ISA
CERTIFIED AUTOMATION PROFESSIONAL® (CAP®)
CLASSIFICATION SYSTEM

Domain I: Feasibility Study - identify, scope and justify the automation project

Task 1:		*Define the preliminary scope through currently established work practices in order to meet the business need.*
Knowledge of:		
	1.	Established work practices
	2.	Basic process and/or equipment
	3.	Project management methodology
	4.	Automation opportunity identification techniques (e.g., dynamic performance measures)
	5.	Control and information technologies (MES) and equipment
Skill in:		
	1.	Automating process and/or equipment
	2.	Developing value analyses
Task 2:		*Determine the degree of automation required through cost/benefit analysis in order to meet the business need.*
Knowledge of:		
	1.	Various degrees of automation
	2.	Various cost/benefit tools
	3.	Control and information technologies (MES) and equipment
	4.	Information technology and equipment
Skill in:		
	1.	Analyzing cost versus benefit (e.g., life cycle analysis)
	2.	Choosing the degree of automation
	3.	Estimating the cost of control equipment and software
Task 3:		*Develop a preliminary automation strategy that matches the degree of automation required by considering an array of options and selecting the most reasonable option in order to prepare feasibility estimates.*
Knowledge of:		
	1.	Control strategies
	2.	Principles of measurement
	3.	Electrical components
	4.	Control components
	5.	Various degrees of automation
Skill in:		
	1.	Evaluating different control strategies
	2.	Selecting appropriate measurements
	3.	Selecting appropriate components
	4.	Articulating concepts

Task 4:	Conduct technical studies for the preliminary automation strategy by gathering data and conducting an appropriate analysis relative to requirements in order to define development needs and risks.	
Knowledge of:		
	1.	Process control theories
	2.	Machine control theories and mechatronics
	3.	Risk assessment techniques
Skill in:		
	1.	Conducting technical studies
	2.	Conducting risk analyses
	3.	Defining primary control strategies
Task 5:	Perform a justification analysis by generating a feasibility cost estimate and using an accepted financial model to determine project viability.	
Knowledge of:		
	1.	Financial models (e.g., ROI, NPV)
	2.	Business drivers
	3.	Costs of control equipment
	4.	Estimating techniques
Skill in:		
	1.	Estimating the cost of the system
	2.	Running the financial model
	3.	Evaluating the results of the financial analysis for the automation portion of the project
Task 6:	Create a conceptual summary document by reporting preliminary decisions and assumptions in order to facilitate "go"/"no go" decision making.	
Knowledge of:		
	1.	Conceptual summary outlines
Skill in:		
	1.	Writing in a technical and effective manner
	2.	Compiling and summarizing information efficiently
	3.	Presenting information
Domain II:	**Definition - identify customer requirements and do high level analysis of the best way to meet those requirements.**	
Task 1:	Determine operational strategies through discussion with key stakeholders and using appropriate documentation in order to create and communicate design requirements.	
Knowledge of:		
	1.	Interviewing techniques
	2.	Different operating strategies
	3.	Team leadership and alignment
Skill in:		
	1.	Leading a individual or group discussion
	2.	Communicating effectively
	3.	Writing in a technical and effective manner
	4.	Building consensus
	5.	Interpreting the data from interviews

Task 2:		Analyze alternative technical solutions by conducting detailed studies in order to define the final automation strategy.
Knowledge of:		
	1.	Automation techniques
	2.	Control theories
	3.	Modeling and simulation techniques
	4.	Basic control elements (e.g., sensors, instruments, actuators, control systems, drive systems, HMI, batch control, machine control)
	5.	Marketplace products available
	6.	Process and/or equipment operations
Skill in:		
	1.	Applying and evaluating automation solutions
	2.	Making intelligent decisions
	3.	Using the different modeling tools
	4.	Determining when modeling is needed
Task 3:		Establish detailed requirements and data including network architecture, communication concepts, safety concepts, standards, vendor preferences, instrument and equipment data sheets, reporting and information needs, and security architecture through established practices in order to form the basis of the design.
Knowledge of:		
	1.	Network architecture
	2.	Communication protocols, including field level
	3.	Safety concepts
	4.	Industry standards and codes
	5.	Security requirements
	6.	Safety standards (e.g., ISAM, ANSI, NFPA)
	7.	Control systems security practices
Skill in:		
	1.	Conducting safety analyses
	2.	Determining which data is important to capture
	3.	Selecting applicable standards and codes
	4.	Identifying new guidelines that need to be developed
	5.	Defining information needed for reports
	6.	Completing instrument and equipment data sheets
Task 4:		Generate a project cost estimate by gathering cost information in order to determine continued project viability.
Knowledge of:		
	1.	Control system costs
	2.	Estimating techniques
	3.	Available templates and tools
Skill in:		
	1.	Creating cost estimate
	2.	Evaluating project viability

