Preface

I did not set out to have a career in IT. Rather, I fell into it sideways when a Human Resources job I took turned out to be an HR software support position. I had always been good at math, and the combination of interests made it a good fit for me. Over the years, my career evolved from employee, to consultant, to finally running my own software development company.

When I started in IT back in the 1990s, I looked around and saw how few other women there were. I started to think about the women in IT I knew, who did not know each other. I was determined to do something about it and hit on the idea of founding an organisation for women in IT, to provide a forum for networking, encouragement in a male-dominated field, publicising IT, and otherwise encouraging other women into what we knew was an interesting and well paid career. In 1997, Women in Information Technology (WIT) was born in Queensland, Australia, with a nucleus of ten women (the name has since changed to Women in Technology [WiT] to reflect a broadening of focus).

Over the years, WIT engaged in many programs to help women enter and progress their careers in IT and other scientific and technology fields. They ranged from interventions to encourage schoolgirls to consider IT all the way to board readiness programs to assist female entry onto company boards.

Through WIT, related organisations such as Australian Women in IT, Science, and Engineering (AWISE) and my personal initiatives, I voluntarily dedicated decades of my life to “the cause” of trying to increase the number of women taking up technology studies and careers, but what I observed was that not only were numbers actually declining but also the same arguments and intervention projects were being recycled and recycled across the years and around the world. Then in 2012, I had one of those “AH-HA” moments. I knew I wanted to write this book; I knew I needed to write this book, and I did.

OVERVIEW

“Attraction, Promotion, and Retention” has been the catch-cry of many passionate activists in this field around the globe for more than two decades. Yet to date the secret of attracting females to study technology and to enter technology careers, navigating suitable promotional pathways, and retaining women in technology industries has not been found. Without a doubt, this topic has attracted voluminous research over the past decades and continues to do so. Essentialist Theory, Social Construction Theory, Individual Differences Theory, Structuration Theory, Theory of Reasoned Action, and resulting Gender Modeling, Leaky Pipeline, Life Course Approach, Critical Mass, and Dualism Models have all been used over time to frame researchers’ discussions regarding the lack and decline of females in technology studies and careers.
Despite the wide variety of theories proposed in efforts to frame and understand the issues, to date none have been accepted as a universally accurate framework, nor been applicable across varying cultures and ethnicities. However, the problem is deeper than that. As succinctly put by Mitchell (2013):

*It’s perplexing to make sense of some theories when one looks at the timeline. If social pressures and cultural attitudes were to blame, one would think the numbers would have been consistently low. On the other hand, if social attitudes had changed for the better over the last four decades, one would expect to see a gradual improvement over time. The same applies to changes in the market, such as negative perceptions of IT careers as outsourcing took hold in the ’90s and ’00s. The numbers also don’t track with the unemployment rate, and even if they did, again, one would expect both men and women to be affected evenly.*

The evidence presented in this book confirms that despite the reams of global research and decades of well-intentioned work by organizations, activists, and advocates to tackle the problem—including ad hoc, systematic, and comprehensive efforts, comprising career days, computer clubs, role modelling, mentoring, coaching, general promotional events and more—the attempts have been futile. A multitude of things have been done, but their goal of increasing the number of women in IT remains elusive. Yet, belief in the value of the programs persists, despite the lack of objective evidence. It is time to recognise that there has been a massive global failure to stem the decline of girls taking up technology studies and women entering technology careers. This failure has cost many millions of dollars around the globe, and it is time to seriously question the sense of continuing.

Ultimately when looking at the “issue or problem” of recruitment, promotion, and retention of women in technology fields, I propose that the chief problem is the topic is fundamentally flawed:

- It assumes that the “natural” state of the number of women engaged in technology studies and careers is a “problem” that needs “fixing or correcting”; and
- It layers a gender lens over the ensuing discussions, research, and actions.

This matters because the way we perceive a topic determines our responses to it. For example, if we believe artificial external factors are the main cause, it implies that artificial interventions to ameliorate those factors will have a significant benefit. For example, in her TEDx talk, Schiebinger (2013) states, “Fix the numbers of women…ought to shift to Fix the institutions.... We will not be successful in recruiting and retaining more women if we focus on women alone, we need to take the next step and that is transform institutions.”

The hard fact is that neither the issue nor the proposals are new. For decades, we have been worried about how few women there are in IT and other technical fields. We have generated theories and interventions relating to surmised barriers that keep women out of IT or drive them from it after they enter it. We have achieved nothing – so why do we think more of the same will achieve more?

