. Functional vocabulary of gender equality – definitions and terminology

Building on the results of the literature review, this chapter seeks to develop a functional vocabulary of gender equality. This vocabulary establishes the relevant definitions and terminology that are (to be) used to address gender equality consistently within the MoRRI project. A further goal of this chapter is to outline any potential links between gender equality and the other RRI dimensions.

MoRRI follows a social constructivist understanding of gender. Thus, **gender** is understood as a **social construct** which results from performative practices (Butler 1990; West & Zimmermann 1987). It encompasses not only the differences between men and women, but also the distinctions which are made in order to replicate social gender roles as well as the mechanisms of inclusion and exclusion associated with these roles. Gender does not denote a simple dichotomy of two supposedly homogeneous gender groups but must instead always be conceived as intricately linked with other structural categories such as age, socio-economic status, race/ethnical background, disability, sexual preference, etc. The aim is not only to differentiate between men and women but to follow an intersectional approach (Hancock 2007) and inherently consider other relevant criteria for differentiation in any kind of gender analysis.

Consequently, **gender equality** is understood as a **three-dimensional construct** whereby gender equality is reached when (1) women and men are equally represented in all disciplines and at all hierarchical levels, (2) gendered barriers are abolished so that women and men can develop their potential equally, and (3) when the gender dimension is considered in all research and innovation activities.

If we look more closely at this three-dimensional definition of gender equality, it becomes evident that gender equality policies in science and research demand more than just the promotion of women in male-dominated fields or to male-dominated positions. Indeed, there should be three pillars to equality policies.

The **first pillar** comprises measures to **promote women** in fields where they are under-represented as well as to increase female participation in management and decision-making positions. The goal here is to reduce **gender segregation**. In employment terms, gender segregation refers to the tendency of women and men to work in different occupations and sectors. We distinguish here between two types of segregation. *Horizontal segregation* is understood as the under-representation or over-representation of a specific group of workers in occupations or sectors not ordered by any criteria, whilst *vertical segregation* refers to the under-representation or over-representation of a group of workers in occupations or sectors at the top of a ranking based on 'desirable' attributes – income, prestige, job stability, etc. In the literature, vertical segregation is sometimes referred to as the '**glass ceiling**', which points to the existence of visible or invisible obstacles that lead to the underrepresentation of women **in positions of power and decision making functions**. This is completed by the concept of the '**sticky floor'**, which describes the forces that tend to maintain women at the lowest levels in an organisation (Caprile et al. 2012).

The **second pillar** comprises **structural measures** aimed at a changing existing organisational arrangements in order to progressively eliminate barriers for women on their path to top positions or factors which induce women to drop out of science. This

is in line with the gender mainstreaming[6] approach, which aims at "the (re)organisation, improvement, development and evaluation of policy processes, so that a gender equality perspective is incorporated in all policies at all levels and at all stages, by the actors normally involved in policy-making. In concrete terms, this implies that the needs, interests, competences and skills of both women and men are taken into account" (Council of Europe 1998). In its recent recommendations to Member States on gender equality standards and mechanisms, the Committee of Ministers of the Council of Europe recalls the importance of adopting methodologies for implementing the gender mainstreaming strategy, including gender budgeting, gender-based analysis and gender impact assessment (Council of Europe 2011). A **gender-based analysis** is designed to establish a description of the realities facing men and women in a specific field. The goal is to provide empirical evidence for policy development that adequately considers the socio-economic realities of both genders. **Gender budgeting** refers to the application of gender mainstreaming to the budgetary process. This includes a gender-based assessment of budgets, bringing a gender perspective into all levels of the budget process and restructuring revenue and expenditure to promote gender equality. **Gender impact assessment** has its roots in the environmental sector and is a typical example of an existing policy tool that has been adapted for use in gender mainstreaming. Gender impact assessment allows for the screening of a given policy proposal in order to detect and assess its differential impact or effects on women and men, so that these imbalances can be redressed before the proposal is endorsed. Gender impact assessment can be applied to legislation, policy plans, policy programmes, budgets, concrete actions or government bills as well as to reports or calls for research.

The **third pillar** of gender equality – the integration of a **gender dimension in research and innovation content** – is legitimised by the gender mainstreaming strategy on the one hand and by quality standards in science and research on the other (Caprile et al. 2012). Gender studies are now either well-established or at least partly in place in almost all fields of research. Indeed, it is argued that research results are not valid or reliable if they only consider male research subjects. This point has been discussed at length, for example in medicine with regard to false diagnosis or medication (e.g. the false diagnosis of heart attacks among women or the different effects of the same dosage of medication on men and women). Mainstreaming gender analysis into research creates **gendered innovations**, while a gender bias (as described above) limits the potential benefit of science and innovation to society. Hence, it is important not only to identify gender bias in science and innovation but also to understand how it operates. On this basis, gender analysis is seen as a resource that stimulates gender-responsible science and innovation.

The successful implementation of equality policies which include all three pillars should lead to a **cultural change** both in science and research as well as in RFOs and RPOs. In academia, the concept of **excellence** plays a crucial role in this regard. Excellence as a (national) higher education and research strategy defines the institutional framework for a career in science, academia and research. This ostensibly focuses on the implementation of meritocratic principles in science, academia and research, which are shown in feminist research to be gender biased. To achieve cultural change, new standards for excellence are needed in the academic and research system. This requires a reflection on the inherent gender bias in the definition of principles to support excellence such as output orientation, the breaking down of research findings into *least publishable units*, strategic publication planning ('A' journals), research niche

---

[6] Gender mainstreaming was established as a major global strategy for the promotion of gender equality in the Beijing Platform for Action produced at the Fourth United Nations World Conference on Women in Beijing in 1995.

building and the assessment of ability based on the amount of third party funding generated (Matthies & Zimmermann 2009; Beaufays & Krais 2005).

To sum up, in the context of the MoRRI project, we understand gender equality as a three-dimensional construct. To achieve gender equality, progress is required on all three dimensions. Accordingly, the three equality goals are:

- integration of women in all fields and at all levels in research and innovation (reduction of horizontal and vertical segregation)[7],

- structural change in research institutions in order to abolish structural barriers for women (e.g. through implementation of comprehensive equality plans, quotas for women, transparent decision-making), and

- integration of gender in research and innovation content to ensure that the needs and interests of women are adequately addressed.

This definition of gender equality in science and research is in line with the equality goals formulated for the European Research Area (ERA) strategy and, thus, in Horizon 2020. The strategy on gender equality in Horizon 2020 aims at:

- fostering gender balance in research teams, in order to close the gaps in the participation of women,

- ensuring gender balance in decision-making, in order to reach the 40% target for the under-represented gender in panels and groups and 50% target in advisory groups, and

- integrating the gender dimension in research and innovation (R&I) content, in order to improve the scientific quality and societal relevance of the produced knowledge, technology and/or innovation.

Considering the three-dimensional construct of gender equality in science and research consequently, gender is also relevant in other RRI dimensions. In the course of the interim evaluation of the Science-in-Society programme, in particular the section on "Assessment of Future Options" (Bührer et al. 2012a), the connection between RRI and the (former) Science-in-Society topics was also a subject of investigation. In concrete terms, an Impact Assessment workshop was used to ask 26 expert participants from different thematic fields to express their views on the interconnectedness of the different topics and their potential integration into the RRI concept. The results of this workshop are depicted in Figure 1.

---

[7] The focus on gender also means that men have to be addressed in order to reduce horizontal segregation – e.g. in fields where they are underrepresented (e.g. humanities, pedagogy and veterinarian medicine).

Figure 1: Interconnectedness between thematic fields
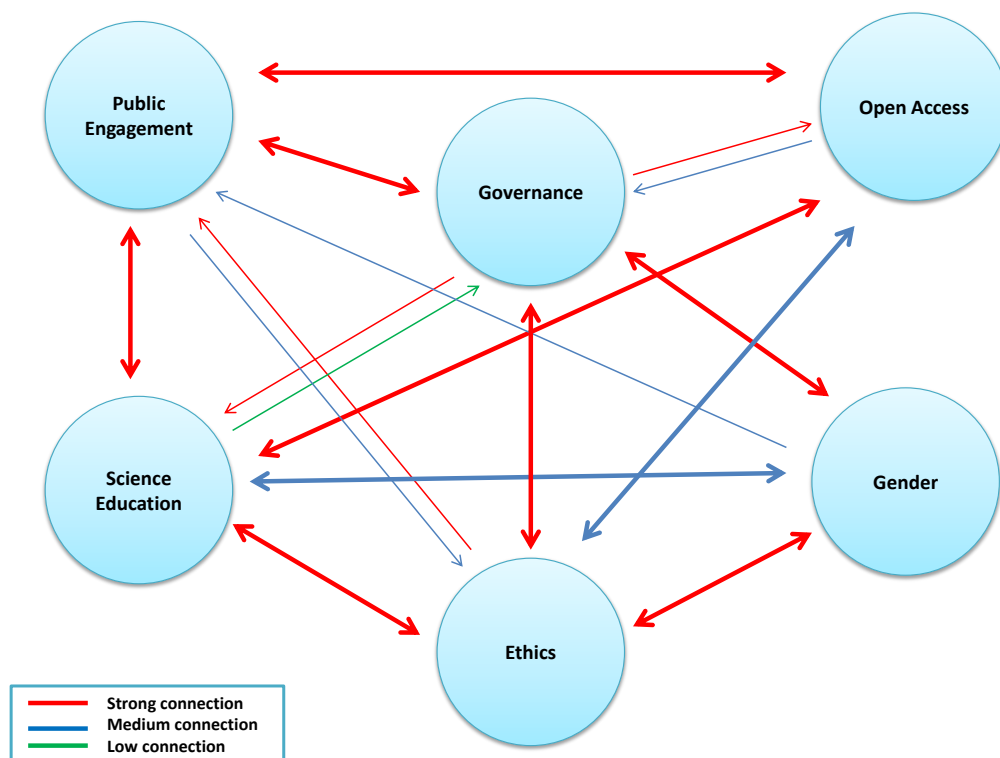
Source: Bührer et al. 2012b:33.

Figure 1 shows the strong connections between the different RRI dimensions. It is notable that, in almost all cases, the experts are in agreement on the strength of the bonds between the dimensions and the fact that these connections are reciprocal. With regard to the gender dimension, the participating experts perceived particularly strong connections with Ethics and Governance (reciprocal *and* strong), medium connections with Science Education (reciprocal but medium), non-reciprocal connections with Public Engagement and *no* connection with Open Access.

This does, however, raise another question, namely how these interrelations can be defined with regard to content. The questions/aspects formulated below serve here only as a first step towards the more systematic analysis of linkages between the gender dimension and other dimensions, which will be carried out in the course of the MoRRI project.

Public engagement: Which social groups are addressed by public engagement initiatives? Which social groups are represented by stakeholders participating in public engagement possibilities? Who are the opinion leaders, and what are their socio-demographics? Which competences or roles are assigned to citizens in the RRI context?

Open access: Who uses open access (men/women)? Are there differences between disciplines in open access usage? How are open access publications rated and valued in comparison to traditional publication forms? Which ascribed characteristics are associated with open access?

Science education: PISA results indicate a significant gender difference in interest and self-confidence in science among 15-year-olds. In order to tackle this gender difference, teaching and learning strategies will need to be reformed. As a consequence, teacher education will also need to be changed to support the

implementation of such reforms. In addition to measures addressing the pre-school and school sectors, measures addressing adults should also be designed in a gender sensitive manner (e.g. science labs, science museums).

Ethics: it should be standard practice in good (reliable, valid, transparent) science to consider gender as a central topic in all research. From an ethics point of view, it is important to avoid the (re-)production of gender stereotypes in all stages of research (formulation of research questions, research process, analysis, reporting) as well as in the application of research findings. Gendered norms and values as well as unintended consequences and impacts, particularly for women etc., could play a role here.

Governance: All steering mechanisms in science, research and innovation should consider the three-dimensional construct of gender equality. This is especially important in the budget allocation context as well as in the development, implementation and evaluation of science, research and innovation policies. The different instruments intended to influence behaviour and/or processes, e.g. regulatory acts like quota regulations, also play an important role here.

4. Review of existing empirical knowledge of gender equality

In this chapter, which constitutes the bulk of the report, the focus turns to empirical studies in the gender equality field. It presents the results of Sub-task 2.2 and Sub-task 2.3, which review the state of knowledge regarding the RRI dimensions, including the empirical knowledge emerging from EC-funded studies on the RRI dimensions. In doing so, it focuses on those results which apply specifically to the gender equality dimension.

The chapter is divided into two parts. It begins with a review of selected EC studies which contain particularly rich empirical information on gender equality. This is followed by a summary of a selection of other studies which offer equally rich information on gender equality. The aim of the review of the EC studies is:

1. To specify the questions concerning gender equality that are (partially) answered in these studies,

2. To tentatively identify the indicators that can be harvested from these studies,

3. To assess whether the information contained in these studies relates to the context, input, output, or outcome of gender equality following the intervention logic model,

4. To specify the analytical level of the information and distinguish between global, national, and sub-national (regional, institutional, programme/project, and individual) levels, and

5. To specify whether the studies provide quantitative or qualitative data.

Our aim with the extensive list of other relevant empirical studies is to summarize the information sources, the analytical level at which the information is presented and the key focus of the studies, in order to pave the way for a subsequent qualified selection of existing gender equality indicators in Task 3 of the MoRRI project.

This review of studies containing empirical information on gender equality will then serve as the background for assessing the overall availability of empirical information on gender equality (see Chapter 5).

4.1 EC studies and projects in the gender equality field

A number of EC projects have explored the gender equality dimension. For the purposes of this report, eight projects which are considered particularly relevant for the gender equality dimension in terms of identifying empirical data for further analysis have been reviewed. These projects are listed in Table 1 below.

Seven of these projects aim at supporting gender equality in RPOs through the implementation of gender action plans which address several areas simultaneously. These interventions are targeted at:

1. Increasing female participation in STEM disciplines and in management positions,

2. Building up gender competence among all stakeholders with a special focus on management,

3. Tackling structures that hinder women on their path to top positions (with a focus on recruitment practices), and

4. Supporting the integration of a gender dimension in research and innovation content.

They also aim at initiating a broader discourse on gender equality in science and research by addressing not only RPOs but also RFOs, politicians and experts (in particular the GenSET, STAGES and GENOVATE projects). The eighth project, MORE2, does not explicitly address gender but does focus on two aspects that are of high relevance to gender equality barriers, namely mobility patterns and career paths (including remuneration aspects).

A key instrument for progress towards gender equality in RPOs is the development and implementation of targeted gender equality plans. This requires the development of a comprehensive policy mix for research performing institutions, which addresses any problematic aspects (e.g. gender gaps and their origin) revealed in a gender analysis. It is ultimately to be assumed that the measures in a consistent and coherent policy mix will support and supplement each other. Hence, it is not possible to determine direct relationships between a single measure and an achieved outcome (e.g. change in female participation in management). On the contrary, change is understood as a consequence of the policy mix as a whole.

All these EC projects include case studies where targeted gender equality plans and other specific tools have been implemented. One of the explicit goals of the projects is/was to develop general guidelines or supporting tools based on the analysis of experiences made within the case studies. The target group for these guidelines, tools, etc. are RPOs interested in the implementation of gender equality policies.

The analyses of the case studies provide starting points for the development of context, input and output indicators with regard to gender equality at institutional level. In most, cases input indicators cover a broader range of dimensions of gender equality than output indicators. Conversely, output indicators focus in most cases on one dimension of gender equality, i.e. horizontal and vertical segregation. It would appear to be difficult to use quantitative indicators to measure output with regard to either structural or cultural change or the integration of the gender dimension in research and innovation content.

Table 1: EC studies for review

Proposal Call	Project Acronym	Project Title	Project Start Date	Project End Date	Sources
FP7-SCIENCE-IN-SOCIETY-2007-1	**PRAGES**	Practising Gender Equality in Science	01-04-2008	31-12-2009	http://www.pragesdatabase.eu/ http://www.retepariopportunita.it/prages/ Reports: Final Report Summary – PRAGES, http://cordis.europa.eu/result/rcn/45561_en.html Cacace, Marina (2009), Guidelines for Gender Equality Programmes in Science, Prages – Practising Gender Equality in Science, Rome. http://www.retepariopportunita.it/Rete_Pari_Opportunita/UserFiles/Progetti/prages/pragesguidelines.pdf
FP7-SCIENCE-IN-SOCIETY-2009-1	**GENSET**	Increasing Capacity for Implementing Gender Action Plans in Science	01-09-2009	29-02-2012	www.genderinscience.org/ Reports: Periodic Report Summary – GENSET http://cordis.europa.eu/result/rcn/53610_en.html genSET Project (2010), The Consensus Report:

Proposal Call	Project Acronym	Project Title	Project Start Date	Project End Date	Sources
					Recommendations for Action on the Gender Dimension in Science, http://www.portiaweb.org/images/stories/genSET_consensus_report.pdf
					European Gender Summit (2011, 2012, 2013, 2014), Communication. Available at: www.genderinscience.org
FP7-SCIENCE-IN-SOCIETY-2010-1	**GENIS LAB**	The Gender in Science and Technology LAB – GENIS LAB	01-01-2011	31-12-2014	www.genislab-fp7.eu/ Report: Periodic Report Summary - GENIS LAB. http://cordis.europa.eu/result/rcn/54862_en.pdf
FP7-SCIENCE-IN-SOCIETY-2010-1	**INTEGER**	Institutional Transforma-tion for Effecting Gender Equality in Research	01-03-2011	28-02-2015	http://www.projectinteger.com/en/about-the-project Report: Periodic Report – INTEGER. http://cordis.europa.eu/publication/rcn/15978_en.html
FP7-SCIENCE-IN-SOCIETY-2011-1	**STAGES**	Structural Transforma-tion to Achieve Gender Equality in Science	01-01-2012	31-12-2015	http://www.stages.csmcd.ro/ Reports: Periodic Report Summary 1 – STAGES. http://cordis.europa.eu/result/rcn/141360_en.html Progress evaluation report no. 3, 2014 (unpublished)
FP7-SCIENCE-IN-SOCIETY-2012-1	**GENO-VATE**	Transforming organisational culture for gender equality in research and innovation	01-01-2013	31-12-2016	http://www.genovate.eu/ Report: GENOVATE Convention Report March 2013. http://www.genovate.eu/dissemination/genovate-reports/
FP7-SCIENCE-IN-SOCIETY-2008-1	**WHIST**	Women's careers hitting the target: gender management in scientific and technological research	01-05-2009	30-11-2011	http://cordis.europa.eu/project/rcn/91101_en.html Reports: Final Report – WHIST. http://cordis.europa.eu/publication/rcn/15270_en.html Periodic Report Summary 2 – WHIST. http://cordis.europa.eu/result/rcn/55789_en.html Final Report Summary – WHIST. Available at: http://cordis.europa.eu/result/rcn/56106_en.html
European Commissio	**MORE2**	Support for continued data collection and			http://www.more-2.eu/www/index.php

Proposal Call	Project Acronym	Project Title	Project Start Date	Project End Date	Sources
n		analysis concerning mobility patterns and career paths of researchers			Reports: Final Report – MORE2. http://ec.europa.eu/euraxess/pdf/research_policies/more2/Final%20report.pdf Researcher Indicators Report. http://ec.europa.eu/euraxess/pdf/research_policies/more2/Indicators%20report.pdf 150 indicators - online database. http://www.more-2.eu/www/index.php?option=com_content&view=article&id=118&Itemid=125 MORE2 - Remuneration Cross-Country Report (WP4). http://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=47102&mime_type=application/pdf

PRAGES - Practising Gender Equality in Science

The PRAGES project, which was carried out in 2008 and 2009, aimed to analyse "existing practices to support universities and research institutes, both in European and extra-European (Australia, Canada, USA) countries, willing to implement gender-equality oriented measures in their research management".[8] As main outputs of this extensive analysis and stocktaking exercise, a database containing an assessment of 109 promising gender quality programmes in S&T and a set of guidelines were produced. These guidelines include 31 recommendations, 61 lines of action and 219 specific examples relating to how gender equality can be promoted in S&T (Cacace 2009). The vast amount of stocktaking data collected, the recommendations produced and the cross-cutting analysis performed provide a very rich foundation for further analysis in terms of indicator development within the gender equality dimension (see also Table 2).

Table 2: Examples of gender equality indicators retrieved from PRAGES

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which gender equality initiatives/programmes/measures have proven effective in implementing gender actions in S&T?	• Organisational performance indicators	Input	Institutional (across Europe and beyond)	Database of 109 programmes: Semi-structured questionnaires Quality evaluation
How has (and can) gender equality in S&T been (be)	• Identified effective	Outcome	Institutional (across Europe	31 guidelines (+61 lines of

---

8   http://cordis.europa.eu/result/rcn/45561_en.html

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
promoted?	guidelines for monitoring and enhancing gender equality		and beyond)	action + 219 examples): Review process involving some 30 experts
Which gender equality tools have proven effective in implementing programme objectives?	• Identified effective tools for implementing programme objectives	Outcome	Institutional (across Europe and beyond)	Cross-cutting analysis: 31 effective tools applied across programmes (+138 examples)
How has (and can) can programme quality been (be) evaluated?	• Quality assessment dimensions	Outcome	Institutional (across Europe and beyond)	Cross-cutting analysis: 30 action patterns across four quality dimension (relevance, effectiveness, efficiency and sustainability)

GENSET - Increasing Capacity for Implementing Gender Action Plans in Science

The GenSET project, which was carried out in the period from 2009 to 2012, aimed "to improve the excellence of European science through inclusion of the gender dimension in research and science knowledge making." It is a "forum for sustainable dialogue between European science leaders, science stakeholder institutions, gender experts, and science strategy decision-makers, to help implement effective overall gender strategies".[9] To facilitate the sustainable dialogue, a range of participatory mechanisms – such as consensus seminars, mentoring workshops and gender summits – were implemented with the purpose of producing "practical guidelines for implementing gender action plans within existing institutional mechanisms". One related goal was to explore how existing gender knowledge and expertise could feature effectively in European science institutions in order to "increase women's participation in science" with regard to (1) science knowledge-making, (2) the research process, (3) recruitment and retention, (4) the assessment of women's work, and (5) the science excellence value system (cf. Recommendations for action on the gender dimension in science 2010:6).

The set of recommendations produced with regard to constructing an "overall gender strategy in scientific institutions" include actions in four different areas (see Figure 2). The actions recommended could be a useful resource in the development of indicators which characterise gender equality. The range of additional experiences, outputs and outcomes produced throughout and beyond the project phase are also considered relevant for further analysis. For instance, the European Gender Summits explored "how gendered methodologies can stimulate innovation and advance scientific

---

9   http://www.genderinscience.org/

excellence" with regard to main policy initiatives. At the first Gender Summit, a manifesto for integrated action on the gender dimension in research and innovation was signed by more than 2,300 researchers. This manifesto stresses the important role of research funding institutions and calls for the consideration of gender in all stages of all research projects. The recommendations of the subsequent Gender Summits forge a collective commitment to strengthening human capital development, scientific research and innovations and the transformation of higher education and research institutions via an integrative focus on gender equality. Hence, gender has to be integrated in research and innovation content, methods, analysis policies and practices. The conclusions of the fourth Gender Summit once again stress the relevance of gender criteria for all Horizon 2020 calls as well as for their monitoring and evaluation.

Figure 2 Overall Gender Strategy, GenSET
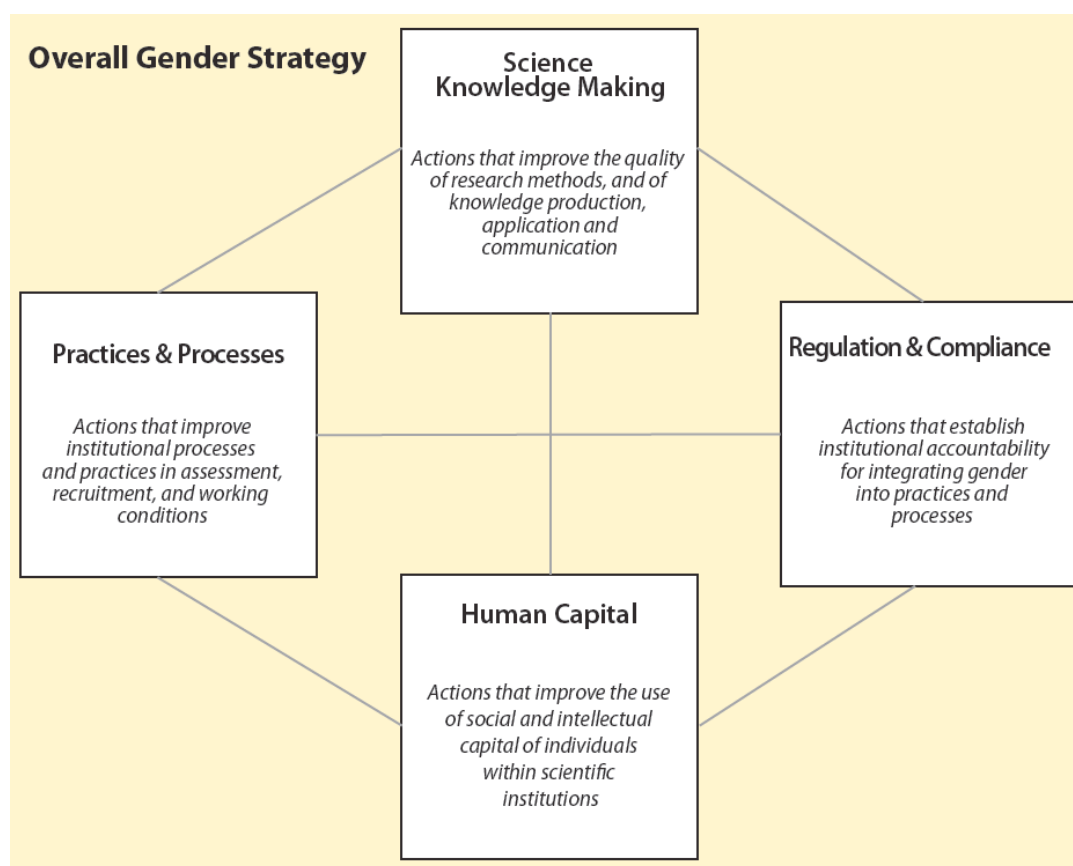
Source: Recommendations for action on the gender dimension in science 2010:10

Table 3: Examples of gender equality indicators retrieved from GENSET

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
How can effective Gender Equality Action Plans (GEAPs) be implemented?	• Effective guidelines for monitoring and enhancing gender equality	Input	Institutional	Consensus seminars, mentoring workshops, Gender Summits
In what way can gendered methodologies stimulate innovation and advance scientific excellence (with regard to main policy initiatives)?	• Monitoring and assessment criteria	Input	European National (programme)	Gender Summits

GENIS LAB - The Gender in Science and Technology LAB

The GENIS-LAB project (2011-2014) "aims to implement structural changes in a group of selected scientific organisations in order to overcome the factors that limit the participation of women in research". Furthermore, the project aims to construct and implement effective gender equality policies which have the capacities to bring about tangible changes in scientific organisations. The project focuses primarily on the nanotechnologies field as well as two other STEM areas, namely Physics and ITC. In contrast to earlier measures which focused primarily on producing cultural change, the GENIS-LAB project promotes actions centred around the structural conditions/factors that impede effective gender equality in scientific organisations. Such factors are seen to be related both to organisational systems as well as to the relationship between the organisation and the individual. In order for systematic actions to be effective, "co-operative support" is deemed necessary at local, national and European levels. With this established premise, GENIS LAB implemented an "integrated and systemic approach, focusing on three levels":[10]

- The organisational level (scientific organisation partners). Development of specific management tools and formulation of self-tailored action plans aimed at promoting internal structural changes.

- The social/environmental level. Training for HR managers aimed at fighting against stereotypes (de-constructing the stereotyped relationship between women and science). Training will support cultural changes within the organisation through the re-definition of excellence evaluation criteria.

- The transnational European level. Promotion of networking/mutual learning among involved scientific organisations to support the exchange of experiences, practices, and efficient management tools. The driving idea is to promote and support structural changes on the basis of self-tailored action plans in order to establish a more equalitarian approach to (female) talents that is based on the recognition of skills and competencies and is suitable to overcoming gender discriminations.

Some of the key tools for obtaining the project's objectives include the participatory gender audit methodology (PGA), gender budgeting, evaluation of excellence and a training programme for HR managers. The project is currently in its closing phase, and

---

[10] genislab-fp7.eu; http://cordis.europa.eu/result/rcn/91197_en.html

final results have not yet been published. It is to be assumed that the range of results, experiences and recommendations produced will serve as an inspirational source for indicator development. For instance, the specific PGAs produced at the six partner institutions already provide relevant data for further analysis. The PGAs analyse specific factors which impede women's participation in scientific research decision-making and develop "additional tools to assess gender equality issues within organisations (e.g. redefinition of criteria for organisational assessment related to human resource and gender; gender stereotypes; gender responsive budgeting)" (Periodic Report Summary 2013:2). The adaptation of the International Labour Organization's PGA and the performance indicators used therein (see www.ilo.org) could also provide relevant data for performance indicator developments at the organisational level.

Table 4: Examples of gender equality indicators retrieved from GENIS LAB

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which factors impede women's participation in scientific research decision-making?	• Representation of women in scientific organisations (STEM specific) • Structural obstacles	Input	Institutional	6 separate PGA analyses of partner organisations (interviews, workshops, focus groups and feedback session data)
Which tools can effectively be applied to assess gender equality issues in scientific organisations?	• Organisational performance indicators	Input	Institutional	6 separate PGA analyses of partner organisations (interviews, workshops, focus groups and feedback session data
How does resource distribution affect gender in scientific organisations?	• Resource/ budgeting monitoring	Input	Institutional	Gender budgeting
How can excellence indicators be redefined in order to reduce gender biases?	• (New) evaluation criteria	Input	Institutional	Evaluation of excellence

INTEGER - Institutional Transformation for Effecting Gender Equality in Research

The INTEGER project (2011-2015) aims to "engage problems of gender equality in academia and research institutions in the STEM sector involving every part of them – managers, researchers, administrative staff etc."[11]. Its main objective "is to escalate career progress of women in research and academia." Accordingly, it will strive to improve organisational matters, raise awareness of gender correspondence and

---

[11] http://www.projectinteger.com/

initiate a more comprehensive working environment, thus increasing the number of women researchers.[12]

Four key areas of intervention and analysis are to be implemented over the course of the project, namely:

- empowerment of decision-makers,

- improvement of organisational structures,

- career progression, development and support, and

- work-life balance.[13]

INTEGER further aims to create so-called transformational action plans as a key output. These are defined as "a user-friendly and effective implementation model, written utilising an 'approved code of practice' approach"[14]. Evaluation methods (GESIS) will be used to measure the effects and impacts of these plans in order to improve them and make them available for use beyond the duration of the project and in institutions outside the consortium.

Table 5: Examples of gender equality indicators retrieved from INTEGER

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which factors impede women's participation in scientific research decision-making?	• Representation of women in scientific organisations • Identified structural obstacles	Input	Institutional	On-going participatory evaluation
What are the results of implementing GEAPs?	• Effective guidelines for monitoring and enhancing gender equality	Outcome	Institutional	On-going participatory evaluation

GENOVATE - Transforming organisational culture for gender equality in research and innovation

The FP7-funded GENOVATE project (2013-2016) aims to '"implement strategies for the transformation of organisational structures towards more gender-competent management".[15] Its main objectives are:

- the implementation of GEAPs with sustainable strategies within each partner institution,

- the development of a Social Model of Gender Equality, and

- implementation for wider application to other organisations and stakeholders".

---

[12] http://www.projectinteger.com/en/activity

[13] http://cordis.europa.eu/result/rcn/57758_en.html

[14] http://www.projectinteger.com/en/activity

[15] http://www.genovate.eu

The project chose to approach gender equality at the institutional culture and organisational structure levels rather than focusing on individual factors, an approach which has had a tendency to zoom in on how the individual can change (Convention report 2013:2) (this concept is also described by Londa Schiebinger as "fixing the women"). GENOVATE also aims to implement GEAPs in six European universities. As a part of this objective, a "social model of gender equality implementation" (SMoGEI), underpinned by "the gender Change Academy Model" (CAM) will be constructed. Key elements in this process are:

1. the establishment of a consultation model, using suitable mechanisms such as online surveys, online forum, etc. (in discussion with UNINA), or E-portfolios;

2. the documentation of each partner institution's perceptions and best practices in implementing the GEAPs, at micro and macro institutional level (personal, team, institutional levels);

3. discussion with all partners on the use of the CAM and the social model of equality for creating the GENOVATE SMoGEI (rationale, applicability, projected outcomes). (Convention report 2013:8).

The project is currently still in the implementation phase. Nonetheless, its "social model of gender equality implementation" is expected to be able to provide data on relevant mechanisms regarding barriers to gender quality, best practice, effects of implemented actions plans, etc.

Table 6: Examples of gender equality indicators retrieved from GENOVATE

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which factors impede women's participation in scientific research decision-making?	• Representation of women in scientific organisations • Identified structural obstacles	Input	Institutional	On-going participatory evaluation
What are the results of implementing GEAPs?	• Effective guidelines for monitoring and enhancing gender equality	Outcome	Institutional	On-going participatory evaluation

STAGES - Structural Transformation to Achieve Gender Equality in Science

The STAGES project (2012-2015) broadly aims to support "the career advancement of women researchers" through the implementation of institutional action plans and "structural change strategies" and by working in close cooperation with HR management at the participating research institutions.

The three main objectives of STAGES are:

1. Applying different self-tailored action plans aimed at introducing gender-aware management at all levels in each of the participating organisations. Each action plan includes activities in one or more of the 3 strategic areas identified in PRAGES: Building a women-friendly environment, promoting gender-aware science and supporting women's leadership in science;

2. Producing a deeper understanding of the dynamics surrounding structural change efforts by constantly analysing, monitoring and assessing the process activated in each institution, in order to initiate mutual learning practices among partners;

3. Spreading information among European universities and research institutes on successful negotiation strategies implemented to build consensus on and commitment to structural level gender equality initiatives which address different leadership levels and the many stakeholders directly or indirectly involved in change (Periodic Report Summary 1 2014).

Due to the ongoing status of the project, no final results have yet been produced. However, the results that are already available (see Table 7) and the final set of guidelines and recommendations to be generated are expected to provide relevant material for further data review in indicator development terms. Also of relevance are the set of five main criteria adopted for the regular evaluations performed in the project (effectiveness, efficiency, impact, sustainability, relevance), which cover more than 70 indicators (Progress evaluation report no. 3 2014).

Table 7: Examples of gender equality indicators retrieved from STAGES

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which factors impede the career advancement of women researchers?	• Structural obstacles	Input	Institutional	Ongoing evaluation and assessments (surveys) (measures at each participating organisation, e.g. statistics with regard to recruitment, workplace assessment, etc.)
How can effective GEAPs be implemented?	• Effective guidelines for monitoring and enhancing gender equality	Input	Institutional	Ongoing evaluation and assessments (surveys) (measures at each participating organisation)
Which mechanisms are in place to effectively monitor institutional gender actions?	• Representation of women in scientific organisations • Mechanisms to monitor institution objectives	Outcome	Institutional	Ongoing evaluation and assessments (surveys) (measures at each participating organisation such as periodical reports on gender share of staff and scientific personnel at Aarhus

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
				university, periodical surveys at Fraunhofer-Gesellschaft, etc.

