

# Your Career And IEEE

## 1. Introduction

**T**he issues faced by the engineers in the present day work environment related to their careers have changed in the 90's more dramatically than previous decades. Numerous publications and web sites are now available as resources for engineers for career planning and management. This article discusses these issues and lists the web sites of interest to the Canadian engineers for use as effective tools to deal with various career issues. The relevant topics from the Proceedings of the 1998 Professional Activities Conference organized by IEEE USA [1] are briefly described in this article for the benefit of the IEEE Canada members.

The upheaval taking place in modern work environment has dramatically changed the traditional methods of career planning and growth. IEEE has been very active in developing effective resource tools to assist the electrical, electronics and computer engineers with the development of leadership, teamwork, networking and other professional skills essential to survive in the present day work place.

## 2. New Paradigms of Work

There is a new paradigm emerging in today's work place for which all employed and self-employed engineers must be prepared. The new paradigm involves the following characteristics of the modern engineer.

- Accepting full responsibility for own career planning and growth.
- Motivation for life long learning.
- Effective oral, written and audio-visual communication skills.
- Integrating knowledge from multiple disciplines to define and formulate most cost-effective solutions to practical problems.
- Using modern technology for engineering analysis and design.

## 3. Work Skills - Technical and Non-technical

Based on the premise that rapid technological advances render engineering skills obsolete in an ever shorter time span, it is important to incorporate strategic planning into an engineer's list of priorities in order to keep the technical skills current. Engineers who fail to keep up with the rapid change in their specialties risk technical obsolescence leading to potential layoffs or career advancement hurdles.

An engineer today has to think like a marketing personnel. He or she is a product or service to the employer. Like a normal market for any product or service, an engineer has to remain competitive in the market place of all other engineers. The engineer has to be ready to innovate new products, services and processes for the market needs. To succeed, the engineer must build on his or her strengths.

Non-technical skills are now as important as technical skills to survive in the work place. Of all the non-technical skills, probably the most important skill is the effective communication. The strategy for effective communication in any situation is defined in the following 7-step communication process.

1. To understand the listener's representation strategy.
2. To utilize the techniques of mirroring, matching, pacing and leading verbal and non-verbal communication cues to place the listener in a receptive mode.
3. To understand the listener's paradigms of reality by probing and asking questions.
4. To transmit the message to the listener so that they may be received according to the listener's representation strategy.

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This article summarizes the career issues faced by electrical, electronics and computer engineers in the present day work environment and discusses the available tools to effectively tackle those issues. IEEE's roles and resources in helping its members to cope with their career growth and challenges are emphasized.

Cet article résume les défis touchant la carrière des ingénieurs électriques, électroniques et informatiques dans l'environnement actuel de leur travail et les outils disponibles pour relever efficacement ces défis.

5. To check if the message is received by the listener as intended.
6. To go back to steps 1, 2 or 3 to set the stage to send the message again if it is not received as intended.
7. To send the next messages using steps 1, 2 or 3 if the message was received as intended.

People skills are the non-technical behaviors we use to promote our technical usefulness. Examples of such skills are communication with peers, subordinates and supervisors, teamwork, negotiating with team members, professional manners, attitude and humor. The seven step communication process is essential for all engineers to understand and practise to survive and thrive in today's work environment.

Teamwork involves working in groups to solve problems. To work effectively in teams we must be willing to listen to and respect the team members' ideas and views. In any teamwork, there is possibility of differences among the members. When involved in a difference of opinion, we should analyze the situation and determine how we can compromise to achieve the overall goal of the team. All engineers need to have some negotiation skills for effective teamwork.

In our professional lives, good manners also are assets to our careers. We need to demonstrate good manners in the business social events. As engineers, we must conduct ourselves in an ethical manner at all times. For example, sexual and racial harassment in the workplace is an ethical and integrity issue. We have to guard ourselves and try to prevent occurrence of any integrity and ethical issues. Good attitude is also an essential element of a successful career. A positive attitude contributes to the success of our career. The skill to use humor in teamwork can also be helpful to an engineer's career. Used appropriately, humor can reduce stress and help the team members relax in a tense situation.

We have to take responsibility to develop the people skills discussed above to ensure our survival in a competitive work environment.

## 4. Career Management

Most professional engineers and scientists go through several career crises. Some experience career stress late in their careers, while others experience in just a few years after graduating. In order to manage your career effectively, you need a career mission statement, goals and a strategic plan. The process for developing a career mission statement, goals and plans consists of four key steps: self-evaluation / identification of principles, values and goals; writing a mission statement with goals; generating a career plan; and finally, taking action.

Self-evaluation consists of taking an inventory of your personal beliefs and principles. You should rank these principles from the most to the least important. Once you have identified and ranked your principles, the next step is to generate a mission statement.

