



Fixing the leaky pipeline and retaining our talent

**A summary report on a one-day event held at
the Royal Irish Academy, 26 September 2017**

**Edited by Dr Elizabeth Daly—IBM Research - Ireland, Professor Gerald Farrell—Dublin Institute
of Technology, Professor Jane Grimson, MRIA—Trinity College Dublin (Chair), Professor Alan
Smeaton, MRIA—Dublin City University**

Organised by the Engineering and Computing Sciences Committee of the Royal Irish Academy



Acadamh Ríoga na hÉireann
Royal Irish Academy

Executive summary

The Royal Irish Academy's (RIA) Engineering and Computer Sciences (E&CS) Committee, in conjunction with Engineers Ireland, convened a one-day event on 26 September 2017 to explore the problems and issues associated with the retention and progression of early career women engineers and computer scientists. The aim was to consider best practice here and elsewhere, and to develop a set of recommendations on how to improve the situation of gender equality in Ireland. By bringing together representatives from across the different sectors—higher education, business, industry and the public sector—the Workshop sought to identify ways in which we could learn from each other. The aim was to identify initiatives and experiences that show evidence of having a positive impact on addressing gender inequality in one sector or organisation which would potentially be transferable to other sectors or organisations.

The background to the event was the growing realisation, nationally and internationally, of the imperative to address gender inequality across many sectors including in the Science, Technology, Engineering and Mathematics (STEM) areas. While most of the efforts in STEM have been targeted at girls in school with a view to increasing the uptake of women taking STEM courses at third level, this Workshop focused on the issue of the retention and progression in STEM of young women who already have a STEM qualification. All the evidence shows that women either drop out of STEM careers altogether or do not progress up the career ladder at the same rate as their male colleagues—the so-called 'leaky pipeline'.

The figures are stark and disturbing. While 50% of the academic staff at lecturer level are female, women comprise only 19% of full professorships.¹ The figures for industry are very similar, with women comprising 40% of junior management positions and only 17% of CEOs.² Disaggregated figures for STEM and E&CS are difficult to obtain but in 2015, only 25% of those working in Ireland's STEM industries were women.³ The numbers of women progressing to senior leadership roles in STEM are therefore significantly less. Quite apart from the economic cost of having such a waste of highly trained individuals against a background of a global skills shortage, these figures paint an unacceptable picture of a loss of talent, undermining creativity and innovation—and ultimately profitability and success.

It is not surprising then that the elimination of gender inequality is a priority on the agenda of many organisations, but especially those in the STEM areas where the numbers of women entering the pipeline are so small to start with. It is all the more alarming that a number of studies have shown that women are more likely than men to drop out of STEM careers (73% as opposed

¹ Higher Education Authority, *HEA National Review of Gender Equality in Irish Higher Education Institutions*, 2016. See: http://hea.ie/assets/uploads/2017/04/hea_review_of_gender_equality_in_irish_higher_education.pdf.

² Women in Management, the Leadership Pipeline 2016, see: https://30percentclub.org/assets/uploads/Ireland/PDFs/women_in_management_the_leadership_pipeline_2016.pdf.

³ Accenture, 'Powering economic growth: attracting more young women into science and technology'. See: https://www.accenture.com/ie-en/~/_media/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Industries_14/Accenture-STEM-Powering-Economic-Growth.pdf.

to 48%), according to a 2012 study in Scotland.⁴ Studies elsewhere have shown similar results; for example a study published in 2014⁵ showed that following completion of an MBA, women were more likely than men to move out of the technology sector (53% women compared to 31% men).

The Royal Irish Academy event was divided into four sessions (see Appendix 1 for the programme and Appendix 2 for the list of attendees): an opening keynote address, a panel, a second keynote and finally a moderated audience discussion.

Before the main presentations, the event was opened by Professor Peter Kennedy, President of the Royal Irish Academy, and by Dee Kehoe from Engineers Ireland, who set out the aim of the Workshop—to produce this report which acts both as a record of contributions and defines a set of follow-on actions and recommendations arising from the discussion.

The first keynote was given by Alice Brown from the Scottish Funding Council and Emeritus Professor of Politics at the University of Edinburgh. She gave a precis of the 2012 Royal Society of Edinburgh report on retaining female talent in the STEM workforce and the actions that had followed and their impact.

