Table. Proposed fundamentals and complements DevOps practices

#	Name	Elements	Dimensions			
			T	Pr	C	Pe
1	Continuous Integration (CI)	Description: Software development practice that requires developers to embed code in a shared repository many times a day [24]. Each new version of the project is then verified using an automated build, allowing teams to detect bugs more easily and quickly [24]. Purpose: Provide quick feedback such that; If a defect is introduced into the code base, it can be identified and corrected as soon as possible. Specific objectives: 1. Enable a version control system 2. Accelerate the code integration process 3. Detect integration errors early 4. Constantly make compiled versions visible for testing, demonstration or launch processes Expected artifacts: Continuous integration workflow, new software product update [93].	+	+		+
2	Continuous Delivery (CD)	Description: Practice that allows developed source code that has passed all validation tests to be ready for a pre-production environment as soon as possible. Purpose: Produce software in short cycles, ensuring that the software can be released reliably at any time. Specific objectives: 1. Deploy code predictably 2. Create low-risk product releases executed on demand. 3. Reduction of the times for the creation and delivery of incremental changes in the software. Expected artifacts: New software product update, continuous delivery workflow [93].	+	+		+
3	Continuous Testing (CT)	Description: This practice incorporates continuous, pre-programmed, and automated code testing as the application code is written or updated. These tests can speed the delivery of code to production. Purpose: To assess the quality of the software at each step of the continuous delivery process through early testing and frequent testing. Specific objectives: 1. Enable testing environment. 2. Integrate testing into continuous deployment and delivery processes. 3. Analyze test results. 4. Submit defect reports. 5. Discover defects early. Expected artifacts: Automated tests, test execution report.	+	+		+
4	Requirements Management (RM)	Description: Practice related to requirements management in tools to make it easier to track, test, analyse, visualize, and communicate project requirements to stakeholders. Purpose: To operate with clear, realistic and agreed requirements. Specific objectives: 1. Requirements management process (obtained, analyzed, documented and managed 2. Requirements analysis 3. Prioritization of requirements 4. Traceability of requirements to work items 5. Evaluate the impact of the changes Expected artifacts: Requirements specification documents / product backlog		+	+	+
5	Data Management (DM)	Description: Practice related to selecting, obtaining, maintaining and using data safely and efficiently. Purpose: To increase the speed of changes in databases, constantly monitor the impact of changes in the DevOps process and replicate them to the place where they are required. Specific objectives:	+	+		+

		1. Increase the speed of delivery of changes in the database 2. Reduce the risk of data loss during the deployment process 3. Synchronization of changes in the application and the database 4. Establish version control systems for the database 5. Preserve and protect critical business data Expected artifacts: Database, data dictionary, data models.				
6	Security Monitoring (SM)	Description: Practice related to integrating testing and security controls into daily QA, operations, and development work. Purpose: Improve software delivery and organization performance. Specific objectives: 1. Identity and access management 2. Privilege management 3. Enforce policy and governance 4. Firewall / Unified Threat Management 5. Vulnerability management throughout the DevOps workflow Expected artifacts: Information security policies, access control, passwords and backup copies.	+	+		+
7	Strategic Direction (SD)	Description: Practice in charge of mobilizing people and resources towards the use of DevOps environments, making things happen without overvaluing the benefits that the tools can offer to work teams, generating action within the organization. Purpose: Align all the efforts of the organization around a goal. Specific objectives: 1. Formulate and implement the strategy 2. Development and mobilization of resources and capacities 3. Coordination of different resources so that they are available 4. Establish the vision, mission and philosophy 5. Value creation Expected artifacts: Strategic objectives, mission and vision, action plan.		+		+
8	Configuration Management (CM)	Description: The practice of controlling and managing changes to software using version control in a standard and repeatable way. Purpose: Maintain the integrity and validity of the products developed during all stages of the product life cycle. Specific objectives: 1. Identify the products that will be treated as configuration items 2. Support the evaluation of change requests and document change control results 3. Maintain the validity of the configuration and the accuracy of the configuration management system Expected artifacts: Configuration management plan, change control records, source code, executables, requirements specification.	+	+		+
9	Continuous Monitoring and Observability (CMO)	Description: The practice of proactively monitoring, alerting, and acting in key areas to provide teams with visibility into application health throughout the lifecycle of a software product. Purpose: Essential DevOps practice that takes care of monitoring all types of resources, people and processes to find errors as soon as possible and determine why they happen. Specific objectives: 1. Improve transparency and visibility of IT and network operations 2. Identify causes of errors in the operation and performance of the software 3. Apply appropriate fixes to identified bugs before major damage to uptime and revenue occurs 4. Track user behavior Expected artifacts: Event and trace log, metrics.	+	+		+
10	Education around DevOps (EaD)	Description: Practice that drives better software delivery and organizational performance. Purpose: Contributes to software delivery performance with the following characteristics: increased deployment frequency, reduced lead times for changes, time to restore service and change in failure rate, strong team culture [94]. Specific objectives: 1. Improve the quality and speed of the team in your workflow Expected artifacts: Training plan.		+	+	

