

KNOW THE CAREER WORLD

INFORMATION AND TECHNOLOGY CAREERS

By Dr Charles Mugaviri

© Copyright 2016 – Charles Mugaviri

ISBN: 978-0-7974 -7100-9

A LASOF Careers Institute Publication

KNOW THE CAREER WORLD
Information and Technology Careers

By Dr Charles Mugaviri

All rights reserved under International Copyright Law. This book may not be copied or be reprinted for commercial gain or profit. The use of short quotations or occasional page copying for personal or group study is permitted and encouraged. Permission will be meaningfully granted upon request.

Printed in Zimbabwe

A product of

LASOF Careers Institute Publications

Agriculture House

1 Adylin Road, Marlborough

Harare, Zimbabwe

Tel: +263 – 4- (0) 864 414 6968, (0) 864 414 6969

Purposeful Career Planning

www.lasofcareersinstitute.com

DEDICATION

I dedicate this book to the millions of teenagers in and from the African continent. May your lives be consumed by a deep desire to build leadership legacies that will unlock Africa's potential and greatness. Africa is too rich to be poor. You were born for a purpose. You were born to leave Africa a better continent than you found it. Don't disappoint and don't settle for less.

Acknowledgements

No task of this magnitude can ever be achieved without divine wisdom and knowledge. I would like to first and foremost acknowledge the LORD Almighty for granting me the love to inspire and empower my generation.

Writing is time consuming and requires a lot of support from the family. My life has been blessed with a loving wife and supportive purpose partner Shingie. For close to the three decades that I have known her, she has supported me through thick and thin, highs and lows and has been the most loving and inspirational person I have known in my life time. I would like to also acknowledge the unflinching encouragement I have received from my loving and dear children Tinashe Charles Jr, Tendaishe and Takundanashe. My wider family and friends have been great and deserve special mention.

I would like to also acknowledge the inspiration and motivation that I have received over the years from the legacy building individuals that I have worked with in the Church community, at the University of Zimbabwe and at LASOF Leadership Institute. Our journey together of inspiring and empowering thousands of learners to make purposeful career choices and become character based leaders ignited the desire and vision for this career guidance series.

Each learner, parent, school, company, government department, Church or NGO who came through our career and leadership programs in Zimbabwe and the wider African region has inspired us to continue the journey and they deserve special acknowledgement. You each made me believe this was a worthwhile cause.

Special acknowledgement goes to the Joshua Nkomo Scholarship Fund. The opportunity you granted us to develop the career and leadership capacity of your scholarship beneficiaries (the Joshualites) over the last ten years has been truly a mutually enriching experience which went a long way in inspiring me to write these books.

Introduction

The career world is diverse and dynamic. Before you make a career choice, it is important that you have an appreciation of the width and depth of the career world in terms of options that are available.

A career is a chosen pursuit, a profession or occupation requiring special training, followed as one's lifework. It is a path or course one chooses to follow to earn a living. It is the progression of one's working life or one's professional achievements, for instance a soldier or a teacher. A career is a course of successive situations that make up a person's occupation. A career is therefore doing what one does as a permanent occupation.

The term career is derived from the Latin word *carrera*, which means race. The verb was first attested in 1594 from the notion of a horse "passing a career" on the jousting field. A career is usually considered to pertain to remunerative work and formal education. One can have a sporting career or a musical career without being a professional athlete or musician, but most frequently "career" in the 20th century referenced the series of jobs or positions by which one earned one's money.

Career Cluster is a broad group of related career majors within an occupational interest area. They represent groupings of occupations and industries based on shared traits. There are sixteen (16) career clusters that cover all occupations.

This book focuses on the Agriculture, Food and Natural Resources career cluster.

Perspectives on career planning

One of the most important choices you have to make in your life time is selecting a career. This choice has far reaching implications and it has to be an informed choice. The quality of information you have determines the quality of decisions you make. This book is a tool designed to empower you to make an informed career choice that you won't regret in the future. In this introduction, we are going to share some perspectives that you need to take into account as you make use of this book.

Purpose perspective to career planning

Take a moment and think of the best footballer in your nation. Think also about your favourite local musician. Can you imagine the two of them switching places? How do you think the footballer would perform on the music stage and the musician in the football field?

We were all created and designed to fulfil a specific purpose in life. None of us was created to do everything. You have a life purpose that will bring out your best. That purpose is your life assignment. You need to choose a career that is aligned to that assignment. In fact your career should be an expression of that assignment. The platforms for expressing your purpose may vary from one season to another but the assignment itself does not change. Its expressions may also change but your purpose will remain a constant factor in life.

Many professionals today are not fulfilled and satisfied with their careers mainly because of a lack of purpose perspective in the manner they selected their careers. Your career should be an expression of who you are and it must be an opportunity for you to utilize your gifts, talents, passions and other latent abilities. This is why you must first know yourself well before you make your career choice. This question of self-knowledge is fully addressed in the book “Know Yourself: A Foundation for Career and Character Development” which is the first book in the Career Education series.

Dynamic perspective to career planning

You also need to appreciate the career world is so dynamic and ever changing. Did you know for example, that the top ten jobs in the world in 2010 did not exist in 2004? You need to be aware that some of the jobs that are on demand today may not be relevant in the future. Can you imagine what is happening to someone who invested all their time in developing a career that has to do with manufacturing or repairing manual type writers?

The dynamism of the career world means you need to be prepared to continuously develop new knowledge and skills that are relevant to the ever changing career world. Multi skilling is also important as you will have to adapt to the changing socio economic and political environment.

Please note the career listing in this book is not exhaustive. There are other careers that are not mentioned in this book under this career cluster. The ones listed here are only samples.

Local perspective to career planning

When making a career choice, invest effort in developing an understanding of the economic environment in your country as it has a direct bearing on the labour markets. You don't want to spend years developing knowledge and skills in an area where there are limited or no employment prospects. You need to have some insights in terms of employment trends in your local job market.

For example, a country like Zimbabwe did not have diamond mining until a few years ago. Today, however, diamond mining is redefining the economic terrain in ways that have far reaching implications in terms of new career opportunities. Diamond cutting, for example, is a new career pathway that had never been explored before but that is becoming a major area of

employment opportunity as Zimbabwe has the fourth largest diamond deposits in the world. We have other examples of countries in countries that have discovered oil deposits like Ghana. Such developments have far reaching economic implications that are reflected in new career opportunities.

Global perspective to career planning

We encourage all learning to also develop knowledge and an appreciation of regional and global economic and employment trends. There is a lot of migration of skills across nations and continents. Developments in other parts of the world will have some bearing on developments in your nation as well. It is wise to have a global perspective even when you are deciding to pursue your career locally.

In this book, we have looked at the Career world from both an African and global perspective. There will be many careers you may see that you have not heard about before. Some of them may be in your country but you have not been aware of it. Other listed careers may not be found in your country. This broad view should help you to appreciate local, regional and global trends in terms of the career world.

Entrepreneurial perspective to career planning

The rate of unemployment has been growing across the nations of Africa and the world. There is need to rethink the traditional approach to career planning and employment. It is important to observe that in most African nations the informal or Small to Medium Enterprises (SMEs) sector is growing rapidly. Many people are creating jobs for themselves and others instead of seeking and waiting for non-existent employment opportunities.

As you plan your career, you need an entrepreneurial perspective where you see yourself as a prospective employer not just an employee.

Contents

Dedication	i
Acknowledgements	ii
The career and character development series	iii
Foreword	iv
Career 1: Armature Winders	12
Career 2: Call Centre Agents Also Known As Call Centre Operators	14
Career 3: Compositors or Phototypesetters	17
Career 4: A Computer-Aided Drafting or Design Technician	19
Career 5: Computer & Information Systems Manager or CIS Manager	21
Career 6: Data Administrator	24
Career 7: Computer Hardware Engineers	26
Career 8: Computer Operations Manager And Projector Manager	29
Career 9: Computer Operators	31
Career 10: Computer Programmers	33
Career 11: Computer Scientist	36
Career 12: Computer Security Specialist	39
Career 13: Computer Software Engineer	41
Career 14: Computer Support Specialist	43
Career 15: Computer Systems Analysts	46
Career 16: Computer Technicians	50
Career 17: Computer Terminal Operators	53
Career 18: Network Administrator	54
Career 19: Network Systems and Data Communications Analyst	57

Career 20: Phone Shop Operator	59
Career 21: Satellite System Technician	61
Career 22: Systems Engineer	63
Career 23: Telecommunications Engineer	65
Career 24: Telecommunications Lines worker	67
Career 25: Telecommunication Technician	69
Career 26: Telemarketer or Call Centre Agent	71
Career 27: Web Designer	74
Career 28: Webmaster	77

Information and Technology Career Pathways and Sample Careers

Focus: Building Linkages in IT Occupations Framework: For Entry Level, Technical, and Professional Careers Related to the Design, Development, Support and Management of Hardware, Software, Multimedia, and Systems Integration Services.

Cluster Summary: Careers in the Information Technology cluster are usually very technical. People in these occupations work with computers and a lot of information. They may work in almost any business where computers are used. They may develop or design computer programs and hardware. You can be a web master, programmer or database administrator and be in this career cluster.