This was followed by a panel discussion moderated by Margaret E. Ward, with speakers including Marion Palmer from Women in Technology and Science (WITS), Oonagh Reid of Arup, Kara McGann of Ibec, Ann-Marie Holmes of Intel and P.J. Rudden from the RPS Group. Each contributor presented case studies of initiatives in their respective organisations to address gender imbalance.

The second keynote was given by Marie Donnelly, the former director for New and Renewable Sources of Energy Efficiency and Innovation at DG Energy, European Commission, who began by looking at the EU distribution of graduates in different areas disaggregated by gender. She took us on a journey describing how Ireland compares to other EU member states in terms of pay gaps and employment rates, for example, using information taken from Eurostat. She showed that there are some areas where there are pay and employment biases that are in-built. In summary, Marie showed that Ireland performs well below the average and close to the bottom in a number of these key gender equality indicators. She pointed out that in her view there is a strong need for organisations to make gender equality metrics transparent, for example by making key figures available for showing the balance of men versus women in different grades and the male/female distribution for pay grades in an organisation. The keynote by Marie Donnelly was followed by a short Q&A session, with useful discussions on topics such as work-life balance and the benefit of improved gender balance, for example through harnessing to good effect the better social skills of women.

The Workshop did not seek to revisit the recommendations made elsewhere, for example, in the Higher Education Authority Review of Gender Equality or in the various industry reports. It was evident from all the presentations that women face very similar challenges in the workplace in both engineering and computer sciences. Traditional career structures are largely based on the male norm whereby the man is the principal wage earner with his partner staying at home

⁴ Royal Society of Edinburgh, *Tapping all our Talents. Women in Science, Technology, Engineering and Mathematics in Scotland*, April 2012

⁵ See: 'High potentials in tech-intensive industries; the gender divide in business roles', *Catalyst*, 2014. http://www.catalyst.org/system/files/high_potentials_in_tech-intensive_industries_the_gender_divide_in_business_roles_2.pdf.

to care for the children. However, this is no longer the case. In more and more families both parents have careers working outside the home—whether out of choice or economic necessity. However, men’s careers still tend to follow the linear model without breaks, whereas women’s careers are much more likely to be interrupted by breaks. Addressing this issue requires radical changes in working practices, including tackling the long working hours culture which has become so prevalent in recent years; equality of responsibility within the home and equal uptake of parental leave. In short, it requires a major organisational and societal transformation. The Workshop participants recognised that bringing about such a transformation is the only sustainable way to eliminate gender equality, however, equally they recognised that there is a growing body of evidence, including a number of examples put forward by the speakers, which point to actions that have the potential to make a difference in the shorter term. Crucially, these will contribute to the long-term goal of full equality.

The common challenge facing young women is achieving a satisfactory work-life balance, especially when children are small. From a career perspective, this period of parenthood (which after all is relatively short compared to an entire working life) tends to coincide exactly with the critical point at which an individual’s career may or may not take off. For example, in higher education it coincides with the point at which research should be having an impact, and in industry it is the point at which those who are ready to progress to senior management positions will be identified. All the evidence shows that it is at this point that women either drop out of the workforce altogether, switch to part-time working or move to more family-friendly jobs, which may be less demanding and which do not always utilise their full skillset.

Workshop conclusions and recommendations

As mentioned earlier the aim of this Workshop was to identify initiatives and experience in specific sectors or organisations that show evidence of having a positive impact on addressing gender inequality and are potentially transferable to other sectors or organisations. At this workshop the sectors represented were the higher-education sector and the industrial and professional sectors. In summary, the transferrable initiatives and experiences between these sectors identified by the Workshop were as follows:

What can higher education learn from industry?

1. The business case for eliminating gender inequality is proven;
2. The need for total commitment to supporting flexible working in its various forms;
3. The need to support equality and diversity champions and networks;
4. The need to celebrate successful women;
5. The need for successful women to raise their personal profiles as standard bearers; for women who are starting out in their careers;
6. The importance of sponsorship as well as mentoring.

What can industry learn from higher education?

1. The availability of an external driver (such as the Athena SWAN awards system in higher education) can act as a powerful force to drive and embed gender equality
2. The importance of independent research evidence based on quantitative and qualitative data.

