Editorial

What is IT/S? Information Technology in Business

1. Introduction

Information Technology and Systems (IT/S) is a *tool* – like any other technology. IT/S is a technology to be applied to achieving (business) goals or purposes by coordinating production processes with its help.

Like with any other tool, just having it does not guarantee success while not having it is a likely prescription for competitive failure. It is therefore not the amount of money spent on IT/S, but the business value IT/S generates that matters. Having the IT/S tool is necessary but not sufficient condition of business success.

The key to IT/S is *knowledge*: the ability to coordinate one's action purposefully. Without this knowledge IT/S is just a tool, a piece of hardware or software. Tools must be used, properly and appropriately. The users of IT/S must *know* what to do, how to do it, under what conditions and why. Knowledge, not money, is the primary form of capital.

While the US has over 450 computers per 1000 people and is reaping the economic benefits, many countries are still seriously lagging, not participating fully in the New Economy. Brazil has only 24 computers per 1000 people, Russia 31, Turkey 20, India 3 and Indonesia 9, indicating clearly where the needs for IT/S are the largest.

Even in Europe, the differences remain significant: compare Denmark with 349, Switzerland's 299 and UK's 283 with Poland's 55, Czech Republic's 81 and Hungary's 90 computers per 1000 people to see how the recent economic performance virtually perfectly correlated with modern IT/S infrastructure. Still, among all standard production technologies, IT/S is undoubtedly the most affordable and the most widely available globally. Catching up will be progressively more difficult: USA is going to double its IT/S investments, transforming small business networks of Silicon Valley into a Silicon Continent within a decade. Strategic advice: stop taxing telecommunications, telecommuting and home office, tax tobacco, gasoline and alcohol instead.

In the US, IT/S based New Economy (or Digital Economy) is creating new jobs (30% in management) globally and at high speeds (70% come from "gazelles", i.e., small, but rapidly growing businesses). Small business alliances, networks and clusters are driving innovation, adaptation and R&D processes with the help of IT/S.

The US is therefore in the forefront of the New Economy: creating new jobs, discarding and sloughing off the old ones at a very high churning rate. US workers are on average switching jobs every four years (every eight years in Europe) generating the need for lifelong learning as a way of life. Technology is being transformed into "teknowledgy", emphasizing knowledge and information rather than the levers and mechanics. Business "gazelles" are creating regional and national "gazelles" in the global business space. IT/S plus knowledge spells healthy and growing economy.

It is our hope that world's developing nations and regions will start taking IT/S seriously as a productivity and growth enhancing tool, learning their lessons from more mature and advanced economies. Falling behind proved to be devastating for many countries during the Industrial Revolution. Falling behind during the Information Revolution could prove deadly and therefore inexcusable.

2. What is IT/S?

As any other technology, IT/S can be divided into separate and clearly identifiable components:

1. Hardware. The physical structure or logical layout and pattern of machine, system or contrivance. This is the means to coordinate required tasks of production (of goods and/or services) to achieve given purpose or goals.

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2. Software. The set of rules, guidelines, and algorithms necessary for "driving" the hardware. Also program, covenants, standards and rules of usage to coordinate the process and its tasks. This is the know-how of IT/S.

3. Brainware. Also known as knoware, it refers to the purpose, objectives and goals, provides the reason and justification for using or deploying the hardware and software in a specific way, under specific circumstances. This is the *know-what* and the know-why of IT/S.

The above three components are interdependent and equally important. They form IT/S core: Any information technology and systems (IT/S) is clearly identifiable through its hardware, software and brainware.

The fourth and the most important aspect of IT/S is:

4. IT/S support net. Also known as infrastructure, it refers to the necessary and requisite physical, organizational, administrative, and cultural networks, including work rules, task rules, requisite skills, work content, standards and measures, styles, culture and organizational patterns of IT/S deployment.

IT/S is the unity of hardware, software, brainware and the support net engaged towards achieving a purpose. If any of the four components is missing or inadequate, in business at least – we cannot speak of IT/S, regardless of what narrowly specialized magazines or experts claim.

That explains the need for IT/S Handbook: in business and management we have to go beyond the mere hardware, we have to know how to run things, not just how to purchase them or have them. In business we deal with systems.

So, why IT/S rather than just IT?

Information technology (IT) is captured in the above definition in a "stand-alone" fashion: there is an IT core (hardware, software, brainware) and its requisite IT support net. However, in contrast to mechanical technologies, information technologies cannot stand alone. Their effectiveness can only be realized when interconnected with other information technologies into networks or systems. So, IT/S refers to the networks of ITs. In the above terminology, IT/S deals not only with the core and its support, but with the meshing of different support nets into larger systems. This "meshing" is an art and science of its own, justifying the enrichment of IT into IT/S, like businesses into business networks and business networks into a global economy.

For this reason, we refer to IT/S throughout the entire Handbook and the selection of entries confirms our full awareness of both technology and systems of technologies as equal parts of professional inquiry.

3. IT/S Handbook

The Handbook of *Information Technology in Business* is going to be published by the International Thomson Business Press in September 1999. This encyclopedic volume is edited by Prof. Milan Zeleny of Fordham University and is customized for international management and business audiences.

Current publication information and ordering details can be obtained by e-mail from "info@itpuk.co.uk".

The Handbook, in spite of its title, deals with IT/S, i.e., Information Technology *and* Systems, thus including the *systems* or networks of information technologies as well.

Finally, business people can look up their ERP, OSS and BPR as well as their Linux, Firewalls or Digital Signature, and learn about them from 3000–4000 words articles written by top international experts.