WHIST - Women's careers hitting the target: gender management in scientific and technological research

WHIST (2009-2011) aimed to "improve the situation of gender diversity in science, by inter alia improving transparency in recruitment, promotion, and nomination" and to "increase the capacity of S&T institutions in monitoring, managing and feeding gender diversity in their own organisation, at all levels"[16]. The project followed the strategic directions for conducting successful interventions that were identified in the FP7 project "Practising gender equality in science" (PRAGES) to provide new knowledge on gender dynamics in scientific and technological research institutions. Experimental initiatives in building a women-friendly environment, promoting gender-aware science and supporting women's leadership in science were carried out in three organisations (Fraunhofer IAO, Stuttgart, Germany, the University of Aarhus, Denmark, and the European Space Agency, France) with the aim of identifying effective solutions.

The main objective of the WHIST project was to "provide for a review on the main areas of risk for gender diversity in research settings as well as on the correspondent regimes to cope with them that will allow the drafting of the provisional version of guidelines to be used for the implementation of experimental activities"[17]. To provide a solid base for the experimental initiatives, the guidelines were discussed in interactive workshops. The initiatives included "both the direct promotion of new programmes and the support to programmes promoted by the organization" to help revise the guidelines on their potential to support gender diversity in science.

In its "Guidelines on gender diversity in S&T organisations", the lessons learned were formalised in obstacles to the gender equality activity and recommendations to achieve the established objectives as well as information on the key role of negotiation activity and the size of interventions. The direct impact of the project was primarily the increased knowledge obtained on discriminatory dynamics, but it did also produce an increase in institutional capacity building and better awareness of the topic, as was pointed out in the internal evaluation of the project. [18]

---

[16] http://www.retepariopportunita.it/defaultdesktop.aspx?page=3414

[17] http://cordis.europa.eu/project/rcn/91101_de.html

[18] http://cordis.europa.eu/project/rcn/91101_de.html

Table 8: Examples of gender equality indicators retrieved from WHIST

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
Which obstacles affect actions for gender equality?	• Structural obstacles	Input	Institutional	Lessons learned 53 obstacles concerning knowledge on gender discrimination and organisational arrangements
What capacities promote gender equality actions?	• Effective guidelines for monitoring and enhancing gender equality	Input	Institutional	Lessons learned 61 recommendations
What are the results of implementing gender equality initiatives?	• Effective guidelines for monitoring and enhancing gender equality	Outcome	Institutional	Internal evaluation

MORE2 – Support for continued data collection and analysis concerning mobility patterns and career paths of researchers

The aim of the FP7-funded MORE2 project is to "investigate remuneration and working conditions of researchers across 40 European and 10 non-European countries" because "these factors strongly impact the decision of researchers whether to become mobile or not during their career or whether to work in the academic or non-academic sector."[19] The main objective of MORE2 is to "provide internationally comparable data, indicators and analysis in order to support further evidence-based policy development on the research profession at European and national level."

MORE2 is the follow-up to the MORE project and builds on its predecessor's "results and methodologies, which will be improved, fine-tuned and expanded, where needed, both methodologically and conceptually."

The "Researcher Indicators Report" focuses on the selection and update of "indicators on the state and development of the European research system (EU and Member State level), particularly the stock, mobility and overall career path of researchers"[20]. Besides indicators that are related to various dimensions of mobility (geographical mobility; intra-EU 27 mobility and mobility in or out of EU 27; sectorial mobility; virtual mobility), it also offers information on the remuneration of researchers in over 45 countries. The data collected allow the comparison of remuneration aspects across countries and includes not only salaries, stipends and benefits by job position and employment contract but also social security systems, labour legislation in the Higher Education Institution (HEI) sector, the tax system, etc. Unfortunately, it only provides a very limited number of gender-segregated indicators.

---

[19]
    http://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=47102&mime_type=applications.pdf

[20]   http://ec.europa.eu/euraxess/pdf/research_policies/more2/Indicators%20report.pdf

Table 9: Examples of gender equality indicators retrieved from MORE2

Guiding question	Indicator potential	Analytical level (intervention logic model)	Analytical level (aggregation)	Data classification and methods
What are the most important factors of geographical mobility?	• Barriers and motivations for mobility on individual, institutional, and social level	Input	Country	Survey on more than 20.000 researchers in higher education institutions across the EU + 4.000 researchers outside the EU Case studies on working conditions and career paths
What are the effects of mobility on careers?	• Impacts of international mobility on advancement of research skills, networking, and overall career progression	Outcome	Country	Surveys of researchers and institutions and case studies on working conditions and career paths
What are the main characteristics of researchers' remuneration?	• Purchasing power parity in different countries • Gender wage gap	Outcome	Country	Surveys on researchers and institutions, expert interviews and structural earnings survey

4.2 Other recent empirical studies on gender equality

In addition to the EC-funded studies identified and reviewed above, a number of other studies also offer relevant empirical information on issues related to gender equality in the research and innovation contexts.

Table 10 lists 31 such studies. For each entry, the analytical level in terms of aggregation is specified along with a brief indication of the key focus of the study.

Table 10 Main empirical studies on the dimension of gender equality - for review

Source	Type of source	Analytical level (aggregation)	Key focus
Participation of women			
Balafoutas, Loukas & Sutter, Matthias (2012), Affirmative Action Policies Promote Women and Do Not Harm Efficiency in the Laboratory, Science 335, 579-582.	Scientific article	Global	Gender differences (labour market); policy interventions to support women
Best, Kathinka & Schraudner, Martina (2014), Wer macht wirklich MINT? Forschung und Lehre 10/2014, 21(10), 826–827.	Scientific article	National (Germany)	STEM career paths (full professor)
Britton, Dana M.; Baird, Chardie L.; Dyer, Ruth A.; Middendorf, B. Jan; Smith, Christa; Montelone, Beth A. (2012), Surveying the Campus Climate for Faculty: A Comparison of the Assessments of STEM and non-STEM faculty, International Journal of Gender, Science and Technology, Vol.4, No.1, 102-122.	Scientific article	Institutional	Gender differences in satisfaction; comparison of STEM and non-STEM faculty.

Source	Type of source	Analytical level (aggregation)	Key focus
Cundiff et al (2014), Do gender–science stereotypes predict science identification and science career aspirations among undergraduate science majors? Soc Psychol Educ (2013) 16, 541–554.	Scientific article	Institutional	Gender-science stereotypes; science identity; intent to persist in science
Good, Catherine; Rattan, Aneeta; Dweck, Carol S. (2012), Why Do Women Opt Out? Sense of Belonging and Women's Representation in Mathematics, Journal of Personality and Social Psychology, Vol. 102, No. 2, 700-717.	Scientific article	National (USA)	Gendered stereotypes in mathematics; sense of belonging
Hatmaker, Deneen M. (2013), Engineering Identity: Gender and Professional Identity Negotiation among Women Engineers, Gender, Work and Organization. Vol. 20 No. 4, 382-396.	Scientific article	National (USA)	Professional identity and gender identity of women (STEM)
Judson, Eugene & Kulinna, Pamela Hodges (2012), Recruiting and Retaining Girls and Women to Pursue STEM Careers and Play Sports: Comparing Challenges and Lessons Learned, International Journal of Gender, Science and Technology, Vol.4, No.2, 191-207.	Scientific article	National (USA)	Recruiting and retaining women in STEM and sports.
MacPhee, David; Farro, Samantha; Canetto, Silvia Sara (2013), Academic Self-Efficacy and Performance of Underrepresented STEM Majors: Gender, Ethnic, and Social Class Patterns, Analyses of Social Issues and Public Policy, Vol. 13, No. 1, 2013, 347-369.	Scientific article	Institutional	Academic self-efficacy and performance among STEM-minorities
Moss-Racusin, Corinne; Dovidio, John F.; Brescoll, Victoria L., Graham, Mark J., Handelsman, Jo (2012), Science faculty's subtle gender biases favor male students, PNAS, 2012, Vol. 109, No. 4, 16474-16479. Online: http://www.pnas.org/content /early/2012/09/14/1211286109.full.pdf+html	Scientific article	National (USA)	Recruitment (gender bias); participation of women
Robnett, Rachael (2013), The Role of Peer Support for Girls and Women in the STEM Pipeline: Implications for Identity and Anticipated Retention, International Journal of Gender, Science and Technology, Vol.5, No.3, 232-253.	Scientific article	National (USA)	Influence of peer support for women/girls in STEM
Stout, Jane G.; Dasgupta, Nilanjana; Hunsinger, Matthew; McManus, Melissa A. (2011), STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM), Journal of Personality and Social Psychology, Vol. 100, No. 2, 255-270.	Scientific article	Institutional	Influence of same-sex role models (for women) in STEM; professional identity/self-concept
Structural change			
Abramo, Giovanni; D'Angelo, Ciriaco Andrea; Murgia, Gianluca (2013), Gender differences in research collaboration. Journal of Informetrics 7(2013), 811– 822.	Scientific article	National (Italy)	Differences in collaboration patterns of male and female scientists
Fischer, Christian & Reckling, Falk (2010), Factors Influencing Approval Probability in FWF Decision-Making Procedures, FWF Stand-Alone Projects Programme, 1999 to 2008, FWF	Scientific article	Institutional	Systematic distortions in decision-making procedures (research

Source	Type of source	Analytical level (aggregation)	Key focus
discussion paper, Vienna.			funding)
Husu, Liisa & Cheveigné, Suzanne D. (2010), Gender and gatekeeping of excellence in research funding: European perspectives, in: Riegraf, Birgit; Aulenbacher, Brigitte; Kirsch-Auwärter, Edit; Müller, Ursula (eds.), Gender Change in Academia: Re-mapping the fields of work, knowledge, and politics from a gender perspective, VS Verlag, Wiesbaden, 43-59.	Book chapter	Europe	Gatekeeping in research funding; gender perspective; gender and excellence
Jänchen, Yvonne & Schulz, Kristina (2005), Geschlecht als Faktor ungleicher Zugangschancen zu Ressourcen der Forschungsförderung. Zugänge zur Analyse sozialer Selektionsprozesse im Bereich der Projektförderung des Schweizerischen Nationalfonds, Genf	Report	Institutional	Gender inequality/ differences in research funding
Kahlert, Heike (2014), Gender (In)Equality in Academic Career Promotion of Doctoral Students, in: Thege, Britta; Popescu-Willigmann, Silvester; Pioch, Roswitha; Badri-Höher, Sabah (Hg.): Paths to Career and Success for Women in Science. Findings from International Research, Wiesbaden, Springer VS Verlag für Sozialwissenschaften, 37-62.	Book chapter	National (Germany)	Gender equality, changes in universities and research organisations
Van den Brink, Marieke; Benschop, Yvonne; Jansen, Willy (2010), Transparency in Academic Recruitment: A Problematic Tool for Gender Equality?, Organization Studies, 31 (11), 1459-1483.	Scientific article	National (Netherlands)	Gender equality, academic recruitment (transparency and accountability)
Van den Brink, Marieke; Fruytier, Ben; Thunnissen, Marian (2013), Talent management in academia: performance systems and HRM policies, Human Resource Management Journal, 23(2), 180–195.	Scientific article	National (Netherlands)	Recruitment and selection practices for junior and senior academic talent; gender
Wennerås, Christine & Wold, Agnes (1997), Nepotism and sexism in peer-review, Nature 387, 341-343.	Scientific article	Institutional	Discrimination of women in peer review
Gender in research and innovation content			
Bührer, Susanne & Schraudner, Martina (Hrsg.) (2006), Gender-Aspekte in der Forschung. Wie können Gender-Aspekte in Forschungsvorhaben erkannt und bewertet werden? Stuttgart, Fraunhofer IRB-Verlag.	Report	National (Germany)	Gender aspects in research and innovation content
Institute of Medicine (IOM) (2010), Women's Health Research: Progress, Pitfalls, and Promise, Washington, D.C., United States National Academies Press.	Report	Global	Gender aspects in research and innovation content
Kafai, Yasmin B.; Heeter, Carrie; Denner, Jill; Sun, Jennifer Y. (eds.) (2008), Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming, Cambridge, Massachusetts Institute of Technology (MIT) Press.	Report	Global	Gender aspects in research and innovation content
Oertelt-Prigione, Sabine & Regitz-Zagrosek, Vera (Eds.) (2012), Sex and Gender Aspects in	Report	Global	Gender aspects in research and innovation

Source	Type of source	Analytical level (aggregation)	Key focus
Clinical Medicine, London, Springer Verlag.			content
Regitz-Zagrosek, Vera (ed.) (2012), Sex and Gender Differences in Pharmacology, London, Springer Verlag.	Report	Global	Gender aspects in research and innovation content
Schenck-Gustafsson, Karin; DeCola, Paula R.; Pfaff, Donald W.; Pisetsky, David S. (eds.) (2012), Handbook of Clinical Gender Medicine, Basel, Karger.	Report	Global	Gender aspects in research and innovation content
Schiebinger, Londa & Klinge, Ineke (eds.) (2010), Gendered Innovations: Mainstreaming Sex and Gender Analysis into Basic and Applied Research, Brussels, European Commission.	Report	Global	Gender aspects in research and innovation content
Schraudner, Martina & Lukoschat, Helga (Hrsg.) (2006), Gender als Innovationspotenzial in Forschung und Entwicklung, Stuttgart, Fraunhofer IRB-Verlag.	Report	National (Germany)	Gender aspects in research and innovation content
Stvilia, Besiki; Hinnant, Charles C.; Schindler, Katy; Worrall, Adam; Burnett, Gary; Burnett, Kathleen; Kazmer, Michelle M.; Marty, Paul F. (2011), Composition of Scientific Teams and Publication Productivity at a National Science Lab, JASIST, 62(2), 270-283.	Scientific article	National (USA)	Team performance
Wajcman, Judy (2010), Feminist Theories of Technology, Cambridge Journal of Economics, 34 (1), 143-152.	Scientific article	Global	Gender aspects in research and innovation content
Woolley, Anita Williams & Baer, Julia B. (2011), The role of gender in team collaboration and performance, Interdisciplinary Science Reviews, 36(2), 146-153.	Scientific article	Global	Team performance

The publications included in this list provide helpful input for the development and discussion of indicators because they all explicitly or implicitly address formulated assumptions about direct relations between measures/policies and changes/effects. In the following, we will now discuss selected examples of such claims for the three dimensions of gender equality.

Participation of women

There is a lot of evidence pointing to the (under-)representation of women in science and research both at national level as well as in international comparison (mainly EU countries). The description of female participation in science and research refers in most cases to the image of the leaky pipeline. This image is characterised in most European countries by a female dominance among students and graduates and a decreasing share of women in higher levels of the hierarchy.[21] Women account for only 20% of professors (Grade A, EU 27) and 15% of heads of higher education institutions. However, although women are still underrepresented both in science and research as well as in top positions, the share of women increases and the leaky pipeline constricts slightly in the university and government sector at least. In the business sector, 19% of researchers are women (EU 27). However, there is less

---

[21] The figures presented are taken from she figures 2012 (European Commission 2013b).

evidence available on vertical segregation in the business sector and how it differs from the university and government sectors.

Women are also still under-represented in STEM disciplines: one in four PhD graduates in engineering, manufacturing and construction, and 40% of PhD graduates in science, mathematics and computing is female. In contrast, almost two thirds of PhD graduates in education science are female.

A well-known problem with regard to horizontal segregation is that higher education course choice is strongly determined by experiences in school. PISA surveys – especially those focusing on maths and science – show that boys not only perform better than girls in these subjects, they also show a higher level of self-esteem and interest here (OECD 2013a+b, 2012). This is already the starting point for numerous programmes to increase the interest of girls and women in science (e.g. various STEM initiatives, specific degree course advice, job coaching, etc.).

One specific problem with regard to female participation in STEM disciplines is the drop out phenomenon. Several recent studies and articles discuss the reasons for female drop out in specific STEM disciplines (e.g. Cundiff et al. 2014; Hatmaker 2013; MacPhee et al. 2013; Robnett 2013; Britton et al. 2012; Good et al. 2012; Judson & Kulinna 2012; Stout et al. 2011). These publications focus on the male-dominated culture in STEM disciplines, which is the result of traditional and gendered practices, persistent stereotypes and the lack of role models. These (and other) factors create a working culture which lacks a sense of belonging for women. This also leads to a reduced self-perception of their academic skills among women, despite the fact that no gender gap in performance is evident (e.g. MacPhee et al. 2013). Conversely, research also indicates that if women stay in the STEM field, they enjoy equal career opportunities to their male counterparts (Best & Schraudner 2014).

In most countries – and at European level – several policies have been implemented to increase female participation in professor level and management positions (e.g. anti-discrimination legislation, positive action, quota regulations, etc.). These policies have indeed contributed to an increasing participation of women, especially in the public sector (including universities). However, has this also led to a change in culture in academia? Kanter (1977) formulated the hypothesis that increasing female participation would lead to a change in organisational culture. Indeed, it is assumed that the interests of an under-represented group cannot be ignored by an organisation if the share of that group reaches a critical mass (between 25% and 33%), since other topics will then feature on the agenda, decision-making criteria will change and – last but not least – better and more innovative decisions will be made. This assumption is also corroborated by research for the corporate sector: McKinsey and Company (2007) and Catalyst (2004) both demonstrate a striking and positive correlation between female participation in management and economic performance indicators. However, there is also research which shows that women in decision-making positions in universities are as gender biased as men (e.g. Moss-Racusin et al. 2012). Accordingly, in order to reduce gender bias in decision-making, female participation is a necessary, but not sufficient, condition for change. Instead, this requires the building up of gender competence among both female and male managers.

In recent years, quota regulations have been discussed at length as a measure to increase female participation in decision making. In academia, the quota discourse is characterised by a clash of two different logics: the goal of increasing female participation contains a social justice argument that is seen as a threat to excellence criteria, and is therefore denied by many academics. Balafoutas and Sutter (2012) analyse acceptance of several measures to promote women (including quota regulations) and the effect of such measures on performance and willingness to cooperate with "quota women". They found a significant positive impact of quota

regulations on women's willingness to participate in a competitive situation and no negative effects on performance or cooperation in teams.

Structural change

A common goal of the EC studies presented in Chapter 4.1 is the elimination of structural barriers to women's careers in science and research institutions. It is assumed that structures and processes in RPOs and RFOs contain an inherent gender bias, which is reproduced in everyday practices. In most cases, this gender bias is not intentional but just "somehow happens" (Martin 2003, 2006). The implementation of NPM in academia supports or even strengthens traditional, gender-biased practices. NPM brings about new managerial control mechanisms based on quantitative performance indicators intended to raise efficiency and intensify competition in science (e.g. Jansen 2007).

There is a vast amount of research dealing with questions of gender bias in the context of appointment procedures or promotion, access to funding or within peer review. Van den Brink et al. (2012) analyse appointment procedures for professorships in the Netherlands and show that the success of women in appointment procedures is highly influenced by the design of the procedure (public advertisement or not). Wroblewski (forthcoming) shows for the Austrian context the scope of action universities have in designing non-discriminatory appointment procedures (avoiding drop out of women at early stages of the procedure) and describes examples of non-discriminatory practices. In an experimental study, Moss-Racusin et al. (2012) reveal a significant gender bias in favour of men in appointment procedures for lower level management positions (with regard to income, promotion or mentoring). Kahlert (2014) discusses the relevance of professors as gatekeepers[22] and shows their lower support for women in female and male dominated disciplines alike. Her results are also in line with those obtained by Husu (2004) for Sweden.

In 1997, Wennerås and Wold published an article in *Nature* on sexism and nepotism in the peer review of research grant applications to Sweden's Medical Research Council. The study showed that peer review is not as "neutral" or "objective" as it claims to be. Despite the quality of the proposal, the applicant's gender or affiliation significantly influenced its chance of being funded. Gender bias in the research funding context is disturbing as it contradicts one of the core myths in science: decision-making should only be based on meritocracy (excellence). Several national funding organisations as well as the European Research Council (ERC) have analysed gender bias in success rates, or are currently doing so.[23] Most studies show an under-representation of women in funding (basic research) and offer different explanations for this phenomenon. Fischer and Reckling (2010) argue for the Austrian context that women are under-represented because of the gender segregation in disciplines. Jänchen and Schulz (2005) also use segregation to explain the low participation of women in funding, but focus on vertical segregation. The main reason why only a few women receive funding from the Swiss National Fund lies is seen to lie in the low number of formally qualified women.

Critiques from gender scientists on the current ways of measuring excellence focus on bibliometric indicators, i.e. advanced analytical tools used to assess scientific

---

[22] According to Merton (1973), gatekeeping represents the fourth major role or function of scientists (in addition to those of research, teacher, and administrator). The role of gatekeepers is described as evaluating the promise and limitations of aspirants to new positions, thus affecting the mobility of individual scientists and, on aggregate, the distribution of personnel throughout the system.

[23] A consortium of Joanneum Research, VU Amsterdam, and Tecnalia is currently working on such a project. The goal of this research – gendERC – Gendered dimensions in ERC grant selection – is to identify possible gender-specific influences on the assessment of the ERC Starting Grant.

productivity, visibility and impact – factors which are interpreted as proxies for quality and excellence. The increasing use of quantitative measures for the assessment of research performance has enhanced the real consequences of bibliometric indicators for the allocation of positions and resources (Van den Brink et al. 2013; Husu & Cheveigné 2010; Weingart 2005). Previous studies have revealed significant gender differences in scientific productivity. On average, female scientists tend to publish fewer peer-reviewed papers than their male colleagues, although this difference has been decreasing since the 1970s (Xie & Shauman 2003). However, there are notable indications of a gender bias in bibliometrics in favour of male researchers (e.g. Abramo et al. 2013). For example, the classification of "excellent" and "normal" publication channels is influenced by mainstream approaches and topics, to the disadvantage of (female) researchers, who deviate from the prevailing norm in notions of research. Research which focuses on gender relevant questions is often not in line with mainstream research in a specific field. Instead, it is frequently interdisciplinary or transdisciplinary and is therefore difficult to assess using disciplinary excellence criteria. The increasing literature on gender and research funding highlights the importance of gender equitable measures of research performance.

Such findings confirm the need for structural change and support the calls for specific measures to initiate structural change in research performing as well as research funding institutions. Important instruments in this context include gender action plans or equality plans, which often form the focus of the case studies described in Chapter 4.1. It is assumed that a comprehensive bundle of measures (a policy mix) which addresses all three pillars of gender equality will bring about cultural change in research institutions. This is based on the assumption that the successful implementation of equality plans requires a reflection on existing practices with regard to an inherent – and probably unintended – gender bias. The success of such an approach depends on gender competent management. Consequently, measures also aim at increasing gender awareness and gender competence among decision-makers and management. To date, no comprehensive impact analysis of equality plans is available.

Gender in research and innovation content

The discussion of gender aspects in research and innovation content emerged several years ago and is part of a shift towards a "benefit-orientation" in the debate on gender equality.In the meantime, the need to integrate gender aspects into the research and innovation process has become largely accepted and, to some extent, even institutionalised, e.g. through specialised institutes like the Institute of Gender in Medicine (GiM) at the Charité University Clinic in Berlin.

The European Commission supported the improved consideration of gender aspects in research through different approaches such as (1) the mandatory integration of gender impact assessment in research proposals during FP6, (2) the existence of explicit programme lines within the Science-in-Society programme in FP7, and (3) the continuous monitoring of research project achievements with regard to gender aspects through the inclusion of corresponding items in the reporting questionnaires.[24] During an expert workshop organised in the course of the interim evaluation of the Science-in-Society program (see above), the following aspects were identified as necessary steps for an improvement in gendered research and innovation in the future: gender bias (dominance of male as the norm) in science knowledge making, gender balance

---

[24] Template Project Final Report, part 4.3: Report on societal implications; Science and society reporting questionnaire. Most recent recent developments are described in the document "Vademecum on Gender Equality in Horizon 2020 http://ec.europa.eu/research/ swafs/pdf/pub_gender_equality / vademecum_gender_h2020.pdf)

in teams as enhancement of collective intelligence and new ways to promote interdisciplinary advancements (e.g. linking areas where women are in a majority – such as life sciences – with areas where they are in a minority – such as photonics).

In a large explorative study, the Fraunhofer society developed a conceptual framework and subsequent guidelines aimed at supporting researchers in the identification of gender aspects in their research processes (Bührer & Schraudner 2006). They also developed a checklist which helps guarantee proper consideration of gender aspects in the application of empirical social research methods like surveys, interviews, focus groups, etc. (Bührer 2006; Kane & Macaulay 1993). The conceptual framework of the Fraunhofer project elaborates four different aspects of the gender construct (Bessing 2006): (1) biological (= gender), (2) psychological (individual attitudes and needs), (3) social (role patterns, differences in way of life, availability of financial, social, cultural resources, etc.), and (4) ideological (values, norms, stereotypes), which are intended to help with the identification of gender aspects in research. In the meantime, many other checklists and collections of examples have also been produced (see, for example, Oertelt-Prigione et al. 2012; Schenck-Gustafsson et al. 2012; Regitz-Zagrosek 2012; the database of references in major clinical disciplines http://bioinformatics.charite.de/gender/).

The Gendered Innovations Website (http://genderedinnovations.stanford.edu/) offers a series of tools and case studies aimed at helping researchers and innovators to identify gender aspects in research. Its conceptual framework covers the complete research and development process, from the identification and determination of topics to the utilisation of results. It is pointed out, for example, that the definition of research content priorities is largely shaped by the availability of (public) funding, the dominant reward systems for the respective careers as well as existing norms and stereotypes (Schiebinger & Klinge 2010).

There are numerous examples of how the neglecting of gender aspects leads to sub-optimal or even harmful results, e.g. with regard to the lack of appropriate diagnostic and therapeutic instruments for heart disease in women or the under-diagnosis of osteoporosis among men (for further examples in the health sector see IOM 2010; Wajcman 2010). Harmful product examples include car seatbelts and airbags which do not take into account the safety of pregnant women. Research and development processes can also reinforce gender stereotypes, e.g. by designing "male" and "female" computer games (Kafai et al. 2008). Likewise, the use of particular standards and reference models can lead to a certain bias if, for example primarily young white men are defined as norm (a famous example here are crash test dummies). There also several examples of dysfunctional product developments, e.g. assistance systems for the elderly (household robots) which neglect the fact that the main target group – elderly women – is not tall and strong enough to manoeuvre such robots or voice recognition systems that cannot recognise female voices, etc. (for further examples see, for instance, Schraudner & Lukoschat 2006).

In contrast, the potential for improved user-orientation through participatory research and design that involves both female and male target groups is also described in several studies (Schraudner 2006; Leung et al. 2004; Oudshoorn & Trevor 2003; Greenwood et al. 1993).

5. Assessment of the availability of data on gender

Based on our review and presentation of empirical studies on gender equality above, this chapter provides an overall assessment of the availability of data on the gender dimension for indicator development purposes. It discusses the issue of data availability in terms of 1) the extent to which the empirical studies provide relevant information across the three dimensions of gender equality identified in the functional vocabulary, 2) the balance and availability of both quantitative and qualitative data, 3) the extent to which the available data address the four analytical levels specified in the intervention logic model, and 4) the availability of data at different levels of aggregation.

5.1 Data availability across gender equality categories

The studies presented in the previous chapters offer rich empirical information on gender in science, research and innovation. Due to the substantial support provided by the European Commission through its systematic embedding of gender (and ethics) across all projects and programs since FP6 and the establishment of different working groups and networks (e.g. Helsinki Group, ETAN Group, etc.), many of the studies cited above include comparative elements, at least with regard to the EU Member States.

Following the three-dimensional definition of gender equality applied in MoRRI, there are great differences in the availability of data on 'horizontal and vertical participation of women in research' on the one hand and 'structural change in institutions' and 'gender in research and innovation content' on the other. The continued dominance of data on individual participation has been tackled recently by the enhancement of existing data sources like the "She Figures" (European Commission 2013).

Developed by the European Commission in co-operation with the Statistical Correspondents of the Helsinki Group on Women and Science, the "She Figures" contain statistics and indicators on the critical mass or scope of women in science, on female participation in different scientific fields, on seniority and careers as well as on the setting of the scientific agenda. They allow us to measure and monitor the extent of gender imbalances in science from a comparative perspective and provide empirical evidence to support the design of policies to reduce such imbalances. The "She Figures" were first published in 2004 and provided a set of indicators which related mainly to individual data on female participation for the year 2003. The structure of the indicators was maintained in the following editions (for the years 2006, 2009, and 2012), but the indicators themselves were extended in all areas, with increasing efforts to:

- achieve a more differentiated description of researchers with regard to ascribed attributes like age, mobility and children,

- focus on the horizontal segregation of researchers as well as graduates,

- develop indicators for career development (like the glass ceiling index, gender pay gap, etc.), and

- introduce indicators for the setting of scientific agenda (e.g. heads of universities and institutions, R&D expenditure, applicants and beneficiaries of research funding).

The information on the gender setting in institutions has been extended in particular in recent waves. Data and indicators are based on EU-harmonized statistics like the Statistics on Research and Development, Education Statistics, Statistics on Income

and Living Conditions, Structure of Earnings Survey and WiS-Database. A majority of the indicators are based on representative data covering all EU Member States.

The monitoring of ERA gender goals refers to "She Figures" with regard to female participation, but also focuses on cultural and institutional changes in organisations and gender quotas in committees.[25] The empirical basis is provided here by the **ERA surveys** of RPOs and RFOs.

The 2014 ERA survey is a simplified version of the 2012 questionnaire and was designed to reduce the response load and collect adequate data for the indicators agreed with Member States. ERA surveys gather information from 1,265 public or publicly funded research organisations (universities, institutes, hospitals, research agencies, etc.). With regard to RPOs, they cover about 20% of the total research population in the EU. In financial terms, the RFO responses represent around 34% of total government budget appropriations or outlays for R&D (GBAORD) in the EU. There is a great difference in representativeness between countries in both categories. The data are used to classify Member States 1) according to the existence of specific measures in support of the ERA, and 2) by the level of implementation of RFOs and/or RPOs in relation to the EU average.

In addition to these primary sources of gender data, there are also a number of projects that collect information on the implementation of gender equality plans and related measures on a case study basis (see Chapter 4.1 for details of corresponding EC projects). The CESAER Gender Equality Survey 2012/2013 merits specific mention here because it provides data on the state of play of gender equality and gender equality management for 48 European universities of science and technology based on a standardized survey (Horvat et al. 2014). It covers the organisational structure for gender equality, gender equality plans, initiatives and measures supporting gender equality, barriers and statistics on the gender structure of staff (on different hierarchical levels) and also provides examples of best practices.

With regard to institutional strategies, the CESAER survey covers (1) existing gender equality plans and whether they are integrated into overall strategy, (2) monitoring, evaluation and/or benchmarking activities, and (3) implemented measures like gender budgeting or internal communication and supporting measures like training, manuals, etc. In terms of implementing strategies and plans, the survey distinguishes between nine different activities, including work-life-balance support, programs for attracting female students, networking opportunities, quotas, etc. With regard to organisational structures and approaches to promote gender equality, the survey differentiates between a special unit for gender equality, gender equality as part of the other responsibilities of a unit, one person dealing full-time with gender equality, one person dealing part-time with gender equality, no unit or person dealing with gender equality and other ways of supporting gender equality. It also looks at requirements in place for gender diversity in appointment committees.

The CESAER report depicts barriers to gender equality in the participating institutions. Typical barriers mentioned here are lack of tailored regulations or policies, lack of resources for the implementation of gender equality and internal resistance. Change resulting from gender equality activities are described in terms such as the top institutional level takes responsibility for gender equality, women get more visibility, dedicated institutional structures, increased gender awareness, changed institutional cultures, improved working environment, changes in quantitative terms, positive impacts of specific programs, targeted measures to support institutional change,

---

[25] European Commission (2014): European Research Area. Progress Report 2014. The indicators on gender are still under discussion.

planning, monitoring, evaluation, benchmarking and gender equality performance as criterion in university ranking (Horvath et al. 2014:39).

Other interesting projects which collect data on science and research are also in place, although they are not all adequate for use in gender analysis. For instance, MORE2, a study to support the continued collection and analysis of data on the mobility patterns and career paths of researchers, covers gender relevant aspects in science (e.g. career development and remuneration of researchers). However, gender issues are not an explicit focus, and gender segregated data is only presented for a few aspects (such as the stock of researchers, satisfaction with scientific career or the gender wage gap to researchers in the private sector).

5.2 Availability of quantitative and qualitative data

Due to improvements in the provision of sex-segregated data, progress in gender equality can be identified in many aspects on the basis of quantitative data. This applies especially for the participation of women in different fields and positions in research. The challenges for a monitoring of the gender dimension in RRI are 1) to go beyond sex segregated data and assess gender differences, 2) to measure gender inequalities beyond female participation, 3) to quantify progress in structural changes in institutions, and 4) to indicate the integration of gender in research and innovation content.

Most of the available quantitative data address the horizontal and vertical segregation of women and men in science and innovation, an indicator which is thoroughly documented by the "She Figures". The share of female researchers serves as a rough indicator for gender inequalities in careers in science, research and innovation. Differences relating to fields and levels of research positions indicate hierarchical differences between women and men. Complex indicators like the Dissimilarity Index for horizontal segregation or the Glass Ceiling Index for career opportunities of women in academia allow a comparative analysis between countries in their respective contexts. Similarly, participation indicators cover individual researchers by gender for EU Member States, candidate countries and EFTA countries based on R&D statistics.

However, there are also some shortcomings in the comparability between sectors (higher education, government, business), especially with regard to scientific fields or career positions. In the higher education sector, sub-categories of the major science and technology fields can be applied because corresponding detailed administrative information is available. This is not really possible, in contrast, for the private and non-profit sectors. Similar difficulties arise with regard to hierarchical differentiation in non-university institutions, where there are no equivalents to the rigid hierarchy of formal positions in higher education. Likewise, it is not easy to differentiate between activities in the field of research and innovation and related technological, industrial, administrative or other supporting activities in a non-university setting.

Researchers can be differentiated according to their gendered social roles, for instance by differences in parental roles. The 'maternal wall' refers to the multiple barriers faced by women scientists with family responsibilities. Because of the lack of quantitative data on the family situation in research data, "She Figures" uses EU-SILC[26] data to report on the parenthood status of researchers, with the deficiency that researchers cannot be identified precisely in this data.

Similar challenges occur in approaches to measuring female disadvantages beyond participation: There is no quantitative gender-segregated data on career paths or the working conditions of researchers that can be used for a monitoring. The gender wage

---

[26] European Union Statistics on Income and Living Conditions

gap can be interpreted as the central indicator of gender-structured labour markets. As a synthetic indicator of multiple inequalities between men and women, this gap is determined by differences in educational attainments, labour market experience and tenure, sectoral affiliation and occupations as well as by wage discrimination, etc. Because of the lack of harmonized and comparable gender-segregated data on the remuneration of researchers, the Structural Earnings Survey is used, with the focus on men and women with ISCED[27] 5 and 6 level qualifications in ISCO[28] 2 and 3 occupations as a proxy for researchers, with the major disadvantage that this does not cover the government sector.

Women in decision-making positions can be measured by their share in top positions in research and management as well as by female participation in recruitment committees and evaluation processes. The ERA surveys provide a basis for such indicators, but with the drawback that the coverage of institutions is limited.

A number of projects deal with the implementation of policies and programmes, including guidelines and monitoring criteria for the promotion of structural change towards gender equality in science (see Chapter 4). However, the availability of data on structural change is much less satisfactory than for female participation. Experiences in statistical surveys show that dealing with diverse gender equality measures is difficult. Accordingly, the data collected data on implemented measures for gender equality are hardly comparable between countries according to intensity or scope. Information on the existence of gender equality plans, recruitment and promotion policies only indicate if and how gender equality is on the agenda of RPOs and RFOs.

