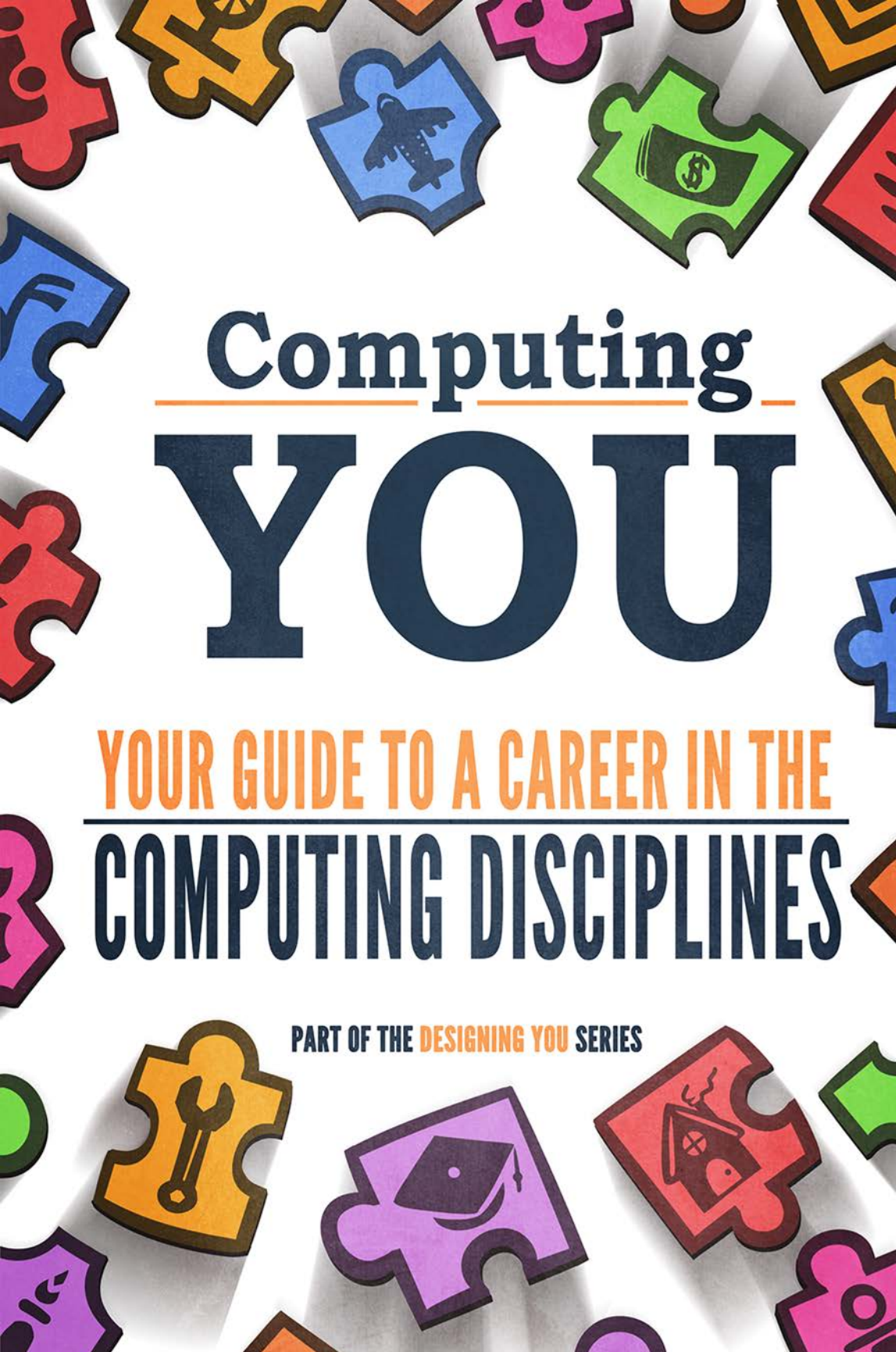


Computing YOU

YOUR GUIDE TO A CAREER IN THE COMPUTING DISCIPLINES

PART OF THE DESIGNING YOU SERIES

COMPUTING YOU

Your Guide to a Career in the Computing Disciplines

Faith-Michael Uzoka
Janet Miller
David J. Finch

Contributors
Shoba Ittyipe & Bill Patterson

Illustrations by
S.R. Ringuette

FDR Publishers
2017

First Printing: 2017

ISBN 978-0-9952277-0-5

FDR Publishers
Suite 100, 209 4th Ave NE, Calgary, AB Canada, T2E 0J2

Website: www.DesigningYOU.org

Email: info@DesigningYOU.org

Editing by Zoey Duncan zoeyduncan.com

Did you find a typo? Let us know! Please email the details to info@DesigningYOU.org and we'll correct it in the next edition.

Computing YOU is dedicated to all of our past, present and future students.
Be curious and never stop designing you!

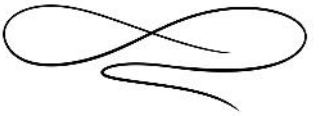


TABLE OF CONTENTS

I. INTRODUCTION 1

II. COMPUTING YOU 3

Reflection and Computing YOU 3

III. A LIFE IN COMPUTING 5

What Are the Different Careers in Computing? 5

What Computing Discipline am I interested in? 6

What Aspect of Computing will I focus on? 8

What Type of Organization do I want to be part of?? 11

What Does it Take to be a Computing Professional? 12

Computing Knowledge and Skills 12

Transferable Skills 14

The Future of Computing—What it Means to You 16

Does Sex Matter? 23

IV. DEFINING YOUR PROFESSIONAL MISSION 25

Step 1: Conduct Secondary Research 27

Step 2: Analyze Computing Job Postings 28

Step 3: Networking and Talking to Professionals 29

Step 4: Defining your Mission 31

Don't Forget About Everything Else 35

V. GETTING FROM HERE TO THERE 36

Link Your Professional Mission to Knowledge and Skills 36

Bridging the Gap 38

Mission Mapping 42

1. Senior Network Systems Administrator – Systems Integrator
2. Senior Software Developer – Start-up
3. Computer Network Support Specialist – Board of Education
4. Hardware Engineer – Global Technology Vendor
5. Database Administrator – National Retailer

6. Senior Game Producer – Global Developer
7. Freelance IT/IS Consultant
8. Software Quality Assurance Specialist – Consumer Electronics
9. Web Developer – Digital Agency
10. Senior IT Business Analyst – Agribusiness
11. Director, Business Development – Technology
12. Digital Project Manager – Marketing Agency
13. Information Security Analyst – Financial Services
14. Associate Professor – University
15. Founder/ Entrepreneur – Start-up

Consolidating Your Mission Map 65

VI. ADAPT AND CHANGE 68

VII. AT A GLANCE 69

VIII. APPENDIX 70

Glossary of Knowledge & Skills 70

Computing Career Resources 78

Related Readings 80

Four-Year Mission Map Checklist 82

10-Year Mission Map Framework 83

The *Designing YOU* Process 84

IX. ABOUT THE AUTHORS 86

X. NOTES 87

INTRODUCTION

It's about Designing YOU

Computing YOU is part of the *Designing YOU* book series. ***Designing YOU*** **isn't just a series of books, it's a process of viewing yourself and your life more strategically.**

It's about exploring and being curious.

It's about designing a map for making decisions big and small—a map that helps you address the relentless questions and unsolicited advice about your future you're getting right now.

This series of books is written for a specific time in your life. You're likely attending (or maybe have graduated from) college or university. Your future is starting to actually feel like *your* future. That's exciting and scary. Even if you think you know where you want to end up, there's no Google Map that'll get you there. Life is rarely that obvious. Each one of the roads on your journey offers detours, pit stops and often a few intriguing hitchhikers.

"EVEN IF YOU THINK YOU KNOW WHERE YOU WANT TO END UP, THERE'S NO GOOGLE MAP THAT'LL GET YOU THERE."

Now is the time to make some weighty, often intimidating, decisions for yourself. That's why building your own map right now is so critical.

Throughout the process of designing you, you'll need to be **intentionally curious**. Intentionally curious people look at the world—and their place in it—and wonder about the big picture:

- How do things work together?
- How do these pieces connect?
- How can I influence things?
- How can I improve things?

Like any new skill, intentional curiosity takes practice. As you start to get curious about things, be humble enough to recognize that you don't know it all. Humility creates a hunger that can only be fed by answers.

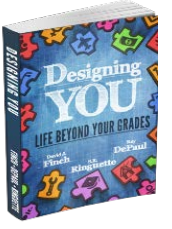
In *Designing YOU,* we answer some daunting questions you may be asking:

1. Why do I **like certain things** and not others?
2. How can I choose a program or courses at school that are **right for me**?
3. What questions should I ask in **interviews**?
4. Does **emotional intelligence** really matter?
5. How does my **gender impact** my life?
6. How can I find a **mentor**?
7. Am I more of an **artist or an analyzer**?
8. How can I tell **my story**?
9. How do I **prioritize and balance** all the things I want in life?
10. What should I do if **the world changes?**

Refer to the Appendix for a summary of the *Designing YOU* process.

Throughout *Computing YOU*, you'll see a numbered puzzle piece. This icon will recommend you go to a specific step of the *Designing YOU* book or eBook for additional information.

For a limited time, go to DesignngYOU.org to download your complimentary eBook copy of *Designing YOU – Life Beyond Your Grades*.



COMPUTING YOU

Computing YOU is a guided tour through the world of computing. By the end, you'll be able to confidently step in the direction of your future because you'll have a solid understanding of what you need for success in this industry now and long-term.

All aspiring computing professionals are faced with the same crucial questions:

- What are the **different careers** in computing?
- What **does it take** to be a computing professional?
- What's the **future of the computing** profession and what does this mean to me?
- How have other computing professionals **got to where they are today?**
- And the inevitable… **how much money can I mak**e?

In *Computing YOU*, we dig into answering each of these questions with intentional curiosity.

Step 1: Explore the computing career landscape

To make the world of computing feel as familiar as your school, we explore:

1. What are the different **careers** in computing?
2. What **knowledge and skills** do I need?
3. What are the **major trends** in computing and what do they mean for my future?

Step 2: Define your destination

Your destination is where you want to be in your career 10 years from now. We call this your 10-Year Professional Mission. Knowing your destination will help you make decisions, big and small, along the way. You'll define your destination by the end of this section, but it will evolve with you over time, too.

Step 3: Develop your Mission Map

Like any epic journey, this one will require some serious planning. You'll need to determine the knowledge and skills required to achieve your 10-Year Professional Mission and map out a plan to achieve them. To inspire you as you plan this odyssey, we review 15 Mission Maps inspired by the career journeys of real computing professionals.

Reflection and *Computing YOU*

Living in the moment is essential to a good life—but so is personal **reflection**.[1] Taking thoughtful notes and noticing what works and what doesn't ensures you're always gathering

new information, analyzing it and evaluating what to do next. You'll be reflecting with the goal of trying to connect it all together. To do this, you'll ask yourself questions in three basic categories: What? So What? And Now What?

What?

1. What happened?
2. Why did it happen?
3. What did you do? What did others do?
4. What was your reaction?

So What?

1. What were your feelings when it happened?
2. What are your feelings now? Are there any differences? Why?
3. How do you think others feel?
4. What was the impact of what you did?
5. What worked well? What didn't?
6. What did you learn? How did you learn it?

Now What?

1. What are the implications for you and others?
2. What would you do differently next time?
3. What information do you need to move forward?
4. Why is this learning important to you?
5. What actions are you going to take?

Your best tool for reflection is a *Designing YOU* journal. Though there is no shortage of digital tools to capture thoughts and information (smart phone, vlogs, blogs, Google Drive or a combination), we find that an old-fashioned handwritten notebook is the most effective for your *Designing YOU* work.

Going forward, when you see this symbol in the book, grab your journal and get to work. Remember to refer to this list of questions as you reflect.[2]

There are no rules for when or how to use your journal, but consider it a catch-all for the thoughts flitting through your head that you don't want to lose. There's something rewarding about filling a little book with your questions, thoughts, ideas and interests.

In *Computing YOU*, we try to avoid computing jargon, but sometimes we just can't help ourselves. If we start using terms you are not familiar with click this computing dictionary, and jot down any unfamiliar terms in your journal.

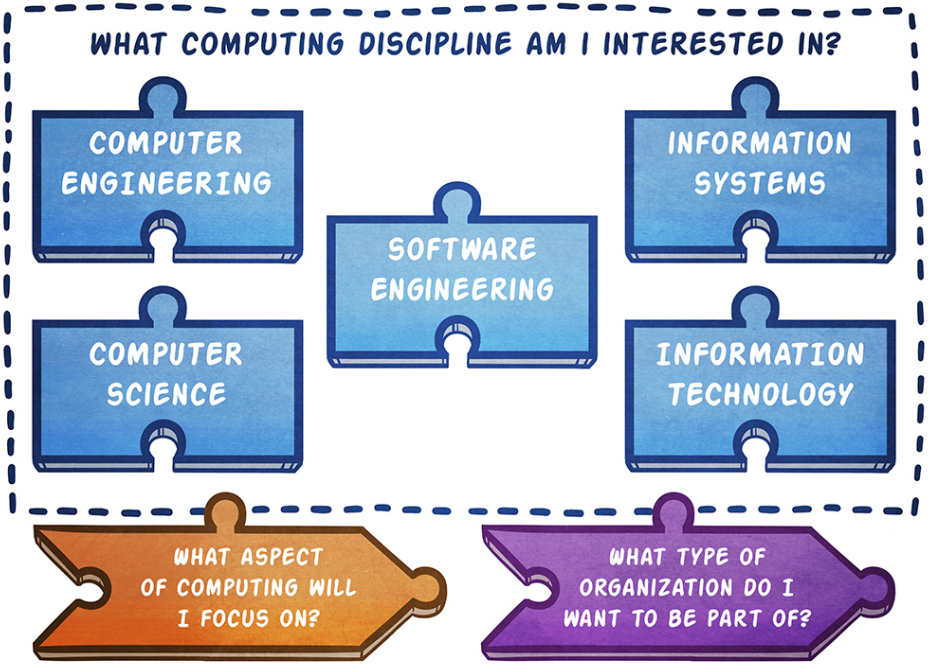
A LIFE IN COMPUTING

WHAT ARE THE DIFFERENT CAREERS IN COMPUTING?

What is computing?

It's helpful to think of all the jobs in computing as existing on a spectrum ranging from theory and development to application and practice. Further, computing careers cover a broad range of knowledge areas including organizational issues, technologies, software development, system infrastructure and computer architecture.[3] You can figure out your place on the computing job spectrum by considering three key questions:

1. What **computing discipline** am I interested in?
2. What **aspect of computing** will I focus on?
3. What **type of organization** do I want to be part of?



Computer Engineering

Potential jobs

Network and computer systems administrator
Back-End Developer
Computer network support specialist
Computer network architects
Hardware engineers
Systems programmers
Embedded Systems Engineer

Questions:

- How do we design computer systems that can simulate human thinking, learning, and reasoning?
- What are the best designs for computer systems to ensure durability and reliability?
- How do we develop new and more powerful computer systems that would meet the enhanced needs of users?
- What are the most efficient ways of designing and developing computer networks?
- Can we develop computer applications and other devices for medical use?

Typical Tasks

- Designs hardware to implement communication systems
- Develops hardware devices that are software-controlled, such as iPods, smart phones and gaming devices
- Focuses exclusively on hardware design, including digital electronics, with little or no involvement in software design
- Evaluates and improves the usability (user experience) of computing systems
- Take existing equipment and adapt it for specialized use

Tackle these questions in the order that makes the most sense for you. For example, your passion may be game development, so you'll answer the focus question first. Or you may know that you prefer to work in a hospital setting, so you already know what organization type you're looking for. Or you may be drawn to a career in software engineering, meaning you already know what discipline you want to study. Don't worry if you find some of the following computing terms unfamiliar at this point. Flip to the Glossary of Knowledge & Skills in the Appendix for definitions.

What computing discipline am I interested in?

The Association for Computing Machinery (ACM) classifies computing careers into five main disciplines, which encompass hundreds of jobs across industries.

Here are the five ACM computing disciplines[4].

Computer Science: The theory of programming and the science of cutting-edge computing solutions. Jobs in CS focus on designing or building software, developing innovative computing solutions to real world problems, and creating new and better ways of using computers.

Computer Engineering: Engineers who focus on the design and development of digital hardware and software systems. Jobs in CE may be concerned with software methods (programming), the hardware side of computing (development) and/or embedded systems.

Information Systems: Jobs in IS focus on the information that computer systems can provide to help organizations function well. IS professionals serve as a link between the technical side and management side of a company.

Computer Science

Potential jobs

Application analyst
Data analyst
Database administrator
Games developer
IT consultant
Multimedia programmer
Systems analyst
Computer systems developer
Web developer
Quality Assurance Specialist

Questions:

- What are the tools needed to develop software solutions using contemporary programming languages and platforms?
- How do we analyze the local and global impact of computing on individuals, organizations, and society?
- What are the current techniques, skills, and tools necessary for computing practice?
- How do we apply mathematical and algorithmic principles and theories and computing theory in decision modeling?
- How can I to learn to apply design and development principles to the construction of software systems of varying complexity?
- How can we analyze complex problems and synthesize their alternate solution

Typical Tasks

- Uses new theories to create cutting edge software
- Focuses on the theoretical aspects of technology
- Utilizes theory to research and design software solutions.
- Uses a wide range of foundational knowledge to adapt to new technologies and ideas.
- Applies mathematical and theoretical knowledge in order to compare and produce computational solutions and choose the best one.

Information Technology: Focused on the applied side of computing, jobs in IT focus on taking care of an organization's technology infrastructure and also the people who use it.

Software Engineering: Jobs in SE focus on making software systems that are reliable, efficient, affordable and user-friendly.

Education in any one of these computing disciplines can open the door to a variety of jobs. Studying any of them at the graduate level will make you more competitive. As you'll see below, there's a lot of overlap between disciplines. Strong candidates for any particular job might have a variety of backgrounds. For example, a project manager could have a degree in any of the five disciplines, and a database administrator might have a background in IT, IS or CS.

Not all jobs are created equal—even when they have the same job title. Just think—an IT manager in a start-up may have responsibilities that relate to all five disciplines; whereas, in a global company they may be responsible for only a specific part of the organizational IT profile.

Whatever discipline you find yourself drawn to, you can benefit immensely by **exploring the full computing spectrum**. For example, if you love programming, also spend some time on networking or other hardware skills. These are considerations you can build into your Mission Map later.

The point of you getting a depth and breadth of experience across the spectrum is to create empathy. Any great project manager needs to genuinely can empathize with the challenges of a programmer, and vice versa. If you can't empathize with your colleagues, it's easy to blame others when things go off the rails instead of finding a solution.

Information Systems

Potential jobs
Application analyst
Business analyst
Database administrator
Information systems manager
IT technical support officer
Multimedia programmer
Network administrator
Systems developer
Project manager

Questions:

- How do we apply computing principles and techniques in the effective and efficient planning and control functions of management?
- How can we generate useful reports about the performance of human, material, financial and other organizational resources?
- How do we determine the best software solutions for driving the organizational production, marketing, human resources and finance functions?
- How can we measure the current performance level of the organization and compare it with the expected levels?
- In what ways could the organization utilize information systems to gain strategic competitive advantage?
- How can we analyze complex problems and synthesize their alternate solutions?
- How does the technology infrastructure of the organization increase usability and reduce user complaints?

Typical Tasks

- Combines knowledge of business and technology
- Selects computer systems to improve business processes
- Focuses on information, and views technology as a tool for generating, processing and distributing it.
- Uses technology to give a business a competitive advantage.
- Manages projects, teams of software developers or a computing department.

What aspect of computing will I focus on?

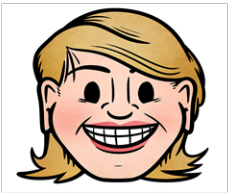
The kind of computing work you focus on will have **huge influence over your day-to-day job as a computing professional.** Graduates of the different computing disciplines typically work in one of five job categories.

The first job category is ***infrastructure***, this is where computing professionals develop, test and manage the computing infrastructure (that could be hardware, communications technology and/or software) we use every day. Jobs that fall into this category include network engineers, DevOps managers, hardware architects, system administrators, computer operations managers, and automation engineers.

The second job category focuses on managing and protecting information used by, or stored in, computers (e.g. employee information, financial records. Jobs in this area include security specialists, data scientists, database administrators, data mining specialists or analytics consultants. As we'll soon see, big data is an important trend in this industry and jobs in this sector are on the rise.

The last job category is design, where the focus is on creating computer products that captivate people. When something is well designed, you enjoy using it, feel inspired by it, and look forward to using it again. Within the job category of ***design***, we see multimedia specialists, software architecture consultants, information architects, quality assurance specialists, UI/UX designers and usability engineers. These designers could be embedded in giant companies like Microsoft or Cisco, or they may work as freelance consultants.

Information Technology



Potential jobs

Computer Support Specialist
Database administrator
Network and Computer Systems Administrators
Information Security Analysts
Computer Network Architects
IT consultant
Cloud architect

Questions:

- How can we effectively identify and analyze requirements in order to create IT solutions?
- How to evaluate current and future technologies and their applicability in addressing individual and organizational needs?
- How can we develop and implement IT-based solutions?
- In what way can we use information technology to enhance product development, process improvement, cost efficiencies and competitive advantage?