Generation of a mission statement may require several iterations. Factors to consider are your ambitions, balance between personal and work life you wish to attain, the stage of the career you are in, the ultimate position you wish to hold and any obstacles you may have to overcome. Your career plans must include a balance between your personal life and the demands of your job. Total success in life is equal to success in personal life and success in professional life. Another aspect to consider during the generation of your mission statement is where you are in your career.

**Table 1** is a list of typical goals that engineers have in their personal and work lives. These examples should help you identify your own goals. Note, however, that goals change as we move through life; therefore, continual reassessment of these goals is important.

After you have completed your strategic career plan, you come to the hard part, taking action! Once you are committed to your own plan, you have to take actions to implement your career plan.

As you move through various stages of your career, it is imperative for you to take full responsibilities for your own career growth. Given the rise of outsourcing engineering work to consultants and contractors and the increasing mobility of engineers from one employer to another, you have to understand what your customers' expectations are and make sure that you deliver according to their expectations. You have to have a personal strategy to develop skills to achieve your career goals and continually market yourself.

## 5. Consulting Career

The market for technical and management consultants is booming. The incessant downsizing and outsourcing by companies to reduce overhead costs have created a market for consulting and contract work. The rapid pace of technological innovation has created numerous technical "niches". When a company needs an expert in a technology for solution of a particular problem, it will often turn to a consultant.

Developing a consulting career requires critical assessment of your skills, such as, past contributions, networking abilities, marketing and

sales capabilities, personal presentation, people skills and flexibility.

## 6. IEEE Resources

In addition to offering the state-of-the-art technology to the engineers through publications, IEEE is active in offering various resources for career development. IEEE Conference on Professional Activities conducts workshops and seminars covering all aspects of career issues. This and other technical conferences provide a forum for networking among colleagues and experts.

Technical competency is required to expand your network. The larger your network, the more important it is that you maintain the highest level of knowledge in your area of specialization. Another aspect of networking offered by IEEE is through volunteering in various responsibilities to develop teamwork and leadership skills.

## 7. Conclusion

Career plans must include balance between work and personal life. Maintaining balance among family, work, health, social activities and religion is most important for everyone's career success. Total success in life is equal to success in your professional as well as your personal life. Self-directed career development is one of the new present day employment realities. Taking responsibility for one's own career provides options and opportunities. However, without effective tools, most engineers are not equipped to plan and manage their careers.

The tools suggested in this article and the references should pave the way for a successful career for an engineer.

## 8. References

1. "The Balanced Engineer", Essential Ideas for Career Development, 1998 Professional Activities Conference Proceedings, Phoenix, Arizona, September 4-7, 1998.
2. "Engineer's Guide to Lifelong Employability", IEEE Employment Assistance Committee, 1997.
3. "Career Asset Manager", IEEE Educational Activities Board, 1996.

**Table 1: Typical goals for individuals**

Years from graduation	Age	Goals	
		Work/Career	Personal/Family
0-5 years First job	22-30	<ul style="list-style-type: none"> <li>Adjust to work environment</li> <li>Learn company ropes</li> <li>Enhance technical/business skills</li> </ul>	<ul style="list-style-type: none"> <li>Pay off student loans</li> <li>Start financial plans</li> </ul>
5-10 years Early career	30-35	<ul style="list-style-type: none"> <li>Focus on technical or business specialty</li> <li>Develop technical skills</li> <li>Seek out higher levels of responsibility</li> <li>Publish papers</li> <li>Lead projects or Develop products</li> </ul>	<ul style="list-style-type: none"> <li>Get married</li> <li>Purchase home</li> <li>Start family</li> </ul>
10-20 years Mid-career	35-45	<ul style="list-style-type: none"> <li>Make career path decision - technical or business</li> <li>Develop leadership skills</li> <li>Return for MBA</li> <li>Patent inventions</li> </ul>	<ul style="list-style-type: none"> <li>Take family vacations</li> <li>Get involved in children's school &amp; activities</li> </ul>
20-30 years Late career	45-55	<ul style="list-style-type: none"> <li>Continue leadership development</li> <li>Get promotion to higher levels</li> <li>Mentor young engineers</li> <li>Start consulting career</li> </ul>	<ul style="list-style-type: none"> <li>Plan for children's education</li> <li>Plan for retirement</li> </ul>
30-40 years Retirement	55+	<ul style="list-style-type: none"> <li>Increase consulting role</li> <li>Teach classes</li> </ul>	<ul style="list-style-type: none"> <li>Organize children's wedding(s)</li> <li>Plan for retirement activities &amp; hobbies</li> </ul>

