#### Texto 1

“**Organisation and management of information systems**

Definition, structure, and efficient sizing of information systems.

Information in organisations. Information-based organisations. The Administration as a specific case of this type of organisation.

ICT governance models. Organisation and operational instruments of information and communications technologies in the General State Administration and its public bodies. The digital transformation of the General State Administration.

Reuse of information in the public sector in Europe and Spain. Role of ICT in the implementation of open data and transparency policies.

Strategy, objectives and functions of the information systems and technologies manager and information technology manager in the Administration.

Planning and management control tools for the role of the systems and information technology manager in the Administration. The dashboard.

Organisation and operation of an information systems centre. Development, maintenance, systems, databases, communications, security, quality, microcomputing and user support functions.

Management and administration of information technology projects. Strategic planning, resource management, project monitoring, decision-making.

Predictive methodologies for project management: GANTT, PERT.

Agile methodologies for project management. Lean methodologies.

IT auditing. Concept and content. Administration, planning, organisation, technical infrastructure and operational practices.

Management of public procurement of information technology.

System acquisition: study of alternatives, feasibility assessment and decision-making.

Basic decision-making alternatives in the field of hardware and software equipment.

The profitability of investments in information technology projects.

The legal protection of computer programs. Methods for verification of the legality and control of software.

Accessibility and usability. W3C. Universal design. Adaptive web design.

System interoperability (1). The National Interoperability Scheme. Dimensions of interoperability.

System interoperability (2). Technical Interoperability Standards. Interoperability of electronic documents and files and standards for data exchange between public administrations.

System security (1). Risk analysis and management. Tools.

System security (2). The National Security Scheme. Compliance with the National Security Scheme. National Security Strategy. CCN-STIC.

Infrastructures, common and shared services for interoperability between public administrations. Cl@ve, the Citizen Folder, the Registry Interconnection System, the Data Intermediation Platform, and other services.

International and national standardisation organisations. Conformity testing and certification. The establishment of conformity testing services.

Plans and Actions of the Digital Agenda for Spain. Description, structure and objectives of the plans. The Digital Single Market.”

#### Texto 2

“**Basic technology**

High-performance systems. Grid Computing. Mainframe.

Departmental equipment. Servers. Security measures for departmental equipment and servers. Data processing centres: design, implementation and management.

Personal PCs and mobile devices. Connectivity of personal devices. Security measures and management for personal equipment and mobile devices.

Cloud computing. IaaS, PaaS, SaaS. Private, public and hybrid clouds.

Storage systems for large and departmental systems. Devices for multimedia information processing. Storage virtualisation. Backups.

Types of multi-user information systems. Large, medium and small systems. Data and application servers. Server virtualisation.

Cooperative processing and client-server architecture. SOA architecture.

Concepts and fundamentals of operating systems. Evolution and trends.

UNIX-LINUX operating systems. Fundamentals, administration, installation, management.

Microsoft operating systems. Fundamentals, administration, installation, management.

Basic concepts of other operating systems: OS X, iOS, Android, z/OS. Operating systems for mobile devices.

Database management systems (DBMS). The ANSI reference model.

The relational model. SQL language. Rules and standards for interoperability between relational database managers.

Web development architecture. Front-end web development. Client scripts. Frameworks. UX. Server-side web development, database connection and interconnection with systems and services.

Microsoft.NET development environment.

JAVA development environment.

PHP development environment.

Open-source software. Free software. Basic concepts. Applications in office automation and web servers.

Artificial intelligence: Purpose and classification: machine learning, deep learning, NLP, computer vision, expert systems, robotics, and intelligent agents. Ethical aspects.

Data science. Data modelling process lifecycle (ETL, pre-processing, modelling, validation, MLops). Statistical fundamentals. Tools and languages. Data visualisation.

CRM (Customer Relationship Management) and ERP (Enterprise Resource Planning) systems. Generation of reports for management.

E-learning: concepts, tools, implementation and standardisation systems.

Geographic information systems. Basic concepts and functionality.

Data exploitation technologies and systems: data lake, data warehouse, lakehouse, data fabric, data mesh, technologies for confidentiality protection (PET). Data sharing environments: data spaces, technological and organisational aspects.

Data strategy. Data governance, data management and data quality management. Technologies and standards for describing catalogues and data sets: semantics and ontologies.

Languages and tools for using global networks. HTML, CSS and XML. Web browsers and compatibility with standards.

E-commerce. Payment mechanisms. Business management. Electronic invoicing. Payment gateways.

Encryption. Symmetric and asymmetric encryption algorithms. The hash function. Notarisation.

Electronic identification and signature (1) European and national framework. Digital certificates. Private, public and agreed keys. Electronic signature formats. Directory protocols based on LDAP and X.500. Other services.

