Competency repository for the domain of Information Systems Design and Implementation

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Domain: Design and implementation of information systems in organizations

Goals :

- Draw up the competencies that will serve as a guide for the development of masters training in the domain

- Allow a professional to assess his/her competencies in the domain

- Enable a company to improve the competencies of its teams in the domain through training and recruitment

Structuration principles:

- Identification of competencies from the activities of trades in the domain

- Hierarchical organization based on a composition relationship with 4 competency levels (general competencies, main competencies, specific competencies, elementary competencies)

- Expression of the level of ability through action verbs respecting the BLOOM classification; these verbs serve as a guide for the assessment of competency acquisition; they allow the expression of knowledge, know-how, interpersonal competencies

- Choice of general competencies (roots of hierarchies) according to precise criteria allowing to break down the domain into large blocks of competencies; distinction between higher general competencies in direct connection with the trades and primary general competencies which support the previous

- Explicit representation of prerequisites

Main features of the repository:

- 10 general competencies (5 superior general competencies and 5 primary general competencies)

- 60 main competencies

- 140 specific competencies

- 800 elementary competencies

Presentation of the 10 general competencies:

Domain	Design and implementation of information systems in organizations
Superior general competencies	PS-Managing the information system at the strategic level
	PO-Managing the information system at the operational level
	CD-Designing and implementing computer applications and systems
	FO-Maintaining the proper functioning of IT infrastructures and implementing their evolutions
	SS-Implementing an information system in a specific sector
Primary general competencies	I-Choosing and using models, methods and techniques of computer science
	G-Analyzing functioning of a company and interactions with its environment
	M-Implementing mathematical models to evaluate or optimize a product, a process, a service
	CP-Evaluating and improving interpersonal competencies
	IE-Developing innovation, research and entrepreneurship projects

Presentation of the repository:

- The repository is presented into 10 tables, one for each general competency.
- The competencies of the first three levels are indexed in order to permit installation of prerequisites.

PS-Managing the information system at the strategic level			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Car-Elaborating a global IS map		• Explaining the interest of a map for IS • Explaining the different views / layers to represent a map for IS • Comparing different formalisms for representing a map for IS • Collecting the elements participating in a map for IS • Elaborating a map for an IS using a software tool • Updating a map after each evolution while keeping the traceability information	
Fes- Formalize a solution for a strategic evolution	a- Characterizing a strategic need in its context	• Analyzing a strategic evolution posed by business actors and its causes • Characterizing a strategic need • Characterizing the constraints to be respected in order to implement a strategic need	G-Str, G-Dof, CD-Sbe
	b- Studying potential solutions to meet a strategic need and choose a solution	• Searching for potential solutions for a strategic need respecting the constraints • Developing criteria for evaluating solutions (expected benefits, costs, risks, compliance with constraints, implementation difficulties, etc.) for a strategic need • Evaluating a solution for a strategic need • Choosing a solution for a strategic need	G, PO-Msi-d, CP-Car-f
	c- Developing a macroscopic formalization of a solution to meet a strategic need	• Redesigning existing business processes impacted by a strategic evolution solution (performance improvement, introduction of new operations, automation of manual operations, ...) • Designing the new business processes required by a strategic evolution solution • Characterizing the objects that will be used, modified, created by the processes to implement a strategic evolution solution • Identifying the applications and infrastructures that will be deleted, modified, created during the implementation of a strategic evolution solution • Inserting a strategic evolution solution in the form of a new project or a new program of projects in the portfolio of strategic projects	CD-Mod, PS-Car
Oes-Studying opportunity of typical solutions of strategic evolution	a-Using an ERP software	• Explaining the advantages and disadvantages of an ERP • Explaining the organization of an ERP, the challenges of its configuration and the necessity of additional programming to adapt it to the business needs • Identifying constraints to install and operate an ERP • Identifying ERP that can take into account expressed needs • Developing criteria for evaluating an ERP (functional coverage, possibility of adaptation or complementation, cost of purchase or license, estimated cost of installation or deployment, risks, etc.) • Choosing an ERP using evaluation criteria	G
	b- Unifying separate information systems	• Explaining situations where it is necessary to unify separate information systems • Explaining different approaches to unify separate information systems • Explaining criteria to choose an approach for the unification of separate information systems • Explaining the implementation of the unification process of two separate information systems • Explaining the implementation of the unification of the hardware and software infrastructures of two separate information systems	G
	c- Outsourcing activities and services	• Explaining principle of outsourcing activities, its advantages and disadvantages • Describing the phases of an outsourcing project	G

		• Explaining important clauses of an outsourcing contract and the need to provide for a possibility of reversibility	
	d-Using a decisional system	• Identifying criteria to assess the interest of a decision-making system • Explaining how to define the perimeter of a decision system • Explaining requirements and prerequisites for installing a decision system • Identifying possible solutions to install a decision system • Choosing a perimeter and a solution to install a decision system	G
Gps-Managing portfolio of strategic projects		• Explaining principles to manage a portfolio of strategic projects • Defining criteria to prioritize strategic projects in a portfolio • Elaborating a planning of strategic projects in a portfolio taking into account availability of resources and interdependencies between projects • Deciding on the launch of a strategic project in agreement with business actors of the company • Controlling progression of strategic projects and compliance with objectives • Reconsidering planning and/or objective of a strategic project • Using PPM (Project Portfolio Management) software	M-Rop-a, M-Gra, G-Str, CP-Car
Gcc-Managing strategic change and ensure the continuity of business processes		•Assessing the potential impacts of a strategic change • Defining and implementing actions to support a strategic change • Maintaining the continuity of business processes during a strategic change	G
Gco-Managing knowledge	a-Identifying forms of knowledge and issues of knowledge management in organizations	• Identifying the different types of knowledge (skills, processes, models, etc.) and the various forms of knowledge (explicit, tacit, etc.) that organizations use • Identifying the different sources of internal and external knowledge within organizations • Explain the objectives of knowledge management within organizations	G
	b-Formalizing knowledge	• Explaining forms of representation for knowledge • Producing ontology for representing knowledge of an organization • Producing a semi-formal knowledge repository (ex: MASK) for an organization • Using query languages to query a knowledge repository	I-Bdd, M-Log
	c-Implementing a knowledge management system	• Explaining the cycle of knowledge management: identify, preserve, update, share, develop • Explaining knowledge sharing strategies and models • Identifying main knowledge management tools and their respective characteristics • Using a tool to manage knowledge	I-Bdd
Gdd-Organizing data governance		• Identifying the role of data in the digital transformation of company • Identifying the roles and responsibilities of the actors involved in data governance • Analyzing the impact of law or regulation relating to data • Explaining data governance procedures • Explaining the concept of enterprise data repository and metadata • Using a data repository management tool	I-Bdd

