Chapter 2. ICT professionals

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Introduction

- Facts
  - Computer science is a very recent science.
  - It has considerable **socioeconomic impact**:
    - Information Technology extends to multiple facets of our lives:
      - In our work, our leisure, …
    - Information Technology uses
      - From human life support to entertainment applications
    - In all areas of human activity, there is a need to seek out competent Information Technology professionals.
  - It is necessary to analyse this phenomenon from different points of view:
    - **Countries**
      - Setting strategies, employment policies, legislative regulations, …
    - **Businesses**
      - Organisational structure, human resources strategy
    - **Professionals**
      - Adapt to the future, we must take control of our professional future
    - **Clients**
      - Finding a professional best suited to meet your needs
  - Much remains to be explored (new areas and possibilities).

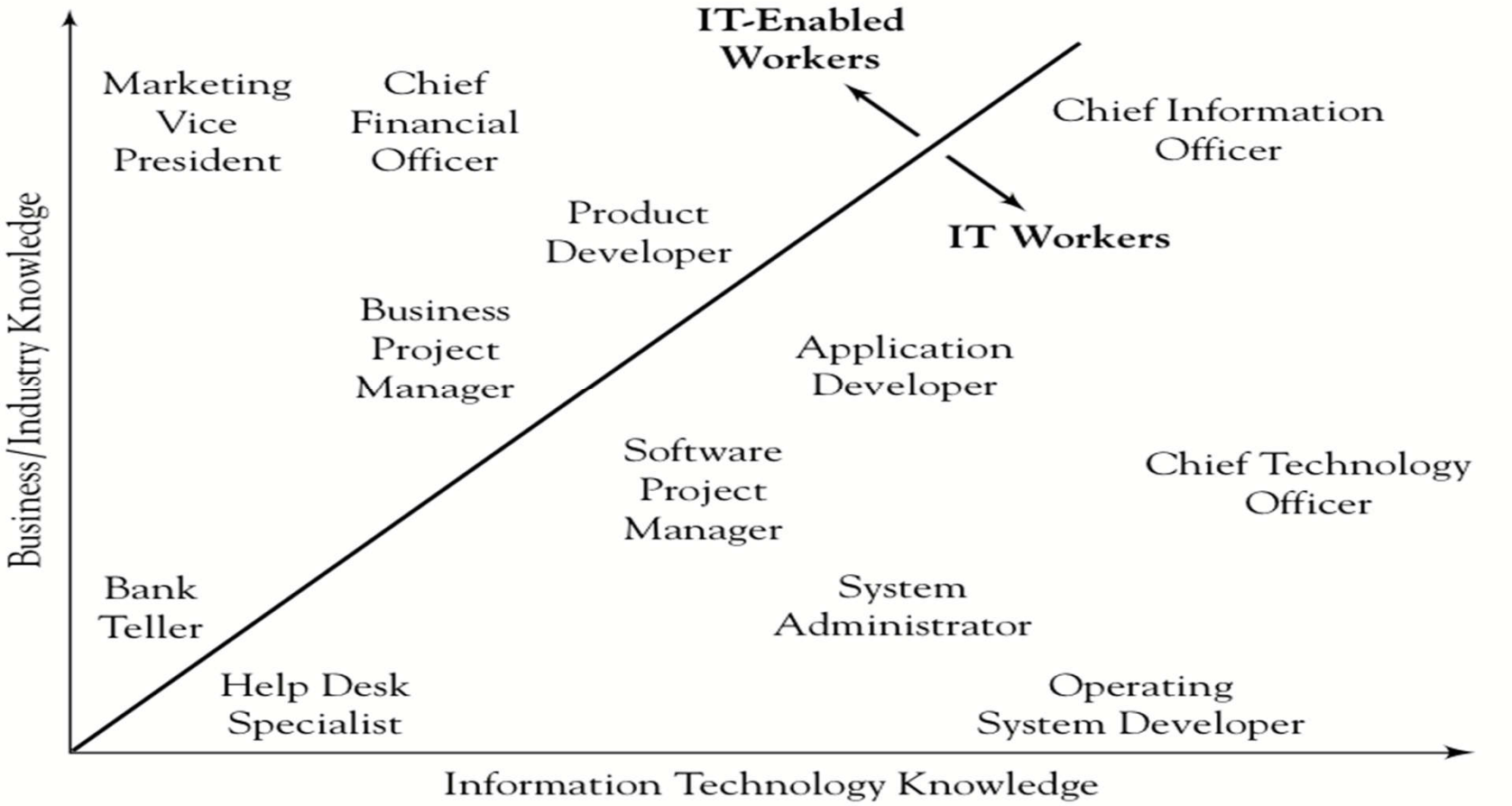
Introduction

- In this context, there are several questions to be answered:
  - Should all these **emerging profiles** be considered as profiles within the computing sector?
  - How can we **classify** those we consider to be profiles in computing?
  - What **social network** supports these professionals?
  - **Legal responsibilities** must be defined:
    - In which cases is the work illegal (process or outcome)?
    - When is there negligence?
    - How to quantify the impact of an error?
  - How do we **select** a person to perform a job and what is his or her **responsibility**?

Ancient Egyptian Scribe

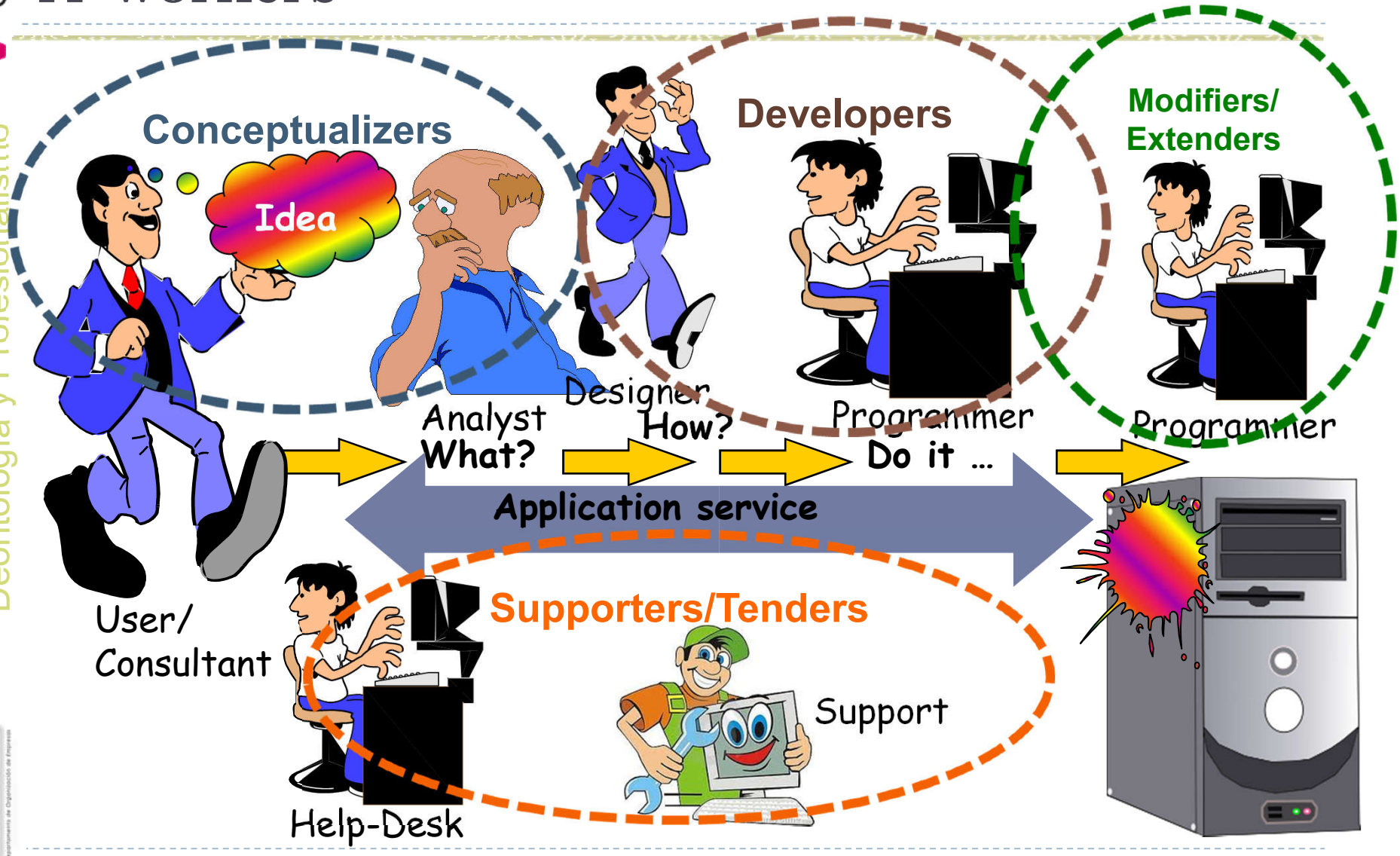
- **Early ICT**
- **The roles of the scribe**
  - Tax Collectors
  - Law administrators
  - Writing letters and legal documents such as marriage contracts
  - Recording harvests, food supply and distribution
  - Documenting rainfall and water levels of the Nile
  - Controlling the food supply and distribution
  - Conducting censuses
  - Overseeing the construction of buildings including planning, surveying and supervising
- Writing was a highly regarded skill and closely associated with the divine.
  - Today it is something usual!