Typical Tasks

- Integrates computer hardware and software
- Applies technology to solve practical problems
- Provides a support role within an organization, to help others make the best use of its technical and information resources
- Uses a wide range of foundational knowledge to adapt to new technologies and ideas
- Understands both technology and business, but with a focus more on the technical side

If you focus your computing work on aspects of ***development,*** your expertise will be in general software development. Jobs in this area include web developers, front-end developers, programmers, software engineers and game developers.

And lastly, many computing professionals focus their work in the ***corporate*** sector. Computing work touches every sector of our economy, big or small, including finance, energy, retail, government and healthcare. Those who focus on the corporate aspects of computing become system analysts, SEO specialists, cloud product managers, business analysts, content strategists, and/or move into management positions including project managers, application development managers, ITS managers or Chief Information Officers.

To find out more about specific areas of study, check out ***Computing Disciplines: A quick Guide for Prospective Students and Career Advisors*** (Connolly, Miller & Uzoka, 2017), available online at www.ceric.ca.

Software Engineering

Potential jobs
Application software developers
System software developers
Quality Assurance
Specialist/Solutions Tester
Systems analyst
Software engineer
Systems architect

Questions:

- How can we design systems to meet desired needs within realistic constraints?
- How do we identify and solve real life problems using sound engineering principles?
- How are software solutions influenced by their global, economic, environmental, and societal context?
- How do we apply relevant computing and mathematical theories and principles in the development of complex software systems?
- How do we manage the system development life cycle from

Typical Tasks:

- Focuses on large-scale systems development
- Designs testing procedures for large-scale systems
- Utilizes theory to research and design software solutions
- Develops software systems that are maintainable, reliable, efficient, and satisfy customer requirements
- Utilizes sound engineering practices to create computer applications
- Manages a team of software developers.

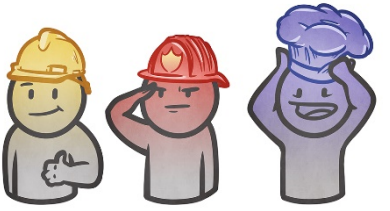
In most cases, the driver of a country's or city's economy significantly determines the viability of various computing careers. For example, in Calgary many computing graduates are employed directly or indirectly in the energy sector. Most of positions in the energy sector require education in the areas of computer science, information systems, software engineering or information technology. In process-driven departments (e.g. knowledge management) we also see computer engineers and computer scientists. In large organizations (e.g. energy or financial services) these professionals focus on infrastructure; data and security management; design and development of new software solutions; or corporate aspects of computing geared towards sustainability and competitiveness of the organization.

The government sector also employs a significant number of information systems and information technology specialists. For example, Alberta Health Services is one of the largest employers of computing professionals in the province, especially in the areas of systems analysis, database administration, data analysis and project management. These professionals share a commitment to the umbrella organization, but the flavour of their work depends on the aspect of computing they focus on.

Usually, the aspect of computing professional focuses on (infrastructure, data, design, development or corporate) will connect back with one of the five core disciplines (CS, IS, IT, CE or SE). However, through the course of your career, you're going to develop more than one area of expertise. You may start with a focus in the area of development and end up as a project manager in a more corporate setting. This kind of transition is common with

job progression and experience in this field, regardless of what discipline you're first trained in.

In *Computing YOU,* when it's time to narrow in one area of expertise, we recommend you go to Step 4 of *Designing YOU* and complete the exercises in the section titled, "What Do You Love to Do?" Afterward, consider whether a particular focus would fit your responses. For example, if one of your answers was "I love cars," you may want to explore computing opportunities in the automotive industry; or maybe it was "I like big-business environments." In that case, explore working on the corporate side.



Most people don't know what aspects of computing they love (or hate) until they experience them. If you're like most people and you're uncertain, then be sure to include opportunities in your Mission Map to get diverse experiences. Find those opportunities through things like internships, summer jobs, volunteer work, or by working in an entry-level position in a range of industries. You may even find out that one aspect of computing you assumed was boring lights your fire. At the very least, you'll be able to put your assumptions to the test.

What type of organization do I want to be part of?

An organization's size and scope affects the daily job of a computing professional, including how specialized or generalized their daily tasks will be. For example, a software developer working with a small start-up technology company with $1 million in revenue is likely responsible for developing and supporting software for multiple products. In contrast, a software developer working with a company with 50,000 employees, operating in 100 countries and generating $3 billion in annual revenue may be responsible for the software of a single feature on a single product.

Large organizations tend to hire many computing graduates in various departments. Multinational firms usually hire two categories of individuals: those who deal with local computing needs and those who work across geographical zones. If you're in the latter category, your job may involve traveling or collaborating virtually with colleagues. Most of these large organizations do not create in-house applications, but rely on external designers and developers for their application needs. Their employees, on the other hand, usually manage existing applications, customize Enterprise Resource Planning (ERP) software, manage databases and security systems, and perform other support functions.

Small- to medium-sized organizations usually hire only a few computing employees. These computing professionals develop and maintain systems that manage multiple processes for a wide range of organizational functions. As a result, these employees are required to develop expertise across many aspects of computing.

The salary structures also vary according to the size of the organization. Large organizations tend to pay more than smaller ones and offer better career progression. For example, a systems analyst in a small firm could earn about $70,000, while their counterpart in a multinational oil and gas firm could earn as much as $130,000.

It's time to grab your journal for your first reflection. Think about each of the three questions and your early impressions of how you'd answer today. Does the discipline, aspect or type of an organization jump out as most important to you? Why? This early reflection on "why" is important. It should start to raise questions and assumptions that you can explore with further research.

WHAT DOES IT TAKE TO BE A COMPUTING PROFESSIONAL?

In general, knowledge and skills for computing professionals fall into two clusters.

The first cluster is **discipline-specific knowledge and skills.** These include the knowledge and skills required for a job in computing technology. For example, a computer professional may develop expert skills in programming and will gain specific knowledge of various programming languages over the course of their career. These discipline-specific knowledge and skills can be applied to a variety of positions.

The second cluster is **transferable skills**. Transferable skills can be used in lots of contexts. For example, being organized is a critical skill regardless of whether you're an accountant, a marine biologist or a hardware engineer.

In the charts that follow, look at the knowledge and skills that various computing and technology jobs might require. Don't worry if some of the knowledge and skills are unfamiliar at this point. You can refer to these charts later when you're identifying the current gaps in your knowledge and skills.

Infrastructure

Example Jobs
- Automation Engineer
- DevOps Manager
- Computer Operations Manager
- Operations Research Analyst
- Network Support Technician
- Network Administrator
- Systems Administrator
- Hardware Architect

Basic Skills
- Hardware Architecture
- Software Architecture
- Operating Systems
- Utility Software
- Lower Level Programming Languages
- Data Structures and Algorithms
- IS Project Management
- IT infrastructure design and Management
- Knowledge of systems fundamentals and computer architecture
- Knowledge of networking and communications
- Knowledge of network design and administration.
- Information Technology Security Configuration and Management

Discipline-Specific Knowledge & Skills: Discipline-specific knowledge and skills in computing can be broken into five major clusters. Each cluster includes a series of specific knowledge areas and skills that are more (or less) important for different jobs.[5]

Data

Example Jobs
- Security Specialist
- Analytics Consultant
- Database Administrator
- Data Scientist
- Data Mining Specialist
- Big Data Specialist

Basic Skills
- Data Structures and Algorithms
- Information Management
- Enterprise Systems Architecture (ESA)
- Skilled at developing and administering databases
- Knowledge of business intelligence and analytics
- Information Technology Security Configuration and Management

Design

Example Jobs
- Usability Engineer
- UI/UX Designer
- Information Architect
- Multi-media specialist
- Quality Assurance Specialist
- Systems Analyst and Designer
- Software Architecture Consultant

Basic Skills
- Human Computer Interaction (HCI)
- Software Architecture
- Object-Oriented Programming (OOP)
- Software Development Process
- Data Structures and Algorithms
- Software Modeling
- Enterprise Systems Architecture (ESA)
- Design and Analyze Information Systems
- Skilled at developing and administering databases
- Knowledge of enterprise systems analysis and integration
- Web Development and Administration
- Mobile Applications and Device Management
- Information Technology Security Configuration and Management

Development

Example Jobs
- Web developer
- Software Developer
- Front-end Developer
- Programmer
- Game Developer

Basic Skills
- Human Computer Interaction (HCI)
- Software Architecture
- Object-Oriented Programming (OOP)
- Software Development Process
- Data Structures and Algorithms
- Software Modeling
- IS Project Management
- Design and Analyze Information Systems
- Skilled at customizing and maintaining applications
- Skilled at developing and administering databases
- Web Development and Administration
- Mobile Applications and Device Management
- Information Technology Security Configuration and Management

Corporate

Example Jobs
- Cloud Product Manager
- Business Analyst
- Systems Analyst
- Content Strategist
- SEO Specialist
- Chief Information Officer
- Project Manager
- ITS Manager
- Application Development Manager

Basic Skills
- Operating Systems
- Utility Software
- Information Management
- Enterprise Systems Architecture (ESA)
- IS Project Management
- Knowledge of IS strategy, management, and acquisition
- Skilled at customizing and maintaining applications
- Knowledge of enterprise systems analysis and integration
- Information Technology Security Configuration and Management

Core Transferable Skills

Transferable skills are also broken into five major clusters. Each cluster includes a series of specific skills that are more (or less) important for different jobs.[6]

Thinking Skills

Demonstrates thinking skills:

- Analytic thinking
- Transdisciplinary systems thinking
- Problem solving
- Adaptive thinking
- Intentional curiosity
- Thoughtful creativity

Communications Skills

Evidence of communication skills:

- Ability to communicate effectively for different audiences using written, verbal, & non-verbal mediums
- Effective listening
- Persuasive storytelling
- Conflict resolution & negotiation

Organizational Skills

Evidence of organization skills:

- Self-starter
- Time management
- Follow through
- Perseverance

Interpersonal Skills

Evidence of interpersonal skills:

- Cross-contextual competency
- Effective leadership
- Self-confidence
- Strong work ethic
- Effective team player
- Emotional intelligence

Confident use of Digital Technology

Technology use is integral to functioning both personally & professionally. Most career pathways require using technology to communicate, problem-solve & conduct research. Note, this is different than task-specific technical literacy.

As you develop your Mission Map, you'll need to prioritize the knowledge and skills that best fit your professional mission. Many of the skills a web designer, for example, are distinct from the skills needed to be a game developer or a mobile app developer (though there are lots that overlap).

To prioritize what experience and education you'll need, think about knowledge and skills for each job on a **four-level rating system.** Overall, you want to focus your limited time on the areas that offer maximum return.

Level 1: Not required	**Level 2: Good at**
Depending on what career you're pursuing, there will be a bunch of knowledge and skill areas that you won't even require a "good at" to deliver on the vision of your Computing YOU.	"Good at" reflects an ability to engage and understand a topic but not be completely fluent (let alone an expert) in. For example, as a network administrator, you may be good at encryption algorithms or schemes, but you don't have to be an expert.
Level 3: Great at	**Level 4: Expert**
"Great at" reflects advanced knowledge or skill in an area. You may not be the best in your organization in this area, but you're close. For example, as a web developer you may not be a database specialist, but you should be great at integrating databases into the web system.	You need to be an expert in this knowledge area or skill. This is a "need to know," not a "nice to know." For example, as a software engineer you'll need to be an expert in user-requirements analysis and documentation.

At this stage you might be asking yourself, **"How can I be good at all these things?" You can't be. Start by identifying your current knowledge and skills, with evidence to back it up.**[7]

Replicate the following table in your journal. List the skills you currently have and rate them using the four-level system above. Come up with **at least 10 individual** knowledge areas or skills for computing and for transferable skills. **The most important part of this exercise is the proof that you can do what you say you can do.** That evidence could be in the form of a certificate or associated work experience.

For example:

Cindy knows she is "great at" leadership (an interpersonal skill). Her evidence is that she was head bartender at the university pub with six staff reporting to her and experienced no staff turnover.

Marco is "great at" written communication. He has strong evidence of this since he publishes a popular blog for students at his university.

My Current Knowledge & Skills	Level Rating (1-4)	My Evidence Is…
My computing skills are….		
My transferable skills are…		

Once you have completed this table, review it with family, friends and any current mentors you may have. Having a fresh set of unbiased and trusted eyes can often be an important reality check.

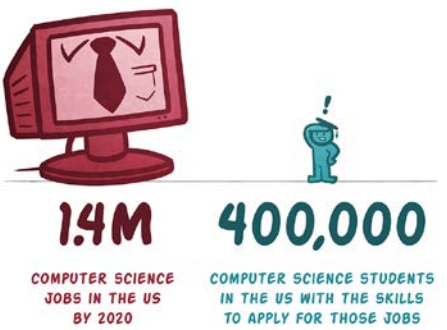
What's a mentor?

A mentor is a trusted advisor on everything from school to jobs to volunteer opportunities and what clubs to join. This person may be a professional acquaintance or a friend. We recommend the best long-term approach is to build a team of mentors with diverse backgrounds and expertise (some professional, some personal). Dive into Step 3 of *Designing YOU* for advice on how to develop your mentor team.

THE FUTURE OF COMPUTING WHAT IT MEANS TO YOU

Computing is one of fastest-changing careers today. Some powerful trends—from technology to demographics—are redefining computing careers. **Many computing jobs from a decade ago no longer exist or have evolved beyond recognition.** Mapping your 10-Year Professional Mission is going to be a challenge—but it's also an opportunity to jump ahead of the curve.

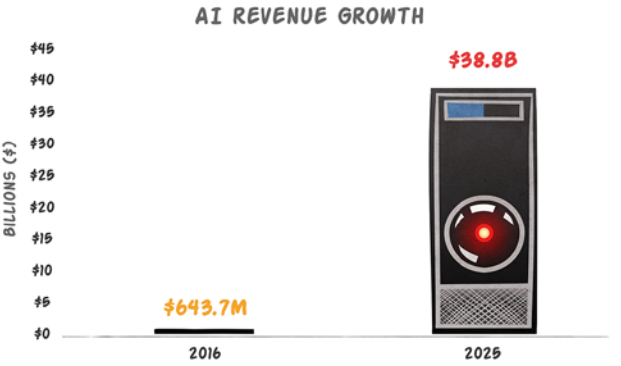
It's essential you consider the computing professional of tomorrow as carefully as the computing professional of today. [8]



We won't pretend to predict how computing careers will change over the next decade. That's not realistic. What you can do now is **go in with your eyes wide open** to the prevailing trends that'll influence computing and reflect on how these could affect your mission. Consider the following list of current trends as **a starting point** for what you must keep in mind as you define and live your 10-Year Professional Mission.

Trend 1:
Artificial Intelligence, Machine Learning and Cognitive Computing

Artificial intelligence (AI) is the driver of automation. It'll define many aspects of our lives soon, from driverless cars to household automation to computer-automated manufacturing, not to mention automated warfare. Revenue created by AI is expected to explode over the next decade. AI is already behind many of the mechanisms in our daily tech lives, like Amazon product recommendations (that's powered by machine learning). Other forms of AI, like the cognitive computing applications that seek to mimic inherently human skills such as understanding natural speech, aren't part of our daily interactions. Yet. [9]



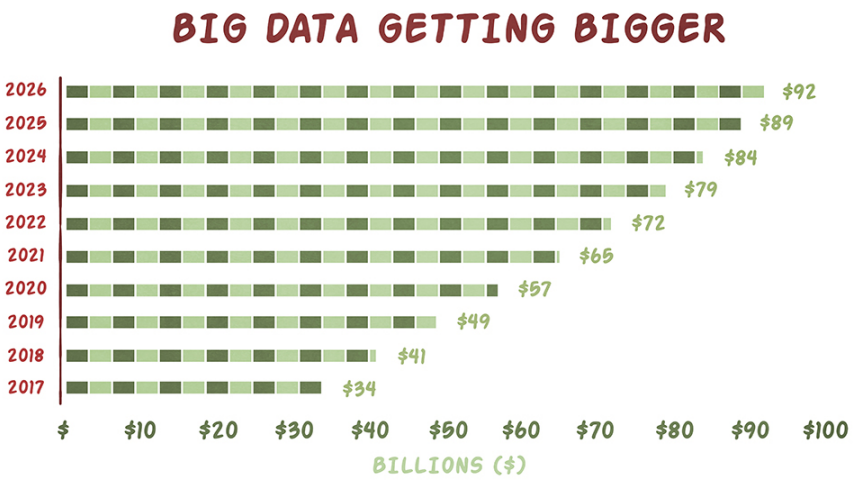
What it Means to YOU

A degree in computer science, software engineering or computer engineering with a focus on intelligent systems, robotics or automation will likely prepare you for careers relating to artificial intelligence, machine learning and cognitive computing. Job opportunities in AI are predicted to grow by 15% over the next five years, and average salaries have been $25,000 higher than the average salary for all other computer occupations.[10] , it's hard to predict just what those AI jobs will look like a decade from now.

Trend 2: Big Data

When we're talking about big data, we're talking about huge data sets captured from individual and organizational transactions and the ability to analyze and do something with that data. Our devices are collecting data all the time—our phones, social media, Internet activities—and this data can be used to predict our behaviour and reveal our preferences. In other words, every credit card transaction, click on Google, Instagram post and GPS ping from your smart phone generates data that is collected and used by organizations. Use of big data could lead to smarter business moves, increased efficiency, cost reduction, faster decision-making, new product development and increased customer satisfaction.

In the past two decades, technological innovation has transformed our society. The Internet, social media and mobile devices are only the tip of the digital iceberg. Big data is growing bigger, with global consumer Internet data traffic projected to grow from **9,059 petabytes (PB; a petabyte is one million gigabytes) per month in 2016 to 19,538 PB in 2021.**[11]



The following chart provides a sense of the revenue growth projection for big data investments over the next decade. [12]

What it Means to YOU

Big data equals big opportunities. As big data continues to expand in size and complexity, so too do the demands for jobs specializing in this kind of data analysis. Today, the largest players in big data include Microsoft, IBM, Hewlett Packard Enterprise, PayPal, Google, eBay and Amazon, but smaller companies are also gaining access to these datasets.[13] Opportunities in the future will be across all aspects of computing. Big data players will be looking for data science specialists who can design the hardware and software to manage big data, integrate big data systems into a company's operations, and analyze and transform big data into better decisions. A career in computer science or information systems, with an emphasis on databases, data warehousing, mining and modeling are pathways that will prepare you to ride the big data wave.

Trend 3: 5G and the Internet of Everything

The fifth generation (5G) wireless connection was built specifically to keep up with the "Internet of everything," enabling the connection of most devices to the Internet. Home appliances, security cameras, cars, office devices and personal devices are being connected to the Internet in ways that are becoming virtually seamless. **Gartner Inc. estimates that about 8.4 billion "things" are currently connected to the Internet, and predicts this will grow to 20 billion in 2020, with consumer applications representing about 63% of total connections.** Ericsson is predicting 90% of all devices will have mobile broadband

capability by 2022.[14] The 5G connectivity dramatically increases data transfer speeds, making it easier to download and upload large volumes of data, including Ultra HD and 3D videos.

What it Means to YOU

A degree in computer science, information technology or computer engineering can prepare you to participate in the Internet of everything era that is propelled by 5G networks. To be competitive in this environment, your focus should be on design, data and development areas including computer networks, cyber security, web development and application development (especially Android development).

Trend 4: Cloud Computing

Cloud computing relies on shared resources available through the Internet, and allows users to host applications, store data and access digital resources beyond their own local systems. Creating collective access means that users can access third-party systems that are larger, more advanced and more efficient than what could be created individually. Cloud use may also shield the subscriber from certain security risks. With the help of cloud computing, end users can access computing resources for diverse workloads and have the flexibility of scaling up (or down) as their needs change. To give you a sense of the explosive growth of cloud computing, the International Data Corporation (IDC) is forecasting the worldwide public cloud computing market to expand from **$67 billion in 2016 to $162 billion by 2020**.[15]

What it Means to YOU

A degree in any computer discipline could position you to work in large service provision organizations or work in organizations that require cloud services for their operations. These organizations require analysts and software developers who will develop and maintain applications that are linked to the cloud and a focus on the corporate aspects of computing would be an asset.

Trend 5: Cybersecurity

The future of computing isn't technology, but rather our trust in technology. Arguably the biggest issue facing computing professionals over the next decade is related to Internet privacy and security.

THE FUTURE OF COMPUTING ISN'T TECHNOLOGY, BUT RATHER OUR TRUST IN TECHNOLOGY.

Data security has enormous implications on every business. Think about next-generation tech trends, like wearables, augmented reality, the Internet of everything, driverless cars, and so on. How many data breaches will it take—like the hack of 40 million Target customer accounts; or the Equifax data breach of 200 million people's credit card details and other

personal information – before people start to question their trust in the technology they've become dependent on?