There are many recommendations in common across virtually all the national and international reports on eliminating gender inequality. For example, in the higher-education sector, there is a lot of commonality among the universities with respect to their Gender Action Plans in applications for Athena SWAN awards.⁶ Therefore issues such as gathering and analysing comprehensive gender disaggregated data, developing a Gender Action Plan with clear targets, ensuring gender balance in committees and teams, including appointment and promotion committees, addressing unconscious bias, promoting female role models and providing support to women returning to work after periods of leave. More controversial areas include the introduction of mandatory quotas and leadership programmes targeted specifically at women. Here in Ireland there is a growing, albeit often reluctant, realisation that such policies are essential if progress is to happen within a realistic time-scale.

The recommendations arising from the Workshop are as follows:

⁶ See: The Athena Swan Charter: <http://www.ecu.ac.uk/equality-charters/athena-swan/> (accessed 13 November 2017)

To the higher-education sector:

1. More research needs to be conducted to develop objective evidence of the benefits of gender equality. There is widespread acknowledgment that equality and diversity are important for reasons of social justice, to improve overall decision-making, to make organisational decision-making a more holistic process and to avoid 'group think'. However, there is less consensus within the academic world that diversity will lead to an improvement in research quality. Indeed, many would hold the opposite view, namely that gender equality and diversity undermine excellence. The ultimate objective evidence that would convince the sceptics would be if the elimination of gender inequality within an institution contributed to improved international rankings. It may not be a direct cause-and-effect relationship but evidence suggests that when an organisation improves the workplace environment for one under-represented group, everyone benefits, including the institution.
2. A much greater commitment to improving work-life balance is needed, for example through fully supporting flexible and part-time working. Equally important is that when staff return to work after periods of family-related leave, such breaks in service do not adversely affect promotion prospects. Simply 'stopping the clock' is not sufficient—at best it will ensure that women continue to progress much more slowly in their careers and at worst it will stop such progress altogether.
3. Much more attention needs to be given to training and support of PhD supervisors. The WITS survey and other similar surveys internationally have shown very clearly that a negative experience as a doctoral student can—understandably—have a very dramatic impact on subsequent career choices. In this context, the important development in the ongoing National Forum on Doctoral Education is significant. The Forum is chaired jointly by QQI and the HEA and where concerns about the leaky pipeline during doctoral research are identified, this could potentially lead to positive action with funders, awarding bodies and government agencies.

To the industry sector:

1. Partner with academic institutions to undertake targeted research to ensure that barriers to the retention and progression of women in business are fully understood and that all actions are evidence-based.
2. Effective support for parents before, during and after periods of extended leave and when dealing with the challenges of work-life balance during early years of parenting. The objective needs to allow not only women but all parents to maintain their integration within the organisation and their knowledge of the organisation. By supporting and providing flexibility to both men and women in the challenges of parenting we normalise the shared responsibility of childcare that will benefit working women.
3. A gender equality network for SMEs should be established to share experience in relation to addressing gender inequality. The network could consider, for example, shared mentorship schemes and unconscious bias training, as well as schemes to support women returning to work after a period of leave.

To government:

1. Mandate the publication of gender disaggregated data about staff by all larger companies (as in Australia under the Workplace Gender Equality Act 2012). This has been shown to drive improvements in gender equality and furthermore companies that do well have a competitive advantage over others.
2. Include progress towards the elimination of gender inequality as part of the scoring system for public procurements.
3. Commission research to benchmark data on the retention and progression of women in STEM careers with the objective of developing targets against which progress could be monitored regularly.
4. Continue introducing progressive measures such as state-sponsored paternity leave. Involving both parents in the early stages of raising their children will set the tone for sharing parenting responsibilities going forward.
5. Continue to build upon recent advances in tackling the high cost of childcare in Ireland given that the costs can make it financially difficult for both parents to continue working.

To all stakeholders:

Encapsulating all of the above, the Workshop identified a single recommendation that could be addressed to all stakeholders:

The Workshop recognises that there are a myriad of activities and initiatives at various grassroots levels to address gender imbalance in the STEM area. The Workshop welcomes the assignment of 'Equality' in the titular description of the Government Department of Justice and Equality and calls for an action plan to be developed as part of a consultation between the top levels of government and business. This would bring together all the key stakeholders from education, business, industry, funding partners and the public sector to develop a single fully costed National Gender Action Plan with clear targets and timelines to address gender inequality covering the entire STEM pipeline.