Electronic identification and signature (2) Provision of public and private services. Public key infrastructure (PKI). Identification and signature mechanisms: smart cards, electronic ID cards, biometric mechanisms.

Adaptation of applications and environments to the requirements of data protection regulations according to security levels. Encryption and auditing tools.

Image processing. Digitisation and printing technologies. 3D printing.

Optical character recognition (OCR, ICR). Biometric recognition.

Features of blockchain, Szavo glossary, types of networks and consensus algorithms, smart contracts. The European EBP consortium and the construction of the EBSI infrastructure.”

#### Texto 3

“**Information systems engineering**

The life cycle of information systems. Life cycle models.

Strategic planning for information and communications systems. The information systems plan.

Functional analysis of systems, use cases and user stories. System development methodologies. Agile methodologies: Scrum and Kanban.

System domain analysis: domain modelling, entity-relationship modelling and class modelling.

Dynamic systems analysis: process modelling, dynamic modelling and BPMN (Business Process Model and Notation).

Analysis of non-functional aspects: performance, security, privacy.

Architectural design of systems. Deployment diagrams.

Software design techniques. Layered design and design patterns.

Prototyping in systems development. Application interface design.

The Metrica information systems planning and development methodology.

Testing and quality assurance processes in software development. Planning, testing strategy and standards. Software testing levels, techniques and tools. Software acceptance criteria.

Continuous integration models. Tools and their applications.

Software quality metrics and evaluation. Implementation of the quality function.

Estimating resources and effort in the development of information systems.

Application migration in the context of dimensional adjustment and technical obsolescence processes. Configuration and version management. Environment management.

System maintenance. Predictive, adaptive and corrective maintenance. Maintenance planning and management.

Change management in software development projects. Configuration and version management. Environment management.

Quality in information services. The EFQM Model and the ISO 9004 Guide for Services.

Document management. Content management. Widely implemented CMS and DMS technologies.

Information retrieval systems. Policies, procedures and methods for information preservation.

ICT planning and control: ICT service and infrastructure management, ICT value management. Service level agreements. Incident management. Conceptual bases of ITIL (IT Infrastructure Library) and CoBIT (Control Objectives for Information and Related Technology), control objectives and metrics.

Emerging technologies. Concept. Classification, legal aspects and applications.”

#### Texto 4

“**Networks, communications and Internet**

Telecommunications networks. Concepts. Transmission media. Circuit and packet switching. Routing protocols. Access infrastructures. Network interconnection. Quality of service.

The Internet and basic services.

Cabling systems and network interconnection equipment.

The ISO Open Systems Interconnection (OSI) reference model: architecture, layers, interfaces, protocols, addressing and routing.

Access technologies: fibre (GPON, FTTH), mobile (LTE), wireless.

Transport networks: JDSxWDM, MPLS. Aggregation networks: ATM, Carrier Ethernet-VPLS (H-VPLS).

Wireless networks: the IEEE 802.11 standard. Functional and technical characteristics. Spectrum expansion systems. Access systems. Authentication. Modes of operation. Bluetooth. Security, regulatory standards.

IP networks: network architecture, routing and quality of service. IPv4 - IPv6 transition and coexistence. Specific IPv6 functionalities.

Next-generation networks and converged services (NGN/IMS). VoIP, ToIP and unified communications.

Digital transformation and Industry 4.0: smart cities. Internet of Things (IoT).

Local area networks. Architecture. Types. Transmission media. Access methods. Interconnection devices. Device management. LAN network administration. User management in local networks. Traffic monitoring and control. SNMP management. Configuration and management of virtual networks (VLAN). Wide area networks.

Intranet and Extranet network architecture. Concept, structure and characteristics. Their implementation in organisations. Layer model: application servers, data servers, server farms.

Public data transmission networks. The SARA network. The sTESTA network. Network planning and management.

Cable telecommunications (CATV). Cable network structure. Market operators. Network services.

Email. Messaging services. Directory services.

Mobile communications. Generations of mobile phone technologies.

Mobile applications. Features, technologies, distribution and trends.

Network security. Types of attacks and tools for their prevention: firewalls, access and intrusion control, cryptographic techniques, etc. Specific measures for mobile communications.

Application-level security. Types of attacks and protection of web services, databases and user interfaces.

Cybersecurity. The national cybersecurity strategy.

Business continuity management. Business Continuity and Contingency Plans.

Telecommunications regulatory standards. The National Commission for Markets and Competition (CNMC): organisation, functions and competence in the field of telecommunications.

Video conferencing systems. Group work tools. Dimensioning and quality of service in communications and conditioning of rooms and equipment. Video streaming.

Remote access to corporate systems: identity management, single sign-on and teleworking.

System and data centre virtualisation. Workstation virtualisation. Windows terminal and Linux server models.

Collaborative work tools and social networks. The State Administration's Digital Communication Guide.”