Career Pathways	Sample Careers
Network Systems	Network Design & Administration: Communications Analyst ●Data Communications Analyst ●Information Systems Administrator ●Information Systems Operator ●Information Technology Engineer ●Network Consulting Engineer ●Network Pre-Sales Engineer ●Network: Administrator, Analyst, Architect, Engineer, Manager ●Operations Analyst ●Security Analyst ●Specialist ●Technician ●Transport Administrator ●PC Support Specialist ●Systems: Administrator, Engineer, Support Lead ●Technical Support Specialist ●User Support Specialist ●Telecommunications Network Technician
Information Support and Services	Database Development and Administration: ●Data: Administrator, Analyst, Architect ●Management Associate ●Modeler ●Modeling Specialist ●Database: Administration Associate, Administrator, Analyst, Developer, Manager, Modeler, Security Expert, DSS (Decision Support Services), Knowledge Architect ●Senior: Database Administrator, Systems Analyst ●Systems: Administrator, Analyst Tester ●Technical

	<p>Writer: Desktop Publisher, Document Specialist, Documentation Specialist Editor, Electronic Publications Specialist, Publisher</p> <ul style="list-style-type: none"> ●Instructional Designer ●Online Publisher Technical Communicator ●Editor ●Publications Manager ●Writer ●Technical Support: Analyst, Call Centre Support Representative, Content Manager ●Customer: Liaison, Service Representative, Service Professional ●Help Desk Specialist ●Technician ●Maintenance Technician ●PC Support Specialist ●PC Systems Coordinator ●Product Support Engineer ●Sales Support ●Technician ●Technical: Account Manager, Support Engineer, Support Representative, Testing Engineer ●Enterprise Systems Analysis and Integration: Application Integrator, Business Continuity Analyst, Cross-Enterprise Integrator ●Data: Systems Designer, Systems Manager, Warehouse Designer ●E-Business Specialist ●Electronic Transactions Implementer ●Information Systems: Architect, Planner ●Systems: Analyst, Architect, Integrator
<p>Web and Digital Communications</p>	<ul style="list-style-type: none"> ●Digital Media: 2D/3D Artist, Animator, Audio/Video Engineer, Designer, Media Specialist, Media or Instructional Designer ●Multimedia: Author, Authoring Specialist, Developer, Specialist, Producer, Production Assistant, Programmer, Streaming Media Specialist, Virtual Reality Specialist ●Web: Designer, Producer, Specialist ●Web Development and Administration: Web: Administrator, Architect, Designer, Page Developer, Producer, Site Developer, Specialist, Webmaster, Web Developer, Social Networking Specialist, Blog Developer, Search Engine Marketing Specialist, Search Engine Optimization Specialist
<p>Programming and Software Development</p>	<ul style="list-style-type: none"> ●Programming / Software Engineer ●Applications: Analyst, Engineer ●Business Analyst ●Computer Engineer ●Data Modeler ●Operating System: Designer or Engineer, Programmer Analyst ●Program Manager, ●Programmer ●Programmer/Analyst ●Project Lead ●Software Applications: Specialist, Architect, Design Engineer, Development Engineer, Engineer, Quality Assurance Specialist, Tester ●Systems: Analyst, Administrator, Test Engineer, Tester

Career 1: Armature Winders

Armature Winders locate and repair or replace the broken parts of electric motors, or where the coils are burnt out or damaged, and repair or replace them, or completely rewind all the coils.

Wire coils constitute one of the most important parts of any electrical machine. Armature winders use various kinds of testing instruments to locate damaged coils. Once found, a decision has to be made whether to repair the damaged coil or to completely rewind the machine.

When the machine is dismantled, it is cleaned to remove all dirt, since even a speck of metal can cause short-circuiting in a coil. Armature winders work from diagrams that give details of the arrangement of coils, the number of turns required for each, etc. Sometimes they have to draw the diagrams themselves. Every coil is thoroughly checked and recorded in detail.

To wind coils with the correct number of turns and shape, coil-winding machines are used. The coils are then checked and fitted into the slots of motors and generators connecting them according to specified circuit requirements. The motor is finally assembled, ensuring that the insulation around the wires is not damaged. The motor or generators are then ready for use again.

Armature winders work at benches usually in well-lit workshops. Working conditions have to be kept very clean. The work can be rather monotonous when coils must be rewound, since the process must be watched the whole time. This can lead to eyestrain.

Some fulfilling and satisfying aspects of this career

- getting motors and generators working again
- working with your hands
- working in a clean environment

Some demanding and challenging aspects of this career

- monotony
- making mistakes cause delays and waste money
- possible eyestrain

Purpose Orientation

An armature winder should:

- have mechanical and practical aptitude
- have some mathematical ability
- have ability to think logically
- have neat, methodical work habits

- have good concentration
- have manual dexterity and mental alertness
- have good health, vision and colour discrimination

School Subjects

Ordinary Level Certificate but employers prefer higher educational qualifications.

Compulsory Subjects: None

Recommended Subjects: Mathematics

Training

Apprenticeship training.

Employer

- Steel and engineering companies
- The electricity supply industry
- Motor vehicle manufacturers
- Motor vehicle repair companies and garages
- Independent armature winding shops

Career 2: Call Centre Agents Also Known As Call Centre Operators

Call centre agents also known as call centre operators respond to questions and inquiries, about products or services and handle and resolve complaints. Call centre agents are a first point of contact between the company and the customer. As such they serve an important public relations role i.e. of representing the company to the customer. Customers may be individual consumers or other companies.

Call centre agents communicate with customers through a variety of means—by telephone; by e-mail, fax, or regular mail correspondence; or in person. Some customer service representatives handle general questions and complaints, whereas others specialize according to the product or service. The service needs of customers vary from one request to another and should be treated accordingly.

Most call centre operators deal with routine questions and requests for customers. For instance, a cell phone company may have call centre agents answering routine questions about balance enquiries, and new products or services and general complaints about service. In handling customers' complaints, agents attempt to resolve the problem according to guidelines established by the company. These procedures may include asking questions to determine the validity of a complaint, offering possible solutions, or providing a customer with refunds and exchanges.

In some cases, customer service representatives are required to conduct follow up with an individual customer. For instance, questions from customers may require additional research or further explanation on the part of the customer service representative.

An additional function of most call centre agents is to make changes or to update a customer profile or account information. Call centre agents have access to records of transactions and update and maintain databases of information. Account information can be pulled up on a computer screen while the agent is dealing with the customer. The advantage of this is that the agent can answer specific questions relating to the account and deal with these queries immediately. Customer service agents have often provide standard answers to deal with common customer questions or queries. They also have guidelines for dealing with complaints.

Most customer service agents use computers and telephones extensively in their work. Customer service agents frequently enter information into a computer as they are speaking to customers. In the event that they encounter a question or situation to which they do not know how to respond, agents consult with a supervisor to determine the best course of action.

Call centre agents communicate with customers using telephone, e-mail, fax, or mail

correspondence. Customer service representatives use multi-line telephones systems, which often route calls directly to the most appropriate representative. Call centre agents work in an automated office environment. Most operators have their own workstation or cubicle space equipped with a telephone, headset, and computer.

Some fulfilling and satisfying aspects of this career

- good employment opportunities
- good pay
- pleasant working environment

Some demanding and challenging aspects of this career

- call centres may be crowded and noisy
- work may be repetitious and stressful
- long periods spent sitting, typing, or looking at a computer screen may cause eye and muscle strain, backaches, headaches, and repetitive motion injuries
- some call centres operate 24 hours a day, seven days a week. Shift work is common - weekend or holiday work also may be necessary

Purpose Orientation

Customer service agents play a critical role in providing an interface between customer and company, and for this reason employers seek out people who come across in a friendly and professional manner. The ability to deal patiently with problems and complaints and to remain courteous when faced with difficult or angry people is very important. The ability to speak a foreign language is an advantage.

In addition a call centre agent needs to have the following requirements:

- a pleasant telephone voice that conveys sincerity and confidence
- commitment to providing good customer service
- good written and oral communication skills
- organisation and multi-tasking skills
- the ability to work independently or as part of a team
- the ability to remain interested and focused when repeating information
- the ability to think quickly and respond to complaints smoothly and tactfully.

School Subjects

Ordinary Level Certificate is a standard requirement

It may be an advantage to have a degree or diploma, however an Ordinary Level Certificate is a requirement to complete a learnership programme.

In-service training

Compulsory Subjects: None

Recommended Subjects: Information Technology, Languages, Computer Applications

Training

Although some positions may require previous industry, office, or customer service experience, many customer service jobs are entry level. Customer service jobs are often good introductory positions into a company or an industry. In some cases, experienced workers can move up within the company into supervisory or managerial positions or they may move into areas such as product development, in which they can use their knowledge to improve products and services.

Because of a constant need to update skills and knowledge, most customer service agents continue to receive instruction and training throughout their career. This is particularly true of workers in industries such as banking, in which regulations and products are continually changing.

Employer

Customer service jobs are often good introductory positions into a company or an industry. Call centre agents are employed by:

- insurance companies
- telephone companies
- power, water and gas utility companies and contractors
- retail establishments
- wholesale establishments such as mail-order and Internet-based companies

Career 3: Compositors or Phototypesetters

Compositors or phototypesetters operate and tend machines that provide typeset matter. Typeset matter is used to prepare printing plates for the pressroom worker who prints newspapers, magazines and various other publications.

Compositors read from copy clipped to typesetting machines and operate a keyboard. There are two kinds of compositors:

Linotype compositors: assemble letters into lines of words, called slugs.

Monotype compositors: feed perforated tape into machines that read and select metal moulds for each letter.

Phototypesetters type text and produces a magnetic or perforated tape. The tape is fed into a computer that hyphenates, creates columns, and makes a second tape, which is photographed.

Some fulfilling and satisfying aspects of this career

- satisfaction of seeing the job completed
- reading interesting articles while working

Some demanding and challenging aspects of this career

- working shifts
- lack of variety in work activities

Purpose Orientation

- manual dexterity
- good eye-hand coordination
- good eyesight
- healthy

School Subjects

Ordinary Level Certificate for a learnership at a company.

Compulsory Subjects: Mathematics, English

Recommended Subjects: Languages

Training

Apprenticeship

Employer

- newspaper plants
- commercial printing companies
- book and magazine publishers
- government departments
- banks and insurance companies
- advertising agencies
- firms that do their own printing

Career 4: A Computer-Aided Drafting or Design Technician

A computer-aided drafting or design technician creates detailed design drawings using computer-aided drafting (CAD) software. The drawings are high resolution (the degree of detail visible in an image or photograph), easy to correct, and can be shifted or rotated to any perspective. Parts of the drawing can be shown in 3D and they can be annotated. CAD software is used to enable the technician to visualise the structure and function of an item, as well as indicating what colour and texture are to be used to fill in the shape.

Every physical structure or object created in recent years - from hand-blenders to skyscrapers - has a set of design or drafting diagrams applicable to it. Structures are carefully designed by a team of engineers assisted by computer aided drafting (CAD) technicians. CAD technicians support the work of engineers and architects by developing and preparing the engineering designs and technical drawings used to build everything from mechanical products to structures.

CAD technicians operate computer-aided design systems and peripheral equipment to draft and modify drawings which vary from rough or detailed sketches or notes to specified dimensions for manufacturing, construction, engineering, or other purposes. They utilise knowledge of various CAD programs, machines, engineering practices, mathematics, building materials and other physical sciences to complete drawings.