Such a plan should bring together all the current initiatives in order to ensure that there is no unnecessary duplication and that the impact is maximised.

Summary of Workshop

The Royal Society of Edinburgh Report of 2012

In 2012 the Royal Society of Edinburgh (RSE) produced a report entitled *Tapping all our Talents. Women in STEM: A Strategy for Scotland*,⁴ which was the culmination of work by a Working Group chaired by Professor Dame Jocelyn Bell Burnell. It was this report which acted as a major catalyst for the decision by the Academy's Engineering and Computer Science Committee to hold this event in 2017.

The report was commissioned because in 2012 the data for Scotland and for the UK as a whole on the career paths of women qualified in STEM showed a huge gender disparity. They realised that they could not afford this waste of talent and that all talents need to be tapped in order for Scotland to prosper economically. There is no reason to think that the figures for Ireland are any different.

The vice-chair of the Working Group that produced the report was Professor Alice Brown from the Scottish Funding Council, who presented a summary of its recommendations at the Academy Workshop and an assessment of its impact since publication, five years previously.

The 2012 report was intended to draw together existing evidence of the high attrition rate for women in STEM, such as the fact that 73% of women leave STEM jobs or research, compared to only 48% of men.

The report identified some of the factors that contribute to this loss of STEM talent from the workforce at all stages of the pipeline, which include practical aspects such as childcare needs and unfriendly working hours for a good work-life balance. The report also identified cultural factors such as systematic inequality, attitudinal and behavioural issues at institutional level and a lack of female role models due to the low degree of female representation at senior levels of organisations. Women are lost to the STEM workforce at every stage, with the result that men dominate disproportionately at the top and at most senior levels.

The RSE report recommended creating a strategy to increase the proportion of women in the workplace qualified in STEM subjects, and to increase the number who rise to senior positions in universities, research institutes, government, business and industry.

This required an integrated, comprehensive and coordinated strategy at policy level rather than a set of ad hoc project initiatives such as those we currently have in Ireland. It called for practical actions like extending parental leave and linking public research funding to Athena SWAN qualification, as well as introducing initiatives to change behaviour and attitudes. Critically, it called on the UK and the Scottish governments to take action and to lead by example. It also identified the need for active dissemination of these actions with a comprehensive dissemination plan to MPs, organised events, individual meetings with key organisations, presentations to government, to Deans of Science and Engineering, to EU bodies and to parliamentary committees in Scotland, the UK and the EU. In addition to the recommendations there were also targets and measurements of these targets covering the short term, medium term and long term (1, 3 and 5–10 years).

The carrot for this was partly an economic imperative leading to greater productivity and increased diversity of workforce as outputs. So what has happened since the report's publication?

The Scottish government welcomed the report positively and allocated new funding for some new initiatives and activities to support women, including changes to statutory parental leave. With the requirement for Athena Swan qualifications to draw down funding, the number of Athena Swan applications from HEIs, research institutes, faculties and schools increased, as did the number of awards achieved.

Several new initiatives to address gender imbalance also emerged, including, for example, the Sci-Sisters network in Edinburgh. This is a support network funded by the Royal Society of Chemistry for female junior chemists to find other senior chemists who can support them in helping to make career choices by offering advice. It consists of geolocation maps and is in effect an online network for senior women to mentor junior women in a kind of 'scientific sisterhood' model. This helps to combat potential isolation of women in the workforce by helping them find links across discipline or job type and it also makes the work of Scotland's female STEM experts more visible, countering some of the effects of unconscious bias.

However, the most significant action to arise from the RSE report is the creation of outcome agreements between funding councils (which fund higher education in Scotland) and the higher-education institutions. These contain targeted actions for gender balance, including target percentages on a per-course basis. Thus, instead of sitting back and saying 'women just don't apply to certain kinds of courses', the outcome agreements require the HEIs to reach out and to find the women to apply to those courses. This is an example of how imposing gender quotas on course intakes make stakeholders like the higher education institutions take action and not hide behind the history and the status quo as excuses for gender inequality.

