CIPS IT
Body of Knowledge
CIPS (Canadian Information Processing Society), headquartered in Mississauga, Ontario, is the professional association for Information Technology (IT) practitioners in Canada.

Founded in 1958, CIPS is a non-profit organization that represents more than 6,000 IT professionals (in 25 sections across the country) on important issues affecting the IT industry and profession.

The CIPS mandate is IT professionalism. CIPS works to set quality IT standards and practices that will benefit all Canadians.

Vision

• The professional association providing leadership information systems and technologies.

Mission

• To provide leadership in information systems and technologies by developing and promoting quality standards and practices, research, certification, and professional development while safeguarding the public interest.

CIPS is a dynamic organization focused on IT excellence through its work on public policy, setting standards within the profession and providing IT support to its community. Some CIPS national programs include:

• Certification of IT professionals (Information Systems Professional - I.S.P. designation);
• Accreditation of computer science, software engineering, and MIS programs in Canadian colleges and universities; and
• Organization of a Women in IT program to educate high school girls about career opportunities in IT.

CIPS also offers other benefits and services to its members ranging from a Code of Ethics and Professional Conduct to educational conferences (e.g. INFORMATICS) and networking opportunities.

In the province of Québec, CIPS is partnered with the Fédération de l'informatique du Québec (FIQ).
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1. **Acknowledgements**

The Canadian Information Processing Society (CIPS) gratefully acknowledges the support provided by the British Computer Society.
2. Foreword

In February 2005, the CIPS National Board ratified the following motion: “The British Computer Society (BCS) Professional Examination Study Guide Syllabus Diploma level (Core and 11 specialist modules) be adopted as the Body of Knowledge (BOK) for CIPS.”

The full details of BCS Professional Examination Study Guide Syllabus can be found at: http://www.bcs.org/server.php?show=ConWebDoc.12058

The development of the BOK is in line with the CIPS mission and the vision as outlined in the vision document: “CIPS in the 21st Century”. A core component of this vision was the formalization of a relevant Information Technology (IT) body of knowledge (BOK) for CIPS. The vision for the BOK was to develop a comprehensive description of the sum of knowledge and professional practices that are generally accepted within the IT profession in Canada and that characterize the content, ethical standards and codes of conduct that define the profession. The BOK provides topical access to knowledge areas and serves as a foundation for individual certification of IT practitioners. The development of a BOK also allows CIPS to further its objectives by enabling a number of initiatives such as:

- Development of alternate paths to the I.S.P.
- Development of I.S.P. exams to test for mastery of specific parts of the BOK
- Recognition of other designations as evidence of mastery of specific parts of the BOK
- Leading the profession by setting the standard for the knowledge base.

Through the BOK, CIPS has established a baseline for the minimum core body of knowledge requirements for the field of Information Technology (IT).

The BOK, in brief, is comprised of a “core” (professional issues in IT) and 10 technical modules in each of the following knowledge areas:

- Architecture
- Networks
- Databases
- OO Programming
- Project Management
- Service Management
- Software Engineering
- Systems Analysis
- Systems Design
- The Internet and the WWW

3. Preface
Purpose of the BOK

The purpose of the BOK is to outline the fully defined and complete core of IT knowledge for the Canadian IT industry and to provide topical access to this information.

The BOK was developed with a number of audiences in mind. It aims to assist the CIPS Certification and Accreditation Councils in more clearly defining the requirement for professional membership and the accreditation criteria. It also was developed to serve organizations that are in need of a consistent view of IT.

Evolution of the BOK

The BCS Syllabus at the Diploma level was chosen as the baseline for the BOK for a number of reasons. First, the list of individual topics closely corresponded to the core material required for a CIPS accredited university level program. The accredited four year degree program of study serve as the benchmark for I.S.P. certification. Second, CIPS has a long-standing relationship with the BCS and the BCS Diploma level exam route is a valid entry route into the I.S.P.

CIPS explicitly decided not to choose the Professional Graduate level as the baseline for the BOK, because many of the topics in this level are in the Diploma level. Moreover, the Professional Graduate level contains a number of specialized areas, which go outside what one would expect to find in a BOK. Such advanced topics would more naturally appear in extensions to the BOK. The model of the CIPS BOK has long been envisioned to be both modular and extensible and would involve a “Core” and Extended Bodies of Knowledge (eBOK).

CIPS, at this time, has no intentions to change or evergreen the BOK, as it is the current fully defined and complete core of IT knowledge. However, in light of the experiences gained through the use of the BOK by CIPS in coming years, an eBOK development process may be started. This process may involve the development of one or more eBOKs, identifying areas in which IT professionals are working and that are not covered by the current BOK. The BCS Syllabus will not be the only source of material for the further development of the BOK, nor will it be only source of material for the eBOKs. IT as viewed by CIPS appears to be a broader subject than what is captured through the BOK, and later version of the BOK will take into account this greater breadth.