Possible indicators for assessing the integration of gender in science and research content include whether gender criteria are used in research project or programme evaluation processes or whether other activities to promote gender content in research exist. The challenge here lies in transferring these qualitative data into quantitative indicators. However, it is rather challenging to operationalise change of structures and processes as a consequence of the introduction of systematic screening of gender aspects in research proposals or the institutionalisation of governance structures which shall enable their detection. Process-oriented and structural criteria of this kind are typically dichotomous, indicating merely the existence or lack of the respective structures. This is the case for the ERA surveys mentioned above, and is mirrored by the criteria used for the final reports of FP projects, which respond to questions like "Was there a gender dimension associated with the research content?" [Yes, please specify / No][29], or "Type of actions mentioned within the GAPs"[30] (Design and implementation of an equal opportunity policy, Clear defined targets to achieve a gender balance in the workforce, Organisation of conferences and workshops on gender, Actions to improve work-life balance, Other [text box]).[31]

The illustrated examples of indicators provide valuable information on the implementation of policies but not on the quality of the implementation processes or

---

[27] International Standard Classification of Education

[28] International Standard Classification of Occupations

[29] Science and society reporting questionnaire

[30] See Template Project Final Report, part 4.3: Report on societal implications

[31] The final reporting questionnaires mentioned also ask for several aspects, which cover all three pillars of the gender equality dimension (see: Interim evaluation and assessment of future options for Science in Society Actions [Ares(2011)1117587], Final Report (D5), Part 2: Assessment of future options for Science in Society actions on EU-level, ANNEX III: Description of a set of indicators to be used in future evaluation and assessment exercises for Science in society actions. November 2012)

the changes the bring about. Accordingly, the implementation as such remains a black box.

5.3 Availability of data across the analytical levels included in the intervention logic model

Following the MoRRI proposal, indicators will be considered for different levels or phases of the 'logic model' of gender equality interventions. These levels include the 'context', i.e. the overall environment for gender equality, the 'input', i.e. the activities carried out, measures taken, structures created or resources provided to improve gender equality, the 'outputs', i.e. the immediate or direct results of such activities, and the 'Outcomes' i.e. the medium- and long term achievements and consequences of a better integration of women in research and innovation (from both a position and a content perspective).

The empirical information that emerges from the studies presented in chapter 4.1 mainly address the input and the outcome levels of the 'logic model' of gender interventions. The relevant context, i.e. the overall environment for gender issues, relates to the gender division of paid and unpaid work. Output indicators, i.e. the immediate or direct results of gender equality policies, are scarcely available because there is little evidence on causal effects. Accordingly, we will interpret most of the indicators as outcome.

A large share of the available data addresses indicators for the representation of women in different fields and decision-making positions. Depending on the underlying goal, specific indicators can be interpreted as context, input, output or outcome indicators. For instance, the number of formally qualified women in a specific field establishes the basis for female professors in that field. The share of women in decision-making positions can also be interpreted as an input indicator for cultural change in universities. As explicit goals of specific measures (e.g. recruitment processes for professorships), they can also be interpreted as the direct output of activities or as the long-term outcome. Following the logic of the gender dimension in MoRRI, the integration of women in all fields and at all levels in research and innovation is one of the main goals. Therefore, we will consider participation of women mainly as an outcome.

Input indicators relate to a range of different activities covering institutional measures like regulations, institutional settings, etc. as well as to substantial measures like individual career promotion, work-life-balance activities, etc. This includes context factors that directly influence the integration of women into research (like working hours arrangements, care infrastructure, working conditions in the business sector, equal pay legislation, etc.).

A large proportion of the literature reviewed depicts the influence of context factors on gender equality in science and research (e.g. working hours arrangements, care infrastructure, working conditions in the business sector, equal pay legislation). The analysis of outputs and outcomes is less common: If these are the subject of a study, they mainly occur in terms of improved performance (e.g. more frequently cited publications, improved products and services or integration of new aspects in research content etc.).

However, there is also a growing body of literature on how to evaluate gender equality measures and activities. How this can be used in the definition of typical outcomes, impacts and benefits should therefore be explored further. Indeed, one of the main challenges of the continued work within the MoRRI project will lie in developing indicators for the impact/benefit or output of gender equality activities.

5.4 Availability of data at different levels of aggregation

A significant number of the empirical studies presented above provide empirical information on gender equality at the European level (EU Member States, candidate countries and EFTA countries). Likewise, several studies also target the national level. But there is also rich empirical evidence referring to the sub-national level, and in particular the institutional level, since single (R&I) institutions are also implementing structural change. The individual level is also featured, for example, in discussions of the individual success factors for career advancement.

6. Data selection for RRI monitoring – reflections on current data gaps and required data collection

The purpose of this chapter is to assess data gaps and reflect on the need for primary data collection in order to mitigate these data gaps based on the content and results of the previous chapter as well as the list of promising indicators constructed in Chapter 7.

With regard to the data available for monitoring gender equality, we can conclude that while harmonized quantitative data is available for the first dimension (participation), the data available for the structural change and gendered innovations dimensions can be described as a patchwork of mainly qualitative data. Although there are several projects implementing and monitoring equality policies in research organizations (including Helsinki Group initiatives and the development of monitoring for ERA goals), there is less representative data available for cross-country analysis. Even less satisfying is the supply of data on the gender dimension in research and innovation content. With the exception of EU projects that are subject to specific evaluation criteria, hardly any data exists on the integration of gender in research. This dimension can only be covered by input indicators limited to specific fields. However, the data on the integration of women in all fields and at all levels in research and innovation has several shortcomings. Vertical segregation can be presented only for the higher education sector by grade, and no data currently exists that would allow an analysis of the hierarchical position of female scientists in sectors other than higher education. Other indicators illustrating structural gender inequalities for researchers (e.g. income distribution) are faced with the challenge of defining what constitutes a research occupation. Last but not least, gender discrimination in excellence evaluation criteria can scarcely be illustrated using quantitative indicators.

Table 11: Summary of the contents of Chapter 7

Indicator	Analytical Model (Logic model)	Analytical Level (Aggrega-tion)	Unit of Analysis	Number of Observations	Times Series	Year of Data, Most recent
Indicator 1 Women's participation in paid work	Context	National	Countries	33 EEA countries	Yes	2013
Indicator 2 Share of female researchers by sector	Outcome	National	Countries	33 EEA countries	Yes	2011
Indicator 3 Years to achieve gender equality in research participation	Outcome	National	Countries	33 EEA countries	Yes	2011
Indicator 4 Dissimilarity Index	Outcome	National	Countries	28 EEA countries	Yes	2011
Indicator 5 Glass Ceiling Index	Outcome	National	Countries	29 EEA countries	Yes	2011
Indicator 6 Female graduates and academic staff by grade	Outcome	National	Countries	31 EEA countries	Yes	2011
Indicator 7 Gender Wage Gap	Outcome	National	Countries	17 EU countries	Yes	2010
Indicator 8	Outcome	National	Countries	1,265 RPOs in	Not yet	2013

				28 EU countries		
Indicator 9 Share of gender-balanced recruitment committees of RPOs	Input	National	Countries	1,265 RPOs in 28 EU countries	Not yet	2013
Indicator 10 Share of gender-balanced research evaluation panels in RFOs	Input	National	Countries	RFOs covering about 20% of total GBAORD in 28 EU countries	Not yet	2013
Indicator 11 Share of RPOs with gender equality plans	Input	National	Countries	1,265 RPOs in 28 EU countries	Not yet	2013
Indicator 12 Share of RPOs with female recruitment and promotion policies	Input	National	Countries	1,265 RPOs in 28 EEA countries	Not yet	2013
Indicator 13 Share of RFOs promoting gender content in research	Input	National	Countries	RFOs covering about 20% of total GBAORD in 28 EU countries	Not yet	2013
Indicator 14 Share of RPOs promoting gender content in research	Input	National	Countries	1,265 RPOs in 28 EU countries	Not yet	2013
Indicator 15 Share of research projects with specific gender equality actions	Input	Projects	Research Projects	737 projects	No	2007-2012
Indicator 16 Share of research projects with gender dimension in content	Output	Project	Research projects	737 projects	No	2007-2012
Indicator 17 Gender of individual participants with contact person roles in signed grant agreements	Output	Projects	Research Projects	737 projects	No	2007-2012
Indicator 18 Share of organisations with organisational structures for gender equality	Input	Institutional	Institutions	48 universities	Not yet	2013/ 2014

7. Early thoughts on gender equality indicators

This chapter provides a space for compiling promising indicators based on the existing empirical information identified throughout the report. The intention here is to prepare the ground for Task 3, in which the existing indicators will be selected and new indicators will be developed.

Table 12: Potential indicator for gender, no. 1

Information Item	G1
Name of indicator	Women's participation in paid work
Brief description	Quantitative indicator on women's participation in paid work to illustrate the context of female employment in science and research
Analytical level (logic model)	Context-related
Analytical level (aggregation)	Country level
Qual. / Quant.	Quantitative
Source of data	Labour Force Survey
Date	2013
Time series	Yearly
Measurement level	Metric - share of women in total working population
Unit of analysis	Country
Coverage	33 EEA countries
Attributes	

Table 13: Data presentation, Share of women in total working population (2013)

Country	Share (%)	Country	Share (%)
EU 15	46.20%	Italy	42.00%
EU 28	46.00%	Latvia	50.60%
Austria	46.90%	Lithuania	51.00%
Belgium	46.00%	Luxembourg	44.30%
Bulgaria	47.50%	Malta	38.10%
Croatia	46.20%	Netherlands	46.80%
Cyprus	48.40%	Norway	47.60%
Czech Republic	43.40%	Poland	44.60%
Denmark	47.90%	Portugal	49.10%
Estonia	48.90%	Romania	44.10%
Finland	48.90%	Slovakia	44.40%
Former Republic Yugoslavia	39.90%	Slovenia	45.50%
France	47.90%	Spain	45.70%
Germany	46.70%	Sweden	47.90%

Country	Share (%)	Country	Share (%)
Greece	41.40%	Switzerland	46.40%
Hungary	46.00%	Turkey	30.00%
Iceland	48.10%	United Kingdom	47.00%
Ireland	46,50%		

Table 14: Potential indicator for gender, no. 2

Information Item	G2
Name of indicator	Share of female researchers by sector
Brief description	The percentage of female researchers depicts the (under-)representation of women in research. Its differentiation by sectors indicates different opportunities and barriers.
Analytical level (logic model)	Context or outcome-related
Analytical level (aggregation)	Countries
Qual. / Quant.	Quantitative
Source of data	Eurostat: Statistics on research and development
Date	2011
Time series	Most countries biennial – but data availability differs according to countries
Measurement level	Metric – share of female researchers
Unit of analysis	Countries
Coverage	R&D statistics are currently available for EU Member States and Candidate Countries, EFTA Countries, the Russian Federation, China, Japan, the United States and South Korea. Regional R&D statistics are available for EU Member States, Candidate and EFTA countries. Besides national and regional statistics Eurostat calculates and disseminates aggregates at the EU-and Euro-area-levels (EU-28, EU-15 and EA-18). – but data availability differs over the years.
Attributes	• Female researchers in Higher education sector • Female researchers in Government sector • Female researchers in Private non-profit sector • Female researchers in Business enterprise sector The Share of female researchers is presented in Head Counts – Full Time Equivalents are also available. But they are provided on a voluntary basis, hence it is not guaranteed that they can be computed in the future.

Table 15: Data presentation, Share of female researchers by sector (2011)

	All sectors	Higher education sector	Government sector	Private non-profit sector	Business enterprise sector
EU 28	33.0	40.7	40.9	44.7	19.7
EU 15	32.2	40.3	39.9	44.8	19.5
Austria	33.5	40.1	33.5	36.0	26.1

	All sectors	Higher education sector	Government sector	Private non-profit sector	Business enterprise sector
Belgium	49.1	45.3	54.9	42.1	45.0
Bulgaria	28.2	34.7	38.1	31.5	15.2
Croatia	33.1	39.4	36.8	62.5	27.0
Cyprus	26.8	36.3	33.5	:	14.2
Czech Republic	43.7	46.3	60.4	54.5	32.0
Denmark	32.4	42.1	35.7	:	22.3
Estonia	36.7	35.6	48.1	43.6	30.8
Finland	38.7	40.6	48.1	47.6	29.4
France	25.6	33.3	35.2	42.0	19.6
Germany	47.3	46.5	52.7	29.4	40.2
Greece	34.9	39.2	46.1	51.0	20.8
Hungary	36.9	38.0	47.9	34.3	26.8
Iceland	53.3	52.4	60.8	:	51.3
Ireland	52.1	55.1	50.8	:	31.8
Italy	24.0	39.7	34.8	:	11.4
Japan	31.7	36.7	41.1	:	21.2
Latvia	26.9	29.9	42.0	:	21.9
Lithuania	24.1	40.8	33.6	:	14.5
Luxembourg	29.0	38.9	44.0	43.4	16.3
Malta	38.6	42.1	40.1	37.4	19.8
Montenegro	44.0	47.9	61.1	43.5	30.4
Netherlands	46.1	47.9	46.3	43.9	39.0
Norway	36.4	41.8	47.9	56.3	26.7
Poland	42.6	45.2	45.4	51.7	20.9
Portugal	32.1	47.0	43.0	57.8	16.8
Romania	37.2	44.5	50.0	41.5	25.6
Russia	37.7	44.4	33.4	40.5	19.1
Serbia	37.3	47.3	42.3	47.4	25.5
Slovakia	36.2	44.9	44.0	:	22.7
Slovenia	49.9	47.7	56.9	55.6	37.6
South Korea	49.3	47.8	55.9	88.9	31.5
Spain	35.6	40.7	30.6	:	22.9
Sweden	41.4	44.9	45.1	36.6	38.4
Turkey	14.0	24.7	15.4	13.5	7.6
United Kingdom	17.3	27.3	22.1	32.9	12.8

Table 16: Potential indicator for gender, no. 3

Information Item	G3
Name of indicator	Years to achieve gender equality in research participation
Brief description	Estimation of the years required to reach equal participation (50%) of women and men in research, based on the average growth rate of female participation in research between 2003-2011 and the share of female in researchers in 2011. This indicator is very responsive to progress and refers to the status quo in female participation.
Analytical level (logic model)	Input-related
Analytical level (aggregation)	National
Qual. / Quant.	Quantitative
Source of data	Eurostat: Statistics on research and development
Date	2003-2011
Time series	Most countries biennial – but data availability differs according to countries
Measurement level	Metric – estimated time to reach equal participation of women and men in research in years
Unit of analysis	Countries
Coverage	R&D statistics are currently available for EU Member States and Candidate Countries, EFTA Countries, the Russian Federation, China, Japan, the United States and South Korea. Regional R&D statistics are available for EU Member States, Candidate and EFTA countries. Besides national and regional statistics Eurostat calculates and disseminates aggregates at the EU-and Euro-area-levels (EU-28, EU-15 and EA-18). – but data availability differs over the years.
Attributes	Annual growth rate of female participation (in head counts) between 2003 and 2011 (geometric mean) Years to achieve 50% women in research Years to achieve 50% women in research (Y) are given the difference between 50% and the current share of female researchers of I in year a (2011) in percent (R_{fIb}) in relation to the average annual rate of growth g_{ab}. $$Y = (50\% - R_{fa})/g_{ab}$$ the share of female researchers between an initial year (year b 2003) and a final year (year a 2011) in percent is given by: $$g_{ab} = \frac{R_{fa} - R_{fb}}{b - a - 1} * 100$$

Table 17: Data presentation, Number of years to achieve equal participation of women and men in research

Country	Annual growth rate	Years to achieve gender equality	Country	Annual growth rate of female participation	Years to achieve gender equality
EU 28	0.35%	49	Latvia	0.02%	
Austria	0.77%	27	Lithuania	0.48%	
Belgium	0.68%	24	Luxembourg	0.83%	32
Bulgaria	0.31%	3	Malta	0.47%	49
Croatia	0.64%	4	Netherlands	0.53%	49
Czech Republic	-0.01%		Norway	0.86%	16
Denmark	0.63%	27	Poland	-0.09%	

Estonia	0.08%	84	Portugal	-0.04%	
Finland	0.44%	40	Romania	0.39%	10
France	-0.28%		Slovakia	0.25%	30
Germany	0.91%	25	Slovenia	0.52%	26
Greece	-0.05%		Spain	0.30%	38
Hungary	-0.43%		Sweden	0.23%	55
Iceland	-0.26%		United Kingdom	0.33%	37
Ireland	0.28%	64	Turkey	-0.04%	
Italy	0.70%	22			

Table 18: Potential indicator for gender, no. 4

Information Item	G4
Name of indicator	Dissimilarity Index
Brief description	The Dissimilarity Index provides a theoretical measurement of the percentage of women and men who would have to move to another field of science to ensure a gender balanced distribution across fields. It measures the distance from balanced gender distribution across fields for horizontal segregation in research.
Analytical level (logic model)	Outcome
Analytical level (aggregation)	National
Qual. / Quant.	Quantitative
Source of data	She Figures 2012
Date	2011
Time series	All 3 years (at least up to now)
Measurement level	Metric – share of men and women for the distance of balanced gender distribution across fields
Unit of analysis	Countries
Coverage	2011: 29 countries; EU 27
Attributes	Higher education sector and government sector

Table 19: Data presentation, Dissimilarity Index

	Dissimilarity Index HES (DI)	Dissimilarity Index GOV (DI)
Austria	0.23	0.21
Belgium	0.21	0.14
Bulgaria	0.16	0.10
Cyprus	0.13	0.34
Czech Republic	0.19	0.20
Denmark	0.22	0.17
Estonia	0.03	0.09
Finland	0.42	0.32
Germany	0.22	0.17
Hungary	0.2	0.19
Iceland	0.27	0.20
Italy	0.12	0.18
Latvia	0.26	0.12

Lithuania	0.24	0.22
Luxemburg	0.25	0.14
Malta	0.28	0.36
Netherlands	0.15	
Poland	0.86	0.16
Portugal	0.14	0.10
Romania	0.13	0.09
Sweden	0.19	0.29
Slovakia	0.16	0.15
Slovenia	0.18	0.17
Spain	0.03	0.09
United Kingdom	0.25	0.25
Croatia	0.17	0.06
Japan	0.09	0.09
Norway	0.17	0.19
Turkey	0.16	0.19

Table 20: Potential indicator for gender, no. 5

Information Item	G5
Name of indicator	Glass Ceiling Index
Brief description	The Glass Ceiling Index measures the relative chance for women, as compared with men, of reaching a top position for vertical segregation. It compares the proportion of women in grade A positions to the proportion of women in academia (grades A, B and C).
Analytical level (logic model)	Outcome
Analytical level (aggregation)	National
Qual. / Quant.	Quantitative
Source of data	She Figures 2012
Date	2010
Time series	All three years (at least up to now)
Measurement level	Metric – share of women in grade A in relation to share of women in academia
Unit of analysis	Countries
Coverage	2010: 29 countries; EU 27
Attributes	A Glass Ceiling Index of 1 indicates equality between women and men being promoted, a score below 1 means an over-representation of women in grade A level and a score above 1 an under-representation of women in grade A.

Table 21: Data presentation, Glass Ceiling Index 2010

Country	Glass Ceiling Index 2010	Country	Glass Ceiling Index 2010
EU 15	1.9	Israel	1.71
EU 27	1.8	Italy	1.76
Austria	1.9	Latvia	1.78
Belgium	2.25	Lithuania	2.96
Bulgaria	1.4	Luxemburg	2.82
China	1.35	Netherlands	2.26

Croatia	1.51	Norway	1.66
Cyprus	3.56	Portugal	1.83
Czech Republic	2.12	Romania	1.26
Denmark	1.95	Sweden	2.14
Finland	1.71	Slovakia	1.9
France	1.78	Slovenia	1.79
Germany	1.45	Spain	2.12
Hungary	1.76	Turkey	1.25
Iceland	1.48	United Kingdom	2.23

Table 22: Potential indicator for gender, no. 6

Information Item	G6
Name of indicator	Female graduates and academic staff by grade
Brief description	The proportion of female academic staff by grade illustrates the share of women in different hierarchical positions in the higher education sector and is supplemented by the share of graduates in first and second stage of tertiary education
Analytical level (logic model)	Outcome
Analytical level (aggregation)	National
Qual. / Quant.	Quantitative
Source of data	She Figures 2012: - Academia: DG Research and Innovation: WiS Database - Graduates: Eurostat: Statistics on research and development
Date	2011
Time series	All three years (most countries for graduates biennial)
Measurement level	Metric – share of women in different grades and ISCED levels
Unit of analysis	Countries
Coverage	26 EU countries
Attributes	Grade A: The single highest grade/post at which research is normally conducted Grade B: Researchers working in positions not as senior as top positions (A) but more senior than newly qualified PhD holders (ISCED 6) Grade C: The first grade/post into which a newly qualified PhD graduate would normally be recruited Grade D: Postgraduate students not yet holding a PhD degree who are engaged as researchers Graduates ISCED 5A: First stage of tertiary education Graduates ISCED 6: Second stage of tertiary education

Table 23: Data presentation, Share of female graduates and academia by grade (2010)

	Graduates ISCED 5A	Graduates ISCED 6	Grade D	Grade C	Grade B	Grade A
EU 27	-	-	46	44	37	20
Austria	54	47	42	44	22	17
Belgium	52	45	-	34	27	12
Bulgaria	55	50	46	34	31	13
Cyprus	56	41	34	49	21	11
Czech Republic	57	42	46	34	31	13
Denmark	60	48	47	38	29	15
Estonia	62	58	67	57	37	17
Finland	54	53	45	52	52	24
Germany	48	-	41	27	21	15
Hungary	56	49	37	40	36	21
Iceland	64	57	-	49	36	24
Italy	58	53	51	45	34	20
Latvia	63	59	-	63	47	32
Lithuania	60	58	63	53	42	14
Luxemburg	-	-	-	31	29	9
Netherlands	52	45	45	34	21	13
Portugal	53	54	47	45	37	22
Romania	57	48	59	x	51	36

	Graduates ISCED 5A	Graduates ISCED 6	Grade D	Grade C	Grade B	Grade A
Slovakia	60	47	54	49	37	23
Slovenia	61	51	51	46	31	20
Spain	55	51	52	49	38	17
Sweden	60	50	50	43	48	20
United Kingdom	55	47	46	47	37	17
Croatia	59	47	56	45	43	26
Norway	61	50	55	48	37	21
Turkey	45	43	48	48	35	28

Table 24: Potential indicator for gender, no. 7

Information Item	G7
Name of indicator	Gender Wage Gap
Brief description	The Gender Wage Gap illustrates the observed unadjusted difference in average gross annual earnings of male and female paid employees as a percentage of the average gross annual earnings of male paid employees. Persons with tertiary education corresponding to the ISCED codes 5 and 6 who are employed in occupations in the major groups 2 ("Professionals") and 3 ("Technicians and Associate Professionals") of the ISCO classification are used as a proxy for defining researchers in the non-academic sector. The Gender Wage Gap can be interpreted as a synthetic indicator of multiple inequalities between men and women. It is determined by differences in educational attainments, labour market experience and tenure, sectoral affiliation and occupations, etc., as well as wage discrimination etc.
Analytical level (logic model)	Outcome-related
Analytical level (aggregation)	National
Qual. / Quant.	Quantitative
Source of data	MORE2 on the basis of the structural earnings survey
Date	2006
Time series	Y – 2002, 2006, 2010
Measurement level	Metric – difference in gross annual earnings between women and men in relation to male gross annual earnings
Unit of analysis	Countries
Coverage	17 EU countries
Attributes	

Figure 3: Data presentation, Gender Pay Gap in gross annual earnings of median male and female non-academic researchers 2006
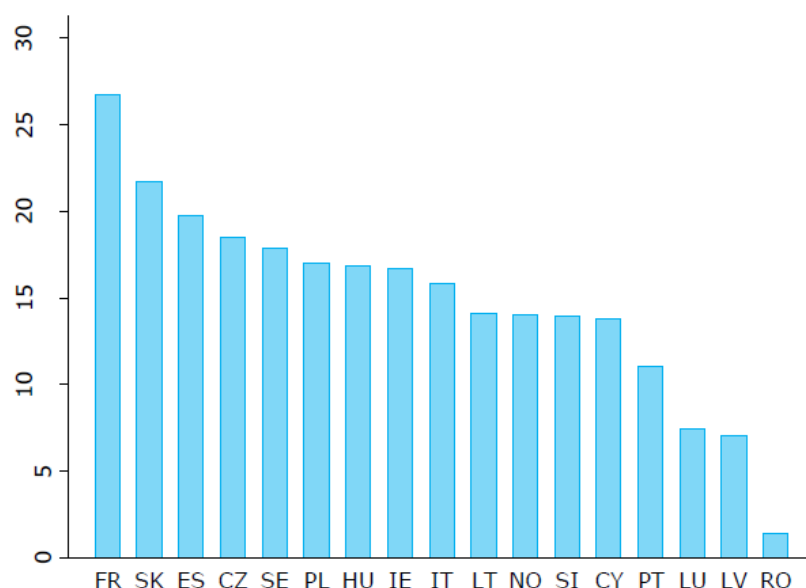
Source: MORE2 Report on case study of researchers' remuneration

Table 25: Potential indicator for gender, no. 8

Information Item	G8
Name of indicator	Share of female heads of research performance organisations
Brief description	Proportion of organisations headed by women. This can be interpreted as an indicator for gender balance in decision-making and, therefore, structural setting for gender equality.
	Information obtained from responses to ERA RPOs survey question 35: Please specify the gender of the person who was head of your organisation at the end of the calendar year in 2013 (Head of organisation: highest decision-making official in the organisation (e.g. rector or equivalent in the academy, president or equivalent in non-academic research organisations)
Analytical level (logic model)	Input- and outcome-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis ERA Survey data RPOs
Date	2013
Time series	Not yet
Measurement level	Metric – share of organisations
Unit of analysis	Countries
Coverage	Research performing organizations in 28 EU countries, covering about 31.6% of staff (headcount) in research organisations in the EU
Attributes	

Figure 4: Share of PROs whose heads were women, 2013
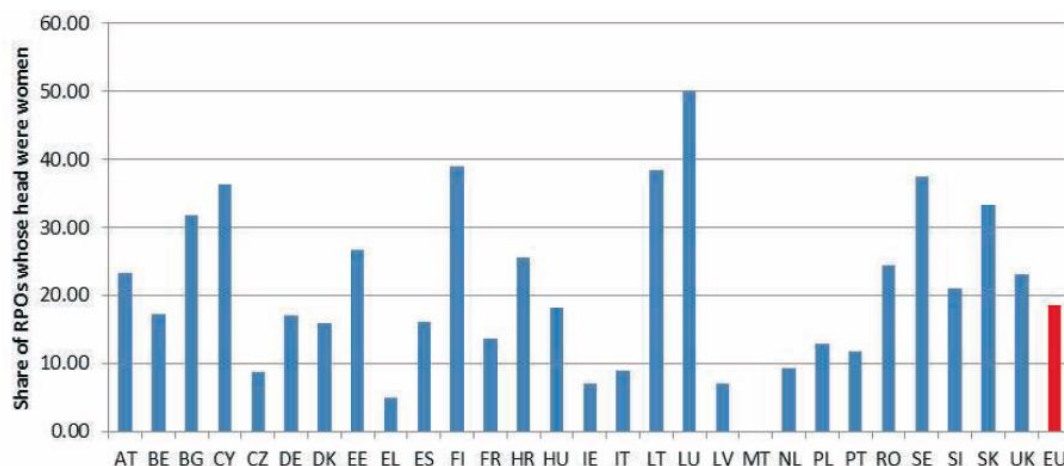
Source: ERA Facts and Figures 2014

Table 26: Potential indicator for gender, no. 9

Information Item	G9
Name of indicator	Share of gender-balanced recruitment committees at RPOs
Brief description	This indicator depicts the share of recruitment committees for internationally recognised researchers (e.g. team leaders, management positions, full professors, etc.) which are gender balanced (i.e. reach the threshold of 40% of the under-represented gender). It can be interpreted as an indicator for women in decision-making process. The data is obtained from responses to ERA RPOs survey question 39: How many recruitment committees for leading researcher positions did your organisation set up in 2013 for the recruitment of researchers? and question 40: Amongst them, how many recruitment committees for leading researcher positions reached the threshold of 40% of the under-represented sex?
Analytical level (logic model)	Input-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis of data from ERA RPOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric – share of committees
Unit of analysis	Countries
Coverage	Research performing organisations in 28 EU countries, covering about 31.6% of staff (headcount) in research organisations in the EU
Attributes	

Figure 5: Gender-balanced recruitment committees for leading researchers in PROs, 2013
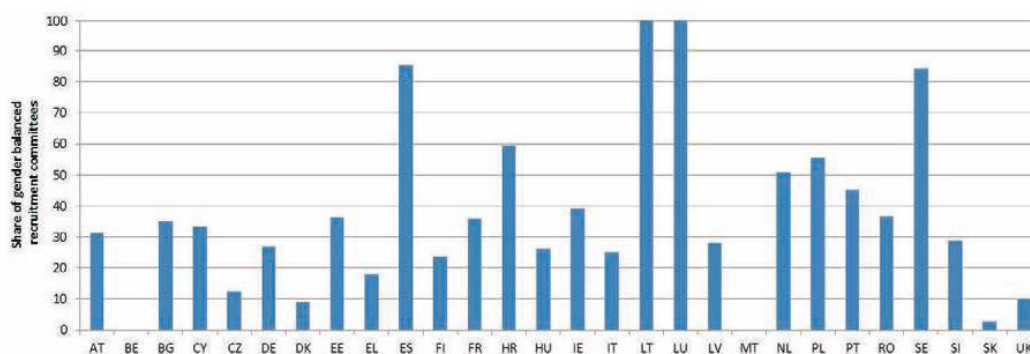
Source: ERA Facts and Figures 2014

Table 27:Potential indicator for gender, no. 10

Information Item	G10
Name of indicator	Share of gender-balanced research evaluation panels in RFOs
Brief description	The indicator measures the share of evaluation panels which reach the threshold of 40% of the under-represented gender in RFOs. It relates to panels which are responsible for the evaluation of research projects and programmes as well as performance at the institutional or individual level. The outcome of the evaluation may be linked to the allocation of research funding and/or other resources. The data is obtained from responses to ERA RFOs survey question 27: How many research evaluation panels did your organisation set up in 2013? and 28: Amongst those, how many panels reached the threshold of 40% of the under-represented sex?
Analytical level (logic model)	Input-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis of data from ERA RFOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric - share of panels
Unit of analysis	Countries
Coverage	Research performing organisations in 28 EU countries, covering about 31.6% of staff (headcount) in research organisations in the EU
Attributes	

Figure 6: Women in research evaluation panels in RFOs, 2013
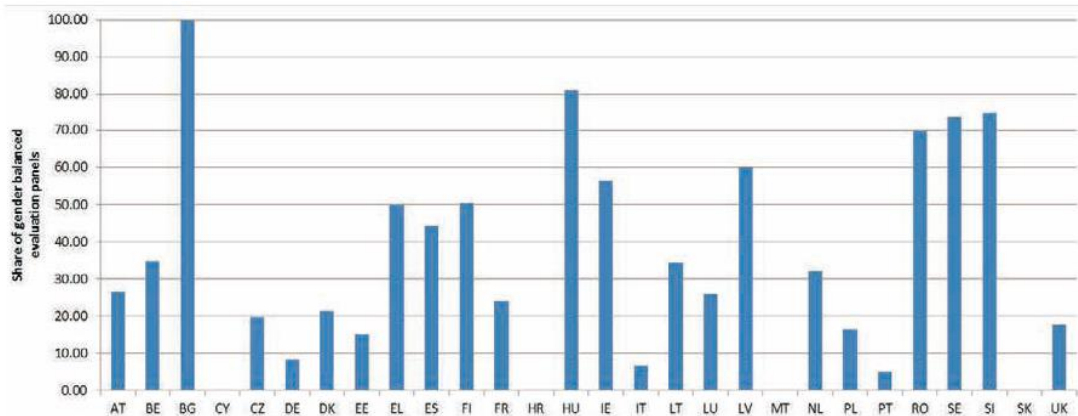
Source: ERA Facts and Figures 2014

Table 28: Potential indicator for gender, no. 11

Information Item	G11
Name of indicator	Share of RPOs with gender equality plans
Brief description	The existence of a gender equality plan indicates institutionalised activities for gender equality. A gender equality plan is a consistent set of provisions and actions aimed at ensuring gender equality. The information is obtained from responses to ERA RFOs survey question 36: In 2013, has your organisation implemented a gender equality plan or equivalent?
Analytical level (logic model)	Input- and outcome-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis of data from ERA RPOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric – share of organisations
Unit of analysis	Countries
Coverage	Research performing organisations in 28 EU countries, covering about 31.6% of staff (headcount) in research organisations in the EU
Attributes	Existence of Gender Equality Plans Yes / No / Not known / Not applicable

Figure 7: Research performance organisations with gender equality plans, 2103
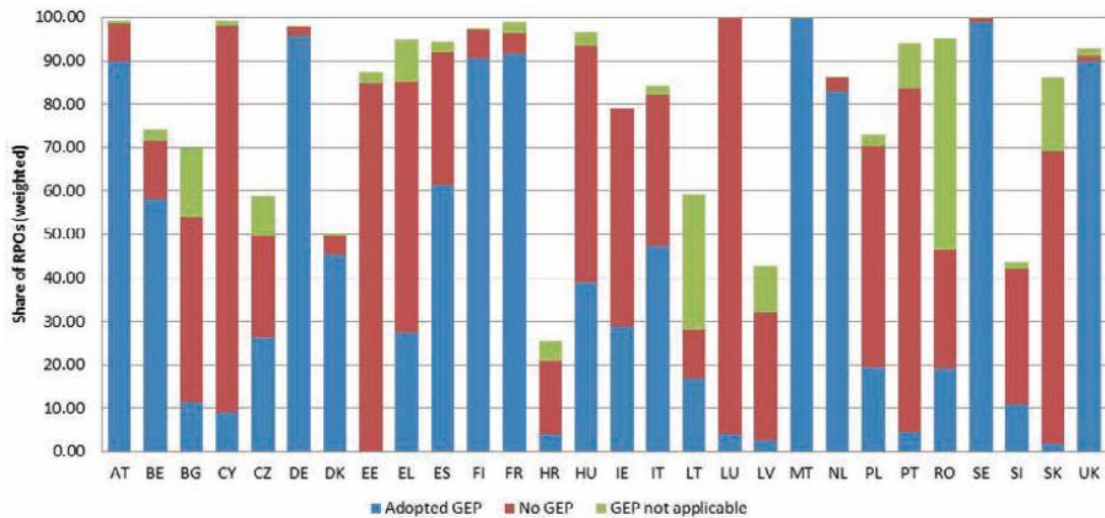
Source: ERA Facts and Figures 2014

Table 29: Potential indicator for gender, no. 12

Information Item	G12
Name of indicator	Share of RPOs with female recruitment and promotion policies
Brief description	The indicator depicts the share of research organisations that have implemented recruitment and promotion policies for female researchers. This is an indicator of special actions to increase the participation of women in research. The information is obtained from responses to ERA RPOs survey question 37: As part of the gender equality plan or equivalent, which of the following measures or actions have been implemented by your organisation in 2013? Recruitment and promotion measures / Targets to ensure gender balance in recruitment committees / Flexible career trajectory (e.g. provisions for interruptions of career, returning schemes after career breaks, gender aware conditions, provisions on dual careers) / Work-life balance measures (e.g. parental leave, flexible working arrangements) / Support for leadership development (e.g. mentoring or networking opportunities for female researchers) / Other
Analytical level (logic model)	Input- and outcome-related
Analytical level (aggregation)	National, on the basis of information about organisations
Qual. / Quant.	Metric – share of organisations
Source of data	ERA facts and figures 2014, on the basis of data from ERA RPOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric – share of organisations with female recruitment and promotion policies
Unit of analysis	Countries
Coverage	28 EU Member States, the respondents in the ERA RFOs survey 2014 account for about 34% of total GBAORD in the EU.
Attributes	