11	Continuous feedback and innovation (CFI)	Description: Practice in charge of permanently maintaining the socialization and / or documentation of the work team's learning. Purpose: Communication and lifelong learning. Specific objectives: 1. Optimize the processes associated with the workflow. Expected artifacts: Feedback plan, feedback questionnaires.			+	+
12	Measurement of Culture (MC)	Description: Practice that allows to measure the capabilities that drive the delivery of software and organizational performance to determine improvement actions. Purpose: To know the impact of culture on the results in the process of adopting DevOps in the company. Specific objectives: 1. Identify behaviors in the organizational culture. 2. Encourage organizational practices that promote trust and workflow. Expected artifacts: Questionnaires for staff.		+	+	
13	Continuous Deployment (CD)*	Description: Practice that strives to automate the deployment of software to production environments without human intervention. Purpose: To ensure that minimal effort is required to deploy code in production environments. Specific objectives: 1. Establish a continuous deployment pipeline 2. Establish containerization or virtualization practices. 3. Reduction of dependencies between team members (Dev -Op - QA) Expected artifacts: Infrastructure provisioning and deployment scripts [93].	+	+		+
14	Infrastructure as Code (IaC)*	Description: Practice in charge of automating the provisioning of the infrastructure necessary for the construction of a software product at any stage, using descriptive or high-level languages to code more versatile and adaptable implementation and provisioning processes. Purpose: To enable developers or operations teams to automatically manage, monitor, and provision resources. Specific objectives: 1. Users can define, provision and manage the resources they need, without the need for IT staff to do it for them. 2. Creation and use of definition files where the infrastructure elements are specified and how they should be configured. 3. Manage definition files for each product code in a version control system. Expected artifacts: Environment configuration document.	+			+
15	Privileged Access Management (PAM)*	Description: A practice that integrates policies, processes, and tools to protect, manage, and monitor access, users, and privileged credentials. Purpose: Protect the infrastructure and applications used, manage the business efficiently and maintain the confidentiality of sensitive data and critical infrastructure. Specific objectives: 1. Manage privileged accounts. 2. Monitor privileged activity. 3. Control the access of privileged users. 4. Control and protect infrastructure accounts. 5. Protect the credentials of third-party applications. Expected artifacts: Password policy, role and user management policy.	+	+		+
16	Continuous Learning (CL)*	Description: Practice that facilitates learning new skills and knowledge continuously. Purpose: Maintain competitiveness, promote innovation. Specific objectives: 1. Formalize the learning process. 2. Establish learning objectives within the teams. 3. Start a peer-to-peer coaching ecosystem Expected artifacts: Training plan.		+	+	+
17	Continuous Experimentation (CE)*	Description: Practice in charge of motivating the participation and generation of new ideas independently, writing and changing specifications during development. Purpose: Promote innovation and learning.		+	+	+

		Specific objectives: 1. Encourage debate on different perspectives. 2. Prioritize the decision-making process. Expected artifacts: Ideation workshops.		
18	Work Satisfaction (WS)*	Description: Positive emotional state of the staff regarding the company and the work carried out in it. Purpose: To positively impact the performance and commitment of the work team. Specific objectives: 1. Implement reward systems that promote trust and collaboration. 2. Involve the team in company processes. 3. Share a system of values and objectives. Expected artifacts: Questionnaires to capture people's perception and opinion.	+	+

Acronyms used: T (Tools), Pr (Processes), C (Culture), Pe (People), more information about the proposed dimensions can be consulted in section 3.1.