PO-Managing the information system at the operational level			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Eai-Managing requests for evolution of applications and infrastructures	a-Designing a solution for a request for changes in applications and infrastructures	• Formalizing request for evolution of applications or infrastructures • Researching and evaluating potential solutions for request for evolution of applications or infrastructures • Choosing a solution for a request for evolution of applications or infrastructures • Inserting a solution in the form of a project into the portfolio of applications and infrastructure projects	PO-Msi-d
	b-Managing the portfolio of application projects and infrastructure projects	• Elaborating a planning for the projects of a portfolio taking into account availability of resources and interdependencies between all projects (strategic projects, application projects, infrastructure projects) • Deciding to launch a project in agreement with the stakeholders • Controlling progression of projects and compliance with objectives • Reconsidering planning and/or objective of a project • Using PPM (Project Portfolio Management) software	M-Rop-a, M-Gra, CP-Car
Sai-Studying typical solutions for evolution of applications and infrastructures	a-Explaining the iso-functional reengineering of an application	• Explaining the objectives of an iso-functional reengineering of an application • Explaining the risk factors of an iso-functional reengineering of an application • Explaining the solutions to implement an iso-functional reengineering of an application	
	b-Explaining migration of infrastructures	• Explaining the objectives of infrastructure migration • Explaining the risk factors for infrastructure migration • Explaining the solutions to carry out infrastructure migration	
Ppr-Managing a project	a-Analyzing the objectives and constraints of a project	• Checking and analyzing the specifications of a project • Identifying deliverables and time and cost constraints Identifying constraints relative to development methods and techniques • Identifying performance criteria • Identifying control procedures imposed by stakeholders • Identifying constraints relative to sustainable development	PO-Msi-d
	b-Breaking down a project into tasks	• Elaborating a decomposition of a project into homogeneous tasks • Elaborating links and dependencies between the tasks of a project	
	c-Choosing a project management methodology	• Explaining and comparing standard and agile methodologies for project management • Choosing a project management methodology according to context and constraints	
	d-Elaborating and watching a schedule for a project	• Assigning resources for each task of a project • Estimating the times and costs for each task of a project • Establishing an initial planning of a project • Using project management software to follow the progression of a project and the evolution of indicators • Adjusting the allocation of resources in the event of a project drift	M-Gra
	e-Managing the risks of a project	• Evaluating the probability and the consequences of the main risks that could affect a project • Identifying potential solutions to reduce the consequences of project risks • Capitalizing knowledge to improve identification of the risks of projects and parades	
	f-Coordinating the project team	• Defining clearly roles and responsibilities within a project • Solving misunderstandings and conflicts that may arise within the project team	CP-Car
	g-Communicating with the client of a project	• Elaborating regularly summary statements to show for the client the progression of a project • Implementing user training and support • Establishing documentation to provide to users • Checking deliverables	CP-Car

Qua-Organizing IS quality	a-Identifying potential approaches for IS quality	• Identifying how ISO 9001 standard can contribute to the quality of the IS • Identifying what are the recommendations of IS specific standards (CMMI, ITIL, COBIT,…) relating to IS quality • Explaining how to combine recommendations of norms and standards to contribute to the IS quality	
	b-Defining an IS quality policy	• Identifying the axes and objects of the IS whose quality must be controlled • Establishing quality indicators for the IS • Defining actions to continuously improve the quality of the IS • Assigning responsibilities for IS quality • Implementing awareness and training actions relating to the quality of IS	
	c-Controlling IS quality	• Elaborating a dashboard for monitoring IS quality indicators • Carrying out IS quality audits • Updating an IS quality policy based on audit results and dashboard observations	G-Aud
Ssi-Organizing IS security	a- Defining an IS security policy and the terms of its application	• Evaluating the vulnerabilities of the IS and the risks involved • Defining the IS security policy based on security standards and methods • Establishing prevention and remediation plans • Developing and promoting the IS security charter • Validating IS security tools • Watching legal and technical evolutions for IS security • Checking compliance with IS security policy • Elaborating the economic assessment of IS security	I-Sec, FO-Gin-d, G-Aud
	b-Analyzing incident history and updating IS security policy	• Analyzing statistics relating to incidents and their remediation • Controlling the implementation of IS security audits • Using results of analyzes and audits to readjust the IS security policy	M-Sta-a, G-Aud
Msi-Managing the SI	a-Managing human resources	• Identify the skills to be reinforced • Defining the training and recruitments to be carried out in order to strengthen skills	G-Dof
	b- Managing financial resources	• Planning investments for the IS • Defining a purchasing policy for the IS • Managing IS budget	G-Dof, G-Out
	c-Defining contract policy	• Defining the services that may involve contracts • Defining the rules for establishing a contract (procedure to be followed, preliminary estimate, choice of beneficiary, etc.) • Defining standard clauses of a contract • Supervising the execution of a contract	G-Jur
	d-Organizing and supervising IS activities	• Implementing good practices from IS governance frameworks (COBIT, ITIL, TOGAF) • Promoting sustainable development in all IS activities • Supervising IS activities with indicators and dashboards • Auditing the IS	G-Out, G-Aud

CD-Designing and implementing solutions			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Mod-Using modeling languages	a-Modeling with the Entities Associations (EA) model	Explaining the modeling of entities and associations with the basic EA model Explaining the modeling of generalized / specialized entities with the extended EA model Using the EA model to represent a conceptual data schema	
	b-Modeling with UML	• Explaining the modeling principles with UML • Using the different UML diagrams • Using OCL to specify conditions and constraints not supported by graphical notations • Explaining the place of UML in an object oriented development approach • Identifying the tools allowing a UML modeling, their strengths and their weaknesses • Using a tool to build a UML model	
	c-Modeling with BPM	• Defining what a business process is • Explaining BPMN notations and diagrams to represent a business process • Creating business process models that can be simulated for validation and optimization • Creating a business process model in BPMN from a description in natural language • Using a tool supporting modeling with BPMN	
	d-Identifying other modeling languages	• Identifying other modeling languages (SysML, IDEF, ...), their strengths and weaknesses • Comparing the possibilities of UML, BPMN, IDEF0 to model business processes	
	e-Using meta modeling	• Explaining the concept of meta model and the interests of meta modeling • Explaining the four levels M0 to M3 of the OMG • Designing meta models • Using a tool allowing meta modeling	
Sbe-Identifying and specifying requirements	a-Acquiring and formalizing requirements	• Explaining the importance of the requirements engineering phase in the design of applications or systems • Comparing acquisition, specification and validation techniques • Comparing arbitration techniques and prioritization of requirements • Identifying typologies and standards for non-functional requirements • Using techniques for acquisition, specification and validation of requirements in different situations • Managing any changes in requirements during the subsequent design and development phases	CP-Car-a/d
	b-Using formal specification of requirements	• Explaining the value of formal specification of requirements • Explaining the different types of formal specification languages for requirements • Using a language of formal specification of requirements • Using a tool for formal specification of requirements	
Mco-Using design and development methods	a-Choosing a development process	• Explaining the need to control software development • Explaining each of the phases of the software life cycle • Explaining the different types of software life cycles, their strengths and weaknesses • Choosing a software life cycle according to a given situation	
	b-Choosing a design and development method	• Explaining the principles for designing an application or system (levels, dimensions, approach) • Explaining the concept of analysis and design method and its advantages • Identifying the different types of design methods (systemic, object-oriented, component-oriented, etc.) and the strengths and weaknesses of each • Choosing the appropriate design method for a given situation	