What it Means to YOU

Cybersecurity is increasingly becoming one of the most important aspects of computing, considering the rapidly changing modes and intensities of cyber threats. Most cybersecurity professionals are anticipating successful attacks on their organizations and so we're seeing boosts in security budgets. However, there's a huge talent shortage in the cybersecurity industry, coupled with a lack of security awareness among employees.[16]

Organizations are concerned about data loss and third-party breaches, so they're looking for professionals with expertise in security monitoring, firewall management, threat hunting, event correlation and alerting. A degree in computer science or information technology would prepare you to work on the technical side of cybersecurity, while a degree in information systems is more aligned with the organizational aspects including policies, procedure and a focus on infrastructure, design and corporate aspects of computing.

Trend 6: The Gig Economy

Your career may be less about a job and more about an endless series of "gigs," or short- to medium-term contracts. For most of the last century, having a job meant going to an office or store or facility, and every two weeks getting a paycheque. This same model also existed in computing. But today in Canada, 21% of the workforce (and almost 40% in the U.S.) are freelancers who work for themselves.[17] That's more than four million people and growing by 10% a year. In computing, 17% of positions today are contractors or freelancers.[18] This gig economy is becoming mainstream as companies and talent alike recognize the benefits of employment on-demand.[19]

What it Means to YOU

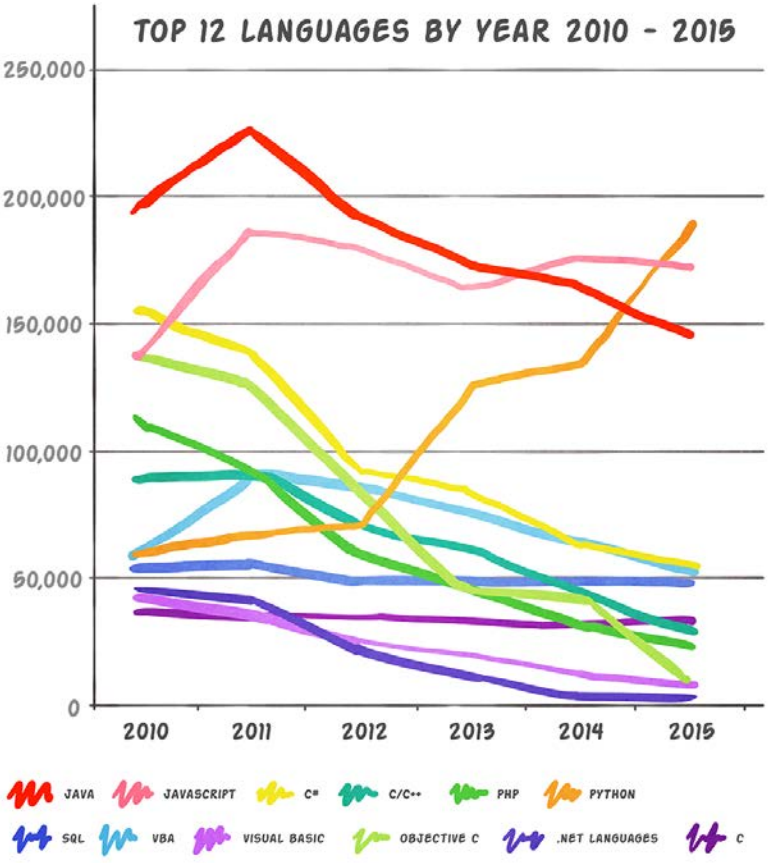
A gig economy can be both exciting and stressful. It's exciting because you'll be working with diverse clients and you're your own boss. If you want to go to Australia for six months, no one can say no. It's stressful because you have to pay the rent (and for a flight to Australia). Your success will be dependent on having a robust network of professionals who recognize and value your expertise and talent. These are the advocates who will help sell your value and ensure you can pick and choose your gigs (and pay that rent). The other implication is that all these future giggers will require IT and support. This is both a challenge and opportunity for those in the computing discipline.

Trend 7: Constant Change

We can't know the future, but the one thing that's certain is the pace of change in computing will not slow down. Your job is to not only keep pace, but to stay one step ahead of emerging technology, programming languages, operating systems and applications. Check out the graph below to see how computing languages have shifted in popularity over time. The moral of this story? Don't stand still.

What it Means to YOU

Your education doesn't end when you walk across a stage to get your degree. That's only the beginning. To stay competitive, you'll need to establish an annual professional development plan. This could include completing certifications that align with your Mission Map, taking courses to expand your technical (e.g. programming) or non-technical (e.g. presentation) skills, and ongoing learning by reading, listening to podcasts or watching informational videos. Aim to gain experience across several aspects of computing and keep track of the transferable skills you're adding to your repertoire. [20]

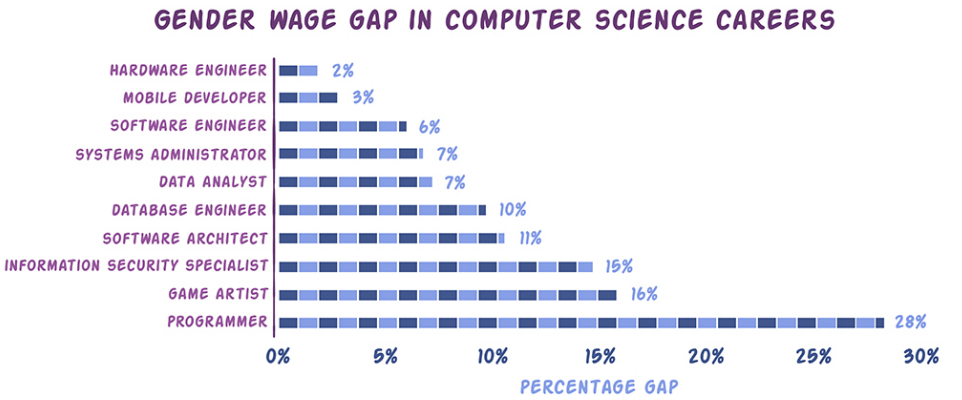


Does Sex Matter?

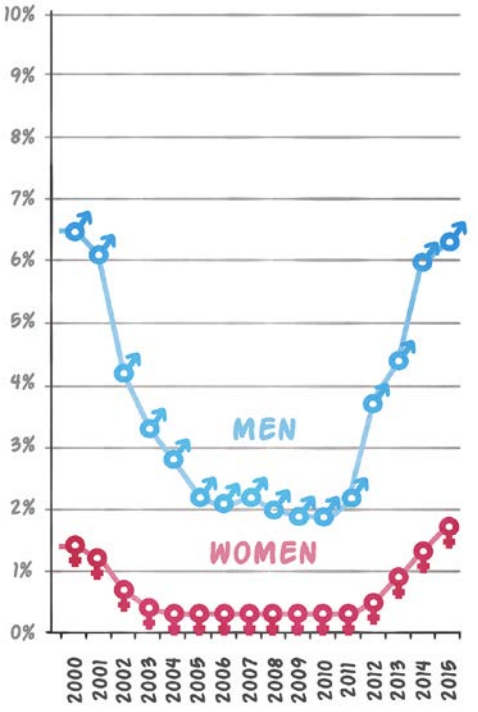
Though it's not a "trend," an important issue to consider when it comes to your career is sex. And by sex, we really mean gender here. The basic difference between the terms "sex" and "gender" is that **sex refers to biology**, while **gender refers to cultural and social perceptions of** (and biases toward)

appropriate roles for different genders. There's a load of really complex research suggesting society plays a massive role in designing you based on their view of your gender.[21] This research also suggests the brains of men and women are wired differently. Studies also show that we still treat men and women differently.

The guidance in ***Computing YOU*** **is applicable, regardless of your gender identity.** As you launch your professional life, however, there are **gender realities in the workplace worth understanding** and incorporating into your thinking.



For example, research shows the value of building diverse teams; companies with gender balance on their boards and executive teams perform better than those without it.[22] Yet, women remain drastically underrepresented in the senior ranks in many fields and equal pay for equal work remains elusive. For example, female computer programmers on average earn 28% less than their male counterparts.[23] These two charts illustrate this wage gap in computer sciences related fields.

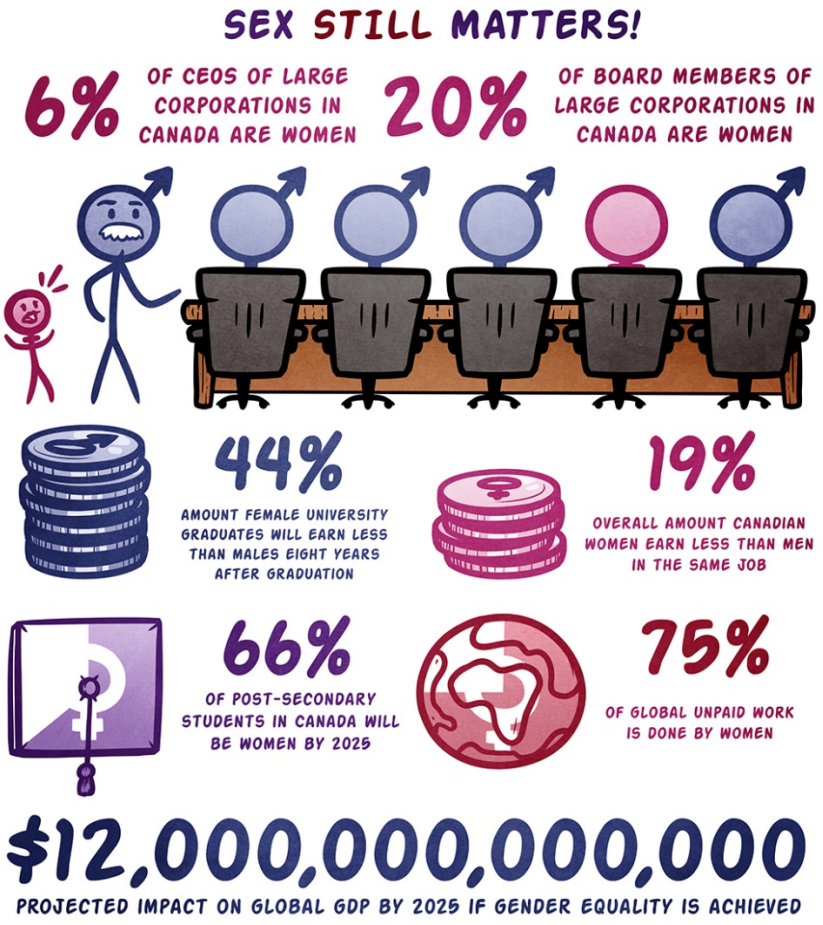


We now see that teenage girls are using computers and other technology at rates that are on par with their male peers, yet they are five times less likely to take on a technology-related career or enter into a post-secondary technology-related program of study.[24] Of all the bachelor's degrees awarded in Computer Science in the USA, only 18% are earned by women (National Center for Education Statistics

[NCES], 2014), and the proportion of women entering into computing majors remains low (refer to chart) Barriers that hinder women's entry into the technology (and other STEM fields) have been traced back to gender stereotypes and biased educational practices. If we can be successful in addressing these barriers, advancement in technology is bound to occur, as women bring their diverse perspectives to improve the design, development and analytical processes.[25]

Statistics Canada says that the earning gap ratio has improved, in part, due to rising educational attainment by women. In 2015, 35% of Canadian women had university degrees, compared to 14% in 1990. But even education doesn't completely erase the gap.

"Even when they had a university degree above the bachelor's level, women earned an average of 90 cents for every dollar earned by men in 2015. The gender pay gap partly owes to the differential allocation of female and male workers across occupations. Women are overrepresented in low-paying occupations and underrepresented in high-paying ones."[26]



Infographic note: 27

Society has not yet achieved true equality. This includes not only gender, but also areas such as sexual orientation, race, ethnicity or religious beliefs. Keep this all in mind when you're designing you.

IN 2015, 35% OF CANADIAN WOMEN HAD UNIVERSITY DEGREES, COMPARED TO 14% IN 1990.

For most of us, unconsciously or otherwise, our expectations of men and women are different. Sheryl Sandberg, the chief operating officer of Facebook, wrote a bestselling book called *Lean In*, in which she discusses how we all have **powerful unconscious biases about gender roles and gender behaviour**.[28] Think about it: The same behaviour that's viewed as strong, positive leadership from a man is often seen as negative and overbearing when it comes from a woman. Some computing disciplines continue to be male-dominated, but many efforts are being made to bring more women into the field. Organizations that empower women in technology are listed in our reference section.

It's human nature to notice other people's biases, while being blind to our own. Regardless of your gender identity, when you find yourself judging a woman for behaving aggressively, ask yourself whether you would be as critical of a man acting the same way. Also consider how prepared you are to challenge gender bias when you observe it happening around you. **Gender bias is deeply seated, so we all need to be self-critical to weed it out**.[29]

We can be hampered if we think of "men's jobs" and "women's jobs." In *Computing YOU*, you'll research potential jobs and conduct informational interviews to explore what sort of opportunities might be out there for a person of your skillset and interests. This process provides a prime opportunity to push beyond any (often unconscious) gender biases you may have about your future professional life. The great thing about conducting informational interviews is you're exploring possibilities, which should include possible jobs that you might not consider at first because of your gender. **Don't rule out any role simply because it seems stereotypically more suited to another gender.**

Be sure to talk with people in non-traditional gender roles. Is their field of work improving for the underrepresented gender? Or are there still deeply entrenched barriers that are difficult to overcome? As part of this process, consider the importance of finding mentors that you can relate to.

With some research, you should be able to determine whether the role in question is an opportunity to improve

diversity and foster equal opportunities. For example, when investigating a particular industry or company, research their current leadership teams. If there is some degree of diversity, that's promising. If there's not, then consider whether the organization is doing anything to encourage more inclusion. You may also want to check into the organization's work/life policies. Does the organization subsidize daycare? Top up maternity/parental leave benefits? Pay for fitness club memberships? In a competitive market for talent, you want to define a mission and join an organization that recognizes people as its most important asset.

Finally, **your 10-year Professional Mission might include a consideration about starting a family**. Since the biological reality remains that females are the ones with the potential to give birth, "starting a family" means quite a different thing depending on your sex (unless you are adopting a child).

Having children is a particularly difficult thing to plan years in advance. In fact, even after a woman is pregnant, it's impossible to predict exactly when her maternity leave will start. **The more realistic approach is to expect to update your Mission Map down the road when you are ready to start a family.** Or as Sheryl Sandberg puts it, don't "lean out" of your career until you're pregnant. You might miss wonderful opportunities if you put too much focus on a possible future pregnancy that may or may not happen as planned.[30]

The Last Word: Never Stop Asking Questions

Every great computing professional knows that competitive intelligence and environmental scanning are core to identifying opportunities and threats. Consider these seven macro-level trends as a start and rigorously continue to evaluate other trends, both inside and outside of computer science.

Look at this type of research as a daily task. **Follow lots of industry leaders on social media channels or blogs.** Find out what they're thinking about and the questions they're asking; remember to keep asking yourself the implications that emerging trends have on your life as a computing professional.

DEFINING YOUR PROFESSIONAL MISSION

When you know your destination, you can use it to support your decision-making enroute. To define your professional mission, you'll consider your current and future experience, knowledge and skills, all of which create your unique value as a computing professional.

First, make sure you've answered the questions from the start of *Computing YOU*:

1. What **computing discipline** am I interested in?
2. What **aspect of computing will I focus on?**
3. What **type of organization** do I want to be part of?

In your journal, consider these questions once again. Have your answers changed? Why? Why not?

You'll need to tap into that **intentional curiosity we talked about earlier**. **Great research starts with asking great questions**. Below are some **thought-starter questions** you may want to consider as you start exploring your professional mission:

1. What are the different types of computing careers?
2. How is the field of computing changing? What's driving this change?
3. What aspects of the computing field are growing the fastest?
4. What type of education do I need to be successful in different computing jobs?
5. What are the most important knowledge and skills for careers in each computing discipline?
6. What's the starting salary for various computing jobs?
7. Do people stay in computing for their entire careers?
8. What kinds of entry-level positions are typical in the computing disciplines?
9. How does my location impact my computing career?
10. What international opportunities may exist in computing?

Answering these big questions can't be rushed, so go slow and expect this part to take weeks or months to complete. Don't forget that predicting the future is hard and few of us get it right, so when doing your research, use **the principle of triangulation**: If you see or hear something from three credible sources then there's a very good chance you should pay attention and add it to your Mission Map.

Step 1: Conduct Secondary Research

Your secondary research, sources will include:

- government reports (e.g. employment studies, census data)
- annual reports of companies, periodicals (e.g. newspapers)
- other media (e.g. podcasts)
- scholarly journals
- professional association information—such as Association of Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), American Computer Science Association (ACSA), Canada's Association of I.T. professionals (CIPS)
- credible online publications (e.g. Scientific American, Fast Company)
- information from large computing firms (e.g., Google, Apple, Microsoft)

This research will uncover industries, educational programs, people, books, websites, podcasts, trends, tools, companies and jobs in computing you've never heard of.

Replicate the following table in your journal and use it to track your research. Keep notes on the sources of your information and the nuggets you find. The invaluable part about existing information is that it can trigger questions. Jot down these questions for your informational interviews later.

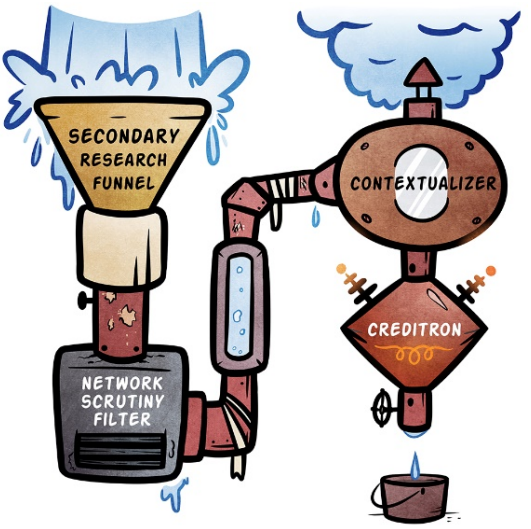
As a starting point to answering these questions, we suggest you follow the detailed research process in Step 4 of *Designing YOU*. Below is a condensed version of this process.

Potential Opportunities	My Questions
Computing-Specific Career Orientation	o What kind of pay can I expect to earn? o What are the potential opportunities? o Do I need to move?
Autonomous Vehicles	o What type of education is required? o What other kinds of experience will I need? o Are there internships available? o Where are these jobs?

Step 2: Analyze Job Postings in the Computing Disciplines

Job postings are easy to find online and are invaluable for identifying emerging opportunities and trends in the areas that you love. They can also expose you to the types of jobs that exist in your areas and companies of interests. Also:

1. It's simple to collect a large and diverse sample. Review **a minimum of 25 job postings** in a specific area you love to ensure an effective comparison.
2. Many job postings are archived and are accessible. Consider www.indeed.ca, www.itjobs.ca, or www.computer.org.
3. The extra work you put in to summarize the job postings can help you identify trends and themes that may not be obvious to others.



When you're summarizing job postings, it's helpful to collect information on several major areas of employment that you're interested in. Use a spreadsheet program such as Microsoft Excel or Google Sheets to track the answers to the following questions:

Company Details

1. Industry
2. Size of company (e.g. number of employees)
3. Location (the location may reflect culture, language and compensation)

Job Details

1. Title
2. Level of position (titles can be misleading)
3. Responsibilities (e.g. does it mention what tasks are associated with this position?)

Qualifications

1. Education (do they specify a major?)
2. Professional experience (years and type of experience)
3. Professional credentials (does it mention specific required credentials or licensure?)
4. Association engagement (does it mention if active involvement in a professional association is important?)

5. Personal attributes (does it mention the importance of any specific interpersonal or communication skills?)
6. Are each of these qualifications "required" or "preferred"?

Below is a sample of a summary table of job postings related to the job of a **Software Developer.**

Professional Mission	Major Themes	So What?
Software Developer	90% require **a university degree in computer science or software engineering** 10% mention the possibility of hiring someone with an **electrical engineering** degree 20% indicate that **equivalent industry experience** would be recognized instead of having a degree. All jobs ask for **previous experience** with the majority asking for a minimum of five years. 80% ask for **specific practical knowledge and skills**. 70% ask for experience with specific languages; 60% ask for experience with specific system	I really should complete my university degree, but the specific discipline area seems to be a secondary consideration. I need to build evidence of my expertise. I should get diverse expertise in various aspects of computing I need to hone my expertise over the first five years of my career. I need to be on top of the languages and systems that employers use today and in the future

Step 3: Networking and Talking to Professionals

The next step is to immerse yourself in the industry by meeting and interviewing real computing professionals. These people can tell you what the next 10 years of the computing industry may look like. It's important that you do the work in Steps 1 and 2 first so that you go to your interviews armed with enough information to get a deeper level of knowledge.

In Step 4 of *Designing YOU* we walk through a detailed process on how to network, book interviews, and get the most value out of these meetings. Each interview will raise new themes or questions that you'll want to explore and test in future interviews.

One useful approach to determine what you're trying to learn from these interviews is to notice the assumptions you're making about the field, industry or job, and then use the interviews to test these assumptions. For example, your earlier work may have uncovered game developer as a possible career path. To dig deeper into game development, you would list a set of assumptions and detail how you might validate them. For example:

My Assumption	How I Can Test This
To be a game developer, I need to work for a large company.	Interview game developers and ask them about their pathway to this career. Interview game developers and hiring managers about the skills they use/need every day.
I need a degree in computer science to work as a game developer.	Search past job postings to look for qualifications. Interview a broad range of game developers and ask about their training, education and experience.

