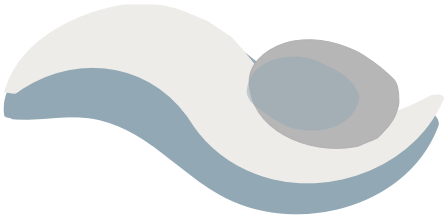

from IDEAS to MARKETS: the Gender Factor

Introducing how gender dimension can transform and enhance research ideas and open up new markets for science knowledge

Report prepared for the 2012 Gender Summit
European Parliament, 29-30 November, Brussels

This report has been produced by Portia Ltd to support the discussion of gender issues at the 2012 European Gender Summit.

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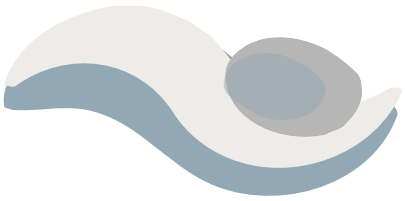
from IDEAS to MARKETS: the Gender Factor

Introducing how gender dimension can transform and enhance research ideas and open up new markets for science knowledge



INTRODUCTION

In this, first-of-a-kind report, you will find a selection of examples from science and engineering showing how the gender dimension can be integrated in research and in innovation, and become a source of new applications for science knowledge, promoting economic growth and social advancement.

Past policies have often excluded women from scientific studies and, consequently, the 'male' as the norm has dominated research content until very recently. Many examples of gender bias in research process and in engineering have now been identified, and we are much more aware what the consequences for the reliability of science knowledge base are when there is far less evidence available for women than there is for men. For example, our understanding of environmental toxic effects is based mostly on studies that excluded females, producing gaps in toxicokinetic models relating to the exposure and susceptibility to chemical risk for women throughout their lives. It is perhaps not surprising that of the 10 prescription drugs withdrawn from the market in the US during 1997-2000, eight were more dangerous to women than to men, with four significantly so.

Another example, from metrology, concerns current radiation dosimetry models, which do not fully or accurately reflect available radiobiological or physiological information, either because the models are outdated or because they were based on selective or uncritical use of data from measurements involving the bodies of white, middle-aged men. The concern among medical professionals is growing. Since the average annual radiation exposure increased dramatically over the last 20 years, (in the United States by about 75 per cent between 1982 and 2006) radiation dosimetry models do not provide sufficient support to minimise risk, for example, when radiation is used as medical intervention (140 million X-ray examinations are performed per year in Germany alone) in the case of women, children, and young men.

The main purpose of the examples highlighted in this volume is not to demonstrate the presence of gender bias in science – a good introduction and many research papers, together with an overview, can be found on the genSET website at www.genderinscience.org. Rather, the aim is to draw attention to the emerging understanding of the importance of considering 'gender' as a driver for new research ideas, for promoting innovation, and as a way to stimulate new markets for science knowledge.

The traditional route for knowledge transfer has favoured the research-to-manufacture, technological advancement model, driven by commercialization interests and consumer markets, where intellectual value could be protected by patents and licensing. But knowledge itself can be transformed into a tool (e.g. services to advance Civil Society) or a product (i.e. the specific know-how and expertise), in both a tangible (e.g. e-course) and intangible form (e.g. professional advice). Our objective here is to raise awareness of the quality-enhancing role that the gender dimension can play in knowledge production, and of the market-growth enhancing role that it can have in innovation. This is a win-win situation, with gender equality becoming a 'big ticket' item for policy makers and science communities wishing to maximise the value and benefit of societal investment in R&D.

The core of the EU Europe 2020 policy strategy for growth and jobs is for future investment in R&D to play a key role in creating sustainable economies and orienting knowledge production towards solutions linked to societal challenges (climate change, energy and food security, health and an ageing population). Its flagship initiative, Innovation Union is built around 34 specific commitments with the broad aim to ensure that innovative ideas are translated into new goods and services that create growth and jobs.

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There is no gender equality indicator among the 34 performance commitments to show that women and men will benefit equally from Innovation Union. A recent Eurobarometer study of the attitudes to innovation among Europe's citizens concluded that women are "anti-innovation." Such gender bias represents a real barrier to engaging women's human capital in innovation (60% of undergraduates and 50% of PhD students in Europe are women) and tapping into women's growing consumer budgets (estimated at $20 trillion annually worldwide) in the plans for economic growth. Not challenging gender bias would be a major cause of opportunity loss for Innovation Union.

In HORIZON 2020, for the very first time, a systematic, policy-driven intervention has been envisaged to promote the gender dimension as a way to improve quality of science knowledge production and application. The 2012 Gender Summit provides a timely opportunity to discuss and agree on the practical ways in which the gender equality mission of the HORIZON 2020 proposal could be translated into effective, operational structures and practices in the next Framework Programme (e.g. requiring that gender aspects of the proposals are evaluated).

It is our hope, that this collection of research and innovation examples will encourage researchers, innovators, policy makers, citizens, and others to take a fresh look at gender, and, specifically, consider its role as an important dimension of quality, and an opportunity to create competitive, sustainable and inclusive knowledge economies. We have also included in this report six examples of very recent studies (e.g. benchmarking), projects (e.g. involving women in innovation cycle), and guidelines (e.g. science leaders' recommendations) specifically focused on the role of using gender equality to enhance effectiveness of research and innovation.

To help promote the discussion, now and in the future, the 2012 European Gender Summit includes a Community Portal and a TV Channel, both linked to the Summit website www.gender-summit.eu, developed through the initiative and generosity of the European Science Foundation(www.esf.org) and the support of the Davinci Institute(www.davinci-institute.net).

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Six examples of recent contributions to advancing evidence for addressing gender issues in research and innovation: genSET science leaders' Consensus Report; Portia's Creating Futures in Science project; Fraunhofer Discover Markets project; WIGSAT's Benchmarking Survey; AWIS' work-life balance survey; ETH's Women Professors Network

FROM IDEAS to MARKETS: the GENDER FACTOR - Biomarkers

BIOMARKERS for BETTER HEALTH
for women and men enabling more accurate diagnostic and therapeutic approaches that recognise important biological differences, from the molecular to population levels.

SUMMARY

"The investigation of 131 serum metabolite concentrations of 3,300 population based samples revealed significant differences in the metabolite profile of males and females. Furthermore, a genome-wide picture of sex-specific genetic variations in human metabolism of 2,000 subjects showed differences in the effect of genetic variations on metabolites in men and women. Metabolites, which may be used as predictive biomarkers to indicate the presence or severity of a disease, have to be used selectively depending on sex."[1]

The global biomarker market was valued "at $13.16 billion in 2011, growing at a steady pace of Compound Annual Growth Rate (CAGR) of 14.40%. It is expected to reach $25.79 billion by 2016. The biomarker discovery technology market is the major contributor of this market followed by the application market. Oncology is seen to be the largest indication in terms of revenue, but cardiology is the fastest growing indication with a CAGR of 16.24% expected from 2011 to 2016. In both these areas, women as a topic for research have been studied in the past far less than men, suggesting that new opportunities for targeting women's needs in the diagnostics and therapeutic biomarker markets may be overlooked, with the possible increase in risk for women from inadequately evidenced products.

North America is leading the market followed by Europe and Asia, which is the fastest growing region due to high adoption rate of high throughput technologies for biomarker discovery and rapid growth of IT industry in this region."[2]

LEADING RESEARCH GROUPS
http://www.helmholtz-muenchen.de/epi/epi-home/index.html

KEY DISCIPLINES
Biochemistry, Genetics, Medicine, Molecular Biology, Bioinformatics, Proteomics, Metabolomics, Molecular Diagnostics

TARGET INDUSTRIES/MARKETS
Pharmaceuticals, Diagnostics, Health, Insurance, Regulatory industry

NEW PRODUCTS/SERVICES
Personalised drug design, Predictive diagnostic tools, Computer analytics, Laboratory equipment (e.g. http://www.lifetechnologies.com/uk/en/home.html), Forensic technology

REFERENCES

1 Kirstin, Mittelstrass, K.; Janina S. Ried, Zhonghao Yu, et al. 2011, Discovery of sexual dimorphisms in metabolic and genetic biomarkers, PLoS Genetics 7(8):e1002215
2 http://www.marketresearch.com/MarketsandMarkets-v3719/Biomarkers-Discovery-Technologies-Applications-Indications-6792106/

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FROM IDEAS to MARKETS: the GENDER FACTOR - Cancer Probe

LIGHT SCATTERING DEVICE IMPROVES accuracy of standard equipment used to diagnose patients at risk of develop colon cancer.

SUMMARY

Colon cancer is the second-leading cause of cancer death in the United States, killing 55,000 Americans each year. It occurs more or less equally in women and men. The disease is 90 percent preventable if precancerous polyps are detected early and removed. Current diagnosis guidelines are that everybody over age 50 is recommended to undergo colonoscopy at least once every 10 years. This would mean testing more than 90 million Americans over the age 50. Evidence shows that 70-80% of colonoscopies are negative and unnecessary and that 85% of the population receives no colonoscopic screening. Colonoscopic screening of the entire eligible population is impossible due to: 1) expense (annual cost would be ~$50 billion); 2) insufficient number of endoscopists; 3) patient reluctance; 4) complication rates.[1]

While colon cancer strikes roughly as many women as men, there are significant differences in how the disease presents itself. Women are more likely to have cancerous lesions in the proximal colon, the section of the colon furthest away from the rectum and the part of the colon that isn't examined during flexible sigmoidoscopy. Due to this discrepancy, studies have found that flexible sigmoidoscopy alone detected only one-third of colon cancer in women. With the estimated cost attributable to colon cancer treatment 1 year after diagnosis in the US at $29,196, there are clear benefits to improve diagnosis for women.[2]

By using a novel light-scattering approach, scientists were able to detect an early increase in blood supply (EIBS) in the distal colonic mucosa, which served as a marker of field carcinogenesis and, hence, proximal neoplasia. The technology makes use of a biological phenomenon known as the "field effect," a hypothesis that suggests the genetic and environmental milieu that results in a neoplastic lesion in one area of an organ should be detectable throughout the organ and even in neighbouring tissue.