	c-Applying a design and development method	• Identifying software tools to assist in the implementation of a design and development method • Applying an object-oriented type method (variants: PU, OMT, etc.) using a support tool • Applying a systemic type method (variants: Merise, O *, etc.) using a support tool • Applying an agile approach (variants: Scrum, XP, Clear Christal, DevOps, etc.) using a support tool • Applying an MDA type approach using a support tool • Applying a design approach for the reuse of reusable fragments or components • Adapting a design method according to a context of use	
Sdc-Developing conceptual diagrams for data and behavior	a- Developing a conceptual diagram for data	• Explaining the value of conceptual data modeling in the design of an application or a system • Constructing a conceptual data model from a statement written in natural language (variants: class diagram, E / R, MCD, etc.) • Validating a conceptual data model • Transforming a conceptual data model according to a logical data implementation model (variants: relational, hierarchical, NoSQL) • Using a conceptual data modeling tool	CD-Mod, CD-Sbe
	b-Developing a conceptual diagram for behavior	• Explaining the value of behavior modeling in the design of applications or systems • Explaining the different types of behavior models, their strengths and weaknesses • Identifying the the relevant behavior model according to a given situation or context • Building a conceptual behavior model from a statement in natural language (variants: automata, Petri net, flow, MCT, state diagram, statechart, O *, etc.) • Validating a behavior model • Using a conceptual behavior modeling tool	CD-Mod, M-Pet, CD-Sbe
Alo-Implementing software architecture with design patterns, architectural patterns and frameworks		• Defining the objective of a software architecture • Defining the concepts of architectural pattern (architectural style), design pattern, framework • Explaining the main types of architectural patterns (n-tiers, layers, client-server, MVC, micro services, ...) and identifying their advantages and disadvantages • Describing the main design patterns using a UML model • Describing known important frameworks • Explaining the development of a framework • Building a framework • Explaining how patterns and frameworks facilitate the development of different types of applications including web applications, mobile applications, cloud applications • Implementing patterns and frameworks to develop software components	I-Pro-b CD-Mod-b
Ihm-Designing and developing human-machine interfaces (HMI)	a-Describing the elements which compose an interface	• Explaining the different types of interface and the elements they are composed • Describing the properties of devices allowing interaction with user through an interface • Describing different modes of interaction in an interface • Explaining the notion of metaphor and its interest in an interface	
	b-Designing an interface	• Explaining the behavioral criteria characterizing user groups and their impact on the interface design • Describing appropriate techniques for determining user needs from an HMI perspective • Explaining the importance of a collaborative design based on various levels of prototypes to capture user needs relative to interfaces • Applying the principles of low fidelity / high fidelity prototyping for the design of an interface • Describing the principles of a user-centered approach to interface design • Listing good ergonomic practices for the design of an interface • Participating in a user-centered process for the design of an interface • Modelling interactions using an adapted formalism (statecharts, task model, etc.)	CP-Car-a/d

	c-Implementing an interface	• Describing the main architectural patterns for HMI (MVC, MVP, MVVM) • Using an HMI framework (eg: Angular, React, ...) to implement an HMI architecture template • Using various programming styles (event, asynchronous, reactive) to develop an interface • Using Java Swing classes to create interface components	CD-Alo
Pas-Organizing the programming of an application or a system	a-Using the principles of software quality assurance	• Identifying the most important software quality metrics • Explaining the principles of quality assurance to guarantee the code quality • Using inspection techniques to check the code quality during development • Using verification and validation techniques to guarantee the code quality at the end of development	
	b-Using automatic code generation	• Explaining situations where automatic code generation is efficient • Explaining the different types of code generators and the metadata used as input • Using existing code generators	
	c-Using good practices for manual coding	• Identifying general manual coding rules • Identifying coding rules specific to a language • Applying coding rules for a given development	
	d-Documenting the code	• Applying best practices for documenting the code • Identifying tools for documenting the code automatically or semi-automatically • Use an automatic documentation tool for code	
	e-Using test-driven development	• Explaining the principles of test-driven development • Explaining the conditions to be respected for a test-driven development • Explaining the strengths and weaknesses of a test-driven development • Using a test-driven approach to develop a component	CD-Tas
Tas-Organizing dynamic tests of an application or system	a-Explaiing the different types of dynamic tests	• Explaining the difference between fault and error • Differentiating dynamic testing from other software verification and validation methods • Explaining the 7 principles that govern tests • Explaining the different categories of dynamic tests by crossing levels, techniques, objectives (what to test) • Explaining the objective of the black box tests, white box tests, random tests • Explaining the difficulties in assessing the coverage of a test	
	b-Developing dynamic test plans	• Explaining the steps of the test process: case choice, data preparation, expected results, script coding, script execution, verdict • Developing manual scripts for tests • Performing tests according to a script and documenting the results	
	c-Automating dynamic testing	• Identifying the principles of dynamic test automation • Identifying software tests environments to automate tests • Explaining the types of tests provided by a test environment • Using a test environment to perform automatic tests	
Moa-Managing the installation of an application	Cap-Managing the configurations of an application	• Explaining the different characteristics of an application configuration • Explaining the difference between version and configuration • Explaining the different configuration phases provided by the ISO 10007 standard • Ussing configuration management tools	
	Dap-Manageingthe deployment of an application or a software package	• Explaining the deployment procedure of an application (components concerned, sites concerned, possible data migration, service interruption, assistance to users, etc.) • Organizing the deployment of an application (team, calendar, control, logging of operations, recovery in case of failure, ...) • Automating partially or fully the deployment of an application • Using software to help deploy an application	
	Mas-Managing the maintenance of an application	• Describing the different types of maintenance for an application • Describing the typical process for the maintenance of an application	

