

ICT Project Management Theory and Application for Digital Transformation and Sustainable Development

Academy of ICT Essentials
for Government Leaders



The Academy of ICT Essentials for Government Leaders

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ICT PROJECT MANAGEMENT: THEORY AND APPLICATION FOR DIGITAL TRANSFORMATION AND SUSTAINABLE DEVELOPMENT

This module is about information and communication technology (ICT) project management, the theories and practices to deliver digital transformation and achieve sustainable development outcomes. The module introduces the international standards, bodies of knowledge and principles in project management to support organizations in the successful initiation, planning, implementation, monitoring and closing of projects that aim to strategically leverage ICTs to achieve the Sustainable Development Goals (SDGs). The module provides guidance on tailoring the project management methodology to match the operational context and complexity of a project. It aims to ensure that projects are able to achieve their intended objectives with value, effectiveness, efficiency, security and sustainability. The module intends to answer the following questions:

- How to successfully initiate, plan, implement, monitor, control and close a digital transformation project?
- How to set up a project organization?
- How to engage with project stakeholders?
- How to identify, analyse, evaluate, report and mitigate the complexity and failure factors that come with project delivery?
- How to ensure the effective and efficient governance and management of a project?
- How to tailor a project management methodology to fit the operational context and complexity of a project?

MODULE OBJECTIVES

The module is divided into the following five sections and aims to:

Section 1: The Sustainable Development Goals and Digital Transformation Projects

- Discuss the role of digital transformation in achieving the SDGs.
- Define “digital transformation” and explore the associated portfolios, programmes and projects to achieve the SDGs.

Section 2: Common Project Elements

- Define “project” and describe the elements that make up a project.
- Define “stakeholders” and outline the processes of identifying, analysing and engaging with project stakeholders.
- Define “project organization” and examine the structures, roles, accountability and responsibility of the project organization.
- Explore the principles and processes of digital transformation projects.
- Discuss the risk of digital transformation projects, including project complexity and failure factors.
- Be aware of the tools available for project management and development.

Section 3: Governance and Management of Digital Transformation Projects

- Examine the governance and management standards and principles to guide the successful leadership, direction and control of digital transformation projects.
- Define “project management” and identify the performance areas.

Section 4: Project Management and Development Practice Standards

- Provide an overview of the project management and development practice standards, including those from the International Organization for Standardization and professional bodies of knowledge that are relevant for digital transformation projects.

Section 5: Tailoring ICT Project Management Methodology

- Discuss the need for tailoring a project management methodology.
- Highlight issues to address in tailoring traditional project management, system development and agile project management methodologies.

LEARNING OUTCOMES

Upon completion of this module, learners will be able to:

- Determine and describe the common understandings that influence the view of digital transformation projects in realizing the SDGs.
- Agree and use common concepts and terminologies to lead, direct and control the delivery of project objectives.
- Examine and adopt the appropriate system of principles and rules to lead, direct and control the quality, value, effectiveness, efficiency and security of a project.
- Analyse and apply globally-recognized standards and bodies of knowledge in delivering quality products and services in a project.
- Identify the complexity and failure factors of a project and possible ways to mitigate them.
- Tailor the project management framework and methodology to match the contextual environment and successfully deliver the objectives of a digital transformation project for sustainable development.

TARGET AUDIENCE

The module addresses the training needs of the following on project management:

- Project sponsor – Person or entity funding a project.
- Project owner – Person or entity whose interest is the product or service to be delivered by the project.
- Project manager – Person or entity who is tasked to lead the execution of the agreed policy, methodology and enablers to deliver the project intention and results.
- Project team – Person or entity who is assigned to execute certain tasks agreed in the project terms of reference.
- Project governance – Person or entity who provides and oversees the implementation of project intention, policies and enablers.
- Management student – Person or entity admitted as a trainee in a management programme.