It is not that those past focuses were inherently unreasonable. Given the historical fight of women against bias in education and careers, it was not unreasonable to propose that persistently low numbers in a given field reflected the same causes and prejudices. Nor, given that the issue is gender disparity, was it unreasonable to view it through the lens of gender theory. However, when we see the number of women pursuing higher education rising to surpass the number of men, when intervention after inter-
vention in one field has no real effect, while in other fields women come to equal or outnumber men without anybody pushing: it is surely time to question our theories.

In business, when an approach consistently fails to deliver expected outcomes either the approach is adjusted or the “issue” is dropped. In science, when experiments are not consistent with a theory we question the theory. However, when it comes to women in IT, the theories live on while reality is blamed for the results. Perhaps it is time to ask the questions, “Should we really care if fewer women are attracted to IT roles? If women aren’t interested in IT careers there is no reason to hold a gun to their heads and force them to into work they don’t want to do” (Cave, 2013), and “Why don’t we just leave the situation alone and see what emerges, instead of collectively trying to engineer an artificial situation?”

It is notable that the overwhelming majority of respondents to a poll conducted for this book identified personal interest from a young age as their own greatest influence on choosing a career in IT, and a clear majority of the remainder nominated discovering an interest after being exposed to IT in their job. In other words, the vast majority of respondents simply chose according to their internal affinity for the field, whether discovered early or later in life. These results map to a more rigorously designed survey conducted by Lyons et al. (2012). These women neither sought out nor were converted by intervention programs, they just chose according to their personal interests. Women in IT or girls interested in STEM see themselves as interested, competent, and above all, as people who regard obstacles as a challenge to be met and overcome. It is that strength and uniqueness of the individual core that forms the central thesis of this book.

Similarly, the failure of interventions and the stagnant level of female participation in IT, while in other fields it has soared from a small minority to a large majority, point to the answer lying within women, not outside them. It is certainly not that women are not as good at the subject as men. It is not even the case that women are not interested in it: many girls are interested in STEM fields. However, career choice takes more than ability and interest. It takes being more interested than in any of the other choices available.

I believe that is the whole secret. Women are under-represented in some fields and over-represented in others because, statistically, their interests differ from those of men. It does not matter how much we tell girls how much we enjoy IT, all that matters to them is what they are interested in doing.

However, whilst personal interest is the main driver, not all girls have an equal ability to discover their interest, and whilst interest can drive someone to a career, there may still exist barriers such as prejudice that make it an unhappy experience.

That is where the seismic shifts happening within the field of IT itself bring both a challenge and a solution.

The challenge is to researchers and organisers. Our frequently changing technology landscape makes it difficult for a traditionally developed and distributed research framework to keep up with the rate of change and incorporate the current influencing factors. Technology and industry game changers that impact the relevancy of a model or theory are introduced frequently. And when it comes to disseminating information, we are in an era where “trending” and following the latest technology craze is fast becoming not only the norm, but the main source of information for society. Similarly, those engaged in women in technology activities—planning, coordinating, or funding—ought to take notice of the tectonic shift beginning in technology and society and shift accordingly. It would be ironic indeed to bemoan the status of women in a dynamic technology field if we did not embrace the new approaches that field enables.

Perhaps we need to widen our perspective, to step back further and ask ourselves even harder questions about the issue of increasing female participation in IT. If you looked with fresh eyes at this issue
today and saw the increasing influence of social media and tools, the organic growth of self-help groups, projects, and programs, ever more disruptive technologies coming online, and the increasing prospect of life extension, what would you do if starting now? Would you even perceive there was an “issue”? Would you feel there was a pressing need to take action to address “the problem”?

The fundamental solution to the “problem” is the same as the fundamental cause: women are unique individuals. It is by promoting the idea that it is the individual who matters, the individual who thinks and has talent, which will one day mean people are judged as individuals on their own merits, not according to prejudices based on gender or ethnicity. It is not up to us to decide what other people should be interested in, but it is up to us to do what we can to empower all individuals, whoever they are and whatever their interests are.

Embracing the new technologies is about recognising that the world is entering an era of disruptive technologies that will empower the individual in ways we cannot predict, that old power bases will crumble and new things arise. Already, we have seen social media playing a leading and powerful influence, such as in the “Arab Spring.” That is where the power of the model presented in this book—the STEMcell model and its #SocialIT aspect—comes in to break down old traditions and build new ones. We must tap into this shifting technological landscape and actively use its tools and platforms, and by doing so, to empower every individual to find and achieve the interests and goals that are uniquely hers.