Areas of Knowledge

The BCS Syllabus provides a listing for every knowledge area of “Primary Texts” and “Other Reading”. For the purposes of providing a topical access to content, it was felt to be irrelevant to provide the suggested reading in this BOK document. Second, the suggested texts and reading are focused on a U.K. based audience and does not necessarily reflect the Canadian market. Finally, the amount of literature that has been published in North America on the knowledge areas is considerable and the suggested reading should only be seen as a reasonable selection, but not a definitive selection.

The contents of the BOK must be viewed as a reasonable and informed depiction of the IT industry and as a baseline for future evolution. The BOK is also not attempting to
replace or amend any policies or procedures that have been defined elsewhere pertaining to the practice of IT.

The BOK is divided into eleven (11) Areas of Knowledge. Each Area of Knowledge is divided into two sections: “Context”, and a “List of Topics”. The classification of topics is not intended to limit the scope of the area or an indication which topics are included or excluded, but rather it is an illustrative range of topics.

Readers of this document may find that many important technical aspects of IT that may be constituted as important IT knowledge are not covered in the document. The BOK knowledge areas as identified in this document were specifically chosen because they form the core of IT – a core that, unlike more recent technical innovations, is not going to be replaced as rapidly. They form the essential minimum knowledge areas of the IT industry.

**The BOK and the I.S.P.**

It is essential to understand the fundamental difference that exists between the BOK and the BCS examinations based on the BCS exam syllabus. The BOK comprises the material in the BCS exam syllabus, whereas to pass the BCS examination at the Diploma level one needs to successfully pass papers in roughly one-third of the material. In other words, passing the BCS Diploma level requires college-level knowledge of one-third of the BOK; whereas "mastery of the BOK" as specified by the CIPS Certification Council manifestly will require much more knowledge.

Therefore, it can be argued that the BOK equals the BCS Diploma level syllabus, not the BCS diploma level examinations. Furthermore, the level or depth to which knowledge of the various topics is required by the BCS is not necessarily the same as that required by the BOK.

**The BOK and the I.S.P. - Questions and Answers**

The BCS Diploma and Professional Graduate examinations currently provide entry routes to the I.S.P. At the Diploma level, this route requires five years professional-level experience. The CIPS Certification Council has always taken the view that the purpose of the professional-level experience is two-fold, first to provide professional experience that cannot be obtained in any other setting than the actual workplace, and second to compensate for a lower level of knowledge.

It should be apparent from the distinction that has been made between BOK and the BCS examinations, that it would not follow that mastery of the BOK would be satisfied by passing the BCS examination, nor that such mastery would require a five-year experience period.

**Q. The BCS equates passing the Diploma exams to a two-year college program. Does this mean that the I.S.P. is at the College level?**
A. No, it does not, and this question underlines an important distinction. Two points should be made, one regarding quantity, and the other regarding level. First, the BOK comprises all of the topics listed in the BCS syllabus, whereas the BCS diploma level is achieved by passing examinations in one-third of the topics listed. Second, the topics themselves do not speak to the level or depth at which knowledge is to be expected. As one example, the topic "databases" could perfectly well be studied and examined at a variety of levels, from a low-level practitioner using a database package, through a college course, ad indeed right up to a post-graduate course. The same holds true of most of the topics in the Diploma level list.

Q. Why was the BCS diploma level chosen rather than the "Professional Graduate"?

A. It is the detailed content of the individual topics rather than their title which determines the level. Furthermore, the list of topics in the diploma level corresponds closely to the "core" material required for university-level CIPS Computer Science Accreditation Council (CSAC) accreditation.

The Professional Graduate syllabus contains many of the same topics as the diploma level, reinforcing the point that the title by itself means relatively little. However, the Professional Graduate level also contains a number of specialized areas which it is felt go outside what one would expect to find in an all-encompassing BOK. Such advanced topics would more naturally appear in extensions to the BOK as discussed in the response to the next question.

Q. Should the BCS Professional Graduate level not be included in the BOK?

A. The short answer is not in the BOK, but possibly in later eBOKs. The model of the CIPS BOK that has long been envisioned is both modular and extensible. It is to be expected that other more specialized modules will in the future be added to the current BOK so as to construct other extended bodies of knowledge. Some of the specialized areas from the BCS Professional Graduate syllabus would naturally be candidates.

Q. Is the BCS material to be the only source for material for eBOKs?

Absolutely not. It, as viewed by CIPS, appears to be a broader subject than Computer Science as viewed by the BCS, and later eBOKs should naturally take account of this greater breadth.
4. The Areas of Knowledge

4 a) Professionalism Issues in Information Systems Practice

Context:

In order to function effectively, professional Information Systems professionals need not only appropriate technical knowledge, skills and experience, but also a broad understanding of the context in which they will be expected to work.