Task 5:		*Summarize project requirements by creating a basis-of-design document and a user-requirements document in order to launch the design phase.*
Knowledge of:		
	1.	Basis of design outlines
	2.	User-requirements document outlines
Skill in:		
	1.	Writing in a technical and effective manner
	2.	Compiling and summarizing information
	3.	Making effective presentations

Domain III: System Design - do the complete conceptual design of the control and information systems including specifications of the hardware and software to be used in the system (sometimes called "front end engineering" or "basic engineering"); and also do the "detail design" and procurement of the hardware systems including preparation of construction work packages.

Task 1:		*Perform safety and/or hazard analyses, security analyses, and regulatory compliance assessments by identifying key issues and risks in order to comply with applicable standards, policies, and regulations.*
Knowledge of:		
	1.	Applicable standards (e.g., ISA S84, IEC 61508, 21 CFR Part 11, NFPA)
	2.	Environmental standards (EPA)
	3.	Electrical, electrical equipment, enclosure, and electrical classification standards (e.g., UL/FM, NEC, NEMA)
Skill in:		
	1.	Participating in a Hazard Operability Review
	2.	Analyzing safety integrity levels
	3.	Analyzing hazards
	4.	Assessing security requirements or relevant security issues
	5.	Applying regulations to design
Task 2:		*Establish standards, templates, and guidelines as applied to the automation system using the information gathered in the definition stage and considering human-factor effects in order to satisfy customer design criteria and preferences.*
Knowledge of:		
	1.	Process Industry Practices (PIP) (Construction Industry Institute)
	2.	IEC 61131 programming languages
	3.	Customer standards
	4.	Vendor standards
	5.	Template development methodology
	6.	Field devices
	7.	Control valves
	8.	Electrical standards (NEC)
	9.	Instrument selection and sizing tools
	10.	ISA standards (e.g., S88)
Skill in:		
	1.	Developing programming standards
	2.	Selecting and sizing instrument equipment
	3.	Designing low-voltage electrical systems
	4.	Preparing drawing using AutoCAD software

Task 3:	Create detailed equipment specifications and instrument data sheets based on vendor selection criteria, characteristics and conditions of the physical environment, regulations, and performance requirements in order to purchase equipment and support system design and development.	
Knowledge of:		
	1.	Field devices
	2.	Control valves
	3.	Electrical standards (NEC)
	4.	Instrument selection and sizing tools
	5.	Vendors' offerings
	6.	Motor and drive selection sizing tools
Skill in:		
	1.	Selecting and sizing motors and drives
	2.	Selecting and sizing instrument equipment
	3.	Designing low-voltage electrical systems
	4.	Selecting and sizing computers
	5.	Selecting and sizing control equipment
	6.	Evaluating vendor alternatives
	7.	Selecting or sizing of input/output signal devices and/or conditioners
Task 4:	Define the data structure layout and data flow model considering the volume and type of data involved in order to provide specifications for hardware selection and software development.	
Knowledge of:		
	1.	Data requirements of system to be automated
	2.	Data structures of control systems
	3.	Data flow of controls systems
	4.	Productivity tools and software (e.g., InTools, AutoCAD)
	5.	Entity relationship diagrams
Skill in:		
	1.	Modeling data
	2.	Tuning and normalizing databases
Task 5:	Select the physical communication media, network architecture, and protocols based on data requirements in order to complete system design and support system development.	
Knowledge of:		
	1.	Vendor protocols
	2.	Ethernet and other open networks (e.g., Devicenet)
	3.	Physical requirements for networks/media
	4.	Physical topology rules/limitations
	5.	Network design
	6.	Security requirements
	7.	Backup practices
	8.	Grounding and bonding practices
Skill in:		
	1.	Designing networks based on chosen protocols

Task 6:	Develop a functional description of the automation solution (e.g., control scheme, alarms, HMI, reports) using rules established in the definition stage in order to guide development and programming.