LEADING RESEARCH GROUPS
Department of Biomedical Engineering at McCormick at Northwestern University

KEY DISCIPLINES
Biophotonics, Biomedical Engineering, Imaging, Medical Diagnostics, Optical Microscopy

TARGET INDUSTRIES/MARKETS
Diagnostic equipment, Health

NEW PRODUCTS/SERVICES
Diagnostic equipment, Fibre optic probes

REFERENCES

1. N. Mutyal, A. Radosevich, B. Gould, J.D. Rogers, A. Gomes, V. Turzhitsky, V. Backman, A fiber optic probe design to measure depth-limited optical properties in vivo with Low-coherence Enhanced Backscattering (LEBS) Spectroscopy, Optics Express, 20(18), 19643-19657 (2012)
2. Hemant K. Roy, Andrew J. Gomes, Sarah Ruderman, 2010. Optical Measurement of Rectal Microvasculature as an Adjunct to Flexible Sigmoidosocopy: Gender-Specific Implications, Cancer Prev Res; 3(7); 844–51

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FROM IDEAS to MARKETS: the GENDER FACTOR - Wounds

LED for BETTER WOUND HEALING
in women and men enabling quicker repair of skin wounds by inducing skin blood vessels to stop bleeding faster.

SUMMARY

Wound healing, as a normal biological process in the human body, is achieved through four precisely and highly programmed phases: haemostasis, inflammation, proliferation, and remodelling. For a wound to heal successfully, all four phases must occur in the proper sequence and time frame.

Research has shown that "skin architecture displays inherent gender divergence: the dermis is thicker in males than females and the epidermis and hypodermis are both thicker in females."[1] These differences can provide the basis for skin healing treatments that are different for women and for men.

In wound healing sexual dimorphism involves: "steroid sex hormones, macrofage migration inhibitory factor (MIF), plus other factors... Normalization of the hormonal milieu helps reveal underlying differences in the ways that wounds heal in males and females. These differences extend to the response to MIF, which worsens repair in females but not males...[with] important implications for the treatment of chronic wound pathologies." [2]

"Non-healing wounds affect about 3 to 6 million people in the United States...[which] result in enormous health care expenditures, with the total cost estimated at more than $3 billion per year." [3]

LED induced photo-coagulation has been shown to "speed up the healing process... the specific absorption of the radiation wavelength by haematic components, without interacting with other tissues...it ensures the minimum invasivity of the technique." [4]

LEADING RESEARCH GROUPS
http://www.ipc.uni-jena.de/members.php?id=2&lang=en, http://www.lens.unifi.it/bio/, http://www.photonics4life.eu

KEY DISCIPLINES
Photonics, Biochemistry, Physiology, Medicine, Molecular Biology, Epidemiology

TARGET INDUSTRIES/MARKETS
Optical therapeutic instruments, Health Care, Insurance, Regulatory Industry

NEW PRODUCTS/SERVICES
Antihaemorraghic treatments, for humans (e.g. closing shaving cuts) and animals (e.g. stopping bleeding in too closely clipped nails where the vein is located in the middle of the nail)

REFERENCES

1 Mathieu D, Linke J-C, Wattel F. (2006). Non-healing wounds. In: Handbook on hyperbaric medicine, Mathieu DE, editor. , Netherlands: Springer, pp. 401-427

2 Stephen C. Gilliver, Jayalath P.D. Ruckshanthi, Matthew J. Hardman et al (2008). Sex Dimorphism in Wound Healing: The Role of Sex Steroids and Macrophage Migration Inhibitory Factor. Endocrinology, Nov 2008, 149(11): 5747-5757

3. S. Guo and l.A. DuPietro (2010). Factors Affecting Wound Healing, J Dent Res. 2010 March; 89(3): 219–229

4. http://www.light4tech.com/emoled.html

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FROM IDEAS to MARKETS: the GENDER FACTOR - Antenna

BREAST CANCER DIAGNOSIS IMPROVED for women and men through antenna technology used in land mine detection, changing the diagnostic equipment as well

SUMMARY

Developed at the University of Bristol (UK), MARIA is made from 60 antennas, which create a complete scan of the breast in only eight seconds, searching for areas with a high dielectric constant. In the human body, these areas are rich in blood and water, the hallmark signs of a tumour. The scanning technology was originally made for land mines, which also have a high dielectric constant around them. Patients simply lie on a table with a circular hole cut into it, which their breast hangs through, while the machine is hydraulically moved up to 'nestle' against the skin. It then scans the breast to pick up areas with a high dielectric constant - immediately highlighting them in a bright colour such as blue or red. Three successful trials involving more than 300 women at Bristol's Frenchay and Southmead hospitals were already carried out. Results from the latest trials, completed this year, showed a diagnostic success rate of 80 per cent, although the team are aiming to boost that to 90 per cent.[1]

The most significant risk factors for breast cancer are gender (being a woman) and age (growing old). A man's lifetime risk of getting breast cancer is 1:1000 for women it is 1:8. In England, the breast screening programme is now estimated to cost around £96 million a year. A new study reported in the British Medical Journal suggested that experts overestimated the extent to which screening saved lives, and ignored the risks that come with it. The principal risk is misdiagnosis, which leads to unnecessary surgery and medication, and happens much more often than accepted until now. More effective screening policy and technology is needed to avoid risks of damage due to factors such as the type of attenuated radiation used for soft tissue visualisation, vigorous compression of the breast tissue and needless biopsies.[2]

LEADING RESEARCH GROUPS
Engineering Department, University of Bristol

KEY DISCIPLINES
Engineering, Medical diagnostics

TARGET INDUSTRIES/MARKETS
Medical diagnostics

NEW PRODUCTS/SERVICES
Cancer screening

REFERENCES

1.http://www.maturetimes.co.uk/health/health-news/745-cancerdiagnosed-in-eight-seconds-–-with-"landmine-technology."html. 13 January 2012
2. BMJ 2012; 344 doi: 10.1136/bmj.d8279 (Published 6 January 2012)

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FROM IDEAS to MARKETS: the GENDER FACTOR - Eggs

KNOWING SEX of CHICKEN EMBRYO can help egg and poultry industry better manage egg and bird production, as well as improve animal welfare.

SUMMARY

There are an estimated 6 billion chickens in the world, that's one chicken per person. The need for segregation of poultry based on sex is driven by sex-related differences in growth rate, market, age, management practices, and nutritional requirements.

Each day, global poultry industry staff would ideally like to determine the sex of >150 million newly hatched birds. Currently, this can be done only manually at the hatchery, which is a virtually impossible undertaking.

It is becoming more difficult each year to conduct manual sexing, as this skill is disappearing from the workforce, is becoming unaffordable to the industry, and is encumbered by such negatives as repetitive motion disorder[1].

Automated gender sorting of eggs prior to hatching could resolve many, if not all, of these problems. Successful application of Ultraviolet Resonance Raman (UVRR) spectroscopy to determine the gender of birds has been tested. This approach is based on the fact that genome size is larger in male birds as compared to females.

In chickens, the difference relative to the respective DNA content amounts to about 2%. This difference should be detectable by means of UVRR spectroscopy since other sample components such as carbohydrates or lipids contribute negligible Raman signals in the deep UV region. After extraction of the DNA-rich cell material by pressing the thawed feathers from tip to base, no further extensive sample preparation is required[2].

This research and innovation has major applications for the poultry industry, in particular the egg industry which does not require male chickens. A way to determine the sex of a chicken embryo before it hatches should also save money and improve animal welfare[3] by reducing unnecessary cost of raising unwanted chicken such as food, water and vaccinations.

LEADING RESEARCH GROUPS
Adnan Menderes Universities Veteriner Fakultesi, Zootekni
CSIRO Livestock Industries' Australian Animal Health Laboratory (AAHL)
Molecular Profiling Laboratory, Massachusetts General Hospital Center for Cancer Research and Harvard Medical School, Charlestown, MA 02129

KEY DISCIPLINES
Genetics, Molecular Biology, Animal Health, Agriculture

TARGET INDUSTRIES / MARKETS
Poultry industry, Egg industry, Food, Farming

NEW PRODUCTS/SERVICES
Genetic sex testing equipment, Farming equipment and methods, Food production methods

REFERENCES

1 Tran HT, Ferrell W, Butt TR. An estrogen sensor for poultry gender sorting. J Anim Sci. 2010 Jan 15, LifeSensors Inc. 271 Great Valley Parkway, Malvern, Pennsylvania 19355.
2 http://www.daserste.de/wwiewissen/Gendering_per_Laserscan.pdf
3 Economist, Feb 9th 2010, http://www.economist.com/node/15491505

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FROM IDEAS to MARKETS: the GENDER FACTOR - Drilling

MORE EFFICIENT DRILLING in SPACE based on female wasp's drilling mechanism for laying eggs in wood with a minimum of power and least destruction to samples.