How do I book an interview?

The first rule of an informational interview is respect. **Every person you want to interview is doing you a favour.** Most of these interviews won't exceed 30 minutes, so they need to be laser-focused. Consider the following:

1. **Connect through a mutual contact.** For example, "Hamid Zakari suggested I contact you because of your expertise in…"
2. **Make it personal.** Demonstrate you know something about them through your digging. For example, "I see you also studied computer science at the University of…"
3. **Be persistent and keep asking.** As you're the lowest priority in their inbox, you'll likely have to send a couple of reminders. Be polite and persistent and if they say no, ask them for anyone else that they could suggest. This'll ensure you'll have a return on your effort.
4. **Make it easy for them**. Offer to work to their schedule and meet them at their office or anywhere they'd like to meet. This interview is for you—not them. Don't be surprised if the interview is a month or more out. Professionals are busy people.

What should you ask?

In addition to the questions above, below are some more thought starter questions to consider asking during your interviews (there is an expanded list in the appendix of *Designing YOU*):

1. What does your current job entail? What does a typical day look like?

2. What kind of decisions or issues are you often faced with in your job?
3. What type of training or education prepared you for your current job?
4. What's the best part of your current job?
5. What's your least favourite part of your current job?
6. What courses at school best prepared you for your career in computing?
7. If you could go back to school and start all over again, would you do anything differently?
8. Did you do a co-op or internship in college/university? Would you recommend this? Why?
9. Are there specific extracurricular activities that might help me prepare for a career in computer science?
10. What jobs and experiences have led you to your present position?
11. When you reflect on your career so far, what would you do more of? What would you do less of?
12. When you look at people who have succeeded in this computing field, what characteristics do they tend to have?
13. What would you suggest is the most important thing someone entering the computing industry should know?
14. If you were going to do it all over, would you become a computing professional again?
15. What do you wish you'd known before you became a computing professional?

Consider this only a start

Ideally, this interview is not simply a one-off. A core objective of this process is for you to **build your professional network** and identify mentoring candidates. Following the interview, ensure you send a note thanking the interviewee for their time. Personalizing the note by identifying some key themes they highlighted shows you were paying attention and reinforces the value of the time they spent with you. In your note, ask if they'd be open to keeping in touch so you can reach out with any additional questions.

Step 4: Defining your Professional Mission

Once you've completed your informational interviews, you should be closer to defining your professional mission. There are three stages to defining your mission:

What's Your "What"?

For the first stages, let's go back to the original three questions we asked.

1. What **computing discipline** am I interested in?
2. What **aspect of computing** will I **focus on?**
3. What **type of organization** do I want to be part of?

Your research should have inspired you to be able to **answer at least two of these three questions.** In addition, you should have a sense of priority. As you work through this, it is important to also reflect on **why the areas you chose are important.** Understanding the root of these will provide you a framework and logic for future decisions. Once you have done this, replicate the table below in your journal.

Here is the challenge—you need to project yourself 10 years into the future. These aren't just questions for next week or next year… but a 10-year target.

The 10-Year "What"	Your Mission	Priority
I want to be a…		
I want to focus on….		
I want to work for…		

Here's a sample.

The 10-Year "What"	Your Mission	Priority
I want to be a…	Director of Business Analytics	1
I want to focus on….	Big data in professional Sports	2
I want to work for…	An NHL Club	3

THESE AREN'T JUST QUESTIONS FOR NEXT WEEK OR NEXT YEAR... BUT A 10-YEAR TARGET.

What's Your "Why"?

The limitation with the above exercise is that it tells us what you want to be, but not **why anyone would want to hire you** compared to other candidates. Therefore, the next step requires you to articulate "why you?" compared to others. This will allow you to create your unique value proposition—in other words, what makes you the best choice for the job. Remember, you're projecting 10 years into the future here. To do this, complete the table below:

Your Professional Mission	
For…	Who's your target industry or company?
That…	What's their specific need that isn't being met?
I am…	What's your discipline of study?
Who…	What's your specific skill or knowledge that'll satisfy their need?
Unlike…	Who are your competitors who are also trying to satisfy this need?
I…	What unique skills and experience do you have that'll differentiate you from all the other employees?

Here's a sample of how these questions might be answered.

Your Professional Mission	
For…	A global game developer
That…	Needs to leverage both technical knowledge *and* creativity
I am…	A skilled programmer with a track record of creativity
Who…	Is both a computer scientist and a graphic artist
Unlike…	Those who are either programmers *or* graphic artists.
I…	Have proven experience in game development. I am proud of the graphics I have designed.

In answering these questions, consider the things you love to do and what you're good at combined with real opportunities in the marketplace for you to make a living. If all those elements are there, you've just defined your professional mission! If you have trouble answering these questions, it probably means that you'll have to go interview more people or find some additional information. Be honest with yourself.

What if I get stuck?

Remember, getting to the point where you can articulate your professional mission is hard but important. **Don't be in a rush to move on and don't be frustrated if you conclude you don't have any unique value yet.** At the start of this process, this is understandable.

A key goal of this process is to identify the knowledge and skills that'll make you unique and valuable in the future. **The difference between the you of today and the you of tomorrow is the gap that forms the foundation to your Mission Map.**

Articulating your 10-Year Professional Mission Statement

Now, you'll condense your answers to the six questions from the table above into a concise **10-Year Professional Mission Statement**. **Keep it under 100 words.** Your mission statement offers a simple description of the future you. Having this mission statement allows you to check if you're spending your precious and limited resources (time and money) on a meaningful purpose.

Here's the trick to an effective mission statement: It can't be constrained by history, the status quo, your comfort zone or your current personal identity and emerging professional identity. Your 10-Year Professional Mission Statement is about defining your professional identity; it will be a big part of your personal identity.

At this stage, you don't have to fully understand how to achieve your mission, but you should be able to see some of the major milestones along the way. Below is an example:

"In 10 years, I will be a director of consumer analytics for a major fashion brand. I will be an expert in big data, modeling and trend analysis. I will be a sought-after analyst with expertise in strategic information systems management that helps companies develop that competitive edge."

Defining your 10-Year Professional Mission is hard and it's a house of cards. When it all comes together it feels great, but sometimes the littlest unexpected thing (good or bad) can disrupt it all.

For this reason, we encourage you to **map out at least three** 10-Year Professional Missions based on **three distinct "what if" scenarios** using the table below. When you're considering the possibilities for your "what ifs," be aspirational. For example, "what if" in one of your scenarios you stay in the city you grew up in, but in another scenario, you move to New York? What if in another scenario, you decided to stay development-side for the next decade? But in a third scenario, you decided to go to a large multi-national production company? The system-wide implications of one "what if" may be massive or small, but through "what if" planning you can start to understand life's trade-offs. (We are only considering the professional mission "what ifs" here. In *Designing YOU* we challenge you to think about all the other potential "what ifs" that could influence your future, such as relationships.)

The goal of reflecting on these "what ifs" isn't intending to paralyze you, but to inspire you. Instead of being crushed when circumstances get in the way of achieving your chosen professional mission, you'll know that it was only one of many possible scenarios.

"What If" Scenario A:_____	"What If" Scenario B:_____	"What If" Scenario C:_____

As part of the "what if" reflection, engage your mentors for input. Refer to Step 3 of *Designing YOU* if you don't have a mentor yet.

Don't Forget About Everything Else

If you've come this far, you have a pretty good sense of what your professional mission looks like. Maybe you aspire to be the chief software engineer in Toronto at a global agency or a director of cyber security at Suncor Energy. Your professional mission should be audacious. Your ambition should highlight the gaps between the you of today and the you envisioned in your 10-Year Professional Mission.

However, don't forget, you are way more than just the work you do; you have relationships and other passions that extend beyond a job. This is **everything else in our life that is important and only you know what those things are.**

Over your lifetime, you and the world around you will continuously change. This re-iteration process is common. It's a sign of a great computing professional; a professional who doesn't fall in love with a single idea, but rather one who is prepared to change and adapt when the evidence tells them it's time.

At this stage, we recommend you head to Step 5 of *Designing YOU* and test your professional mission relative to **everything else** in your life.

GETTING FROM HERE TO THERE

Your 10-year mission is aspirational and ambitious. It's a little scary, but it's supposed to be. The ambitiousness in your 10-year mission highlights gaps between the you of today and you in 10 years. If your mission is the destination, then the gap is the journey—it is the actions required to reach your destination.

The map to get you from here to there involves a series of complex and interdependent activities. In this section, you'll build the Mission Map to get you to your 10-Year Professional Mission.

Link Your Professional Mission to Knowledge and Skills

To create your Mission Map, you'll first need to understand the critical skills core to your 10-Year Professional Mission. Then we'll address the gap between here and there.

First, recall the five computing disciplines we introduced earlier: computer science, computer engineering, information systems, information technology, and software engineering. At the highest level, any jobs that fall under a specific discipline require **a common set of knowledge and skills**. You probably saw this trend in the research you did earlier when certain knowledge areas or skills kept appearing over and over. This is because certain knowledge areas and skills are critical to specific computing disciplines. So, if you want a career in the "computer science" discipline, there are minimum skills you'll need to develop. Understanding the priority of these knowledge and skills as they relate to your mission is an essential component of your mission mapping process.

Refer to our four-level ranking system from "not required" to "expert" and rank the knowledge and skills relevant to your 10-Year Professional Mission. By the time you're 10 years into your career, you'll need to be at least "great at" (and often an "expert" in) each of these areas.

Critical Knowledge and Skills by Computing Discipline

The next step in developing your Mission Map is a **professional gap analysis** so we can plot your journey. **Complete the Mission Map Table 1 below**, which considers the following four questions:

Question 1: What are the specific priority knowledge and skills (both computing-specific and transferable) required to achieve your 10-year mission?

Question 2: What is your evidence these priorities are important (e.g. interviews, research)?

Question 3: What is the required skill level you'll need to achieve in 10 years?

Question 4: What is your best guess of your skill level today?

The third and fourth columns represent your professional gap. **There should be A LOT of gaps. Your Mission Map will allow you to close these gaps over time.**

Mission Map Table 1 – Mission Map Gap Analysis

Specific Priority Knowledge and Skills	Evidence this is Important	Required Level in 10-Years	My Level Today
Data analytics	7 of 10 interviews. 70% of job postings.	Expert	None

Be sure to share your results with your mentors.

Do you still have questions about what your mission in computing may be?

To find out more about specific areas of study, check out ***Computing Disciplines: A quick Guide for Prospective Students and Career Advisors*** (Connolly, Miller & Uzoka, 2017), available online at www.ceric.ca.

Bridging the Gap

For most twenty-somethings, 10 years may as well be 100 years. As a result, a lot of people get frozen by the daunting task of looking ahead 10 years. One of the biggest barriers to moving forward is the question:

What is the first *real job* I should get after graduation?

There's a problem with this question. "Real life" doesn't begin after graduation. It's happening right now.

The development of your foundational knowledge and skills is happening in the context of five professional types of **building blocks experiences**:

1. education & learning
2. employment experiences
3. volunteer experiences
4. contextual experiences
5. relationships

The knowledge and skills you defined as critical to your 10-Year Professional Mission can't all be learned by accident. Rather, they need to **be the outcome of an intentional development process.** In other words, the expertise you'll possess in 10 years, whether it be leading a programming team or being a sought-after game designer, won't be a fluke.

Delivering Your 10-Year Professional Mission with Intention

Let's review each of these experiential building blocks. In your journal, **consider the sample questions based on the current you and the you 10 years into your career.**

Education and learning refers to traditional forms of education (like university or college) and other forms of lifelong learning ranging from professional development courses to awesome podcasts and books.

Questions to explore:

1. What should I major and minor in?
2. What specific courses should I take?

3. Do I need to go to graduate school?
4. What certifications will I need?
5. What books should I read?

Employment experience means every job you'll ever have that contributes to your skill development (even outside of the computing disciplines). While in school, this could include co-op terms, internships, and part-time and summer employment.

Questions to explore:

1. What type of internships or co-op positions should I take while in school?
2. What could be my first job in computing when I graduate?
3. What are the benefits of working for a computing firm compared to being a computing professional within a business or organization?
4. How can I get employment experience so I can become knowledgeable in relevant computing discipline?
5. How much time should I spend in various jobs?

Community experience includes all those volunteer and extracurricular activities that contribute to your knowledge and skill development. This might include involvement in clubs, teams or community organizations.

Questions to explore:

1. How can volunteer roles support the development of my key knowledge and skills?
2. How can volunteering support my networking?
3. What types of organizations align with my values?
4. Do I want to assume a leadership position in an organization?

Contextual experience includes international experiences, industry experiences, organization size and scope, and travelling experiences.

International experiences: Paid or unpaid international work experience.

Questions to explore:

1. What are the benefits to doing a semester abroad?
2. How can working internationally contribute to my computing knowledge and skills?
3. Do I need to relocate in order to be involved with international projects?
4. How is working internationally in the computing disciplines different from working abroad?

Industry experiences: Specific industry sector experiences throughout your career.

Questions to explore:

1. How could my choice of industry sector change my job as a computing professional?
2. Should I work as a consultant or seek to be employed with an organization?
3. Should I get experience in both product-development and client-service?
4. I'm not very technical; does this mean I'm at a disadvantage if I want to be a computing professional?

Organization size and scope: The size of an organization can have a significant impact on the scope and depth of a role.

Questions to explore:

1. How does working for a start-up help me?
2. What are the benefits and risks of me building an entire computing career in a single large company?
3. Should I take a job at a large global multinational organization to meet my goal of working internationally?

Travelling experience: International experience and exposure to diverse cultures can contribute to your personal and professional development.

Questions to explore:

1. How can travelling internationally contribute to my knowledge and skill development?
2. If I take time out of my career to travel, do I risk losing my competitive edge?
3. Can I blend my desire to backpack around the world with a desire to have an international career as a computing professional?

Relationships captures three major categories—mentors, networking and personal relationships.

Questions to explore:

1. How can mentors help me get ahead?
2. How can my professional network contribute to knowledge and skill development?
3. My professional mission is part of my life—but it's not my whole life. How can I ensure I maintain successful and fulfilling personal relationships while still pursuing my professional mission?

Sample Mission Maps

Before you develop your own Mission Map, we'll review 15 sample Mission Maps based **10 years into a career. Each map is a summary based on interviews and surveys of real people and their real experiences in a computing career and in life.**

There is never just one single map to get from here to there. **Consider these sample Mission Maps more of a compass than a GPS**. They won't tell you exactly how to get from here to there, but they'll point you in the right direction, tell you where to start and offer example attractions along the route. Below are the 15 sample mission maps we've included in Computing YOU:

1. Senior Network Systems Administrator – Systems Integrator
2. Senior Software Developer – Start-up
3. Computer Network Support Specialist - Board of Education
4. Hardware Engineer – Global Technology Vendor
5. Database Administrator – National Retailer
6. Senior Game Producer – Global Developer
7. Freelance IT/IS Consultant
8. Software Quality Assurance Specialist – Consumer Electronics
9. Web Developer – Digital Agency
10. Senior IT Business Analyst – Agribusiness
11. Director, Business Development - Technology
12. Digital Project Manager – Marketing Agency
13. Information Security Analyst – Financial Services
14. Associate Professor – University
15. Founder/ Entrepreneur, Start-up

The "10 years into a career" bit is important because **the people behind these Mission Maps all started in a place like you.** It was their diverse experiences that made them what they became. The 15 Mission Maps are composed of the following sections:

Job Title & Discipline: Pay attention to the sector or industry.

Salary Range: What this position earns in Canada in 2017 dollars.

Job Description: What this hypothetical person does in their role.

Priority Knowledge and Skills: The knowledge and skills required to succeed in this job.

The Tip: Something so important about this person's role they had to tell you about it.

Building Block Experiences: This section is broken down by the five professional building blocks and examines how each contributed to this professional's knowledge and skill development.

Regardless of your 10-Year Professional Mission, **read and reflect on all the samples below** and take lots of notes. You may not be interested in being a web developer, but you may find it interesting how a person may have started in the non-profit sector; you may not aspire to be a director of sales, but you may find it valuable how someone used extracurricular experiences to develop their networking skills.

Senior Network Systems Administrator – Systems Integrator

SALARY RANGE (2017): $65,000–$80,000[31]

I maintain, support, troubleshoot and optimize computer networks (LANs, WANs and Intranets). I keep corporate servers and storage functional. I sustain communication within companies and I know my way around hardware, software and network connections. Without me, the organizations I work with would be inefficient and uncoordinated, and could be susceptible to a cyber-attack. I manage network and computer systems administration.

The Tip: Build your work experience and pick external certifications that align to your mission, then make a plan to get these one by one. This planning not only signals expertise, it signals intentionality and focus.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Data & information management
- Enterprise systems & architecture
- IT infrastructure design & management
- Systems fundamentals & computer architecture
- Networking & communications
- Web administration
- Information technology security configuration & management

Languages & Certifications
- Cisco Networking
- CompTIA A+ Certification
- CompTIA Network+ Certification
- CompTIA Security+ Certification
- Cisco CCNA Certification
- Cisco CCNP Certification
- Microsoft Certified Solutions Associate (MCSA)
- Microsoft Certified Solutions Expert (MCSE)

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Science (computer science) • Completed networking certifications	I've been a techie since I was a kid. I knew what I wanted to study; that part was easy. The best part of computing is it's always changing; the most challenging part is it's always changing. You need to be on top of certifications and be looking forward not backward.

Employment Experiences: • Worked in Apple Store part time as a client services technician • Did an internship at a local technology start-up as a network technician assistant. This company offered me a position upon graduation. • First position was as a network technician assistant • Promoted to network technician and was mentored by senior network administrator, who gave me additional network administration responsibilities • Recruited by large systems integrator as senior network administrator (moved to Toronto). Currently have a team of six reporting to me.	I tell people: to succeed you need to be hungry and humble. You need to start by doing anything and everything. Just say "yes." Every day is a learning curve; the more you're prepared to put in, the more you will get out. The best decision I made was to be intentional about being client-facing. To be a network administrator, you need to possess a good level of technical competence, coupled with some element of client management skills. Developing client management skills is difficult, but you then have a sweet mix of technical and people skills. This mix was what the head hunter was looking for when they recruited me to my current role.
Community Experiences: • Served as president of my computing student society during university • I am an alumni mentor at my university • Very active in the local gaming community through the Game Developers Association	Engaging in your professional community is win-win. It feels awesome to give back, but it also connects you with other inspiring people and builds your professional network.
Contextual Experiences: • To progress in this career, I chose to move. This wasn't essential, but in a larger city, I found there were far more opportunities.	My contextual experiences in different types of organizations were critical. I worked as network technician for a start-up and now I'm a senior network administrator for a global systems integrator. These related experiences allowed me early to realize what I really liked to do and where I wanted to do it.
Relationships: • I met the founder of a start-up at an alumni event in my first year of university. This led to my internship and the founder is still a valued friend to this day.	When you are in school, one of the most valuable assets is the thousands of alumni who have been in your shoes before. Use your professors or tools like LinkedIn to reach out for a coffee. It may take time, but I've never had an alumnus decline to meet me (and as an alumni mentor today, I NEVER say no).

Senior Software Developer – Start-up

SALARY RANGE (2017): $74,000–$97,000

I am as analytical and practical as I am inventive. My job may include designing and testing the foundational software that runs devices or controls networks, or writing and developing applications and tools to be used on those devices. Although capable on my own, I will usually collaborate with other developers to build and review software. I also work with software architects, designers, testers, project managers and systems analysts to ensure the software we develop is efficient, aesthetically pleasing, and meets customer needs and other quality requirements.

The Tip: Join a club that is outside of your comfort zone. There is magic in being different. Software development requires passion, dedication and consistency.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skils

- Customizing & maintaining applications
- Developing & administering databases
- Web development & administration
- Mobile applications & device management
- Human-computer interaction
- Object-oriented programming
- Designing, coding & testing software
- Software modeling, analysis & design

Programming Skills and Certifications

- Apple OS, Microsoft OS, Android OS
- ASP.Net
- Python, C, Java, C++, C#, JavaScript, PHP, VB.Net, Swift
- Microsoft Certified Solutions Developer (MCSD): App Builder
- Certified Secure Software Lifecycle Professional (CSSLP)
- Microsoft SQL server

Other

- Organizational behaviour

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Science (computer science) with a minor in business • To succeed, I need to be fluent in a range of programming languages. I have taken advanced training in Java, C#, C++, Objective-C, Python and ASP.Net. • I regularly listen to creativity podcasts	People sometimes stereotype software designers as nerds. There is some truth to this, but the reality is that to succeed as a designer you need to be an amazing problem-solver and an off-the-wall creative. Creativity can be taught. My minor in business exposed me to entrepreneurship, which taught me non-linear thinking and how to get out of the box. Commit to creativity as much as you commit to keeping up your technical certifications.
Employment Experiences: • Developed first app in high school • Did contract IT support while in university • Completed first internship as a software developer for a local start-up where I developed websites and apps • Completed second internship with a global technology company as a technical support analyst where I configured and managed network servers • First job out of university was as a programmer for a mid-sized development company. Promoted to designer after three years. • Seven years after graduation, I joined a small start-up as senior software developer. I now have a team of three reporting to me.	I knew with the first sale of my first app that I wanted to be an entrepreneur. The challenge was I didn't know how much I didn't know. This led me down an intentional career path that started with doing contract IT support in university, to doing two VERY different internships. I intentionally wanted to find a mid-sized company after graduation that was big enough to support my professional development and mentoring needs, but not too big as to get lost in a cubicle. This experience gave me the skills to shift to a start-up in a senior developer role. The entrepreneurial culture (and ability to take risks) at this start-up inspires me.