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ABBREVIATIONS AND ACRONYMS

APCICT	Asian and Pacific Training Centre for Information and Communication Technology for Development
APM	Association for Project Management
ESCAP	Economic and Social Commission for Asia and the Pacific
ICT	Information and Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ITU	International Telecommunication Union
PRINCE2	Projects in Controlled Environments
SDG	Sustainable Development Goal

1. THE SUSTAINABLE DEVELOPMENT GOALS AND DIGITAL TRANSFORMATION PROJECTS

Learning Objectives:

- Discuss the role of digital transformation in achieving the Sustainable Development Goals (SDGs).
- Define “digital transformation” and explore the associated portfolios, programmes and projects to achieve the SDGs.

1.1 The SDGs and Digital Transformation

Government agencies, private enterprises and interest groups can be considered service delivery organizations with publicly-registered legal purposes. The registration defines the mandated goals and context of developing and maintaining the portfolio of products and services that protect the interest and realize the benefit of their stakeholders.

In 2015, all member States of the United Nations adopted the 2030 Agenda for Sustainable Development with the following 17 SDGs at its core:¹

1. End poverty in all its forms everywhere.
2. End hunger, achieve food security and improve nutrition, and promote sustainable agriculture.
3. Ensure healthy lives and promote well-being for all at all ages.
4. Ensure inclusive and equitable quality education, and promote lifelong learning opportunities for all.
5. Achieve gender equality and empower all women and girls.
6. Ensure availability and sustainable management of water and sanitation for all.
7. Ensure access to affordable, reliable, sustainable and modern energy for all.
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all.
9. Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10. Reduce inequality within and among countries.
11. Make cities and human settlements inclusive, safe, resilient and sustainable.
12. Ensure sustainable consumption and production patterns.
13. Take urgent action to combat climate change and its impacts.
14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

¹ United Nations Department of Economic and Social Affairs, "Make the SDGs a Reality". Available at <https://sdgs.un.org/>.

15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.
16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable and inclusive institutions at all levels.
17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Together, these 17 SDGs provide a comprehensive set of actions and targets for government agencies, private enterprises and interest groups to achieve by 2030 for peace and prosperity for people and the planet. The SDGs have become the basis for organized efforts and activities of individuals, businesses, governments and civil society to create and deliver products and services. The SDGs play an important role in influencing the strategically planned and funded programmes, projects and operations of service delivery.

Information and communication technologies (ICTs) play an indispensable role in achieving SDG targets. ICTs are transformative tools that can potentially improve project impacts; reach, engage and empower users and communities; and accelerate the development and delivery of products, services and results.²

Digital transformation is a change driven by the Internet, mobile devices, social web applications, cloud computing, Internet of Things, smart technologies, digital intelligence systems, and the digital data generated from these devices, applications and systems. Commonly talked about technologies include the following:

- Blockchain technologies
- Cloud computing
- Internet of Things
- 5G mobile broadband
- Big data
- Artificial intelligence and analytics
- Automation
- 3D printing
- Robotics
- Intelligent sensors

The digital transformation context of achieving the SDGs is in the “fusion of technologies that is blurring the lines between the physical, digital and biological spheres”.³ These technologies of digital transformation have become an equalizer to enhance connectivity,

² APCICT, *An Overview of ICTs and Sustainable Development*, Academy of ICT Essentials for Government Leaders, fourth edition (United Nations, 2020). Available at https://www.unapcict.org/sites/default/files/2020-09/An_Overview_of_ICTs_and_Sustainable_Development.pdf.

³ Klaus Schwab, "The Fourth Industrial Revolution: what it means, how to respond", World Economic Forum, 14 January 2016. Available at <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>.

grow inclusivity, drive participation, bring financial inclusion, deliver education and health for all, tackle climate change, and improve access to trade and public services.

The digital network of people, data, applications and devices has changed the way social structure, individuals, groups and communities are organized.⁴ Manuel Castells, the author of, *The Rise of the Network Society – The Information Age: Economy, Society and Culture*, said in an interview⁵ that a country is a “network society”. It is a societal experience where interaction between ICT and society determines power relationships.