CHAPTER ORGANISATION

This book is organised into 10 chapters. An introduction presents a detailed summary of the other chapters, of which a brief outline is given here.

Chapter 1 tells the story of pioneering women in the technology field and frames the background. It is not meant to be a complete history of women in technology. Its intent is to highlight some historical pioneers and their contributions, and at the same time draw out the social and cultural circumstances that have contributed to the “lack” of women in technology throughout history.

Chapter 2 discusses global impacts of the new social era, leading to the proposal of a new model for framing the topic. Whilst the new model absorbs the elements of past models, it adds the influence of pervasive technologies such as social media and changes perspective to the main driver being individual choice more than external forces. The layers within the model are presented later in the book, in chapters 5 – 8.

Chapter 3 debates the relative and perceived value of traditional intervention programs. It proposes a practical cost/benefit analysis for the reader to conduct to understand and measure their value. The chapter then looks at some recent interventions in Europe, UK, and the USA. Results of original research are presented and mapped to the topic. It is argued that inherent individual interest is the true driver of career choice today.

Chapter 4 reviews popular theories proposed to address the situation, with specific attention to the Leaky Pipeline model, Critical Mass theory, Life Course approach, Structuration and Dualism theory, and Gender Modelling. The relevance of the traditional theories in the new #SocialIT era is examined.

Chapter 5 is primarily a literature review of the social and cultural contexts. Factors such as popular culture, cultural norms, parental expectations, occupational culture, stereotypes, role models, mentoring, clubs, networking, media, peers, family, security, and social norms are deconstructed.
Chapter 6 is primarily a literature review of the structural context. Factors such as IT industry branding, access to information, access to facilities, education, support mechanism, and government policies are discussed.

Chapter 7 presents the individual context, the core of the model. It specifically addresses the influence of philosophy, values, rights, assumptions, strength, self-belief, interests, differences, ability, curiosity, creativity, and reality on female career decisions.

Chapter 8 describes #SocialIT, the newer social forces, and future driving forces impacting all layers of the model and thus the overall participation of females in technology studies and careers. This chapter discusses future developments such as life extension, wide adoption of augmented technology and increased smart devices, and their likely impact. This chapter is a key chapter to the overall model and is fundamental to adapting to the new era.

Chapter 9 looks at the similarities and differences of the situation for women in IT in other industries and cultures. It examines the fields of science, construction, and engineering, and looks at ethnic differences in countries such as Korea, India, Malaysia, the Middle East, and South Africa, plus subcultures within Europe and the USA.

Chapter 10 gives the conclusions and presents 3 overarching recommendations plus 35 detailed recommendations. The detailed recommendations are structured within a framework mapping to the book’s overall thrust and new social era approach.

PURPOSE AND SCOPE

Whilst I fit at least some definitions of “geek,” I am not a coder. However, my key interest for this book lies in technology core or “hard” skills: the coders, analysts, and architects, the designers and creators. As such in this book, except where quoted from others, I use the term IT instead of ICT. To me there is a clear difference, and mostly I never really “took to” ICT when it was first coined. I always felt that the “C” (Communication) implied more than optical cables and wireless networks, and softened and blurred the concept of “IT” to include mere users of the technology – but maybe that’s just me 😊.

Specifically, I want to make the difference between adopting and using technology versus designing and building it very clear. Many times, I have read headlines and reports that confuse the issue: where quotes regarding use of technology are cited as evidence that there are plenty of women involved. There is a clear and distinct difference between using and building. It is that difference I want to target and where my burning passions to make a difference in this field lie.

Similarly, we have to stress the difference between working in IT and working in an IT company. Whilst including marketers and artists who work for IT companies might make the figures look better, someone whose career would be equally applicable in a software house or a clothing manufacturer does not have an IT career unless she is applying core IT skills. Indeed, this blurring of lines is a critical problem with recent headlines rather hopefully proclaiming that “more than half of tech hires this year are women” (Fortt, 2013; Neal, 2013).