SUMMARY

"Apollo astronauts wielded rotary drills to penetrate beneath lunar terrain, but the close-packed regolith proved extremely resistant...ExoMars is one of several planetary missions incorporating a drill. One of the most difficult engineering challenges in extra-terrestrial exploration is gaining access to sub-surface samples and data." [1]

Low gravity encountered on Mars or on the Moon and the low mass of the probes, landers and rovers that carry drilling devices limit classical drilling techniques. Novel boring solutions optimised in mass and power consumption are thus needed for space applications and it is in the humble wood wasp, which drills holes into trees in order to lay its eggs, that the European Space Agency has identified a solution.

Their analysis showed the wood wasp's egg-laying 'ovipositor' to be divided into two elements, one side possessing cutting teeth and the other side equipped with pockets to remove the resulting debris. Applying this lesson in natural engineering, led to development of a double-drill bit able to penetrate metres underground using a few watts of power, providing more competitive performance compared to static penetration.[2]

The goal is to stimulate research for space applications in general as well as taking advantage of potential 'spin-in' for space from other technologies originally intended for other domains.

LEADING RESEARCH GROUPS
http://www.surrey.ac.uk/ssc/
http://www.isae.fr/en/
http://www.esa.int/gsp/ACT/bio/bio_op.htm

KEY DISCIPLINES
Space Research, Space Engineering, Mechanical Engineering, Soil Mechanics, Structural Biology, Sensors

TARGET INDUSTRIES/MARKETS
Space Applications, High Performance Machines, Robotics Exploration

NEW PRODUCTS/SERVICES
Drilling technology

REFERENCES

1 Thibault Gouache, Yan Gao, Yves Gourinat, Piere Coste , Wood wasp inspired planetary and Earth drill. In: Biomimetics, Learning from Nature, InTech - Open Access Publisher, Rijeka, Croatia, 2010, pp. 467-486. http://oatao.univ-toulouse.fr/ Eprints ID: 44
2 http://www.esa.int/esaMI/Technology/SEM737NEG5G_0.html

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FROM IDEAS to MARKETS: the GENDER FACTOR - Chemical Risk

IMPROVING CONSUMER PRODUCTS containing chemicals that disrupt female and male hormone systems and cause harmful effects.

SUMMARY

Endocrine Disrupting Chemicals (EDCs) represent a broad class of molecules such as organochlorinated pesticides and industrial chemicals, plastics and plasticizers, fuels, and many other chemicals that are present in the environment or are in widespread use. They can interfere with synthesis, secretion, transport, metabolism, binding action, or elimination of natural blood-borne hormones that are present in the body and are responsible for homeostasis, reproduction, and developmental process. A spectrum of disorders throughout life, some of which are sexually dimorphic, can be related to endocrine disruption. Male sexual differentiation is androgen-dependent (and potentially estrogen-dependent), whereas female differentiation occurs largely independently of estrogens and androgens. Therefore, it is expected that different disorders are seen in males and females as a result of EDC effects that overall mimic estrogens and/or antagonize androgens.[1,2]

Bisphenol A (BPA) is one of many man-made chemicals classified as endocrine disruptors. It is widely used in consumer products such as reusable water bottles, food can linings, water pipes and dental sealants. There is: “a very strong suspicion in the scientific community that this chemical has harmful effects on humans.” There is also environmental risk where plastic manufacturing and incineration creates air and water pollution and exposes workers to toxic chemicals.[3]

Studies have examined people from the general population and found associations between low levels of hormone-altering compounds and infertility and other reproductive problems, cardiovascular disease, neurodevelopmental effects, obesity, abnormal bone health, cancer and other diseases. The overall cost to society is enormous, and it continues to rise. Academic, regulatory and industry scientists must work together to identify and replace such chemicals that are ubiquitous in everyday consumer products. Reducing and eventually eliminating these exposures is absolutely needed to protect human health.[4]

LEADING RESEARCH GROUPS
Tufts University’s Department of Developmental and Regenerative Biology
Center for Risk Science and Public Health at The George Washington University
JRC, Institute of Health and Consumer Protection

KEY DISCIPLINES
Materials Science, Chemistry, Engineering, Environment

TARGET INDUSTRIES/MARKETS
Chemical, Plastics, Packaging, Fuel, Agriculture

NEW PRODUCTS/SERVICES
Packaging, Cleaning, Food containers, Dental products, Pipe and container linings

REFERENCES

1. Evanthia Diamanti-Kandarakis, Jean-Pierre Bourguignon, Linda C. Giudice, et al. Endocrine-Disrupting Chemicals: An Endocrine Society Scientific Statement, Endocrine Reviews June 1, 2009 vol. 30 no. 4 293-342
2. http://www.mst.dk/English/About+the+Danish+EPA/News/20120328pregnant.htm
3. http://www.environmentalhealthnews.org/ehs/news/2012/opinion-endocrine-disruptors-low-level-effects
4. BISPHENOL A SHOULD BE PHASED OUT FROM CONSUMER PRODUCTS, http://www.beuc.org/custom/2011-00248-01-E.pdf

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FROM IDEAS to MARKETS: the GENDER FACTOR - Radiation

IMPROVING DIAGNOSTIC RADIOLOGY through more accurate dosimetry models based on detailed physiological information for women and men, as well as children.

SUMMARY

Many of the current radiation dosimetry models do not fully or accurately reflect available radiobiological or physiological information, either because the models are outdated or because they were based on selective or uncritical use of data or inadequate model structures. For example, most current estimates of bone marrow radiation dose are obtained from two-dimensional images acquired from seven skeletal sites in a 44-year-old adult male during the late 1960s. The medical community is sounding the alarm about the potential for harm from excessive radiation exposure.

"According to the National Council on Radiation Protection and Measurements, the average annual radiation exposure in the United States increased about 75 percent between 1982 and 2006. During that time, the proportion of exposure due to medical interventions rose from 15 percent to 48 percent. Worldwide figures for 2000–2007 indicate that 3.6 billion medical procedures with ionizing radiation (3.1 billion diagnostic radiologic, 0.5 billion dental, and 37 million nuclear medicine examinations) are performed annually. Worldwide, the average annual per-capita effective dose from medicine (about 0.6 mSv of the total 3.0 mSv received from all sources) has approximately doubled in the past 10–15 years." [1]

In 1997, the German Federal Office for Radiation Protection reported 136 million X-ray examinations and 4 million nuclear medicine diagnostic tests, resulting in a mean effective dose of 2.15 mSv per person per year.[2] A total of about 41.5 million medical and dental x-ray examinations are now conducted each year in the UK (0.70 examination per head of population) resulting in an annual per caput effective dose of 330 μSv.[3]

LEADING RESEARCH GROUPS
European Association of National Metrology Institutes

KEY DISCIPLINES
Metrology, Radiation Physics, Medical diagnostics, Radiation risk

TARGET INDUSTRIES/MARKETS
Radiologic medical diagnostics and interventions

NEW PRODUCTS/SERVICES
X-ray and other radiation interventions, Protective equipment and measures

REFERENCES

1. http://radiology.rsna.org/content/253/2/520.full
2. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC381057/
3. http://www.medicalphysicist.co.uk/nrpb_w4.pdf, 2001

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FROM IDEAS to MARKETS: the GENDER FACTOR - Wildlife Control

IMPROVING WILDLIFE DISEASE CONTROL by taking into account different roles and impact in how males and females respond to and affect spread of infection.

SUMMARY

There is a great deal of interest in wildlife disease surveillance in Europe, and a lot of scholarly information from different disciplines has been contributed to this issue. A significant proportion of results and experience is not reported in peer reviewed journals, however. Moreover, efforts to co-ordinate the activities in this field are just beginning to develop. There is little agreement on what the best methods are.

Management through population reduction has been used in an attempt to control badger bovine TB, CSF in wild boars and fox rabies. Different methods were employed to kill badgers, wild boars and foxes, either at the den (burrow gassing) or by shooting or trapping (or even poisoning). However, a trial to reduce an animal population will be sooner or later balanced by reproduction or immigration. “Lessons and expertise deduced from previous experience are beneficial for the community on a whole since at the stage where we are, good descriptions and clear portrayal of facts are needed. We can certainly speculate and try to build hypotheses, models and theory about emerging infections and parasites, but factual information (properly sampled) is what is really desired.”[1]

Wildlife managers traditionally establish differential hunting regulations based on sex, but their goals have focused mainly on sustainable wildlife management and not disease control. Important economic trade-offs emerge from a sex-based management approach when disease control becomes an additional objective. Males and females influence demographic change differently. Sexual dimorphism can be used to manage wildlife disease because physical, physiological, genetic, and behavioural differences may lead to different levels of disease transmission and susceptibility between the sexes. Differentially harvesting males and females affects levels of disease prevalence, and the make up of both the current stock and future harvests – and, apart from disease control is also important because males and females of many species are valued differently.[2]

LEADING RESEARCH GROUPS
Department of Agricultural Economics, Agriculture Hall, Michigan State University
Ecole Nationalle Veterinaire Lione (ENVL), Unité Pathologie infectieuse,Marcy l’Etoile

KEY DISCIPLINES
Public Health, Field Biology, Behavioural Ecology, Evironment, Population Biology, Micorbiology, Epidemiology, Animal Health

TARGET INDUSTRIES/MARKETS
Wildlife Management, Agriculture, Veterinary services, Coordinating agencies

NEW PRODUCTS/SERVICES
Multidisciplinary training, Policy initiatives, Models

REFERENCES

1. M. Artoris, WILDLIFE INFECTIOUS DISEASE CONTROL IN EUROPE, J. Mt. Ecol., 7 (Suppl.): 89-97
2. Eli P. Fenichel, Richard D. Horan, and Christopher A. Wolf, The Role of Sexual Dimorphism in the Economics of Wildlife Disease Management

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FROM IDEAS to MARKETS: the GENDER FACTOR - Seeds

IMPROVING MAIZE HYBRID SEED PRODUCTION by exploiting the plant's own mechanism for producing male organs, to create plants that could save huge effort spent by commercial farmers on detasseling hybrid crops.