Figure 8: Female recruitment and promotion policies in research performing organisations, 2013
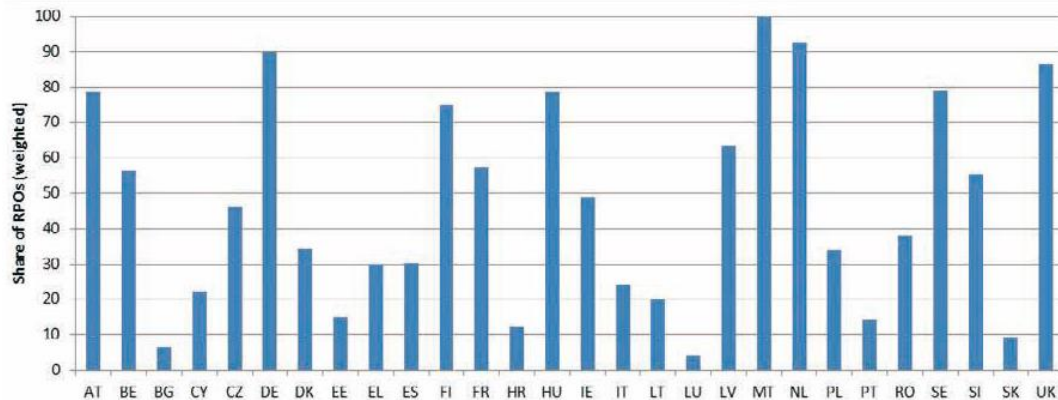
Source: ERA Facts and Figures 2014

Table 30: Potential indicator for gender, no. 13

Information Item	G13
Name of indicator	Share of RFOs promoting gender content in research
Brief description	This indicator illustrates the integration of gender as part of the research design and process. It entails **sex and gender analysis being integrated into basic and applied research.** The information is obtained from responses to ERA RFOs survey question 26. When allocating research and development funding in 2013, did your organisation include the gender dimension in research content? (Yes, in half or more of the projects/ programmes / Yes, in less than half of the projects/ programmes / No / Not known / Not applicable)
Analytical level (logic model)	Input- and outcome-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis of data from ERA RFOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric - share of organisations
Unit of analysis	Countries
Coverage	28 EU Member States, the respondents in the ERA RFOs survey 2014 account for about 34% of total GBAORD in the EU.
Attributes	Existence of gender content in research Yes / No / Not known / Not applicable

Figure 9: RFOs promoting gender content in research (2013)
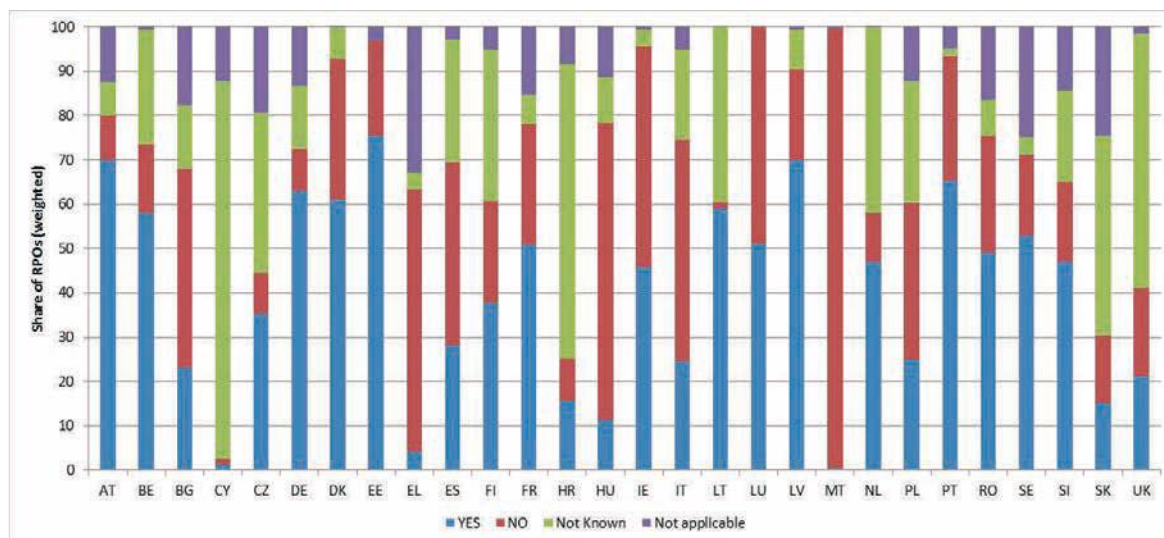
Source: ERA Facts and Figures 2014

Table 31: Potential indicator for gender, no. 14

Information Item	G14
Name of indicator	Share of RPOs with gender in research content
Brief description	This indicator summarizes activities to integrate the gender dimension in research content that can address research design and process gender analysis. The information is obtained from responses to ERA RPOs survey question 38: Does your organisation include a gender dimension in research and innovation content of programmes, projects and studies? (Yes / No / Not known / Not applicable)
Analytical level (logic model)	Input- and outcome-related
Analytical level (aggregation)	National on the basis of information about organisations
Qual. / Quant.	Quantitative
Source of data	ERA facts and figures 2014 on the basis of data from ERA RPOs Survey
Date	2013
Time series	Not yet
Measurement level	Metric – share of organisations
Unit of analysis	Countries
Coverage	Research performing organisations in 28 EU countries covering about 31,6% of staff (headcount) in research organisations in the EU
Attributes	

Figure 10: Share of PROs which include the gender dimension in research content, 2013
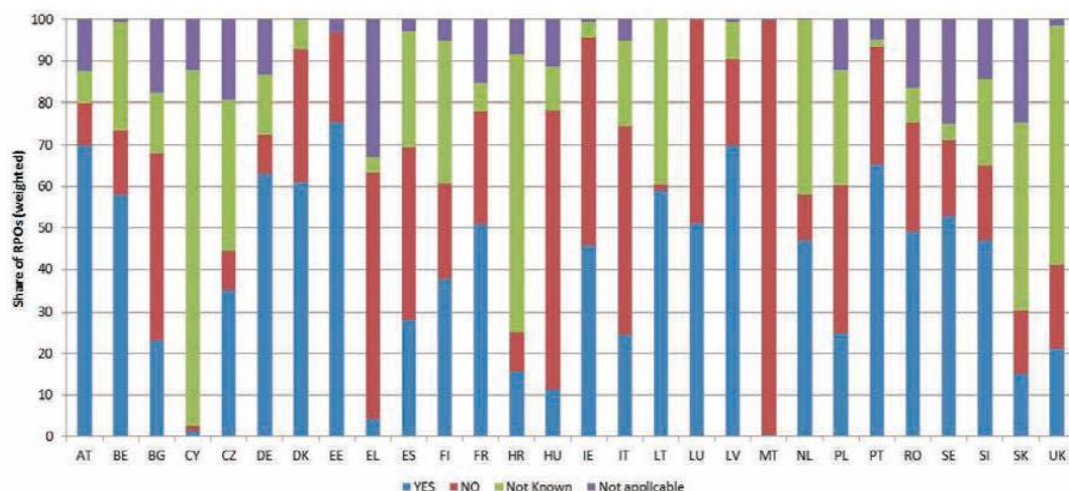
Source: ERA Facts and Figures 2014

Table 32:Potential indicator for gender, no. 15

Information Item	G15
Name of indicator	Share of research projects with specific gender equality actions
Brief description	This indicator asks for the existence of specific gender equality actions and whether these actions are perceived as effective or non-effective. Three types of gender action types are differentiated: design and implementation of an equal opportunity policy; set targets to achieve a gender balance in the workforce; actions to improve work-life balance
Analytical level (logic model)	Input
Analytical level (aggregation)	Project level of cooperation projects within completed FP7 projects (by June 2013) that reported specific gender equality actions and gender action types
Qual. / Quant.	Qualitative
Source of data	EC Sixth Monitoring Report 2012
Date	Published 2013 for the time period 2007-2012
Time series	No
Measurement level	Metric – share and number of projects
Unit of analysis	FP7 Cooperation programme
Coverage	FP7 Projects
Attributes	Number and share of projects according to priority areas with specific gender equality actions; assessment of the gender action types as effective / non effective

Table 33: Data presentation, gender action types

Priority Area		No. of projects having answered to gender aspects questions	No. of projects with specific Gender Equality Actions		Gender Action Types					
					Design and implement an equal opportunity policy		Set targets to achieve a gender balance in the workforce		Actions to improve work-life balance	
			No.	%	Effective	Not Effective	Effective	Not Effective	Effective	Not Effective
COOPERATION	Health	203	71	35%	70	8	60	5	45	5
	KBBE	52	14	27%	11	1	13	1	7	1
	NMP	125	40	32%	32	6	24	10	25	1
	Energy	37	8	22%	4		5		5	1
	ENV	91	26	29%	21	2	19	2	17	2
	Transport	98	15	15%	8	3	11	2	8	4
	SSH	71	26	37%	16		22	2	14	
	Space	27	3	11%	3	1	2	2	5	
	Security	27	3	11%	4		4		1	
	General Activities	6	2	33%	2		2		2	
	Total	737	208	28%	171	21	162	24	129	14

Table 34:Potential indicator for gender, no. 16

Information Item	G16
Name of indicator	Share of research projects with gender dimension in content
Brief description	This indicator asks for the existence of a gender dimension associated with the research content.
Analytical level (logic model)	Output Indicator
Analytical level (aggregation)	Project level of cooperation projects within completed FP7 projects (by June 2013) that reported gender aspects and with specific gender equality actions and gender action types.
Qual. / Quant.	Qualitative
Source of data	EC Sixth Monitoring Report 2012
Date	Published 2013 for the time period 2007-2012
Time series	No
Measurement level	Metric – share and number of projects
Unit of analysis	FP7 Cooperation programme
Coverage	Final Reports of FP7 projects mentioning gender aspects (N=737)
Attributes	Number and share of projects according to priority areas which report gender aspects; number of projects where gender dimension was associated with the research content, per priority area and total

Table 35:Data presentation, gender aspects in research

	Priority Area	No. of projects with a gender aspects report	No. of projects where gender dimension was associated with the research content	
			No.	%
COOPERATION	Health	203	50	25%
	KBBE	52	7	13%
	NMP	125	7	6%
	Energy	37	5	14%
	ENV	91	11	12%
	Transport	98	14	14%
	SSH	71	37	52%

Table 36: Potential indicator for gender, no. 17: Women as contact persons for FP7 projects

Information Item	G17
Name of indicator	Gender of individual participants with contact person roles in signed grant agreements
Brief description	This indicator depicts the gender of individual participants with contact person roles in signed grant agreements of FP7 during the period 2007-2012
Analytical level (logic model)	Input Indicator
Analytical level (aggregation)	Project level
Qual. / Quant.	Quantitative
Source of data	EC Sixth Monitoring Report 2012
Date	Published 2013 for the time period 2007-2012
Time series	No
Measurement level	Metric – share of women and men in grants
Unit of analysis	Signed grant agreements
Coverage	Final Reports of FP7 projects mentioning gender aspects (N=737)
Attributes	The roles of the contact persons differentiate between coordinators and participants on the one hand and seven other individual contact roles on the other (contact person, contact person for legal aspects, contact person for scientific aspects, Marie Curie individual fellows, first administrative officer, principal investigator, secondary administrative officer)

Table 37: Data presentation, individual participants

Role	Coordinator			Participant			All		
	F	M	% F	F	M	% F	F	M	% F
Contact Person	8.534	10.159	45,7%	28.825	51.121	36,1%	37.359	61.280	37,9%
Contact Person for Legal Aspects	7	4	63,6%	13	13	50,0%	20	17	54,1%
Contact Person for Scientific Aspects	2.669	10.617	20,1%	13.074	47.961	21,4%	15.743	58.578	21,2%
Marie-Curie Individual Fellows	2.285	4.169	35,4%	n.a.	n.a.	-	2.285	4.169	35,4%
First Administrative Officer	3.603	13.135	21,5%	9.905	53.369	15,7%	13.508	66.504	16,9%
Principal Investigator	618	2.599	19,2%	n.a.	n.a.	-	618	2.599	19,2%
Secondary Administrative Officer	3.250	7.853	29,3%	8.856	27.717	24,2%	12.106	35.570	25,4%
Total	20.966	48.536	30,2%	60.673	180.181	25,2%	81.639	228.717	26,3%

*figures valid for the number of persons linked to the participants in signed FP7 contracts
*data for People programme is available only for individual fellowships.
*E-CORDA does not contain gender information in ICT projects
Source: E-CORDA as of 26/02/2013

Table 38: Potential indicator for gender, no. 18

Information Item	G18
Name of indicator	Share of organizations with organisational structures for gender equality
Brief description	This indicator describes the existence of implemented formal organisational structures for gender equality issues in universities/faculties of science and technology. These personnel resources can be interpreted as engagement for gender equality by the institutions.
Analytical level (logic model)	Input-related
Analytical level (aggregation)	Institutional
Qual. / Quant.	Quantitative
Source of data	CESAER survey data
Date	2013/2014
Time series	Not yet
Measurement level	Metric - number and share of institutions with specific gender equality units
Unit of analysis	Institutions
Coverage	48 CESAER member institutions at leading European universities of technology and engineering schools/faculties at full universities and university colleges
Attributes	Number and share of institutions with special unit for gender equality; gender equality part of other responsibilities of a unit; one person dealing full-time with gender equality; one person dealing part time with gender equality; no unit or person dealing with gender equality; other ways of supporting gender equality

Figure 11: Data presentation, Organisational structures and approaches promoting gender equality
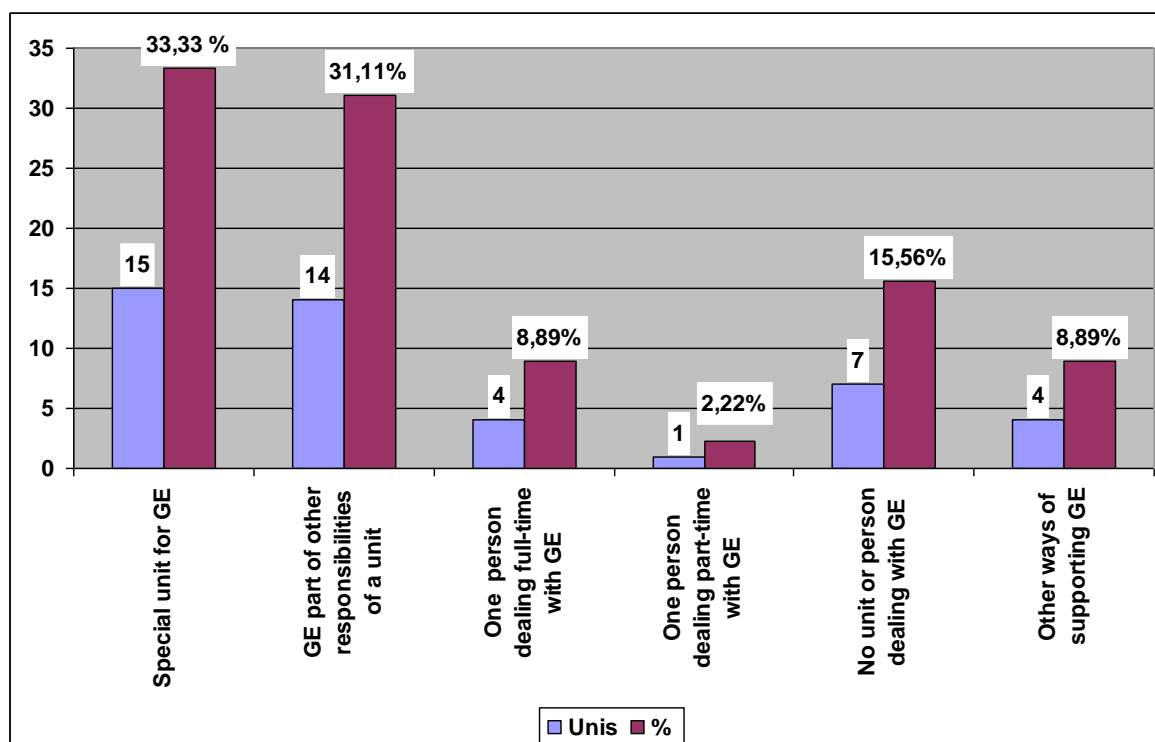
8. References

Abramo, Giovanni; D'Angelo, Ciriaco Andrea; Murgia, Gianluca (2013), Gender differences in research collaboration, Journal of Informetrics 7(2013), 811– 822.

Balafoutas, Loukas & Sutter, Matthias (2012), Affirmative Action Policies Promote Women and Do Not Harm Efficiency in the Laboratory, Science 335, 579-582.

Berryman, Sue E. (1983), Who will do Science? Minority and Female Attainment of Science and Mathematics Degrees: Trends and Causes, Rockefeller Foundation, New York.

Beaufais, Sandra & Krais, Beate (2005), Doing Science – Doing Gender. Die Produktion von WissenschaftlerInnen und die Reproduktion von Machtverhältnissen im wissenschaftlichen Feld. Feministische Studien (Zeitschrift für interdisziplinäre Frauen- und Geschlechterforschung), 23. Jahrgang, 1, 82-99.

Bessing, Nina (2006), Gender als reflexionsbedürftiger Begriff, in: Schraudner, Martina & Lukoschat, Helga (Hrsg.): Gender als Innovationspotenzial in Forschung und Entwicklung, Stuttgart, Fraunhofer IRB-Verlag, 17-34.

Best, Kathinka & Schraudner, Martina (2014), Wer macht wirklich MINT? Forschung und Lehre 10/2014; 21(10), 826–827.

Britton, Dana M.; Baird, Chardie L.; Dyer, Ruth A.; Middendorf, B. Jan; Smith, Christa; Montelone, Beth A. (2012), Surveying the Campus Climate for Faculty: A Comparison of the Assessments of STEM and non-STEM faculty, International Journal of Gender, Science and Technology, Vol.4, No.1, 102-122.

Bührer, Susanne; Kripp, Kerstin; Meyer, Niclas; Goos, Kerstin; Lindner, Ralf; Kroll, Henning (2012a), Interim evaluation & assessment of future options for Science in Society Actions. Assessment of future options. Final Report. Brussels.

Bührer, Susanne; Kripp, Kerstin; Meyer, Niclas; Goos, Kerstin; Lindner, Ralf; Kroll, Henning (2012b), Interim evaluation and assessment of future options for Science in Society Actions [Ares(2011)1117587] Draft Final Report Assessment of Future Options (D5). Brussels.

Bührer, Susanne & Schraudner, Martina (Hrsg.) (2006), Gender-Aspekte in der Forschung. Wie können Gender-Aspekte in Forschungsvorhaben erkannt und bewertet werden?, Stuttgart, Fraunhofer IRB-Verlag.

Bührer, Susanne (2006), Gendersensible Forschungsmethoden, in: Bührer, Susanne & Schraudner, Martina (Hrsg.), Gender-Aspekte in der Forschung. Wie können Gender-Aspekte in Forschungsvorhaben erkannt und bewertet werden?, Stuttgart, Fraunhofer IRB-Verlag, 167-176.

Butler, Judith (1990), Gender Trouble. Feminism and the Subversion of Identity, New York et al, Routledge.

Caprile, Maria et al. (2012), Meta-analysis of gender and science research, Synthesis report, Luxembourg, Publications Office of the European Union.

Carvalho, Teresa & Santiago, Rui (2010), New challenges for women seeking an academic career: the hiring process in Portuguese higher education institutions, Journal of Higher Education Policy and Management, 32 (3), 239-249.

Catalyst (2004), The bottom Line: Connecting Corporate Performance and Gender Diversity, New York, San Jose, Toronto.

Council of Europe (1998), Gender mainstreaming – Conceptual framework, methodology and presentation of good practices. Final report of activities of the Group of Specialists on Mainstreaming, Strasbourg.

Council of Europe (2011), Make equality in law a reality in fact. Compilation of recommendations of the Committee of Ministers in the field of equality between women and men, Strasbourg.

Cundiff, Jessica L.; Vescio, Theresa K.; Loken, Eric; Lo, Lawrence (2014), Do gender–science stereotypes predict science identification and science career aspirations among undergraduate science majors? Soc Psychol Educ (2013) 16, 541–554.

EIGE (2014), Effectiveness of Institutional Mechanisms for the Advancement of Gender Equality Review of the implementation of the Beijing Platform for Action in the EU Member State, Vilnius.

European Commission (2004), Gender and Excellence in the Making, Luxembourg, Office for Official Publications of the European Communities.

European Commission (2006), Women in Science and Technology. The Business Perspective, Luxembourg, Office for Official Publication of the European Communities.

European Commission (2009a), Gender Challenge in Research Funding Assessing the European National Scenes, Luxembourg, Publications Office of the European Union.

European Commission (2009b), Women in Science and Technology. Creating sustainable careers, Brussels.

European Commission (2010), Stocktaking 10 years of "Women in Science" policy by the European Commission 1999-2009, Brussels.

European Commission (2012), Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation, Luxembourg, Publications Office of the European Union.

European Commission (2013a), Gendered Innovations. How Gender Analysis contributes to Research, DG Research and Innovation, Luxembourg, Publications Office of the European Union.

European Commission (2013b), She Figures 2012. Gender in Research and Innovation, Statistics and Indicators, EU Publications Office, Luxembourg.

Fischer, Christian & Reckling, Falk (2010), Factors Influencing Approval Probability in FWF Decision-Making Procedures, FWF Stand-Alone Projects Programme, 1999 to 2008, FWF discussion paper, Vienna.

Gilmer, Penny J.; Tansel, Berrin; Hughes Miller, Michelle (eds.) (2014), Alliances for Advancing Academic Women. Guidelines for Collaborating in STEM Fields, Rotterdam, Boston, Taipei, Sense Publishers.

Good, Catherine; Rattan, Aneeta; Dweck, Carol S. (2012), Why Do Women Opt Out? Sense of Belonging and Women's Representation in Mathematics, Journal of Personality and Social Psychology, Vol. 102, No. 2, 700-717.

Greenwood, Davydd J.; Whyte, William F.; Harkavy, Ira (1993), Participatory Action Research as a Process and as a Goal. Human Relations, 46 (2), 175-192.

Hancock, Ange-Marie (2007), Intersectionality as a Normative and Empirical Paradigm. Gender and Politics, 3(2), 2007, 248-254.

Hatmaker, Deneen M. (2013), Engineering Identity: Gender and Professional Identity Negotiation among Women Engineers. Gender, Work and Organization. Vol. 20 No. 4, 382-396.

Hoogendoorn, Sander; Osterbeek, Hessel; van Praag, Mirjam (2011), The impact of gender diversity on the performance of business teams, http://dare.uva.nl/document/2/96364

Horvath, Manfred; Hein-Saygili, Nina; Coninx, Lieve; Steiger, Anna (2014), Gender Equality at European Universities of Science and Technology. Results of the CESAER Gender Equality Survey 2014, unpublished draft report, Vienna.

Husu, Liisa (2004), Gate-keeping, gender equality and scientific excellence, in: European Commission (ed.), Gender and Excellence in the Making, Brussels, 69-76.

Husu, Liisa & Cheveigné, Suzanne D. (2010), Gender and gatekeeping of excellence in research funding: European perspectives, in: Riegraf, Birgit; Aulenbacher, Brigitte; Kirsch-Auwärter, Edit; Müller, Ursula (eds.), Gender Change in Academia: Re-mapping the fields of work, knowledge, and politics from a gender perspective, VS Verlag, Wiesbaden, 43-59.

Institute of Medicine (IOM) (2010), Women's Health Research: Progress, Pitfalls, and Promise. Washington, D.C., United States National Academies Press.

Jänchen, Yvonne & Schulz, Kristina (2005), Geschlecht als Faktor ungleicher Zugangschancen zu Ressourcen der Forschungsförderung. Zugänge zur Analyse sozialer Selektionsprozesse im Bereich der Projektförderung des Schweizerischen Nationalfonds, Genf.

Jansen, Dorothea (ed.) (2007), New Forms of Governance in Research Organizations, Dordrecht, Springer.

Joshi, Aparna (2014), By Whom and When Is Women's Expertise Recognized? The Interactive Effects of Gender and Education in Science and Engineering Teams, Administrative Science Quarterly 59 (2), 202-239.

Judson, Eugene; Kulinna, Pamela Hodges (2012), Recruiting and Retaining Girls and Women to Pursue STEM Careers and Play Sports: Comparing Challenges and Lessons Learned, International Journal of Gender, Science and Technology, Vol.4, No.2, 191-207.

Kafai, Yasmin B.; Heeter, Carrie; Denner, Jill; Sun, Jennifer Y. (2008), Pink, Purple, Casual, or Mainstream Games: Moving Beyond the Gender Divide, in: Kafai, Yasmin B.; Heeter, Carrie; Denner, Jill; Sun, Jennifer Y. (eds.), Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Gaming, Cambridge, Massachusetts Institute of Technology (MIT) Press.

Kahlert, Heike (2014), Gender (In)Equality in Academic Career Promotion of Doctoral Students, in: Thege, Britta; Popescu-Willigmann, Silvester; Pioch, Roswitha; Badri-Höher, Sabah (Hg.): Paths to Career and Success for Women in Science. Findings from International Research, Wiesbaden, Springer VS Verlag für Sozialwissenschaften, 37-62.

Kane, Emily W. & Macaulay, Laura J. (1993), Interviewer Gender and Gender Attitudes. Journal of the American Association for Public Opinion Research, 57 (1), 1-28.

Kanter, Rosabeth M. (1977), Men and Women of the Corporation, New York, Basic Books.

Leung, Margaret W.; Yen, Irene H.; Minkler, Meredith (2004), Community-Based Participatory Research: A Promising Approach for Increasing Epidemiology's Relevance in the 21st Century. International Journal of Epidemiology, 33 (3), 499-506.

Lipinsky, Anke (2014), Gender Equality Policies in Public Research, Luxembourg, Publications Office of the European Union.

MacPhee, David; Farro, Samantha; Canetto, Silvia Sara (2013), Academic Self-Efficacy and Performance of Underrepresented STEM Majors: Gender, Ethnic, and Social Class Patterns, Analyses of Social Issues and Public Policy, Vol. 13, No. 1, 2013, 347-369.

Martin, Patricia Y. (2003), "Said and Done" Versus "Saying and Doing": Gendering Practices, Practicing Gender at Work, Gender & Society, 17(3), 342-366.

Martin, Patricia Y. (2006), Practicing Gender at Work: Further Toughts on Reflexivity, Gender, Work and Organization, 13(3), 254-276.

Matthies, Hildegard & Zimmermann, Karin (2009), Gleichstellung in der Wissenschaft, in: Simon, Dagmar; Knie, Andreas; Hornbostel, Stefan (Hrsg.), Handbuch Wissenschaftspolitik, Wiesbaden, VS-Verlag, 193-209.

McKinsey and Company (2007), Women Matter: Gender diversity, a corporate performance driver, McKinsey & Company Inc. Online: http://www.mckinsey.de/sites/mck_files/files/Women_Matter_1_brochure.pdf

Merton, Robert K. (1968), The Mattew Effect in Science. The reward and communication system of science are considered, Science 159(3810): 56-63.

Moors, Amy C.; Malley, Janet E.; Stewart, Abigail J. (2013), My Family Matters: Gender and Perceived Support for Family Commitments and Satisfaction in Academia Among Postdocs and Faculty in STEMM and Non-STEMM Fields, Psychology of Women Quarterly, 1-15.

Moss-Racusin, Corinne; Dovidio, John F.; Brescoll, Victoria L., Graham, Mark J., Handelsman, Jo (2012), Science faculty's subtle gender biases favor male students, PNAS, 2012, Vol. 109, No. 4, 16474-16479.

Müller, Jörg; Castaño, Cecilia; Castaño, González Ana; Palmen, Rachel (2011), Policy Towards Gender Equality in Science and Research, Brussels Economic Review, Vol. 54, No. 2/3, 295-317.

Mutz, Rüdiger; Bornmann, Lutz; Daniel, Hans-Dieter (2012), Does Gender Matter in Grant Peer Review? An Empirical Investigation Using the Example of the Austrian Science Fund, Zeitschrift für Psychologie, Vol. 220(2), 121–129.

Neuss, Jana & Drüner, Marc (2006), Gender-Aspekte im Markt- und Innovationsprozess, in: Schraudner, Martina & Lukoschat, Helga (Hrsg.): Gender als Innovationspotenzial in Forschung und Entwicklung, Stuttgart, Fraunhofer IRB-Verlag. 95-112.

OECD (2012), Closing the Gender Gap: Act Now, OECD Publishing.

OECD (2013a), PISA 2012 Results: Ready to Learn: Students' Engagement, Drive and Self-Beliefs (Volume III), OECD Publishing.

OECD (2013b), PISA 2012 Results: What Students Know and Can Do: Student Performance in Mathematics, Reading and Science (Volume I), OECD Publishing.

Oertelt-Prigione, Sabine & Regitz-Zagrosek, Vera (eds.) (2012), Sex and Gender Aspects in Clinical Medicine, London, Springer Verlag.

Oudshoorn, Nelly, & Pinch, Trevor (Eds.) (2003), How Users Matter: The Co-Construction of Users and Technologies, Cambridge, Massachusetts Institute of Technology (MIT) Press.

Regitz-Zagrosek, Vera (ed.) (2012), Sex and Gender Differences in Pharmacology, London, Springer Verlag.

Robnett, Rachael (2013), The Role of Peer Support for Girls and Women in the STEM Pipeline: Implications for Identity and Anticipated Retention, International Journal of Gender, Science and Technology, Vol.5, No.3, 232-253.

Rothe, Andrea et al (2008), Gender budgeting as a Management Strategy for Gender Equality at Universities - Concluding project report, Munich, Frauenakademie.

Schenck-Gustafsson, Karin; DeCola, Paula R.; Pfaff, Donald W.; Pisetsky, David S. (eds.) (2012), Handbook of Clinical Gender Medicine, Basel, Karger.

Schiebinger, Londa & Klinge, Ineke (eds.) (2010), Gendered Innovations: Mainstreaming Sex and Gender Analysis into Basic and Applied Research, Brussels, European Commission.

Schiebinger, Londa & Schraudner, Martina (2011), Interdisciplinary Approaches to Achieving Gendered Innovations in Science, Medicine, and Engineering, Interdisciplinary Science Review, Vol. 36, No. 2, 154–67.

Schraudner, Martina & Lukoschat, Helga (Hrsg.) (2006), Gender als Innovationspotenzial in Forschung und Entwicklung, Stuttgart, Fraunhofer IRB-Verlag.

Schraudner, Martina (2006), Beispiele für Gender und Diversity-Aspekte, in: Bührer, Susanne; Schraudner, Martina (Hrsg.) (2006), Gender-Aspekte in der Forschung. Wie können Gender-Aspekte in Forschungsvorhaben erkannt und bewertet werden?, Stuttgart, Fraunhofer IRB-Verlag, S. 5-9.

Stout, Jane G.; Dasgupta, Nilanjana; Hunsinger, Matthew; McManus, Melissa A. (2011), STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM), Journal of Personality and Social Psychology, Vol. 100, No. 2, 255-270.

Stvilia, Besiki; Hinnant, Charles; Schindler, Katy; Worrall, Adam; Burnett, Gary; Burnett, Kathleen; Kasmer, Michelle M.; Marty, Paul F. (2011), Composition of Scientific Teams and Publication Productivity at a National Science Lab. JASIST, 62(2), 270-283.

Van den Brink, Marieke; Benschop, Yvonne; Jansen, Willy (2010), Transparency in Academic Recruitment: A Problematic Tool for Gender Equality?, Organization Studies, 31 (11), 1459-1483.

Van den Brink, Marieke; Fruytier, Ben; Thunnissen, Marian (2013), Talent management in academia: performance systems and HRM policies, Human Resource Management Journal, 23(2), 180–195.

Wajcman, Judy (2010), Feminist Theories of Technology, Cambridge Journal of Economics, 34 (1), 143-152.

Weingart, Peter (2005), Impact of Bibliometrics Upon the Science System: Inadvertent Consequences, Scientometrics, 62(1):117-31.

Wennerås, Christine & Wold, Agnes (1997), Nepotism and sexism in peer-review, Nature 387, 341-343.

West, Candace & Zimmerman, Don H. (1987), Doing gender, Gender and Society, 1, 125-151.

Woolley, Anita W. & Baer, Julia B. (2011), The role of gender in team collaboration and performance, Interdisciplinary Science Reviews, 36(2), 146-153.

World Health Organization (WHO) (2011), Indigenous Peoples and Participatory Health Research, Geneva, WHO.

Wroblewski, Angela (forthcoming), Transparenz und Gleichstellungsorientierung im Berufsverfahren nach § 98 UG 2002, Wien, Verlag Österreich.

Xie, Yu, & Shauman, Kimberlee A. (1998), Sex differences in research productivity: New evidence about an old puzzle, American Sociological Review, 63(6), 847–870.

Appendix – literature review

Review guidelines

MoRRI

Final version / 17.11.2014 (rl)

Task 1: Literature review | Review template

Background and objectives

The purpose of this template is to provide each member of the review team with a common framework and reference point to conduct the literature review and, one the reviews are conducted, to facilitate a systematic and structured analysis of the literature.

According to the TOR, the main objective of this first task in the MoRRI project is to

- review of the state of knowledge regarding RRI

- define the policy context of RRI in Europe and elsewhere

- give a comparative assessment of RRI dimensions, weighing-up advantages, disadvantages and available options

- conduct a preliminary assessment of the availability of empirical evidence on the dimensions

- finalise the definitions and properties of the RRI key dimensions

- finalise the definition and properties of additional factors that may be relevant for the monitoring tasks.

How to use this document

- Due to the standardized nature of this template, you may feel that the content of the literature cannot be adequately represented. In these cases, please use the comment spaces provided for most questions.

- The literature review takes into account a selection of relevant publications in the 5 key dimensions of RRI (as defined by the EC: citizen engagement, science literacy, gender equality, open access, governance and ethics) and a selection of key publications dealing explicitly with RRI. Some of the questions in this template only relate to the 5 key dimensions, others only to the explicit RRI literature. Please make sure to fill in the template accordingly.

- Try to briefly summarise the relevant statements of the review document in your own words, perhaps using bullet points; please always refer to the page number of the document.

- If a question in the template does not apply to the publication at hand, please leave the entry blank.

- Important definitions or other central statements may be copied into the template; please always make reference to the page number of the review document

- Given the diversity of literature covered in this review, it is difficult to provide guidance on how extensive each review should be. For a "normal" journal article we expect the filled-in template to count roughly about 8-10 pages.