In summary, Professor Brown believes that the report has had an impact. It has raised awareness of gender imbalance at least but progress in reversing this is slow and requires an integrated, coordinated and comprehensive strategy rather than a set of individual initiatives which on their own and without forming part of a larger plan have much less impact and may simply wither and die.

Activities in Ireland

The next session of the day was a series of brief presentations chaired by Margaret E. Ward of Clear Ink & Broadly Speaking, which reported some of the experiences and initiatives underway to help reverse gender imbalance.

Marion Palmer from the WITS (Women in Technology and Science) Ireland Executive reported some of the preliminary results of an online survey of PhD graduates and students. Of the 80 respondents, as with Scotland, fewer women complete the PhD than men. One issue that surfaced during the survey was career paths for PhD graduates, including job security for postdocs, which was also highlighted in a similar report, *Future for PhDs in Ireland: Objectives, Implications and Recommendations for Engineering and Computer Science in the Context of 'Innovation 2020'*, published by the Royal Irish Academy in 2016.⁷ This arises because of the limited number of permanent positions in research in HEIs and the absence of a comprehensive researcher career framework in Ireland that gives permanent researcher careers in HEIs. The WITS survey also found that supervisor support is hugely important where supervisors act in a mentoring role as well as providing academic guidance.

The WITS survey is welcomed and it is one of a number of similar activities that gather together information on reasons why we are losing female talent in STEM. These include the national student experience survey, which is being extended to research students and is currently at draft stage and to be piloted in Spring 2018. This will give a better voice to Irish-based early-stage researchers. In addition, there are well-established UK and Australian surveys that also identify the issues for research students.

Oonagh Reid from Arup has been Diversity and Inclusion champion within Arup for five years and one of her first actions in the role was to publish, promote and encourage staff to take up flexible working in support of better work-life balance. This included simple things like using Skype for business, video conferencing and providing high-end laptops allowing Arup staff to work effectively from home. She also promotes role models by gathering together individual stories of women from all over the globe, creating podcasts, and organising live events and presentations from people inside and outside Arup, all aimed at celebrating success and inspiring younger women. Arup has maternity and paternity toolkits and provides support including a buddy programme for the stages before, during and after childbirth to assist in the transition back to work. There is also an e-learning module addressing unconscious bias, which includes simple things like slowing down the decision-making process for team formation decisions, in order to allow sufficient time to address gender balance and diversity. Oonagh's take-away message was that it is essential to fix the leaky pipeline and not just in order to increase the numbers of female STEM workers at all levels but also to increase the diversity of the workforce, which in turn will lead to improved performance across the organisation as a whole.

Kara McGann is a senior labour market policy executive at Ibec and she addressed what seems

⁷ Royal Irish Academy, *The Future of PhDs in Ireland: Objectives, Implications and Recommendations For Engineering and Computer Science in the Context of Innovation 2020*, June 2016

to be one of the major problems about female participation in STEM and in business generally at senior levels. There are lots of individual activities to promote awareness of STEM careers among young female students, including school visits, transition year interning and training. However, the cause of the imbalance is multifaceted and not just a question of low numbers entering the pipeline. For example, there is a challenge facing employers around flexibility which is key to enabling men and women to balance work and family life. Employers are facing conflicting demands as employees seek greater flexibility, which employers can often facilitate, but there is also criticism of flexible modes of working and increased calls for further regulation of flexible working arrangements, particularly in the context of the debate regarding so-called precarious or 'low-hour' forms of employment. Kara also focused on the isolating or even hostile attitude towards women in these workplaces. Women in STEM can feel like outsiders when they are the only females in a team and when there are no female leaders. The phenomenon of unconscious bias was the highlight of Kara's presentation and she illustrated this with a simple job advert showing how such bias can creep into the male-dominated language used in something as simple as a job description. Kara also talked about the difference between mentors who talk with you, and sponsors who talk about you and how mentoring is a process that requires time and dedication on the part of the mentor as well as similar efforts from the mentee.