Community Experiences: • Very active in university in student clubs. Was on the executive of ENACTUS club in university and participated in several "Showcase Showdown" entrepreneurial events in my university. • Volunteer webmaster for two local non-profits and developed the membership portal for the Computer Science Students Society of my university • On board of local chapter of the Association of Information Technology Professionals • Play indoor soccer	Investing in your community is critical. While in university, join a bunch of clubs that are outside your typical study focus. The goal is to meet different people. For example, I joined ENACTUS in my second week at university and enjoyed it thoroughly for four years. I did pitch competitions, volunteered in the community and met some of the best people from all over campus.
Contextual Experiences: • During university, I created a portfolio to profile my diverse skill-set and experience	Look at the context of my professional experience; I was intentionally all over the computing map. My advice is to play the field with paid and volunteer gigs to see what you really like (and are good at) starting today.
Relationships: • ENACTUS opened me up to the power of professional mentors. They are both humbling and inspiring.	In my first year of ENACTUS, my team had a professional mentor who had founded a social innovation company. I leaned on her a lot over my time at university for career and personal advice. Today, I call her a colleague and friend. Everyone needs someone like this.

Computer Network Support Specialist – Board of Education

SALARY RANGE (2017): $42,000–$53,000

I enjoy helping others find solutions to technical errors. I analyze, test, troubleshoot and evaluate network systems, such as LANs, WANs and Intranets. I perform maintenance to ensure efficiency and functionality of existing networks for Information Technology (IT) employees.

The Tip: Everyone talks about finding "balance" between your career and your life. There is no magic formula because there is only one person who can decide what balance looks like—YOU.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Systems fundamentals
- Network design & administration
- Web administration
- Mobile applications & device management
- Information technology security configuration & management
- Troubleshooting & remote diagnosis skills

Certifications
- Cisco CCNA Certification
- Microsoft Certified Professional (MCP)
- CompTIA Network+ Certification
- Certified Ethical Hacker (CEH)
- Certified Information Systems Security Professional (CISSP)

	Other • Communication • Problem-solving • Interpersonal skills

BUILDING BLOCK EXPERIENCES

Education & Learning: • Diploma in Information Technology • I am a Cisco Certified Network Associate (CCNA) • Applied degree in Information Technology	I've always been a hands-on tech person. As a teenager, I spent some time with my dad at his computer shop, helping to do some minor computer repairs. Doing an applied IT degree seemed natural, but I had no idea what I would do with it until I did my work term.
Employment Experiences: • Worked part time with Best Buy Electronics Geek Squad before going to college • During school, did a work term as an IT specialist at a local non-profit. I was kept on part time after my term. • Hired in IT support for the local board of education. Promoted to network support specialist.	I like balance in life. Some people are 24/7 workers, but that is not me. I want to be challenged in a good job with good people, but my job is not my life. When you look at my career, I worked for a non-profit and a school board. I am not going to get rich, but I have a rich life in large part because I work regular hours and never work on weekends.
Community Experiences: • I have one real passion in life—music. I am deeply involved with my local music community and especially with my band.	Music has always been my passion. I've played piano since I was five and passed my Grade 10 in the Royal Conservatory of Music when I was 16. In college, I met a bunch of other music people in IT and we started a band (called The Hard Drives). A decade later we are still hard at it. We released one EP and play regular gigs in town. We don't do it for money; we do it for passion. I've designed my work life to fund my love for my music.
Contextual Experiences: • I love international travel, and I do it with a purpose. Once a year, my bandmates and I pick a band on tour (mostly bands we've never heard of) and we follow them around for a few weeks as an excuse to see different parts of the world. So far, we've toured the southern U.S., Germany, Brazil, Japan and New Zealand.	Exposure to different cultures and lifestyles reinforced my humility because it showed me the world is big and what I know is so small. Doing these quasi-music tours taught me that I couldn't be a professional touring musician. So instead, I keep my professional life and my music life separate.
Relationships: • I have a strange mix of mentors from senior IT professionals to a lead singer in a rock band	My diverse mix of mentors keeps me grounded and focused. The one thing they agreed on was to keep my career and music separate. This is the best advice I've ever had.

Hardware Engineer – Global Technology Vendor

SALARY RANGE (2017): $63,000–$112,000

I respond to rapid advances in computer technology, including new directions in hardware and embedded systems. I research, design, develop and test all manner of computing systems and components, including processors, circuit boards, memory devices, networks and routers. I analyze existing hardware and work to improve it. I procedurally test and modify my designs until I am completely satisfied with the results. I update equipment to support newer software and I oversee the manufacturing process to make sure things go according to plan.

The Tip: In a world of hype for big data and analytics, it's easy to forget communication is about real people. Get out from behind your screen and talk to someone different every day. New and fresh perspectives grow the mind and nurture creativity.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills

- Systems fundamentals & computer architecture
- Experience designing, coding & testing software
- A good understanding of various operating systems and their abilities to support certain kinds of software
- Experience with utility software, especially device drivers
- Knowledge of low-level programming languages and object-oriented programming languages

Special Skills

- VHSIC Hardware Description Language
- Board design/debugging
- Engineering design

Certifications

- CompTIA A+ Certification
- Apple Certified Macintosh Technician (ACMT)
- CompTIA Server+ Certification
- CCT Routing & Switching: Cisco Certified Technician Routing & Switching
- BICSI ITS Technician

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Engineering • Halfway through completing my MBA at Boston College (doing it part time) • My favourite author (and business leader) is Sheryl Sandberg. I am a passionate advocate for the principles of her book *Lean In*.	Everyone talks about how there is a huge shortage of qualified technical people (especially women). This is partially true, but the full truth is tech is highly competitive if you are ambitious. I started my MBA after working for seven years. I realized this was essential for me to get to the next level of management. The best thing is my company is sponsoring my MBA. Consider education a lifelong challenge.
Employment Experiences: • Help desk technician while in university • Did internship with local utility as an application developer. Focus was on customer support applications. • At graduation, hired as a display quality associate for a global handset manufacturer. Transitioned to firmware development	Start your career now; if you wait until you graduate, you will already be far behind. Reading about how to do something is important, but doing it (and failing) is your real education. My career has spanned a lot of experiences and all with a clear purpose. As a help desk technician, I worked with real customers. My utility internship gave me experience in working as an application

group. • After three years, I took a transfer to their hardware design centre in Boston as a hardware engineer	developer. Both set me up for getting a job with a large handset manufacturer at graduation.
Community Experiences: • I was the president of Women in Engineering and Computer Science at my university. This is a personal passion of mine and I remain active in the local chapter of Women in Engineering Canada and facilitate a Lean In Circle. • Part of my volunteer work is speaking at local high schools about the importance of women pursuing careers in science, technology, engineering and math (STEM) • I am also an active member of the Institute of Electrical and Electronics Engineers (IEEE)	I have been passionate about the issue of women pursuing careers in technology since high school. Speaking at high schools inspires me as much as I suspect it inspires them. Part of my commitment is to encourage female students to pursue careers in science and technology.
Contextual Experiences: • I'm a passionate traveler. My personal goal is 30 by 30. Visit 30 countries by age 30. • Did a three-month temporary posting with my current company in their Boston design centre. This opened a full-time opportunity.	Travel taught me the reality that "context matters." For me, this recognition has triggered an intrinsic and authentic curiosity in people. Traveling also exposed me to the real need to empower women through involvement in the technology industry.
Relationships: • I've built a diverse mentor team of engineers, technologists and business leaders over the years. Much of my mentoring team is intentionally made up of women, because of my desire to make a significant impact in fostering the participation of women in the technology age.	My mentors coached me to avoid specializing too early and to get out of the cubicle and into the field. I owe them a lot for pushing me.

Database Administrator – National Retailer

SALARY RANGE (2017): $69,000–$92,000

I excel at data organization, management and security. I make sure that information is easy to find for those authorized to look, and that the database system performs as it should. Whether organizing financial information or shipping records, I make sure that there are security measures in place to protect confidential information from unauthorized users. Under my management, I ensure the integrity, quality, organization and protection of valuable data.

The Tip: Technology is only an enabler. Understanding the strategic role of technology in an organization will allow you to make better decisions and more valuable.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills

- Database design & development
- Database administration
- Networks & communication
- Distributed databases
- IT infrastructure design & management
- Customizing & maintaining applications
- Enterprise systems analysis & integration
- Information technology security configuration & management

Environments & Certifications

- Oracle Certified Professional (OCP)
- SAP Certified Technology Associate – SAP HANA
- Microsoft SQL Server Database Certifications
- IBM Certified Database Administrator for DB2
- Oracle Certified Professional, MySQL 5.6 Database Administrator

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Information Systems • Certified in Oracle, Microsoft SQL Server, and IBM DB2 • Completed MBA with a concentration in Management Information Systems (MIS)	My formal education in computer information systems provided the technical skills needed for this role, but I still needed to learn more about organizational contexts of database administration. The MBA provided me with great exposure to all of the organizational pieces that relate to database administration.
Employment Experiences: • Worked in sales for an electronics retailer part time in university • Did a work term while in school as a database analyst in a government health services organization • Following graduation, started as a web developer for a small digital agency • Recruited by one of our clients—a national retailer—to become their network database administrator. In this role, I installed new software and servers, and created and was part of the team that maintained the company's database. I performed other roles relating to security management and user experience management.	Taking a position as a web developer in an agency allowed me to better manage third parties. Having junior roles (including retail sales) early on gave me the ability to understand how to work with people. As web developer for a boutique digital agency, I worked with a range of clients. Some I loved; some I didn't, but it gave me a better sense of the type of people I worked well with and the culture I could succeed in. One day, one of my favourite clients offered me a job I couldn't turn down. This is the reward for being technically skilled and having developed my interpersonal skills.
Community Experiences: • I was very active in student government and was vice president of the student union in my final year of university • I am an active member in the local chapter of DAMA, the Data Management Association	Student government allowed me to gain exposure to a variety of perspectives to interact with and learn from others about what motivates people. It also forced me to be excellent at time management. This is an essential lifelong skill. I attend one DAMA conference annually. In addition to networking, it is an important window into the future of the industry.
Contextual Experiences: • Have worked both for a digital agency and within corporations	The best decision I ever made was to work in diverse aspects of agency computing – sales, data management, database server – giving me the ability to manage databases in various contexts.

	Every day was something different. Building a promo campaign website for a global brand, to a fundraising website for non-profit, all involved designing and implementing some database.
Relationships: • I've worked with diverse clients and managers from different parts of the organization, attending to their data needs, and ensuring data integrity and security.	My peers aren't all technical. I learned very early that to succeed, you need to learn how to speak their language, so I can translate my job into things they appreciate.

Senior Game Producer – Global Developer

SALARY RANGE (2017): $60,000–$81,000

I know how to bring functional substance to artistic concepts. I work with designers, artists, writers and musicians to turn ideas into code and create a game that will entertain players. I will often be directly involved in the design process, as my grasp of software and programming give me perspective on what's feasible and what isn't. At the end of the day, it's up to my computing and design skills to design and construct the skeletal mechanics of a game for others to build. I am a senior game producer.

The Tip: Sometimes, your school major may not differentiate you academically, but your minor can. Pick your minors with a clear intention of signaling interest and expertise. Some minors may sound like an odd combination with your major, but could lead to a great career.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Computer programming & knowledge of programming languages
- Coding
- Knowledge of audio & video equipment
- Embedded devices programming
- 3D graphics programming
- Modeling & animation
- Systems programming
- Web programming

Languages & Environments
- Apple OS, Microsoft OS, Android OS
- HTML5, CSS3, JavaScript, SQL
- C++, Java, Flash, Objective-C
- Blender, Unreal Engine, Unity

Other
- Creativity & imagination
- Problem solving & critical thinking
- Written & verbal communication
- Minor in fine arts discipline

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Information Systems with a minor in creative writing • Diploma in New Media Production and Design from local polytechnic • Completed Game Design: Art and	I always dreamed of being a game producer, but so do many other people. I followed my passion for programming and storytelling, graphic novels and gaming into a degree that blended technical and storytelling skills. Leveraging education is critical to stay one step ahead of my competition.

Concepts Specialization from California Institute of the Arts Coursera	
Employment Experiences: • Did an internship at local game development start-up? This company offered me a position upon graduation. • First position was as game design project coordinator for local start-up. Worked on OS and Android games. • Was given developer lead and launched first game three years after graduation • Recruited by large gaming company to be senior producer for an established series	My big break happened by deciding to do an internship one summer. This single decision defined my career. It showed me what I love to do and what I am good at. Working in a start-up, I realized that to become a game developer, I needed to own the world I designed and all the characters in it. It was all up to me. When I went to a larger company, I had the advantage of having "owned" a title already; this set me apart.
Community Experiences: • Joined gamer club in my community when I was 16. This helped me build my network and identify local mentors. When I am back in my hometown I host an annual gamer hackathon through this club to mentor up-and-coming game designers. • Was on executive of my university gaming developers (GameDev) club. Very active in gaming community and engage in hackathons.	Volunteering not only allows me to contribute my skills to my community, it broadens my network and relationships. The diversity of these relationships forces me out of my comfort zone.
Contextual Experiences: • I took two years off prior to going to school. I thought I could make it on my own as a game producer with no formal education.	There is a lot of debate about the value of formal education in computing. Heck, Steve Jobs, Bill Gates and Mark Zuckerberg never completed postsecondary. They are the exception, not the norm.
Relationships: • I have had two important mentors in my life. One was the principal of my first start-up. He is very technical and a star programmer. The second is a graphic artist and author.	Invest in your relationships with the purpose of getting outside of your comfort zone. It's easy to build a network of people "just like me"… it's much harder to build a network of people who challenge your norms. This challenge will make you a better person.

Freelance IT/IS Consultant

SALARY RANGE (2017): $47,000–$91,000

I am always ready to give advice, support and training in the fields of computer software, multimedia, database systems, networks and hardware for companies or individuals who need it. My wide range of skills and knowledge is in high demand and I know how to market those skills accordingly.

The Tip: Aspire to start your own company someday; but spend your first few years working for other people who'll teach you how to do this well.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Managing IS projects
- IT infrastructure design & management
- IS strategy, management, & acquisition
- Customizing & maintaining applications
- Networking & communications
- Enterprise systems analysis & integration
- Business intelligence & analytics
- Information technology security configuration & management

Special Skills
- Business analysis
- Windows OS
- Microsoft Active Directory

Certifications
- CompTIA Certifications
- Project Management Professional (PMP)

Other
- Communication skills
- Negotiation skills
- Accounting and finance
- Marketing

BUILDING BLOCK EXPERIENCES

Education & Learning:
• Bachelor of Computer Information Systems with a minor in marketing
• Have completed courses in:
  • Graphic design: UX, graphics/layout, template creation/redesign; Search Engine Optimization (SEO) – Utilization of theory and applications for SEO
  • Website development for clients (ASP.Net, PHP, CSS, WordPress)
  • Photography & content curation
	Education in technology is never ending. This is especially true if you aspire to be a freelancer. People pay for expertise. Expertise isn't about what you say you can do; it is about what you can prove you can do. In my field this requires taking courses and being certified in a broad range of areas. This breadth gives me the ability to be professionally agile and serve a broad market.

Employment Experiences: • Did my internship as an application analyst for a local energy company • At graduation, I became the web developer for a small business-to-business firm • Took a position as an e-learning business analyst for a local college. This was an introduction to a breadth of design and content management systems. • Today I am a freelance consultant, where I leverage my breadth of experience and skills to support clients	Being a successful consultant is about putting your time in. Few people have the skills or the professional network at graduation to succeed as a freelancer. If you aspire to be a consultant, spend the first few years of your career investing in your credentials and your network. Your return on this investment will be reputation and respect.
Community Experiences: • I was on the founding executive of the Machine Learning Club at my university. This provided a platform for a small group (at the time) interested in machine learning. These are people who remain friends to this day.	Being in a leadership position in the Machine Learning Club in university taught me key networking skills. This led to me building confidence and having the skills to support my business development. To be a freelancer you must have the confidence to go find and then ask for business. Volunteering at the Food Bank gave me the

• Volunteered to assist the local Food Bank in redesigning their inventory system for more efficient and effective management of donors and beneficiaries	opportunity to understand the incredible value in providing service that is tailored toward the needs of an organization.
Contextual Experiences: • I indulge in mission-focused travel	As a freelancer, I can manage my own schedule and time. This creates opportunities for more freedom and "me time."
Relationships: • I actively network with influential community leaders in both the private and public sectors	My career map isn't for everyone because it can create personal and professional stress. Balance is difficult as a freelancer, but my spouse and mentor are my rocks. They push me back on course when I lose balance and perspective.

Software Quality Assurance Specialist – Consumer Electronics

SALARY RANGE (2017): $53,000–$71,000

It is up to me to make sure that the public receives only the best. I work in the IT department of the company, ensuring that all software developed by the software project team is of high quality and devoid of errors, which could threaten any aspect of corporate reputation and performance. I write software test cases and implement automated test scripts, troubleshoot bugs and document procedures. I will send developers back to the drawing board as many times as necessary until I am confident in the product's quality.

The Tip: Software quality assurance requires determination, dedication and great attention to details.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Code automated tests
- Analyze test results
- Capable of using source code repositories
- Create test plans & establish product quality standards
- Ability to create & document test cases
- Understanding of testing environments
- General knowledge of computer networks, databases & web technology
- Knowledge of web databases
- Website and web application layout management
- Knowledge of object-oriented programming languages

Certifications
- Certified Associate in Software Testing (CAST)
- Certified Software Tester (CSTE)
- Certified Manager of Software Testing (CMST)
- Certified Associate in Software Quality (CASQ)
- Certified Software Quality Analyst (CSQA)
- Certified Manager of Software Quality (CMSQ)

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Software Engineering with a minor in operations management • Have completed courses in the following areas: • Software quality planning, statistical process control, test development and control mechanisms	My degree in Software Engineering introduced me to the importance of discipline and process. I took an elective in project management that soon became a minor in operations management. I commit to a minimum of three professional development courses per year. Most are related to maintaining currency in the latest software testing tools and platforms.
Employment Experiences: • Completed an internship as a programmer, working in an agile software development environment • At graduation, hired by a transportation company as a junior business process improvement analyst • Promoted to quality assurance analyst. Responsible for software testing prior to implementation across corporate network.	My experience has been diverse, but I learned early on the importance of quality assurance. If this is done poorly, it can not only sink a product, it can sink a company. I tell people my job is to protect the integrity and reputation of my company and its information resources.
Community Experiences: • I am passionate about ensuring socio-economic constraints don't limit access to technology. I volunteer for a charity that raises funds to buy technology for local schools. So far, we have distributed 2,400 tablets to children in 64 different schools.	I go to local schools and train teachers and children on how to use different technology platforms. There is no greater reward than seeing the light bulb go on for a child who has never used a tablet before.
Contextual Experiences: • Played varsity basketball in university	I developed a strong work ethic and a reputation for great attention to details. Playing basketball and chess provided me with the discipline to understand the interrelationships that exist among competing variables, with an eye on the final goal.
Relationships: • I seek to foster good working relationships with all the people I am dependent upon for deliverables. They need to know me well enough to understand my intentions.	I understand motivation and how or why people do what they do. I need to know how to read people and know who's having a bad day and how to deal with that so I always get the best out of them. I can see software quality as a holistic concept that deals with correctness of the software, and with the satisfaction of the user.

Web Developer – Digital Agency

SALARY RANGE (2017): $68,000–$84,000

I design the face of organizations. A website must not only be functional, but attractive, too. I understand the importance of balancing simplicity and convenience with complexity and detail to keep a website helpful to both advanced users and beginners. I know how to write scripts to work behind the scenes, scripts to run the actual presentation seen by the user, and database technology that keeps things running smoothly and efficiently, all hidden beneath a design that is aesthetically pleasing and interesting.