SUMMARY

The world produces around 850 million tonnes of maize seed per year.[1] "It is essential to change the architecture of plants to minimize how much land we need to produce food and fuels... If you can find a natural mutation or mechanism that gives you what you need, you are much better off than using transgenic techniques that could be difficult to get approval for...When maize loses the ability to produce brassinosteroids, it becomes a dwarf." The unexpected finding produced is that..."The plants without the naturally occurring steroids could not make male organs -- they had kernels where the tassels should be."[2]

In corn, the tassel is the male and silk on the ear is the female. In a commercial cornfield, only one hybrid is planted and pollen falls from the tassel on the silk, which promotes kernel and ear development. Seed companies create new corn hybrids by planting more than one variety in a field. Tassels are removed from one hybrid, but left on another to promote cross-pollination. The idea is to take the best traits from one type of corn and combine them with the best traits of another.[3]

A mutation resulting in the lack of brassinostereoids could be a cost-saving discovery for the seed industry. Hybrid seed producers must painstakingly remove the male pollen-producing tassels from each plant so that they do not pollinate themselves...maize plants that produce only female organs would eliminate the detasseling step.

Such discoveries could also help address market barriers and opportunities for farmers in drought-affected regions, e.g. Kenya, where reliance on maize is very high and where internal and external, local and certified seed markets compete, and better policies are needed for promoting high quality local seed production.[4]

LEADING RESEARCH GROUPS

Departments of Horticulture and Landscape Architecture and Botany and Plant Pathology, Purdue University, West Lafayette, http://www.purdue.edu/

RIKEN Advanced Science Institute, Wako-shi, Saitama 351-0198, Japan

ESRC STEPES Centre, UK

KEY DISCIPLINES

Genetics, Agriculture, Horticulture, Plant pathology, Biochemistry, Biophysics

TARGET INDUSTRIES/MARKETS

Food industry, Hybrid seed production, Agricultural machinery, Land management, Agricultural policy

NEW PRODUCTS/SERVICES

Locally-focused hybrid seed production and distribution, Plants for better land/water management, Harvesting systems, Food supply security

REFERENCES

1. http://www.geohive.com/charts/ag_maize.aspx

2. Thomas Hartwig, George S. Chuck, Shozo Fujioka, Antje Klempien, Renate Weizbauer, Devi Prasad V. Potluri, Sunghwa Choe, Gurmukh S. Johal, Burkhard Schulz. Brassinosteroid Control of Sex Determination in Maize. Proceedings of the National Academy of Sciences, 2011

3. http://wcfcourier.com/business/local/detasseling-vital-for-crop-development-summer-employment/article_7ca1b2d2-9211-11df-8878-001cc4c03286.html?mode=image

4. Environmental Change and Maize Innovation in Kenya. Exploring Pathways in and out of Maize, October 2009, The ESRC STEPS centre.

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FROM IDEAS to MARKETS: the GENDER FACTOR - Biofuels

IMPROVING BENEFITS OF BIOFUELS
to reduce exclusion of women from agriculture and improve social and environmetal benefits of second generation technologies through the added value of by-products.

SUMMARY

"In Africa, where two-thirds of farmers are women, the potential of biofuels as a low or lower-carbon alternative fuel, with applications at the household energy, community and village level, to a national resource or export commodity, has a critical gender dimension. The key question is: how will increased biofuel production affect women? It's important to account for the complexities involved, and not rely on a simple, traditional commodity model but one that tracks the impacts on women through changing prices and demands for crops to be sold on local and international markets. Who gains and who loses as prices change, and as the value of specific crops and of land changes?"[1]

"Mozambique has recently received numerous requests for land to produce biofuel feedstock, such as sugarcane for ethanol and jatropha for biodiesel. By 2009, requests exceeded 20 million hectares, which is equivalent to two thirds of total arable land in the country and four times the land currently cultivated. Not all requests are considered credible, however, with many of them merely attempting to obtain land use rights in a country where the state formally owns all land. Nevertheless, a recent rapid appraisal of biofuels investors identified 15 ongoing projects seeking to plant a total 500,000 hectares. The analysis of Mozambique through the gender lens is important because biofuels expansion implies rapid growth in cash/export crop production, where men tend to predominate. Food crop production, where women provide the majority of labor, will be indirectly affected via resource competition and exchange rate effects, which are likely to make imported foods relatively more attractive. This leads to higher food prices. Moreover, a shortage of skilled female labor implies that wages for these workers increase substantially."[2]

Another aspects to consider is second-generation biofuels, using recycled waste oils or cellulose containing plant residues such as rice husks, wheat straw or wood chips, which may have fewer negative environmental and social impacts than the first generation biofuels, such as sugar cane, and palm oil, etc. The socio- economic and gender dimensions of second-generation biofuels requires attention as they become commercially available.[3]

LEADING RESEARCH GROUPS
Department of Economics, University of Copenhagen
Gender and Development Group, World Bank
United Nations University's World Institute for Development Economics Research

KEY DISCIPLINES
Economics, Development, Social Science, Behavioural Science, Environment, Energy

TARGET INDUSTRIES/MARKETS
Development, Innovation, Energy, Policy

NEW PRODUCTS/SERVICES
New fuel production methods, Better cash crop production, Skills training

REFERENCES

1. http://blogs.worldbank.org/climatechange/biofuels-threat-or-opportunity-wome
2. Channing Arndt, Rui Benefica, James Thurlow, Gender Implications of Biofuels Expansion in Africa: The Case of Mozambique, World Bank
3. Valerie Nelson and Yianna Lambrou, Scoping the Gender Issues in Liquid Biofuel Value Chains, university of Greenwich

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FROM IDEAS to MARKETS: the GENDER FACTOR - Cooking Stove

IMPROVING BIOFUEL COOKING STOVES to reduce health risks to women from bad indoor air pollution and to improve fuel consumption thus protecting the environment.

SUMMARY

"Half of the world's population, and up to 95 percent in poor countries, rely on solid fuels, including biomass fuels (e.g. wood, dung, agricultural residues) and coal, to meet their energy needs. The World Health Organization lists "indoor air pollution (IAP) from primitive household cooking fires as the leading environmental cause of death in the world (women and girls, mostly)," stating that "it contributes to nearly 2.0 million deaths annually," about as many deaths as malaria and tuberculosis combined. It is conventional wisdom that it is possible to reduce exposure to indoor air pollution, improve health outcomes, and decrease greenhouse gas emissions in the rural areas of developing countries through the adoption of improved cooking stoves. This belief is largely supported by observational field studies and engineering or laboratory experiments.

A randomized control trial conducted in rural Orissa, India (one of the poorest places in India), on the benefits of a commonly used improved stove that laboratory tests showed to reduce indoor air pollution and require less fuel has contradicted these assumptions. Tracking household behaviour for up to four years after they received the stove the study found no evidence of improvements in lung functioning or health and no change in fuel consumption (and presumably greenhouse gas emissions). The difference between the laboratory and field findings appear to result from households' revealed low valuation of the stoves. Households failed to use the stoves regularly or appropriately, did not make the necessary investments to maintain them properly, and usage rates ultimately declined further over time.

Testing environmental and health technologies in real-world settings where household behaviour may temper impacts, and to test them over a long enough horizon to understand how this behavioural effect evolves over time, is critical. Organisations such as the Global Alliance for Clean Cookstoves (GACC), has called for 100 million homes to adopt clean and efficient stoves and fuels by 2020. Rigorous evidence on the efficacy on health and fuel use of recommended technologies is needed",[1] as well as an appreciation what we mean when we talk about the 'household' and its impact. Is the role of the women within recognised fully?.[2]

LEADING RESEARCH GROUPS
Centre for International Development, Harvard University
Haas School of Business, University of California
Università "Ca' Foscari" di Venezia, Italy, Dept. of Economics

KEY DISCIPLINES
Economics, Development, Social Science, Behavioural Science, Environment, Energy

TARGET INDUSTRIES/MARKETS
Development, Innovation

NEW PRODUCTS/SERVICES
Improved stoves, Fuel

REFERENCES

1. Rema Hanna, Esther Duflo, Michael Greenstone, UP IN SMOKE: THE INFLUENCE OF HOUSEHOLD BEHAVIOUR ON THE LONG-RUN IMPACT OF IMPROVED COOKING STOVES, CID Working Paper No. 241 April 2012
2. Vijay Laxmi, Jyoti Parikh, Shyam Karmakar and Pramod Dabrase, Household energy, women's hardship and health impacts in rural Rajasthan, India: need for sustainable energy solutions, Energy for Sustainable Development l Volume VII No. 1 l March 2003

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FROM IDEAS to MARKETS: the GENDER FACTOR - Textiles

IMPROVING PROTECTIVE TEXTILES
to take into account differences between skin properties of women and men and the nature of expected protection.