Knowledge of:		
	1.	Control theory
	2.	Visualization, alarming, database/reporting techniques
	3.	Documentation standards
	4.	Vendors' capabilities for their hardware and software products
	5.	General control strategies used within the industry
	6.	Process/equipment to be automated
	7.	Operating philosophy

Skill in:		
	1.	Writing functional descriptions
	2.	Interpreting design specifications and user requirements
	3.	Communicating the functional description to stakeholders

Task 7:	Design the test plan using chosen methodologies in order to execute appropriate testing relative to functional requirements.

Knowledge of:		
	1.	Relevant test standards
	2.	Simulation tools
	3.	Process Industry Practices (PIP) (Construction Industry Institute)
	4.	General software testing procedures
	5.	Functional description of the system/equipment to be automated

Skill in:		
	1.	Writing test plans
	2.	Developing tests that validate that the system works as specified

Task 8:	Perform the detailed design for the project by converting the engineering and system design into purchase requisitions, drawings, panel designs, and installation details consistent with the specification and functional descriptions in order to provide detailed information for development and deployment.

Knowledge of:		
	1.	Field devices, control devices, visualization devices, computers, and networks
	2.	Installation standards and recommended practices
	3.	Electrical and wiring practices
	4.	Specific customer preferences
	5.	Functional requirements of the system/equipment to be automated
	6.	Applicable construction codes
	7.	Documentation standards

Skill in:		
	1.	Performing detailed design work
	2.	Documenting the design

Task 9:	Prepare comprehensive construction work packages by organizing the detailed design information and documents in order to release project for construction.
Knowledge of:	
1.	Applicable construction practices
2.	Documentation standards
Skill in:	
1.	Assembling construction work packages

Domain IV: Development - software development and coding.

Task 1:	Develop Human Machine Interface (HMI) in accordance with the design documents in order to meet the functional requirements.
Knowledge of	
1.	Specific HMI software products
2.	Tag definition schemes
3.	Programming structure techniques
4.	Network communications
5.	Alarming schemes
6.	Report configurations
7.	Presentation techniques
8.	Database fundamentals
9.	Computer operating systems
10.	Human factors
11.	HMI supplier options
Skill in:	
1.	Presenting data in a logical and aesthetic fashion
2.	Creating intuitive navigation menus
3.	Implementing connections to remote devices
4.	Documenting configuration and programming
5.	Programming configurations

Task 2:	Develop database and reporting functions in accordance with the design documents in order to meet the functional requirements.
Knowledge of:	
1.	Relational database theory
2.	Specific database software products
3.	Specific reporting products
4.	Programming/scripting structure techniques
5.	Network communications
6.	Structured Query language
7.	Report configurations
8.	Entity diagram techniques
9.	Computer operating systems
10.	Data mapping
Skill in:	
1.	Presenting data in a logical and aesthetic fashion
2.	Administrating databases
3.	Implementing connections to remote applications
4.	Writing queries

	5.	Creating reports and formatting/printing specifications for report output
	6.	Documenting database configuration
	7.	Designing databases
	8.	Interpreting functional description

Task 3:	*Develop control configuration or programming in accordance with the design documents in order to meet the functional requirements.*	

Knowledge of:

	1.	Specific control software products
	2.	Tag definition schemes
	3.	Programming structure techniques
	4.	Network communications
	5.	Alarming schemes
	6.	I/O structure
	7.	Memory addressing schemes
	8.	Hardware configuration
	9.	Computer operating systems
	10.	Processor capabilities
	11.	Standard nomenclature (e.g., ISA)
	12.	Process/equipment to be automated

Skill in:

	1.	Interpreting functional description
	2.	Interpreting control strategies and logic drawings
	3.	Programming and/or configuration capabilities
	4.	Implementing connections to remote devices
	5.	Documenting configuration and programs
	6.	Interpreting P&IDs
	7.	Interfacing systems

Task 4:	*Implement data transfer methodology that maximizes throughput and ensures data integrity using communication protocols and specifications in order to assure efficiency and reliability.*	

Knowledge of:

	1.	Specific networking software products (e.g., I/O servers).
	2.	Network topology
	3.	Network protocols
	4.	Physical media specifications (e.g., copper, fiber, RF, IR)
	5.	Computer operating systems
	6.	Interfacing and gateways
	7.	Data mapping

Skill in:

	1.	Analyzing throughput
	2.	Ensuring data integrity
	3.	Troubleshooting
	4.	Documenting configuration
	5.	Configuring network products
	6.	Interfacing systems
	7.	Manipulating data