The Tip: Refine your skills through volunteering in your community. This is an accessible way to build evidence that you can do what you say you can do. If you can prove it, someone will hire you to do it. Community participation also provides you with rich contextual experiences that could impact your ability to meet diverse audience needs.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills

- User experience & design sense
- Search engine optimization (SEO), marketing & social media
- Web server administration
- Project management

Tools and Languages

- HTML5, CSS3
- PHP, ASP.NET, Java, Perl or C++
- JavaScript, Ajax
- Design software (e.g. Adobe Photoshop, Adobe Illustrator)

Certifications

- Google Analytics Individual Qualification (IQ)
- Adobe Certified Expert (ACE)
- Microsoft Certified Solutions Developer (MCSD)
- Zend Certified PHP Engineer
- Certified Web Development Professional

BUILDING BLOCK EXPERIENCES:

Education & Learning: • Bachelor of Fine Arts (graphic design) and Bachelor of Computer Information Systems (double major) • Completed Microsoft Certified Solutions Developer program (MCSD)	It's rare to have a double major in both the fine arts and CIS. It was a long haul in school, but this combination is my unique value proposition. Every job interview I've had since graduation has started with the question, "tell me what drove you to do a double major in the fine arts and CIS?" This has been a very strong edge for me; employers value my qualifications and see the relevance to web development.
Employment Experiences: • I did freelance graphic design while in high school and university • Completed an internship at a small marketing agency as a graphic designer. Did a second	My training and experience taught me to be flexible and thrive within ambiguity. I got comfortable with a fast-paced environment with high potential for the unexpected. My experience allows me to have feet (and respect) in the

internship with the agency as a web developer during my CIS degree. • Worked as a student research assistant with a professor studying human-computer interaction. Co-authored a paper with my supervisor. • Following graduation, I became the lead web application developer for a larger agency in town. Most clients are medium and large businesses across different sectors.	VERY different worlds of graphic design and programming. I have the credentials and experience to be able to go deep and challenge my colleagues in their language. Very few people can do this.
Community Experiences: • In university, I was a member of CS-Can/Info-Can. This was an excellent forum for those pursuing research in technology. • On board of directors of Beakerhead. The festival is a mash-up of arts, science and engineering.	Getting involved in Beakerhead in its first year was huge for me. It allowed me to find "my peeps." Year 1 was like literally starting a new business, and the professional and personal network I developed from this was invaluable. Not a day goes by where I don't learn something new.
Contextual Experiences: • I live in two worlds and need to speak to very different audiences. To support this, in university I created a transmedia-style portfolio which included video, graphic design, a podcast-style interview, a short story, a print ad, a colouring book and a personal brand book.	My ability to use multimedia technology in web development was instrumental to preparing and constantly updating my transmedia portfolio. Organizations are constantly seeking more effective ways of reaching their respective audiences by hiring professionals who have diverse backgrounds, interests and preferences.
Relationships: • Belong to a creative group of friends interested in film, music, writing, design and art	My friends, colleagues and neighbours are endless sources of inspiration, knowledge, stories and creative exploration.

Senior IT Business Analyst – Agribusiness

SALARY RANGE (2017): $66,000–$86,000

I analyze and understand the actual needs of a company while not being swayed by its wants. I investigate an organization's goals and issues before advising them on methods to apply technology to find efficiencies in the most cost-effective way. I work with staff, executives, IT departments and even customers to clearly see the big picture and identify all possible issues. After I have finished my investigation, I will document my findings and present the necessary solutions.

The Tip: Be prepared to adapt and pivot when the time is right. Remember, pivoting from your plan is not a matter of "if," it is only a matter of "when."

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills

- Able to conduct research into systems issues & products as required
- Demonstrated project management skills are an asset
- Database querying, manipulation & analysis
- Knowledge of software development lifecycle, standards, processes & methodologies
- Agile or DevOps environments
- Technical requirements gathering & analysis
- Business process engineering
- IT architecture & IT service management

Certifications

- Certified Business Analysis Professional (CBAP)
- Certification of Competency in Business Analysis (CCBA)
- PMI Professional in Business Analysis (PMI-PBA)

Other

- Communication skills
- Analytic skills
- Information gathering & analysis skills

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Information Systems (BIS) with a minor in statistics • Master of Business Administration (strategic management) • I better understand the science of human decision making and motivation by reading books like Daniel Kahneman's *Thinking Fast and Slow* and Dan Ariely's *Predictably Irrational*	Systems analysis is one of the core courses in the BIS program. It provided me with an understanding of the methods and tools for business analysis. I realized that I may need some statistical skills to analyze organizational and user requirements data, so I decided to take a minor in statistics. The combination of business, computing and statistical skills has been instrumental in my success as a business analyst, while an additional MBA with a concentration in strategic management enables me to understand how to harness organizational human, financial and other assets to gain a strategic advantage, using information systems as a strategic vehicle. Organizations highly value my multi-disciplinary background.
Employment Experiences: • Retail sales specialist at large electronics retailer. Expanded this role into a technical support specialist role. • Did summer job as an IT business analyst for local health authority • First job following graduation was in a customer support role for a large telecommunications company. Promoted to client care specialist. • Recruited to become a business analyst for an Australian-owned agribusiness firm. I am currently at the Canadian office, but my goal is to pursue a career pathway to Australia.	This pathway provided me the background in selling and customer experiences essential to understanding user requirements. Client relationships have been key to my ability to relate with information system users, understanding their needs and exploring ways by which information systems could make their work more effective and efficient. It was key that I was proactive in mapping out the knowledge and skills I would need and how to go out and get them.
Community Experiences: • Founding president of the Business Analytics Club at my university. I have remained active	It was an incredible experience founding a club and using it as a bridge into the professional community. It gave me a reason to "warm" call

as an alumni mentor.	professionals and invite them to come to speak at our events.
Contextual Experiences: • I did a semester abroad at the University of Melbourne in Australia. This opened a world of potential for me.	I always considered myself ambitious, but my semester abroad reframed my definition of what's possible in an international context.
Relationships: • During my semester abroad, I met my future wife. She followed me back to Canada to study. We have committed to defining careers that provide our family a route back to Melbourne.	You never know when you are going to find "the one." My "one" just happened to be Australian. Having a career mission and a plan is good, but being agile and adaptable enough to adjust when life happens is essential. Remember, all plans are created to be changed.

Director of Business Development – Technology

SALARY RANGE (2017): $120,900–$156,900

My job is to help my company grow by generating new sales leads and product opportunities, especially in a fast-paced technology world. I bridge engineering, product management and sales as these functions can often fall into the trap of operating in isolation. I need to be out with our sales team, meeting with customers and prospects all the time to build relationships and uncover emerging needs. I bring market intelligence back from the field to guide product management and engineering as part of a longer-term strategy to grow our business. I'm always on top of industry trends and new players.

The Tip: Go travel internationally. Go do a semester abroad. Go volunteer overseas. You'll realize it's a *really* big world. Once you realize this first hand, complacency is not an option.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- IS strategy, management & acquisition
- Knowledge of applications
- Systems analysis
- System design & software development

Management Skills
- Develop & execute a distribution strategy
- Apply principles of CRM
- Manage a sales process
- Conduct sales presentations
- Measure return on investment (ROI)
- Manage a budget
- Develop & execute a pricing strategy

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Information Systems. Minor in entrepreneurship. • MBA, University of Reading (UK) • Avid listener of tech and sales podcasts. The Sales Evangelist is a current favourite.	I knew early that I wanted to develop my skills to excel in international sales for a global technology company. This was my unique value proposition. Sales is fast and changing; stagnation is a career killer. My goal was to break into international sales, which led me to pursuing an

	MBA in the UK. The classroom learning combined with the cultural context of this experience created my unique value proposition. Few days go by when I don't have a reason to refer to my time in the UK.
Employment Experiences: • Retail telecommunications sales during university • Took a variety of increasingly senior technology sales position • Following the MBA, moved into a senior business development job at a small technology start-up • My product line was acquired by a larger systems integrator and my position was relocated to San Jose	My employment pathway was intentional. I built my technology sales credentials early at home, but with a vision of working in a global technology company. My international MBA (combined with my sales experience) was my differentiator.
Community Experiences: • International travel and assignments makes active engagement in my community difficult	This is a part of me I had to sacrifice, but with my recent three-year appointment in the San Jose, I want to become engaged in the community.
Contextual Experiences: • Doing an international exchange program in high school sowed the seed for building an international career	It sounds like a cliché, but the exchange program I did in high school was life-changing. After this, the question wasn't "if," it was "how" I'll build a global life.
Relationships: • Focused on building international networks	I have a genuine passion for other people's stories. This interest is reciprocated. I consider my international relationships a constant opportunity to learn from others.

Digital Project Manager – Marketing Agency

SALARY RANGE (2017): $96,000–$127,000

I am a skilled and effective leader, and the success or failure of a project is my responsibility. I know how to multitask and prioritize, how to manage my time and keep things organized, all while using my communication skills to provide clear, concise tasks to the teams working under me. It is up to me to make sure that these teams work together, communicate, and meet their goals. If things veer off track, I am the only one responsible.

The Tip: Don't get a mentor. Get *mentors*. No single person has all the answers. I find the real learning isn't in what they agree on, but what they disagree on. This is where you can really start to ask hard questions.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills	**Tools**
• IS strategy, management & acquisition	• Teamwork Projects
• Knowledge of applications	• Zoho Projects
• Systems analysis	• Wrike

- System design & software development
- Project Management Body of Knowledge (PMBOK) skills
- Programming skills
- Software-testing skills
- Workfront
- Microsoft Project

Certifications

- Project Management Professional (PMP)
- Certified ScrumMaster (CSM)
- Certified Associate in Project Management (CAPM)
- Agile Certified Practitioner (PMI-ACP)
- CompTIA Project+ Certification

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Science • Professional Project Management (PMP) certification via the Project Management Institute • Follow the Project Management topic and articles in the *Harvard Business Review*	My major in computer science introduced me to several important aspects of computing, giving me the ability to manage a variety of computing projects. I took electives in project management and business finance, both instrumental to my success as a project manager. At graduation, I committed to completing my PMP certification in four years. PMP is a highly valuable certification for project managers.
Employment Experiences: • Worked as a sales representative for electronics retailer in university • Completed a work term as a project coordinator in a small technology start-up • IT project coordinator for a telecommunications company following graduation • Project manager in telecommunications • Moved to a position as a digital project manager in a global marketing agency	I acquired people skills that help me thrive within ambiguous and sometimes, unrealistic client expectations. In addition, I go comfortable with numbers and analytical tools, which have enabled me to be more methodical in project schedule, scope, cost, and scope management. My experience provides me the ability to a calming influence for my clients and my team.
Community Experiences: • I am the volunteer webmaster and social media coordinator for my church	My church had declining and aging membership for two decades. I built their first website and started all their social media accounts. For the first time in 20 years, our congregation grew by about 40% within one year. Many of the new members were between 18 and 25. I can't take credit alone for this, but it's nice to be able to contribute my skills and knowledge.
Contextual Experiences: • Was on the varsity hockey team at my university. I was assistant captain in my final year.	It is a cliché, but I was taught early as an athlete there is no "I" in team. This principle is central to how I manage people and projects.
Relationships: • Developed a diverse team of mentors inside and outside of technology. This includes senior people in digital marketing, web design, entrepreneurs and professors.	The diversity of my mentors often creates internal conflict and challenges. This is a good thing. I think building a uniform mentor team of people "just like me" may be comforting, but I found it to be a poor strategy. I now use mentors to challenge what I think I know.

Information Security Analyst – Financial Services

SALARY RANGE (2017): $74,000–$95,000

It's up to me to protect my company's computer networks and systems from cyber-attacks. I constantly plan and carry out security measures to keep things safe, and monitor and assess all networks for possible leaks. If a violation is detected, I am the one to investigate and enact backup security systems and sweeps until I am confident that things are secure.

The Tip: Do a work-term experience. This forces you to get out of a classroom and apply yourself. It will open your world and expose you to corporate realities.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills
- Data & information management
- Security risk management
- Security policies & procedures
- Security testing & auditing
- Penetration & vulnerability testing
- Anti-virus & anti-malware systems
- TCP/IP, routing and switching
- Firewall/intrusion detection and prevention protocols
- Network protocols & packet analysis tools
- Cloud computing
- Security information & event management (SIEM)

Tools and Environment
- Windows, UNIX and Linux operating systems
- Utility software
- C, C++, C#, Java or PHP programming languages
- SaaS models

Certifications
- Certified Ethical Hacker (CEH)
- EC-Council Certified Security Analyst (ECSA)
- Certified Information Security Manager (CISM)
- Certified Information Systems Security Professional (CISSP)

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Information Technology (IT) • Completed certifications in Certified Ethical Hacker (CEH)	What gets me up in the morning is knowing it falls on me to ensure that all our corporate data is safe. As a cybersecurity professional, I identify opportunities to enhance information protection. My IT degree exposed me to various ways of protecting the individual and organizations from cyber-attacks and reducing system vulnerabilities. I took several short courses in IT security while studying for my CEH certification, which is highly respected in the industry.
Employment Experiences: • Had a system administrator internship position at a local IT security company. Hired as a full-time system administrator at	My internship as a system administrator exposed me to various aspects of system vulnerabilities. I consolidated on this knowledge in my role as system administrator and junior

graduation. • Moved to a junior system security analyst position at a large financial services company. • Promoted to system security analyst after three years.	system security analyst. Moving into the role of senior security analyst was easy, having worked with people and systems, and being involved in the development and implementation of the organization's security policy.
Community Experiences: • In high school, I volunteered as a "good shepherd," protecting kids that were bullied. This opened my mind to the vulnerability that exists despite institutions' protective structures. • I later developed an interest in traveling abroad, and understood more about individual and corporate vulnerabilities. • Currently, I sponsor two high school kids on an annual educational visit to Silicon Valley where they can experience simulated cyber security scenarios and how they could lead to the collapse of businesses	A passionate professor in university introduced me to this field school program where we spent three weeks in an IT firm in China. We were exposed to their security structures and training sessions that simulated cyber-attacks from another country. It was an eye-opening experience for me.
Contextual Experiences: • I consider myself a risk-taker, but that wasn't always the case	Balance requires discipline and perspective. I've become a better security analyst because I understand the relationship between security and risk. I take risks but always think about the risk of not protecting myself.
Relationships: • I have developed a diverse team of mentors inside and outside of IT. This includes senior people in cyber security. I follow top information security specialists on LinkedIn.	Social media is a very good source of connection with potential mentors. Follow them on Twitter and join them on LinkedIn.

Associate Professor – University

SALARY RANGE (2017): $80,000–$135,000

I develop and teach a wide range of undergraduate and graduate courses. I currently engage in active research that can contribute significantly to knowledge in the field. I can work well in a strong team environment and assume an appropriate share of administrative service in a respectful and collegial manner.

The Tip: Industry experience is an asset when you want to become a professor. Academics alone won't set you apart.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills	**Special Skills**
• Programming • Data structures • Web development • Database design & development	• Technical expertise • Teaching experience • Research focus

• Systems analysis • Operating systems/ Networking • Human-computer interaction	**Certifications** • Ph.D. or master's degree in relevant field with specific industry experience

BUILDING BLOCK EXPERIENCES

Education & Learning: • Ph.D. in Information Systems • While doing my master's in computer science, I served as a teaching assistant and found a passion for teaching	I enjoyed my field of study. I knew I was a high achiever when I excelled in all my classes. There was no stopping for me until I achieved the terminal degree in my field.
Employment Experiences: • Teaching assistant while doing my graduate degree • Did internship with local petrochemical distributer as a junior programmer • At graduation, I was hired as a systems analyst looking at their current system in view of upgrading to a new system	Being a graduate teaching assistant gave me excellent relevant career experience to know what it is to be a professor in a reputed university. Work experience in the industry helped me understand how my research might be applied to solve real-world problems and it was very gratifying. I developed my writing skills so I could publish my research as an academic. My analytical skills helped me with my research - in understanding complex problems.
Community Experiences: • I have a passion to network and connect with people in all walks of life	My natural tendency toward networking has helped me develop excellent verbal communication skills, which are essentials skills for a teacher and researcher.
Contextual Experiences: • I'm a lifelong learner and I believe learning is key to personal fulfillment	You can be a learner at almost any age and in any discipline. Fostering an environment where students can learn and discuss important topics in a respectful manner is important to me.
Relationships: • Worked as a research intern doing relevant research with my professor while in university	I still have contacts and connections with people at my alma mater. My goal is to motivate and inspire students to enter my field of research. I love to do collaborative research as I believe that helps foster professional development among colleagues.

Founder & Entrepreneur – Technology Start-up

SALARY RANGE (2017): $40,560–$122,005[32]

I knew since I was a kid I was born to be an entrepreneur. I'm part financier, part product designer, part human resources manager, part market researcher, and I'm always selling my vision. In this job, I need to have confidence in my vision, the ingenuity to deliver it within limited means, and the enthusiasm to effectively tell the story and move others to action. I also need enough humility to adapt my solutions to changing market conditions and feedback.

The Tip: Don't get a mentor. Get *mentors*. No single person has all the answers. I find the real learning isn't in what they agree on, it's what they disagree on. This is where you can really start to ask hard questions.

PRIORITY KNOWLEDGE AND SKILLS:

Technical Knowledge & Skills	**Management Skills**
• IS strategy, management & acquisition • Knowledge of applications • Systems analysis • System design & software development • Project Management Body of Knowledge (PMBOK) skills • Programming skills • Software-testing skills	• Market analysis • Develop & execute a product strategy • Financial analysis • Revenue generation • Measure return on investment (ROI) • Manage projects • Sales & distribution management • Conduct sales presentations

BUILDING BLOCK EXPERIENCES

Education & Learning: • Bachelor of Computer Information Systems with a minor in entrepreneurship. • A commitment to be a lifelong learner. I read one book a month.	I was mostly a self-taught software designer but realized I had a lot to learn. What gets me up in the morning is change. In my space, if you're not learning every day, you're falling behind.
Employment Experiences: • Developed my first App in high school. I only sold 300 units but I learned how to listen to real customers. My second App sold 3000 over units. • I did an internship at a start-up during by third-year and was hired after graduation. • I founded my own start-up four years after graduation and secured angel investment from my mentor.	I learned how to take risk early. This process reinforced a quote by the founder of LinkedIn Reid Hoffman *"If You're Not Embarrassed by The First Version of Your Product, You've Launched Too Late"*. I now manage my company that way and coach my staff. Perfection is the enemy of progress. My boss at my start-up became my mentor and is now my partner. She believed in me and my vision.
Community Experiences: • Since my second year of university, I spend one week a year volunteering overseas. For the past four years, I've coordinated the trip.	A passionate professor in university introduced me to this field school program where I still spend one week a year abroad on project work. These experiences allowed me to realize I was born to be an entrepreneur.
Contextual Experiences: • I've never worked beyond start-ups and never will. I believe in self-reflection and I learned to listen to myself.	What I loved to do and I was good at was software design and never wanted to get to far removed from this.
Relationships: • Developed a diverse team of mentors inside and outside of social work. This includes senior people in technology, finance and academia.	The diversity of my mentors often creates internal conflict and challenges. This is a good thing. I think building a uniform mentor team of people "just like me" may be comforting, but I found it to be a poor strategy. I now use mentors to challenge what I think I know.

CONSOLIDATING YOUR MISSION MAP

This is it. Now that you've been inspired by the sample Mission Maps, it's time for you to connect the dots and put it all together in a concise and actionable plan. To develop your Mission Map, refer to the knowledge and skill gaps you identified in Mission Map Table 1 (p. 37) and link these to professional building blocks.

In the sample below, data analytics was identified as a gap. **To close this gap, we identified four possible building block activities.** Executing these activities is your Mission Map.

You might find it useful to create a checklist based on the activities you've identified as key to your mission. See the appendix for a Mission Map checklist designed to be accomplished during a four-year university program.

Mission Map Table 2 – Linking to Professional Building Blocks

Knowledge or Skill Gap	Professional Building Block Activities Required
Data analytics	Education: Do my minor in statistics. Complete certificate in data analytics. Employment: Internship or summer job at marketing research agency. Community: Join analytics club at school. Relationship: Secure a mentor who is immersed in analytics.

Mission Map Finale

You've put in the work and now it's time to write down your Mission Map in your journal. Follow the template below. This information includes the concise 10-year mission statement from earlier and the professional building block activities from Table 2 above.

What is your final 10-year mission statement?

What are the priority knowledge and skills you'll need to achieve your mission?

Expert	Great at	Good at

What are the building block experiences you'll need to achieve your mission?

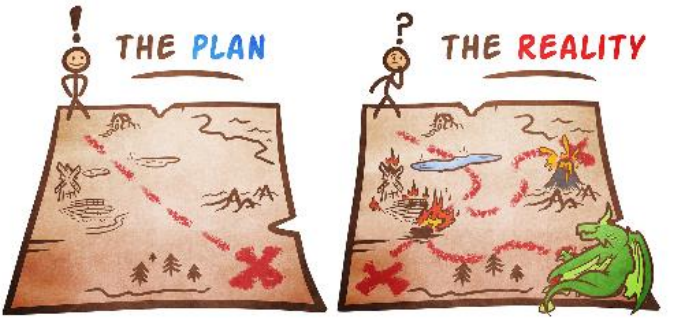
Now map out priority building block experiences you'll need to achieve your mission. In the near-term (years 1-3) these should be more refined. For example, these may include specific courses or volunteer opportunities you'd like to pursue. In the longer-term (years 7-10) your building blocks will be more aspirational.

Experiences	Years 1-3	Years 4-6	Years 7-10
Education & Learning Experiences	`		
Employment Experiences			
Community Experiences			
Contextual Experiences			
Relationships & Mentors			

ADAPT AND CHANGE

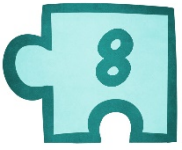
"THE MEASURE OF INTELLIGENCE IS THE ABILITY TO CHANGE."

–Albert Einstein



During our interviews with working professionals for this series, we'd ask a common question: "What advice would you give your 18-year-old self?" The most common answers were to be proactive, worry less, plan more, and embrace opportunities when they come. In other words, planning to be a VP in 10 years is important, but always **be prepared to adapt and change** as you grow and learn.