		• Explaining the specific measures to characterize the maintenance of an application • Explaining the models to estimate the cost of maintaining an application • Explaining the possible approaches to manage the maintenance of an application	
Dsd-Developing decisional applications and systems	a-Collecting decision-making needs	• Expressing decision-making needs in the form of reports and tables • Identifying the data sources which are necessary for covering decision-making needs	CD-Sbe
	b-Implementing decisional data structures	• Designing data structures to allow the storage and query of decision-making data: data warehouses and data marts, big data structures • Installing decisional data structures on centralized or distributed infrastructures • Organizing the storage of decision-making data in coherence with existing data	I-Bdd
	c-Using an ETL to integrate data	• Organizing collection and alignment of decision-making data through an ETL tool • Describing the characteristics of the main ETL tools on the market • Deploying an ETL tool taking into account the constraints imposed • Choosing the methods for refreshing the data • Scheduling data extraction from sources • Transforming the data (pre-aggregations, filters, conversions, enrichment,…) to make them homogeneous • Loading data into decision-making structures	
	d-Using OLAP and reporting tools	• Explaining the two main types of tools that can be used to query decision-making data: OLAP tools and reporting tools • Explaining the principles of OLAP and its different versions • Identifying the main types of OLAP tools and their functionalities • Installing an OLAP tool • Identifying the main types of reporting tools and their functionalities • Installing a reporting tool	
	e-Using data mining and AI to solve decision problems	• Using data mining and AI algorithms to meet decision-making needs • Creating algorithms to meet specific decision-making needs	M-Dat, M-Ina, M-Sta
Dmm- Developing multimedia applications and systems		• Differentiating a web application from a website • Defining the concept of Rich Internet Application • Designing the interface of a web application: interactions, page organization, tree structure and navigation, styles and colors, ergonomics, accessibility • Adapting the interface of a web application to different types of terminals (smartphone, tablet, computer) • Building classes and functions using a web-oriented scripting language (eg: JS) • Describing the main frameworks representative of web development (eg: Angular.js, REACT ...), their strengths and weaknesses • Developing standalone web applications with or without a database • Presenting client-side data with a Web framework • Describing the exchange formats used on the Web (XML, Json) • Implementing the security of a Web application	CD-Ihm CD-Alo
Dmo- Developing mobile applications and systems		• Describing the specificities of a mobile application (memory constraints, energy, offline mode, etc.) • Identifying the GUI requirements for mobile applications • Using specialized frameworks for mobile applications • Developing a mobile application using web technologies (PWA Progressive Web App, IONIC, Android, etc.) • Implementing interactions based on sensors of a smartphone (NFC, Inertial unit, Camera, Qr-code, Geolocation, ...) • Ensuring the performance and the security of a mobile application • Deploying a mobile application	I-Sys-e, CD-Ihm, CD-Alo

Erp-Installing an ERP software		• Choosing the ERP hosting infrastructure • Choosing the ERP deployment mode • Modelling the processes to be implemented • Organizing the configuration and the tests • Developing additional modules • Integrating with applications • Organizing data migration and data loading • Organizing user training • Evaluating return on investment	G-Dof, I-Sys, CD-Mod, CD-Moa

FO- Maintaining the proper functioning of IT infrastructures and implementing their evolutions			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Gin-Managing hradwre and software infrastructures	a-Managing systems, networks, services	• Administrating and supervising servers and networks • Managing the different types of access to a server and to a service • Managing user accounts • Managing virtualization and virtual machines • Managing shared files • Deploying pre-packaged services • Describing the main Quality of Service factors • Measuring a Quality of Service factor for a service or system • Conducting and analyzing an audit of infrastructures • Describing standards of good practices for management of services or systems • Applying good practices for management of services or systems	I-Sys, G-Aud
	b-Managing maintenance of infrastructure	• Choosing the terms of a maintenance contract • Checking that a maintenance contract is properly executed • Installing and using a remote maintenance tool	I-Sys
	c-Optimizing performances of infrastructure	• Choosing and installing a performance monitoring tool • Using performance statistics • Implementing devices and procedures to improve performance	I-Sys, M-Sta
	d-Implementing infrastructure security	• Applying techniques and tools to detect vulnerabilities in networks and systems • Analyzing the objectives of a security policy • Implementing standards, methods, tools in accordance with a security policy • Developing and implementing security procedures in accordance with a security policy • Carrying out and analyzing a security audit • Ensuring technological watch in terms of infrastructure security • Contributing to security practice with users	I-Sec, CP-Car-a, IE-Vei, G-Aud
	e- Organizing infrastructure service continuity	• Organizing the availability of hardware and software resources • Organizing backup and recovery plans • Organizing monitoring of alerts and incidents • Organizing the actions to be taken to remedy an alert or incident	I-Sys
	f-Integrating a new hardware or software component	• Checking the integration conditions of a component • Integrating a component • Managing the change of a component with users	I-Sys
Gap-Gérer les applications		• Organizing the monitoring of application executions • Managing incidents for applications in operation • Optimizing application performance • Listing the improvements needed by the users of an application • Contributing to the improvement of the functional and technical documentation of applications	G-Dof, I-Sys
Gdo-Gérer les données	a-Administrating DBMS and data bases	• Installing a DBMS • Installing new version of a DBMS • Administrating databases (security, access rights, storage optimization, processing and request optimization, backup, restoration, ...) • Identifying and correcting problems or incidents related to BD and DBMS • Ensuring a technological watch on DBMS	I-Sys, I-Bdd, CP-Car-j

		• Assisting databases users • Contributing to the choice of a DBMS	
	b-Administrating data	• Guaranteeing access to data sources • Guaranteeing t quality and sustainability of data • Creating infrastructures to store data • Implementing procedures to capture and integrate data • Carrying out data cleaning • Contributing to the protection of personal data	I-Sys, I-Bdd

SS-Implementing an Information System in a specific sector			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
San-Implementing an Information System in the health sector	a-Explaining organization and operation of the health system	• Explaining the different functions that a health system must perform • Explaining the main components of the healthcare system • Explaining the financing of care by public or private health insurance • Explaining statutes and functions of public and private health establishments • Explaining the management of the health system at different levels (national, regional, etc.)	
	b- Explaining challenges of the personal health record	• Explaining the composition of a health record, its feeding, the regulations for its use • Explaining the models of patient participation in health decisions and the central role of the health record • Explaining the principle of data banks for hosting health records and the access methods for professionals and patients	
	c-Explaining operation of care networks	• Explaining the composition of a healthcare network and the forms of collaboration between healthcare establishments • Explaining the complementarity between city care and hospital care • Explaining the different forms of telemedicine (teleconsultation, remote diagnosis, remote expertise, remote monitoring, etc.) and their roles in a healthcare network • Describing the principles of healthcare network management platforms • Explaining the impact of a healthcare network on the cost and quality of healthcare	
	d- Explaining organization and operation of the hospital	• Explaining the different missions that a hospital must perform • Explaining the main principles of the regulations that a hospital must comply with • Explaining the medical organization of a hospital in poles and the functioning of the poles • Explaining the strategic choices for a hospital and the elaboration of a strategic plan • Describing the typical processes involved in the care of a patient in a hospital • Describing the types of software used to support patient management in a hospital and their integration into the hospital information system • Explaining the interoperability between medical software and the interest of using data health standards (IHE, HL7, DICOM, PN13)	G-Dof
	e- Explaining data processing in epidemiology	• Describing the objectives of epidemiology and its place in the public health system • Describing the measures used in epidemiology • Describing the cycle of an epidemiological study • Explaining the principles of descriptive, analytical, evaluative epidemiology • Explaining survey methodologies in epidemiology • Explaining how to take into account sampling fluctuations in epidemiology • Explaining the level of evidence required to establish causality in epidemiology	
	f-Explaining assessment of medical practices	• Explaining the purpose of an assessment of health practices: health program (eg vaccination), establishment, service, procedure, device • Explaining the criteria of assessment: effectiveness, applicability, economic aspects, ... • Explaining the level of evidence required in a medical assessment • Explaining the regulations for medical assessment • Explaining the role of the information system in helping to assess medical practices	M-Sta
	g-Explaining standards and classifications used for medical knowledge	• Differentiating representation models of medical knowledge: nomenclature, thesaurus, classification, dictionary, ontology • Explaining the advantages and limits of using scales to aid in the assessment of situations, states, costs in the health field	PS-Gco