Task 5:	Implement security methodology in accordance with stakeholder requirements in order to mitigate loss and risk.	
Knowledge of:		
	1.	Basic system/network security techniques
	2.	Customer security procedures
	3.	Control user-level access privileges
	4.	Regulatory expectations (e.g., 29 CFR Part 11)
	5.	Industry standards (e.g., ISA)
Skill in:		
	1.	Documenting security configuration
	2.	Configuring/programming of security system
	3.	Implementing security features
Task 6:	Review configuration and programming using defined practices in order to establish compliance with functional requirements.	
Knowledge of:		
	1.	Specific control software products
	2.	Specific HMI software products
	3.	Specific database software products
	4.	Specific reporting products
	5.	Programming structure techniques
	6.	Network communication
	7.	Alarming schemes
	8.	I/O structure
	9.	Memory addressing schemes
	10.	Hardware configurations
	11.	Computer operating systems
	12.	Defined practices
	13.	Functional requirements of system/equipment to be automated
Skill in:		
	1.	Programming and/or configuration capabilities
	2.	Documenting configuration and programs
	3.	Reviewing programming/configuration for compliance with design requirements
Task 7:	Test the automation system using the test plan in order to determine compliance with functional requirements.	
Knowledge of:		
	1.	Testing techniques
	2.	Specific control software products
	3.	Specific HMI software products
	4.	Specific database software products
	5.	Specific reporting products
	6.	Network communications
	7.	Alarming schemes
	8.	I/O structure
	9.	Memory addressing schemes
	10.	Hardware configurations
	11.	Computer operating systems
	12.	Functional requirements of system/equipment to be automated

Skill in:

	1.	Writing test plans
	2.	Executing test plans
	3.	Documenting test results
	4.	Programming and/or configuration capabilities
	5.	Implementing connections to remote devices
	6.	Interpreting functional requirements of system/equipment to be automated
	7.	Interpreting P&IDs

Task 8: *Assemble all required documentation and user manuals created during the development process in order to transfer essential knowledge to customers and end users.*

Knowledge of:

	1.	General understanding of automation systems
	2.	Computer operating systems
	3.	Documentation practices
	4.	Operations procedures
	5.	Functional requirements of system/equipment to be automated

Skill in:

	1.	Documenting technical information for non-technical audience
	2.	Using documentation tools
	3.	Organizing material for readability

Domain V: Deployment - field installation, checkout and startup of the systems

Task 1: *Perform receipt verification of all field devices by comparing vendor records against design specifications in order to ensure that devices are as specified.*

Knowledge of:

	1.	Field devices (e.g., transmitters, final control valves, controllers, variable speed drives, servo motors)
	2.	Design specifications

Skill in:

	1.	Interpreting specifications and vendor documents
	2.	Resolving differences

Task 2: *Perform physical inspection of installed equipment against construction drawings in order to ensure installation in accordance with design drawings and specifications.*

Knowledge of:

	1.	Construction documentation
	2.	Installation practices (e.g., field devices, computer hardware, cabling)
	3.	Applicable codes and regulations

Skill in:

	1.	Interpreting construction drawings
	2.	Comparing physical implementation to drawings
	3.	Interpreting codes and regulations (e.g., NEC, building codes, OSHA)
	4.	Interpreting installation guidelines

Task 3:	*Install configuration and programs by loading them into the target devices in order to prepare for testing.*	

Knowledge of:

	1.	Control system (e.g., PLC, DCS, PC)
	2.	System administration

Skill in:

	1.	Installing software
	2.	Verifying software installation
	3.	Versioning techniques and revision control
	4.	Troubleshooting (i.e., resolving issues and retesting)

Task 4:	*Solve unforeseen problems identified during installation using troubleshooting skills in order to correct deficiencies.*	

Knowledge of:

	1.	Troubleshooting techniques
	2.	Problem-solving strategies
	3.	Critical thinking
	4.	Processes, equipment, configurations, and programming
	5.	Debugging techniques

Skill in:

	1.	Solving problems
	2.	Determining root causes
	3.	Ferreting out information
	4.	Communicating with facility personnel
	5.	Implementing problem solutions
	6.	Documenting problems and solutions

Task 5:	*Test configuration and programming in accordance with the design documents by executing the test plan in order to verify that the system operates as specified.*	

Knowledge of:

	1.	Programming and configuration
	2.	Test methodology (e.g., factory acceptance test, site acceptance test, unit-level testing, system-level testing)
	3.	Test plan for the system/equipment to be automated
	4.	System to be tested
	5.	Applicable regulatory requirements relative to testing

Skill in:

	1.	Executing test plans
	2.	Documenting test results
	3.	Troubleshooting (i.e., resolving issues and retesting)
	4.	Writing test plans

Task 6:	*Test communication systems and field devices in accordance with design specifications in order to ensure proper operation.*	

Knowledge of:

	1.	Test methodology
	2.	Communication networks and protocols
	3.	Field devices and their performance requirements
	4.	Regulatory requirements relative to testing

Skill in:

	1.	Verifying network integrity and data flow integrity

	2.	Conducting field device tests
	3.	Comparing test results to design specifications
	4.	Documenting test results
	5.	Troubleshooting (i.e., resolving issues and retesting)
	6.	Writing test plans
Task 7:		Test all safety elements and systems by executing test plans in order to ensure that safety functions operate as designed.
Knowledge of:		
	1.	Applicable safety
	2.	Safety system design
	3.	Safety elements
	4.	Test methodology
	5.	Facility safety procedures
	6.	Regulatory requirements relative to testing
Skill in:		
	1.	Executing test plans
	2.	Documenting test results
	3.	Testing safety systems
	4.	Troubleshooting (i.e., resolving issues and retesting)
	5.	Writing test plans
Task 8:		Test all security features by executing test plans in order to ensure that security functions operate as designed.
Knowledge of:		
	1.	Applicable security standards
	2.	Security system design
	3.	Test methodology
	4.	Vulnerability assessments
	5.	Regulatory requirements relative to testing
Skill in:		
	1.	Executing test plans
	2.	Documenting test results
	3.	Testing security features
	4.	Troubleshooting (i.e., resolving issues and retesting)
	5.	Writing test plans
Task 9:		Provide initial training for facility personnel in system operation and maintenance through classroom and hands-on training in order to ensure proper use of the system.
Knowledge of:		
	1.	Instructional techniques
	2.	Automation systems
	3.	Networking and data communications
	4.	Automation maintenance techniques
	6.	System/equipment to be automated
	5.	Operating and maintenance procedures
Skill in:		
	1.	Communicating with trainees
	2.	Organizing instructional materials
	3.	Instructing

Task 10: Execute system-level tests in accordance with the test plan in order to ensure the entire system functions as designed.	
Knowledge of:	
1.	Test methodology
2.	Field devices
3.	System/equipment to be automated
4.	Networking and data communications
5.	Safety systems
6.	Security systems
7.	Regulatory requirements relative to testing
Skill in:	
1.	Executing test plans
2.	Documenting test results
3.	Testing of entire systems
4.	Communicating final results to facility personnel
5.	Troubleshooting (i.e., resolving issues and retesting)
6.	Writing test plans
Task 11: Troubleshoot problems identified during testing using a structured methodology in order to correct system deficiencies.	
Knowledge of:	
1.	Troubleshooting techniques
2.	Processes, equipment, configurations, and programming
Skill in:	
1.	Solving problems
2.	Determining root causes
3.	Communicating with facility personnel
4.	Implementing problem solutions
5.	Documenting test results
Task 12: Make necessary adjustments using applicable tools and techniques in order to demonstrate system performance and turn the automated system over to operations.	
Knowledge of:	
1.	Loop tuning methods/control theory
2.	Control system hardware
3.	Computer system performance tuning
4.	User requirements
5.	System/equipment to be automated
Skill in:	
1.	Tuning control loops
2.	Adjusting final control elements
3.	Optimizing software performance
4.	Communicating final system performance results
Domain VI:	**Operation and Maintenance - long term support of the system.**
Task 1:	Verify system performance and records periodically using established procedures in order to ensure compliance with standards, regulations, and best practices.
Knowledge of:	
1.	Applicable standards
2.	Performance metrics and acceptable limits