If you have any questions, please get in touch:

Ralf Lindner, ph.: +49 (0) 721 / 6809-292

ralf.lindner@isi.fraunhofer.de

Review reports

Basic information			Document no.: (citavi #)	000

Reviewer's name	Fan, Cheng, Fraunhofer ISI			

1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	Caprile, Maria et al. (2012): Meta-analysis of Gender and Science Research – Synthesis Report, Luxembourg: Publications Office of the European Union, 2012
	229 Pages
	ISBN 978-92-79-21311-3
	doi 10.2777/75176

2. Abstract (copy and paste)	The purpose of the study Meta-analysis of gender and science research was to collect and analyse research on **horizontal and vertical gender segregation** in research careers, as well as the underlying **causes and effects** of these two processes.
	The objectives of the study were to:
	• Provide an exhaustive overview and analysis of research on gender and science carried out at the European, national, and regional levels.
	• Make the study results accessible to researchers and policy-makers via an informed bibliography (online database) and a set of reports.
	• Steer policy-making on gender and science and define future research priorities within the Framework Programme, in particular through good practice examples and gap analysis in the various research topics. (P. 15)
	It shows that women's advancement in science is too slow. It unravels and exposes the subtle mechanisms that maintain gender inequalities in research institutions, and demonstrates that the traditional view of science as gender-neutral is flawed. On the other hand, and this should come as no surprise, there is also enough evidence that science benefits from the greater involvement of women. (P. 5)

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:	

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		

Comment on 5:	A synthesis report

6. System level (if applicable)	Global	☐	European	☑	National	☑	Sub-national	☐
Comment on 6:	EU, 27 EU MS and 6 Associated Countries to the 7th Framework Programme for Research and technological Development							
7.1 Country focus (if applicable, please specify)	EU, EU MS and EU AC							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)					Comments on 7: The Consortium Comprises CIREM (Spain), Université Libre de Bruxelles (Belgium), Inova Consultancy Ltd. (United Kingdom), Fondazione Giacomo Brodolini (Italy), Bergische Universität Wuppertal (Germany) and Politikatörténeti Intézet KHT (Hungary).			
Data and indicator availability								
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)		The study covered the research on gender and science produced between 1980 and 2008, in all European languages, in 33 countries: the 27 EU Member States as well as 6 Associated Countries to the Seventh Framework Programme for Research and Technological Development (FP7) (Croatia, Iceland, Israel, Norway, Switzerland, and Turkey). The online database (Gender and Science Database, GSD) and the reports are available at the website of the study: www.genderandscience.org p.15			
Comment on 8.1	Concept and methodology: National experts in the 33 countries covered by the study were in charge of selecting the most important contributions to the national literature from 1980 onwards and preparing an informed bibliography, which included the bibliographical reference, English title and abstract, as well as additional codified information addressing thematic and methodological issues. National experts codified the publications according to the following conceptual dimensions and topics: 1. A first descriptive dimension dealing with the main trends as regards: Horizontal segregation, Vertical segregation, Pay and funding. 2. A second dimension dealing with the analysis of gendered structural social dynamics that are reproduced in scientific work: Stereotypes and identity, Science as a labour activity 3. A third dimension, dealing with the analysis of issues directly related to							

<table>
<tr><td colspan="2">

scientific culture and scientific institutional practices: Scientific excellence, Gender in research contents

4. A fourth and last contextual dimension, dealing with the analysis of policies towards gender equality in research.

Table 1. Topics and dimensions

	Topics		Dimensions	
Policies towards gender equality in research	Horizontal segregation	Vertical segregation	Descriptive	
	Pay and funding			
	Stereotypes and identity		Structural social dynamics	Causes and effects
	Science as a labour activity			
	Scientific excellence		Scientific culture and institutional practices	
	Gender in research contents			

</td></tr>
</table>

8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				

Guiding questions for review
- please add page numbers where appropriate -

9. How is RRI characterized?
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative	

democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension	
(benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	Research gaps: Overall, the meta-analysis of the literature provides a clear overview of the most under-researched themes as regards gender and science: • Non-normative scientific careers is a largely neglected topic. In general, studies concentrate on academia and focus on scientists that pursue the most standard path. Little is known about those scientists who leave the academic pipeline or fail to adjust to the rigidity of academic 'tempos'. Industrial research and other science and technology-related professions remain under-researched. • There is a lack of theoretical and empirical research on the criteria and procedures for assessing scientific excellence. Particularly, studies about research funding are noticeably absent, specifically analysis of the recruitment practices for

	gate-keeping positions, as well as of the practices of the different bodies and scientific committees that award research grants and funds and assess scientific excellence. Overall, the lack of transparency in awarding procedures hinders empirical research.
	• Research on pay in scientific professions is scarce. It is a rather new topic of study, for three reasons: First, there is a lack of available official data on income and gender income differences. Second, in an important
	number of research institutions wages are entirely determined by rank and seniority. Third, in some countries and in some cultures, discussions of earnings are taboo.
	• Research addressing the evaluation of gender equality policies in science and research is scarce. There is a relative abundance of position statements, conceptual clarifications and recommendations dealing with gender issues in science across most countries.
	There is also a relatively large body of research documenting horizontal and vertical segregation in science. However, there are comparatively fewer systematic evaluations of policy measures. (p.20)
Comments on 11.	Main findings:
	4. **Overview** of the most important trends as gender segregation in science and related research: current research focuses on four sets of factors in order to explain gender segregation: gender stereotypes, choice of study field, gender division of labour and time constraints, and covert barriers and biases in organizational practices.
	5. **Gender segregation in scientific careers**: A large strand of the literature refers to gender differences in scientific careers, with a focus on three critical moments: choice of studies, which remains largely gendered; the 'rush hour', i.e. the early stage of the scientific career, in which family and career demands most often collide, a fact that disproportionately disadvantages women; and career advancement, which shows persistent gender inequality.
	6. **Gender, institutions and knowledge**: with a focus on three different themes: the gender dimension of current institutional changes, gender analysis in research content and policies towards gender equality in science.
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	**Gender segregation** in employment refers to the tendency of women and men to work in different occupations and sectors. The literature usually distinguishes between different types of segregation: Horizontal segregation is understood as the under- (over-) representation of a certain group of workers in occupations or sectors not ordered by any criterion, whilst vertical segregation refers to the under- (over) representation of a group of workers in occupations or sectors at the top of a ranking based on 'desirable' attributes –income, prestige, job stability, etc. In the literature, vertical segregation is

sometimes referred to as the 'glass ceiling', which points to the existence of visible or invisible obstacles that lead to the scarcity of women in power and decision– making positions. This is completed by the concept of the 'sticky floor', which describes the forces that tend to maintain women at the lowest levels in the organisation. (p. 26)

Leaky pipeline: Berryman (1983) introduced the metaphor of the 'leaky pipeline'. The process of becoming a scientist can be conceptualized as a 'pipeline'. The science pipeline refers to the normative sequence of educational and employment stages that typically comprise a scientific career. From this point of view, the decreasing proportion of women moving up the educational/professional hierarchy is attributable to women's higher rates of attrition from the science pipeline: at each moment of transition from one educational/ professional stage to another, the pipe line loses more women than men. (p.26.)

Scientific excellence: The definition of scientific excellence is elusive. The scientific community acts as if excellence were an obvious quality, and seldom feels the need to define it clearly. According to the documents written by professionals and agencies whose mission is to foster scientific excellence, it can be defined as follows:

Scientific excellence is the ability of a scientist or an institution to impact on a field of study producing a major change, leading other scientists towards asking new questions and producing new, important and useful contributions to knowledge, using new methodologies. The quality of excellence must be proven by a number of means, (such as publications, citations, funding, and students) and recognized by the peers by the bestowing of various honours, prizes and other awards.

The scientific community seems to act as if the meaning of scientific excellence were obvious and agreed on by all participants of the scientific enterprise. It behaves as if scientific excellence were an uncontested terrain and as if the procedures and criteria that lead to the selection of the top layer of scientists who are considered excellent were given, known, and unproblematic. However, contributions in the literature (Addis & Brouns, 2004) underline the need to engage in a critical reflection on the concept of excellence as well as on the processes and procedures that lead to the creation and recognition of excellence. Excellence is the final result of procedures that place scientists and scientific institutions in different positions within the network and the hierarchy of their fields. The fact that women scientists do not achieve excellence at the same rate as would be predicted by their outputs in the earlier stages of their scientific career is the product of a number of social processes within and outside the scientific community. (p. 27.)

Subtle gender discrimination: Gender discrimination in the scientific system is prohibited, but still exists, though it adopts more subtle forms than in the past. It may impact on the selection, hiring and promotion procedures, on the distribution of resources or on the assessment of scientific excellence. (p. 27.)

Cumulative advantages and disadvantages: Merton (1968, 1988) coined the term 'Matthew effect' to describe the

	pattern of cumulative advantages in science ('For to all those who have, more will be given, and they will have abundance; but from those who have nothing, even what they have will be taken away'. Gospel of Matthew 25:29). The Matthew effect refers to the social processes through which initial advantages in terms of capacity, structural location and available resources make for successive increments in advantage such that the opportunities for undertaking scientific research and receiving symbolic and material rewards for its results tend to accumulate for some scientists and scientific organisations. (p. 28.)
	Gate-keeping: Gate-keepers are established scientists or peers that control the definition of merit and the means of exercising academic power (Merton, 1973). More generally, gate-keeping processes can aim to control or influence the entry or access to a particular arena, allocation of resources and information flows, the setting of standards, development of the field and the agenda, or the external image of that arena. (p. 28.)
	Political approaches to gender equality in science and technology: To better understand the complex processes involved in the increasing participation of women and minorities in science and technology, Schiebinger (2008b) identifies three interrelated political approaches: • Fixing the number s of women in science • Fixing the institutions • Fixing the knowledge (pp. 28-29)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	NPM (pp. 140-142) Gender theory in relation to gender analysis in research area (p.20) Cultural and structural change (p.25)
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	

14. Anything else deemed relevant?	
15. General comments and remarks	With the overall purpose of promoting gender equality in science by facilitating non-linear careers and degendering, the main priority of research should be to build more consistent links between analysis and policy making.

Recommendations can be grouped into four main issues:

7. Better statistics: information on qualitative aspects of their employment is very limited.

- The European Labour Force Survey is a valuable source of data for the analysis of scientific and technological employment. It offers rich information on personal and family variables. However, it does not make it possible to distinguish clearly between professional and research activities.

- European "She Figures" on a tri-annual basis since 2003 constitutes a unique attempt and opportunity to build a comparable European database in order to monitor the relative position of women in science. Collecting more systematic sex-disaggregated data on pay and research funding should be a priority. In particular, research funding requires proper monitoring whilst the lack of transparency in the allocation of research grants and awards is a major obstacle.

- Major hindrances for research are the lack of sex-disaggregated data on personal and career developments (including demographic variables such as the number of children, marital status, etc.) and the lack of longitudinal data.

- Research suffers from a lack of panel data, which hinders the development of longitudinal research, which is the best way of analyzing patterns of cumulative advantage and disadvantage that shape gender differences in scientific careers.

8. Broader scope of research: Overall, research on gender and science should be less descriptive and more theoretically embedded within the strand of literature that analyses divergent patterns of feminization and change in highly qualified professions. More research is needed to fully understand the complex mix of structural barriers, discrimination and cumulative disadvantages that account for women's underrepresentation in the highest scientific positions. Research should also address the development of science-related professions in nonacademic settings and its gender dimension, including technicians working as research staff and technology transfer professions.

9. Mainstreaming sex and gender analysis

- Developing internationally agreed upon methods of sex and gender analysis.

- Training current researchers and evaluators in gender methodology.

- Holding senior management accountable for developing evaluation standards that take into account the proper implementation of gender analysis in research.

	• Training the next generation in methods of sex and gender analysis.
	10. Focus on institutional change and evaluation of gender equality policies
	• The need for common quality standards for evaluation: a common evaluation framework might be useful for addressing the related problem of detecting structural change. This also points to the need to make the normative component of many evaluation studies explicit.
	• The need for theory and interdisciplinarity: Most studies are descriptive and lack explicit theoretical references. This reinforces the isolated nature and lack of comparison between case studies across Europe.
	• There is a need for research on long-term effects. (pp. 20-24)
	Concluding remarks:
	11. A cultural change in terms of challenging traditional gender roles, specifically in terms of more gender-balanced decision making in research, will be required. The key challenge is not to change women but, on the contrary, to change the culture of science and research. This change would concern not only the definition and assessment of excellence but also issues relating to career and family balance.
	12. At present, the main challenge is not to define new policies but to reinforce their effects through an in-depth evaluation of measures and transferability of good practices. It implies developing sound theoretical frameworks, appropriate methodological tools and shared evaluation standards.
	13. In the end, the new European perspective on gender and science comprises the idea that gender policy is not only made by regulation and legal changes but mostly by leadership and a commitment to changing structures and cultures.
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	European Commission 2008, Mapping the Maze. Getting More Women to the Top of Research, Office for Official Publications of the European Communities, Luxembourg.

Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication,	Catalyst (2014), The bottom line: Connecting Corporate Performance and Gender Diversity, Catalyst Publication 28 pages		

pages, DOI)	ISBN 0-89584-244-0						
2. Abstract (copy and paste)	The connection between gender diversity and corporate financial performance was examined in this study. The key findings are 14. The group of companies with the highest representation of women on their top management teams experienced better financial performance than the group of companies with the lowest women's representation. This finding holds for both financial measures analyzed: Return on equity (ROE), which is 35.1 % higher, and Total Return to Shareholders (TRS), which is 34.0 % higher. 15. Financial performance was also analyzed by industry, and in each of the five industries analyzed, the group of companies with the highest women's representation on their top management teams experienced a higher ROE than the group of companies with the lowest women's representation. 16. In four out of the five industries analyzed, the group of companies with the highest women's representation on their top management teams experienced a higher TRS than the group of companies with the lowest women's representation 17. Catalyst Award-winning companies financially outperformed others in the sample. (pp. 1-3)						

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:	Impact of Gender diversity on corporate financial performance							

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:		Statistical analyses to support the link between Gender diversity and business financial performance			

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:								

6. System level (if applicable)	Global	☐	European	☐	National	☑	Sub-national	☐
Comment on 6:	USA							

7.1 Country focus (if applicable, please specify)	USA

7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/	USA	Comments on 7: Catalyst is the leading research and advisory organisation working to advance women in business, with offices in NY, San Jose and

author(s) (if applicable, please specify)				Toronto.
Data and indicator availability				
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	Financial Data for the comanies: Standard & Poor's Compustat database
				Diversity data for top management teams: Catalyst's annual censuese of women corporate officers and top earners.
				ROI: a ratio of income to average shareholder equity for the year.
				TRS: total return for the company for each calendar year (pp. 17-18)
Comment on 8.1				
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				
Guiding questions for review				
- please add page numbers where appropriate -				
9. How is RRI characterized?				
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)				
9.1 Which definition of RRI is being used? (author's definition or reference to other source)				
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)				
9.2 Which arguments are presented in support or rejection/criticism of RRI?				
9.3 To which concepts, theories, approaches, schools				

of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension	
(benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	• Gender diversity improves the corporate financial performance. • In companies that focus on diversity – developing and leveraging women's talent- the relationship to the bottom line is remarkable (P. 2)
11.2 Which arguments are used to support the claim(s)?	1. Tapping into an increasingly educated and skilled segment of the talent pool. 2. Women have the growing economic power /purchasing power 3. Gender diversity improves the quality of decision-making with the consideration of women's needs 4. According to group behavior research, diverse groups make more innovative business decisions than non-diverse groups. (pp. 2-3)
11.3 What evidence is presented to support the	ROI, TRS of 353 fortune 500 companies between 1990- 1996, divided into quartiles, based on women's representation on

claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	the top management teams were investigated (pp. 4-11) Distinctive characteristics: • A longer time period • A large sample • Quality of data (P. 3)
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	Gender Diversity = developing and leveraging women's talent Gender Diversity= recruiting, retaining and advancing women (P. 2)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	Research of group behavior in business decision P. 3. Footnote 10. e.g. Karen A. Bantel and Susan E. Jackson "top management and innovation in Banking: Does the Composition of the Top make a difference?" Strategic Management Journal Vol. 10 (1989)
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	
16. Relevant sources cited (Please list references to other sources cited in the literature	

which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	

<table>
<tr><td colspan="3">Basic information</td><td colspan="3">Document no.:

(citavi #)</td><td>000</td></tr>
<tr><td colspan="2">Reviewer's name</td><td colspan="5">Fan, Cheng, Fraunhofer ISI</td></tr>
<tr><td colspan="2">1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)</td><td colspan="5">EIGE (European Institute for Gender Equality) (2014), Effectiveness of Institutional Mechanisms for the Advancement of Gender Equality – Review of the implementation of the Beijing Platform for Action (BPfA) in the EU MS, Luxembourg: publications Office of the European Union

149 pages

ISBN 978-92-9218-361-5

DOI: 10.2839/16888</td></tr>
<tr><td colspan="2">2. Abstract (copy and paste)</td><td colspan="5">This publication compares and presents the progress of Member States in the area of <u>institutional mechanisms and gender mainstreaming</u> since 2006 when the first report on institutional mechanisms was developed by the Finish Presidency of the Council of the EU.

<u>The main findings</u> show that by 2012 all Member States had established governmental bodies for gender equality and bodies for the promotion of equal treatment on various grounds. Notwithstanding positive trends in institutional settings over the last decade, the bodies responsible for gender equality are often marginalised in national governmental structures; split into different policy areas; hampered by complex and expanding mandates; lack adequate staff, training, data and sufficient resources; and experience insufficient support from political leadership.

The report emphasises several <u>important trends</u>. Firstly, although recognised as a fundamental value of the European Union, the status and profile of gender equality currently shows signs of decreased importance. Independent bodies for the protection against discrimination on the ground of sex are increasingly replaced by bodies for the protection against discrimination on various grounds. Whereas the importance of acknowledging the heterogeneity of women and men in terms of age, class, disability, ethnicity/race and sexual orientation is crucial to the recognition of diverse experiences among women and men, the consequences of downplaying gender as a structural dimension and underlying element of all inequalities should not be overlooked. <u>The political, social and administrative remit of gender equality has started shifting towards legal and procedural mechanisms addressing discrimination at the individual level</u>. Gender equality is more seldom addressed and promoted through policies and institutions that tackle gender gaps and the disadvantages of certain groups of women and is more often viewed <u>as a human right requiring legal measures to protect individual citizens against discrimination</u>. This approach marginalises gender equality as a political goal and undermines gender equality as an important policy area in itself. (P. 3)</td></tr>
<tr><td colspan="2" rowspan="2">3. Main focus (key dimensions according to MoRRI)</td><td>RRI / RI</td><td>☐</td><td>Citizen participation</td><td>☐</td><td>Science literacy</td><td>☐</td><td>Gender equality</td><td>☑</td></tr>
<tr><td>Open access</td><td>☐</td><td>R&I governance and ethics</td><td>☐</td><td>Other</td><td>☐</td><td></td><td></td></tr>
</table>

Comment on 3:							
4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative ☑
	Other	☐	Comment on 4:		5th Report of Review of the implementation of BPfA in the EU to examine how the strategic objectives regarding gender equality was achieved till now		
5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report ☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐	
Comment on 5:	A report in form of a book published						
6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national ☐
Comment on 6:	Cross EU MS						
7.1 Country focus (if applicable, please specify)							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)					Comments on 7: The European Institute for Gender Equality is an autonomous body of the European Union		
Data and indicator availability							
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)		Indicator 1: Status of governmental responsibility in promoting gender equality PP: 27-42 This indicator includes the following: • highest responsibility for promoting gender equality at the governmental level; existence and permanence of governmental gender equality body at national/federal level; the position of location of the governmental gender equality body within the government hierarchy; the functions of the governmental gender		

				equality body at national/federal level; existence of governmental action plan on gender equality (GAPGE); reporting to the legislative bodies such as Parliament on the progress of gender equality.
				Indicator 2: Human resources for the promoting of gender equality PP. 43- 50
				• Indicator 2a indicates the ratio of the personnel resources available for the governmental gender equality body to the size of the Member State in terms of population. It thereby represents a government's commitment to the promotion of gender equality in terms of personnel resource allocation for the governmental gender equality body.
				• Indicator 2b indicates the ratio of personnel resources available to the designated body for the promotion of equal treatment of women and men to the population size of the Member State. It thereby represents a government's commitment to promoting gender equality in terms of resource allocation for the protection and promotion of equal treatment in accordance with Directive 2002/73/EC.
				Indicator 3: Gender mainstreaming (PP. 51-66); the indicator included five aspects:
				• status of the governmental commitment to gender mainstreaming in public administration; existence of structures and methods for use in gender mainstreaming; gender impact assessment in law drafting; gender impact assessment in drafting policy programmes; gender budgeting.
				Indicator 4: Production and dissemination of statistics

				disaggregated by sex PP. 67-76 Three indicators are examined: • governmental commitment to the production of statistics disaggregated by sex; governmental commitment to the dissemination of statistics disaggregated by sex; methods in use for the dissemination of gender statistics (the existence of publications and/or dedicated websites).
Comment on 8.1	The report is based on the following methods of data collection and analysis: • literature and documentation review; • data collection through an online questionnaire and face-to-face interviews; • data-analysis; and • review of indicators:			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	RNGS (research network on gender politics and state) QUING (Quality in gender+equality polices) (P. 11)
Comment on 8.2:				

Guiding questions for review
- please add page numbers where appropriate -
9. How is RRI characterized? (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the	

area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension	
(benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	According to the 4th World Conference on Women held in Beijing (1995), the global problem of gender inequality was

	raised, which resulted in an international commitment taken on by almost all UN Member States to initiate a radical agenda for change. The European Union and its Member States committed themselves from the very beginning to deliver on the strategic objectives of the Beijing Platform for Action (BPfA). (H1: create or strengthen national machineries and other governmental bodies; H2: integrate gender perspectives into legislation, public policies, programmes and projects; H3: Generate and disseminate gender-disaggregated data and information for planning and evaluation.) This publication is the fifth report in EIGE's review of the implementation of the BPfA in the European Union.

12. Key dimensions of RRI
(For literature dealing with one or more of the 5 key dimensions.)

| 12.1 How is the key dimension defined?

(terminology applied, central features/characteristics) | 18. Institutional mechanisms for gender equality:

• The BPfA defines these as the national machinery for the advancement of women regarded as the central policy coordinating unit inside government. Its main task is to support government-wide mainstreaming of a gender equality perspective in all policy areas.

The following necessary <u>conditions</u> for an effective functioning of institutional mechanisms for gender equality:

• location at the highest possible level in the government, falling under the responsibility of a cabinet minister;

• institutional mechanisms or processes that facilitate, as appropriate, decentralised planning, implementation and monitoring with a view to involving non-governmental organisations and community organisations from the grassroots upwards;

• sufficient resources in terms of budget and professional capacity;

• the opportunity to influence the development of all government policies (P. 11).

19. Gender mainstreaming

• A Council of Europe study described gender mainstreaming as 'the (re)organisation, improvement, development and evaluation of policy processes so that a gender equality perspective is incorporated in all policies at all levels and at all stages by the actors normally involved in policymaking'.

• What currently is known as the dual approach to gender equality, 'meaning the integration of the gender dimension into all policy areas and specific measures' (European Commission, 2010b).

<u>Components of gender mainstreaming</u>

• Commitment — a mandate for all ministries to review all policies and programmes from a gender perspective with the responsibility for that mandate at the highest possible level;

• Structure — an inter-ministerial coordination structure to monitor progress and network with stakeholders; |

	- Involvement of civil society — centres for women's studies and research; academic and educational institutions; the private sector; the media; non-governmental organisations, especially women's organisations; and all other actors of civil society; - Gender awareness training and advisory services for government bodies; - Focus on legal reform in the following areas: family, employment, social security, income tax, education, positive measures to advance women, perceptions and attitudes and creation of a culture that supports gender equality; - Sufficient budget resources and professional capacity; - Tools — development of strategies and methodologies. The Council of Europe developed the conceptual framework for gender mainstreaming and identified the following tools and methods for gender mainstreaming: - analytical techniques and tools — statistics; surveys and forecasts; cost-benefit analysis; research; checklists, guidelines and terms of reference; gender impact assessment methods; - educational techniques and tools — awareness raising and training courses; follow-up action; 'mobile or flying expertise'; manuals and handbooks; booklets and leaflets; educational materials for use in schools; - consultative and participatory techniques and tools — working or steering groups and think tanks; directories, databases and organisational charts; participation of both sexes in decision-making; conferences and seminars; hearings. (PP. 13-14) 20. statistics disaggregated by sex To produce sex-disaggregated data and information, where appropriate, for planning and evaluation purposes, for gender impact assessment and, in general, for an effective gender mainstreaming. (P.15)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	The involvement of civil society is crucial for the change (gender equality): complementary. (P. 11) Participatory techniques and tools for gender mainstreaming (P. 14)
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative	Involvement of civil society (p.11)

democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	Outshoorn J., Kantola J. (2007), *Changing state feminism*. New York: Palgrave Macmillan. Outshoorn, J. (2007), *Instituties voor emancipatiebeleid. Nederland in een internationale context.* [Gender equality institutions. The Netherlands in an international context]. Den Haag: Visitatie Commissie Emancipatie [Dutch Emancipation Review Committee]. Krizsán, A., Skjeie, H., and Squires, J. (2012), Institutionalizing Intersectionality: the changing nature of European equality regimes. Basingstoke: Palgrave Macmillan. United Nations Economic Commission for Europe (2010), *Developing Gender Statistics: A Practical Tool*, United Nations, Geneva, 2010 (http://www.unece.org/fileadmin/DAM/stats/publications/Developing_Gender_Statistics.pdf) McBride, D., Mazur, A. (2010), *Politics of state feminism: innovation in comparative research*. Philadelphia: Temple University Press.
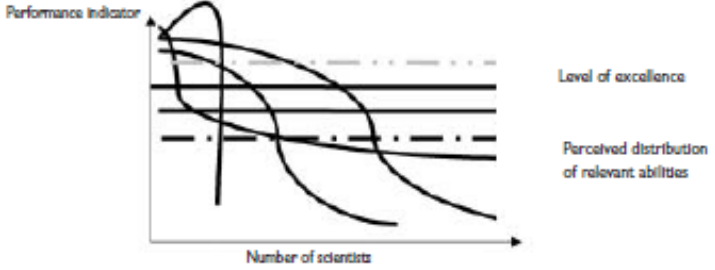
Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2004), Gender and Excellence in the Making, Luxembourg: Office for Official Publications of the European Communities ISBN 92-894-7479-3 Pages: 179		
2. Abstract (copy and paste)	This report is the result of a joint initiative between the three following entities: the Gender Studies and the Governance, Science and Technology Programmes of the Robert Schuman Centre for Advanced Studies, EUI, the Women and Science Unit, Research DG, European Commission, and the Women and Science Network, Joint Research Centre DG, European Commission. It seeks to stimulate debate on the **construction of notions of 'excellence' in the shaping of scientific careers**. In particular, it considers in what ways gendered assumptions underpin constructions of excellence, and what these imply for both women and men. (The aim of the workshop was thus to explore the mechanisms and present modes of evaluation of scientific excellence, and the operation of gender within these.)		

	The report comprises a synthesis of the papers at the workshop and the discussions that took place around them. It offers the reader diverse resources for thinking about the problems of defining and measuring excellence and will lead to some new research initiatives and improved practices which will have benefits for all. Whilst the setting considered here is predominantly academia, the discussion and research findings are also relevant for other institutional settings – public and privately funded research institutes, and industry. (pp. 7-8)						
3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality ☑
	Open access	☐	R&I governance and ethics	☐	Other	☐	
Comment on 3:							
4. Main perspective (multiple entries possible)	Theoretical, conceptual	☑	Methodological	☑	Policy oriented	☑	Evaluative ☑
	Other	☐	Comment on 4:	An academic discussion with very broad scope			
5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report ☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐	
Comment on 5:	Report in form of a book						
6. System level (if applicable)	Global	☑	European	☑	National	☐	Sub-national ☐
Comment on 6:	Cases and practices from different countries in the world						
7.1 Country focus (if applicable, please specify)							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)					Comments on 7: The Experts are coming from USA, Germany, India, Canada, Finland, Sweden, UK, Iceland, Italy, the Netherlands, France and Hungary		
Data and indicator availability							
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)				

Comment on 8.1	This study presents the results of a workshop "MINIMISING GENDER BIAS IN THE DEFINITION AND MEASUREMENT OF SCIENTIFIC EXCELLENCE", held at the European University Institute (EUI) in Florence in October 2003, jointly organized by the Women and Science Unit of the European Commission's Research DG, the Women and Science Network of the European Commission's Joint Research Centre and the Robert Schuman Centre for Advanced Studies of the European University Institute. The workshop presented 21. The **state of the art in measuring scientific excellence** (including what conceptualizations underpin different techniques), and how these techniques may be gendered. It asked, amongst other questions, whether they measure what they claim to, and to what extent they are applied across countries, sectors, and fields in Europe and elsewhere. 22. In the first session, **mechanisms of evaluation** were discussed in relation to careers. 23. The **interaction of gender** in the definition of excellence and characteristics of evaluation systems was the scope of the second session which sought to address more specific practices of evaluation, for instance through peer review, in gate-keeping mechanisms, and in the decision-making processes of promotion committees. 24. The final session explored **strategies** to combat gender bias.			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	See Experts' papers (pp. 33-174) The methodology comprises case studies, text analysis, experiments, extensive surveys etc.
Comment on 8.2:	The workshop participants were scholars from a range of disciplines – including sociology, gender studies, history, economics – either specialists in women and science and in the measurement and evaluation of scientific achievement, or in a related field that could offer insight into constructions of excellence. The exchanges between them made for an extremely lively interdisciplinary event. Very different points of view and paradigms were heard, and a wide range of data sources and modes of analysis and interpretations were brought into productive dialogue with one another.			
Guiding questions for review - please add page numbers where appropriate -				
9. How is RRI characterized? (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)				
9.1 Which definition of RRI is being used? (author's definition or reference to other source)				
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural				

approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI

(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension

(benefits, costs, disadvantages, trade-offs)

11.1 What claims are being made?	• The rationale for this workshop was developed from two observed trends. • First, the increased formalisation of systems of evaluation in some (but not all) countries of the European Union (and elsewhere), itself part of a broader emphasis on

	accountability.
	• Secondly, direct attention to the general under-representation or under-promotion of women in science (albeit with variation by institutional sector, level, and scientific field).The processes which give rise to inequalities in scientific careers across different social groups are multifaceted.
	• There is evidence to suggest that systems of evaluation of scientific work are one element (and may interact with others) of processes which generate marked segregation between men and women in career trajectories. (p. 7)
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	1. Sexism and Nepotism in the peer review of research grant applications: in 1997,Wennerås and Wold published their ground-breaking Nature article on sexism and nepotism in the peer review of research grant applications to Sweden's Medical Research Council (MRC). The article showed that the peer review system is not as 'neutral' as it claims to be. Male applicants and researchers with an affiliation with one of the evaluators were more successful in their applications to the MRC for postdoctoral research grants. The article concluded that whilst the quality of the proposal was an important factor in assessing the scientific competence of research grant applicants, so was the gender of the applicant, as well as his or her affiliation to one of the members of the evaluation committee.

This evidence of gender bias was particularly disturbing because it contrasts with one of the scientific community's core beliefs about its own internal governance. Decision-making should be based on meritocracy, hierarchy on individual performance in furthering scientific inquiry. This belief is rooted in the heart of the scientific ethos, connected with the struggle of science to liberate itself from theology and other societal powers (Merton, 1942).

A science that is oriented by non-scientific judgments on the performance of some scientists lacks the fundamental quality of objectivity. In this context, the supposition of attributing 'excellence' mainly and mostly to male scientists becomes problematic for all scientists.

2. Evaluation system is hindering women in establishing scientific careers: According to Cozzens' input into the discussion, the long-lasting debate on 'objectivity' and 'fairness' of assessment systems ended more or less in the statement that although the system is not perfect, it is the best available (Cole and Cole, 1985). However, with the growing interest in gender issues in the field of research policy, the picture seems to be changing: the system is not only imperfect, it may even be hindering women in establishing scientific careers. Merit and talent are not sufficient conditions to become a successful scientist. Resources, time, social networks, encouragement – unevenly distributed between the sexes – are necessary prerequisites.

3. Gender bias: An important issue is that of the hegemonic position of the 'hard sciences' vis-à-vis the humanities and social sciences, in combination with the relative absence of women in the hard sciences.

4. Problems related to measuring scientific excellence: Simplism is |

<table>
<tr><td></td><td>surely one of them. The dangers that derive from using an over-simplistic model of excellence are illustrated by the following set of graphs. (pp. 13- 16)

If we consider all that, the model of the first box deconstructs in a rather more complex scheme. Excellence as we see it today is just one of many possible consensuses about what excellence is. This consensus is shaped by gender relations in the scientific community and in society at large. But the standards used may be different, and the distributions may be received differently.

Excellence can change. Thus excellence becomes a contested terrain. The effort to measure excellence is also a battleground. Existing measures, like bibliometrics, are not gender-biased, but this is not the same as saying that there is not structural gender bias in the larger environment (Feller).The effort to establish criteria and build indicators that take into account the difference in men's and women's lives and abilities is an effort to redefine excellence so that excellent people of both genders may contribute to science. (pp.11-12.)</td></tr>
<tr><td>11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)</td><td>25. A lack of reliable data comparing men and women working under similar conditions (age, experience, etc.) makes it difficult to draw conclusions on gender differences in publication rates across disciplines and age. (p. 17)

26. More research is needed for a better understanding of where the bias comes from. (p. 29)</td></tr>
<tr><td>Comments on 11.</td><td>Conclusion:

The fact that the workshop did not produce consensus on numerous points – including on appropriate methodologies and interpretations of research – is hardly surprising, and this multiplicity of perspectives remains a feature of this report and one which we consider to be amongst its positive contributions.

- Based on evidence presented from their own research, participants agreed that scientific excellence is not "a universal fact" but rather a social construction and, as such, it is open to many kinds of biases.