		• Explaining the use of various specific health tools: CIM 10, CCAM, coding of drugs and medical devices, UMLS, SNOMED, MESH	
	h-Explaining the major uses of ICT in health	• Explaining the advantages and limits of the use of sensors and connected devices for monitoring and follow-up of patients • Explaining the advantages and limits of the integration and interoperability of data from various sources in order to make analyzes on large volumes to facilitate the understanding of medical situations and phenomena • Explaining advantages and limits of techniques from expert systems and AI to develop software to aid in the diagnosis and analysis of a health problem	I-Bdd, I-Iot, M-Sta, M-Dat, M-Ina

I-Choosing and using models, methods and techniques of computer science			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Stru-Using data structures		• Identifying the main data structures, their implementations and their manipulation algorithms • Comparing advantages and disadvantages of main data structures • Evaluating the complexity of an algorithm handling a data structure • Formalizing as an abstract data type a data structure and its manipulation algorithms • Using the most appropriate abstract type to solve a given problem	
Pro-Mastering different types of programming	a-Mastering procedural programming	• Identifying the main procedural programming languages • Explaining the role of the basic concepts used in procedural programming: data types, variables, arrays, operators, program flow control (conditional flow, loops), functions, pointers, procedures • Writing, executing and debugging programs using data structures to manipulate lists and trees, to perform sorting by insertion and selection, to perform binary search • Implementing recursive functions • Writing programs using files to read and write digital or text data • Using pointers to implement data structures • Testing the mechanisms for passing parameters • Decomposing a program into modules	I-Stru
	b-Mastering object oriented programming	• Identifying the main object oriented programming languages • Explaining the role of basic concepts used in object oriented programming: types, classes, objects, methods, inheritance, polymorphism, exception • Explaining how different languages like Java and C ++ implement object oriented concepts • Using object oriented class libraries for programming applications	I-Stru
	c-Using script languages	• Identifying the main scripting languages and their objectives • Explaining programming with scripts • Using a scripting language to code an application	
	d-Using fonctional programming	• Explaining the principles of functional programming • Explaining the notion of lambda expression • Explaining the concepts of pure function and higher order function • Explaining the manipulation of linear and non-linear structures • Using a functional programming language (JAVA, ...) to code typical problems involving pure functions, higher order functions, recursions, lists	
	e-Using aspect oriented programming (AOP)	• Explaining the principles of AOP • Explaining the efficiency that the AOP allows in the development of the code • Explaining the implementation of AOP in different types of languages • Using a OOP language (ex: JAVA) to implement the AOP in representative cases	
	f-Comparing programming paradigms	• Identifying the different programming paradigms and associated languages • Explaining the strengths and weaknesses of different types of languages in different contexts	
Glo-Using the basic principles of software engineering		• Explaining the phases of software development • Explaining initialization of development based on specifications • Defining data structures and processing modules respecting specifications • Using code reliability techniques: data inputs validation, data encapsulation, strict data typing, protection against buffer overflow, exception management, error condition management • Explaining how to ensure data persistence across multiple executions	I-Stru, I-Pro-a

		• Using the basic tools for development: editors, compilers, interpreters, debuggers • Developing software based on specifications	
Ide-Using tools for helping development	a-Using an IDE (Integrated Development Environment) for developing an application	• Explaining the role of an IDE in the development of an application • Using an IDE to develop / debug / an application • Using an IDE to execute an application without dependencies with different configurations	I-Glo
	b-Using an IDE (Integrated Development Environment) to manage versions and development projects	• Configuring an IDE to use a version management system • Configuring an IDE to use a development project management system • Integrating a version management system with a development project management system • Differentiating a centralized version management system from a distributed version management system • Describing the value of a project management tool such as Maven	I-Glo
Bdd-Mastering design and management of structured data and unstructured data	a-Implementing a DB in centralized context	• Designing relational databases, NoSQL, XML and implement them with DBMS on the market • Developing requests to manipulate a DB in a specific language or from a host language • Identifying the properties, advantages and limits of the different types of BD and DBMS	CD-Mod-a, CD-Mod-b, M-Log
	b-Implementing a DB in distributed context	• Identifying the operating principles of a DB in a distributed context and the existing technical solutions • Implementing a DB in a distributed context	
	c-Implementing a data warehouse	• Explaining multidimensional modeling • Building a multidimensional model to meet decision-making needs • Transforming a multidimensional model into a relational model • Implementing a data warehouse with an extended relational DBMS • Creating queries in SQL and extended SQL to meet decision-making needs	
	d-Implementing big data structures	• Identifying the architectures and technologies to store, manipulate and process big data • Implementing component software using Big Data technology	
Sys-Mastering computer systems and networks	a-Installing and restoring computer systems	• Explaining the fundamental principles of operating systems: processes and threads, synchronization and scheduling of processes, memory management, management of FAT files • Using main commands of an operating system • Installing and administrating systems and services • Repairing a malfunction in an operating system • Configuring a workstation using a scripting language to automate tasks • Explaining how an operating system manages security	
	b-Installing and restoring computer networks	• Describing the different types of network infrastructures and the different types of protocols • Explaining the role of the different layers of the OSI, IETF and IEEE models as well as their interactions • Describing the different internet access devices • Explaining the concept of address and its use in a communication network • Building the routing tables from an interconnection diagram • Constructing an interconnection diagram from routing tables • Implementing a protocol used in a distributed application • Describing the specific features of wireless networks in terms of infrastructures and protocols • Identifying performance factors in networks • Installing a wired and / or wireless network to connect workstations and a server to the internet • Repair a malfunction in a network	
	c-Using virtualization	• Explaining the place of the hypervisor and virtual machines in the different types of virtualization architectures • Explaining server virtualization, storage virtualization, network virtualization • Create a virtual machine	