Ann-Marie Holmes is vice-president of Intel's Technology and Manufacturing Group and factory manager in Intel's Fab 24 facility in Leixlip, co. Kildare. At corporate level, Intel is totally committed to increasing diversity across all areas of the company. Ann-Marie is responsible for Ireland's part of this strategy, which has five pillars—attracting students; hiring; integration and support; female leadership and progression; and branding. In her talk, Ann-Marie concentrated on two of the five pillars—namely integration and support; and female leadership and progression. Under the first of these two, in addition to a mentoring 'buddy' system, they also have a 'Women in Intel' (WIN) network, aimed at reducing isolation among women and also providing a forum in which women can celebrate their success. Under Intel's female leadership and progression programme, the top, high-performing female employees in the organisation are hand-selected and their careers are nurtured and encouraged. Ann-Marie reported an increased female representation in Intel's workforce at all levels, five-fold at some levels. The evidence suggests that once bootstrapped and supported, this can then become self-perpetuating, as it creates female role models so younger, earlier career hopefuls have senior figures to aspire towards.

P.J. Rudden from the RPS Group had two simple messages for the Workshop. First, we should always and only hire and promote people on the basis of talent and second, that the nature of engineering and STEM in general has and is changing and that the modern workforce in engineering at least requires us to move away from hard hats and muddy boots, requiring greater levels of sophistication, communications skills and awareness that can only be realised with a diverse workforce. P.J. also referenced a 2014 report by the UCD Engineering Graduates Association⁸ which focused specifically on gender balance in engineering and on what the third-level sector could do to redress the imbalance at the recruitment stage.

⁸ See: UCD Engineering Graduates Association, *Towards Gender Balance in Engineering*, October 2014

Discussion

The moderated discussion covered a wide range of issues. This section of the report highlights the main points.

Large versus small companies

One of the concerns of Workshop participants was that many of the gender balance initiatives are aimed at large companies with large workforces and it is therefore difficult to see how they could be applied in smaller companies that do not have the budget or the expertise. Furthermore, given the smaller workforce, the impact of one employee taking maternity/parental leave can be very significant. However, it was noted that some initiatives, including unconscious bias training and peer networking initiatives, are not expensive and represent an investment from which smaller companies may see the benefits sooner than would larger companies. It was agreed that a possible approach for SME was to come together in a Gender Equality Network through which mutual support and advice could be provided as well as offering a shared resource for, say, unconscious bias training.

Equality and quality

Participants highlighted the need to ensure that targets and quotas do not result in or create any perception that a lower standard is applied to women. This misconception—prejudice—can be difficult to tackle and much of the opposition is born out of fear among both men and women. Better qualified men fear they will lose out to less-qualified women and well-qualified women want to be promoted on the basis of merit and not just because they are women. In the first instance, it is essential to be very clear and transparent regarding the criteria that are being used. In the second, objective gender disaggregated data about women and men within the organisation must be published and monitored regularly. And in the third, as the leaks in the pipe are being plugged, objective evidence must be provided of the benefits this has brought to the organisation.

Maternity/parental leave

The discussion of shared maternity and parental leave was also raised. Finland is one example of a country that has a progressive strategy where parental leave must be shared between the mother and the father. By focusing on supporting parents and not just women we can help make work-life balance issues a gender-neutral topic.

Overarching issues

Fixing the women or fixing the system

Many initiatives concerned with addressing gender inequality target women—‘fixing the women’—as opposed to targeting the system and culture within the organisation which has led to the gender imbalance in the first place—‘fixing the system’. The key principle underpinning effective initiatives in gender equality is to treat everyone equally but not necessarily the same. Equality is not always about treating everyone the same—it is about treating people in such a way that the outcome for each person is the same.

Mentoring and sponsorship

One suggestion is that for every woman who takes time out from employment for family reasons, their employer should assign a mentor: a senior person, who could be male, to act as adviser and to support that woman transitioning back into the organisation following an extended period of leave. Mentorship programmes are common throughout many organisations today but they should not be designed only for women. There is considerable evidence that in many organisations—particularly in business—women are over-mentored and under-sponsored.⁹ Mentoring prepares people to move up, while sponsorship makes it happen.

Concluding remarks

Organisations nationally and internationally have been working at trying to address the problem of gender balance for decades. There has been extensive research and thousands of reports identifying the problems and proposing solutions. We know what needs to happen and we are well past rolling out more ad hoc ‘flavour-of-the-month’ initiatives. We need a systematic, embedded behaviour and attitudinal change with strong leadership and sustained commitment from the top. There is clear evidence that a coherent strategy with clear targets will make a difference. Leaders of universities, politicians, corporate leaders and others need to take an active role.