SUMMARY

The skin exerts a number of essential protective functions ensuring homeostasis of the whole body. It acts as a barrier to the external world, providing thermoregulation and antimicrobial defence. Textiles, in particular clothing, interact with skin functions in a dynamic pattern. Mechanical properties like roughness of fabric surface are responsible for non-specific skin reactions like wool intolerance. Thermoregulation, which is mediated by local blood flow and evaporation of sweat, is an important subject for textile-skin interactions. There are age-, gender- and activity-related differences in thermoregulation of skin that should be considered for the development of specifically designed fabrics. Antimicrobial textiles may interfere with non-specific defence mechanisms like antimicrobial peptides of skin or the resident microflora. Antibacterial compounds like silver, copper and triclosan have been used in conjunction with textile material. Macromolecules with antimicrobial activity like chitosan have been incorporated into textiles. Interaction of textiles with the specific immune system of skin may lead to allergic contact dermatitis. Electronic textiles and other smart textiles offer new areas of usage in health care and risk management but bear their own risks for allergies.[1]

Medical textiles are one of the most dynamically expanding sectors in the technical textile market. Above average growth rates are a result of increases in consumption in developing countries in the Asian and Western markets. A forecast suggests that the world market for medical textiles will increase at a rate of 4.5% per annum in volume from 2005 to 2010 to reach 2.4 million tons with a value of $8.2 billion by 2010. Additionally, technical textiles will grow at 3.8% per annum to reach 23.8 million tons with a value of $126 billion dollars in the same time frame.

Disposable and reusable textile products are two popular but competing materials employed in health care and other fields requiring personal protection against biological and chemical hazards.[2] For example, Kimberly-Clark has introduced its first line of gender specific adult absorbent underwear. The new male and female designs are tailored to fit the unique body shapes of both sexes offering superior fit and protection.

LEADING RESEARCH GROUPS

Department of Dermatology, Hospital Dresden-Friedrichstadt, Academic Teaching Hospital of the Technical University of Dresden, Germany
Division of Textiles and Clothing One Shields Avenue, University of California, Davis, CA, US

KEY DISCIPLINES

Materials, Textile Engineering, Environment, Toxicology, Fashion, Chemical Engineering

TARGET INDUSTRIES/MARKETS

Medical environment, Hazard protection, Waste management

NEW PRODUCTS/SERVICES

Protective clothing, Functional textiles, Technical textiles, Disposable and reusable products

REFERENCES

1. Wollina U, Abdel-Naser MB, Verma S., Skin physiology and textiles - consideration of basic interactions, Curr Probl Dermatol. 2006;33:1-16
2. Health Protective Textiles: Bridging the Disposable/Reusable Divide A National Science Foundation – Materials Use: Science, Engineering, and Society Study, University of California, Berkeley

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FROM IDEAS to MARKETS: the GENDER FACTOR - Packaging

PACKAGING for MORE EFFECTIVE application of prescription medicines helping patients to take medicine as recommended by the manufacturer or the doctor.

SUMMARY

In the context of health, “proper patient compliance with taking the right dose of the right medication at the right time for the prescribed duration of the treatment is very important... Carefully designed packaging can make a significant contribution to patient compliance with respect to, for example: 1) Ease of identification; 2) Clarity of instructions; 3) Visible evidence of medication taken. Through elements such as printing, colour-coding and the format of the package itself, package designers can incorporate features that serve to improve patient compliance.”[1,2]

“In the US the number of patients needing support to stay compliant or adhere to medication instructions is around 150 Million, and for Europe the relative figure would be in excess of 220 million people, 50% of whom are estimated to give up their treatment within one year, while they are supposed to stay on the prescribed treatment. It has been estimated that every day 10% of those who are engaged with their therapy forget to take their medicine.”[3]

”Clyk is a refillable electronic tablet dispenser with an LCD display...specifically designed to help women comply with a new oral contraceptive within a unique flexible extended intake regimen, to provide a woman with reliable contraception and the option to personally plan her period. The dispenser guides the woman through her cycle and the 4 day tablet free interval.”[4]

LEADING RESEARCH GROUPS
http://www.hcpc-europe.net
http://abcproject.eu/index.php

KEY DISCIPLINES
Packaging Design, Psychology, Manufacturing, Pharmacology

TARGET INDUSTRIES/MARKETS
Pharmaceutical industry, Packaging industry, Patient organisations, Health insurance, Health professionals organisations, Policy makers

NEW PRODUCTS/SERVICES
Packaging, dispensers, education for healthcare professionals, education for patients

REFERENCES

1. http://www.hcpc-europe.net/cms/front_content.php?idcat=3
2. http://abcproject.eu/img/Brussels%20presentation%20FINAL.pdf
3. http://www.hcpc-europe.net/cms/front_content.php?idcat=200
4. http://www.hcpc-europe.net/cms/front_content.php?idcat=205

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FROM IDEAS to MARKETS: the GENDER FACTOR - Safety

SOFT ARMOUR PROTECTION SOLUTIONS that are flexible and strong and can be specifically adapted to suit women's and men's bodies.

SUMMARY

In the early 1970s, DuPont commercialised aramid fibre, under the trade name Kevlar. Long aramid molecules were dissolved and then spun into fibres that were stretched as they solidified. This process oriented the long molecules along the length of the fibre, greatly increasing the finished fibre's tensile strength. Originally developed to replace steel in the reinforcement belts of car and truck tires, aramid proved useful as well for bulletproof vests.[1]

"More recently, systems have been developed to provide the highest level of ballistic penetration resistance and blunt trauma protection for concealable protection vest. Specialized laminate materials typically found in hard armour ballistic panels have been adapted into flexible soft armour solutions for individual protection. Law enforcement officers benefit from increased safety and protection against ballistic penetration as well as the devastating effects of blunt trauma impact"[2].

"The concept of a 'curvy' bulletproof vest was adopted for women, that would fit perfectly to the female body curves offering maximum comfort possible, with functionality and key structural features. The female vest combines the highest ballistic protection, low blunt trauma effect, positive flotation, UV and moisture resistance and high comfort. The vest has already been chosen by Belgium, France and Finland Police officers to protect them in their everyday duty life.[3]"

The number of women serving in the police is rising. In Scotland's eight police forces it has reached a record high. New figures show that female officers now account for 26.8 per cent of the police workforce. The findings reveal a huge rise in women entering the force since 1998, when just 15.3 per cent of officers were female. Two of the eight chief positions on Scotland's police forces are now held by women. And 32 per cent of new recruits each year to the Scottish Police College at Tulliallan in Kincardine, Fife, are female - a level which has been achieved for the past five years."[4]

LEADING RESEARCH GROUPS
Army Research Laboratory (ARL, US)
http://www2.dupont.com/personal-protection/en-us/dpt/article/ballastics-lab.html
http://www.pro-systems-ballistic-protection.com/engl/company_profile.html

KEY DISCIPLINES
Physics, Materials Science, Chemistry, Polymer Chemistry, Composite Materials

TARGET INDUSTRIES/MARKETS
Personal protection, Police, Army, Materials, Laboratory methods

NEW PRODUCTS/SERVICES
Personal protection gear for women and for men, Mechanical testing, Optical testing

REFERENCES

1. http://www.compositesworld.com/articles/new-options-in-personal-ballistic-protection
2. http://www.turtleskin.com/Body-Armor/Body-Armor-Soft-Panel.aspx
3. http://www.army-technology.com/contractors/personal/elmon-co/presselmon-female-curvy-bulletproof-vest.html
4 .http://www.dailyrecord.co.uk/news/scottish-news/2011/03/06/record-high-as-number-of-women-police-officer-hits-27-of-workforce-86908-22970532/

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FROM IDEAS to MARKETS: the GENDER FACTOR - Gaming

ON-LINE GAMING SOFTWARE for RESEARCH with thousands of users, women (30%) and men contributing solutions for faster and more effective exploration and manipulation of protein structure.

SUMMARY

"The online game Foldit, developed by teams led by Zoran Popovic, director of the Centre for Game Science and biochemist David Baker, both at the University of Washington in Seattle, allows players to manipulate structures involved in the folding of proteins on their home computers in search of the best-scoring (lowest-energy) configurations."[1] The latest effort involved an enzyme that catalyses one of a family of dedicated reactions used regularly in synthetic chemistry, called Diels-Alder reactions. Members of this huge family of reactions are used throughout industry to synthesise everything from drugs to pesticides, but enzymes that catalyse Diels-Alder reactions have been elusive and FoldIT users can help.

Foldit turns protein-folding into a game and awards points based on the internal energy of the 3-D protein structure, dictated by the laws of physics. The game was part of an experiment to see if gamers could pick up where supercomputer logic fails. Gamers can take risky moves and can consider the future, which are things computers can't do.[2]

In one problem, 57,000 players have taken the challenge to contribute to scientific research of solving a problem that scientists couldn't solve for over 10 years. It's a new kind of collective intelligence, as opposed to individual intelligence. FoldIT top five solo players didn't study biochemistry after high school and most of the players are not scientists. 30% of Foldit players are women, and some are among the highest-scoring Foldit players.

The project has progressed from volunteers donating their computers' spare processing power for protein-structure research, to actively being engaged in predicting protein structures, and now to designing new proteins. The game has 240,000 registered players.

LEADING RESEARCH GROUPS
Centre for Game Science, University of Washington

KEY DISCIPLINES
Chemistry, Biochemistry, Physiology, Medicine, Molecular Biology, Structural Biology

TARGET INDUSTRIES/MARKETS
Chemical industry, Pharmaceutical industry, On-line gaming,

NEW PRODUCTS/SERVICES
Enzyme design, Designing new proteins, Gaming software for research, Open innovation platforms

REFERENCES

1 Jessica Marshall, (2012, Victory for crowd sourced biomolecule design, http://www.nature.com/news/victory-for-crowdsourced-biomolecule-design-1.9872

2 Cooper, S. et al. Predicting protein structures with a multiplayer online game. Nature 466, 756–760 (2010)

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FROM IDEAS to MARKETS: the GENDER FACTOR - Voice Response

IMPROVING VOICE RECOGNITION SYSTEMS to reduce the higher level of errors when responding to women's voices compared to men's, as well as improving accuracy on tasks.