Computer professionals or advanced computer users?



Source: Computing Research Association, Intersociety Study Group on Information Technology Workers, published in Freeman and Aspray, 1999.

IT workers


Conceptualizers
Idea
Developers
Modifiers/
Extenders
Designer
Analyst
What?
How?
Programmer
Do it ...
Programmer
Application service
User/
Consultant
Supporters/Tenders
Support
Help-Desk

IT workers: Categorisation

- **Conceptualisers**
  - Those who conceive of and sketch out the basic nature of a computer system artifact
    - Entrepreneur, Product designer, Research engineer, Systems analyst, Computer science researcher, Requirements analyst, System architect
- **Developers**
  - Those who work on specifying, designing, constructing, and testing an information technology artifact
    - System designer, Programmer, Software engineer, Tester, Computer engineer, Microprocessor designer, Chip designer
- **Modifiers/extenders**
  - Those who modify or add on to an information technology artifact
    - Maintenance programmer, Programmer, Software engineer, Computer engineer, Database administrator
- **Supporters/tenders**
  - Those who deliver, install, operate, maintain, or repair an information technology artifact
    - System consultant, Customer support specialist, Help desk specialist, Hardware maintenance specialist, Network installer, Network administrator

International Standard Classification of Occupations

- **International Labor Organization (ILO)**
  - http://www.ilo.org/global/about-the-ilo/lang--en/index.htm
  - The ILO is the international organization responsible for drawing up and overseeing international labor standards. It is the only 'tripartite' United Nations agency that brings together representatives of governments, employers and workers to jointly shape policies and programmes promoting Decent Work for all. This unique arrangement gives the ILO an edge in incorporating 'real world' knowledge about employment and work.
- **ISCO-08: International Standard Classification of Occupations**

2 Professionals (ISCO)

- 25 **Information and communications technology professionals**
  - 251 **Software and applications developers and analysts**
    - 2511 Systems analysts
    - 2512 Software developers
    - 2513 Web and multimedia developers
    - 2514 Applications programmers
    - 2519 Software and applications developers and analysts not elsewhere classified

  - 252 **Database and network professionals**
    - 2521 Database designers and administrators
    - 2522 Systems administrators
    - 2523 Computer network professionals
    - 2529 Database and network professionals not elsewhere classified

3 Technicians and associate professionals

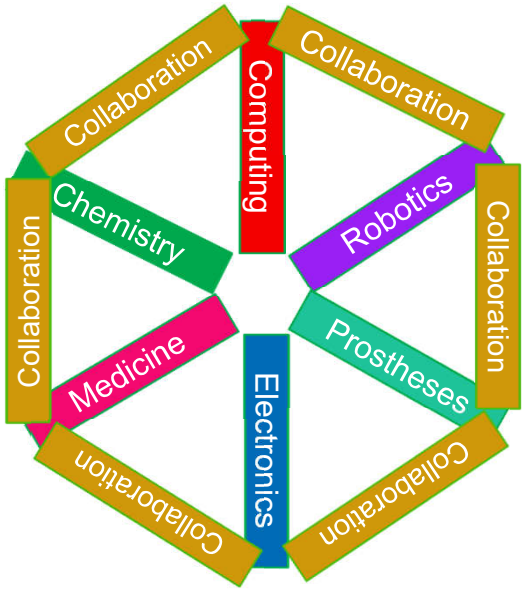
- 35 **Information and communications technicians**
  - 351 **Information and communications technology operations and user support technicians**
    - 3511 Information and communications technology operations technicians
    - 3512 Information and communications technology user support technicians
    - 3513 Computer network and systems technicians
    - 3514 Web technicians
  - 352 **Telecommunications and broadcasting technicians**
    - 3521 Broadcasting and audio-visual technicians
    - 3522 Telecommunications engineering technicians