The World Economic Forum views digital transformative technologies changing the way people, society, business and government create value, affecting people’s meaning “to work productively; to be entertained; to exist with dignity; to be secure and healthy; to exercise freedom; to be in a relationship; to plan a future; to achieve a purpose”.⁶

Digital transformation has reimagined productivity and creativity, ease of doing business, inclusivity of services, content distribution, knowledge formation, relationship building, and community mobilization.

“The Digital Practitioner Body of Knowledge” describes the experience of digital transformation as follows:⁷

Digital transformation is fundamentally a strategy and an operating model of change, in which technological advancements are leveraged to improve human experiences and operating efficiencies and to evolve the products and services to which customers will remain loyal. It is the consequence of:

- *The ability to handle information in the digital form.*
- *Using digital technologies to manage the process of creating, capturing and analysing information to deliver perceptive human-machine interaction experience.*

⁴ School of Oriental and African Studies, "Unit 1 Introduction to Knowledge, Communication & Development: 1.4 The Network Society". Available at https://www.soas.ac.uk/cedep-demos/000_P523_MKD_K3637-Demo/unit1/page_10.htm.

⁵ Jack Linchuan Qiu, "Interview with Manuel Castells", *Chinese Journal of Communication*, vol. 1, no. 1 (2008), pp. 3-6. Available at <https://www.tandfonline.com/doi/abs/10.1080/17544750701861863?journalCode=rcjc20>.

⁶ Klaus Schwab, "The Fourth Industrial Revolution: what it means, how to respond", World Economic Forum, 14 January 2016. Available at <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>.

⁷ Digital Practitioner Body of Knowledge Standard, 6 May 2021. Available at <https://pubs.opengroup.org/dpbok/standard/DPBoK.html#digital-transformation>.

The theme of the 75th anniversary of the United Nations – “UN75: Shaping the Future Together” – recognizes the impact of digital technologies on sustainable development.⁸

Technologies can help make our world fairer, more peaceful and more just.

Digital advances can support and accelerate achievement of each of the 17 SDGs – from ending extreme poverty to reducing maternal and infant mortality, promoting sustainable farming and decent work, and achieving universal literacy.

But, technologies can also threaten privacy, erode security and fuel inequality. They have implications for human rights and human agency. Like generations before, we – governments, businesses and individuals – have a choice to make in how we harness and manage new technologies.

The United Nations Department of Economic and Social Affairs – Division for Public Institutions and Digital Government⁹ believes that digital government can play a role in building effective, inclusive and accountable institutions to support policymaking and service delivery for the SDGs. The following enables the digitalization of good governance:

- Mobile technologies and broadband connectivity.
- Social networks on the ways people interact with one another and with their governments.
- Open government data and cloud computing and mobile devices.

The World Bank¹⁰ identifies the following building blocks for digital government:

- | | |
|---|--|
| • Single portal: | The single and integrated portal presents information and services from the view of the users. The user experience is one of completing the transaction on the integrated website rather than being “handed off” to another website. |
| • Unified data shared across the public sector: | The use of a unified database for the basic data of government services. A master data is accessible to and used across the public sector, rather than each agency keeping its records. |

⁸ United Nations, "UN75: The Impact of Digital Technologies". Available at https://www.un.org/sites/un2.un.org/files/un75_new_technologies.pdf.

⁹ United Nations Department of Economic and Social Affairs, "Digital Government". Available at <https://publicadministration.un.org/en/ict4d>.

¹⁰ World Bank, "Digital Government 2020: Prospects for Russia", April 2016. Available at <http://documents1.worldbank.org/curated/en/562371467117654718/pdf/105318-WP-PUBLIC-Digital-Government-2020.pdf>.

- Cross-government shared services: The common components of government service delivery unify service by all government agencies to ensure efficiency, optimization and security of delivery. Identity and access management system provides a cross-government shared service.
- Shared government infrastructure: Standardization of infrastructure components and the use of cloud computing.
- Improved sensor networks and analytics: The use of sensors and analytics of the data in automated information processing. Internet of Things is an example.
- Cybersecurity and privacy: The digitalization of information provides the services that assure confidentiality of information, the integrity of the process, system reliability, user safety and data privacy.