SUMMARY

Interactive voice response (IVR) systems are one of the most mature applications of automatic speech recognition (ASR) today and are widely deployed for customer care and service applications. ASR research is currently moving from mere "speech-to-text" (STT) systems towards "rich transcription" (RT) systems, which annotate recognized text with non-verbal information such as speaker identity, emotional state. In IVR systems, this approach is already being used to identify dialogues involving angry customers, which can then be analysed with the goal of automatically identifying problematic dialogues. Also, the first adaptive dialogues are now appearing, particularly in systems exposed to inhomogeneous user groups. These can adapt a degree of automation, order of presentation, waiting queue music, or other properties to properties of the caller such as age or gender. As an example, it would be possible to offer different advertisements to women and men in the waiting queue.

In non-personalised services, speaker classification will be based on the caller's speech data. While classifier performance is only one factor influencing the utility of the above approach in an IVR system, it is certainly a major factor.[1] In the case of speaker-independent voice recognition it is well known that the performance of recognizers for female speakers is almost always worse than for male speakers. The common solution is to have separate male and female acoustic-phonetic models. There is a significantly higher rate of transcription error in women compared to men when using commercial voice recognition applications.[2]

There are other types of error issues with IVRs: research has shown that speech recognition software produces eight times as many errors as conventional dictation transcription in breast imaging reports. Major errors included word omission, word substitution, nonsense phrases, and punctuation errors, among others. Errors varied by report type. Breast MRI reports were most prone to them, with 35 percent of speech recognition versions having a major error, 13 percent of interventional procedures, and 15 percent of mammography reports (the dictation equivalents had error rates of 7 percent, 4 percent and 0 percent, respectively).[3]

LEADING RESEARCH GROUPS
INRS Telecommunication, France
Machine Intelligence Laboratory, University of Cambridge

KEY DISCIPLINES
Acoustics, Phonetics, Language, Computing, Databases,Software Development, Modelling

TARGET INDUSTRIES/MARKETS
Telecommunication, Health, Customer services, Call Centres

NEW PRODUCTS/SERVICES
Voice response tools, Communication support tools, Transcription tools

REFERENCES

1. Florian Metze, Jitendra Ajmera, Roman Englert, Udo Bub et al, Transferring unsatisfied customers to an agent, and other purposes. COMPARISON OF FOUR APPROACHES TO AGE AND GENDER RECOGNITION FOR TELEPHONE APPLICATIONS, , ICASSP 2007
2. Rivarol Vergin , Azarshid Farhat , Douglas O'Shaughnessy, Robust Gender-Dependent Acoustic-Phonetic Modelling In Continuous Speech Recognition Based On A New Automatic Male/Female Classification, in Fourth Internalional Conference on Spoken Language Processing, 1996, http://www.asel.udel.edu/icslp/cdrom/vol2/816/a816.pdf
3. Sarah Basma, 2011, Speech Recognition Brings Breast Imaging Report Errors, American Journal of Roentgenology.

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FROM IDEAS to MARKETS: the GENDER FACTOR - Communication

TRANSLINGUAL COMMUNICATION
can support intercultural exchanges in an increasingly globalized world by including knowledge how women and men use English language.

SUMMARY

"Comparing the language of men and women in a large, heterogeneous sample of written and spoken text reveals small but consistent gender differences in language use. For the women who contributed 8,353 text files to the study, the English language was more likely to be used for discussing people and what they were doing, as well as communicating internal processes to others, including doubts. Thoughts, emotions, senses, other peoples, negations, and verbs in present and past tense figured high on the list of words that women used more than men. For the men who contributed 5,970 files, language was more likely to serve as a repository of labels for external events, objects, and processes...Contrary to popular stereotypes, men and women were indistinguishable in their references to sexuality, anger, time, their use of first-person plural, the number of words and question marks employed, and the insertion of qualifiers in the form of exclusion words (e.g., but, although)." [1]

"Along with the growing need for intercultural and translingual communication in an increasingly globalized world, machine translation (MT) becomes more and more important both in assisting language professionals in their daily work and in helping non-professionals understand and create texts in foreign languags...if you regard these [MT] as communication aids or translation tools rather than as a substitute for a human translator, you will find that their value is often vastly underestimated." [2]

LEADING RESEARCH GROUPS
Lingenio GmbH, Heidelberg, http://www.lingenio.de/
Department of Social and Behavioural Sciences, Arizona State University, https://webapp4.asu.edu/directory/person/1094007

KEY DISCIPLINES
Linguistics, Discourse Analysis, Machine Translation, Computational Linguistics

TARGET INDUSTRIES/MARKETS
Machine Translation, ICTs, Printing, Publishing, Social Networking, Forensics

NEW PRODUCTS/SERVICES
Translation tools, Communication support tools, Discourse analysis tools, Text forensics

REFERENCES

1 Matthew L. Newman, Carla J. Groom, Lori D. Handelman and James W. Pennebaker (2008). Gender Differences in Language Use: An Analysis of 14,000 Text Samples, Discourse Processes, 45:211–236, http://homepage.psy.utexas.edu/homepage/faculty/pennebaker/reprints/NewmanSexDif2007.pdf

2 Anke Frank, Christiane Hoffmann, Maria Strobel, Lingenio GmbH, Heidelberg (2004). Gender Issues in Machine Translation, http://www.adlantech.de/Publikationen/GIST.pdf

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FROM IDEAS to MARKETS: the GENDER FACTOR - Vehicles

MAKING ACCURATE FEMALE CRASH DUMMIES to better assess the risk and potential injuries that women experience when in a car accident.

SUMMARY

The calculable costs of motor-vehicle crashes are wage and productivity losses, medical expenses, administrative expenses, motor vehicle damage, and employers' uninsured costs. In the US, the costs of all these items for each death (not each fatal crash), injury (not each injury crash), and property damage crash were estimated in 2010 to be: Death $1,410,000, Nonfatal Disabling Injury $70,200, Property Damage Crash (including non-disabling injuries) $8,900.[1]

From data on past crashes, researchers found that the odds of serious injury for female drivers wearing seat belts were 47 percent higher than those of men in a comparable accident. Women, having smaller bones and lower bone density, are at greater risk than men of suffering injury or death in crashes. Their less muscular necks make them more vulnerable to whiplash. In general, smaller people cannot tolerate crash forces as well as can full-sized men.[2]

At present, there are no specific female crash dummies. General Motors use 200 dummies, about 35 are considered female, which are defined as such by changing height and weight, making wider hips than for a male of comparable size, and using chest-jackets simulating breasts. Vehicle crashes causing 'whiplash injuries', is a worldwide problem. In Sweden, such injuries account for ~70% of all injuries leading to disability due to vehicle crashes. It is well established that the whiplash injury risk is higher for females than for males, even in similar crash conditions. These studies concluded that the female injury risk was 1.5 to 3 times higher than the male injury risk. The different anthropometry and mass distribution between women and men may influence the interaction of the upper body with the seatback/head restraint and thus increases the injury risk. For example, the deflection of the seat frame, seatback padding and springs may depend on the mass and/or the centre of mass of the upper body with respect to the lever about the seatback hinge..[3]

LEADING RESEARCH GROUPS
Humanetics (Germany, USA)
Chalmers University, SAFER Centre, Sweden
University and ETH Zurich, Switzerland
AGU Zurich, Switzerland
Swedish National Road and Transport Research Institute VTI, Sweden

KEY DISCIPLINES
Scaling anthropometry, Sensor systems, Computational modelling

TARGET INDUSTRIES/MARKETS
Road and Transport design, Automobile, Insurance

NEW PRODUCTS/SERVICES
Scaling methodologies, Car seat design, Test methods

REFERENCES

1. National Safety Council, 2012
http://www.nsc.org/news_resources/injury_and_death_statistics/Pages/EstimatingtheCostsofUnintentionalInjuries.aspx
2. Dipan Bose, Ph.D., Maria Segui-Gomez, ScD, MD, MPH and Jeff R. Crandall, PhD, 2011. Vulnerability of Female Drivers Involved in Motor Vehicle Crashes: An Analysis of US Population at Risk, Am J Public Health. 10.2105/AJPH.2011.300275
3. Fred Chang, Anna Carlsson et al, 2010. EvaRID: a dummy model representing females in rear end impacts, Whiplash 2010: Neck Pain in Car Crashes

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FROM IDEAS to MARKETS: the GENDER FACTOR - Robotics

MAKING ROBOTS BETTER DESIGNED for interaction with human users by taking into account social and identity reinforcing knowledge.