Using industry standards and regulations, they make calculations and prepare design drawings using preliminary concepts, sketches, calculations, specifications and other data. Their drawings indicate the details of products and structures, specify materials to be used and procedures to be followed. CAD technicians may also prepare a technical report to accompany the CAD drawings.

CAD technicians use a number of sources and aids to assist them in their drafting and design work, such as data tables, calculators and computers. They are also involved in related activities such as estimating, contract administration as well as specification preparation and interpretation. Traditionally, this type of job involved hand drawing blueprints and designs, but with advances in technology, nearly all design now takes place on CAD systems.

CAD technicians can specialize in specific fields of design, such as mechanical engineering, architecture, electronics, or automotive, or even fashion design.

Some fulfilling and satisfying aspects of this career

- interesting and varied work
- opportunity to enhance a natural technical skill
- satisfaction of seeing your work appear in publications, or produced as a finished product

Some demanding and challenging aspects of this career

- long hours
- pressurised environment
- having to sit in the same position for long periods

- eye strain from all the detailed computer work
- constant need to update skills, with advances in technology

Purpose Orientation

- pay attention to detail
- able to maintain good hand-eye coordination when designing projects
- have the ability to visualise three-dimensional objects from two-dimensional drawings
- able to work well under pressure
- excellent computer / technology skills

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Physical Sciences, Information Technology, Computer Applications.
Art

Training

Completion of a one- or two-year college programme in CAD engineering technology is usually required for computer aided drafting technicians.

With further education, CAD operators may go on to become technologists, engineers or architects.

Employer

- consulting and construction companies
- utility, resource and manufacturing companies
- private machine design firms
- architectural and engineering consulting firms
- electronics manufacturing companies
- petrochemical, food processing and energy industries
- automotive manufacturers
- fashion houses

Career 5: Computer & Information Systems Manager or CIS Manager

Computer and information systems manager or CIS manager is the title given to a person in charge of the overall computer operations of a company. This person, also known as the information systems manager or IT manager may also be a director responsible for planning, coordinating and directing all computer-related activities of firms.

Computer and information systems managers play a vital role in the technological direction of their organisations. They do everything from constructing the business plan to overseeing network security to directing internet operations. How and when organisations use technology are critical to remaining competitive.

Computer and information systems managers help determine both technical and business goals in consultation with top management and make detailed plans for the accomplishment of these goals. For example, working with their staff, they may develop the overall concepts and requirements of a new product or service, or may identify how an organisation's computing capabilities can effectively aid project management.

These managers plan and coordinate activities such as installation and upgrading of hardware and software, programming and systems design, development of computer networks, and implementation of Internet and intranet sites. They are increasingly involved with the upkeep, maintenance, and security of networks. They analyze the computer and information needs of their organisations from an operational and strategic perspective and determine immediate and long-range personnel and equipment requirements. They assign and review the work of their subordinates and stay abreast of the latest technology to ensure the organisation does not lag behind competitors.

According to the Occupational Outlook Handbook (www.bls.co.za), computer and information systems managers are often called by different titles depending on their duties and the nature of the organisation. For instance:

Chief technology officers evaluate the newest technologies and determine how these can help their organisations to become more competitive. As such chief technology officers are constantly on the lookout for trends and developments that could benefit their organisations. Chief technology officers set the technical standards and look to continually upgrade and adapt where necessary.

Management information systems directors (MIS) are often used in firms which have a variety of user services such as, call-centre operations where employees and customers can call with questions or problems. MIS directors or managers make hardware and software upgrade recommendations and ensure that data is secure and available at all times.

Project managers as the name suggests, tend to work on a project-by-project basis. Project managers are often brought in when there is a new rollout of systems, products or processes that need direct and specialised oversight. They coordinate projects from development of the project

through to implementation, working with teams of people directly involved in the delivery of the project. Teams almost always consist of computer programmers who write programs or integrate the required system components.

LAN/WAN (local area network/wide area network) managers provide a variety of services, from design to administration of the local area network, which connects staff within an organisation. These managers direct the network and its computing environment, including hardware, systems software, applications software, and all other computer-related configurations.

Information systems consultants offer their services to wide range of companies. They play a similar role to the CIS manager in that they develop and manage information systems. However, as a consultant they often come with pre-developed computer/business solutions which can be adapted and integrated into the clients systems. Where appropriate, consultants assess the fit of available applications and adapt existing software for particular uses.

In some situations, they may be involved in the design or restructuring of business processes supported by information systems. To keep up to date with new developments in the computer industry, information system consultants must spend a considerable amount of time reading and attending seminars and conferences.

Some fulfilling and satisfying aspects of this career

- variety of work
- intellectual challenge
- problem-solving
- creative thinking
- dealing with people
- good remuneration

Some demanding and challenging aspects of this career

- having to work long hours on occasion
- stressful when projects are behind schedule
- difficulty in keeping abreast in the field
- mental fatigue due to complexity and pressures of the job

Purpose Orientation

- the ability to think logically and analytically
- the ability to pay close attention to detail
- the flexibility and adaptability required to manage change effectively
- the ability to work independently, in teams and as group facilitators
- excellent oral and written communication skills including the ability to express ideas and solutions in clear, understandable language and to deliver presentations to groups
- the interpersonal skills required to maintain good working relationships with clients and vendors.
- enjoy analysing business problems and finding innovative solutions
- enjoy taking responsibility for projects that require planning, decision-making and co-ordinating the work of others.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course
Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Information Technology, Computer Applications

Training

Because CIS managers are called on to make important business they need considerable experience in both computer information systems and management. The requirements for employment are often experience with the specific software or technology used on the job, as well as a background in either consulting or business management.

Information systems consultants need a combination of technical expertise and business-related training or experience. A four year university degree in computer science is a good starting point.

However, few consultants are hired directly out of university unless they have previous business experience. Most computer science graduates must first gain experience in computer programming, and acquire education or experience related to business administration or management. Information systems consultants must continuously upgrade their knowledge to keep up with changing methods and technologies.

Employer

- the information technology industry
- large computer companies
- large business and industrial organizations
- government departments
- provincial administrations
- computer bureaus
- any company or business using computer systems and networks
- self-employment, on a consultancy basis.

Career 6: Data Administrator

Data administrators ensure that large amounts of information are efficiently and effectively managed stored in computer databases. Data administrators ensure that information is easy to access and can be managed effectively in order to save time and money for the company.

For example, an organisation may have an electronic record of all of their customer data such as name, address, phone number, credit card number, and buying history. This information needs to be managed for a variety of purposes, for example, to send out invoices or catalogues, or log purchases and incentive program points. Such processes require special software (database management systems). Data administrators are responsible for the day-to-day operation of database management systems and for long range planning regarding system design and operation.

Specific duties and responsibilities vary depending on the size and type of employer. In very large organisations, data administrators may have specialised responsibilities and work in teams. In other organisations, one data administrator may be responsible for all aspects of data administration.

However, in general, data administrators:

- develop and implement data administration policies (which describe the types of information collected, who has access to data, etc.), technical standards (which ensure data security, integrity and validity) and data models (which describe data elements and how they are used)
- consult managers in the organisation to determine and document data requirements, data collection and administration policy, and data access rules
- advise others in the organisation about the collection of data and its suitability for various uses.

Data administrators also may:

- develop and administer policies and procedures for accessing and using networks, backing up data and recovering lost data;
- supervise the work of database analysts who design and maintain database management systems.

Some fulfilling and satisfying aspects of this career

- seeing improvements in efficiency and costs through your efforts over a period of time;
- the challenge of the working with large amounts of information;
- solving problems daily
- working in a field that is constantly changing and advancing

Some demanding aspects of this career

- having to work long hours to solve problems

- working under pressure
- the frustration of not being able to solve a programming problem
- the fact that the work can be very fatiguing
- having to work irregular hours on occasion

Purpose Orientation

Data administrators need the following characteristics:

- the ability to learn quickly, think logically and understand abstract relationships
- excellent communication and interpersonal skills
- good stress management skills
- an interest in policy development and planning
- an interest in keeping up with ever-changing technology.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Information Technology, Computer Applications

Training

Data administration is not an entry level position. Employers generally prefer to hire applicants who have several years of related experience. Prospective data administrators are strongly advised to talk to potential employers about required and preferred qualifications before enrolling in an education or training program.

Data administrators must continuously upgrade their knowledge because systems and security threats are constantly changing.

Employer

Most data administrators are employed in the head offices of large organisations in: Some data administrators are employed by information technology consulting firms. Experienced data administrators who have post-secondary education in business administration or management may advance to senior management positions or establish their own consulting firms.

- Government departments
- Computer manufacturers
- Research organisations
- Commerce and industry
- Insurance companies
- Educational institutions and libraries
- Transport enterprises
- Mining companies
- A skilled and entrepreneurial computer programmer can start his or her own business.

Career 7: Computer Hardware Engineers

Computer hardware engineers design, develop, implement, evaluate and maintain computer systems, and equipment that forms part of that system. In addition to design and development, computer hardware engineers may supervise the manufacturing and installation of all computer-related equipment. This is basically an Electronics Engineering degree with more computer courses.

Computer hardware engineers were, and sometimes are still, called computer systems engineers. However, computer systems engineers need to know about both hardware and software engineering.

The term hardware refers to all physical aspects of the computer, such as central processing units (CPU's) computer chips, microprocessors, custom integrated circuits, and peripherals such as printers, disc drives scanners, keyboards, modems and related equipment. In some cases, they develop special purpose "embedded" products that use computer technology, for example, embedded computers are used in applications ranging from refrigeration equipment to car engines and aeroplanes.

Computer hardware engineering is a specialized field very closely linked to the field of electronics engineering. In South Africa most computer hardware engineers study electronics at university or a university of technology, with specialization subjects in computers and computer-related equipment.

The rapid integration of mechanical and electronic systems means that all fields of engineering require some aspects of computer hardware knowledge. Computer hardware engineers are also required to have a strong all-round computer knowledge including some knowledge of support logic and programming.

The rapid advances in computer technology are largely as a result of the research, development and design efforts of computer hardware engineers.

Consulting opportunities for computer hardware engineers tend to grow as businesses need help managing, upgrading and customizing increasingly complex systems. Growth in embedded systems, a technology that uses computers to control other devices such as appliances or cell phones, will also increase the demand for computer hardware engineers.

Many computer hardware engineers are employed in computer and data processing services and in office equipment manufacturing firms, but many are also employed in communications industries and engineering consulting firms.