The digital transformation of government services achieves its model of effectiveness and efficiency by observance of the following development principles:

- Digital by default: Service delivery is achieved with digital channel.
- Device agnostic and mobile-centric: Service is accessible on any device and mobile application.
- User-centred service design: Service is not about the government service but user need is the focus of the delivery model.
- Digital from end to end: The user result is experienced as an end-to-end digital transaction of service delivery.
- Government-as-a platform: The citizen interacts and achieves service objectives in the digital platform of government presence on a website or mobile application.

1.2 The Digital Transformation Project

A digital transformation project represents the strategic intention of “transformational leadership” to create new business value and to differentiate the provision of target users’ experience. It exploits disruptive technologies to evolve the products and services. It includes improving compliance with acceptable service quality indicators that affect the users’ trust of the service delivery organization.

Value creation has become a digital service. The user experience of effectiveness, efficiency and security in service delivery has become anywhere, anytime, any device and anyone with digital technology-enabled products and services.

The digital platform of value creation is reimagining the planning, design, acquisition, transition, operation and improvement of service delivery that meets the stakeholder and user requirements for greater value, inclusivity, reach, effectiveness, efficiency, security and continuity.¹¹

Transformational leadership in digital service delivery believes in differentiating the user experience with digital technology-enabled services to achieve the following objectives:

- Initiate quality processes and efficient user interaction with automation.
- Use technology as a tool to ensure good governance, quality management of services and security of information.
- Spread inclusivity, participation and transparency.
- Simplify administrative processes of creating value.

Governance and management pursue the creation of a “digital-first culture” in the organization. It means leadership, data-driven governance, strategic value chain thinking, user focus, fault tolerance, innovation, agility and disruptive technologies are the drivers behind the business model, plan, architecture and implementation.

Transformational leadership co-creates value with users or citizens through the acquisition and operation of a service delivery platform that integrates the use of the following digital technologies in accomplishing the service delivery agreements:

- Broadband network and wireless technology of connecting devices, location, data, application and people of value creation and user experience.
- Cloud computing of digital strategy and operation that brings the infrastructure, platform and software of performance as-a-service.
- Artificial intelligence and big data that extend the capability in data analytics and robot-enabled automation.
- Digital, social and mobile technologies are mobile devices, web applications and social networks of content delivery and interactivity.
- Internet of Things and intelligent devices.

¹¹ World Economic Forum, "Fourth Industrial Revolution". Available at <https://www.weforum.org/focus/fourth-industrial-revolution>.