SUMMARY

Research in human robot interaction (HRI) shows that men and women respond differently to 'male' and 'female' robots. For example they tend to rate the robot of the opposite sex as more credible, trustworthy, and engaging. The effect was much stronger between male subjects and the female robot. These results demonstrate the importance of considering robot and human gender in the design of HRI. "Much of what roboticists take for granted in their own gendered socialization and daily lives is reproduced and reified in the robots they design, and in their publications. In short, gender for them constitutes common-sense knowledge, or a cognitive style through which they experience the social world as a factual object. The practice of attributing gender to robots is also an application of this knowledge as a representation of their social world. How robot-makers gender their humanoids is a tangible manifestation of their tacit understanding of femininity in relation to masculinity, and vice versa."[1,2]

Understanding HRI issues contributes to future development and acceptance of robotics technologies. Important opportunities for robotics are emerging in: Logistics; Medicine; Healthcare; Professional services and Domestic services. In addition to these sectors, the European Roadmap has also cited space and security (home protection, border security, etc.) as important areas of market opportunity. As an indication, in healthcare alone powered wheelchairs could reach a market volume of a little over $1 billion by 2013 in the USA and Asia.[3,4]

LEADING RESEARCH GROUPS
Personal Robots Group, MIT, Cambridge, MA, USA
The Hamlyn Centre, Imperial College, London

KEY DISCIPLINES
Computing, Human-Computer Interaction, Interface Design, Sensor Systems, Anthropology, Communication

TARGET INDUSTRIES/MARKETS
Health, Logistics, Medicine, Entertainment

NEW PRODUCTS/SERVICES
Robots for domestic use, Robots for caring tasks, Robotic surgery

REFERENCES

1. Siegel, M., Breazeal, C., Norton M.I., 2009. Persuasive Robotics: The influence of robot gender on human behavior. IEEE Intelligent Robots and Systems Conference, 2009
2. Jennifer Robertson, Gendering Humanoid Robots. Robo-sexism in Japan, 2010, Body and Society, Vol 16(2), pp 1-36, Sage
3. http://www.robotics.org/content-detail.cfm/Industrial-Robotics-Feature-Article/Roadmap-to-the-Future/content_id/1647
4. http://ec.europa.eu/information_society/activities/health/docs/studies/robotics_healthcare/robotics-final-report.pdf

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FROM IDEAS to MARKETS: the GENDER FACTOR - Assistance

TECHNOLOGY SOLUTIONS to ASSIST with age related and other types of chronic disability that affect women and men's independence and physical mobility.

SUMMARY

A myriad of everyday technologies fail people with disabilities. Doorknobs, kitchen tools, or shirt buttons that do not produce a second thought for most people but can become obstacles for someone with arthritis. A lever door handle and a simple buttonhook device, although not useful to most people, can assist someone who finds it difficult to manipulate these devices.[1] Women and men may differ in the types of disability and in the nature of their need for assistive devices.

There is an increasing awareness of the need for person-centred planning in health and social care, supported by the move towards personalization in a number of health policy areas. The use of assistive technology potentially provides a level of flexibility and choice for individuals.[2]

The range of needs is highly diversified. They extend from 'intelligent' tablet dispensers, emergency biosensor technology in motor vehicles, motion sensor technology through telemonitoring, online consultations, or brain jogging and exercise games.[2]

Chronic conditions can account for 70 percent of total health expenditure in Europe. Understanding the different structures in acceptance motives of both women and men is particularly important in the development of assistive medical devices considered for diseases that, due to their prevalence, affect either men or women more frequently. With an increasing comprehension of factors forming the usage acceptance of medical technologies in men and women, developers, designers as well as marketing experts can profit in creating user adjusted technology and advertisements.[3]

Medical assistive devices may contribute to maintaining personal independence and mobility in everyday life, and in home environments could advantage several aspects of life quality, and provide better control of health status maintenance (e.g. monitoring of bodily functions).[4]

LEADING RESEARCH GROUPS
Swedish Institute of Assistive Technology
RWTH, Aachen University
Department Health Systems and Policy, School of Public Health, University of Medicine and Dentistry of New Jersey, US

KEY DISCIPLINES
Materials Science, Human-computer Interaction, Engineering, Mechanics

TARGET INDUSTRIES/MARKETS
Personal technologies, eHelath and medical technologies, Carer support systems

NEW PRODUCTS/SERVICES
Assistance systems, e-Health and health games,'Intelligent' tablet dispensers, Emergency biosensor technology in motor vehicles and motion sensor technology, Telemonitoring, Online consultations, Brain jogging and exercise games

REFERENCES

1. The Future of Disability in America. Institute of Medicine (US) Committee on Disability in America; Field MJ, Jette AM, editors. Washington (DC): National Academies Press (US); 2007.
2. Age appropriate technology on the advance, Digital economy and structural change, Deutsche Bank Research, December 2009
3. http://www.humtec.rwth-aachen.de/files/small_but_significant_difference.pdf
4. Wiktoria Wilkowska, Sylvia Gaul, and Martina Ziefle, 2010, A Small but Significant Difference – The Role of Gender on Acceptance of Medical Assistive Technologies, in The Role of Gender on Acceptance of Medical Assistive Technologies, Springer Verlag 2010

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genSET Science Leader's Consensus Report on the Gender Dimension in Science

As part of EU project genSET (gender in science), a panel of 14 science leaders have met over a period of three months in 2010 to consider available gender research evidence identify common gender issues in science and recommend actions that institutions can take to put in place the necessary improvements.

A panel of science leaders has identified four areas where action is needed: 1) science knowledge making, processes and practices, human capital, and compliance with regulation. The science leaders panel developed:

- 13 evidence-based recommendations for institutional action, to best take advantage of the benefits in recognizing the gender dimension in scientific research
- Compiled in cooperation with gender experts and institutional stakeholders, and based on extensive personal experience as members and leaders of scientific institutions

Recognition that gender equality contributes to better science is fundamental to the genSET recommendations. The genSET project was the subject of the editorial in The Lancet (5 March 2011) titled 'Promoting Women in Science and Medicine'

Recommendations:

1. Leaders need to 'buy into' the importance of the gender dimension in research
2. Scientists (and managers) should be trained in methods of sex and gender analysis
3. The use of methods for sex and gender analysis must be considered in all assessments
4. Research teams should be gender diverse
5. All committees, panels should be gender balanced
6. Diversity in leadership style should be encouraged
7. Women already in scientific institutions should be made more visible
8. Research quality rather than quantity should be assessed
9. Researchers with heavy committee burdens should be provided with additional support
10. Policies on e.g. working conditions should be reviewed
11. Special strategies developed to attract women to research positions
12. Explicit public targets to improve gender balance
13. Gender issues must be part of evaluations and strategies

Information how the consensus seminars were conducted, the briefing notes produced by experts for the panel, the science leaders' report and all the papers included in the discussions can be viewed on genSET website, www.genderinscience.org.

genSET

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Discover Markets, Fraunhofer

Discover Markets seeks to develop new ideas for future markets. The aim is to run through the entire innovation to market process – from coming up with ideas and developing prototypes to the market launch of a product.

The focus is on gaining different perspectives before research processes begin, in particular the consumer opinion: What do consumers expect from products and technology? The project involves women as participants in the workshops, who have no science or engineering background.

So far, the project has explored three major areas: health, energy, and material. In the area of health, the specific topic of interest is rehabilitation after injury or illness, as it is currently a very small market.

Once ideas are collected, Fraunhofer scientists evaluate their technical feasibility. Out of 100 ideas that came from the rehabilitation workshop, about 70 could be implemented immediately, for example. The other suggestions were either still too far away from potential realization or referred to social themes.

After suitable ideas are selected, the next phase poses the following questions: Which potential end-customers are there for the ideas that are already technically feasible? Which stakeholders should be included in development? When technical feasibility is established and there are market opportunity for the idea, the project establishes partners at Fraunhofer institutes who can develop the prototypes. That is one of the basic principles of Discover Markets: involving the right stakeholders at the right time to ensure that a successful product can be developed.

Discover Markets has introduced a blog, www.forschungs-blog.de, for disseminating information about technological issues and advances, and uses on-line poll to gather opinions. In one case:

- The poll followed an article on food packaging that was presented on the project's Forschungs blog and announced through Twitter, Facebook, and google+; the announcement reached roughly 189,200 people.
- On twitter, the original announcement was re-tweetted 29 times by different users (re- tweets indicate greater interest).
- In different social media, the link to the article was posted 209 times.
- On the blog and in other social media, 121 comments to the article were posted.
- The posts were predominantly serious and related to the topic.
- In addition to packaging, the posts addressed the related issues of waste disposal, food waste, food taste, buying patterns, plastic materials, and utilization of natural resources such as oil (analysis forthcoming).
- 20% of the regular blog readers participated in the poll.
- Roughly 20,000 people read the article and/or saw the poll

Fraunhofer

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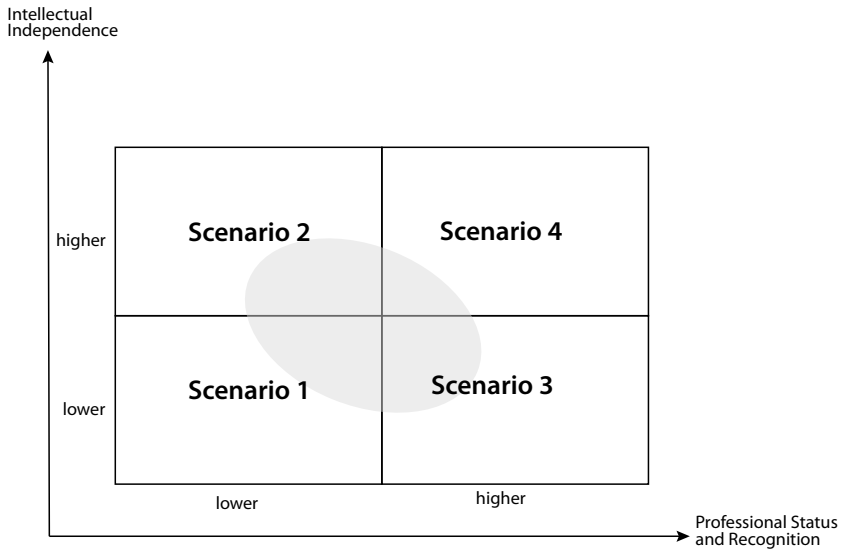
Scenario Toolkit for Advancing Careers in Science

The European Commission's recent public consultation on strengthening the role of women in science yielded professional development feedback:

- the need for career models and pathways
- balancing career aspirations and family responsibilities
- childcare issues and costs
- mobility
- dual career couples, and
- returning after career breaks.