Some fulfilling and satisfying aspects of this career

- work variety
- intellectual challenge

- problem solving
- creative thinking
- good salaries

Some demanding and challenging aspects of this career

- working long hours can be stressful and tiring
- the long period of preparation and study required to register as a professional engineer
- having to continue your education throughout your career to keep up with the latest technological advances and developments in your field

Purpose Orientation

- excellent oral and written communication skills
- inquiring and inventive mind
- good decision-making and problem-solving skills
- aptitude for Mathematics and Science
- ability to teach others
- good time management skills
- innovative and technical skills
- able to work both with others and on your own
- enjoy detailed work that requires precision
- able to manage and organize projects
- keenness to learn, combined with logical reasoning

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory subjects: Mathematics, Physical Sciences

Recommended subjects: Information Technology, Computer Applications

Training

Degree: BEng Computer Engineering or Electronic Engineering

Computer hardware engineers must have a 4-year degree in computer engineering or a related discipline such as electrical engineering. Some employers hire only computer hardware engineers who have a Master of Science (MSc) degree in electronic / electrical engineering. A doctoral degree in engineering is generally required for a career in research and development, or as a professor of engineering.

Employer

- Companies that supply computers
- Government departments
- Provincial administrations

- Computer bureaus
- Universities and universities of technology
- Any company or business using computer systems and networks.
- Self-employment, a registered engineer with the necessary experience and initiative, as a consultant

Career 8: Computer Operations Manager and Projector Manager

The operations department in an organisation is responsible for the production of the data centre.

Operations managers plan software, organise personnel, helping them to set and accomplish goals, and control the operation of all data processing equipment and software. They interpret management's needs to their staff.

Project managers plan and control all the different projects, monitor their progress and ensure that projects are completed within their set target dates.

Operations managers and project managers should be able to make quick decisions. They must have good interpersonal communication skills.

Both operations managers and project managers have considerable seniority and experience and may have been through the ranks of a programmer or systems analyst. Various management courses are offered at universities of technology and universities.

Some fulfilling and satisfying aspects of this career

- variety of work
- intellectual challenge
- problem-solving
- creative thinking
- dealing with people
- good remuneration

Some demanding and challenging aspects of this career

- having to work long hours on occasion
- stressful when projects are behind schedule
- difficulty in keeping abreast in the field
- mental fatigue due to complexity and pressures of the job
- working with more than one project at a time

Purpose Orientation

A computer project manager should:

- be practical and enjoy solving problems;
- be accurate and persistent;
- have managerial and organisational skills;
- have good judgement;
- work well with others;
- express ideas clearly in writing and in speech;
- be willing to continue education to keep up with the latest developments in the field.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course
Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Information Technology, Computer Applications

Training

Degree: BSc Computer Science or Information Systems or Information Technology as major, or a BCom. degree with information systems

A qualification in project management is also recommended.

Employer

- any company or business using computer systems and networks
- government departments
- provincial administrations
- computer bureaus

Career 9: Computer Operators

Computer operators help shift leaders in ensuring that all work allocated to the shift is processed efficiently, timeously and according to schedule. They have to clean the equipment such as printers, to ensure that no job failures arise due to dirt or dust.

Operators communicate with computers by means of keyboards. They should have an understanding of the system they are using, so that they can check the correctness of all operations and take all necessary precautions to ensure that no mistakes are made. In cases of malfunctioning, operators must find the causes, correct them or call service technicians. They also keep a record of the work done on the computer and prepare reports on its use.

Computer operators are responsible for the efficient, accurate operation of the system. They feed in information either via the keyboard or tapes as computer input and, if necessary, collect output as it emerges from the printer.

Increasingly complex hardware and software, together with the increasing use of remote terminals connected via telephone networks to a central computer, have broadened the scope for computer operators.

Computer operators may specialize with regard to equipment manufacturer. They must be able to understand written technical instructions and be able to work quickly and accurately.

With experience and ability, computer operators may advance to supervisors. To advance to programmer or systems analyst, however, computer operators need additional training, experience and ability.

Some fulfilling and satisfying aspects of this career

- keeping things running smoothly
- good employment opportunities

Some demanding and challenging aspects of this career

- working under pressure
- having to sometimes work long hours and shifts

Purpose Orientation

A computer operator should:

- have an aptitude for solving mechanical problems;
- be able to work independently as well as with others;
- be able to concentrate and work for long hours without getting frustrated or tired;
- have good judgement and be able to think logically;
- be thorough, patient and responsible;
- have good eye-hand coordination;
- have keyboard skills;

- be able to understand written technical instructions;
- be able to work quickly and accurately.

School Subjects

Ordinary Level Certificate for a diploma course

Compulsory Subjects: None

Recommended Subjects: Mathematics, Information Technology, Computer Applications

Training

Computer operators can receive in-service training. Apart from the mechanical skills that are needed, they will usually be trained towards a thorough understanding of the organization owning the machine and an understanding of the operating systems of the machine. To keep up with developments in computers, short courses are frequently offered by suppliers of computers.

Computer operators with one year's experience, can write the Computer Operator Proficiency Examination (COPE) of the Computer Users' Council. This certificate enables them to obtain professional recognition in the computer industry.

Employer

- commercial and industrial organizations
- research institutions
- education and government departments

Career 10: Computer Programmers

Computer programmers create, modify and test the forms, scripts and code that tell the computer what to do. They serve as the link between the operator and the computer.

The work of computer programmers is both demanding and rewarding. In general terms, they are people who write programs for specific purposes or needs, whether it is to create a virtual reality game, a database system, control machinery or to program a company's telephone system.

They write programs, which are detailed instructions, which list the specifications that the computer must follow to solve a problem or handle information in a logical order. Systems analysts provide the specifications for a particular task. Programmers write programs and translate them into a computer language such as VISUAL BASIC, DELPHI, Pascal, Cobol, Java, Oracle, Informix, C and C++, to name but a few. The sequence of instructions is carefully entered on the keyboard and checked to make sure that the instructions are correct and that they will produce the desired information. If errors occur, the program is changed and rechecked until the desired results are produced.

Computer programmers work closely with systems analysts to produce programs based on the specifications derived from the needs of the client.

The work of computer programmers involves researching and documenting computer users' requirements; analysing the objectives and problems specified by the systems analyst; and determining what steps need to be taken and in what order, then translating these steps into computer language commands. They test programs and software applications and then "debug" them. They also need to document what the programs do and how they do it, by preparing user manuals and help screens.

Computer programmers may specialize in a number of different areas:

Network programmers work with vendor networking languages to support the implementation or modification of network configurations

Database programmers are involved in the development of programs to suit the access to and maintenance of databases

Analyst programmers design and analyse clients' needs and create complex design structures for translation into a programming language

Multimedia programmers are involved with systems, applications and programming issues. This includes conversion between platforms and the initial writing of code for incorporation of text, graphics, video, animation, digital / analogue photographs, audio and 2/3D modelling

Systems software programmers write, maintain and update programs that control the overall

functioning of computers

Some fulfilling and satisfying aspects of this career

- the challenge of the work
- solving problems
- working in a field that is constantly changing and advancing

Some demanding and challenging aspects of this career

- having to work long hours to solve problems
- working under pressure
- the frustration of not being able to solve a programming problem
- the fact that the work can be very fatiguing
- having to work irregular hours on occasion

Purpose Orientation

A computer programmer should:

- enjoy mathematics and solving problems;
- be able to concentrate for long periods;
- be imaginative;
- be patient and accurate;
- think logically and sequentially, and make own decisions;
- persevere with a task until all the problems are solved.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Information Technology, Computer Applications

Note: Before deciding on a career in computer programming, candidates are advised to take aptitude tests.

Training

Most large computer firms have their own training departments where intensive in-service training courses are offered and trainees have the opportunity to work on the firm's own computers. A number of private firms also offer training courses.

Employer

- Government departments
- Computer manufacturers
- Research organisations
- Commerce and industry
- Insurance companies

- Educational institutions and libraries
- Transport enterprises
- Mining companies
- A skilled and entrepreneurial computer programmer can start his own business.

Career 11: Computer Scientist

Computer scientists not only understand the intricate innards of a computer, they also know how to write programs and have an intimate knowledge of everything relating to computers.

Computer scientists can be involved in all dimensions of computers, including: hardware electronics, operating systems, artificial intelligence, communication related information such as programming languages, and all aspects of applications, that is, software.

When employed, computer scientists may specialize in hardware, programming or theory. They can also develop virtual reality in robotics. However, they tend not to specialize in only one field and are, therefore, sought after as employees.

There has been much debate about definitions for this subject area. Some examples of these are: computer science is the study of computers and the major phenomena that surround them; computer science is the body of knowledge concerned with computers and computation; computer science is the study of knowledge representations and their implementations; and computer science is the study of abstraction and the mastering of complexity.

In one sense, it is easier to define what computer science is not. It is not the study of programming, as that is too limited. It is not learning to use computer applications (word processing or spread sheet packages).

Computer science has been defined as the discipline of computing the systematic study of algorithmic processes that describe and transform information: their theory, analysis, design, efficiency, implementation and application.

Computer scientists need to understand the science that underlies the software aspect of computer systems and the interrelationship between software and hardware systems, as well as issues related to efficiency and usability, with most emphasis usually placed on software.

When studying computer science, emphasis is usually placed on the analysis and design of algorithms, which are a generalized form of representing problem solutions. Computer scientists need to be able to analyse and solve problems, by finally translating their solutions into particular software tools and a given computer environment.

Some computer scientists end up in managerial positions as leaders of information systems development projects or Management Information Systems (MIS) managers. They often act as facilitators between software developers and clients.

Graduates going out into the workplace often begin as programmers (later becoming systems analysts and project leaders) with companies such as big mining or financial institutions, some join firms of computing consultants, some join the internet service provider companies, and some start their own computer (software or hardware) companies, etc.

The term ‘Information Technology’ is sometimes used to encompass all aspects of computers. People in information technology usually assist businesses and industries to computerize operations in manufacturing, finance, law, mining and transportation, and other areas.

Computer Science: most opportunities exist with software development companies.

Networks: organizations such as banks, insurance companies and large government departments which rely on networked information require graduates with this specialization to deal with network management and systems design. The explosive growth of the Internet will see an increasing demand for such skills.