Figure 1: Cyberspace of value creation

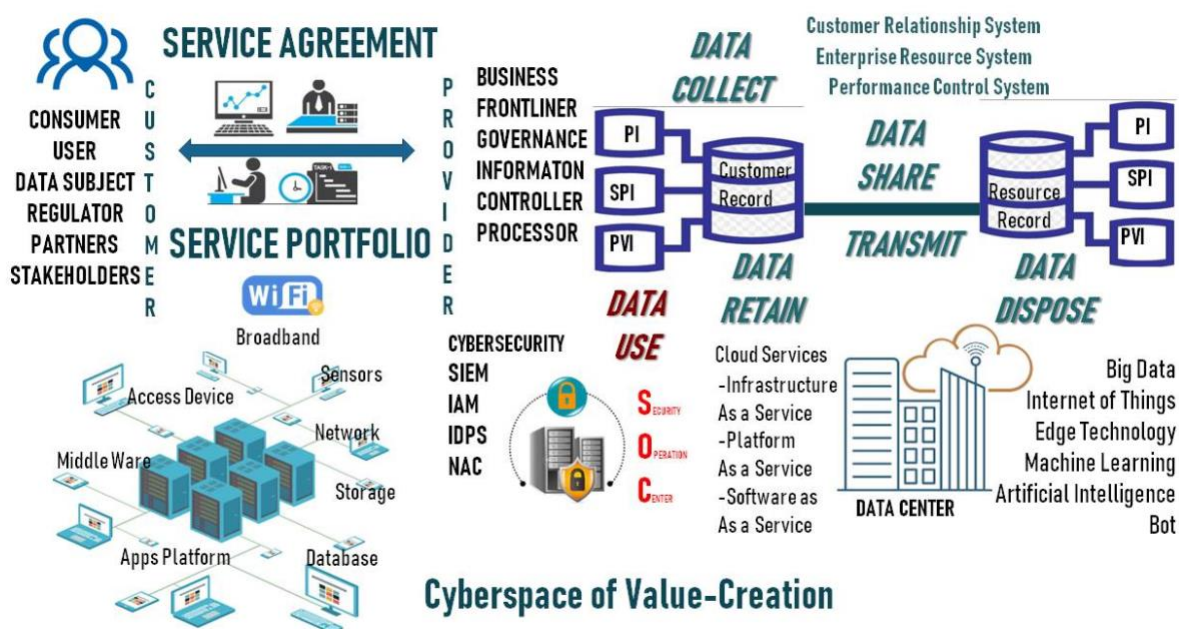


Table 1: Examples of digital transformation projects for achieving the SDGs

SDG	Digital Transformation Project	Transformative Technologies
SDG 9: Build resilient infrastructure	Free Wi-Fi project connects people in remote locations to the Internet	Wireless broadband technologies and mobile access devices
SDG 4: Ensure inclusive and equitable education	Massive open online course project connects learners to the opportunity of education for all and academic qualification without discrimination	Wireless broadband, learning management system, unified communication and mobile social technology
SDG 3: Ensure healthy lives	Telehealth project connects the grass-roots level of primary health care to digital diagnostic devices, medical records and online medical experts, and support sustained delivery of health for all	Wireless broadband, cloud computing, health information system and financial technology
SDG 8:	Online stores and workspaces connect producers of goods and	Wireless broadband, financial technology,

Promote full and productive employment and decent work for all	services to online users and business support providers	mobile access devices and cloud computing
SDG 10: Reduce inequality	National digital identification project connects individuals to a single system of personal identification for equitable delivery of public service	Wireless broadband, Internet of Things, cloud computing and identity management system
SDG 13: Take urgent action to combat climate change	Rainforest project connects the trees in the forest to a monitoring and control system	Wireless broadband, cloud computing and artificial intelligence

Digital transformation is the canvas on which government agencies, private enterprises and interest groups draw their new business model and strategy to deliver value, effectiveness, efficiency, continuity, security and sustainability. The modelling of change ensues from the impact of disruptive technology and agile methodology in defining the good, better or best frontline service delivery systems and backend operation in fulfilling purpose in the era of the digital economy in achieving the SDGs.

Digitalization brings new organizational, legal and technology pathways to plan, design and implement the strategy and operation models. These pathways make the governing body and executive management protect the stakeholders' interest and realize the users' benefits in the context of the digital delivery system of creating value, reaching market, engaging partner, fulfilling delivery and assuring compliance.

The digital transformation project is the development and operation of new services with the digital platform of service delivery. It is where the organization is developing new or improved products and services with emerging and disruptive digital technologies.

1.3 Digital Transformation Project Standards

The project organization of digital transformation relates effectiveness to the value stream and supply chain that is inside the complex online service delivery environment called cyberspace. The International Organization for Standardization (ISO) describes cyberspace as: "A global domain within the information environment consisting of the interdependent network of information systems infrastructures including the Internet,

telecommunication networks, computer systems, and embedded processors and controllers.”¹²

A digital transformation project develops products that are located in cyberspace. The digital technologies drive the creation of the new or modified business model, culture and user experience. It answers the question of whether we change our processes in a way that will enable better decision-making, game-changing efficiencies or a better user experience with more personalization.¹³

The digitalized value delivery system of achieving the SDGs demonstrates the following common critical activities to realize intention:

- Determine the business model that underpins the realization of the organization’s strategic intention.
- Understand the business case of the value to be created relative to its users’ view of utility and warranty.
- Create the implementation policy and action plan to move forward the intended results with clear, coherent, complete and consistent direction and controls.
- Design and develop the appropriate products or services following stakeholders’ requirements of quality to address opportunities and threats.
- Manage the project and product development life cycle of the services that fulfil the benefit, effectiveness, efficiency and security objectives of the planned strategy.
- Communicate and deliver the worth of the released products or services to the users.
- Improve products or services from users’ feedback or product incidents.