		• Migrate an application to a virtual infrastructure	
	d-Using cloud services	• Explaining the operating principles of cloud infrastructures • Explaining the scalability and elasticity properties of cloud infrastructures • Explaining the three main types of services (IaaS, Paas, SaaS) of a cloud infrastructure • Identifying existing private or public cloud infrastructures, their strengths and weaknesses • Explaining the economic points in the use of a cloud infrastructure • Implementing an application using a cloud infrastructure	
	e-Using Android or/and IOS	• Explaining the software architecture and the operating of Android and IOS • Identifying the different versions of Android and IOS • Characterizing programming languages for Android and IOS • Explaining the characteristics and use of development kits for Android and IOS • Explaining the main differences between Android and IOS • Implementing an application for Android or IOS and storing it on a store	
Iot-Using IOT (Internet Of Things)	a-Explaining principles of IOT	• Explaining the organization and operation of an IOT system • Explaining the application fields of the IOT • Identifying the differences between IOT and traditional data collection systems • Explaining place and role of big data, cloud computing and data analysis in an IOT system	
	b-Explaining components and architectures for IOT	• Describing the various types of IOT components (sensors, actuators, microcontrollers, single board computers, communication interfaces, ...) • Explaining problems and solutions related to the energy autonomy of connected objects • Explaining particularities of distributed IOT architectures	
	c-Summarizing communication techniques in IOT	• Identifying categories of IOT protocols • Identifying software paradigms that facilitate the integration of services and the management of network resources in an IOT system • Using virtualization to optimize services and network functions in an IOT system	
	d-Categorizing data processing techniques in IOT	• Explaining the different types of processing to be carried out and their inclusion by hardware or software components in an IOT system • Organizing time requests in the IOT • Explaining data specificities in the IOT and the families of tools to analyze them • Building an IOT data processing flow	
	e-Implementing an IOT system	• Composing an object able to capture its environment (sensor) and / or to act on this environment (actuator) from components on the shelf (Arduino-type microcontroller, STM, Sensors, Shields, 3D printing) • Developing an IOT solution on a cloud platform • Explaining the integration of IOT with enterprise applications (eg Mobile Phone, SCADA, Enterprise Apps)	
	f-Implementing security techniques for IOT	• Explaining the security problems posed by the IOT and the main existing solutions • Applying specific protection mechanisms to connected objects	I-Sec
Sec-Implementing security and cyber security techniques	a-Organizing security of workstations	• Identifying threats specific to user workstation • Implementing backup / restore / restart procedures, cloning • Exploiting operating system protection tools and commands • Choosing and deploying antivirus, antimalware • Encrypting disks and removable media	I-Sys
	b-Organizing security of accesses	• Identifying solutions to secure user authentication • Introducing user identification methods • Listing repositories or standards which classify information relating to security • Differentiating user privileges and rights • Explaining advanced access control models • Formalizing authentication rules and privileges	I-Sys

		• Explaining how authorization systems operate	
	c-Organizing security in a network environment	• Explaining threats and vulnerabilities specific to a network environment • Explaining the basic techniques to ensure security in networks: secure protocols, keys and certificates, firewall, proxy, demilitarized zone • Installing a demilitarized zone • Explaining the use of encryption techniques in the implementation of secure protocols • Explaining the use of public key management infrastructures and their limits • Explaining how block chain-based architectures operate • Explaining authentication methods specific to wireless networks	I-Sys
	d-Designing and implementing cryptographic algorithms	• Explaining the fundamental role of cryptography in information security • Explaining the theoretical principles underlying cryptography and cryptographic analysis • Describing the main types of existing cryptographic algorithms and their performance • Developing and testing implementations of cryptographic algorithms	I-Sys
Wse-Using web services		• Explaining the difference between a web service and a web application. • Describing the advantages and disadvantages of SOAP and REST architectures for Web services. • Explaining conventions and design principles associated with SOAP / REST services. • Describing the basic data flow and responsibilities related to the consumption of Web services. • Describing request and response formats of a Web service using a SOAP interface / a REST interface. • Developing web services SOAP or REST web service clients with JAX-WS and JAX-RS. • Implementing a service oriented architecture (SOA) using Web services. • Explaining the handling of exceptions within a SOAP or REST web service. • Using XML and JSON data formats in a web service. • Explaining how to secure SOAP / REST services.	
Qua-Using quantum computing		• Explaining principles of quantum computing and quantum logic • Explaining fundamental differences between conventional computing and quantum computing • Explaining the challenges of building a quantum computer • Explaining how basic quantum algorithms work (eg Deutsch, Griver, Shor) • Explaining how quantum parallelism is used in quantum algorithms • Explaining classes of problems that could be solved efficiently by quantum algorithms • Using a quantum programming framework (eg QISKIT) to implement quantum algorithms	

G-Analyzing the functioning of a company and interactions with its environment			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Eco-Analyzing the economic environment of companies		• Describing the classes of actors in the economic system and their influences in the conduct of business • Explaining the factors of all kinds (economic, political, fiscal, socio-cultural, technological, etc.) that influence the activities of the company and the changes they can bring about • Describing the role of state authorities in an international context • Analyzing approaches to study markets in the national context and in the global context • Analyzing the competitive environment of a company • Linking the competitive environment to the issue of marketing and strategy	
Jur- Analyze the legal environment of companies	a-Analyzing the foundations of corporate law	• Explaining the organization and operation of the legal system relating to companies • Analyzing the different branches of law that concern companies • Analyzing the objectives and main provisions of business law • Analyzing the objectives and main provisions of labor law	
	b-Analyzing the foundations of IT law	• Analyzing the main provisions of internet law • Analyzing the legal regulations relating to public freedoms (IT law and freedoms) • Explaining the legal regulations for settling IT disputes • Analyzing the main provisions of criminal law in IT	
	c-Analyzing the foundations of contract law	• Analyzing the nature and terminology of contract law • Identifying the different types of contract • Explaining the difference in a contract between means obligations and results obligations • Analyzing the execution conditions of a contract, the breach, the violation • Explaining how the contractual remedy works • Analyzing the different types of IT contracts: advice and study, implementation, maintenance, security, etc.	
	d-Analyzing the foundations of intellectual property law and personal data law	• Explaining the principles governing intellectual property and the mechanisms for protecting it • Analyzing the various attacks that may concern software and the remedies provided by law • Analyzing the impact of legal regulations on personal data	
Str-Analyzing the strategy of a company		• Identifying the SAA (Strategic Activity Areas) of a company • Analyzing a SAA (Strategic Action Area) of a company in relation to the price / perceived value pair • Analyzing a SAA (Strategic Action Area) of a company using business portfolio matrices (McKinsey, BCG, Doolittle) • Comparing the main strategic directions (diversification, specification, differentiation, cooperation, outsourcing, integration, internationalization) for a company or a SAA • Analyzing, for a company or a SAA, the best positioning between a strategy of avoidance and a strategy of confrontation • Analyzing strategic decision support tools • Identifying the Business Model of a company from the value chain • Explaining the consistency of resources and skills with strategic choices • Analyzing the role of governance in strategic orientation • Describing the different types of strategic dashboards and associated performance indicators	
Org-Analyzing the social organization of companies		• Differentiating the roles of stakeholders (owners, shareholders, employees, customers, suppliers, etc.) in creating and sharing value (agency conflicts, CSR, sustainable development, etc.)	