T-shaped skills

- Computer professionals become a basic element of effective group work.
- **Interdisciplinary teams** compete more effectively and need individuals known as T-shaped people.
- The concept of T-shaped skills, or T-shaped persons is a metaphor used in job recruitment to describe the abilities of persons in the workforce.
  - "The hunt is on for the Renaissance Man of computing," in The Independent, September 17, 1991.

T-shaped skills

- The **vertical bar** on the *T* represents the depth of related skills as **expertise in a single field**,
- whereas the **horizontal bar** is the **ability to collaborate** across disciplines with experts in other areas, and to apply knowledge in areas of expertise other than their own.



ICT in business sectors

- Banking
  - Information Systems; automation: ATM (Automatic Teller Machines), ticket counting machines, …; security: video, cryptography, …
- Health
  - Clinical analysis equipment; robotic prostheses; telemedicine; expert systems; image processing: X-ray, MRI, …
- Metal mechanic
  - Robotic production machinery; network and computer resiliency in hostile environments, …
- Aviation
  - Air traffic control; airport surface management; airport emergency planning, …
- Traffic
  - Traffic lights, …
- …

New ICT-based business areas

- Or ones which will drastically change…
- At first, computing professionals are recruited for all business roles, then adjustments should be made.
- Examples:
  - Videogames
  - Business communication (Web-based, Web 2.0, …)
    - E-commerce, online social networks, “community manager”
  - Film production (Animated films, 3D films, …)
  - Music (Electronic music, DJ mixer, …)
  - Embedded software
    - Camera lets you focus after you take a picture
    - Ergonomic chairs to fit your specific body's natural posture
    - Avionics, …