That said, this book has been written for a diverse audience spanning many interest groups and individuals: feminists and gender theorists, researchers, governments and policy makers, educators (primary, secondary, trade, and tertiary), traditional women in IT associations, new social media-style women in tech associations and specialist groups, sponsors and supporters, parents, individual activists and advocates, recruiters, employers, the media, content developers, and taxpayers, and above all, for the individual
women and men in technology. In large part, this is an academic book, but I am not an academic. I am an
active industry participant, and I own and run a successful, multi-award-winning software development
company in the growing areas of Governance, Risk Management, and Compliance. Thus, I hope this
book is of value to academics and researchers – but also to those in industry and the wider community.

I thoroughly enjoyed the research component of this book and only wish I had so widely covered
the literature during my very active earlier days in the field. Not only has the intensive research activity
contributed to my body of knowledge, but also I was fascinated to see projects and groups I had been
involved with discussed and analysed in the formal literature. In some instances, specific references
were made to me by name, whereas at the time I had no idea this was occurring even though I knew and
networked with the authors. Looking at it historically, I found it highly interesting, and I realise I ought
to have been more on top of it earlier. Perhaps a robust debate would have ensued and some ideas in this
book would have been launched already. The value of hindsight rings in my ears.

Beyond published research, the themes in this book have been informed not only by my experience
as an activist for women in technology over the years, but by the exponential explosion of knowledge
and technology during those years. In my lifetime, we’ve come from hundreds of wires, thousands of
switches, and vacuum tubes to chips embedded into everyday devices and tiny multifunction computers;
from where not every home had a phone to where your phone not only goes with you but will take photos
and video, surf the Internet, and play games. Now the influence of social media has become increasingly
pervasive. We cannot sensibly talk about the future of women in IT without considering how the future
itself is going to be radically different from today.

Indeed, the increasingly intersecting areas of science and technology fascinate me, and in this book
you will find analogies reflecting that intersection. I use language that is representative of science and
the model I have developed is represented as a three-dimensional Earth globe, with Earth events and
layers as descriptive areas of the overall model.

All authors have biases that inform their choices, evaluations, and interpretations of source material
as well as their own conclusions. I declare my author bias up front: I am grounded in strong philosophi-
cal roots of reality and reason, and firmly believe that individuals are individuals and responsible for
their decisions and lives. Philosophy underpins my company and home life – in fact, each month for
the past 15 years my house has been opened up for philosophical salons, where “taboo” subjects such
as politics, religion, and education are robustly discussed while we consume copious amounts of wine.

As that last sentence might indicate, I am unashamedly and fairly typically Australian. As such,
amongst the expected USA, European, and Asian references, you will find many references to Australian
researchers and characters that inhabit my Australian landscape and world. My role model interviewees
are all Australian.

I believe that the analyses, conclusions, and recommendations in this book present a view that to date
has not been enunciated. I have tried to look at the theories and the facts and present them with a dose
of reality. In part, it may be seen as a brave move to have done so: entrenched memes do not like to be
challenged. Perhaps this book’s main contribution to the field will be shock value resulting in people
rethinking, engaging in discussion outside the traditional frameworks, and redesigning approaches ac-
cordingly. If all this book achieves is making people think and examine their assumptions, I will consider
it a success.

My style in both business and activism is to innovate, lead, build, and establish an environment for
independent operation, without the absolute requirement for my continued physical presence or hands-
on involvement. I believe in reality, and facing reality means acknowledging that one day my physical
presence (and/or possibly mental presence) will not be around. I like to leave “things” behind that make a difference. It is my hope that this book will do exactly that. It is my hope that this book will be read broadly and thoroughly across all my target audiences, and that its recommendations will be enthusiastically adopted. It is my hope that people refer back to this book as the start of a change for the better.

I have taken the unusual path of inviting two Forewords, specifically to help represent the key thrust and theme of this book. One foreword is from Dale Spender, a widely published, high profile, and well respected Feminist, who initially approached this issue from a traditional viewpoint and viewing lens. The other, Pia Waugh, is from the emerging young, hacker, geek, “do awesome” culture. I met Dale in 1998 when we were both appointed to the Queensland State Government Ministerial Technology Advisory Board, and I met Pia in 2006 when we were both presenters at a Girls in Computing event in Western Australia. I highly respect both Dale and Pia and feel honoured they agreed to craft forewords for this book.

I have chosen to begin each chapter with a quote. They have all been carefully selected not only for what they say but also for who said them and their fit to the chapter contents. I hope you enjoy them.

Sonja Bernhardt, OAM
ThoughtWare, Australia

REFERENCES