The realization of the SDGs requires a platform to deliver the services that accomplish the adopted quality performance indicators. ISO 25010 provides the common indicators to measure the assured quality of the planned, designed, developed or operated digital service or product, as follows:¹⁴

- Functional suitability: Functional completeness, correctness and appropriateness
- Performance efficiency: Time behaviour, resource utilization and capacity
- Compatibility: Co-existence and interoperability

¹² National Institute of Standards and Technology, U.S. Department of Commerce, "Cyberspace". Available at <https://csrc.nist.gov/glossary/term/cyberspace>.

¹³ Salesforce, "What is Digital Transformation?" Available at <https://www.salesforce.com/products/platform/what-is-digital-transformation/>.

¹⁴ See quality service assurance indicators of ISO/IEC 25010. Available at <https://iso25000.com/index.php/en/iso-25000-standards/iso-25010>.

- Usability: Appropriateness, recognizability, learnability, operability, user error protection, interface aesthetic and accessibility
- Reliability: Maturity, availability, fault tolerance and recoverability
- Security: Confidentiality, integrity, non-repudiation, accountability and authenticity
- Maintainability: Modularity, reusability, analysability, modifiability and testability
- Portability: Adaptability, installability and replaceability

The successful acceptance of digital transformation product or service deliverable is measured by its in-use quality, which according to ISO 25011, includes the following:

- Effectiveness: Accuracy and completeness with which users achieve specified goals.
- Efficiency: Resources expended concerning the accuracy and completeness with which users achieve goals.
- Satisfaction: The degree to which user needs are satisfied when a product or system is used in a specified context (includes attitudes towards the use of the product).
- Freedom from risk: The degree to which a product or system mitigates the potential risk to economic status, human life, health or the environment.
- Context coverage: The degree to which a product or system can be used with effectiveness, efficiency, freedom from risk and satisfaction in pre-defined or changing contexts.

The integration of digital transformation approaches and technologies is changing the way service delivery organizations demonstrate their worth, effectiveness and efficiency to deliver results. The quality management of digital transformation projects requires a clear and current instrument to assess risk. The clear, common, coherent and complete identification of the risk criteria comes from identified, analysed, mapped and applied regulations and standards.

The ISO provides the community-driven generic technical standards to do-plan-check-act digital transformation, as follows:

- Customer satisfaction:
 - ISO Guide 76 – Development of service standards consumer issues

- ISO 10001 – Guidelines for codes of conduct for organizations customer satisfaction
- Quality in service delivery:
 - ISO 25011 – Service quality models
 - ISO 20000 – Service management system requirements
- Master data quality:
 - ISO 8000-150 – Master data: Quality management framework
 - ISO 8000-61 – Data quality management: Process reference model
 - ISO 25012 – Data quality model
- Cloud computing approach:
 - ISO 22123 – Cloud computing concepts
 - ISO 23167 – Cloud computing common technologies and techniques
 - ISO 19944 – Cloud data flow, data categories and data use
 - ISO 19086 – Cloud computing service level agreements
 - ISO 27018 – Cloud computing privacy
 - ISO 27017 – Cloud computing security
- Outsourcing management:
 - ISO 37500 – Guidance on outsourcing
 - ISO 27036 – Information security for supplier relationships
- Data privacy:
 - ISO 29100 – Privacy framework
 - ISO 29151 – Privacy control
 - ISO 24760 – Identity management
 - ISO 29184 – Online privacy notices and consent
 - ISO 27550 – Privacy engineering
 - ISO 29134 – Privacy impact assessment
- Information security:
 - ISO 27701 – Privacy Information management system
 - ISO 27001 – Information security management system
 - ISO 27002 – Security controls
 - ISO 27033 – Network security
 - ISO 27040 – Storage security
 - ISO 27034 – Application security
 - ISO 27032 – Guidelines for cybersecurity
 - ISO 27110 – Cybersecurity framework development guidelines
 - ISO 27035 – Information security incident management
 - ISO 22301 – Business continuity management requirement
 - ISO 27031 – Guidelines for ICT readiness for business
 - ISO 27005 – Information security risk management
- Innovation management:
 - ISO 56002 – Guidance on innovation management system