⁹ Ibarra, H., Carter, N.M. and Silva, C. ‘Why men still get more promotions than women’, *Harvard Business Review*, September 2010.

Appendix 1

Programme: Fixing the Leaky Pipeline and Retaining our Talent

Engineering and Computer Science Committee of the Royal Irish Academy
One-day Workshop. Tuesday, 26 September 2017, Academy House, 19 Dawson Street, Dublin 2

- 10:00: Registration
Tea & Coffee
- 10:30–10:40: Welcome from RIA President
- 10:40–11:10: Keynote address: Alice Brown, Scottish Funding Council & Emeritus Professor of Politics at the University of Edinburgh
- 11:10–12:40: Panel discussion moderated by Margaret E. Ward

Speakers: Ann-Marie Holmes, Intel; Oonagh Reid, Arup; Kara McGann, Ibec; Niamh Shaw, Connect2Communicate; P.J. Rudden, RPS Group
- 12:40–13:15: Lunch
- 13:15–13:45: Marie Donnelly, former director, New and Renewable Sources of Energy Efficiency and Innovation at DG Energy, European Commission
- 13:45: Audience discussion and next steps moderated by Margaret E. Ward
- 14:45: Close

Appendix 2

List of Attendees

First Name	Surname	Institution
Marie	Barrett	WITS Ireland Executive
Alice	Brown	University of Edinburgh
Hugh	Byrne	DIT
Mary Anne	Carrigan	Engineers Ireland
Mary	Carroll	WITS Ireland Executive
Julianne	Chaloux	Accenture
Claire	Curtis	Arup
Elizabeth	Daly	IBM Research & TCD/RIA Committee
Marie	Donnelly	Former DG Energy European Commission
Eileen	Drew	TCD
Gerald	Farrell	DIT/RIA Committee
Val	Fenton	Cork City Council
Martha	Flynn	
M.	Godwin	
Jane	Grimson	TCD/RIA Committee
Bill	Grimson	Past President, Engineers Ireland
Sandra	Healy	DCU
Julie	Hogan	Memjet Technology Ltd
Ann-Marie	Holmes	Intel
Jennifer	Keenahan	UCD
Dee	Kehoe	Engineers Ireland
Peter	Kennedy	RIA President
Dympna	Kilgannon	Arup
Lisa	Looney	DCU
Joyce	Loughnan	International Women's Forum
John	Maguire	RIA
Hilary	McDonald	UCD
Kara	McGann	Ibec

Lisa	McGeough	Broadly Speaking
Deborah	Murphy	ARM
Sinead	O'Donnell	ESB
Emer	O'Hare	
Emer	O'Reilly	UCD
Marion	Palmer	WITS Ireland Executive
Oonagh	Reid	Arup
Jennie	Rothwell	UCD
P.J.	Rudden	RPS Group
Rochelle	Rutman	Arup
Anne	Scott	NUIG
Alan	Smeaton	DCU/RIA Committee
Akshima	Sukhija	Accenture
Anne-Marie	Taylor	Career Returners
Daphne	Tsatsoulis	Accenture
Aline	Vidotto	TCD
Margaret	Ward	Clear Ink & Broadly Speaking
Mary	White	Fingleton White

Appendix 3

Members of the Engineering and Computer Sciences Committee of the Royal Irish Academy

Professor Thomas Brazil, MRIA, University College Dublin

Dr Conor Brennan, Dublin City University

Dr John Breslin, National University of Ireland, Galway

Dr Elizabeth Daly, IBM Ireland

Professor Gerald Farrell, Dublin Institute of Technology

Professor Orla Feely, MRIA, University College Dublin

Professor Michael Gilchrist, University College Dublin

Mr Will Goodbody, RTÉ

Professor Jane Grimson, MRIA, Trinity College Dublin

Professor Fiona Lyddy, Maynooth University

Dr Roger O'Connor, Department of Communications, Energy and Natural Resources

Professor Padraic O'Donoghue, NUI Galway

Professor Mairtín Ó Droma, University of Limerick

Mr Damien Owens, Engineers Ireland

Professor Nabeel A. Riza, University College Cork

Professor Alan Smeaton, MRIA, Dublin City University (Chair)

Appendix 4

Other initiatives in Ireland aimed at addressing gender balance in STEM

This Appendix contains list of just some of the other initiatives, other than those referred to in the main text of this report, which play a role in improving gender equality in STEM in Ireland.