		• Identifying the different types of corporate structures and operations, their advantages and disadvantages in relation to different contexts and situations • Analyzing the adaptation of the structure to a hostile or favorable environment • Analyzing the advantages and disadvantages of different management styles • Analyzing the alignment of individual and organizational needs • Explaining the challenges and risks of management in an intercultural context • Explaining the role of the information system (digital or not) in the life of the organization	
Out-Analyzing the role of accounting tools to control and evaluate the activities of the company	a-Analyzing financial accounting	• Identifying the purposes of financial accounting • Explaining the implementation of the accounting model and the organization of accounting treatments • Explaining the preparation of summary accounting documents	
	b-Analyzing management accounting and management control	• Identifying how management control participates in decision-making, forecasting and adaptation • Explaining the different systems for costs elaboration and their use in management control • Explaining the analysis of the accounting results of the responsibility centers • Explaining the analysis of the economic and financial profitability of a company • Explaining the development of forecasts in establishing budgets	
	c-Analazing financial management	• Explaining the financial analysis of the balance sheet and the income statement • Explaining the main ratios of financial analysis • Explaining the concept of ROI and other investment criteria • Explaining the impact of strategic decisions on company finances • Evaluating the financial situation of a company taking into account the effect of time	
	d-Analyzing management by accounting and financial dashboards	• Explaining the objectives of a financial dashboard • Explaining the best practices for designing a financial dashboard • Explaining the choice and customization of indicators in a financial dashboard • Analyzing examples of financial dashboards	
Dof-Characterize the functional areas of the company and the main IT solutions supporting them		• Explaining the functional areas that can be distinguished in a company and their interactions • Characterizing the main business processes for each of the functional areas: objectives, stakeholders, input and output information, performance indicators • Explaining how the main business processes in functional areas can be partially or completely automated • Characterizing the main software suites capable of supporting business processes in functional areas and their possible integration in the information system	
Aud-Analyzing the internal audit procedure		• Recalling the objectives of the internal control of a company or a functional area • Explaining the place of audit in the internal control of a company or a functional area • Explaining the principles of ISO 19011 relating to internal auditing • Explaining the constitution of an internal audit committee and the role of each member • Explaining the development of a checklist for an internal audit • Explaining the planning of an internal audit • Explaining good practices for conducting interviews with auditees • Explaining the need to characterize non-conformities and collect objective evidence during an internal audit • Explaining good practices for writing an audit report, following up and communicating with stakeholders	

M-Designing and implementing mathematical models to evaluate or optimize a product, a process, a service			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Gra-Using graph theory to model and optimize		• Describing the various types of graphs: oriented or not, weighted or unweighted graphs, bipartite graphs, multigraphs, trees • Explaining problems that can be modeled with graph theory: connectivity, path, circuit, cut, flow, coupling, scheduling • Describing the main algorithms leading to the search for an optimum in a graph: spanning tree of minimum weight in a connected graph (Prim, Kruskal), shortest path (Dijkstra), longest path in an acyclic graph (Moravek), min / max flow in a network • Explaining the data structures used to represent a graph and their performance • Implementing algorithms for finding an optimum in a graph using in each case the most appropriate data structure	
Pet-Using PETRI nets		• Explaining the basic elements of Petri nets • Describing the functioning of a Petri net • Explaining the principles of behavioral and structural analyzes of a Petri net • Explaining the modeling with Petri nets of classical problems (asynchronous communication, critical section, producer-consumer) and dynamic systems (industrial processes) • Identifying the main extensions of Petri nets and their objectives • Studying a system with Petri nets using a modeling tool (variant: TINA, E-NetObject, PTNET Editor,…)	
Log-Using models and reasoning of logic	a-Using propositional logic	• Defining the elements of propositional logic • Defining tautologies, contradictions, common equivalences in the propositional logic • Representing a text with the propositional logic and vice versa • Using truth tables and derivations to demonstrate the equivalence of propositional formulas • Optimizing a propositional formula • Checking / Building the proof of a propositional formula with the rule of modus ponens or modus tollens	
	b-Using first order logic	• Defining the elements of first order logic • Checking if a first order logical formula is well formed • Transforming a first order logic formula, using in particular rules on quantifiers • Representing a text with first order logic and vice versa • Verifying / Constructing the proof of a first order logic formula from a set of formulas • Checking that a structure satisfies a first order logical formula • Producing a model satisfying a first-order logical formula • Justifying the use of the completeness theorem in first order logic	
	c-Using logic programming and PROLOG	• Explaining the principles of logic programming • Calculating if two terms unify • Calculating the most general unifier of two terms • Translating a statement into Prolog language • Implementing a Prolog program using cutoff and negation by failure • Implementing PROLOG programs using recursion, arithmetic functions, lists, input / output instructions • Identifying applications of logic programming	
Sta-Using techniques of statistics and data analysis	a- Using techniques of one-dimensional descriptive statistics	• Explaining the calculation from a statistical series for indicators (central tendency, dispersion, shape, etc.) for a discrete or continuous quantitative variable • Explaining the representations using tables or graphs of a one-variable statistical series	

		• Use statistical software to manipulate statistical series and calculate indicators	
	b-Using inferential statistics techniques	• Explaining the objectives of inferential statistics • Explaining the properties that a statistical sample must have • Describing the main methods of statistical estimation of parameters • Calculating the size of a statistical sample needed to estimate a parameter with a desired precision • Implementing a method of statistical estimation of parameters using statistical software • Describing the main hypotheses tests • Choosing the statistical hypotheses to test according to the problem to be studied • Choosing a statistical test suited to the hypothesis to be tested • Implementing a statistical test using statistical software	
	c-Using techniques of regression	• Explaining the main regression models: simple or multiple linear regression, logistic regression • Describing the three steps in a regression problem: formulation of hypothesis, estimation, validation • Describing estimation and validation techniques in the case of linear regression • Implementing linear regression using statistical software	
	d-Using data analysis tools	• Explaining the purpose of data analysis • Explaining the methods of data analysis in three main families (principal components analysis, classification, discriminant analysis) by specifying the conditions of application and utility • Drawing up conclusions from a data analysis based on interpretation tools • Using data analysis software	
Dat-Using data mining algorithms		• Explaining the two major objectives of data mining: finding models and finding patterns in big data • Explaining the main algorithms of data mining: search for association rules, classification, clustering, extraction of complex patterns, prediction • Differentiating between descriptive and predictive approaches in data mining • Identifying tools or platforms allowing the implementation of data mining algorithms • Using data mining algorithms to solve problems in areas such as: web mining, recommendation systems, decision systems (e-marketing, CRM - customer-relationship management)	
Ina- Using models and reasoning of artificial intelligence		• Explaining the objectives of artificial intelligence • Describing the main models and algorithms of artificial intelligence by specifying the conditions of application: intelligent agents, game algorithms, learning algorithms, machine learning, deep learning • Choosing the right algorithm to solve a given artificial intelligence problem • Identifying tools or platforms to implement AI algorithms • Developing components for AI systems in different areas: expert systems, information research, decision-making systems, etc.	
Rop-Using tools of operational research	a-Optimizing in a combinatorial universe	• Identifying types of enumerable problems and their complexity • Comparing different methods based on linear programming and / or graph theory to solve a given problem • Choosing an appropriate resolution method to solve an enumerable problem • Solving a simple enumerable problem by the simplex algorithm and / or a graph theory algorithm • Implementing a given method to solve a simple enumerable problem • Choosing a "solver" to help the resolution of combinatorial problems • Using tools / libraries to solve a given enumerable problem • Arguing about the interest of using an approximate and / or meta-heuristic method for the resolution of a given problem	M-Gra