4. Structure of the Handbook

This Handbook is less about the "hardware" and much more about the whats, the hows and the whys of IT/S. Here we present IT/S in the framework of business environments, application know-how, strategic support and future opportunities. We do not well on the past but try to open up the future.

To that purpose we have classified all entries into four basic sections:

1. IT/S business environment.
2. IT/S conceptual support.
3. IT/S hardware/software tools.
4. IT/S strategic applications.

Business environment section covers the conditions, circumstances and trends that motivate, stimulate and encourage the use of IT/S. *Conceptual support* presents selected concepts and techniques which are most suitable for further IT/S development and support. *Hardware/software tools* section presents all major tools for serious IT/S deployment. The *Strategic applications* section provides the necessary infrastructure or support network with selected strategic applications for IT/S function. Clearly, our Handbook is designed for executives, businessmen, managers and students, more than for hardware engineers and specialized programmers or "hackers".

The IT/S Handbook is fully international in its outlook, its authors come from many countries and large number of institutions, its entries (see Table 1) are writ-

Table 1
Examples of typical entries and subjects

Agile Manufacturing	Artificial Intelligence (AI)
Benchmarking and IT/S	Decision Support Systems (DSS)
Fuzzy Expert Systems	IT/S in Marketing
IT/S and Strategy	Just-in-time (JIT) Systems
Knowledge vs. Information	Optimization with IT/S
Knowledge Industry	IT/S in Forecasting
Global Strategic Planning	IT/S in Capital Markets
Information Revolution	IT/S in Marketing
Management Information Systems (MIS)	Marketing Information Systems
Enterprise Resources Planning (ERP)	Organizational Learning
Telecommunications	Teleworking
IT/S in Total Quality Management (TQM)	What is IT/S?
Crisis Management in Business	Artificial Life (AL)
Integrated Process Management (IPM)	Autopoiesis of Systems
High Technology	Systems Complexity
Business Process Reengineering (BPR)	Mass Customization
Fuzzy Logic and Control	Decision Making
New Economy	Cost/Benefit Analysis
Intellectual Property	Small-Business Networks
Project Management	Smart Cards
Technological Forecasting	Ethical Considerations
Optical Fibers	Household Informatics
Cellular Telephony	Computers
Modems Computer Vision	
Optical Scanning	Bar Coding
Information Overload	High-Definition TV
Optical Computing	Desktop Manufacturing
Military Informatics	Digital Telephony
Voice & Face Recognition	Intelligent Automation
Automatic Data Collection	Enterprise Technological Architecture
Fire-Wall Systems	Computer Graphics
Digital Payment Systems	Public Key Encryption
CAD/CAM Systems	Computer Graphics
Application Program Interfaces (API)	Open-Source Software (OSS)
Database Management Systems	Groupware
Graphic Languages	Intelligent Agents
Internet Search Engines	JAVA Languages
Neural Networks	Object-Oriented Analysis
On-Line Processing	Remote Software Installation
Relational Databases	Human–Computer Interaction (HCI)
IT/S Strategy and Strategic Thinking	E-Commerce
Electronic Point-of -Sale (EPOS)	Directory Services
Data Mining	Key Escrow
Disaster Recovery	Client–Server Computing
Computer-Aided Instruction (CAI)	Global Management Paradigm (GMP)
Computer-Supported Cooperative Networks	Computer-Aided Manufacturing
Critical Path Method (CPM)	Home Office
Multiple Criteria Decision Making (MCDM)	Educational Technology

Table 1
(Continued)

Expert Systems	Geographic Information Systems
Do-It-Yourself Investing	Electronic Mail (E-mail)
Telecommuting	Telepresence
Teleconferencing	Data Warehousing
Hypercompetition	IT/S Privacy Legislation
Information Superhighway	Distributed Computing
Network Organization	Management of Change
Copyright of Electronic Documents	Cooperative Computing
Outsourcing vs. Insourcing	The Y2K Problem
Ergonomics	Intracompany Markets
Information Policy	Internet
Intranets & Extranets	Local Area Networks (LAN)
National Information Infrastructure	Teams & Teamwork
World Wide Web (WWW)	Knowledge Workers
Wide Area Networks (WAN)	Distributed Enterprise
Knowledge Accounting	Digital Signature
Self-Service Society	Electronic Payments
Logistics and IT/S	Supply Chain and IT/S
E-engineering	Tradeoffs & Forecasting

ten in a language understood globally. The purpose is to bring the world executives, managers and business people up to the highest levels of IT/S information and knowledge.

All of the above topics are equally important for *both manufacturing and services*. As we can see, the distinction between the two is becoming irrelevant in the Internet era. Producers provide services, service corporations produce real and virtual products, producers and consumers merge into “prosumers”, and disintermediation, do-it-yourself and self-service reign supreme. “Service industry” is the right oxymoron here, reflecting the change. One would have to think very hard to come up with a single real distinction between production and services in the real world of business. Internet, mass customization, outsourcing, etc., are for everybody and everybody is responsible for using them. Unless they wish to fade away. . .

Clearly, no handbook can aspire to cover all that is relevant in the IT/S area. The topics and their importance are changing and shifting daily. New labels are emerging and fading, there is a great conceptual churning going on. No matter how rapid the change, it will never slow down, it can only gain speed, add abruptness and discontinuities, redefine the ways we do things and also the things we do. Many are being left behind, in the dust of outdated, rusty and irrelevant knowledge, experience and habits. Lifelong learning and learning to learn are the only alternatives.

Imagine what would happen should your own business miss out on a few or even just one of the above IT/S topics: global hypercompetition would mass-customize you for its own virtual e-breakfast.

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