The Higher Education Authority commissioned an Expert Group to complete a National Review of Gender Equality in Irish Higher Education Institutions, which led to a report published in June 2016. This report called out dozens of recommendations for stakeholders including higher-education institutions, Irish research funding agencies, the Higher Education Authority and others such as government departments, IUA, QQI and the RIA. Each of recommended actions has named stakeholders and timelines. The Athena SWAN charter was adopted in Ireland in February 2015 and many HEIs have started to win awards under the scheme. Funding organisations and others have started to produce coherent strategies for addressing gender imbalance, such as the Science Foundation Ireland Gender Strategy for 2016–2020, published in November 2016.

Some of the initiatives below are necessary to redress an imbalance where STEM subjects are not taught in girls' secondary schools to the same extent as in boys' schools. This points to difficulties right at the beginning of the pipeline, and for STEM subjects this is particularly important regarding the provision of honours mathematics in secondary schools.

In addition, there are a range of bottom-up initiatives, including:

- **Girls Hack** Ireland, which runs fun and creative technology workshops for teenage girls and their parents in community settings around Ireland;
- **Coding Grace**, who provide female-friendly coding workshops and support networks;
- **Tech4Moms**, an initiative aimed primarily at 25-plus year-old women who may have left the workforce after becoming moms but now have an interest in becoming aware of the new web technologies;
- **Rails Girls Galway**, which is part of a worldwide movement to teach women how to build web applications, and comprises an annual summer weekend of workshops for females of all ages;
- **I-WISH (Inspiring Women In STEM)**, an initiative to inspire, encourage and motivate young female students to pursue careers in STEM, which features a conference with engaging talks by women and men who have seen the opportunities for a great career in STEM as well as interactive STEM-themed exhibitions;
- The **Aurora Leadership Programme** is a leadership development programme for women, designed by the UK's Leadership Foundation to encourage and support females to move into leadership roles in universities by embedding a leadership mindset whereby women identify as leaders and seek appropriate opportunities to develop capabilities, skills and networks to support them in their careers. Participants are matched with a mentor for the duration of the programme;
- **Connecting Women in Technology (CWIT)**: a collaborative initiative made up of women from sixteen technology companies in Ireland, which aims to attract and retain women to the technology sector. The CWIT network is formed by women working at

- Accenture, BT, Dell, Eir, Ericsson, Facebook, Google, HPE, HP, IBM, Intel, Microsoft, Twitter, LinkedIn and Vodafone and runs a regular series of seminars to facilitate networking;
- **Inspirefest** is Europe's leading sci-tech and arts festival, unique in that it has diversity at its heart. It is an annual event which connects sci-tech professionals with fresh perspectives on leadership, innovation and diversity, including addressing gender imbalance issues;
 - **WITS Women in Technology and Science**: supports and promotes women in STEM. It is a voluntary membership organisation, founded in 1990, which holds regular events for members. Members come from across STEM, including the public and private sectors. It has free third-level STEM student membership. More information at www.witsireland.com;
 - **Improving Gender Balance Ireland**: DCU and the Institute of Physics is extending the Improving Gender Balance project, originally run by the Institute of Physics in the UK in 2014, to Ireland. Initially regional in nature, working with six schools in the Dublin area, the project creates a framework for encouraging girls to study physics / STEM subjects, which can be replicated throughout Ireland;
 - **CodePlus Mentoring: Coding Better Futures for Girls** exploits the network and expertise of the **Bridge21** project in Trinity College Dublin, which focuses on developing skills of students and teachers in the area of technology-mediated, 21st century teaching and learning, in order to promote awareness and interest in computer science in the female secondary school cohorts through a series of related activities. Since 2007 the project has worked with over 12,000 students and 1,500 teachers. Female volunteer mentors are recruited and engage in a range of activities aimed at the target audience.
 - In addition, the **STEPS programme of Engineers Ireland and the Smart Futures Programme of SFI** place a particular emphasis on seeking to attract more girls into careers in STEM. Ibec also runs a number of events and provides supports to companies seeking to improve their gender balance.