Information Systems: industry and business need information systems specialists. Graduates with combined degrees have special scope because of their knowledge of other areas.

Statistics and Applied Mathematics: graduates with this specialization find opportunities in company forecasting, planning or research organizations and large government departments involved with projections.

Information Technology is an exciting industry in which to be involved. A recent survey of the paying professions showed IT to be ranked among the five highest average incomes, and in most countries the demand for IT professionals far outweighs the supply.

Some other areas of specialization within computer science include:

- Computer Software Development
- Computer Systems Development and Maintenance
- Computer Management
- Computer Consultancy
- Teaching
- Research

Some fulfilling and satisfying aspects of this career

- being the ultimate specialist in a very large field
- solving problems
- good remuneration and fringe benefits
- being at the cutting edge of technology

Some demanding and challenging aspects of this career

- hard work
- sometimes many hours are needed to solve problems
- difficulty in staying abreast in the field

Purpose Orientation

- excellent problem solving skills

- teaching ability, being able to explain solutions
- great interest in computers
- highly intelligent and logical thinker
- able to work independently and in a team
- high degree of concentration
- patient and persistent
- good mathematical skills
- enjoy putting information into logical sequence

School Subjects

Advanced Level Certificate requirements for a degree course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Physical Sciences, Information Technology

Training

Degree: BSc with majors such as Information Technology, Electronic Engineering, Bachelor of Information Technology

The more theoretical majors lead to specialized work in computer science and programming.

Employer

- software houses
- financial institutions
- insurance industry
- scientific, research and educational institutions
- government departments and organizations
- non-governmental organizations
- mining companies
- manufacturing facilities
- transport systems and telecommunications
- Internet service providers

Career 12: Computer Security Specialist

Computer security specialists assess administrative, physical and technical security risks to information, software and hardware; and develop policies, procedures and contingency plans to prevent or minimize the effects of security breaches and concerns.

Computer security specialist also known as Information Technology Specialists, or Systems security analysts have a primary role to protect and safeguard information in computer files against accidental or unauthorized modification or disclosure.

To keep up to date with new developments, systems security analysts share information via e-mail, use web-based resources that send out alerts about new threats (for example, computer viruses), attend technical training courses and conferences, and read computer-related journals, magazines and newsletters.

The work of a computer security specialist is varied by the type of equipment and data that is stored. For instance, the type of equipment and mediums for information management include the following: modems, fax machines, manuals, wide & local area networks, telephones, computer cassette/reel tapes, computer printers & scanners, authentication server software, notebook & protocol analysers, network monitoring software, computer terminals & mainframes, notebook computers, internet directory services software, and virus protection software.

The duties of computer security professionals may vary from the strategic planning and of computer security measures to detailed implementation, maintenance and upgrading measures. These include: developing and write policies and procedures for the computer security department; entering commands into the computer in an attempt to circumvent the new security measures in order to test the system; modifying security data files to incorporate new software into the firms security software; reviewing employee violations of computer security procedures recorded by the computer and monitoring current reports of computer viruses to determine when to update virus protection systems; reporting employee violations to user department managers.

Some fulfilling and satisfying aspects of this career

- the challenge of the work
- solving problems
- working in a field that is constantly changing and advancing

Some demanding and challenging aspects of this career

- having to work long hours to solve problems
- working under pressure
- the frustration of not being able to solve a programming problem
- the fact that the work can be very fatiguing
- having to work irregular hours on occasion

Purpose Orientation

- the ability to think logically and analyse complex problems

- the ability to remain alert while performing routine tasks
- the decisiveness, creativity and flexibility required to meet security challenges and solve problems quickly
- a high degree of honesty and integrity
- the ability to communicate and get along well with users, other computer specialists and managers throughout the organization
- a keen interest in keeping up to date with new developments in technology.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects : Mathematics

Recommended Subjects: Information Technology

Training

Employers generally prefer to hire experienced applicants who have a four year bachelor's degree or two year diploma in computer science or a related discipline. A security background check is normally required. Systems security analysts must continuously upgrade their knowledge because systems and security threats are constantly changing.

Employer

- Government departments
- Computer manufacturers
- Research organisations
- Commerce and industry
- Insurance companies
- Educational institutions and libraries
- Transport enterprises
- Mining companies
- A skilled and entrepreneurial computer programmer can start his own business.

Career 13: Computer Software Engineer

Computer software engineers apply the principles and techniques of computer programming, engineering, and mathematical analysis to the design, development, testing and evaluation of the software and systems that enable computers to perform their many applications. This is basically an Electronics Engineering qualification with more software subjects and less engineering subjects

Computer software engineers design and develop many types of software including software for operating systems, network distribution systems and compilers, and which convert programs for faster processing. Software engineers program computers using various programs, for instance, Assembler, C++ or Java. The major part of their work is, however, developing algorithms and analysing and solving programming problems.

Software engineers are also required to solve technical problems that arise and should therefore have a good knowledge of hardware components, for instance, microprocessors, embedded controllers, personal computers, routers and transmitters. They should also have the skills to develop the necessary software in order to implement a complete system operating on a variety of platforms, such as Windows, Windows NT and UNIX. Because computer systems and technology are rapidly evolving, the tasks performed by a computer software engineer have become more complex and specialized. Some examples of areas of specialization include:

Computer applications: the design, implementation and modification of general computer applications software or specialized utility programs. Software engineers develop both packaged systems and systems software, or create customised applications.

Computer systems: the construction and maintenance of a company's computer systems, and planning for future growth. This may include the setting up of Intranets, or telecommunications networks that link computers within organizations.

Project management: the management and delivery of a project in consultation with other members of a team. A core team may comprise engineering, marketing, manufacturing and design people who work together until the product is released.

Software engineers normally work in an office environment. Their job requires a fair amount of interaction with customers and co-workers and may require spending time away from the office in order to consult with clients at their premises. However, as technology advances, software engineers are increasingly able to communicate via e-mail, and by using the Internet, to connect to a customer's computer remotely in order to identify and correct developing problems.

Some fulfilling and satisfying aspects of this career

- being the ultimate specialist in a very large field
- solving problems

- good remuneration and fringe benefits
- being at the cutting edge of technology
- opportunity to be creative

Some demanding and challenging aspects of this career

- hard work
- sometimes many hours are needed to solve problems
- difficulty in staying abreast in the field
- the long period of preparation and study required to register as a professional computer software engineer

Purpose Orientation

- have above average intelligence
- have an inquiring and analytical mind
- be able to manage and organise projects
- function well with other people
- work well under pressure
- have perseverance and discipline
- be a precise and an accurate worker
- have an aptitude for Mathematics and Computer Science.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course
Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics, Physical Sciences

Recommended Subjects: Information Technology

Training

Degree: BEng Computer Engineering, or Electronic Engineering

Employer

- Companies that supply computers
- Government departments
- Provincial administrations
- Computer bureaus
- Universities and universities of technology
- Any company or business using computer systems and networks.

Career 14: Computer Support Specialist

The explosive use of computers has created a high demand for specialists to provide advice to users on hardware and software related problems, as well as for day-to-day administration, maintenance, and support of computer systems and networks. Computer support specialists are trouble shooters who provide technical assistance, support, and advice to customers for hardware and software systems.

Support specialists install, modify, clean, and repair computer hardware and software often with the help of automated diagnostic programs which are able to identify and repair faults or recurring problems. They provide a range of roles and functions depending on the type of technology. They are generally highly trained specialists and work either online and/or telephone or onsite or in a workshop.

Technical support specialists respond to requests from computer users using automatic diagnostics programs to identify, repair and resolve problems. They may write training manuals and train computer users in how to use new computer hardware and software. In addition, technical support specialists oversee the daily performance of their company's computer systems and evaluate software programs with regard to their usefulness.

Help-desk technicians deal directly with customer issues by answering telephone calls and e-mail messages from customers who are seeking guidance on technical problem relating to computers. They are required to listen carefully to the customer, ask questions, diagnose the nature of the problem, and then talk the customer through the problem-solving steps. Often the help-desk technician will use diagnostic programs which analyse problems and fix them automatically.

Network administrators design, install and provide support to companies local-area network (LAN) and wide-area network (WAN), internet and intranet systems. Network administrators provide on-going support both on and off-site. They maintain network hardware and software, analyse problems, and monitor the network to ensure its availability to system users. They also implement and administer network security measures.

Systems administrators are responsible for the efficient use of networks by organisations. They ensure that the design of an organisation's computer site allows all of the components, including computers, the network, and software, to fit together and work properly. Furthermore, they monitor and adjust the performance of existing networks and continually survey the current

computer site to determine future network needs. Administrators also troubleshoot problems reported by users and by automated network monitoring systems and make recommendations for enhancements in the implementation of future servers and networks.

Computer security specialists help to plan, coordinate, and implement companies' information security. Computer security specialists assess administrative, physical and technical security risks to information, software and hardware; may develop policies, procedures and contingency plans to prevent or minimize the effects of security breaches and concerns. Computer security specialist also known as Information Technology Specialists, or Systems security analysts have a primary role to protect and safeguard information in computer files against accidental or unauthorized modification or disclosure.

Computer support specialists are a valuable source of feedback to hardware and software providers on their products. They provide information about what gives customers the most trouble, as well as other customer concerns. Most computer support specialists start out at the help desk. Help-desk services are a growing industry in developing countries.

Some fulfilling and satisfying aspects of this career

- variety and challenge of work
- dealing with people
- some travelling
- solving problems
- good employment opportunities

Some demanding and challenging aspects of this career

- shift work
- having to be on call
- working long hours
- mental fatigue caused by the complexity and pressures of the job, particularly people who do not understand instructions over the telephone

Purpose Orientation

Because troubleshooting and helping others are vital parts of the job, computer support specialists and systems administrators should be able to communicate effectively.

In addition, a computer programmer should:

- have good communication skills, on paper, via e-mail, or in person
- enjoy problem-solving
- be able to concentrate for long periods
- be imaginative

- be patient and accurate
- think logically and sequentially, and make own decisions
- be able to persevere with a task until all the problems are solved
- strong writing skills are useful in preparing manuals for employees and customers

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics,

Recommended Subjects: Information Technology, Physical Sciences

Training

Due to the wide variety of computer support functions there are many paths of entry. Most employers prefer a person with some formal qualification, either a degree or diploma in a computer-related field. A degree in computer science or information systems is a prerequisite for some jobs.