- Several aspects of possible gender bias in the production and evaluation of scientific excellence were discussed in the workshop. Gender bias can occur (1) in the characterisation of scientific excellence, (2) in the criteria used to assess it, (3) in the choice of the explicit and implicit indicators for scientific excellence, (4) in the way the criteria are applied to men and women, (5) in the failure to integrate women in scientific networks, and (6) in the procedures through which criteria are applied to people.</td></tr>
</table>

Gender dynamics as regards scientific excellence are multifaceted, are often invisible, and apparently related to gender differences in social capital and in the attribution of competence, and to a scientific culture in which the 'similar-to-me' process unwittingly seems to favour men scientists

details:

1. <u>DEFINITION AND MEASUREMENT OF EXCELLENCE: THE MAINSTREAM</u>: Scientific excellence is essentially difficult to grasp. How to achieve the disinterestedness and the ability to be objective is the cornerstones of the scientific ethos. However, different problems could be observed in the mainstream measurements

   a. Bibliometrics

      i. **Tension between reliability (quantity) and validity (quality)**. Indicators that are measured easily and unequivocally – and provide a reliable way of counting – are not necessarily the most valid. In other words, bibliometrics are not necessarily the best indicator of scientific quality, as argued by Feller in this volume. <u>The quantitative is a reduction of the qualitative, which is not easily measured in an objective manner</u>.

      ii. the connection between short-term publication and **long-term scientific impact** is rather weak. Early measures may not be an accurate predictor of the long-term impact of a scientific discovery: Wittgenstein would not have survived such a system (Dummet 1991 cited in Feller in this volume).

      iii. The **validity of the Science Citation Index** regarding scientific excellence is limited as it rarely includes sources in **languages** other than English, and covers only a minority of the scientific journals in **humanities and the social sciences** (see chapter below). The system of judgment employed in bibliometrics privileges well-established fields with long-standing publication traditions and clear boundaries.

      iv. The way individual scientists react by producing more and more publications: The way scientific excellence is measured creates a specific atmosphere in which competition leads to high numbers of publications but not necessarily to good science. "**Publication numbers themselves can be an outcome of a certain form of masculinity**", as Hearn stated during the workshop.

      v. the result of the same **computer technology** that made bibliometrics possible: scientific production has increased massively. There has been a veritable inflation of literature, while the information processing capabilities of humans has stayed the same.

      vi. Issue of gender and publications- **productivity puzzle** -: On average, women tend to publish fewer articles than men. Recent publications clearly show that

productivity appears to be related to **academic rank**. The lower productivity of women can be explained by the fact that they are working at lower professional ranks than men. Within the same category, it seems that there is no significant difference by gender (Bordons et al., 2003). In addition, there are important differences between the scientific fields in terms of women's participation and of publication rates and citations. **Discipline-specific publication traditions** can explain the existing gender differences in productivity. An alternative explanation for gender differences in publication rates emphasises **family responsibilities**. During the workshop, Palomba presented research which showed that there is a family effect on productivity: the publication peak for men is earlier in their careers than for women.

b. Peer review: There was general consensus among the participants in the workshop that excellence is not an 'universal fact' or a 'natural given', or a 'supra-disciplinary' fact. It is a social construction and, as such, it is open to many kinds of bias.

  i. a composite of many skills – carefulness, originality, clarity, complexity, etc. – and is achieved through a process of training, networking, accumulation, and resources. The judgment of excellence depends on the importance attributed to each of these characteristics.

  ii. The most obvious difficulty is the evaluation of original, innovative research. Innovation is not always recognized immediately, and may sometimes even be rejected as 'bad science'. **Other problems arise because of the idiosyncratic character of the judgments**. According to Feller (this volume), there seems to be a lack of attention to or endeavour in the construction of **alternative measures**. The challenge for future work assessing scientific performance and excellence is to develop **metrics that better capture the dynamics of scientific discovery, as well as encompass the array of societal objectives** that led to the initial public policy decision to fund the research.

  iii. In addition, the presupposed disinterestedness of the peers and the **objectivity of the system** are the subject of debate. A standard called 'objective' can be interpreted differently and there is no golden standard – all those participating in the decision-making process must agree on a standard and/or rules to decide whose standard will prevail in order for a decision to be made. Thus, choosing the standards, proper indicators, and devices capable of measuring the standards is a point of contest between different viewpoints. The 'objectivity' of the final decision is the result of negotiation.

  iv. 'Similarity' seems to be a major aspect steering the evaluation process. Although existing research is

ambiguous, there is some evidence that peer reviewers prefer proposals that are similar to their own work (Guetzkow, Lamont & Mallard [in press] cited, with permission, in Griffin in this volume). Knorr-Cetina (1999) has called practices based on similarity '**epistemic cultures'**, a primary orientation and research styles characterising research groups and research fields. This implicit **cloning mechanism** limits the chances of research proposals and publications that do not fit in with the traditions.

   v. **Matthew Effect** (Merton, 1968) – achievements: evaluators tend to overestimate the accomplishments of scientists with an established reputation, whereas unknown researchers meet more reserve. **Matilda Effect**, has also been documented: achievements of female researchers are frequently attributed to their male colleagues or otherwise minimised and underestimated (Rossiter, 1993; Stamhuis, 1995).

2. MASCULINITY, MALE BONUS AND CULTURAL INTERPRETATIONS OF GENDER
   a. the academic career system is based on the traditional male model of labour market participation. The ideal type is essentially a male model of practice, full-time devotion, emphasis on early achievements, and exclusive identification with science, without any other social obligations.
   b. The **similar-to-me effects** implicitly **influence assessment and selection procedures**: the recruitment of new managers is closely related to processes of cultural cloning, pointing at an often unintended preference by men for men or, as Kanter stated some decades ago, h**omosocial reproduction** (Kanter, 1977).
   c. Male bonus: Women scientists seem to encounter trouble in becoming part of loose **networks**, subtly excluded ven by colleagues who are not explicitly sexist in any way. One possible explanation of this fact is that men competing against each other can expect large honour gains when they win and only small ones if they lose. In competition with a woman, the picture changes: men do not want to compete with women because the gains from winningthe competition are relatively small, and the risk related to losing the competition is high, because this implies large honour losses (Addis, this volume). <u>As a result, men treat women differently from the way they treat men, and women remain 'the others'</u>. Under these circumstances, it is far easier for men to gain scientific credibility from an overwhelmingly male scientific forum than it is for women.

3. SOCIAL DYNAMICS OF SCIENTIFIC EXCELLENCE: GENDER PROBLEMS IN PRACTICE
   four stages can be distinguished:
   a. setting the agenda for research
   b. publications and citations

	c. evaluation and assessment processes
	d. transparency and accountability
	4. INDIRECT GENDER BIAS: CROSSING BORDERS Four dimensions of 'situated decision-making' were discussed during the workshop: disciplinary differences, mono- and interdisciplinarity, **different modes of science**, and geographical location at the centre and periphery. Sometimes the relationship with gender is quite clear – e.g. the disciplinary differences – but in some cases the gendered character remains indefinite. There is – for instance – some evidence that women scientists have a stronger tendency towards interdisciplinary research and towards research aiming at social issues, but the results are not unequivocal. (pp. 11-27.)

12. Key dimensions of RRI

(For literature dealing with one or more of the 5 key dimensions.)

| 12.1 How is the key dimension defined? (terminology applied, central features/characteristics) | **Gender bias**: Gender bias is the often unintentional and implicit differentiation between men and women situating one gender in a hierarchical position to the other, as a result of stereotypical images of masculinity and femininity steering the assessment and selection process or the gendered structure of the scientific system. Explicit gender bias is prohibited, but still exists – discriminatory practices considering recourses seemed partly to explain the under-representation of female scholars at the highest positions (MIT 1999). |
| 12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)? | In this report, the different modes of science are discussed. The Agora Model refers to RRI exactly. The text: One of the central lines of debate during the workshop referred to the changing position of the sciences as a social institution in the emerging **knowledge-based society**. Different concepts have been developed to cover these transformations. Gibbons et al. (1994) describe them as **Mode 1 versus Mode 2 models of knowledge production and transmissio**n; Laredo (this volume) addressed it as a '**third mission' of the universities – a responsibility to ensure more direct links with societal and economic needs**. Brouns (this volume) refers to it using the metaphor of **Mount Olympus versus the Agora**. The classic but still powerful metaphor for science is the Olympus model which situates scientists, in their unselfish and disinterested quest for truth, at the top of the pyramid, far removed from the concerns of everyday life. **In the Agora model, science is analysed as a societal practice**, tightly bound to other such practices. In the context of the knowledge-based society, the sciences are moving into the Agora, but this is hardly recognised in the evaluation systems. Scientific knowledge refers to creators, transmitters and users (Blagojevic, this volume), but only the first ones are acknowledged in the dominant system of measuring scientific quality. The Centre de Sociologie de l'Innovation has designed a 'researchcompass card model' to map the complex world in which researchers have to operate (Laredo, this volume). It would be counter-productive for research institutions to consider only academic excellence when, at the same time, policies demand |

	other missions to be developed. What is needed is for **indicators to be developed for performance in other research activities**. Laredo argues for a transition from **scientific excellence to scientific performance**, which clearly engages inscientific activities in a broader scope.
	Concept "Science-in-context" is discussed and refers to PE and RRI
	Instead of adapting traditions and behaviour to the standards, it is argued that it is necessary to **broaden the spectrum of activities and achievements to be included in the definition of scientific excellence**. It is important to include other dimensions of scholarly practice, <u>such as education, participation in committees, administrative tasks, external consultancy, and contribution to public debates.</u> In other words, it is important to emphasise not only production, but also relevance and the different users of scientific knowledge. Measures are meaningful if they are based on the context of their production and in the uses of the knowledge. But the question of how exactly **this science-in-context is** measured and what kind of criteria should be applied remains subject to debate. (P. 26)
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	Recommendations: • Evidence More research is needed for a better understanding of where the bias comes from. Gender is a deep cultural construct that operates at symbolic and institutional levels, and gender bias may assume different forms in different cultures, which may go unnoticed unless systematically explored. There are fields where women have fared better than in others; this needs systematic investigation. **General recommendation**: Funding of research in some neglected areas, such as differences between <u>disciplines, epistemic cultures, and national and regional contexts.</u> These differences

should be compared and investigated in order to improve our understanding of the gender dimension of science and scientific organisations.

- Awareness

An important first step is to make all scientists, male and female, aware of the extent and the consequences of the problem of gender bias in measuring excellence. In particular, those in charge of screening procedures should be trained to understand gender bias and its consequences, so as to minimise it.

General recommendation: Special training programmes on gender awareness, designed by gender specialists. Development of reading material on gender bias in evaluating research.

- Field boundaries

Particular attention should be paid to the fact that the definition of the boundaries of a field of inquiry and the specific activity profiles of scientific institutions matter when deciding who is excellent.

General recommendation: Much greater recognition of the positive contribution of interdisciplinarity, new research fields and gender studies to scientific excellence. Discuss also the relevance of productivity measures as a primary way of assessing researchers' performances.

- Networks

The issue of networks is strongly linked to the issue of awareness and power. Scientists should be more aware of gendered difficulties in engaging in dialogue and networking with scientists of the other sex. More formal processes and criteria need to be set up to allow more women to pass the 'fuzzy screening' of networks.

General recommendation: gender balance in officially funded networks to be achieved by the imposition of recommended quorums formulated with reference to women's and men's respective presence in the field.

- Procedures

Procedures for assessing excellence are not obvious or natural; there needs to be a critical examination of their interaction with gender.

General recommendation: in order to minimise gender bias, it is of particular importance that screening procedures be made more transparent and evaluations more public. (p. 29-31.)

16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	See item 8.2

Basic information		Document no.: (citavi #)	000
Reviewer's	Fan, Cheng, Fraunhofer ISI		

name	
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2006), Women in science and technology- the business perspective, Luxembourg: Office for Official Publications of the European Communities ISBN 92-79-01722-5 Pages: 148

2. Abstract (copy and paste)	In 2003 the European Commission published The Wake-Up Call for European Industry. In order to realize Europe's ambitions in achieving a competitive knowledge-based society, the number of researchers must be increased. Business is a crucial partner for mobilising talent and women are obviously the source of untapped potential. Increasing the participation of women is fundamental to achieving the European innovation goals. Although the proportion of women reaching top positions in government and business has increased, Europe-based companies still have a long way to go in attracting and retaining female talent. Early in 2005 a group composed of 20 company representatives and 5 experts in economics engineering and social sciences (WiST) worked to make the business case for gender diversity in Science and Technology. This is a set-up either for a rich learning experience or for a "dialogue de sourds" (dialogue between deaf people). In any case it has helped <u>form the judgment on many issues, enlarge the understanding of the issues and better perceive all of its facets, including non-business aspects like socio-economical undercurrents</u>. The aim of the expert group was to analyse the possibilities for <u>the promotion</u> of women in Science and Technology from a business perspective and to develop an integrated approach to the cultural change involved. And most importantly, the group wanted to give new impulses to these ongoing changes. (pp. 3 and 7)

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:	

4. Main perspective	Theoretical, conceptual	☑	Methodological	☑	Policy oriented	☑	Evaluative	☑
(multiple entries possible)	Other	☐	Comment on 4:	An discussion between academia and the business				

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		

Comment on 5:	Report in form of a book

6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national	☐

Comment on 6:	Cases and practices from different countries across Europe.		
7.1 Country focus (if applicable, please specify)			
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)			Comments on 7: The Experts are coming from Germany, Italy, the Netherlands, France, Switzerland, and the UK. The participating companies are: AIRBUS, Air Liquide, BP, EADS, EDF, ENI, European Space Agency, France Telecom, Fraunhofer Gesellschaft, Gaz de France, Hewlett Packard, Infineon, Intel, Schlumberger, Shell, Siemens, Total, XEROX.
Data and indicator availability			
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)
Comment on 8.1	This report presents the <u>findings of the dialogues</u> between the members of the Women in Science and Technology (WiST) group. The WIST group (Women in Science and Technology) was set up as a strong collaboration between almost twenty leading multinational companies and five experts from several disciplines (engineering, cultural change, econometrics, economy and policy) to discuss and study these issues (i.e., a better understanding of the present situation, the reasons why change happens so slowly, and what can be done to speed up the processes of change) and to improve our understanding. This set-up allowed researchers to be confronted with companies' experiences and analysis of good practices; companies to be confronted with scientific analysis of recent developments at the micro and macro levels; the results to be communicated to the public and an open European forum involving top managers of technology-driven companies to be organised. <u>The expert group has met five times to discuss presentations from companies and experts.</u> Pierre Bismuth, HR for Schlumberger, was chair of the group – he invited the companies, encouraged the experts and structured the discussions.		
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	See Experts' papers and studies (pp. 27-81) Methodologies applied are interviews, empirical surveys, workshops (see 11.1)
Comment on 8.2:	The topics are as follows: 27. Dual careers: public policies and companies' strategies 28. Quality Management in Gender and Diversity - The Role of Social Auditing – 29. The Leaky Pipeline: Stories from Throughout Europe		

| | 30. Getting Results With Diversity |
| | 31. Gender Diversity and Performance |

| Guiding questions for review | |
| - please add page numbers where appropriate - | |

| 9. How is RRI characterized? | |
| (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.) | |

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

| 10. Policy context of RRI | |
| (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.) | |

| 10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)? | |
| 10.2 Which approaches, instruments are discussed to | |

facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension

(benefits, costs, disadvantages, trade-offs)

11.1 What claims are being made?	Some questions served as guidance through this process: • Where do companies stand as regards women in S&T and managerial jobs and where do they want to go? • How can change happen at a faster pace and • What measures are effective, what measures are not effective? In answering these questions the expert group came to focus on the following five issues all of which are described in this report: • To identify positive and negative events which milestone a typical woman engineer's career and understand the mechanisms of the resulting leaky pipeline. This project was carried out by Dr Ruth Graham from Imperial College (London, United Kingdom) who interviewed a number of women at different career stages all over Europe. • To investigate work-life balance issues, especially to support dual careers. This project was in the hands of Prof. Daniela Del Boca, Economics, from the University of Turin, Italy. • To highlight the complexity of managing diversity. Prof. Martha Maznevski teaches at IMD (Lausanne, Switzerland), where she conducts workshops with companies on this topic. • To identify instruments for organisational change. Prof. Michel Domsch from Helmut Schmidt University (Hamburg, Germany) introduced a social audit instrument – the Gender Dax – and analysed the process management of ten companies. • To measure diversity effects on individual and collective performance. Dr Laure Turner from ENSEA (Paris, France) conducted this research in close collaboration with four companies. (p. 8)
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	

11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	For human resource management:
	Kochan et al. (2002)20, who investigated the business case for gender diversity, make a very clear statement: companies need to adopt <u>a more analytical approach and produce better HR data to be linked to business performance</u>. This will improve the learning capacity of HR practitioners, so that they themselves can answer the question: under what conditions do gender diverse teams outperform or under-perform other teams?
	Laure Turner, in her paper, expressed a similar need for aggregated data as a business tool, in order to improve the explanatory power of the econometric modelling techniques. Collecting, sharing and using the data will not only improve the general knowledge of what's going on, but also provide an understanding of what is not going on, as regards gender diversity.
Comments on 11.	Conclusion:
	This progress is slow because of a subtle and strong resistance. In many instances, academia in this domain seems far too satisfied with the status quo. Many HR managers would readily admit that they are not really prepared for the surge of dual careers. Top managers are still hesitant to take risk on talented women by accelerating their career or to openly raise the issue as a strategic move for the company.
	The participating companies and experts share the conviction that attracting, developing and employing men and women equally in Science and Technology requires **<u>a significant cultural change</u>**, which is essential for innovation, growth and competitiveness.
	This synthesis reflects the most important insights, presenting pieces of a complicated puzzle. It paints a picture of what has been established, while at the same time mapping the road still ahead of us. Although the issue has been on the agenda for more than a decade, sometimes even causing a kind of fatigue, the problem has not been solved. Across all diversity, the companies share a conviction that something needs to be done in order to speed up change – <u>they take responsibility for future balance in the workforce</u>. (pp. 4 and 8)
	Findings regarding the 5 issues mentioned in 11.1
	1. Regarding mechanisms of the resulting in leaky pipeline:
	• The positive statement is that S&T talent is not an innate quality of men and women – it's mostly culture (e.g. self-image: women=emotional, people-oriented vs. S&T=logical, rational machine-oriented) and therefore open to change. The negative statement, however, is that culture hasn't changed much over the years.
	• On the basis of these empirical investigations, it might conclude that the gender difference is partly reality and partly perception but always contextual. Emphasizing differences isolates women and freezes their identity.
	• According to Graham the 'women-only' events are very important for many girls and women in order to feel comfortable in a primarily technology-driven situation, mostly dominated by men.
	• it is important to understand not only why women leave

	S&T, but also why women find other functions or sectors more attractive: both financially – the gender wage gap is largest in male dominated occupations – and in terms of decision-making.
	▪ This means that not always the best will survive the pipeline to senior positions in the business sector. Apart from all the effects this has on individual lives, <u>the social, cultural and financial costs are easily underestimated</u>. The group saw this as <u>a collective failure.</u> Acknowledging this discrepancy between lived experience and organisational discourse on gender equality is a first step in framing the real issue – which is about changing organisational practice and its core value system. (pp. 9-13)
	2. Regarding work-life balance issues:
	• The import issues
	• Companies have to perform better in supporting dual careers.
	• Companies need to take some calculated risks with the best performing women to give them the chance to catch up with the gap.
	• Companies need to pay particular attention to dual career men and women in the early 30s as they then experience the maximum pressure of work/life balance.
	• Companies are – apart from being producers of commodities and services– also social institutions producing time structures (reason: Time sovereignty and flexibility seem to be crucial. When workers feel supported and able to control the amount and conditions of their work, their perception of conflict between work and family diminishes (Gerson and Jacobs), social networks and meaningful relationships. Companies do not sufficiently acknowledge their societal roles.
	3. Regarding organisational change:
	• The expert group identified process management as an important factor affecting the slow progress towards gender diversity. Many reports and conferences express commitment, but this does not always imply major efforts and implemented policies. As Michel Domsch states in his paper, there is a lack of management commitment to sustainable and significant change, in which planning, decision-making, implementation and evaluation follow the ordinary process cycle.
	• Domsch introduced a social audit instrument – the Gender Dax. The Gender Dax is one example that measures not only numbers, but also processes, planning and available tools. Audits and self-assessment are regularly used tools, but organising feedback from gender action plans is rather seldom within these companies. Setting more transparent goals and using instruments and concrete measures would contribute to the quality of process management. Accountability is a driving force behind many business processes, as is managing diversity.
	• One of the powerful strategies is to connect gender

diversity closely to the strategy of the company. Only a few of the participating companies explicitly link participation of women to their core business strategy and the content of the business. One of them is a strong advocate of gender mainstreaming. This means that gender diversity is no longer an isolated target, but an integrated aspect at all levels of the company (an integrated approach).

4. Regarding the complexity of managing diversity:

- Firstly, there is the question of whether firms managed by a gender-balanced top team perform better than firms led by men only (what is the specific contribution of female leadership styles?)

- The study found that if there is a positive relationship, this is due to board diversity affecting firm performance and not the opposite. From this point of view, we can conclude that there is a business case on gender composition of the top levels of the companies, especially related to well-educated women. More turns out to be better.

- Secondly, there is a general question of whether heterogeneous teams outperform homogeneous teams. The empirical literature does not support the simple notion that diverse groups perform better; on the contrary, if not managed, diversity is likely to have a negative effect, leading to conflict and turnover (see also Martha Maznevski's report in this document). The positive effect is that gender-balanced groups have more constructive interaction than either predominantly male or female groups (p.29).

- Thirdly, is there a positive performance effect of engaging more women in traditionally male dominated forms, teams and units, such as S&T?

- This last conclusion was supported by the results from Laure Turner's investigation of team performance in four participating companies (Turner, this volume). She found that the individual performance was highest in teams that were gender balanced (those which were 33-66% women) followed by predominantly male teams and finally the predominantly female teams. However, only the increase in women's individual performance proved to be significant. Hard evidence of the positive impact on collective performance was difficult to obtain due to the low number of investigated cases (69 teams), but the data indicate a positive effect of gender diversity.

- The challenge of managing diversity: In order to make diversity productive, major investments in quality of management have to be realised by focusing on similarities and differences. Maznevski has introduced the MBI approach: Map, Bridge and Integrate differences.

- Diversity management is about valuing difference and trust. The key is inclusiveness. The study showed that diversity tends to have a negative effect on performance if there is a low level of inclusiveness – the extent to which the members of a group feel connected to each other in one team – and a positive effect if there is a high level of inclusiveness. In other words, inclusiveness is the determining factor for the effect of diversity on process

	indicators – such as learning, participation, and communication – and performance indicators. But this is never easy: Diversity doesn't happen by accident!
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	Recommendations: What is lacking in many respects is a sense of urgency. • To repair the "leaking pipe line" which loses sometimes as many as 2/3 of female students with a good track record and strong interest in math and physics between high school and college. • To provide solutions for dual career couples and single parents and respect their basic need for work-life balance by combining the efforts of the business community and society at large. • To manage this cultural change with the same holistic approach as the one followed for example in the search for

	quality.
	• To develop in managers the ability to optimize the efficiency of a diverse group.
	• Finally to measure this efficiency and objectively observe the business impact of gender diversity as it is being deployed.
	Ensuring that company culture is in tune with the evolving needs of our times is vital, and our delay in addressing this issue is not a good sign. This issue may not be an obvious one but it has deep economic and social implications. The companies in this group which are ahead and enjoy the most balanced gender diversity are struggling to sustain their level of diversity because of the limited reservoir of women graduating in technical disciplines from universities. The companies at intermediate level see the risk of a plateau. Finally, the ones that are merely beginning are meeting the strongest internal resistance.
	By working together as a group, we are showing young graduates our commitment to making the technical and scientific business world a much less discriminatory work environment, as quickly as possible. (p. 4)
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	See item 8.2

Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2009), The Gender Challenge in Research Funding - Assessing the European national Scenes, Luxembourg: Publications Office of the European Union ISBN 978-92-79-10599-9 doi 10.2777/36195 pages: 86		
2. Abstract (copy and paste)	In all European countries and beyond, women are having difficulties getting ahead in research careers. Women are heavily underrepresented in research decision-making in Europe, and thus have fewer opportunities to influence the research agenda. Since access to resources is a major key to success, this report focuses on research funding across Europe, mainly but not exclusively from a gender perspective. It is the result of the work of a EU expert group set up by the European Commission to provide recommendations 'on the improvement of transparency and accountability of procedures used in selection committees for grants and fellowship awards and of access to research funding in general'. The report analyses the gender dynamics among applicants, recipients and gatekeepers of research funding, in funding processes, instruments and criteria, and the role of key funding organizations in promoting gender equality in research. The focus of the expert group included national grant awarding procedures		

and accessibility of gendered data on success rates, amounts awarded and peers taking part in the decision-making and evaluation processes, distinguishing according to disciplinary fields. It centred on the funding of academic and basic research, on key public funding organisations in each country, and on competitive project funding and individual grants. Private funding organisations and charities, and bulk funding for institutions were not included.

This report should be seen as a systematic effort to map the European research funding landscape from a gender perspective and highlight key issues and needs for future action and research. (P.5)

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:								

4. Main perspective	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
(multiple entries possible)	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:	Report in form of a book							

6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national	☐
Comment on 6:	The expert group has collected data on 33 countries, the 27 member states and 6 associated countries (Croatia, Iceland, Israel, Norway, Switzerland and Turkey).							

7.1 Country focus (if applicable, please specify)	
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)	Comments on 7: The Expert Group: Suzanne DE CHEVEIGNÉ, *France* Liisa HUSU, *Finland;* *Louise ACKERS, UK* Jana BLAHOVA, *Slovakia* Maija BUNDULE*, Latvia* Thomas HINZ*, Germany* María Jesús IZQUIERDO, *Spain* Carl JACOBSSON, Sweden Petr PAVLIK, Czech Republic

				Rossella PALOMBA*, Italy*
				Maaike J. ROMIJN, *Netherlands*
				Christian SUTER*, Switzerland*
				Hans Kristján GUÐMUNDSSON*, Iceland*
				Renata SIEMIEN´SKA*, Polan*
				Clementina TIMUS, *Romania*
				Nikolina SRETENOVA *Bulgaria*
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	Publicly available data were collected from websites, publications of the funding organisations and other stakeholder organisations, and from relevant research. When data were not publicly available, they were requested from the funding organisations. Other national experts were consulted, in order to complement and assure quality of the data obtained.

An overview of the national situations in terms of research landscape and gender settings is annexed to the report.

The full national reports have been posted on the Science in Society web portal so that the work put into this analysis is made available to all interested parties for both policy-making and further study.

Political measures:

A number of innovative national policies which affect research funding were noted, such as gender balance targets (for example, in Slovenia or Switzerland) and legislation on gender quota of up to 40 % of the minority gender in committees (in Finland, Norway and Iceland). In a number of countries, integrated policies increase university funding based on their performance in terms of gender equity (for example, Germany, Netherlands, Ireland). Some have also set up specific national gender quality structures |

| | | | | with strong prerogatives, which actively support their policies.

Several national research councils strongly and actively promote gender equality in research funding. These include the Austrian Science Fund FWF, the Academy of Finland, the German Research Foundation DFG, Science Foundation Ireland, the Netherlands Research Council NWO, the Norwegian Research Council, the Swedish Research Council, the Swiss National Science Foundation SNSF and the UK Research Councils. Many of these have established permanent infrastructures to monitor and promote gender equality in research, launched ambitious GEAPs, set up specific measures to promote women in research and conducted or are planning in-depth studies and monitoring activities on gender and research funding. Policy improvement can also be boosted by active engagement of the scientific community. An example of a bottom-up action is the Czech Republic National Contact Centre on Women and Science, which has succeeded in having funding mechanisms improved. A number of actions specifically targeted at women, to promote gender equality, are implemented by many funding organizations. They range from actively encouraging women to apply, or setting targets for proportions of women funded, to specific programmes for women, supporting them at the start of their career, aiding them to return to research after a career break or providing additional assistance for mobility. Various measures facilitating work-life balance in research for both women and men have been built into some funding schemes.

Gate-keeps: Detailed gendered data have been provided on gatekeepers in many of the countries under consideration.

Success rate: Success rates by gender and discipline, concerning |

				the main funding organisation(s) and general research project funding were obtained from 27 ofthe 33 countries under consideration, generally for 2007.
Comment on 8.1	This group of 16 experts has provided contributions to this report by gathering the necessary national data to the 7th Framework Programme for Research and Technological Development. The expert core group consisted of twelve experts who provided data and analysis of the national contexts. Each expert examined several countries, to ensure that all were covered. In addition, four experts were invited on a shorter basis. The experts came from the European Union or European Economic Area and brought a wide and high-level expertise from various disciplines and countries, as members of national funding committees, administrators of funding organisations, or academics with research experience on the area.			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	The division between the proactive and the relatively inactive countries appears to follow rather well the **global gender gap rankings of the World Economic Forum**, with most proactive countries having relatively small societal gender gaps, and most relatively inactive ones larger societal gender gaps.
Comment on 8.2:	proactive countries, which promote and monitor gender equality in research and research funding with active policies and measures, and countries relatively inactive in this area, with few, if any, initiatives. (pp. 5-6)			
Guiding questions for review - please add page numbers where appropriate -				
9. How is RRI characterized? (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)				
9.1 Which definition of RRI is being used? (author's definition or reference to other source)				
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)				
9.2 Which arguments are presented in support or rejection/criticism of RRI?				
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature				

relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI

(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension

(benefits, costs, disadvantages, trade-offs)

11.1 What claims are being made?	The balanced representation of women and men in science has been part of a strategic approach to bring forward equal opportunities in the field of scientific research, enhance European competitiveness, and to realise fully the European innovation potential. Clear progress has been made in the last 10 years with the European Commission playing a key role by providing much needed impetus. Equally crucial is the objective of mainstreaming gender in scientific research. The scientific job market should include more women at all levels of seniority. Female researchers, scientists and professors should be able to participate fully in the production of knowledge and research. (p. 4)
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the	This European level synthesis highlights the existence of very

author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	good practices in the field of transparency and accountability of research funding systems which could be applied in other settings. However, data monitoring is not systematic, and publication of research funding results per gender per discipline is far from perfect. • Data are missing from French-speaking Belgium, Croatia, Cyprus, the Czech Republic, Greece, and Hungary. • From Israel only data from 2000 were available, and data were only obtained from one UK Research Council. • From Austria and Luxembourg, data by discipline were not obtained. • No very systematic patterns appear in the data obtained. • Another dimension of success in funding is the amount of funding obtained, for which success rates were obtained for only a few countries. Better monitoring is clearly needed here. • Some very partial data were obtained on post-doctoral fellowships. Although no particular problems were noted, previous research has flagged up strong gender differences at this stage. This question needs clarification. (pp. 5-7)

Comments on 11.	Findings:
	
	 1. Success rates: the expert group has not found a large and systematic gender imbalance in terms of success rates in research funding in the funding systems studied, although a few exceptions exist.
	
	      b. No clear relation could be observed between the proportion of women in a field and their chances of success in obtaining funding. For instance, in some funding chemes and organisations women had higher success rates than men in engineering and technology or in natural sciences, the most male-dominated fields across Europe, and in others lower. Nor was any large and universal imbalance observed in favour of men.
	
	      c. Some cases of imbalance can be observed, with various degrees of statistical significance. In a number of cases, on the contrary, women have significantly higher success rates than men. An example is the Dutch NWO, where, because of low representation of women in research, particular attention is paid to the quality of evaluation, and where promotion of women in research is an important policy goal.
	
	      d. Various 'excellence initiatives' aimed at rewarding the very best researchers and including substantial amounts of research funding were also examined. These instruments generally showed particularly strong gender imbalance. This was also the case with the European Research Council Starting Grants.

	2. However, there is a clear difference in <u>application behavior</u>: women are less likely to apply for funding than men and they request smaller amounts of money. Again, further research is needed to explore this phenomenon, to understand the dynamics and reasons behind it, and to elaborate counter-strategies.
	3. <u>Decision-makers and Gate-keepers are men</u>: In most of them, decision-making and other gatekeeping activities in research funding, including peer review, continue to be dominated by men, in some cases overwhelmingly so. All-male committees and evaluation panels still exist in many countries, even in those where the proportion of women in research is relatively high. The recruitment procedures, in particular for peer reviewers, whose choice may be crucial, are often not clear.
	4. <u>Eligibility</u> rules for applying for funding concern age or academic age, degrees completed, place of residence or citizenship, and present position. Age limits are in many cases increased – by up to three years – if the applicants have children. Rules requiring that applicants have a permanent position and forbidding them to fund themselves within their project are particularly penalizing for women.
	5. The existence of an efficient system for monitoring the outcomes of research funding is an essential element of transparency. (pp. 5-7)

12. Key dimensions of RRI
(For literature dealing with one or more of the 5 key dimensions.)

12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	**Gatekeepers**: members of national science and technology councils, funding organisation directors, managers, board members and staff members, members of evaluation committees and panels, and external reviewers.
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	

Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	Recommendations:
	The Gender and Excellence expert group was set up to provide recommendations on the improvement of transparency in the procedures used in selection committees for the award of grants and fellowships and in access to research funding in general.
	32. Taking the gender challenge seriously, backing specific actions, supporting structures to monitor gender equality, and encouraging research on this area, all with strong political will. The denial of or lack of interest in gender equality appeared to be one of the main sources of imbalance in a large number of European countries.
	33. Increasing applications from women researchers. This implies encouraging and training women to apply and to request more funding. Measures for better work-life balance are essential.
	34. Improving gender balance among the gatekeepers of research funding, including committee or panel members and reviewers, and organising gender training, for all involved in the funding process. Allowing women more equal access to the inner mechanisms of research funding could also have major impact on improving their application rates. (It provides women researchers more opportunities to learn how the funding and evaluation system works and to become integrated into important networks, and allows them a valuable overview of current frontline research.)
	35. Gender monitoring and publishing of funding statistics on a regular basis, differentiated by discipline and research instrument. In-depth monitoring exercises, both quantitative and qualitative, should be carried out and should include an analysis of the pool of potential applicants, the study of team composition in proposals and generally of the gender impact of funding actions.
	36. Generally improving accountability and transparency in research funding, publishing procedures and criteria, using international evaluators, effectively avoiding conflicts of interest, providing feedback and instituting grievance procedures. (p. 7)
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important	

contributions in the field)	

Basic information					Document no.: (citavi #)		000
Reviewer's name	Fan, Cheng, Fraunhofer ISI						
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2009b), Women in science and technology - Creating sustainable careers, Luxembourg: Office for Official Publications of the European Communities ISBN 978-92-79-11150-1 DOI 10.2777/57428 Pages: 132						
2. Abstract (copy and paste)	The European Commission decided to continue the WiST initiative (2006) for two more years due to the interest expressed by the participating companies. The WiST2 working group was thus established, giving more companies the opportunity to join the group, and at the same time expanding its scope to universities (4). The objectives of the second WiST working group were: • Reducing the leaky pipeline for women in science and technology; • Building the business case for work-life balance. And finally the working group aimed to develop recommendations for: • Changing corporate culture to embed best practices for achieving work-life balance; • Promoting and improving the implementation and utilization of best practices. (p. 7)						

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:								

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:		The focus of discussion lies in "leaky pipeline" and "work-life-balance".			

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:	Report in form of a book							

6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national	☐
Comment on 6:	Cases and practices from different countries across Europe.							

7.1 Country	

focus (if applicable, please specify)				
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)				Comments on 7: The Experts are coming from Germany, France, Austria and the UK.
Data and indicator availability				
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	6 experts' reports. pp. 14-82.
Comment on 8.1	Seven international experts were invited to address one or more of the issues above, by inviting the participation of companies and universities from the WiST2 group for data collection.			

Comment on 8.1 (continued):

Many of the organisations participating in WiST2, slowly but surely, provided access to employee samples for data collection, as well as other sources including performance information and communication materials.

The 6 experts' reports represent an intriguing, multi-method, multidisciplinary, cross-culturally comparative collection of insights into the working lives of women (and men) in S&T.

The topics of 6 experts' reports are:

37. Driving Attraction and Commitment with a Work-Life Proposition: Special Focus on Science and Technology Employees (Corporate Leadership Council, CLC): The Council surveyed more than 50 000 employees from 35 different organizations across 20 industries. The majority of data presented in this study was collected using an existing employee survey instrument, The Corporate Leadership Council's Employment Value Proposition (EVP) Survey, which was first used in 2006.

38. Work-life balance and performance (Laure Turner): This study draws on three sets of data: data on employees' answers to the CLC Survey, data on individual performance, and data on industrial project performance and work-life balance in teams.

39. Flexible working policies, gender and culture change (Suzan Lewis): The study adopted a research strategy based on the initial phases of Collaborative Interactive Action Research (CIAR) (Rapoport et al, 2002). CIAR is a process of mutual enquiry that yields new ways of thinking about issues within organisations. This involves a number of stages: establishing case study organisations; establishing collaboration within the companies and a work unit to participate in the research; data gathering and analysis; reflection on the analysis.

40. "It's not the break that's the problem": women SET professionals and career breaks in European companies (Clem Herman): This research into the impact of career breaks on progression of women in SET is based on 28 qualitative interviews with women professional engineers, scientists and technologists.