	b-Optimizing in a random universe	• Identifying the types of stochastic problems • Distinguishing the main characteristics of the different types of stochastic systems • Modeling a problem by a stochastic system • Solving a reliability problem, a waiting problem and a stock problem using a stochastic approach • Identifying the elements of a simulation model of a stochastic system • Defining a simulation method for a given simple problem • Implementing a simulation method for a given simple problem • Using a simulation tool / library to find an initial and / or alternative solution to a given stochastic problem	M-Sta
	c-Optimizing in a competitive universe	• Identifying the types of so-called competitive problems • Designing an algorithm for finding an optimal solution for a competitive problem • Implementing an algorithm to find an optimal solution for a competitive problem • Calculating a Nash equilibrium for a given competitive problem • Explaining how competitive problems are modeled by game theory	M-Ina

CP-Assessing and improving interpersonal competencies			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Vca-Identifying the variety of interpersonal competencies		• Identifying the theoretical work of classification and definition of interpersonal competencies • Identifying interpersonal competencies most often sought by employers in the domain of information systems design and implementation	
Car-Defining and using good behavior principles	a-Communicating in a professional environment orally and in writing in several languages	• Explaining the theoretical bases of communication • Defining communication acts within the company • Explaining your point of view using valid arguments • Synthesizing a set of documents or information • Distinguishing between the different types of presentation and their challenges • Designing a relevant presentation medium with regard to given communication objective • Making an oral presentation adapted to your audience	
	b-Conducting a meeting or a group	• Explaining individual psychological attitudes within a group • Explaining the phenomena of collective behavior within a group • Identifying conflict situations and their importance in the life of a group • Using conflict resolution methods within a working group • Explaining the ingredients of cohesion and motivation in a working group • Explaining patterns for individual and collective decision-making • Using management methods for meeting	
	c-Working in group	• Identifying the success criteria to meet for working groups • Explaining the importance of recognizing the work of a group • Explaining the various methods of working in groups • Explaining the behavioral rules to respect in working groups • Explaining the importance of good information flow in working work	
	d-Adopting a critical thinking	• Identifying the characteristics of critical thinking • Explaining the approaches that help develop critical thinking	
	e-Showing creativity	• Explaining the steps of the creative process • Explaining the obstacles to creativity • Explaining how to measure creativity • Using techniques to structure ideas and improve creativity	
	f- Adopting an ethical approach	• Identifying what the notion of ethics covers • Explaining the concepts of ethical reasoning and ethical decision making • Identifying the rules to be observed in an ethical deliberation process • Describing examples of cases where ethical behavior is at fault: conflict of interest, attempted corruption, unfair choice or decision, etc.	
	g-Managing stress	• Explaining the triggers of stress • Explaining the effects of stress • Using approaches to manage stress	
	h-Showing initiative	• Explaining how to establish a SMART objective (Specific, Measurable, Acceptable, Realistic, Temporarily defined) in terms of initiative • Explaining the steps for taking initiative • Explaining the central role of information in taking initiative • Explaining the risks of an initiative • Explaining the benefits of an initiative • Evaluating the conditions for the success of an initiative	
	i-Showing flexibility	• Defining the characteristics of flexibility	

		• Explaining the advantages and disadvantages of flexibility for the company and for the individual • Explaining what a compromise in flexibility can be	
	j-Showing logic reasoning	• Identifying a set of arguments relating to a given problem • Evaluating consistency, validity, completeness of a set of arguments • Identifying and challenging fallacious reasoning • Developing coherent arguments to produce valid conclusions	
Ren-Evaluating and improving your interpersonal competencies		• Explaining the need for regular assessments of interpersonal competencies • Describing the different methods of assessing interpersonal competencies: declarative evaluation, assessment by analysis of past experiences, assessment by tests and scenarios • Identifying and using improvement solutions for interpersonal competencies • Using an assessment report to plan improvements of interpersonal competencies	
Pcp-Preparing your professional career	a-Analyzing your professional environment	• Identifying the sectors of activity, socio-professional sectors, and companies related to training • Analyzing the trades related to the professional environment targeted by the training • Explained the competencies related to the trades targeted by the training • Applying a method to search internship or work-study	
	b-Specifying your career and your professional project	• Defining a monitoring strategy to scan the job offer • Defining a watch strategy on the activity creation offer • Target your expectations in relation to the internship or work-study offer • Reorganizing its competency profile with respect to an offer • Analyzing an internship, work-study or job offer. • Presenting the professional missions linked to a project, a job, a creation of activities • Elaborating an address book	
	c-Adjusting your professional project	• Using a tool to manage your competencies (eg e-Portfolio) • Building your competency profile based on your experience • Identifying your competencies in benchmarks (e-cf, CIGREF, ...) • Designing a plan for your career	

IE-Developing innovation, research and entrepreneurship projects			
Main competencies	**Specific competencies**	**Elementary competencies**	**Prerequisite**
Vei-Performing a scientific and technology watch		• Explaining the challenges of technology watch • Defining the concept of state of the art • Explaining the typical steps of technology watch • Describing the different types of information sources and the associated access tools • Describing the form of the deliverable of a technological watch and its dissemination methods • Explaining the principles of collaborative watch • Making a watch for a subject concerning IT technologies	
Ino-Developing an innovation project		• Identifying the different types of innovation, the possible contexts, the influencing factors • Explaining the mechanisms of innovation • Explaining the approaches to evaluate an idea • Explaining the process of transforming an idea into a project • Explaining the solutions to protect innovation • Identifying the ecosystem of innovation and creation (clusters, incubators, accelerators ...) • Explaining the sources of funding for innovation • Managing an innovation project to lead to the creation of an activity or business • Identifying subjects that could be the subject of innovations in the digital field	
Red-Developing an R&D project		• Explaining the difference between innovation and R&D • Explaining the forms of R&D • Explaining the steps of an R&D process • Explaining how a personal involvement in a research activity can occurs (eg through a thesis) • Explaining the sources of funding for R&D • Explaining the dissemination and promotion of non-confidential research results • Identifying topics that can be the subject of research in the digital field	
Ent-Developing an entrepreneurship project		• Explaining the different forms of entrepreneurship • Explaining the typical steps of entrepreneurial development • Explaining the economic and financial criteria for the feasibility of an entrepreneurship project • Using "Webmarketing" and "e-business" in the dynamics of entrepreneurship • Explaining the content of a "business model" and "a business plan" • Designing a business plan for the creation of a business project • Characterizing cases of creation of start-ups and activities in the digital field	