The Scenario Toolkit for Advancing Careers in Science targets this call to action to help European women scientists navigate the complex relationships between events and decisions that shape a scientist's professional development through the doctoral and postdoc stages. The scenario method will be tested through workshops delivered by Portia in collaboration with two partners: Fraunhofer and Tel Aviv University.

Portia's scenario toolkit moves beyond traditional mentorship to provide an innovative new strategy for improving the career success of female scientists and engineers. It combines background information about the available research landscape as well as access to experts to help individuals explore their future in science from three career development perspectives: organisational career (possible employment positions in one or more organisations), cognitive career (variety of research topics in the chosen area of interest) and community career (contributions made to advancing knowledge and and/or the community). The figure below shows that there can be a variety of scenarios and within a range of decisions leading to different carrer paths, depending on circumstances, opportunities, decisions made, etc.



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Fraunhofer

THE ELSEVIER FOUNDATION

PORTIA
effective strategies for gender equality in science

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ETH Zurich Women Professors Forum (RTH WPF) and EQUAL!

Founded in 1855, ETH Zurich has more than 17,000 students from approximately 80 countries, 3,700 of whom are doctoral candidates.

Of the 464 professors working at ETH, 56 are female professors (tenured, assistant professors and SNSF professors) - 12 % of the population (April 2012 figures).

The ETH Women Professors Forum was established in March 2012 and formally became an association in May 2012. It is part of ETH Zurich's efforts to create a better work environment for both women and men.

Female professors at ETH can help younger female researchers in developing their careers and motivate young, talented women to choose an occupation in the scientific and technical field. The WPF aims to contribute to ETH Zurich's ongoing efforts to attract, recruit, promote and retain female professors in the university.

The Forum aims to develop collegiality, make visible the scientific excellence of ETH women professors, organize scientific and social events, and gain influence within the ETH environment.

The Executive Board of WPF includes: Ursula Keller, Physics (President), Janet Hering, Director of EAWAG (Vice President), Marcella Carollo, Physics, Silvia Dorn, Environmental Systems Science, Gudela Grote, Management, Technology and Economics, Renate Schubert, Delegate for Equal Opportunities to ETH President, Humanities, Social and Political Sciences, Viola Vogel, Health Sciences and Technology.

Women working at ETH Zurich are also supported through through the University's Equal! office, which:

- helps to improve reconciliation of studies, work and family at ETH Zurich
- supports career development in the academic environment, including training courses and mentoring programs.
- promotes the integration of gender-specific contents in research and teaching.
- helps to prevent sexual harassment and gender-related discrimination and, in this regard, is the place to go for ETH members to get advice.
- informs at least once a year on the development of the proportion of women on the different academic and non-academic levels by means of its Gender Monitoring report.
- carries out studies on how the reconciliation of family and work or career can adequately and efficiently be supported.
- contributes to the Diversity and Diversity Management Working Group at ETH Zurich.
- reports to the ETH president and collaborates with other institutions for the promotion of equal opportunities for women and men within national and international networks.
- uses a mailing list to provide information on gender equality and on gender questions in general as well as on events and courses related to this topic.

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AWIS Work-Life Integration Toolkit for Women in Science

The Association for Women in Science (AWIS) received a three-year grant from the Elsevier Foundation to develop and facilitate a program on work/life integration to give women in science the tools they need to achieve success. At the beginning of the project, AWIS conducted a content planning survey to aid in the development and content of our program. We received 409 responses for a response rate of 14.6%.

From that survey, three interesting results emerged to inform our program development:

- 68% of respondents reported that work/life integration issues had an impact on child-bearing decisions
- 70% of respondents reported not taking advantage or not having access to work/life resources
- 50% of respondents would prefer an in-person program

Key aspects of the **AWIS Work-Life Integration** toolkit have incorporated the following elements:

1. On-line resources for participants.
2. A workbook for participants.
3. Webinars to support on-going learning for participants.
4. On-going mentoring support at the local level.

Participants come away with a better understanding of the challenges that face women in science in the area of work/life integration as well as suggested tools and strategies that can be implemented to achieve work/life integration. Work/life integration is an important concept in helping women in science to achieve future success on both a personal as well as professional level. We discuss research on work/life integration and the seven major areas of focus including ways to establish guilt free boundaries, how to say no, and determining methods to use in asking for what you want or need. The toolkit provides participants with the opportunity to create an action plan that they can immediately put in place in their current position and can use as they pursue their next career steps.

1. Participants come away with the ability to define for themselves what work-life integration is and is not.
2. Participants are able to identify 7 keys to achieving and maintaining work-life integration.
3. Participants are able to develop an action plan that can be implemented immediately or in the future.

THE ELSEVIER FOUNDATION

AWIS
ASSOCIATION FOR WOMEN IN SCIENCE

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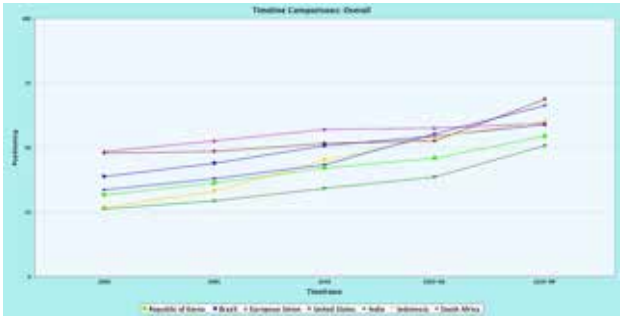
Gender Equality in the Knowledge Society: National Assessments in STI

The Gender Equality – Knowledge Society (GE&KS) indicator framework was developed to address the fact that worldwide, women's capacity to participate in science, technology and innovation is grossly under-developed and under-utilized: not only do they have less access to information and technology, they are poorly represented in educational, entrepreneurship and employment opportunities. It brings together gender-sensitive data on key areas in the knowledge society (ICT, science, technology and innovation) with gender indicators of health, economic and social status to assess the barriers and opportunities for women.

A pilot assessment of six countries and one region took place during 2012: Brazil, India, Indonesia, the Republic of Korea, South Africa, the United States, and the European Union.

Key Findings

The major finding of this study is that there is very little consistent sex-disaggregated data. The knowledge gender divide continues to exist in all countries, even those which have a highly-developed knowledge society. In all countries in this review – which represent the leading knowledge-based economies in the world – the knowledge society is failing to include women to an equal extent, and in some cases, their inclusion is negligible.



- Numbers of women in the science, technology and innovation fields are alarmingly low in the world's leading economies, and are actually on the decline in many, including the United States.
- Women remain severely under-represented in engineering, physics and computer science — less than 30% in most countries – while the numbers of women working in these fields are also declining.
- Women have lower levels of access to the productive resources necessary to support active engagement in the knowledge society and related professions – property (land); finance; technology; and education.
- Female parity in the science, technology and innovation fields is tied to multiple factors, with the most influential being higher economic status, larger roles in government and politics, access to economic, productive and technological resources, and a supportive policy environment. Findings also show that women gain ground in countries that have health and childcare, equal pay, & gender mainstreaming.
- Access to education is not a solution in and of itself and neither is economic status. It's only one part of what should be a multi-dimensional policymaking approach. There is no simple solution.

The **European Union** as a composite ranks first overall, and first or second in every other dimension except opportunity and capability. This is a remarkable result, considering the wide variation among countries in the EU in terms of social support, GDP, and promotion of science, technology and innovation (STI). The **United States** ranks second overall, but fifth in health, agency, social status. The US ranks lowest in enabling policies. While it ranks higher in other sectors, this finding indicates that a more favourable policy environment for women in the US could be an important strategy for regenerating economic growth. **Brazil** ranks the highest of the remaining countries. It is third overall and first in women's participation in the knowledge economy and science, technology and innovation, as well as agency. Brazil is an example of a country with both a highly enabling policy environment for women and effective implementation strategies. Although **Indonesia** comes out fourth overall, its actual status is not clear as a result of a paucity of available statistics on the situation of women **South Africa** ranks fifth overall but first in agency. It ranks highly also in knowledge society decision-making and fairly well in STI participation. This is likely a result of a strong educa-tional system, a policy focus on STI, and a quota system to promote diversity of participation by race and gender. The high rate of HIV in the population is a negative factor. While the **Republic of Korea** ranks first in health it is last in several sectors. Overall, it ranks second to last (sixth) overall. This shows the country has failed to adequately support its women to participate actively in its economic success and is proof of the lack of correlation between a country's GDP and gender equality. **India** ranks the lowest overall and in most categories. While its enabling policy environment is very positive and has been in place for many years, implementation and funding needs to increase substantially before its women can benefit equally from its innovation advantage.

In all countries in this review – which represent the leading knowledge-based economies in the world – the knowledge society is failing to include women to an equal extent, and in some cases, their inclusion is negligible.

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wisat
women in global science & technology

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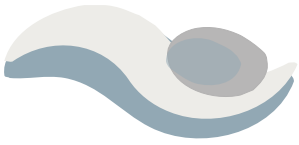
In HORIZON 2020, for the very first time, a systematic, policy-driven intervention has been envisaged to promote gender dimension as a way to improve quality of science knowledge production and application. The 2012 Gender Summit provides a timely opportunity to discuss and agree on the practical ways in which the gender equality mission of HORIZON 2020 could be translated into effective, operational structures and practices in the next Framework Programme (e.g. requiring that gender aspects of the proposals are made explicit and be part of the evaluation).



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