41. Analysing the Leaky Pipeline in Academia (Sara Connolly and Stefan Fuchs): the approach in this study is quantitative, an online survey based

	on the Athena Survey of Science Engineering and Technology (ASSET) surveys – which were run in the UK in 2003, 2004 and 2006.		
	42. Challenging Cultures of Engineering – How words, concepts, and images (de)construct engineering as a male domain (Christine Wächter): In this study, by means of document and media analysis, a) Websites and b) print material (job advertisements, PowerPoint presentations, folders, brochures, flyers, posters, company magazines, calendars, internal magazines, annual reports, sustainability reports) used in several organisations to address scientists/engineers were analysed.		
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)
Comment on 8.2:			

Guiding questions for review
- please add page numbers where appropriate -
9. How is RRI characterized?
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI
(For literature dealing explicitly with responsible (research) and innovation. If the publication

deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	
11. Claims regarding the effects of RRI and / or the key dimension (benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	The working group focused on the following issues: • What can be done by universities and companies to reduce the leaky pipeline? • Which policies and practices are effective in promoting gender diversity in science disciplines and in technical careers? • Which policies and practices are effective in promoting work-life balance, especially for dual career couples? • How do prevalent work-life practices relate to individual and organisational performance? • How do work-life balance policies and practices affect the attraction and retention of talented employees? • Is supporting employees' work-life balance a smart business strategy? • What are best practices for achieving work-life balance and addressing the leaky pipeline? • What is the relationship between such best practices and workplace culture? (p. 7) Besides, the experts tried to figure out the impact of work-life policy: • How such initiatives relate to business performance (Kelly et al., 2008), • How the utilization of such arrangements affects individual career and family outcomes (van Engen, Vinkenburg, & Dikkers, 2009). (p. 8)
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the	

claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	Conclusion: 1. Contemporary and future employees value **work-life balance**, and are expected to continue to do so in the future. Especially for <u>dual career couples </u>with young children, **flexibility (in terms of timing and location of work)** and an appropriate **workload** are in high demand. 2. Offering work-life balance practices is not enough – the **organisational culture** (as evidenced in the communication about these practices, but especially **in terms of the behavior of supervisors and peers**) must be truly supportive of the utilization of these policies. If the message is negative ("you will have to work extremely long hours and put in face-time in order to get promoted"), or mixed ("of course you can work from home, as long as I can expect you to come in at short notice"), many will not utilize what is on offer, and those who do, are likely to fear the consequences. 3. Central to organisational cultures in relation to gender diversity and WLB practices are our (often implicit, mostly incompatible) notions of the "**ideal worker" and the "ideal mother**". These normative beliefs are heavily influenced by cross-culturally similar gender stereotypes and relate to the "separate spheres" of home (i.e. care, children) and work (i.e. career). While many of us consider such norms extremely resistant to change, <u>the good news is these spheres in reality increasingly overlap and are no longer defined by one gender.</u> Finally, Research in fact shows that<u> ideology will follow policy </u>(Sjöberg, 2004): in countries that implemented family policies towards the support of a dual-earner family, normative beliefs progressively shift away from traditional roles. (pp. 9 and 10) Findings regarding the 6 exports' reports mentioned in 8.1 1. Report of CLC: Flexible work schedules together with an appropriate workload tend to play a key role in determining employees' attraction and commitment. 2. Report of Turner: HR and line managers should try to prevent "frustrated" high potentials from dropping out, and "unbalanced" high performers from burning out. Furthermore, HR may need to screen the performance

	review system, as it may (implicitly) penalize those who use work-life practices to achieve balance.
	3. Report of Lewis: for implementing change and improving efficiency, such as reducing the length of meetings and moving meetings to an earlier hour, from which everyone, not only parents, will benefit.
	4. Report of Herman: Work life balance policies (including parental leave, flexible working and reduced working hours) can have the unintended consequence of reinforcing gender stereotyping within the workplace if it is only mothers/female careers who make use of these and not fathers or male careers.
	5. Report of Connolly & Fuchs: possible routes for universities in reducing the leaky pipeline for women in academia in general and S&T in particular: by offering tenure tracks with the possibility to "stop the clock" during maternity or parental leave, by enhancing flexibility and emphasizing alternatives to the "long hours culture", and by making performance appraisal and promotion systems more transparent and standardized.
	6. Report of Wächter: Many of these images essentially reflect and thus reproduce asymmetry, exclusion, numerical underrepresentation, and gender stereotypes, by showing women as support staff and men as engineers in the field, and by relating work-family issues only to women. (pp. 8-9)
12. Key dimensions of RRI	
(For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	

Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	Dissemination actions: In order to make sure that this communication between S&T companies, universities, experts, and the EU DG Research will continue beyond WiST2, we will look for innovative ways such as an on-line community or network of practitioners in order to provide a platform for and support communication between parties involved in WiST2. By these means, we can help create sustainability in combining career and care, which is of critical importance to HR and diversity practice in S&T companies.
15. General comments and remarks	Recommendations: 43. S&T companies need to keep on creating, promoting, and supporting **custom-made WLB practices** that fit the individual's needs and preferences, that match the strategic HR agenda of the organisation, and that are aligned with the national context in terms of legislation. 44. Employers can project their vision of the "ideal" diverse and inclusive organisation by paying extra attention to the **images and language** on their website and in corporate brochures. 45. Employers can protect their high performers and high potentials from **burning out** and/or eventually **opting out** by re-examining the nature of the performance appraisal process and making sure the utilization of WLB practices is not penalized unnecessarily or disproportionally. 46. Employers can better **manage transitions** ("off- and onramps") for those who take career breaks, and make sure that career trajectories take such career breaks or reduced hours into account. Well-managed, **career breaks can bolster loyalty and performance**; if not, they can be demoralizing, demobilizing, and demotivating. 47. **Efficiency** can be rewarded and improved in many ways, by rescheduling and shortening meetings, and by focusing on output rather than long hours made for the sake of long hours, from which not only the WLB of parents will benefit. (p. 10)
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	

Basic information		Document no.:	000

			(citavi #)	

Reviewer's name	Fan, Cheng, Fraunhofer ISI							
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2012), Structural change in research institutions: Enhancing excellence, gender equality and efficiency in research and innovation, Luxembourg: Publications Office of the European Union ISBN 978-92-79-32682-0 doi 10.2777/32045 pages: 45							
2. Abstract (copy and paste)	Boosting innovation in the EU means increasing the number of researchers in Europe by at least one million if the EU is to remain competitive and build on its strengths. To make sure that people starting research careers find it attractive to stay in science is necessary. This is especially true for women: while 45% of doctorates are awarded to female students, only 30% of active researchers and 18% of full professors are women. A group of high level experts has been brought together in order to investigate the reasons behind existing trends. This is their report. The experts have reviewed a large body of evidence, have identified where the problems lie, and have clearly formulated the conditions needed to remedy a waste of talent which has already lasted too long. The report argues that gender-aware management of universities and research organisations would have a positive impact on policies and practices in the recruitment, promotion and retention of both women and men, thus ultimately benefiting the very quality of research. There is no trade-off to look for between promoting gender equality and excellence in research. Instead there is a win-win situation for all researchers, their institutions, and for Europe. The report rightly stresses that progress in integrating gender in research and innovation relies on firm and sustained top-level commitment. Based on recent scientific findings and research practices, this report analyses the progress made so far in legislation, participation and policy, describes the problems remaining for research institutions in Europe and stresses the role that EU policy-makers, science institutions and gatekeepers of excellence must play in order to advance gender equality in research and innovation (P.5)							

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:								

4. Main perspective	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
(multiple entries possible)	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		

Comment on 5:	Report in form of a book						
6. System level (if applicable)	Global	☑	European	☑	National	☐	Sub-national	☐
Comment on 6:	Investigation in Europe, the USA and Japan amongst others.						
7.1 Country focus (if applicable, please specify)							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)				Comments on 7: The Expert Group on Structural Change consisted of 8 members: Ines Sanchez de Madariaga (Chair): Spain Tiia Raudma (Rapporteur): Estonia Thomas Eichenberger: Switzerland Alice Hogan: USA Elizabeth Pollitzer: UK Teresa Rees: UK Martina Schraudner: Germany Sophie Sergent: France			
Data and indicator availability							
8.1 Data, indicators, measurements	Document contains data	☐	If yes, please specify (including page numbers in document)				
Comment on 8.1	The report is based on Literature review and case studies (good practices)						
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	e.g. ADVANCE Programme (Increasing the Participation and Advancement of Women in Academic Science and Engineering careers), USA			
Comment on 8.2:	For example: National Science Foundation, USA • 10 million USD per year for new projects, 2001 – present • Goal to develop systemic approaches to increase the representation and advancement of women in academic science, technology, engineering and mathematics (STEM) careers, thereby contributing to the development of a more diverse science and engineering workforce • Extensive resource base for structural change http://www.portal.advance.vt.edu p. 31						

Guiding questions for review - please add page numbers where appropriate –	
9. How is RRI characterized? (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	
10. Policy context of RRI (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension (benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	The key role given to research and innovation in striving towards a smart, sustainable and inclusive growth in Europe means that the EU should make full use of its human capital – thereby involving both men and women. (p. 6) Cost of no action: There are four consequences that are of concern: 48. Danger of flawed research or diminished relevance of results 49. Missing innovation and market opportunities 50. Unfulfilled use of human capital (women scientists) in a competitive global R&I economy 51. Increased societal distrust of, and reduced support for, science and its institutions Securing the supply of scientific expertise in Europe is a challenge for the European Research Area. Current practices – such as neglecting the development of transferable skills of European R&I human resources capacity or not fully utilizing the trained talent already available (in particular, women) – are not sustainable in the longer term, and will threaten European competitiveness internationally. Inaction will lead to a loss of highly educated and trained women scientists who may choose other careers or move to other global regions. It will also force an even greater rate of transfer of industrial R&I functions from Europe to regions where there are readymade markets and talent pools. (p. 15)
11.2 Which arguments are used to support the claim(s)?	Evidence shows that research performance is limited by the perpetuation of direct and indirect sex discrimination and that promoting gender equality at all levels contributes to achieving excellence and efficiency. Evidence suggest that women and men would both benefit from a system where there is clarity of what is required from researchers, information is freely available, and clear criteria are used in decision making. (p. 6)
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	Problems in the process of improving "gender equality" were identified by the study:

52. Insufficiency if the focus was merely at program level: at the beginning, the focus was initially on specific programmes to help women pursue scientific careers. However, those programmes have proved to be insufficient to increase the number of women in science, particularly in positions of responsibility, and have not helped to address the structural barriers contributing to the well known leaky pipeline phenomenon.

53. A shift in focus towards addressing the structural transformation of institutions: a systemic, comprehensive and sustainable approach was applied. The US has led the way with the **ADVANCE programme**, funded by the National Science Foundation. Some initiatives have also been taken in Europe, but the scale of these needs to be increased.

54. In the EU, the progress made so far in legislation, participation and policy, describes the problems remaining for research institutions in Europe and stresses the role that EU policy-makers, science institutions and gatekeepers of excellence must play in order to advance gender equality in research and innovation.

55. Five main problems faced by research institutions are identified:

   e. **Opaqueness in decision-making**: lack of transparency continues to affect structures and processes, with the associated phenomenon of "old boys" networks and patronage

   f. **Institutional practices** which, while appearing to be neutral, do have negative effects on the career opportunities of women. Cognitive errors in assessing merit, suitability for leadership, or evaluation of performance are embedded in institutional practices, often despite good intentions and a commitment to fairness.

   g. Considerable effect of **unconscious gender bias** in what is the hallmark of science: the assessment of excellence and particularly the process of peer review. The practice of evaluating excellence often conceals gender bias.

   h. Gender inequality generates **wasted opportunities and cognitive errors** in knowledge, technology and innovation.

   i. statistics show that EU Member States still have a gender pay gap, and gender continues to be **a structuring factor in the workplace, also in research**: Work is organized in gendered ways, which makes it difficult for talented women to reconcile work and family; harassment, concentration of power, and the guru/acolytes model of power relations are also factors affecting women negatively.

12. Key dimensions of RRI	
(For literature dealing with one or more of the 5 key dimensions.)	

12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	**Equal opportunity** indicates the absence of barriers to economic, political and social participation on the grounds of sex. Such barriers are often indirect, difficult to discern and caused by structural phenomena and social representations that have proved particularly resistant to change. Equal opportunities, which is founded on the rationale that a whole range of actions are necessary to redress deep-seated sex and gender-based inequities, should be distinguished from equal treatment, which merely implies avoiding direct discrimination. In **gender-sensitive research**, gender is consistently taken into account throughout the research cycle **Gender-specific research** focuses on gender itself as a subject matter **Gender-blind research** does not take gender into account, being based on the often incorrect assumption that possible differences between men and women are not relevant for the research at hand **Gender bias** is the often unintentional and implicit differentiation between men and women by placing one gender in a hierarchical position relative to the other in a certain context, as a result of stereotypical images of masculinity and femininity. It influences both the participation of men and women in research (hence the underrepresentation of women) and the validity of research. An example of gender bias in research is research that focuses on the experience and point of view of either men or women, while presenting the results as universally valid. **Gender audits** are evaluations that monitor and evaluate the implementation of gender issues into procedures. Unlike regular audits, they are based on <u>self-assessments of how gender issues are addressed in internal organizational processes, and not on external evaluation</u>. **Gender impact assessments** provide help for policymakers in incorporating a gender perspective into policies that take account of the different needs, characteristics and behaviours of the users at whom they are aimed. **Gender proofing** is a check carried out on a policy proposal to ensure that any potential gender discriminatory effects arising from that policy have been avoided and that gender equality is promoted. (p. 8)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or	

make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	**Suggestions** of the study: structural change in science institutions as the means to address each of these five sets of problems, so that decision making is more transparent, unconscious bias is removed from institutional practices, human resources management is modernized, excellence is promoted through diversity, and research and innovation are improved by the integration of a gender perspective. In addition, it signals three essential elements which should be considered as a **prerequisite** by all organizations undertaking structural change: <u>knowing the institution</u>, by developing statistics and indicators, so that the situation of each institution becomes widely known and acknowledged; <u>getting top level support from persons in positions of responsibility</u>; <u>generating effective management practices, by ensuring gender expertise and by raising awareness.</u> While a lead is required from the EU and its Member States, a wider range of actors also need to play an active role in modernizing the way in which R&I is conducted in Europe. Some of the most successful innovators are paving the way but others are still lagging behind. **Universities and research institutions, funding bodies and some learned societies** still operate with the stereotypical gender regime of a full time breadwinning man and a female second earner. This report also proposes key recommendations to help different types of actors to improve their performance. In Annex is gender equality strategy attached: Key steps for actors at EU, national and local level.
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	

Basic information		Document no.: (citavi #)	000
Reviewer's	Fan, Cheng, Fraunhofer ISI		

name	

1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	European Commission (2013), Gendered Innovations. How Gender Analysis Contributes to Research, Luxembourg: Publications Office of the European Union 137 pages ISBN 978-92-79-25982-1 doi:10.2777/11868
2. Abstract (copy and paste)	The **goal** of the Expert Group was twofold: to provide scientists and engineers with practical methods for sex and gender analysis, and to develop case studies as concrete illustrations of how sex and gender analysis leads to new ideas and excellence in research. To match the global reach of science and technology, the case studies and methods of sex and gender analysis were developed through European and international collaborations. These fields reflect priorities set in the new European Framework Programme Horizon 2020 that will cover the period 2014-2020. What is Gendered Innovations? Thirty years of research have revealed that sex and gender bias is socially harmful and expensive. Gender bias also leads to missed market opportunities. In engineering, for example, assuming a male default can produce errors in machine translation. In basic research, failing to use appropriate samples of male and female cells, tissues, and animals yields faulty results. In medicine, not recognizing osteoporosis as a male disease delays diagnosis and treatment in men. In city planning, not collecting data on caregiving work leads to inefficient transportation systems. It is crucially important to identify gender bias and understand how it operates in science and technology. But analysis cannot stop there. Gendered Innovations offer sophisticated methods of sex and gender analysis to scientists and engineers. Integrating these methods into basic and applied research produces excellence in science, health & medicine, and engineering research, policy, and practice. Gendered Innovations: Add value to research and engineering by ensuring excellence and quality in outcomes and enhancing sustainability. Add value to society by making research more responsive to social needs. Add value to business by developing new ideas, patents, and technology. (P. 7)

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:	Research and Innovation through consideration of gender bias

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☑	Methodological	☑	Policy oriented	☑	Evaluative	☐
	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		

Comment on 5:	This report was published in form of a book.						
6. System level (if applicable)	Global	☑	European	☑	National	☐	Sub-national ☐
Comment on 6:	Collaboration between EU, USA and Canada under FP 7 SiS programme						
7.1 Country focus (if applicable, please specify)							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)				Comments on 7:			

Data and indicator availability				
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	The whole report shows the results of case studies. The results of case studies serve as the concrete illustrations of how sex and gender analysis leads to new ideas and excellence in research.
Comment on 8.1				
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				

Guiding questions for review
- please add page numbers where appropriate –
9. How is RRI characterized?
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals,	

procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension (benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	Thirty years of research have revealed that sex and gender bias is socially harmful and expensive. Gender bias also leads to missed market opportunities. In engineering, for example, assuming a male default can produce errors in machine translation. In basic research, failing to use appropriate samples of male and female cells, tissues, and animals yields faulty results. In city planning, not collecting data on care giving work leads to inefficient transportation systems. (P.8)
11.2 Which arguments are	As the case studies developed in the Gendered Innovations

used to support the claim(s)?	project demonstrate, integrating sex and gender analysis into research sparks creativity by offering new perspectives, posing new questions, and opening new areas to research. Sex and gender analysis enhances excellence in research. It adds value to society and business by making research responsive to a broad and diverse user base. Integrating the gender dimension into the concept of the Innovation Union will help to create more inclusive innovation processes. (P. 41)
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	Experts met in a series of peer-reviewed, interdisciplinary workshops, representing a unique collaboration between gender experts and experts in each technical field treated. Seven workshops were held. Support was also provided to some of the US experts by the US National Science Foundation in 2012. 8 full Case studies (Animal Research, Stem Cells, Human Thorax Model, Video Games, Climate Change, Nutrigenomics, Osteoporosis Research in Men, Public Transportation)were selected through the advice of the Expert Group and through collaborations with the EU FP7 project coordinators. (P. 7)
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	**Sex** refers to biological qualities characteristic of women [females] and men [males] in terms of reproductive organs and functions based on chromosomal complement and physiology.sex is globally understood as the classification of living things as male and female, and intersexed. **Gender**—a socio-cultural process—refers to cultural and social attitudes that together shape and sanction "feminine" and "masculine" behaviours, products, technologies, environments, and knowledge. **Gender analysis** is presented in twelve methods in this project. Researchers may analyze sex or analyze gender. Gender analysis is the umbrella term for the entire process. Researchers will consider each of the twelve methods and choose the interacting methods that apply to their particular project. **Innovation** in this project refers to new ideas, new knowledge, and new technologies and design. **Gendered Innovations** are defined as processes that integrate sex and gender analysis into all phases of basic and applied research to assure excellence and quality in outcomes.

	Sex and Gender Analysis Enhances all phases of research SEX AND GENDER ANALYSIS - Setting Research Priorities - Making Funding Decisions - Establishing Project Objectives - Developing Methodologies - Gathering & Analyzing Data - Evaluating Results - Developing Patents - Transferring Ideas to Markets - Drafting Policies (P. 9)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	**Checklists** are intended for project directors, researchers, grant writers, and evaluators. Checklists provide stepwise procedures for incorporating sex and gender analysis into research and engineering, as a basis for developing Gendered Innovations. The checklists complement the Methods of Sex & Gender Analysis and should be read in conjunction with them (Checklists are fully detailed on the Gendered Innovations website). • Engineering • Health & Medicine • Tissues & Cells • Urban Planning & Design Checklist When analyzing human standards and reference models, researchers/engineers will want to consider the following questions: j. Does the existing model differentiate between women and men? k. Are existing standards up-to-date, or based on old data that might be invalidated by trends? For example, the incidence of obesity has increased significantly in highly developed countries over time (WHO, 2011). Japan, Brazil, the U.K., and the US have all seen rates of obesity roughly triple in less

	than 30 years (Jeffrey et al., 2008).
	l. If a model does *not* consider sex, is it based on research in both sexes, or is it in fact a male reference model (or, in some cases, a female reference model) that is being improperly used as a generic "human" model?
	m. If standards *do* consider sex, how important is sex to the reference model? Have researchers adequately investigated non-biological influences due to gender and other social or biological factors?
	n. Beyond considering sex differences, does the model address sex-specific factors among women (such as pregnancy) and men (such as susceptibility to prostate cancer)?
	o. Does the existing model take into account differences between women's and men's attitudes, needs, and interests?
	When analyzing experimental reference models, researchers will want to consider the following questions:
	p. A re reference models by default based on one sex but taken to be valid for the species overall?
	q. Do data for one sex lag behind data for another sex, so that sex-specific reference models may not be equally developed or validated?
	r. What criteria are used in selecting species, strain, and sex of model organisms used in research that will be translated to humans?
	s. Does the choice of a particular model organism significantly affect findings? (P. 39)
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	

Basic information	Document no.:	000

		(citavi #)	
Reviewer's name	Wroblewski, Angela, IHS		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	Gilmer, Penny J.; Tansel, Berrin; Hughes Miller, Michelle (eds.) (2014), Alliances for Advancing Academic Women. Guidelines for Collaborating in STEM Fields, Rotterdam/Boston/Taipei: Sense Publishers 238 pages ISBN: 978-94-6209-602-8		
2. Abstract (copy and paste)	The AAFAWCE mission was to increase the representation and promote the advancement of academic women in chemistry and engineering, thereby developing a more diverse science and engineering workforce. The AAFAWCE's goals were to (a) increase recruitment of women faculty in chemistry and engineering, (b) enhance retention of academic women by mentoring and networking, and (c) promote leadership of women within the universities and in their scientific and engineering fields. (P. 4) In order to develop and implement adequate activities to reach the goals mentioned above, AAFAWCE conducted an online-survey to collect data regarding the faculty climate. Based on literature review and the Faculty Climate Survey, AAFAWCE conducted a qualitative study (19 semi-structured interviews) to examine women STEM faculty's experiences with isolation and related factors such as department fit and communication. They also investigated strategies that women use to overcome their isolation, primarily networking and mentoring. AAFAWCE ADVANCE-PAID Objectives: Recruitment of Women Faculty: To assure the recruitment of women faculty to the sciences and engineering by providing opportunities, best practices and strategies for hiring women faculty in these areas. Retention of Women Faculty through Mentoring and Advising: To assure the retention of women faculty in the sciences and engineering the Alliance will provide opportunities, infrastructure, and resources for mentoring and advising assistant and associate professors. Promotion of Leadership Among Women Faculty: To increase the number of women in chemistry and engineering capitalizing on their leadership skills for career advancement and the attainment of leadership positions. (http://aafawce.eng.usf.edu/advancepaid/about)		

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:								

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☑	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:								
6. System level (if applicable)	Global	☐	European	☐	National	☑	Sub-national	☐
Comment on 6:	USA							

7.1 Country focus (if applicable, please specify)	USA	
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)	USA, Florida	Comments on 7: The AAFAWCE is a collaboration of five Florida higher education institutions:University of South Florida (USF, the lead institution), Florida State University (FSU), University of Florida (UF), Florida International University (FIU), and Florida Agricultural and Mechanical University (FAMU).
Data and indicator availability		
8.1 Data, indicators, measurements		If yes, please specify (including page numbers in document)	Analysis of initial regression models of the AAFAWCE Faculty Climate Survey indicates significant differences in ways that women and men responded to the items related to their sense of isolation, fit, and communication. (P. 98) The items were scaled from 1 (strongly disagree) to 4 (strongly agree). Indicator 1: Isolation (P. 98) based upon statements like: • „I feel excluded from an informal network in my department" • "I feel isolated in my department" • "I feel isolated on my university campus overall" Indicator 2: Department Fit (P. 98) based upon statements like: • „I feel like I ‚fit' in my

The 8.1 row also contains: Document contains data ☑

				department"
				• "In my department, I feel that my research is considered mainstream"
				• "I feel that my colleagues value my research"
				Indicator 3: Communication (P. 98) based upon statements like:
				• „I have a voice in how resources are allocated"
				• "My department chair involves me in decision-making"
Comment on 8.1	The report is based on the following methods of data collection and analysis: • Institutional demographic data; • data collection through an online questionnaire and face-to-face interviews; • data-analysis; • literature and documentation review.			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				

Guiding questions for review
- please add page numbers where appropriate -

9. How is RRI characterized?
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities	

(scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI

(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension

(benefits, costs, disadvantages, trade-offs)

11.1 What claims are being made?	"The mission of the AAFAWCE is to increase the representation and promote the advancement of academic women in chemistry and engineering, thereby developing a more diverse science and engineering workforce." (P. 34) "Our central theme across the AAFAWCE is to improve the climate for women faculty in chemistry, physics, and engineering by providing structures, strategies, and best practices for hiring, retaining, and providing leadership opportunities for women faculty in our five state institutions in Florida." (P. 122) To change the faculty climate (especially the isolation of women), AAFAWCE promotes: • Mentoring/Networking/Collaborating • Changes regarding the recruitment practices (raising awareness of gender biases, train the search committees) • Developing academic women leaders in STEM

11.2 Which arguments are used to support the claim(s)?	Mentoring/Networking/Collaborating "Our findings suggest that the sense of isolation that women STEM faculty experience is due to a lack of social capital, driven by insufficient institutionalized mentoring and networking, a deficiency that can be addressed through explicit institutional efforts. These findings indicate that we should not focus on "fixing" women STEM faculty, but rather that institutions should undertake to implement support mechanisms to connect women more directly to their colleagues, departments and institutions." (P. 110) Recruitment "The Faculty Climate Survey from the start of the grant informed us of the issues women faculty faced at our institutions: women's sense of isolation, decreased sense of department fit and communication, and their view of the climate (including recruitment efforts) for women faculty, in comparison to responses from the men faculty." (P. 126) Leadership "We decided to include leadership as one of our three foci for the AAFAWCE grant because women academics that excel and become leaders will have more of a chance of changing the culture within academia and in their profession." (P. 165) "Literature on women as leaders in the academe suggest that efforts to increase the number of women leaders work best if they both enhance women's skills and knowledge and directly confront extant organizational culture that can get in the way of women's advancement." (P. 189)
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	Faculty Climate Survey Semi-structured interviews
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	The gender equality goal is defined as increasing female participation in STEM which requires cultural change in faculties in order to attract women and to avoid drop out. "Culture refers to the shared values, beliefs, symbols, ethics, and goals within academia." (P. 165) "Culture influences actions taken by communities involved in activities, the tools or artifacts available and used, the division

	of labor typically employed, and the rules or schema that can interfere or make likely progress towards the objects [...] the goal of ADVANCE grants is to create a 'new normal' – an externalization of the grant's goals by institutionalizing them. In cultural historical activity theory, human actions can reproduce culture (called internalization or cultural reproduction) or transform culture (called externalization) by creating new 'artifacts'." (P. 50)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	Challenges in gathering survey data: small cell problem – concerns regarding confidentiality and anonymity -> low response rates; solution could be a bigger survey which includes more institutions (to reduce anonymity concerns with cross-aggregation); to market the survey as a general survey of faculty (instead of targeting only departments with very few women or minority groups); or do the faculty climate study in a more qualitative way.
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	Faculty Climate Survey • Online survey • Multi-university campus effort • 5 universities, all Engineering, Physics, and Chemistry departments • List of all instructional faculty with names and email contact information • Oversampling of the female faculty members by including

	all of them, along with a large percentage of the male faculty
	• N= 409 (83 women and 326 men)
	• http://aafawce.eng.usf.edu/advancepaid/documents/Final%20Survey_022510.pdf

Basic information				Document no.: (citavi #)	000	
Reviewer's name	Fan, Cheng (Fraunhofer ISI)					
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	McKinsey&Company (2007), Women Matter - Gender diversity, a corporate performance driver Pages: 24					
2. Abstract (copy and paste)	"Women Matter" is a study conducted by McKinsey & Company as part of its global partnership with the Women's Forum for the Economy & Society. The study suggests that the companies where women are most strongly represented <u>at board or top-management level</u> are also the companies that perform best. Confirming the existence of the gender gap – most notably in the composition of corporate management bodies – the McKinsey study offers <u>fact-based insights</u> into the importance for companies of <u>fostering</u> the development of women in the business arena, so that a greater number attain positions of high responsibility. Finally, building on these insights and observations, and highlighting the main <u>barriers</u> to female representation on management bodies, this study seeks to bring the practical debate of how to make <u>the transition from awareness of the situation to the implementation of change</u>. Are women the future of business? The question is open …					

3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		

Comment on 3:	

4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:					

5. Type of document	Scientific article	☐	Book chapter	☐	Book	☐	Report	☑
	Project deliverable	☐	Policy/ strategy document	☑	Other	☐		

Comment on 5:	

6. System level (if applicable)	Global	☑	European	☑	National	☐	Sub-national	☐
Comment on 6:	There are also comparisons with the USA and Asia							
7.1 Country focus (if applicable, please specify)								
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)						Comments on 7:		
Data and indicator availability								
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	56. Women represent only 11% of the membership of governing bodies of listed companies in Europe (P. 5) 57. The increase in the number of female graduates will have a limited impact on diversity (P. 6) 58. European women devote on average twice as much time as men to domestic tasks (P. 7) 59. Career breaks for women are mainly motivated by the need to spend more time with family 60. Increasing women's employment rate offers one possible response to the demographic challenge (P. 11) These statistically significant studies: the evaluations of 115,000 employees of 231 public and private companies, as well as non-profit organizations. Correlation is not necessarily cause, but the correlation between organizational excellence and women's participation in management bodies is nonetheless striking. Companies with a higher proportion of women on their management committees are				

				also the companies that have the best performance. (P. 13, 14)
				61. The best-ranked companies on organisational performance tend to have an operating margin and a market capitalization more than twice as high as those of the lower-ranked ones
				62. Companies with three or more women in top management functions score more highly for each organisational criterion than companies with no women at the top
				63. Companies with a higher proportion of women in their top management have better financial performance
Comment on 8.1				
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				

Guiding questions for review

- please add page numbers where appropriate -

| 9. How is RRI characterized? |
| (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.) |

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or	

rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension	
(benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	It emerges from this research that while social policies can be more or less favourable to women's employment, corporate models – historically designed by men – form the pillars on which the glass ceiling is supported. Why gender diversity? 64. More women in business: an imperative for competitiveness: A response to the upcoming talent shortage in Europe; *Women are the driving force behind more than 70% of purchasing decisions;* an asset for the corporate image, a positive impact on employment motivation, customer satisfaction; capital markets and investors are paying more and more attention to corporate performance in terms of gender diversity

	65. More women in control: a corporate performance lever / Women's positive impact on organisational excellence
	>>>But it seems that this dilemma – the choice between professional success and work-life balance – has more consequences for women, who might have to pay a higher price for success. (Mckinsey study)
	>>>how to reinvent the model? We interviewed a dozen companies notable for the progress they have made in women's participation in the boardroom and in top management.
11.2 Which arguments are used to support the claim(s)?	66. The "anytime, anywhere" performance Model, a precondition for the top management job in the business world, is irreconcilable with women's double burden (work + domestic responsibility)
	67. Mastering male codes as the only way to rise through the ranks (it requires a greater effort of adaptation for women to be more assertive in making their way to the top; the ability to promote oneself and to be assertive about one's performance and ambitions.)
	68. An added final handicap is that it appears harder for women to find a mentor.
	69. Women's ambitions restrained by an acute awareness of barriers (psychological obstacles: women's difficulty in identifying with success, and their lesser ambition, which combined with a greater focus on their families,)
	>>> For No. 2 above : McKinsey diagnostic tool, which measures the organisational excellence of a company against nine criteria: leadership, direction, accountability, coordination and control, innovation, external orientation, capability, motivation, work environment and values
	>>>>FOUR BEST PRACTICES FOR ACHIEVING GENDER DIVERSITY
	Create transparency by implementing gender diversity KPIs
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	• Many related studies in this area (European Commission, OECD; national statistics; Eurostat; European Commission; McKinsey; data from French institutions, Eurostat; Catalyst10 study of MBA Graduates *"Women and the MBA: Gateway to opportunity"*, Catalyst (2000) *"The Hidden Brain Drain - Off Ramps and On Ramps in Women's Career"*, Sylvia Ann Hewlett, Carolyn Buck Luce, Eurostat; Global Insight; McKinsey Peggy Schiller, HBR Research Report, Harvard Business Review 83 (March 2005): 31-57)
	• Interviews with more than 50 company CEOs, men and women, throughout Europe
	• Source: Amazone Eurofund database; Amadeus; Research Insight; Datastream; Bloomberg; McKinsey – OPP (**Organisational Performance Profile)** analysis
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator	Areas that our study does not cover but that need to be properly addressed if we really want to achieve the mindset revolution needed to speed up change. Two main areas require consideration. The first is education. In some fields – engineering and management in particular – women are under-represented and are therefore deprived of a large number of

specifications etc.)	potential jobs, especially in top management.
	The second area for consideration relates to models of family balance. Men enjoy greater freedom. In seeking to create a balance in the work environment, should we not also encourage and enable a different, more equal balance at home?
Comments on 11.	