	3.	Records and record locations
	4.	Established procedures and purposes of procedures
Skill in:		
	1.	Communicating orally and written
	2.	Auditing the system/equipment
	3.	Analyzing data and drawing conclusions
Task 2:	*Provide technical support for facility personnel by applying system expertise in order to maximize system availability.*	
Knowledge of:		
	1.	All system components
	2.	Processes and equipment
	3.	Automation system functionality
	4.	Other support resources
	5.	Control systems theories and applications
	6.	Analytical troubleshooting and root-cause analyses
Skill in:		
	1.	Troubleshooting (i.e., resolving issues and retesting)
	2.	Investigating and listening
	3.	Programming and configuring automation system components
Task 3:	*Perform training needs analysis periodically for facility personnel using skill assessments in order to establish objectives for the training program.*	
Knowledge of:		
	1.	Personnel training requirements
	2.	Automation system technology
	3.	Assessment frequency
	4.	Assessment methodologies
Skill in:		
	1.	Interviewing
	2.	Assessing level of skills
Task 4:	*Provide training for facility personnel by addressing identified objectives in order to ensure the skill level of personnel is adequate for the technology and products used in the system.*	
Knowledge of:		
	1.	Training resources
	2.	Subject matter and training objectives
	3.	Teaching methodology
Skill in:		
	1.	Writing training objectives
	2.	Creating the training
	3.	Organizing training classes (e.g., securing demos, preparing materials, securing space)
	4.	Delivering training effectively
	5.	Answering questions effectively
Task 5:	*Monitor performance using software and hardware diagnostic tools in order to support early detection of potential problems.*	
Knowledge of:		
	1.	Automation systems
	2.	Performance metrics

	3.	Software and hardware diagnostic tools
	4.	Potential problem indicators
	5.	Baseline/normal system performance
	6.	Acceptable performance limits
Skill in:		
	1.	Using the software and hardware diagnostic tools
	2.	Analyzing data
	3.	Troubleshooting (i.e., resolving issues and retesting)
Task 6:	*Perform periodic inspections and tests in accordance with written standards and procedures in order to verify system or component performance against requirements.*	
Knowledge of:		
	1.	Performance requirements
	2.	Inspection and test methodologies
	3.	Acceptable standards
Skill in:		
	1.	Testing and inspecting
	2.	Analyzing test results
	3.	Communicating effectively with others in written or oral form
Task 7:	*Perform continuous improvement by working with facility personnel in order to increase capacity, reliability, and/or efficiency.*	
Knowledge of:		
	1.	Performance metrics
	2.	Control theories
	3.	System/equipment operations
	4.	Business needs
	5.	Optimization tools and methods
Skill in:		
	1.	Analyzing data
	2.	Programming and configuring
	3.	Communicating effectively with others
	4.	Implementing continuous improvement procedures
Task 8:	*Document lessons learned by reviewing the project with all stakeholders in order to improve future projects.*	
Knowledge of:		
	1.	Project review methodology
	2.	Project history
	3.	Project methodology and work processes
	4.	Project metrics
Skill in:		
	1.	Communicating effectively with others
	2.	Configuring and programming
	3.	Documenting lessons learned
	4.	Writing and summarizing
Task 9:	*Maintain licenses, updates, and service contracts for software and equipment by reviewing both internal and external options in order to meet expectations for capability and availability.*	
Knowledge of:		
	1.	Installed base of system equipment and software

	2.	Support agreements
	3.	Internal and external support resources
	4.	Lifecycle state and support level (including vendor product plans and future changes)
Skill in:		
	1.	Organizing and scheduling
	2.	Programming and configuring
	3.	Applying software updates (i.e., keys, patches)

Task 10: Determine the need for spare parts based on an assessment of installed base and probability of failure in order to maximize system availability and minimize cost.

Knowledge of:		
	1.	Critical system components
	2.	Installed base of system equipment and software
	3.	Component availability
	4.	Reliability analysis
	5.	Sourcing of spare parts
Skill in:		
	1.	Acquiring and organizing information
	2.	Analyzing data

Task 11: Provide a system management plan by performing preventive maintenance, implementing backups, and designing recovery plans in order to avoid and recover from system failures.

Knowledge of:		
	1.	Automation systems
	2.	Acceptable system downtime
	3.	Preventative and maintenance procedures
	4.	Backup practices (e.g., frequency, storage media, storage location)
Skill in:		
	1.	Acquiring and organizing
	2.	Leading
	3.	Managing crises
	4.	Performing backups and restores
	5.	Using system tools

Task 12: Follow a process for authorization and implementation of changes in accordance with established standards or practices in order to safeguard system and documentation integrity.

Knowledge of:		
	1.	Management of change procedures
	2.	Automation systems and documentation
	3.	Configuration management practices
Skill in:		
	1.	Programming and configuring
	2.	Updating documentation