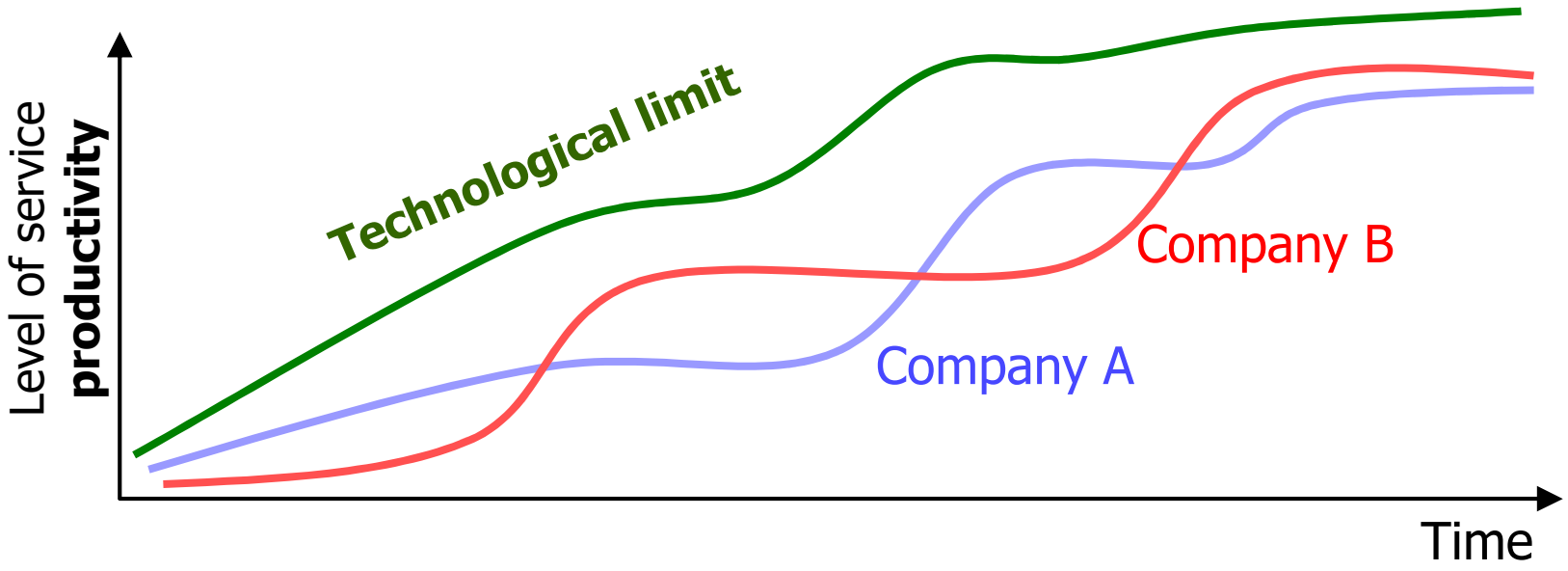
About the ICT industry

- Hardware, consulting, software packages, ERP providers, custom software development, software maintenance, free software
- Many management jobs are held by ICT professionals.
- **ICT jobs**
  - Managers of ICT companies
  - ICT Entrepreneurs
  - ICT Innovators
  - ICT Marketing
  - ICT Project Managers
  - ICT Human Resources
  - ICT Logistics
  - ICT Customer Services

ICT in organizations

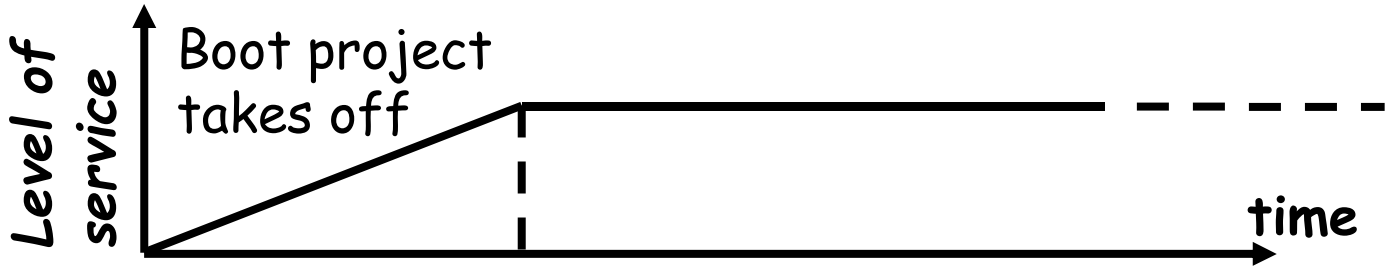
- Business management is one of the oldest clients in the computing market.
- New technologies: the need for vigilance
  - Different service levels
  - Professionals are required in this context.
    - Legal aspects