However, certification and practical experience demonstrating these skills will be essential for applicants without a degree. The completion of a certification training program, offered by a variety of vendors and product makers, may help some people to qualify for entry-level positions. Relevant computer experience may substitute for formal education.

Employer

- Call Centre operators
- Government departments
- Computer manufacturers
- Software development companies
- Insurance companies
- Educational institutions
- Transport enterprises
- Mining companies

Career 15: Computer Systems Analysts

Computer systems analysts may best be described as systems consultants who assist organizations to realise the maximum benefit from their investment in computer equipment and personnel. At all times systems analysts are accountable to clients in developing the best possible systems according to the requirements specified.

In summary, systems analysts study clients' systems requirements, write comprehensive programs and system specifications to meet these requirements, then finally consult with the users of the system to ensure higher production. They are also responsible for the detailed design of computer systems, which a programmer can convert into a computer language.

Their work follows a very logical step-by-step format. For any project undertaken these steps may include the following:

Systems analysts consult with the client in order to determine the client's needs and requirements. They then decide whether and how computers or computer applications could be used to improve them.

They then draw up diagrams of how the work is to be done and work out the new system's requirements and specifications. In some cases, the system analyst may work with a system designer to draw up detailed charts and diagrams that indicate the various components involved.

They specify the inputs to be accessed by the system, design the processing steps and format the output to meet the users' needs. Analysts use techniques such as structured analysis, data modelling, information engineering, mathematical model building, sampling and cost accounting to plan the system.

They then check the feasibility and workability of a conceptual design. This may include the preparation of cost-benefit and return-on-investment analyses to help management decide whether implementing the proposed system would be financially feasible.

After receiving approval they may then oversee the system's development, including design, choice of computers and computer programs.

Finally, they test the new system with a variety of people and fine-tune the system where necessary.

Most systems analysts work with the specific type of system, application or field in which they

have experience:

Applications system analysts undertake design tasks for specific applications. For example a business computer application or system may include the development of a new payroll or stock control system.

Database analysts play a role in devising databases to suit large data acquisition, storage and retrieval requirements. These analysts develop database solutions that satisfy client need for high-speed access, multiple views of the same information, accuracy and security, and the sharing of information between systems.

Network analysts are generally involved in the development of in-house networks for mainframe systems. This work can be very complex, with large numbers of protocols, platforms and software solutions needing to communicate with each other.

Operations systems designers are involved in the design and implementation of operational systems, with the objective of optimising systems performance. The focus is on operational systems such as mainframes and desktop solutions.

Software analysts work in the area of design and modification of the operating environment software that links computer software and hardware.

Systems architects examine the hardware requirements that support systems implementation across personal computers, mainframes or networks.

Systems researchers specialize in systems investigation and research for the on-going development of hardware and software.

Business systems analysts study the overall business and information needs of an organization, in order to develop solutions to business and related technology problems.

Some fulfilling and satisfying aspects of this career

- challenging work
- variety of work
- working with others
- opportunity to be creative
- very good employment opportunities
- good remuneration

Some demanding and challenging aspects of this career

- frustration of programming problems
- having to work long hours to complete
- emergency projects or rectify problems
- stress of having to pay close attention to detail at all times
- dealing with over-demanding clients

Purpose Orientation

- thorough knowledge of computers
- aptitude for mathematics
- insight into the functioning of organizations
- able to think clearly and logically
- above average intelligence
- self-discipline
- sound judgement and good decision-making skills
- initiative and perseverance
- proficient in computer languages
- able to write technical reports
- ability to conceptualize and think creatively
- excellent interpersonal communication skills
- persuasive, patient manner
- team leadership capabilities

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics

Recommended Subjects: Information Technology

Training

Degree: BSc Computer Science or Information Systems or Information Technology as major, or a BCom. degree with information systems

Employer

- the information technology industry
- large computer companies
- large business and industrial organizations

- government departments
- provincial administrations
- computer bureaus
- any company or business using computer systems and networks
- self-employment, on a consultancy basis.

Career 16: Computer Technicians

Computer technicians or computer service technicians are workers who install, diagnose problems, repair, maintain and upgrade a wide variety of computer and peripheral equipment.

Being a computer technician involves having the knowledge on how to build a PC from scratch, develop problem-solving techniques, running tests and diagnostics, technical support and installations. There are basically two types of technicians:

In-house technicians, work for a particular company, repairing and maintaining the computers and the network for the company.

Contract technicians, work for different companies on a contractual basis and check all their hardware or technical requirements; they may set-up and repair PCs and give technical support.

Tasks of computer technicians are complex and demanding. Technicians are responsible for the effective functioning of a wide range of computer equipment that can vary from personal computers (PCs), tele-processing and network equipment, small systems, to large and complex mainframe systems.

They are responsible for carrying out high quality repair and maintenance on the equipment for which they are responsible. They need a thorough knowledge of both theoretical and practical electronics and how to effectively use all the diagnostic tools and techniques available to minimize disruption to the customer and to improve productivity. Computer technicians also need the necessary software skills required by the type of equipment that they maintain, i.e. DOS, Windows, Unix, Novell, etc.

The work requires that computer technicians must keep abreast of the latest technological developments. Even after qualification, they must regularly attend training courses to update their knowledge and skills. Since technology is always changing and improving, technicians' training will continue throughout their career.

Technicians are responsible for keeping customers satisfied. They need to be able to understand and be responsive to customers' needs and requirements. They need to communicate effectively with customers regarding the repairs done and keep them fully informed of any unresolved or outstanding problems. They also attend meetings that monitor customer performance and develop solutions for existing problems. They would be well advised to adhere strictly to any commitments they have made, especially to customers.

Technicians work indoors in computer rooms and departments of customers. They often need to travel between jobs or customers, although distances are usually short.

Some fulfilling and satisfying aspects of this career

- variety and challenge of work
- travelling
- solving problems
- good employment opportunities

Some demanding and challenging aspects of this career

- shift work
- having to be on call
- working long hours
- mental fatigue caused by the complexity and pressures of the job

Purpose Orientation

- accurate, logical mind
- mechanical ability
- manual dexterity and good hand-eye coordination
- patient and enjoy working with people
- good hearing and communication skills
- initiative and problem solving skills
- good eyesight and normal colour vision

School Subjects

Ordinary Level Certificate for a diploma course

Compulsory school subjects: Mathematics

Recommended school subjects: Physical Sciences, Information Technology, Computer Applications

Training

Most computer companies provide product-orientated training for technicians. The duration of this training is normally dependent on the complexity of the equipment and whether it is basic or advanced training.

Employer

- computer companies
- public institutions
- educational institutions such as universities

- government departments
- local authorities
- self-employment - computer technicians, with enough experience and capital, may start their own businesses

Career 17: Computer Terminal Operators

Computer terminal operators type information into the computer for processing. A computer terminal operator's job is to review data for accuracy and make corrections.

The computer terminal operator also types computer programs and inputs data and sets up instruction programs for the computer to follow.

Other responsibilities include:

- programming margin changes, line adjustments and other routine typing decisions
- safe-keeping of all the documentation
- taking care of the computer equipment

Some fulfilling and satisfying aspects of this career

- keeping things running smoothly
- good job opportunities

Some demanding and challenging aspects of this career

- working under pressure
- having to work long hours and shifts sometimes

Purpose Orientation

A computer terminal operator should:

- be alert and attentive;
- be interested in how machinery works;
- work well under pressure;
- have good typing skills;
- work efficiently and accurately;
- have finger dexterity and good eye-hand coordination;
- be able to concentrate;
- have good vision.

School Subjects

Ordinary Level Certificate.

Employers prefer higher educational qualifications.

Advanced Level Certificate for a diploma course.

Compulsory Subjects: None

Recommended Subjects: Information Technology, Languages, Computer Applications

Training

In-Service Training: A candidate must pass a selection process before appointment. The data typist who has already attained proficiency on any other keyboard (such as a typewriter or other office machine) may be trained on the job by senior operators or supervisors.

The candidate with no experience is sent on an external course or given a systematic training course before starting productive work. The basic content of the training course is standard but its application is adapted to the needs of each individual on a personal basis.

Employer

- All businesses and industries
- Educational and health care institutions
- Government departments
- Computer manufacturers

Career 18: Network Administrator

Modern society is becoming increasingly dependent on computers. This ensures a great demand for skilled manpower in the computer field.

Network administrators are responsible for the design, implementation and maintenance of equipment used to link computer networks through the telephone system and other communication systems. They may be involved in designing such networks. They install computer equipment and maintain the system. When necessary, they detect and correct faults in network systems.

The traditional services offered by the Internet are well known to most, but the explosive growth of its use has sparked further demand for access to new and -enhanced services provided by an Information Superhighway (of which the Internet is only a part).

These would include services in the following areas:

- Business: telecommuting and electronic commerce
- Consumer: interactive television, video telephones, video-on-demand, information on demand and other on-line services such as electronic home shopping
- Academic / Scientific: telemedicine, telerobotics and distance learning.

Some fulfilling and satisfying aspects of this career

- good opportunities for promotion
- ensuring a safe and controlled environment

Some demanding and challenging aspects of this career

- the work can become monotonous
- one has to study continuously to keep abreast of developments in the field

Purpose orientation

A network controller and designer should:

- have good communication skills;
- be able to think clearly and logically;
- have good intellectual abilities;
- have initiative;
- be creative;
- be well-disciplined;
- work accurately;
- have an aptitude for mathematics;
- have good judgement and decision-making abilities;
- have patience and perseverance.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course
Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics,

Recommended Subjects: Information Technology, Computer Applications

Training

Degree: Computer Science, Information Technology / Science / Studies -

Diploma: Computer Engineering, Networks etc

Some network controllers receive in-service training after they have obtained an electrical or communications engineering qualification.

Employer

- Internet industry:
- Fundamental networking
- Installation
- Consulting
- Web development
- Software maintenance
- Self-employment, with own business and/or as a consultant

Career 19: Network Systems and Data Communications Analyst

Network systems and data communications analysts design, test, and evaluate systems such as local area networks (LANs), wide area networks (WANs), the Internet, intranets, and other data communications systems.

Systems are configured in many ways and can range from a connection between two offices in the same building to globally distributed networks, voice-mail and email systems of a multinational organization. Network systems and data communications analysts perform network modelling, analysis, and planning, often requiring both hardware and software solutions. For example, a network may involve the installation of several pieces of hardware, such as routers and hubs, wireless adaptors, and cables, while also requiring the installation and configuration of software, such as network drivers. Analysts also may research related products and make necessary hardware and software recommendations.