Table of Relevant Topics:

Professional Institutions

Organizations and their Structure

Finance

Management Accounting

Legal Obligations and Intellectual Property

The Internet

Professional Codes of Conduct and their Limitations

Human Resources Management
4 b) Architecture

Context:

Computer hardware and digital communications required to understand the constraints that computer systems necessarily impose on the development of software applications. These constraints are explored at all levels from the interaction of the major system’s components down to the individual logic gates from which the latter are constructed.

Table of Relevant Topics:

Data Representation

Digital Logic

Processor Organization

Memory Systems

Input/Output Interfacing

Communications

High Performance Architecture
4 c) Networks

Context:

Virtually every computer is connected, or has the potential to be connected, to other computers. When connected locally, they provide vital services such as printing, file servers, CPU servers and electronic mail. When connected over a wide area they support the exchange of information in many forms. Millions of people world wide have been exposed to the World Wide Web of computers and the information they provide. The explosion in the use of such intranets and the long established use of local area networks has made the study of computer networks and the underlying communication technology as important as the more traditional foundations of computer science such as computer architecture, operating systems and programming.

Table of Relevant Topics:

- Digital Communication
- Local Area Networks
- Wide Area Networks
- Inter Networks
- Errors
- Network Security
4 d) Databases

Context:

A database system is the central software of most data processing applications. A database management system supports the operation of database applications within an integrated, controlled and accessible framework.

Table of Relevant Topics:

- An Introduction to the Features of a Relational Database Product
- Database Management Systems
- Data Analysis and Data Modeling
- The Relational Model and Relational Languages
- SQL
- Distributed and Multi-User Database Systems
5 e) Object oriented programming

Context:
Object Technology has been in development for over forty years. It is now embedded in such diverse areas as requirements engineering, software architecture, analysis, design, programming, testing, deployment and maintenance. The most widely used modern programming languages C++, Java and VB.Net all embrace an object-oriented approach.

Table of Relevant Topics:

Foundations

Concepts

Design

Practice
5 f) Project management

Context:

Project management is the application of knowledge, skills, tools, and techniques to a broad range of activities in order to meet the requirements of a particular project.

Table of Relevant Topics:

Stages in a Project

Project Planning and Estimating

Human Factors

Progress Monitoring, Project Control and Reporting
5 g) Service management

Context:

Service Management is the component of Operations Support Systems responsible for service delivery, such as order management, inventory management, provisioning and activation, network topology management and maintenance, and stability/performance diagnostics of communication service providers and their networks.

Table of Relevant Topics:

- Information Systems
- Management Information Systems
- Systems and Management Concepts
- Managerial Decision Making
- Cultural Dimension of Information Systems Development
- Principles of Professionalism
- Acquisition of Software, Hardware, Media and Consumables
- Installation and Site Planning, Security and External Threats
- Applications and System Requirements
5 h) Software engineering

Context:
Software engineering is the profession concerned with creating and maintaining software applications by applying technologies and practices from computer science, project management, engineering, application domains, and other fields.

Table of Relevant Topics:

Software requirements

Software design and architecture

Software construction and maintenance

Software testing and quality assurance

Software engineering management and process

Applications of software engineering to various areas
5 i) Systems analysis

Context:

Systems Analysis is a central part of systems development. It comprises the process of turning a set of user requirements into a logical system specification and encompasses various activities to achieve this end. The traditional systems lifecycle has been challenged by alternative models, for example the spiral (iterative and incremental) lifecycle and rapid application development. There are a variety of systems development approaches including the structured approach, the object-oriented approach, soft systems methodology and agile or lightweight’ approaches.

Table of Relevant Topics:

- Analysis of Existing Systems and New Systems
- Requirements Gathering and Specification
- The Strengths and Weaknesses of Different Approaches
- Analysis Techniques and Tools
- Communication with Users
- System Documentation
5j) Systems design

Context:

Systems Design is a central part of systems development. It comprises the process of turning a set of user requirements into an implementable system and encompasses various activities to achieve this end. Alternative models are challenging the traditional systems development life cycle. Alongside this, two approaches to systems development are emerging: the traditional structured approach; and the object-oriented approach.

Table of Relevant Topics:

- Systems Development Life Cycles Models
  - Structured Systems Design (Logical)
  - Object Oriented Design (Logical)

- Systems Development Approaches
  - Physical Systems Design
5 k) The Internet and the Web

Context:

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer. The Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically, what distinguishes the Internet is its use of a set of protocols.

Table of Relevant Topics:

- Internet Services and Applications
- Website Development
- Hosting
- Performance
- Security
- Privacy