This principle of evolution is essential. The 10-Year Professional Mission you create in your 30s will look very different from the 10-Year Professional Mission you create in your 20s. Regardless of where you are on your 10-year Mission Map, don't sit back. Life inevitably will throw you a curveball. You'll find new skills, new interests, opportunities and relationships. But that's why this process is so important and fun.



Adapting, learning and growing are your only options. At certain times in your life, your professional mission may be most important, and at other times it may be your relationships, your health & wellness or your spirituality. How and where they each fit in depends on how you define success at any moment in time. Stepping back and reflecting on everything else important in your life gives you a solid foundation to make those big (and small) decisions in life.

Recall, you considered several "what if" scenarios before arriving at your 10-Year Professional Mission. That same exercise is practical throughout your life. When you're faced with a change in life, use it as a reason to wonder "what if?" and revisit your 10-Year Professional Mission. If you have a job opportunity on the other side of the world, consider what your 10-Year Professional Mission might be if you went for it. If you lose your job in a recession, consider "what if" scenarios around going back to school, or starting your own business, or taking time off with the kids. "What if" is your best tool against sticking to a path simply because you're already on it.

AT A GLANCE

1. *Computing YOU* is based on three steps: (1) Explore; (2) Define your professional mission; (3) Design your Mission Map.
2. To design you, you need to be intentionally curious.
3. Start a journal so you can reflect every day on the process of designing your life in the computing profession.
4. A career in computing is influenced by three big questions:
    - What **computing discipline** am I interested in?
    - What **aspect of computing** will I focus on?
    - What **type of organization** do I want to be part of?
5. It is critical for you to get a team of professional mentors.
6. When plotting your 10-Year Professional Mission, you must focus on the development of computing knowledge and transferable skills.
7. Computing is influenced by prevailing trends—from technology to demographics—that are redefining what it means to be a computing professional. Reflect on how these trends may influence your mission and the knowledge and skills that'll be valued in the future.
8. Commit to doing rigorous research when defining your 10-Year Professional Mission. Be patient and remember to triangulate your research from credible sources.
9. When you think you've defined your 10-Year Professional Mission, reflect on everything else in life and how you define success. Don't be afraid to stop and change if your professional mission doesn't align with all these other important factors in your life.
10. Designing your Mission Map is based on connecting three questions:
    - What's your 10-Year Professional Mission?
    - What skills are critical to your 10-Year Professional Mission?
    - What professional choices and experiences (building blocks) create the critical knowledge & skills demanded by your professional mission?
11. Once you've answered these questions, build a map to deliver on your professional mission.
12. Evaluate your 10-Year Professional Mission scenarios and be ready to change directions if the evidence tells you it's time.
13. Borrow from the sample Mission Maps included in *Computing YOU*.
14. Engage your mentor(s) for feedback. They are the experts.

APPENDIX

KNOWLEDGE AND SKILL GLOSSARY

Core Transferable Skills

Thinking Skills

Analytical thinking: The ability to deconstruct issues (and data) into smaller, more manageable pieces, use evidence and reasoning to identify unique relationships and weigh the costs and benefits of the alternative actions discovered.[33]

Transdisciplinary systems thinking: In the future, it won't be good enough to be an expert in just one specific area. The ability to understand and apply knowledge from across disciplines and can think like the experts in those disciplines will be essential. Transdisciplinary systems thinking is highly dependent on being intentionally curious beyond one's natural area of expertise.

Problem solving: Problem solving often leverages analytical thinking. Effective problem solving is made up of four inter-related skills:

- The ability to identify vital questions and problems and communicate them clearly.
- The ability to gather and evaluate relevant information.
- The ability to think open-mindedly, recognizing and assessing assumptions, implications and practical consequences.
- The ability to come to well-reasoned conclusions and solutions, testing them against relevant criteria and standards.

Adaptive thinking: The ability to successfully adjust to changes in circumstance or environment. Adaptability includes learning and growing from experience.

Intentional curiosity: The ability to be curious with a purpose and identify and explore a deeper meaning than what is being overtly expressed. Intentionally curious people look at the world (and their place in it), see big questions, are humble enough to acknowledge they don't know it all and seek to understand the unknowns.

Thoughtful creativity: Bringing a fresh voice or approach that helps projects stand out in a noisy technology environment, yet in a way that is appropriate for the corporate culture of an organization, and meets client's requirements.

Communications Skills

Written communication: The ability to share information and explanations with a target audience in writing in a persuasive, engaging and influential way. This includes grammar, tone, vocabulary and style.

Verbal communication: The ability to share information and explanations with a target audience by speaking in a persuasive and influential way. This includes vocabulary, tone, pace, volume and articulation.

Non-verbal communication: The ability to indirectly imply meaning through non-verbal cues that subtly influence a target audience. This includes body language, such as gestures, expressions, stance, eye contact, proximity and appearance.

Effective listening: The ability to commit full attention to what other people are saying, taking the time to understand points being made and ask questions when appropriate, without interrupting at improper times.

Persuasive storytelling: The ability to leverage a story, supported by evidence and delivered with conviction, to influence the attitudes or behaviour of a specific audience. The persuasiveness of a story may be influenced by the mediums used to tell it (speech, video, visual, text). For example, an accountant may be influenced by a logical argument supported by statistics; whereas a graphic designer may be influenced by a story that possesses depth and emotional appeal.

Conflict resolution and negotiation: The ability to resolve conflict or create common ground and reach an agreement to settle a topic that creates friction between individuals.

Interpersonal Skills

Cross-contextual competency: The ability to work well no matter the context. The contextual setting can include the culture, socio-economic conditions, organization size, industry type and team composition in which one is working. Having cross-contextual competency requires adaptive thinking and communications skills to operative effectively across contexts and with diverse people.

Effective leadership: The ability to guide others to complete a task through charisma, rank, intellect, will or experience. A leader's influence may be formal (e.g. a boss) or informal (e.g. social influence). Effective leadership includes three elements: the ability to establish a clear goal; the ability to communicate this goal to others; and the ability to balance the interests of others to engage them to deliver on this goal.

Self-confidence: To trust in oneself and in one's skills, abilities and knowledge.

Strong work ethic: To find value in a job well done and understand the importance of doing high-quality work with the discipline and determination to complete any assigned task.

Effective team player: The ability to cooperate with others to work towards a common goal.

Emotional intelligence: The ability to identify, assess and influence one's own feelings and the feelings of others. Emotional intelligence requires a mix of self-awareness and empathy

towards others. There are six recognized dimensions to emotional intelligence: emotional management, self-awareness, optimism, motivation, empathy and social skills.[34]

Organizational Skills

Self-starter: The discipline and ambition to start a task, regardless of difficulty, with limited guidance from others and be self-reliant under pressure.

Time management: Efficiently and effectively managing one's own time, the time of others and deliverables for projects. Time management also includes the ability to manage and filter vast levels of information to make timely decisions.

Follow-through: The discipline to stay effective and committed to complete a task or project.

Perseverance: The ability to remain persistent in overcoming all obstacles to achieve a goal. Obstacles are broad and may include previous failure, criticism, physical pain or injury. Perseverance is not, however, blindly sticking to a goal when all credible evidence says it is unachievable.

Technical Literacy

Confident use of digital technology: The ability to effectively use digital technology to access, manage, integrate, evaluate, create and communicate information. Most career pathways require using technology to communicate, collaborate, solve problems and conduct research, so understanding how to navigate an increasingly automated world is vital. Note that this broad technical literacy is different from task-specific technical literacy.

Computing-Specific Knowledge & Skills

Basic Skills for Various Aspects of Computing

Infrastructure

Hardware architecture: This refers to the physical components of a system, with an understanding of how each piece works, and how they work together. A submarine will have IC wired logic gates, analog devices, digital components, mechanical sensors and actuators.

Software architecture: Once the physical components of a system are in place (Hardware) we need software to make them function. Software architecture covers the design, implementation and interaction of all the software components in a system. It is the part of the system that dictates what we see as the user (how our websites look when we open them up).

Operating systems: **T**his is the software system that manages the hardware and software resources in a system. Nearly all computer programs need an operating system to function. Without an operating system, your home computer would just be a nice looking black box.

Utility software: This is the software system that is designed to keep computers running smoothly. It will analyze, configure, optimize and maintain the infrastructure of the system.

Lower level programming languages: We use programming languages to tell our computers what to do. Low level languages are used to operate and manage hardware and include basic machine code, machine language and assembly languages.

Data structures and algorithms: Information can be coded, sorted, and organized in a structured way so that it can be understood, managed and used effectively. Algorithmic techniques are used to solve these kinds of computational problems and they are a foundational part of coding.

IS project management: Here we're talking about overseeing projects from start to finish—including defining the scope of the project, creating terms of reference, managing resources, creating a plan, implementation, risk management and assessment.

IT infrastructure design and management: This involves planning out how infrastructure will be set up. Experts in this field will investigate IT infrastructure requirements, and will aim to design a system that meets the needs of individuals, specific departments and the organization as a whole.

Knowledge of systems fundamentals and computer architecture: Here the focus is on hardware including CPU architecture and computer organization. It includes the capabilities of the system and the study of how it works and is implemented.

Knowledge of networking and communications: This is the study of the principles and practices of computer networks and its infrastructure. Protocols, security, routing and communications in the networked systems are key.

Knowledge of network design and administration: This includes planning, analyzing, designing, installing, testing and maintaining networks for organizations. In depth knowledge of networking hardware and software is a must. It is the responsibility of a network administrator to ensure that the networks in the organization meet the needs of the organization. Understanding how to protect data, and keep information secure will be a priority.

Information technology security configuration and management: Learning how to keep information safe and secure using fire walls, encryption, privacy access and architectural solutions.

Data

Data Structures and algorithms: Information can be coded, sorted, and organized in a structured way so that it can be understood, managed and used effectively. Algorithmic techniques are used to solve these kinds of computational problems and they are a foundational part of coding.

Information management: Just as we manage paper on our desks, electronic data needs to be collected, organized, shared, stored, and maintained. Information management also includes the policies and procedures that govern the sharing of data across the information life cycle.

Enterprise systems architecture (ESA): Think about all the information technology systems used in a business, from payroll information to email platforms. The ESA includes these IT operations, and it functions as a continuous loop of improvement. These large-

scale application software packages are used in corporate or business settings to handle information, organize data analytics, and optimize the flow of information.

Skilled at developing and administering databases: This is more than just managing a spreadsheet. Experts in database management systems (DBMS) create software applications that help end-users to interact with large data sets in ways that make sense. Data needs to be linked to search terms, stored safely, and creating systems and processes for managing databases. Building databases, making them accessible and creating ways to maintain data integrity.

Knowledge of business intelligence and analytics: Learning how to use data and information in a way that will give your business a leading edge in the industry**.**

Information technology security configuration and management: Learning how to keep information safe and secure using fire walls, encryption, privacy access and architectural solutions.

Design

Human computer interaction (HCI): Knowledge of how humans interact with technology and how our technology is designed to interact with us. For example, what do you need from an interactive map? When there is a paper jam, can my printer tell me where the jam is? Which tray? How many pages?

Software architecture**:** Once the physical components of a system are in place (Hardware) we need software to make them function. Software architecture covers the design, implementation and interaction of all the software components in a system. It is the part of the system that dictates what we see as the user (how our websites look when we open them up).

Object-Oriented Programming (OOP)**: You've** probably heard of OOP languages like Java, C++ or Python. In this kind of programming, software designers work with chunks of code ("objects") and once the program is running, that work can be scaled-up to handle larger amounts of code.

Software development process: This includes designing, coding and testing software to make it run efficiently, reliably, and effectively.

Data structures and algorithms**:** Information can be coded, sorted, and organized in a structured way so that it can be understood, managed and used effectively. Algorithmic techniques are used to solve these kinds of computational problems and they are a foundational part of coding.

Software modeling**:** This is a way of showing how software is designed, and it allows programmers to see how software components work together to create a good product for the user. Modeling could involve diagrams, pictures or descriptions of the software process.

Enterprise systems architecture (ESA)**:** Think about all the information technology systems used in a business, from payroll information to email platforms. The ESA includes these IT operations, and it functions as a continuous loop of improvement. These large-scale application software packages are used in corporate or business settings to handle information, organize data analytics, and optimize the flow of information.

***Design and analyze information systems*:** This involves capturing and defining user requirements using gathering techniques, and creating models for implementation. Experts will investigate different solutions to the business problem and do a feasibility analysis or a cost benefit economic analysis to finally propose a recommended preferred solution.

Skilled at developing and administering databases: This is more than just managing a spreadsheet. Experts in database management systems (DBMS) create software applications that help end-users to interact with large data sets in ways that make sense. Data needs to be linked to search terms, stored safely, and creating systems and processes for managing databases. Building databases, making them accessible and creating ways to maintain data integrity.

Knowledge of enterprise systems analysis and integration: You'll develop an understanding of systems integration and of interrelated components including people, hardware, software, data and networks. Experts in this field ensure that all functionalities work together towards a common goal.

***Web development and administration*:** creating and maintaining websites with various functions (internal communication, marketing). Web development includes content development, web design, server-side scripting, client-side interface, security and maintenance.

Mobile applications and device management: Creating apps for that (and then some!) on devices that match the needs of the user.

***Information technology security configuration and management*:** Learning how to keep information safe and secure using fire walls, encryption, privacy access and architectural solutions.

Development

***Human computer interaction (HCI)*:** Knowledge of how humans interact with technology and how our technology is designed to interact with us. For example, what do you need from an interactive map? When there is a paper jam, can my printer tell me where the jam is? Which tray? How many pages?

Software architecture: Once the physical components of a system are in place (Hardware) we need software to make them function. Software architecture covers the design, implementation and interaction of all the software components in a system. It is the part of the system that dictates what we see as the user (how our websites look when we open them up).

***Object-Oriented Programming (OOP)*:** You've probably heard of OOP languages like Java, C++ or Python. In this kind of programming, software designers work with chunks of code ("objects") and once the program is running, that work can be scaled-up to handle larger amounts of code.

***Software development process*:** This includes designing, coding and testing software to make it run efficiently, reliably, and effectively.

Data structures and algorithms: Information can be coded, sorted, and organized in a structured way so that it can be understood, managed and used effectively. Algorithmic

techniques are used to solve these kinds of computational problems and they are a foundational part of coding.

Software modeling: This is a way of showing how software is designed, and it allows programmers to see how software components work together to create a good product for the user. Modeling could involve diagrams, pictures or descriptions of the software process.

***IS project management*: Here** we're talking about overseeing projects from start to finish—including defining the scope of the project, creating terms of reference, managing resources, creating a plan, implementation, risk management and assessment.

Design and analyze information systems: This involves capturing and defining user requirements using gathering techniques, and creating models for implementation. Experts will investigate different solutions to the business problem and do a feasibility analysis or a cost benefit economic analysis to finally propose a recommended preferred solution.

Skilled at customizing and maintaining applications: Those skilled in these areas know how to organize and maintain applications that are relevant to business operations. Learning which applications are essential to operations, how to manage change, review and improve systems all fall under this heading. User involvement and implementing software development methodology will likely be part of this process.

Skilled at developing and administering databases: This is more than just managing a spreadsheet. Experts in database management systems (DBMS) create software applications that help end-users to interact with large data sets in ways that make sense. Data needs to be linked to search terms, stored safely, and creating systems and processes for managing databases. Building databases, making them accessible and creating ways to maintain data integrity.

Web development and administration: creating and maintaining websites with various functions (internal communication, marketing). Web development includes content development, web design, server-side scripting, client-side interface, security and maintenance.

Mobile applications and device management: Creating apps for that (and then some!) on devices that match the needs of the user.

***Information technology security configuration and management*:** Learning how to keep information safe and secure using fire walls, encryption, privacy access and architectural solutions.

Corporate

***Operating systems*:** This is the software system that manages the hardware and software resources in a system. Nearly all computer programs need an operating system to function. Without an operating system, your home computer would just be a nice looking black box.

***Utility software*:** This is the software system that is designed to keep computers running smoothly. It will analyze, configure, optimize and maintain the infrastructure of the system.

***Information management*:** Just as we manage paper on our desks, electronic data needs to be collected, organized, shared, stored, and maintained. Information management also

includes the policies and procedures that govern the sharing of data across the information life cycle.

***Enterprise systems architecture (ESA)*:** Think about all the information technology systems used in a business, from payroll information to email platforms. The ESA includes these IT operations, and it functions as a continuous loop of improvement. These large-scale application software packages are used in corporate or business settings to handle information, organize data analytics, and optimize the flow of information.

***IS project management*:** Here we're talking about overseeing projects from start to finish—including defining the scope of the project, creating terms of reference, managing resources, creating a plan, implementation, risk management and assessment.

Knowledge of IS strategy, management, and acquisition: With these skills you'll help organizations to acquire and develop the infrastructure involved in its information system. Experts will strategize and critically analyze IS infrastructure to assess if it meets the needs of an increasingly globalized and technology-intensive business environment.

Skilled at customizing and maintaining applications: Those skilled in these areas know how to organize and maintain applications that are relevant to business operations. Learning which applications are essential to operations, how to manage change, review and improve systems all fall under this heading. User involvement and implementing software development methodology will likely be part of this process.

Knowledge of enterprise systems analysis and integration: You'll develop an understanding of systems integration and of interrelated components including people, hardware, software, data and networks. Experts in this field ensure that all functionalities work together towards a common goal.

***Information technology security configuration and management*:** Learning how to keep information safe and secure using fire walls, encryption, privacy access and architectural solutions.

COMPUTING CAREER RESOURCES

Canadian

Sample Computing Jobs in Canada

The Government of Canada tracks careers and emerging skill needs in extensive detail. This is a powerful source to start to better understand different roles in computing:

Government of Canada Job Bank: https://www.jobbank.gc.ca/home-eng.do

Canada – explore careers, wages, outlooks, education and other labour marketing information at: https://www.jobbank.gc.ca/explorecareers.do?selectExploreCareerBy=ec-occupation

Career Development Resources

- Working in Canada http://www.workingincanada.gc.ca/home-eng.do
- NOC and Canadian Occupational Projection System http://www23.hrsdc.gc.ca/w.2lc.4m.2@-eng.jsp

Provincial/Regional Career Development Resources

- Alberta – Occupational Information www.alis.gov.ab.ca/occinfo
- Manitoba – Career Development http://www.manitobacareerdevelopment.ca/CDI/
- Newfoundland and Labrador http://www.aesl.gov.nl.ca/lmi.html
- Yukon – Explore careers https://lmi.gov.yk.ca/en/explore-careers-and-industries
- Nunavut & Iqaluit Region - https://www.jobbank.gc.ca/report-eng.do;jsessionid=290E4925DCED4DE3B00204ECD4B701AD.imnav2?area=25264&lang=eng&noc=2174&action=final&ln=l&page=1&s=0&source=3
- Nova Scotia – Explore Careers https://careers.novascotia.ca/searchjobprofiles
- PEI – Career Development http://www.cdspei.ca/
- New Brunswick – Explore Careers https://www.nbjobs.ca/explore
- Ontario – Job Profiles https://www.app.tcu.gov.on.ca/eng/labourmarket/ojf/findoccupation.asp
- Work BC https://www.workbc.ca/Jobs-Careers/Explore-Careers.aspx

Women in Technology

http://www.skilledup.com/articles/organizations-empower-women-technology

Women - ACM

- https://womencourage.acm.org/
- https://women.acm.org/international/
- https://women.acm.org

Women in IT – Canada's Association of I.T. Professionals

- http://www.cips.ca/women

Society for Canadian Women in Science and Technology

- http://www.scwist.ca/

Related Readings

Aboriginal Strategic Committee, (2008). *Community Futures British Columbia Aboriginal Engagement Toolkit*. Community Futures, British Columbia.

Aboriginal Human Resource Council, (2008). *National Aboriginal Career Development Dialogue. Summary Report*.

ACM/IEEE- CS (2013). Computer Science Curricular 2013: Curriculum Guidelines for Undergraduate Degree Programs. Accessed on July 09, 2017 from https://www.acm.org/education/CS2013-final- report.pdf

ACM/IEEE-CS (2010); IS 2010 Curriculum Guidelines for Undergraduate Degree Programs in Information Systems. Accessed on May 13, 2016 from http://www.acm.org/education/curricula/IS%202010%20ACM%20final.pdf

ACM/IEEE- CS (2014). Software Engineering Curricular 2017: Curriculum Guidelines for Undergraduate Degree Programs in Software Engineering. Accessed on July 07, 2017 from http://www.acm.org/binaries/content/assets/education/se2014.pdf

ACM/IEEE- CS (2017). Information Technology Curricular 2017: Curriculum Guidelines for Undergraduate Degree Programs in Information Technology. Accessed on July 07, 2017 from http://www.acm.org/binaries/content/assets/education/it2017v085.pdf

Adya, M., Kaiser, K. M., (2005). Early determinants of women in the IT workforce: a model of girls' career choices. *Information Technology & People*, Vol. 18, Iss: 3, pp. 230 – 259.

Anthony E. (2003, October). Computing education in academia: toward differentiating the disciplines. In Proceedings of the 4th conference on Information technology curriculum (pp. 1-8). ACM.