Network systems and data communications analysts normally work in offices or laboratories in comfortable surroundings. They typically work about 40 hours a week, the same as many other professional or office workers. Telecommuting is increasingly common for many computer professionals as networks expand, allowing more work to be done from remote locations through modems, laptops, electronic mail, and the Internet. However, some work still must be done in the office for security or other reasons.

Common work tasks are to:

- perform network modelling, analysis, and planning, often requiring both hardware and software solutions
- install routers and hubs, wireless adaptors, cables, and network drivers
- maintain files by adding and deleting them on the network server and backing up files in the event of problems with the network or electricity supply failure
- set up user accounts, regulate and monitor file access to ensure confidentiality and proper use
- design and implement systems, network configurations, and network architecture, including hardware and software technology, site locations, and integration of technology
- identify areas of operation that need upgraded equipment such as modems, fibre optic cables and telephone wires
- test and evaluate hardware and software to determine efficiency, reliability, and compatibility with existing systems, and make purchase recommendations
- read technical manuals and brochures to determine which equipment meets establishment requirements

Some fulfilling and satisfying aspects of this career

- knowing that you are playing a crucial role in the workplace
- availability of many job opportunities in this field

Some demanding and challenging aspects of this career

- evening or weekend work may be necessary to meet deadlines or to solve specific problems
- having to concentrate for long periods of time
- having to be 'on call' in case of system failure

Purpose Orientation

- have good communication skills
- be able to think logically
- have an analytical mind
- enjoy developing original solutions to problems
- be able to concentrate and pay close attention to detail

School Subjects

Advanced Level Certificate meeting requirements for degree course

Compulsory Subjects: Mathematics

Recommended Subjects: Computer Science

Training

Since relevant computer skills are always essential for network systems and data communications analysts, many enter this field with different levels of formal training since training requirements can vary according to occupation. Most employers seek applicants who have bachelor's degrees in computer science, information science, or management information systems (MIS).

Employer

- business management organisations
- financial firms
- insurance companies
- government agencies
- factories

Career 20: Phone Shop Operator

Phone shop operators use the prepaid cellular technology to deliver a telephone service to the community. By providing this service, phone shop entrepreneurs are able to generate an income by charging customers for calls. Prepaid calls are subsidized by the cell phone company as part of a social responsibility commitment required of major cell phone companies.

Phone shop operators use a product known as the SIGI (Siemens GSM Interface). The Sigi Pro (Siemens GSM Interface) is a prepaid telephone service that works by integrating payphone and GSM technology. The product enables entrepreneurs to establish immediate communication channels via the GSM network without having to wait for the installation of fixed lines. The service offers the unique integration of voice, data and fax facilities and is equipped with a metering unit for billing purposes. Standard fax machines, as well as PCs, can also be connected to the control units, allowing access to Internet and e-mail.

It also serves to offer highly subsidized call rates to the public and would generate sufficient revenue to sustain it as a stand-alone business.

The phone shop concept has not only seen new small entrepreneurs emerge onto the business arena but has resulted in the creation of thousands of jobs. Using technology known as Sigi Auto charge, a cell phone shop owner is able to operate in under-serviced areas to buy bulk airtime, using banking facilities for which they previously did not qualify.

Phone shop operations and the services they offer, have become as much a necessity to the communities as other basic services, such as water and electricity.

Some fulfilling and satisfying aspects of this career

- offering a service to your community
- being able to start your own business

Some demanding and challenging aspects of this career

- accumulating the capital needed to start up
- dealing with difficult people
- and having to repair or replace damaged equipment

Purpose Orientation

A phone shop operator should possess the following qualities:

- have common sense;
- be determined and self-motivated;

- enjoy a challenge, sense of adventure and risk-taking;
- have an interest in and knowledge of business.

School Subjects

No specific level of schooling or compulsory subjects are required

Training

Training by the cell phone company is required as part of the contract

Employer

Self-employed

Career 21: Satellite System Technician

A satellite systems technician puts up television aerials, satellite and digital dishes and attaches them to buildings. The technician will select a suitable receiver for the area and ensure that a good signal is received, discuss its location with the customer.

A satellite systems technician is required to assemble the mast or dish equipment, and connect the cable to it and to the junction box or TV top decoder. The dish or aerial is firmly attached to the building using brackets, bolts etc, and the cable run to the agreed position inside the building. Adjustments are made for best reception, and finally the receiver is tuned.

This career entails activities relating to the designing, planning, manufacturing and managing of systems, equipment and components used in engineering and related areas. The aspirant satellite installer should probably enjoy designing mechanical equipment, manufacturing and maintaining electrical / electronic equipment, designing and manufacturing systems and components in the telecommunication area, as well as monitoring and operating instruments (e.g. electronic, mechanical etc.) and systems.

Some fulfilling and satisfying aspects of this career

- working with your hands
- working outdoors much of the time

Some demanding and challenging aspects of this career

- frequently having to work at roof height
- being exposed to weather conditions
- possibility of injury on the job

Purpose Orientation

- be able to work on your own if necessary
- be careful and have common sense
- have a good head for heights
- be practical
- have good manual skills and stamina

School Subjects

Advanced Level / Ordinary Level Certificate.

Compulsory Subjects: Mathematics, Physical Sciences

Recommended Subjects: Electrical Technology, Information Technology

Training

Private Colleges based training.

Employer

- private companies
- manufacturers of radio and television equipment
- manufacturers of electrical appliances
- self-employed - as a skilled satellite systems technician you can start your own business

Career 22: Systems Engineer

Systems engineers are mainly responsible for coordinating all the computer-related systems available in a company. They work closely with database administrators, and develop and change databases to ensure an environment that is streamlined and automated.

Systems engineers are also responsible for the integration of systems and maintenance of the system flow. They must have extensive knowledge in a similar environment where functions such as engineering, development and the integration of systems are central to the company concerned.

Advanced knowledge of database design is essential to be a successful candidate for this career. Systems engineers also integrate databases with all their tables and information into the technical hardware used by the company. This takes place in conjunction with the network administrator.

Systems engineers work closely with the development team in an office environment, occasionally visiting server and backup rooms to ensure that the complete system is engineered in a successful and automated way.

Some examples of such systems are water and food distribution networks, experimental manned space flights and military defence programmes. Systems engineers also work on telephone systems, electrical power systems, and sewage systems.

Some fulfilling and satisfying aspects of this career

- many areas to choose from, thus working in your field of interest
- solving problems
- opportunity to be creative
- variety and challenge of the work
- good salaries

Some demanding and challenging aspects of this career

- working long hours to finish a project
- heavy responsibility associated with the work
- highly pressurised environment

Purpose Orientation

- have development and technical skills
- able to handle pressure
- able to function well as a team player

- good at organisation
- inquiring, analytical mind
- have sound judgement and be responsible
- good problem-solving skills

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics, Physical Sciences

Recommended Subjects: Information Technology, Electrical Technology

Training

Degree: Computer Science - Software, Programming, Electrical / Electronic Engineering, Network Systems, Database Management

Employer

- government agencies
- computer companies
- any large corporate company that needs a dedicated coordinator / engineer to maintain its IT environment.

Career 23: Telecommunications Engineer

Telecommunications engineers are responsible for the continual and rapid development in the science and methods of telecommunications; the general and basic planning of future expansion; the design and planning of automatic exchanges, carrier systems, telex systems, coaxial cable systems, microwave radio systems; optical fibre systems and videotext systems.

Telecommunications engineers are involved in the planning, design, commissioning and monitoring of complex telecommunications networks and associated broadcasting equipment. Many telecommunications design engineers work for major carriers as well as telecommunications and IT service providers.

Telecommunications engineering can cover any of the following fields: long distance, microwave carrier and coaxial cable systems, foreign radio communications, electronic, automatic and manual exchange switching, overhead and underground line equipment networks, and telex, telegram and data transmission systems.

Telecommunications engineers use a variety of intricate telecommunications test equipment associated with their particular discipline and computers. They work mainly in offices with excursions to the work place e.g. telephone exchanges, carrier rooms, microwave radio rooms etc.

Some fulfilling and satisfying aspects of this career

- solving problems
- working with modern technology
- some opportunity to be creative
- variety and challenge of the work
- providing a service and knowing your work contributes to people communicating
- relatively good remuneration

Some demanding and challenging aspects of this career

- being office-bound at times
- working long hours to finish a project
- having to continually keep up to date in this field

Purpose Orientation

- accurate, methodical and creative
- leadership potential
- aptitude for mathematics and doing calculations
- able to interpret drawings and technical specifications
- able to visualize abstract concepts
- work well with other people

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course
Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: Mathematics, Physical Sciences

Recommended Subjects: Information Technology, Engineering and Graphic Design

Training

Degree: BEng Electrical

Diploma: N.Dip: Electrical Engineering

Employer

- telephone companies
- cell phone companies

Career 24: Telecommunications Lines worker

A telecommunications lines worker or linesman is responsible for the erection, maintenance and repair of the wooden poles, metal towers, cables and other equipment used to construct electrical transmission and distribution power lines. Lines carry electricity from power stations to sub-stations and on to consumers.

A linesman starts working under the supervision of a qualified linesman to erect overhead power lines and lay underground cables. Experienced linesmen move up to more responsible positions, such as planning and the mapping out of the positions of the line supports. They work with a team of ground workers doing tasks such as:

- erecting and installing power lines
- attaching cross-arms, insulators and lightning arresters
- climbing poles or towers to install transformers
- routine maintenance and repair

Some fulfilling and satisfying aspects of this career

- working outdoors
- travelling

Some demanding and challenging aspects of this career

- physically challenging work
- having to answer emergency calls out of hours
- dealing with difficult landowners

Purpose Orientation

A telecommunications lines worker should:

- be technically oriented
- in excellent physical condition
- have manual strength and dexterity
- be willing to work outdoors in all kinds of weather
- like to travel
- understand electricity
- not be afraid of heights

School Subjects

Ordinary Level Certificate.

Compulsory Subjects: None
Recommended Subjects: None

Training

In-service Training

Employer

Telecommunication Companies

Career 25: Telecommunication Technician

Telecommunications technicians are responsible for the maintenance and repair of underground and aerial telecommunication lines, mechanical aids, power installations, satellite earth stations, radio stations and telegraph offices.