## 9. Useful Internet Sites

IEEE	www.ieee.org
Career City	www.careercity.com
Career Magazine	www.careermag.com
Career.com	www.career.com
Careerfile	www.careerfile.com
CareerWeb	www.cweb.com
Career Expo	www.eos.net/careerex
Career Mosaic	www.careermosaic.com
Career Hunters	www.careerhunters.com
Career Bridge	www.careerbridge.com
Career Path	www.careerpath.com
Contractors Direct	www.cdirect.com.au
HeadHunter.Net	www.headhunter.nnet
JobTrak	www.jobtrak.com
ProvenResume.com	www.provenresumes.com
HotJobs	www.hotjobs.com
E-span	www.espan.com
Monster Board	www.monster.com
On-line Career Centre	www.occ.com
HiTechCareer Centre	www.hitechcareer.com
Virtual Job Fair	www.vjf.com
Globecareers	www.globecareers.com
Exec_U_Net	www.execunet1.com
RetireWeb	www.retireweb.com
Toronto High Tech Career Fair	www.1-Jobs.com
Industry Canada Online	www.strategis.ic.gc.ca
Human Resources Dev. Canada	www.hrdc-drhc.gc.ca

## About the author

**Dr. Haran Karmaker** is a senior member of IEEE and a registered Professional Engineer in the Province of Ontario. He received his B.Sc. Engg. degree in Electrical Engineering from Bangladesh University of Engineering and Technology, Dhaka in 1967 and M.A.Sc., Ph.D. degrees from the University of Toronto, Canada in 1971 and 1974, respectively.



Dr. Karmaker joined the Engineering Laboratory of General Electric Canada, Peterborough, Ontario as a Research Engineer in 1975, where he is now Leader of the Electromagnetics Team. His research activities include simulation and modeling of large rotating electrical machines and power electronic drives, numerical and analytical computation of electromagnetic fields and experimental studies for machine parameters, fields and losses. He has published over 30 technical papers in IEEE and international journals.

Dr. Karmaker is a member of the IEEE Working Group on Synchronous Machines Modeling and Testing of Power Engineering Society, IEC Committee on Magnetic Steels and NEMA Electrical Rotating Machinery Committee.

## A Tribute to Dr. John (Jack) A. Hopps

We regret to report the passing of Dr. John (Jack) A. Hopps who is clearly the Father of Biomedical Engineering in Canada and a scientist whose work improved the lives of millions of people around the world. He was a leader in the medical application of engineering science for almost half a century and left an impressive legacy of devices and instruments that helped people with many types of disabilities. His early research was highlighted by the invention of the world's first cardiac pacemaker, which he developed in collaboration with Drs. W.G. Bigelow and J.C. Calahan, at the Banting Institute, in Toronto.

Jack's contribution to the pacemaker alone would make him an important figure in human history, but his achievement was, in fact, merely an illustration of his impact on the field of biomedical engineering. Throughout much of his career he was head of the Medical Engineering Section of the Division of Electrical Engineering at the National Research Council (NRC) of Canada, which Hopps joined shortly after his graduation from the University of Manitoba in 1941. Under his leadership, this group produced a variety of inventions to help the blind, to assist people with muscular disabilities, and to advance the diagnostic uses of ultrasound. He and his colleagues also developed technologies that built upon his early cardiovascular research.

Dr. Hopps was also a national and international leader in the development of biomedical engineering as a profession. He was the Founder and first President of the Canadian Medical and Biological Engineering Society in 1965 and President of the International Federation for Medical and Biological Engineering in 1971. He served as the Secretary General of the International Federation from 1976 to 1985 and General Chairman of the International Conference on Medical and Biological Engineering in 1976. From 1985 to 1988, Dr. Hopps was Secretary General of the prestigious International Union for Physi-

cal and Engineering Science in Medicine.

His numerous awards and honours include his appointment as an Officer in the Order of Canada; Merit Award of the International Union for Physical and Engineering Science in Medicine; Leadership Award of the Alliance for Engineering in Medicine and Biology; The IEEE General A.G.L. McNaughton Award, and Distinguished Scientist Award of the North American Society for Pacing and Electrophysiology. In addition to the above, in 1976, the University of Manitoba conferred a D.Sc. to Jack for the development of the pacemaker and professional leadership in the field of biomedical engineering, and he was both a Fellow of the Canadian Medical and Biological Engineering Society and a Honorary Life Member of the International Federation for Medical and Biological Engineering.

After retiring in 1979, Jack continued to write on biomedical engineering while working with school children and serving his community in various capacities including a term as President of the Ontario Heart Foundation (Ottawa Chapter).

In 1984, Jack Hopps became a recipient of his own invention, a life-saving and essential element in modern medicine that has come to be considered routine surgery. The tiny device lasted thirteen years and was replaced in 1997, when the first battery showed signs of weakness. Jack Hopps passed away on November 24, 1998.

Jack was predeceased by his wife, Eleanor, and leaves behind a daughter, Margaret, two sons, Donald and John, six grandchildren, and a great grandson.

He will be sadly missed by his family and his colleagues.

by: Bryan Finlay



*Pulse-by-pulse and beat-by-beat  
He paced a failing heart to beat  
Another pulse, another beat  
Another living day.*