Careers in Computer Engineering: A Guide to In-demand specialties, employers and skills. Accessed on July 4, 2017 from http://www.computerscienceonline.org/computer-engineering/

Connolly, R., Miller, J., & Uzoka, F. M. (2017). Computing Disciplines: A Quick Guide for Prospective Students and Career Advisors. Ottawa: Canadian Education and Research Institute for Counselling.

Connolly, R., Miller, J., Uzoka, F. M., Lunt, B., Schroeder, M., Miller, C. S., & Habinka, A. (2016, September). Red Fish Blue Fish: Reexamining Student Understanding of the Computing Disciplines. In Proceedings of the 17th Annual Conference on Information Technology Education (pp. 115-120). ACM.

Coker, D. (2016). Career Development Has the Highest Impact on Employee Retention. The HR Digest.

Finch, D., & Paul, R. (2016). Designing You - Life Beyond Your Grades. *FDR Publishing*. Available at www.designingyou.org

Fuesting, M. A., Diekman, A. B., & Hudiburgh, L. (2017). From classroom to career: The unique role of communcal processes in predicting interest in STEM careers. Social Psychology of Education, 1-22.

Grant, D.M., Knight, L.V., Steinbach, T.A., (2007). Young Women's Misinformation Concerning IT Careers: Exchanging One Negative Image for Another. *Informing Science Journal.* Volume 10.

Main, J. B., & Schimpt, C. (2017). The underrepresentation of women in computing fields: A synthesis of literature using a life course perspective. *IEEE Transactions on Education, PP(99),* 1-9.

Redekopp, D., Hopkins, S., & Hiebert, B. (2013). Assessing the Impact of Career Development Resources and Practitioner Support Across the Emplyability Dimensions. CCDF.

Uzoka, F. M. E., Connolly, R., Schroeder, M., Khemka, N., & Miller, J. (2013, October). Computing is not a rock band: student understanding of the computing disciplines. In Proceedings of the *14th annual ACM SIGITE conference on Information technology education* (pp. 115-120). ACM.

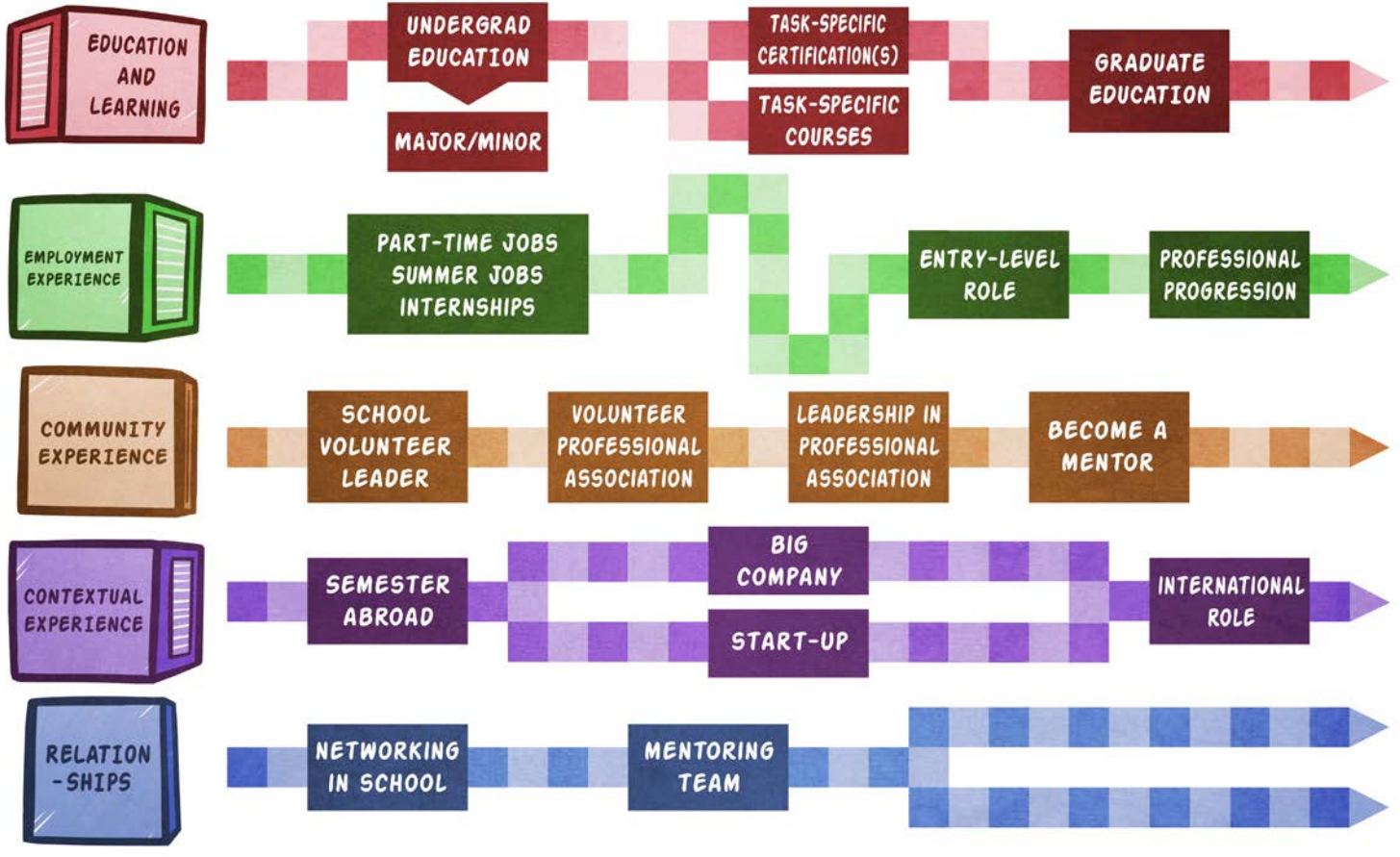
How to Get the Most out of Your University Experience

Building Blocks	Year 1 – Explore	Year 2 – Engage	Year 3 - Lead	Year 4 – Transition
Education & Learning	□ Meet with academic advising to map out courses. □ Explore all your student learning resource and student counselling resources and workshops. □ Be intentionally curious. Explore different courses with a goal. □ Narrow down what you like and what you are good at via Designing YOU. □ Book meetings with professors. □ Go to career development workshops.	□ Select a major or specialization. □ Select a minor. Think interdisciplinary. □ Build relationships with professors. □ Pick electives with intentionality. □ Explore other learning and skill development opportunities via books, podcasts and online courses. □ If your program doesn't have a work term, explore a co-op placement.. □ Visit a career counsellor	□ Meet with advising and map out your courses to graduation. □ Balance your courses – both course and content - to get the most out of them. □ Explore doing a project with a professor. □ Attend graduate school fair to explore your options.	□ Leave your educational options open by finishing with solid grades. □ Turn your course work into evidence. □ Visit a career counsellor for transition support and Mission Map development.
Employment	□ Get a part-time job focused on transferable skill development. □ Plan a summer job that test drives potential career paths. □ Start a LinkedIn profile. □ Explore all the career resources from the Alberta government.	□ Get promoted at work and manage people. □ Test drive different contexts in your summer job. □ Join targeted LinkedIn groups and take targeted courses via Lynda.	□ Identify skill gaps you need to close. All your jobs should be focused on targeted skill development. □ Have employers provide recommendation via LinkedIn. □ Summer jobs may be a gateway to a job post-graduation.	□ Turn your employment experiences into employer benefits on LinkedIn. □ Ask for more responsibility at work. □ Get letters of references from all your employers. □ Build your professional network through your employer.
Community	□ Just say YES to every opportunity! □ Join clubs to meet people with similar interests. □ Explore volunteer opportunities on campus and in the community. □ Get involved in intramural sports.	□ Take a leadership position in a club. □ Volunteer for a professional association linked to your professional mission. □ Organize an event on campus or in the community.	□ Sit on the executive of student club. □ Pick something to lead in the organization you are engaged in. □ Build your professional network via a professional organization.	□ Leverage your club executive role to build your professional network. □ Mentor new students through programs like the Peer Health Educator program.
Contextual	□ Start informational interviews to explore different career options. □ Explore Healthy Campus opportunities through Wellness Services. □ Explore diversity programs on campus. □ Explore international opportunities.	□ Conduct more informational interviews to explore different contexts. □ Do a semester abroad or work overseas in the summer to explore different contexts.	□ What contextual experiences are you lacking? Fill these gaps through class, employment or volunteer experiences.	□ Get your post-graduation plan into place. Be opportunistic to build your experiences.
Relationships	□ Start to build a mentoring team. □ Join a professional association.	□ Tap your mentors for informational interviews.	□ Tap your mentors for support in building out your discipline-specific skills.	□ Ask your mentors to advise on your post-graduation career path. □ Join university alumni association.

10-YEAR MISSION FRAMEWORK

YEAR 1

YEAR 10



THE DESIGNING YOU PROCESS

Computing YOU is just one piece of your life design puzzle. YOU are designing YOU. You're both the product and the product manager. Great products don't happen by accident. Great products have a map, and more importantly, they have a champion: the product manager.

The product manager (PM) is the architect of the circuits that makes up YOU. Without that PM, the entire system faces the risk of failure due to being poorly designed, costing too much, running too slow, or being obsolete in the market.

There can only be one product manager in your case—only you can create your plan, be nimble enough to change it, launch it and tell the world your story.

"Great products don't happen by accident. Products have a map, and more importantly, they have a champion: the product manager."

Designing YOU follows an eight-step process. This process isn't new or revolutionary. In fact, almost every product manager follows a similar map to develop the products you use every day. We've just adapted it to design you.

Step 1 — Becoming your product manager walks you through the seven key attributes of a product manager and why you must adopt these to become the champion of your life. A great product manager:

1. Is intentionally curious.
2. Thinks about the whole.
3. Is empathetic.
4. Gets feedback early and often.
5. Relies on evidence, not simply intuition.
6. Is resilient.
7. Is accountable.

Step 2 — Exploring the Current YOU is about reflecting on the you that you are today. It involves exploring your current personality, knowledge and skills. We all live our lives in the bubble that's our home community, family and friends, so a big part of this step is getting out of that comfort zone and being inspired by the world and the people around you. This inspiration is your launching pad for the Whole YOU.

Step 3 — Building your mentor team focuses on the team effort required to design you. We explore the value of your relationships and from this you'll

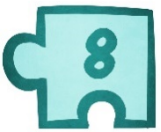
form your **mentor team** of experts who will support and guide you through the *Designing YOU* process.

Step 4 — Defining the future Professional YOU explores career options. First, you'll evaluate what you love to do and what you're good at, then you'll explore how to leverage it to make a living. By the end of Step 4, you'll start to have a vision of the future Professional YOU. **This is the point where *Computing YOU* goes deep into designing your professional mission in the constantly-changing world of computing disciplines.**

Step 5 — Defining the Whole YOU is when you'll discover how your professional mission fits into your Whole YOU. The Whole YOU is about how you define success. You'll think about where you want to live, the people you want to be around, the importance of your bank account and other factors important to you. The alignment of all these factors is the Whole YOU.

Step 6 — Defining your roadmap is possible after you've identified your definition of success in Step 5. The map allows you to implement the Whole YOU. Every decision you make in pursuit of your destination now has a purpose. There are many paths to this destination, some direct, others slower and scenic. We encourage you to take some of the scenic drives and explore. In fact, taking a side route may change your destination and guide you toward a different Whole YOU. This is the value of exploring, adapting and changing.

Step 7 — **Telling your story** recognizes that having the best product that no one has ever heard of or cares about is called "going out of business." Your story is how you'll connect to the audience you care about and how you'll make them care about you. You'll figure out what you can offer the world and develop a strategy to communicate it. Your story must be so compelling that they can't wait to be part of what happens next.



Step 8 — The Whole YOU 2.0 and beyond is about the ever-evolving you. The book *Designing YOU* and the tools you learn within it aren't only useful in your current stage of life. To be always relevant you must constantly update yourself and adjust to new realities. As your mission changes and you decide to try new things and develop new skills, the guidance contained in *Designing YOU* can be there for you.

ABOUT THE AUTHORS

Dr. Faith-Michael Uzoka has taught Computer Science and Information Systems in various universities since 1992. He is a full professor (Computing) and Research Development Officer at Mount Royal University, Calgary; and has served as Adjunct Professor in a number of universities. Michael enjoys research and innovation and has published extensively in the following areas: medical information systems, multi-criteria decision support systems, computing personnel and disciplinary studies, technology adoption and innovation. He is on the editorial board/ program committees several computing journals and conferences. He was a Canadian Commonwealth Scholar and a Carnegie African Diaspora Fellow. Michael can be reached at fuzoka@mtroyal.ca

Dr. Janet Miller is a counselling psychologist with expertise in post-secondary mental health issues and personal development. She celebrates career planning as encompassing all aspects of life, learning and work, and much of her research focuses on career health and student success. In addition to working at Mount Royal University for nearly 20 years (as a Counsellor, Full Professor and past Chair of Student Counselling), Janet is an Adjunct Professor with the University of Calgary, Editor of *Kaleidoscope* (a national newsletter for counselling psychologists) and a Certified Trainer with the Centre for Suicide Prevention (ASIST workshop). For consultations, interviews, or public speaking engagements, Janet can be reached at janet.miller@hotmail.com.

Before becoming a university professor **Dr. David J. Finch** spent almost two decades in product management and marketing roles primarily in the technology sector. After working away in cubicles and on airplanes for some giant companies like Bell Canada and Rogers Communications, David decided it was time to find some answers, so he pursued his PhD in management and became a university professor. It turns out being a university professor is less about finding answers and more about asking better questions. As he started asking those better questions, it struck him that education and product management have a lot in common. Each year, universities and colleges churn out really expensive products called students; some of these products find an audience, but many don't. This led to the question, "What if students started to manage their lives as if they were product managers?" This was the inspiration for the *Designing YOU* series and *Computing YOU* Career Guide. David can be reached at dfinch@mtroyal.ca

NOTES

(In case you want to dig deeper!)

---

[1] For a fascinating TED Talk on the power of being open and empathetic, see Ash Beckham: *We're all hiding something. Let's find the courage to open up.* https://www.ted.com/talks/ash_beckham_we_re_all_hiding_something_let_s_find_the_courage_to_open_up

[2] For further information on the benefits of journaling, see: Slatcher, R. B., & Pennebaker, J. W. (2006). How do I love thee? Let me count the words: the social effects of expressive writing. *Psychological Science*, *17*(8), 660-664.

[3] Refer to the Association of Computing Machinery (ACM) for additional information on each discipline http://www.acm.org/ The ACM and the Institute of Electrical and Electronics Engineers (IEEE) Computer Society (IEEE-CS) are the two-main technical and professional bodies involved in defining standards and content of various computing disciplines. Computing has continuously evolved into a multidisciplinary field, which has left the industry, educational institutions and students confused about the disciplinary differentiations, their career paths, task expectations, and curriculum definitions.

[4] Refer to the Association of Computing Machinery (ACM) for additional information on each discipline http://www.acm.org/ The ACM and the IEEE-CS has jointly identified these five career clusters.

[5] Refer to: Connolly R, Miller J and Uzoka F.M.E (2017). Computing Disciplines: A quick Guide for Prospective Students and Career Advisors. Canadian Educational and Research Institute for Counselling.

[6] For additional reading on transferable skills and their link to employability, refer to Designing YOU – Life Beyond Your Grades by David J Finch and Ray DePaul. Available at www.designyou.org

Refer to Conference Board of Canada Skills 2000+ Report at: http://www.conferenceboard.ca/Libraries/EDUC_PUBLIC/esp2000.sflb

http://www.conferenceboard.ca/Libraries/EDUC_PUBLIC/esp2000.sflb

For more academic reading, refer to:

Finch, D. J., Peacock, M., Levallet, N., & Foster, W. (2016). A dynamic capabilities view of employability: exploring the drivers of competitive advantage for university graduates. *Education+ Training*, 58(1), 61-81.

Finch, D., Nadeau, J., & O'Reilly, N. (2013). The future of marketing education: A practitioner's perspective. Journal of Marketing Education, 35(1), 54-67.

[7] In Step 2 of Designing YOU, we go deep into exploring your personality, emotional intelligence and inventory of your knowledge and skills. If you haven't explored these areas yet, now is a good opportunity to give you a sense of where you stand

[8] Refer to: https://obamawhitehouse.archives.gov/blog/2013/12/11/computer-science-everyone

[9] Refer to: https://globenewswire.com/news-release/2017/03/09/933837/0/en/Artificial-Intelligence-Market-Forecasts-2016-2025-Across-27-Industry-Sectors.html

[10] Computer Science Online – A guide to computer science careers. Accessed August 2017 http://www.computerscienceonline.org/careers/

[11] Refer to: https://www.statista.com/statistics/267181/forecast-of-consumer-internet-traffic-through-e-mail-and-web-usage/

[12] Refer to: https://www.statista.com/statistics/254266/global-big-data-market-forecast/

[13] Refer to: https://www.statista.com/statistics/254266/global-big-data-market-forecast/

[14] Refer to: https://www.ericsson.com/en/press-releases/2016/11/5g-subscriptions-to-reach-half-a-billion-in-2022-ericsson-mobility-report

[15] Refer to: https://www.forbes.com/sites/louiscolumbus/2017/04/29/roundup-of-cloud-computing-forecasts-2017/#3e42a13b31e8

[16] Schulze, H. (2017). Cybersecurity Trends, 2017 Spotlight Report. ISC2,

[17] Refer to: https://www.theglobeandmail.com/report-on-business/careers/career-advice/life-at-work/freelance-work-expanding-to-more-sectors-report-finds/article31519391/

[18] Refer to: https://www.theglobeandmail.com/report-on-business/industry-news/computer science/specialized-freelancers-shaking-up-the-traditional-advertising-business-model/article31777643/

[19] Refer to: https://www.fastcompany.com/3066905/how-the-gig-economy-will-change-in-2017

[20] Refer to: https://techbeacon.com/5-programming-languages-are-fading-fast

[21] For additional information on how men and women's brains are wired differently, see: https://www.theguardian.com/science/2013/dec/02/men-women-brains-wired-differently

For additional resources on gender related issues in the workplace, please see the following:

OECD Report on Closing the Gender Gap in Canada.

Viser Gender Equity Report.

A bestselling book by Sheryl Sandberg: http://leanin.org/

An excellent podcast on gender issues is:
http://www.stuffmomnevertoldyou.com/podcasts/

In addition, it is important to note that issues related to transgender inequality are emerging in the workplace. For additional information, see:

https://othersociologist.com/2014/12/01/transgender-women-inequality-work/

[22] For more information, see Noland, M., & Moran, T. (2016, February). Study: Firms with more women in the c-suite are more profitable. *Harvard Business Review*. https://hbr.org/2016/02/study-firms-with-more-women-in-the-c-suite-are-more-profitable

[23] Refer to data on gender wage gap at:
https://www.glassdoor.com/research/studies/gender-pay-gap/

[24] Melkymuka, Kathleen (8 January 2001). "If Girls Don't Get IT, IT Won't Get Girls", Computer World

[25] Lehman, K.J., Sax, L.J., & Zimmerman, H.B. (2017). Women planning to major in computer science: who are they and what makes them unique? Computer Science Education, 26(4), 277-298.

[26] Moyser, Melissa, Statistics Canada analyst Refer to: http://www.statcan.gc.ca/pub/89-503-x/2015001/article/14694-eng.htm

http://www.cbc.ca/news/business/statistics-canada-gender-pay-gap-1.4014954

[27] Infographic: Yes Sex Matters! Please see: the Organisation for Economic Co-operation and Developmen (OECD) study on Closing the Gender Gap available at: https://www.oecd.org/canada/Closing%20The%20Gender%20Gap%20-%20Canada%20FINAL.pdf Also, please see the *Viser Insights* Gender equity report: https://www.visier.com/lp/visier-insights-gender-equity-report/

Please see, *McKinsey Global Institute* (2015) report - the power of parity: http://www.mckinsey.com/global-themes/employment-and-growth/How-advancing-womens-equality-can-add-12-trillion-to-global-growth

Finnie, Ross (2015). *Barista or Better? New Evidence on the Earnings of Post-Secondary Education Graduat*e. A summary of this study is available at: https://www.thestar.com/news/canada/2016/07/26/higher-education-does-lead-to-higher-incomes-university-of-ottawa-study.html

[28] For more information and resources associated with *Lean In*, refer to https://leanin.org/

[29] McKinsey & Company has an online psychological test you can take to measure whether you have an unconscious gender bias: https://esurveydesigns.com/wix/p46257077.aspx

[30] This section on gender is borrowed from the gender impact of designing you by Leah Hamilton and Laurie Stretch. For more detailed reading on this topic please head to

Designing YOU. At the end of each step, Laurie and Leah provide their insights into the gender issues and how to factor them into your thinking during this step.

[31] All salary ranges are based on 10 years' professional experience and based in Canadian dollars.

[32] This is the national range for Canada. Refer to http://www.payscale.com/

[33] For additional information on evidence-based management, see: https://www.cebma.org/

[34] Step 2 of *Designing YOU* goes deeper into EI, including an assessment. For further information, see: Goleman, D. (2004). What makes a leader? *Harvard Business Review*, *82*(1), 82-91.