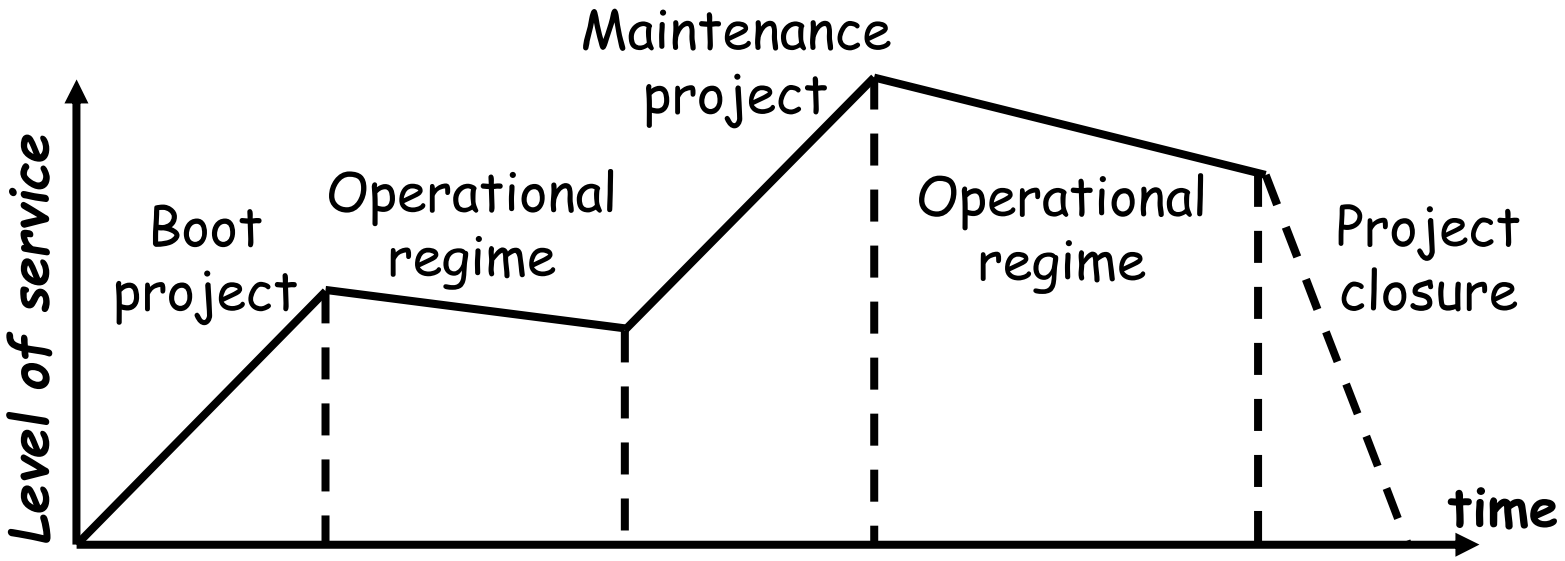
Technological vigilance



- Technological progress is an important variable:
  - The green curve marks the limit of technology.
  - The other curves compare the situation of two companies in the same sector.
- Technology gap
  - Time lag between the appearance of a new technology and its acquisition

Level of service: process and project





List of the largest software companies

Company	Headquarters (region)	Software/services revenue-millions
IBM	Armonk, NY	$78,659
Microsoft	Redmond, WA (Seattle)	$54.426
HP	Palo Alto, CA (Silicon Valley)	$38,520
Oracle Corporation	Redwood Shores, CA (Silicon Valley)	$24,530
Accenture	Dublin, Ireland	$21,551
EMC Corporation	Hopkinton, MA (Boston)	$17,015
SAP AG	Walldorf, Germany	$16,539
Computer Sciences Corporation	Falls Church, VA	$16,128
NTT Data Corporation	Tokyo, Japan	$12,290
Hitachi	Tokyo, Japan	$12,254

Source: http://en.wikipedia.org/wiki/List_of_the_largest_software_companies

The role ICT professionals play in business

- **Technological support**
  - Identify, analyze and innovate major business processes
    - Consultants, business process analysts, …
  - Design, development and deployment of applications
  - Provide timely maintenance, when minor improvements are required in the current system
  - Give support during in-use stability period

- **Legal support**
  - "Legal consultant"
    - Facing new challenges or potentially unclear situations
  - "Judicial experts"
    - Expert reports, therefore, must be presented in a way that will assist the judge in identifying the relevant key issues and conclusions in a very short time.

ICT professional profiles

- The professional profiles in this workspace are varied, and it is even difficult to classify some practitioners:
  - For instance: Is a Web Art Director a designer, an artist, an advertiser, …?
- In recent years, there has been an international clamor to regulate the profession in some way:
  - EUCIP, BCS, …
  - In the next class, we will explore some of these profiles in detail.