12. Key dimensions of RRI	
(For literature dealing with one or more of the 5 key dimensions.)	

12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	How to reinvent the model? Regarding the role of political bodies: **Exhibit 12** **The public policy requirements vary from one country to another** According to the interview results in the business world: **Exhibit 13** **Interviews with companies with significant results in terms of gender diversity revealed four best practices** The pivotal role of the CEO: commitment and initiatives of CEO for the change

12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	Science education (STEM for girls): complementary Public engagement: cultural change
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	

Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		

1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	Müller, Jörg et al. (2011), Policy towards Gender Equality in Science and Research, Brussels Economic Review, 54 (2/3), pp. 295- 316.						
2. Abstract (copy and paste)	The following article summarizes the meta-analysis of policies towards gender equality in science and research across Europe spanning the years 1980 to 2008. Observed overarching trends in the research literature are summarized, including the impact of higher education restructuring on gender equality in science and research and measures for advancing women's science careers. The article closes by stressing three key challenges: first, the integration of gender policy assessment with theories of social change; second, the gendering of innovation policy; and third, re-addressing the question of power and political struggle in relation to policy. (P. 295)						
3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:							
4. Main perspective	Theoretical, conceptual	☑	Methodological	☐	Policy oriented	☑	Evaluative	☑
(multiple entries possible)	Other	☐	Comment on 4:	Meta-analysis of gender equality policy measures at micro and meso level regarding effectiveness and impact				
5. Type of document	Scientific article	☑	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:							
6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national	☐
Comment on 6:	Investigation cross Europe						
7.1 Country focus (if applicable, please specify)							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)				Comments on 7:			
Data and indicator availability							
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in	The thematic priorities are the result of a review of 1,296 abstracts from the Gender and			

			document)	Science Database (GSD). The initial entries in the GSD were made by national gender experts. Where available, selected key texts were studied in depth. This often produced new sources and texts not yet available in the GSD, but subsequently added to it. The content analysis was supported by a statistical analysis of the GSD entries on "policies towards gender equality". (p. 297)
Comment on 8.1	The report is based on Literature review: Here, the literature is rather foregrounded in one of the following three thematic areas: • Advancing science careers through career and skills training, stipends and scholarships, networking and mentoring, and work/life balance measures. • Science and management and reform, including the role of new legislative frameworks, institutional structures such as equality officers, committees and observatories, quotas, or new steering instruments such as incentives and targets. • The gender dimension in research and higher education, including gender proofing pedagogy and curriculum, exclusive education, institutionalisation of gender studies and gender assessment of research. (p. 297)			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☑	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	European Commission 2008: Benchmarking policy measures for gender equality.
Comment on 8.2:	There are two difficulties in this report: 1. Establishing clear-cut relations between certain policy measures and the overall representation of women in science is problematic; 2. Some of the policies or measures examined showed no statistically significant correlation with the proportion of women in science. As the authors argue, however, this should lead to a more thorough examination of measures and initiatives at sub-national levels (*ibid.,* p. 38). Local and small-scale initiatives could have a more decisive impact on women's participation in science than large-scale programmes. The report on policies towards gender equality in science and research aimed to close this gap. (p. 296)			
Guiding questions for review - please add page numbers where appropriate -				
9. How is RRI characterized? (For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)				
9.1 Which definition of RRI is being used? (author's definition or reference to other source)				

9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension	
(benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	Vinnova echoes Londa Schiebinger's (2008) argument on how a gender perspective leads to better science, heightening critical rigor by stressing that gender as "non-normative" thinking strengthens innovation milieus.
	A crucial step therefore consists of questioning the male bias in definitions of innovation which channel available funds into certain types of high-tech male dominated industries (Lorenzi

	2011).
	Broadening the understanding of innovation to include the creative industries or tourism provides alternatives to the usual HR-centred policies of work/life or childcare balance by supporting entrepreneurship in often feminized occupational sectors (see also Ranga & Etzkowitz 2010). (p.310)
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	70. Important limitations with regard to this meta-analysis concern the analysis of the GSD entries. All abstracts are made available in English. Original texts were consulted whenever possible. This means that an in-depth review of the literature on policy measures was restricted by the languages and texts available to the research team (English, Spanish, Catalan, German and French). This might produce a certain bias in the in-depth study for the meta-analysis; 71. A further limitation might involve the classification of the literature when it is entered in the GSD. Particularly in relation to structural reforms of universities, differences were detected as to how certain entries are classified although they essentially deal with the same restructuring process (first from a policy analysis and then from a more individual, subjective perspective). (pp. 297-298) 72. Regarding HE reform: the lack of large-scale comparative studies is especially troubling; Considering the field of institutional reform, this concentration on individual benefits is especially striking. As a consequence, more research is needed in order to clarify the conditions under which NPM may serve as an instrument towards gender equality in higher education, or rather may tend to reinforce existing inequalities and the hegemonic masculine imprint in academia. (p. 305) 73. Regarding Advancing science careers: More research is needed to clarify how the work/life balance affects men and women differently and to what extent it can really help to improve the position and proportion of women in science. Flexibility of working arrangements and other family-friendly policy measures are key; however these policies alone will not reduce the pressure of having an excellent scientific track record (*Beyond Bias & Barriers*, p. 179), nor does their shortage explain the lower proportion of women in higher positions in science (Lind 2008). (p. 306) t. Regarding the large-scale national and international initiatives to provide career and professional training programmes: End-of-course evaluations typically show a high level of satisfaction with content and delivery on a personal level (longer-term benefits in terms of increased confidence,

	clarity of focus and understanding of the system), but do not result in broader institutional change. Besides, due to their partial success and the generally very slight increase in the number of women in top positions, the effectiveness of these measures beyond the individual level is arguable (Brown 2000; Devos et al. 2003) (pp.306-307)
	u. Regarding monitoring programmes and networking activities: these findings are based largely on qualitative interviews, reflecting the first hand experiences of participants. However, what is striking is the absence of any negative statements from the evaluation reports – although this "underestimation" of the real complexities of mentoring relations is a fairly familiar pattern in evaluation studies (Eby & Allen, 2002; Tenner, 2004). (pp.307-308)
	74. A crucial gap in the available literature concerns the lack of knowledge on specific disciplinary career paths, advancement and obstacles.Research on appointment procedures and scientific excellence from the Netherlands showed that "implementation of very general policy measures targeted at academia as a whole is not the best way to obtain a gender-balanced workforce in the upper echelons in universities" (van den Brink et al. 2006, p. 39). In contrast, measures that take into account disciplinary differences seem to be a more promising alternative in the long run. Policy measures will need to take into account these specific disciplinary aspects in order to be successful. (p. 308)
Comments on 11.	Aim of the report is
	75. To summarize and evaluate the main findings of the policy report
	76. To identifying the major shortcomings of policy evaluations for gender equality in science and research and suggests ways to move forward. The main challenge from our point of view consists of overcoming the almost exclusive focus on a human resources approach to gender equality policy and to achieve a tighter theoretical integration of what are often isolated evaluation studies in order to tackle the difficult issues of promoting and fostering cultural change.
12. Key dimensions of RRI	
(For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	**HE restructuring/reform**: the latest introduction of new management strategies into HE and research means that important changes have been made not so much with regard to the goals (e.g. raising the proportion of women in higher career positions), but rather in terms of the steering mechanisms used to achieve them. Several policy instruments such as legal/rights measures, positive actions (such as quotas), co-exist alongside more recent "mainstreaming" mechanisms and new steering instruments such as target/incentive-bound resource allocation. Women

	representatives or equality officers reflect this change in their shifting responsibilities and tasks.
	Advancing Science Careers: The whole field of career development is focused on the core issue of promoting women in science. The well- known, albeit misleading, metaphor of the "leaky pipeline" bears witness to the fact that women are more severely under-represented the higher they climb up the career ladder.
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	Theories of social change, collaboration with organization studies (p. 309). Policy transfer and innovation studies: Whereas in the past, excessive focus was given to the role of individual actors (politicians, bureaucrats, etc.), currently a more ecologically-oriented perspective is being put forward, where individual agents operate under the constraints of past policies, existing socio-economic conditions, ideological climate or the efficiency of the available bureaucratic and administrative infrastructure (see Dolowitz & Marsh, 1996, p. 353ff.) (p. 310). NPM strategies for recent higher education reform. On a very basic level, NPM offers a solution for streamlining an apparently inefficient and oversized bureaucratic state apparatus by introducing market logic into the non-market public sector (Hood 1991; Bouckaert & Pollitt 2005) (pp. 303-304).
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so far not covered by MoRRI?	Structural and Cultural change
14. Anything else deemed relevant?	Theory of Change i.e. gaps between policy implementation and changes in societal values.
15. General comments and remarks	The final section of this article aims to provide a further reflection on the relationship between policy towards gender equality in science and its evaluation. • There continues to be an open discussion on what gender equality entails and how progress towards gender equality can be measured. What are the indicators of success? What is lacking in a certain way is a more thorough theoretical engagement of projects and research which implement and evaluate gender equality policies. As Verloo stresses "*…gender impact assessments merely make gender visible, by producing statistics for instance, but they fail to provide an analysis of such statistics in terms of their link to producing gender inequality, and therefore are not really gender-*

	sensitive, let alone transformative." (Verloo 2005, p.357). **The lack of explicit theory is a further handicap to tackling these aspects of structural and cultural change.** • A strong theoretical model of how gender inequality intersects with other social inequalities and is continuously reproduced in society will be a vital element. Mary Daly (2005) concludes that **while gender mainstreaming is "*trumpeted as fundamentally transformative, it lacks, as yet anyway, a full articulation of a <u>theory of change</u>" (p. 447).** As she furthermore contends, this shortcoming is due to a missing sociological core that would enable reflection on the relationship and **gaps between policy implementation and changes in societal values.** • A further crucial resource should be to explicitly build **on innovation policy studies**. The private R&D sector is the most important factor in determining the proportion of women in research. Innovation policy is primarily directed towards the private business sector. Women entrepreneurs encounter significantly more difficulties attracting investment for their firms than men (Robb& Coleman 2010). This essentially extends the business/diversity case for gender equality to a broader call for the macro-economic benefits of gender equality (Danilda & Granat Thorslund 2011; Pérez Zapata 2010) (pp. 308-310).
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	Castaño, C., J. Müller, A.M. González Ramos, and R. Palmén, 2010. Policy towards Gender Equity in Science and Research, Available from: http://www.genderandscience.org/doc/TR7_Policies.pdf (Last accessed 1st March, 2011). Daly, M., 2005, "Gender Mainstreaming in Theory and Practice", Social Politics,12(3), pp.433-450. European Commission, 1995. A new partnership between women and men, equal sharing and participation; the European Community's priorities for the Fourth UN World Conference on Women, COM (1995) 221 European Commission, 2008a. Benchmarking policy measures for gender equality in science. Directorate General for Research, Luxembourg: Office for Official Publications of the European Communities.

Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher,	Rothe, Andrea et al. (2008), Gender Budgeting as a Management Strategy for Gender Equality at Universities, Concluding Project Report, Frauenakademie München		

place of publication, pages, DOI)	e.V.: München
	136 pages
	ISBN-13: 978-3-937120-09-6
2. Abstract (copy and paste)	The question this project focused on is: how can Gender Budgeting be applied as a powerful instrument in the budgeting policy of an organisation? The intention is to show which dimensions and which phases of the budgeting process have to be considered. Furthermore, some basic steps for a systematic integration of gender issues into the budgeting process were developed.

The main findings are:

77. A concentration of power within university managements could be observed in all universities;

78. The decision-making concerning budgeting is still male dominated in all universities;

79. If gender equality topics expand into the budgeting planning process, there are always quite hard conflicts about them, despite the quite small sums actually concerned;

80. The budget processing gets less transparent: informal networks gain more importance. This leads to disadvantages for women;

81. General lack of gender awareness, of a critical reflection of the relationship between women and men as well as a basic change in the male dominated organizational culture of most universities.

Recommendations:

82. On the level of the universities: this refers e.g. to the need for more sensitisation and awareness raising for gender equality in science, for the implementation of sufficient institutions for the promoting of gender equality, for the operationalisation and implementation of gender equality objectives on grounds of sex-disaggregated data, for an institutionalisation of a Gender Impact Assessment, for the equal participation of women and men and the inclusion of gender equality institutions in all phases of the budgeting process. Important elements: transparency of the budgeting process, integration of gender objectives and gender analyses into all parts of the accounting system, the distribution of financial resources by indicators and the integration of gender issues in all agreements on objectives, the implementation of gender sensitive measures for a modified personnel recruiting, introduction of a gender controlling system to ensure effectiveness and sustainability of the whole process.

83. At national and state level: a strong legal framework for gender equality, to gender equality policies at ministerial level, once more to the collection of sex-disaggregated data and the implementing of gender objectives into performance agreements. Further recommendations concern the distribution of funding by indicators and the introduction of Gender Budgeting for third party funding. Additional further affirmative actions for the advancement of womenin science are necessary.

84. At the European level: we recommend for example the implementation of Gender Budgeting into all research activities of the EU and more funding for projects on the implementing of Gender Mainstreaming and Gender Budgeting into science. We suggest to |

	establish a European gender accreditation system and to develop a set of common gender equality objectives throughout Europe. An improvement of the European database on sex-disaggregated statistics. And finally we strongly recommend the integration of the subject of gender equality as a top level issue into the European agenda. (pp. 7-12)							
3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:								
4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☐	Policy oriented	☑	Evaluative	☑
	Other	☐	Comment on 4:	Strategy and instruments for gender budgeting were developed.				
5. Type of document	Scientific article	☐	Book chapter	☐	Book	☑	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:	A concluding project report in form of a book published							
6. System level (if applicable)	Global	☐	European	☑	National	☐	Sub-national	☐
Comment on 6:	It was a tans-national EU Project							
7.1 Country focus (if applicable, please specify)	Germany, Austria and Poland							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)	Germany, Austria and Poland						Comments on 7:	
Data and indicator availability								
8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	Gender sensitive indicators				

Gender sensitive indicators

Indicator	Explanations (reasons, definitions, etc.)
Number of professors, promoted professors, fulltime scientific staff, administrative staff at all universities of the country (in total, as well as according to departments and working time: full or part time and full time equivalents) (proportion of women and men)	Basic indicator for the (different) positions of men and women in the academic field in total. Serving the individual universities as orientation parameters. Changes of the indicator have a direct relevance for equality.
Number of the students at all universities of the country (in total as well as according to departments) (proportion of women and men)	Basic indicator for the (different) positions of men and women in the academic field in total. Serving the individual universities as orientation parameters. Changes of the indicator have a direct relevance for equality. >>

Indicator	Explanations (reasons, definitions, etc.)
Number of graduations from school (matriculation standard) per graduation age-group (proportion of women and men)	The indicator shows how many women generally achieve access to a tertiary education. This pool which considers the entire society, defines the starting point for the situation at the universities.
Number of mothers and fathers among the professors, the promoted professors, full time scientific staff, administrational staff at the universities of the country	The percentage of women at universities is growing, however, this applies mainly for women without children. This is an important indicator for the compatibility of career and family.
Child-care options (vacancies / number of children according to sort of institution - day nursery, kindergarten, nursery, etc.) and age groups	An adequate furnishing of families with social services, especially in the field of child-care, serves the improved compatibility of career and family. A good offer can have a positive impact on the percentage of female scientists. A lack in offers, however, can also lead to an increase, but this often results in part time jobs.

Target achievement indicators

Gender-orientated formulation of objectives	Indicator	Explanations (reasons, definitions, etc.)
Target-group specific support of the equal access to teaching and research in all scientific fields for women and men according to their proportion	Number of scientists in total and in individual departments (percentage of female professors, scientific staff) Dissimilarity Index (see in She Figures 2006) Number of courses held by the scientists (percentage of female professors, scientific staff); possibly differentiated according to departments, kind of the courses (lectures, courses, practices, etc.), full time equivalent (FTE) Number and volume of the scientific projects (percentage of female professors and scientific staff), differentiated according to departments, FTE Number of laboratory hours (percentage of female professors and scientific staff), differentiated according to departments Gender-sensitive questions in teaching evaluations	On university and faculty level the apportionment of the sexes in different study courses should be reflected. The Dissimilarity Index can give a first reference in this context. Figures are usually available. It is furthermore important to consider up to which extent women are contributing to teaching and research at the university in total and in the individual departments. Queries of "gender-specifics" in the case of course evaluations (e.g. the tutor observes the equal treatment of women and men, e.g. by the use of a gender sensitive language and the course communicates contents under the consideration of gender aspects).
Target-orientated representation of women and men at the universities, according to their percentage or each sex not less than 40 %	Number of employed persons according to sex (percentage of administrational staff, scientific staff, habilitated, female professors), differentiated according to departments, FTE, salary classes, age	The aspect of representation is always a basic information during gender analyses: how many women and how many men are working in particular areas, positions, etc., professional levels, etc. The age pattern should also be taken into consideration when speaking of a mid-term follow-up job filling policy.
Equal opportunities for women and men concerning the scientific career	Doctorate indicator (in total and differentiated according to departments) Habilitation indicator (in total and differentiated according to departments)	Example: Number of doctorates by women (period of 3 years) / number of doctorates in total (period of 3 years) / (number of female students (period of reporting year/s / number of the students in total (period of reporting year/s). >>

Gender-orientated formulation of objectives	Indicator	Explanations (reasons, definitions, etc.)
	Indicator "full-time scientific staff" (in total and differentiated according to departments) Professorship-indicator (in total and differentiated according to departments) Glass ceiling index (in total and differentiated according to departments) - in the following: consideration of full time equivalent (FTE)	The glass ceiling index is an indicator for the measurement of the relative opportunity of women compared to that of men to achieve top-level positions.

Process indicators (pp. 60-65)

Indicator	Explanations (reasons, definitions, etc.)
Institutional installation of persons with gender competence on all academic planning and controlling levels and in the budgeting process	The systematic realisation of gender mainstreaming within the academic policy implies that gender experts are authoritatively included in the design and the implementation and that they are granted suitable authority and responsibilities.
Systematic consideration of the gender perspective in promotion plans	Taking the gender perspective continuously into consideration in all promotion plans is essential in order to improve the integration of women. A "gender neutral" concept of promotion guidelines and promotion documents undermines the strong gender relevance of innovative political strategies.
Composition of budget committees (number, resp. proportion of women and men), differentiated according hierarchic and power structures (professors, mid-level faculty, etc.)	The indicator shows up to which extent women are entrusted with management and decision making functions in budgeting. The appropriate representation of both sexes in budgeting, consulting and decision making functions within higher education is vital for Gender Budgeting.
Transparency and documentation about the decision	The disclosure of decisions can contribute to avoid group-specific selections or decision effects and needs a guaranteed access to documents in connection with the decision making process.
Standardisation of the consulting and the decision making during the budgeting process.	The standardisation of the instruments for consultation and decision making in the budgeting process at universities can contribute to avoid group-specific selection effects.

Gender-sensitive Impact of instruments and strategies **can be assessed on five different levels:**

- On the **input level**: How does the measure effect employment?

- On the **output level** (activities): How does the measure affect the activities and services performed at universities?

- On the **output level** (utilization): Who are the users and beneficiaries of the measure?

- On the **outcome level**: Which direct and external effects of the measure can be assumed?

- On the **process level**: How does the measure influence the power structures in the decision making process of the universities?

Examples for relevant aspects on the five levels mentioned above could be:

Input

As human resources are the most important input of scientific organisations, the analysis of possible effects on personnel is fundamental for the GIA as well as the analysis of the initial situation at universities.
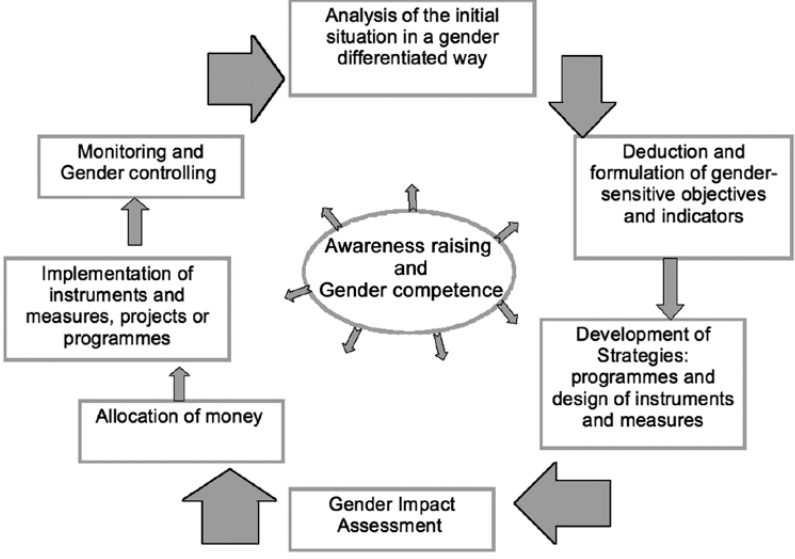
The main questions for this analysis are:

- How would the measure/instrument/project influence the job situation of women and men concerning type of employment, career development, work-life balance and income?

- Important features are therefore: employment: share of women in leading positions (=participation); average

				number of long term employment by sex (=resources); share of women and men in different fields (e.g. IT and administration) (=norms, values).
				Output level: activities
				For the gender analysis of activities and services mainly referring to teaching, research and consulting, the main questions are:
				• How would the measure/instrument influence the activities and services offered?
				• Do the activities meet the different needs and requirements of women and men?
				• Important features are therefore: services and (in)tangible goods provided, e.g. teaching and research activities.
				Output level: utilization
				For the gender analysis of the users of activities and services for students, the beneficiaries of research as well as the general public, the main questions for analysing gender sensitive effects of measures and instruments concerning the users or recipients are:
				• How would the measure/instrument influence the usage by women and men of the universities' activities and services?
				• Does the measure/instrument have an influence in case the activities meet the different needs and requirements of women and men?
				• Important features are therefore: women and men in students' representative bodies (=participation); number of people who use certain services.
				Outcome level
				For the gender analysis of the outcome of a measure, of an instrument or a strategy which concerns indirect effects for users or individual and general external effects, two different kinds of effects need to be examined: the direct effects for users on one hand and general or individual external effects, either positive or negative ones, on the other hand. The main questions therefore are:
				• Which direct effects does the measure have on women and men both in the short and in the long run?
				• Which external effects on women and men and on gender-relations in general does the measure initiate (e.g. on the distribution of unpaid labour between women and men, on gender roles and norms, on power relations, on possibilities

				of political participation)?
				• Does the measure comprise any incentives for women or men to change their behaviour and/or their decisions (on employment, career, family planning, etc.)?
				• Important features are therefore: jobs which female and male graduates get after graduation, contribution to the development of a research field, impact of research on policies and politics.
				Process level
				For the gender analysis of power structures in decision making processes, the central questions during the evaluation of the measures' results on the decision making process are:
				• Would the measure encourage or discourage women or men to engage in university committees, apply for leading positions, etc.?
				• Would the measure strengthen or weaken the position of women or men in decision making bodies, or influence the informal power of women and men?
				• Important features are therefore: decision making processes, participation, power structures, etc. (pp. 67-71)
Comment on 8.1	The report is based on the following methods of data collection and analysis :			
	85. An analysis of the national framework for women and men in science and the financing of the university sector in Austria, Germany and Poland.			
	86. An analysis of the specific situation of women and men and of the process of budgeting at the three cooperating universities, the University of Gdansk, the University of Augsburg and the Vienna University of Economics and Business Administration.			
	87. On the basis of these findings, instruments and measures for the implementation of gender budgeting in scientific organizations were developed.			
	88. As part of the support action a selection of instruments and measures to the specific situation of each cooperating university was adapted.			
	89. By comparing the three countries and the cooperating universities, it was able to extrapolate the findings and to contribute to a future European gender watch system. (p. 8)			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	

Comment on 8.2:	

Guiding questions for review
- please add page numbers where appropriate -

9. How is RRI characterized?
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)

10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	
Comments on 10.	

11. Claims regarding the effects of RRI and / or the key dimension (benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	
11.2 Which arguments are used to support the claim(s)?	
11.3 What evidence is presented to support the claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	Structural disadvantages and the waste of female talent in science have been diagnosed for all states in the European Community by several studies of the European Commission. Parallel to this annoying situation **Gender Mainstreaming** has become an important issue in the debate on reforms for the higher education sector during the last years of the former millennium. Thus the European Commission called upon the member states to implement and intensify gender equality measures and the Commission insisted on a gender action plan as an obligatory request for an application in the 6th Framework Programme on Research and Technological Development. One request was the development of Gender Mainstreaming instruments for the scientific field and another was the implementation of a gender watch system. "Gender budgeting" is one of the instruments for Gender Mainstreaming. (p. 7)
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	The definition of Gender Budgeting by the Council of Europe which is also used by the European Union: Gender budgeting is an application of gender mainstreaming in the budgetary process. It means a gender-based assessment of budgets, incorporating a gender perspective at all levels of the budgetary process and restructuring revenues and expenditures in order to promote gender equality. (p. 8) The following steering cycle of budgeting was applied in the study:

Source: Zebisch/Sagner (2006) and Debski et al. 2008

12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	The introduction of NPM instruments and the changes in the organizational set-up of the universities gave the impulse for the gender quality. Important aspects of the universities' reforms such as transparency, target-oriented governance and financial controlling are good starting points. (p.8) The steering cycle of budgeting of Zebisch/ Sagner (2006) and Debski et al. (2008): Bedarfsgerechte Förderkriterien für Frauen und Männer. Projektbericht. (p. 51)
Comments on 12.	
13. Are other important "dimensions" / aspects of RRI discussed, presented which are so	

far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	Zebisch, Johanna / Sagner, Andreas (2006): Bedarfsgerechte Förderkriterien für Frauen und Männer. Projektbericht. (ed. Amt der Salzburger Landesregierung, Büro für Frauenfragen und Chancengleichheit), www.salzburg.gv.at Sharp, Rhonda (2003): Budgeting for equity: Gender budget initiatives within a framework of performance oriented budgeting. New York: United Nations Development Fund for Women (UNIFEM). www.gender-budgets.org Gubitzer, Luise / Klatzer, Elisabeth / Neumayr, Michaela (2008): Gender Budgeting – Anleitung und Beispiele zur Umsetzung in öffentlichen Institutionen. Wien. Debski, Maciej / Erbe, Birgit / Fröhlich, Werner / Klatzer, Elisabeth / Lapniewska, Zofia / Mayrhofer, Monika / Neumayr, Michaela / Rothe, Andrea / Tarasie wicz, Malgorzata / Zebisch, Johanna (2007): Development of Instruments for Gender Budgeting (WP 11), Munich. Debski, Maciej (2008): Specific Support Actions: Knowledge Transfer to the University of Gdansk to Support Gender Budgeting as an Instrument to Promote Equal Opportunities for Women and Men. (WP 13), Munich.

Basic information		Document no.: (citavi #)	000
Reviewer's name	Fan, Cheng, Fraunhofer ISI		
1. Bibliographical information (author/s, year, title, editor/s, journal/book, volume, publisher, place of publication, pages, DOI)	Schiebinger, Londa; Schraudner, Martina (2011), Interdisciplinary Approaches to Achieving Gendered Innovations in Science, Medicine, and Engineering, Interdisciplinary Science Rreviews, Vol. 36 No. 2, June, 2011, 154–67		
	Published by Maney on behalf of the Institute (Institute of Materials, Minerals and Mining)		
	DOI 10.1179/030801811X13013181961518		
2. Abstract (copy and paste)	'Gendered Innovations' is defined as the process that integrates sex and gender analysis into all phases of basic and applied research to assure excellence and quality in outcomes. Gendered Innovations enhance excellence in science, medicine, and engineering both in terms of knowledge and personnel; they lead to gender-responsible science and technology, and seek to enhance the lives of women and men globally. This paper presents three approaches to gender equality taken by policy makers, institutional administrators, and scientists and engineers over the past three decades. These approaches include: 1) fixing the numbers of women in science, medicine, and engineering; 2) fixing research institutions by removing barriers and transforming structures; 3) fixing knowledge by incorporating gender analysis into basic and applied research. This paper treats each of these approaches but focuses on the third approach — 'Gendered Innovations' — by presenting concrete examples of how gender analysis has enhanced		

	scientific knowledge and technology design. Realizing the full potential of gendered innovations in the next decade will require deep interdisciplinary collaborations between gender experts, natural scientists, and engineers. Realizing the full potential of gendered innovations will also require international coordination, as recommended in the 2010 European Commission genSET Consensus Report and the 2011 United Nations resolutions on Gender, Science and Technology. (P. 154)							
3. Main focus (key dimensions according to MoRRI)	RRI / RI	☐	Citizen participation	☐	Science literacy	☐	Gender equality	☑
	Open access	☐	R&I governance and ethics	☐	Other	☐		
Comment on 3:								
4. Main perspective (multiple entries possible)	Theoretical, conceptual	☐	Methodological	☑	Policy oriented	☑	Evaluative	☐
	Other	☐	Comment on 4: Three approaches to gender equality were presented in this paper					
5. Type of document	Scientific article	☑	Book chapter	☐	Book	☐	Report	☐
	Project deliverable	☐	Policy/ strategy document	☐	Other	☐		
Comment on 5:								
6. System level (if applicable)	Global	☐	European	☑	National	☑	Sub-national	☐
Comment on 6:	EU and the USA							
7.1 Country focus (if applicable, please specify)	EU, EU MS and USA							
7.2 Country/ies of origin indicated by institutional affiliation of editor(s)/ author(s) (if applicable, please specify)	USA and Germany				Comments on 7:			

Data and indicator availability

8.1 Data, indicators, measurements	Document contains data	☑	If yes, please specify (including page numbers in document)	Methods of Sex and Gender Analysis serve to enhance scientific and technological excellence. The methods listed here represent a *minimum* set of issues that researchers should consider. As with any set of methods, researchers will fine-tune methods to their specific enquiry. The value of these methods depends, as with any intellectual endeavour, on the talent and creativity of the research team. 1. Formulating research questions/Envisioning design 2. Analysing research priorities and social outcomes 3. Analysing sex 4. Analysing gender 5. Analysing covariates (age, socioeconomic status, region, etc.) 6. Sampling 7. Analysing reference models 8. Analysing knowledge created through social divisions of labour (physical and cognitive) 9. Participatory research 10. Rethinking language and visual representation 11. Rethinking stereotypes 12. Analysing academic disciplines 13. Redefining key concepts 14. Rethinking theory 15. Rethinking decision-making processes FIGURE 1 Emerging Methods of Sex and Gender Analysis p.159.
Comment on 8.1	In 2009, the Clayman Institute for Gender Research at Stanford University initiated the Gendered Innovations in Science, Medicine, and Engineering Project (Gendered Innovations). This project has been expanded internationally through a collaboration with the European Commission in 2011 entitled Innovation through Gender. Systematic methods of sex and gender analysis are being produced in a series of expert meetings in 2011 and 2012. These meetings bring together gender experts, basic scientists, engineers, public health and medical experts, policy makers, and technology designers. The purpose is to develop practical methods of sex and gender analysis for researchers. The Gendered Innovation project demonstrates methods through case studies. Each section below presents a case study highlighting a problem, a method of sex or gender analysis important to overcoming the problem, and a solution, or gendered innovation. (pp. 158- 159)			
8.2 Reference made to data, indicators measurements in other sources	Document refers to relevant sources	☐	If yes, please list source(s): (URLs, data banks, reports, statistics, etc.)	
Comment on 8.2:				
Guiding questions for review - please add page numbers where appropriate -				

9. How is RRI characterized?	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
9.1 Which definition of RRI is being used? (author's definition or reference to other source)	
9.2 Which aspects of RRI receive special emphasis? (e.g., certain normative goals, procedural approaches, reference to one or more of the 5 key dimensions, …)	
9.2 Which arguments are presented in support or rejection/criticism of RRI?	
9.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 9.	

10. Policy context of RRI	
(For literature dealing explicitly with responsible (research) and innovation. If the publication deals with one of the 5 key dimensions, please proceed to 11.)	
10.1 Which RRI-related developments (international, EU, national, sub-national) are mentioned, how are they characterized and what are they aiming at (strategies, funding initiatives, regulation etc.)?	
10.2 Which approaches, instruments are discussed to facilitate the uptake of RRI?	
10.3 Which problems, barriers, potential drawbacks for RRI are brining discussed, how could they be addressed?	

Comments on 10.	
11. Claims regarding the effects of RRI and / or the key dimension (benefits, costs, disadvantages, trade-offs)	
11.1 What claims are being made?	90. It is important to point out, that increasing women's participation in science and engineering will not be successful without restructuring institutions and incorporating gender analysis into research. 91. The ultimate goal of gendered innovations is to enhance scientific and technological excellence. Research must control for sex and gender. Sex and gender analysis act as yet further controls one set among many standard methodologies that serve to provide critical rigour in science. 92. Gendered innovations also seek to create gender excellence; that is to say, to build inclusive scientific communities where men and women share equally at all levels in decision making, policy, and defining and carrying out research. 93. Gendered innovations seek: 1) to create gender equality; 2) to enhance creativity; 3) to stimulate economic and technological development (or business innovation); 4) to make research more responsive to society. 94. Innovation is what makes the world tick. Including gender analysis in science, medicine, and engineering can spark creativity by offering new perspectives, posing new questions, and opening new areas to research. (p. 155)
11.2 Which arguments are used to support the claim(s)?	This **first** approach seeks to increase women's participation by supporting Women's education and careers. While critically important, this approach has also been criticized for "fixing the women". The implicit assumption is that science, medicine, and technology institutions and research are gender neutral. Consequently, this approach fails to look beyond women's careers to the need to reform scientific institutions and research methods. (p. 156) This **second** policy approach focuses on institutional reform while often assuming that what goes on inside institutions- basic and applied research- is gender neutral. Restructuring institutions is important, but must be supplemented by efforts to eliminate gender bias from research and design. Change needs to come also at a **third** level: gendered innovations in scientific knowledge and technology design. (pp.156-157) With respect to gender, ethnicity, and muchelse, science is not value-neutral. **Gender mainstreaming**, adopted by the United Nations Fourth World Conference on Women in Beijing (1995), entails the systematic integration of gender equality into all systems and structures, policies, programmes, processes and projects, into ways of seeing and doing (Rees 2002). Gender mainstreaming now needs to be expanded to include gender analysis in basic and applied research. Mainstreaming gender analysis into research creates "Gendered Innovations". (pp. 157-158)
11.3 What evidence is presented to support the	

claims? (e.g., data, indicators, research results, case studies, anecdotal evidence)	
11.4 According to the author(s), which type of evidence/data is missing to better support the claim? (e.g. data gaps, limitations with regard to analytical levels, lack of indicator specifications etc.)	
Comments on 11.	
12. Key dimensions of RRI (For literature dealing with one or more of the 5 key dimensions.)	
12.1 How is the key dimension defined? (terminology applied, central features/characteristics)	To better understand gendered innovations, we distinguish three approaches taken by policy makers, institutional administrators, and scientists and engineers over the past three decades (Schiebinger 1999; 2008). The first focuses on programmes designed to increase women's participation. The second approach seeks to increase women's participation by transforming research institutions. The third focuses on overcoming gender bias in science and technology by designing gender analysis into all phases of basic and applied research from setting priorities, to funding decisions, to establishing project objectives and methodologies, to data gathering, to evaluating results, and transferring ideas to markets. (p.155)
12.2 Does the document reach beyond one single dimension / are more than one of the key dimensions discussed? If yes, what is the proposed relationship between different dimensions (complementary, contradictory…)?	
12.3 To which concepts, theories, approaches, schools of thought, communities (scientific or practice) in the area of research and innovation does the literature relate or make reference to? (e.g., STS, constructive TA, anticipatory governance, foresight, deliberative democracy, …)	
Comments on 12.	
13. Are other important "dimensions" / aspects of	

RRI discussed, presented which are so far not covered by MoRRI?	
14. Anything else deemed relevant?	
15. General comments and remarks	Conclusion and recommendations Once methods of sex and gender analysis are in place, there are a few further steps. These involve both researchers and research institutions: 95. Train current researchers and evaluators in gender methodology. The genSET project offers a good model for how to engage researchers as active participants in gendered innovations (genSET 2010). 96. Hold senior management accountable for developing evaluation standards that take into account proper implementation of sex and gender analysis in research. There are several practical ways to encourage researchers to develop proficiency in sex and gender analysis: v. Granting agencies can require that all applicants specify whether, and in what sense, sex and gender are relevant in the objectives and the methodology of their project. Research projects that fulfil this criterion might achieve a higher score for funding. Researchers might also achieve this score by demonstrating that sex or gender is not relevant to a particular project. It is important, however, that the issue be addressed. w. Hiring and promotion committees can evaluate researchers and educators on their success in implementing gender analysis. Knowledge and use of methods of sex and gender analysis can be one factor taken into consideration in hiring and promotion decisions. x. Editors of peer-reviewed journals can require sophisticated use of sex and gender methodology when selecting papers for publication. 97. Train the next generation in methods of sex and gender analysis. Sex and gender analysis should be taught throughout the curriculum, including basic science, medicine, and engineering courses. (pp. 163-164)
16. Relevant sources cited (Please list references to other sources cited in the literature which seem to be highly relevant for MoRRI and/or represent important contributions in the field)	Bührer, Susanne, and Martina Schraudner, eds. 2006. Wie können Gender-Aspekte in Forschungsvorhaben erkannt und bewertet werden? Karlsruhe: Fraunhofer Verlag. genSET. 2010. Recommendations for action on the gender dimension in science. London: Portia. http://www.genderinscience.org/resources.html. (21/3/2011) Klinge, Ineke. 2010. How incorporation of sex and gender in research will lead to better healthcare. In Sex and gender in biomedicine: Theories, methodologies, results, ed. Klinge, Ineke and Claudia Wisemann, 15-33. Göttingen: Universitätsverlag Göttingen. Schiebinger, Londa, ed. 2008. Gendered innovations in science

	and engineering. Stanford: Stanford University Press.
	UN Women. 2011. Gender, Science and Technology, Agreed Conclusions. http://www.un.org/ womenwatch/daw/csw/55sess.htm#agreed. (26/3/11)

Do not delete anything after this (non printing) line