They manufacture and repair equipment and parts in a workshop where cabling, wiring and assembling are done. The duties of telecommunications technicians may include:

- Telephony: The installation and maintenance of computer controlled equipment
- Transmission: The installation and maintenance of telephone lines
- Telegraphy: Installation and maintenance of telegraphic equipment
- Field equipment: The installation and maintenance of underground and above-ground telephone lines
- Mechanical and electrical duties: The repair and maintenance of equipment in the workshop
- Existing technology: Maintenance of new advanced equipment, the 'smart card' public telephone and cellular phone.

Telecommunications technicians must keep abreast of development in the field of electronics, as computers and computerized equipment are widely used for telecommunication systems.

Some fulfilling and satisfying aspects of this career

- working outdoors
- working as part of a team
- possibility of promotion

Some demanding and challenging aspects of this career

- work can be strenuous
- outdoors, in all-weather

Purpose Orientation

A linesman should:

- be technically oriented;
- in excellent physical condition;
- have manual strength and dexterity;
- be willing to work outdoors in all kinds of weather;
- like to travel;
- understand electricity;
- not be afraid of heights.

School Subjects

Ordinary Level Certificate

Compulsory Subjects: None

Recommended Subjects: None

Training

In-Service Training:

Basic training lasts six months after which the candidate begins to work as a learner linesman.

The training includes: Fire fighting, Safety measures, First aid, High tension regulations, Electricity I and II, Construction.

Employer

- Telecommunication Companies

Career 26: Telemarketer or Call Centre Agent

Telemarketers are telephone marketing agents who sell to customers on behalf of the companies they work for. They are in contact with customers by telephone to market products, provide information or to address queries.

Through advances in technology, telemarketers are not restricted to the telephone but also use email, SMS messaging, fax and mail as ways of communicating with customers.

The job demands strong interpersonal and customer service skills since a telemarketer is often a customer's first point of contact with a company. Higher standards are required from call centre staff in some fields of work, where technical and linguistic skills are more important.

A telemarketer's role and day-to-day responsibilities depend on the particular industry in which they work and the type of call they make. Their work may involve:

- direct selling, which may include 'cold calling'.
- taking catalogue or other orders and arranging delivery
- providing advice or other information requested, to customers
- carrying out market research
- providing a financial institution's customers with information requested, such as their account balances, or dealing with credit card bill queries

The work can be highly intensive, and repetitive. Telemarketers are usually set targets to answer or deal with a certain number of calls within a specific period. This creates a pressurised environment.

Most telemarketers work from 35 to 40 hours a week. Depending on the industry, the contact centre may be open 24 hours a day, including weekends, and operators may be required to work shifts to cover all hours. Part-time work is also available.

They usually work at desks or 'workstations' in a large open-plan office. Each call centre operator normally has a computer and telephone headset which enables their hands to be free to access information or input data.

Some fulfilling and satisfying aspects of this career

- usually pleasant working conditions
- sense of achievement when goals are met
- speaking to many different people each day

- getting to know regular callers / customers

Some demanding and challenging aspects of this career

- remaining seated for long periods
- doing the same thing every day, depending on the type of company worked for
- dealing with demanding or unpleasant people
- in some cases, having to work shifts
- staying motivated day-in and day-out in the face of difficult customers

Purpose Orientation

Telemarketers play a critical role in providing an interface between customer and company, and for this reason employers seek out people who come across in a friendly and professional manner. The ability to deal patiently with problems and complaints and to remain courteous when faced with difficult or angry people is very important. The ability to speak a foreign language is an advantage.

In addition call centre agents need to have the following requirements:

- a pleasant telephone voice that conveys sincerity and confidence
 - commitment to providing good customer service
 - good written and oral communication skills
 - organization and multi-tasking skills
 - the ability to work independently or as part of a team
 - the ability to remain interested and focused when repeating information
- the ability to think quickly and respond to complaints smoothly and tactfully.

School Subjects

Depends on the industry sector chosen and the qualifications required, if any.

- Advanced Level Certificate for a degree course
- Ordinary Level Certificate for a diploma for a certificate course

In most cases, however, there are no specific formal qualification required for entry to this career, although some employers prefer applicants to have computer skills and Mathematics. Employers also look for applicants with personal qualities such as confidence and a good telephone manner, and preferably some previous customer care and/or marketing experience. Employers may require applicants to undertake practical telephone and computer keyboard tests.

Training

Training is on the job usually, and may include in-house training courses and/or qualifications through professional bodies. Operator's calls may be screened to ensure that customer service

standards are met.

Employer

- financial institutions eg banks etc
- insurance industry
- sales and marketing
- medical aid companies and emergency services

With experience, it might be possible to gain promotion to team leader, supervisor or manager. Call centre operators may decide to move into different industry sectors, perhaps seeking jobs where they deal with customers face to face. They could also move into another area of business such as human resources, marketing or training.

Career 27: Web Designer

Web designers use a combination of design and IT skills to produce web pages for the Internet.

In order to create a website, a web designer starts with the end user in mind. The most successful sites allow people to travel around them with ease. There is an important balance between a creative design and ease of use. In addition, a web designer as with any commercial artist, designs a website to the satisfaction of the client. Therefore websites are designed in accordance with the specifications of the client and within a stipulated budget. This means that the designer works very closely with the customer, and often in conjunction with the public relations staff and software engineers.

The web pages are developed and designed through a combination of art and programming. Many designers make their websites as interactive as possible. This means that there is a two-way flow of information between the user and the website, that is, the computer responds to the user's requests. The web page can range from a single page to a more complex maze of windows and links, each providing different types of information.

Web designers can use a number of different ways to communicate information. This includes the use of multimedia, for example, text, speech, graphics, animation or video pictures. Web designers may use HTML (Hypertext Mark-up Language) to present text and graphics; they may also use other programming languages such as Java, to add a level of interactivity to a website.

Web designers may be asked by the client to manage the sites they have created. Alternatively, they may be asked to create a site which enable the clients to make their own changes so that they are not reliant on the web designer. In both cases, websites need to be up-to-date and relevant.

Web page designers must ensure that users are able to do searches on the particular web page and extract the required information. The traditional services offered by the Internet are well known to most, but the explosion in growth of its use has sparked further demand for the design of service pages provided by the Information Superhighway (of which the Internet is only a part). These would include services in the following areas:

Business: telecommuting and electronic commerce, for example, company directories made available to the public via the Internet

Consumer: interactive television, video telephones, video-on-demand, information on demand and other on-line services such as electronic home shopping

Academic / Scientific: telemedicine, telerobotics and distance learning

It is, therefore, important that web designers stay up-to-date with developments and innovations in technology as well as in business market information.

Some fulfilling and satisfying aspects of this career

- knowing that your clients are satisfied
- being creative
- being able to provide society with much needed information

Some demanding and challenging aspects of this career

- dealing with tremendous strain on the eyes as focus is constantly needed
- working under pressure can be taxing

Purpose Orientation

A website designer should:

- have good communication skills;
- have good computer skills;
- be able to think clearly and logically;
- be able to communicate ideas clearly;
- have good intellectual abilities;
- have initiative;
- be creative;
- be well disciplined;
- work accurately;
- have good judgement and decision-making abilities;
- have patience and perseverance.

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Each University or College will have its own minimum entry requirements.

Compulsory Subjects: none

Recommended Subjects: Visual Arts or Information Technology

Training

Many entrants have a degree or a diploma in a computer-related subject. Entry is also possible

with a non-IT degree, especially in art or design subjects. For some employers, however, experience and proof of your creative abilities (such as a personal website) are more important than academic qualifications.

Degree: BA Fine Art - most universities

Employer

- Internet industry
- Private organisations
- Universities, colleges
- Any person, group or organisation who needs web pages
- Self-employment, offer services on a freelance or contract basis

Career 28: Webmaster

Webmasters, also known in some cases as website managers, are responsible for managing websites. The main management functions include ensuring that the website is updated regularly so that the information remains relevant accurate and "fresh". They spend a lot of time making changes and adding new things to the site, for instance, fixing mistakes, like links that do not work and pictures that do not show up on the screen.

Webmasters work out ways of making sites work faster. They keep the size of files as small as they can so that it a lot of time is not taken for a computer to download. For example, their website may have text, speech, graphics, animation or video pictures. It is necessary that the website manager gets the balance right. If the user spends too much time waiting for the site to download, they may not want to visit the site again. For this reason they may test web sites by observing people who use the site in order to see if there are any features that are difficult to use and then rectify the problem.

A webmaster's role may also extend to managing the security of the website. In a commercial company, this means making sure that only authorized people can access customers' details, for example, addresses or credit card information. In some cases they may also have a role in selecting the most suitable type of host server on which the website will be hosted and how stored information is to be uploaded to the Internet. They may also select the kinds of software to be used, as well as decide on when and where information will be sent to the Internet.

In a large commercial website operation a webmaster works as part of a team with the web manager as the head. The webmaster's role in this case will be to coordinate the various design and technical aspects according to the requirements of the customer. Webmasters or web managers work with communications, public relations and marketing departments. For example, they try to obtain information on the users of the website. They may put together monthly statistics that indicate how many people visited the website over that period.

Some fulfilling and satisfying aspects of this career

- knowing that your clients are satisfied
- being creative
- being able to provide society with much needed information

Some demanding and challenging aspects of this career

- dealing with tremendous strain on the eyes as focus is constantly needed
- working under pressure can be taxing

Purpose Orientation

A webmaster or website designer should:

- have good communication skills
- have good computer skills
- be able to think clearly and logically
- be able to communicate ideas clearly
- have initiative
- be creative
- work accurately
- have patience and perseverance

School Subjects

Advanced Level Certificate meeting degree requirements for a degree course

Ordinary Level Certificate meeting diploma requirements for a diploma course

Compulsory Subjects: dependent on the field of study, Information Technology. Recommended Subjects: Preferably Visual Arts or Engineering and Graphic Design

Training

Many entrants have a degree or a diploma in a computer-related subject. Entry is also possible with a non-IT degree, especially in art or design subjects. For some employers, however, experience and proof of your creative abilities (such as a personal website) are more important than academic qualifications.

Employer

- Internet industry
- private organizations
- universities, colleges
- any person, group or organization that needs web pages
- self-employment, offer services on a freelance or contract basis