EUCIP
European Certification of Informatics Professionals

ICT professional associations

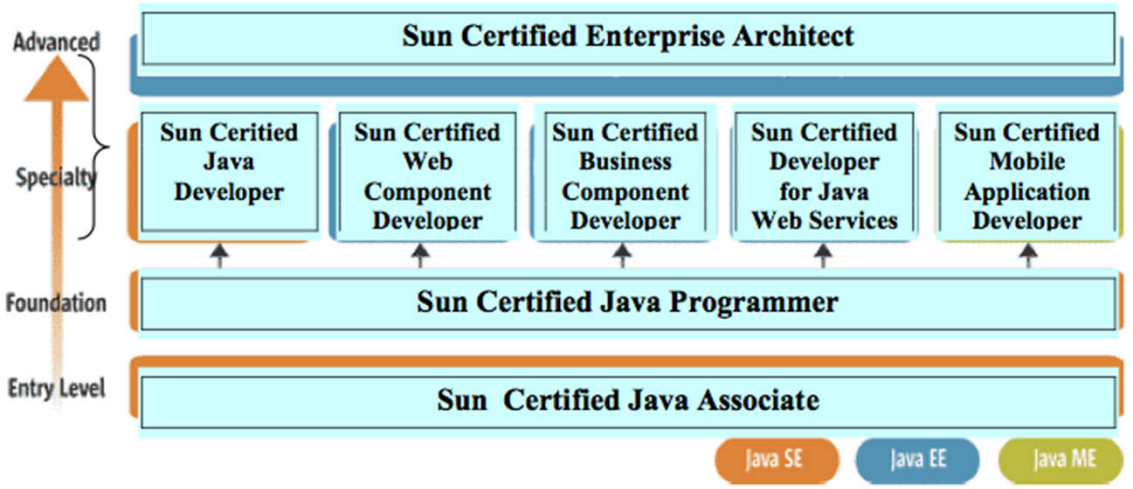
- **Professional associations around the world**
  - CEPIS (Council of European Professional Informatics Societies)
  - IEEE, ACM
  - …
- **Professional associations in Spain**
  - Professional associations
    - ATI (Asociación de Técnicos de Informática)
  - Official associations
    - But without recognized professional skills
    - And not accompanied by European directives

ICT social networks and monographic associations

- **Social networks**
  - Today, many experts are available through social networks, either with their own blogs or by participating in others'.
- **Monographic associations**
  - In many cases, due to the lack of regulation of the profession, specific associations are emerging for a type of work, tool or technology.
    - Examples: Users Group (SAP), IFPUG (software metric), …
- Generic associations which can be seen as monothematic from the point of view of ICT professionals
  - Example: Project Management
    - PMI (Project Management Institute), IPMA (International Project Management Association)

Training in the field of ICT

- Vocational training
  - Middle-level Training Cycles and Superior-level Training Cycles
- Higher education
  - Educational resources would be developed based on the ACM/IEEE-CS computing curriculum.
- Non-formal training
  - Associations: ISACA, BCS, CompTIA (Computing Technology Industry Association), …
  - Private companies: Microsoft, Sun, Oracle, Cisco, IBM
- Example:



Magazines and publishers covering ICT topics

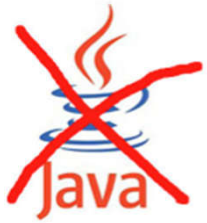
- Magazines geared to the general public
  - PC-World
  - Dr. Doob's: http://en.wikipedia.org/wiki/Dr._Dobb%27s_Journal
- Specialised magazines
  - Novatica (ATI), IT Professional (IEEE-CS)
- Historical and current publishers
  - Yourdon Press, ACM Press
  - Large publishers cover the disciplines of ICT:
    - McGraw-Hill, Springer, Pearson Education
  - While others address specific ICT topics:
    - Dorset House, O'Reilly, Auerbach Publications (CRC Press)

The standards for a global ICT profession

- De facto standard
  - A custom, convention, product, or system that has achieved a dominant position by public acceptance or market forces.
    - Java and C# programming languages
- UNE standards
  - UNE (Una Norma Española)
  - AENOR (Asociación Española de Normalización y Certificación)
  - ISO member
- ISO standards
  - International Organization for Standardization: Network of the national standards institutes of 162 countries, one member per country
    - Well known standard:
      - ISO/IEC 27001: Information security management

Oracle sues Google over Java use in Android

- http://www.computerworld.com/s/article/9180678/Update_Oracle_sues_Google_over_Java_use_in_Android
  - Oracle has filed a lawsuit against Google, claiming that its Android phone software infringes Oracle patents and copyrights related to Java.
  - “In developing Android, Google knowingly, directly and repeatedly infringed Oracle's Java-related intellectual property. This lawsuit seeks appropriate remedies for their infringement.”



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