- Internet of Things:
 - ISO 20924 – Internet of Things vocabulary
- Big data:
 - ISO 20546 – Big data overview and vocabulary

1.4 Digital Transformation Use Cases

This subsection presents digital transformation use cases from Estonia and Singapore.

Table 2: Digital transformation in Estonia and Singapore

e-Estonia¹⁵

Transformation Indicator	Performance Results	Digital Transformation Projects
Savings and efficiency	<ul style="list-style-type: none"> • 2 per cent of gross domestic product saved due to the collective use of digital signatures. • 844 years of working time saved annually thanks to data exchange. • Time to establish a business reduced from 5 days to 3 hours. 	<ul style="list-style-type: none"> • <u>Population Register</u> – A nationwide database for holding basic information about each person living in Estonia. • <u>X-Road</u> – The backbone of e-Estonia that allows the nation's public and private sector e-service databases to link up and function in harmony. • <u>ID-card</u> – The national identity card system that provides digital access to all of Estonia's secure e-services. • <u>Digital Signature</u> – The provision of digital signature in citizen's ID-card, Mobile-ID or Smart-ID, for safe identification and use of e-services. • <u>Mobile-ID</u> – Allows people to use a mobile phone as a form of secure digital identification. It is used to access secure e-
e-Government	<ul style="list-style-type: none"> • 98 per cent of Estonians have a national identity card. • 47 per cent of Estonian voters from 109 countries used i-Voting. 	
Finance	<ul style="list-style-type: none"> • 98 per cent of companies are established online. • 99 per cent of banking transactions are online. • 98 per cent of tax declarations are filed online – taking only 3 minutes. • Over 70,000 e-residents. 	

¹⁵ e-Estonia, "Facts & Figures". Available at <https://e-estonia.com/e-estonia-toolkit/>.

Health care	<ul style="list-style-type: none"> • 99 per cent of patients have a countrywide-accessible digital record. • 99 per cent of prescriptions are digital. • 2.3 million queries by doctors and 2.3 million queries by patients every month. 	<p>services and digitally sign documents.</p> <ul style="list-style-type: none"> • <u>eSchool</u> – Web applications for schools that provide an easy way for parents, teachers and children to collaborate and organize all needed information for teaching and learning.
Education	<ul style="list-style-type: none"> • Ranked first in Europe in the Organisation for Economic Co-operation and Development's Programme for International Student Assessment tests. • Two times more students in ICT-related courses on average than in other developed countries. • 100 per cent of Estonian schools use e-solutions. 	<ul style="list-style-type: none"> • <u>e-Health System</u> – A nationwide system that integrates data from Estonia's health care providers to create a common record every patient can access online. • <u>e-Prescription</u> – A centralized paperless system for issuing and handling medical prescriptions with the use of Mobile-ID and e-Health System.

Singapore Digital Government Blueprint¹⁶

Digital Government Strategies	Digital Transformation Projects
<ul style="list-style-type: none"> • Integrate services around citizen and business needs • Strengthen integration between policy, operations and technology 	<ul style="list-style-type: none"> • <u>LifeSG</u> – A one-stop and personalized access to 40 government services for all citizens. • <u>GoBusiness</u> – A business licensing portal that provides assistance related to grants, loans and tax incentives. • <u>MyInfo</u> – A government-developed data platform that enables locally-registered businesses to digitalize their business operations by requesting citizens' data via

¹⁶ Smart Nation and Digital Government Office, Singapore, "Digital Government Services". Available at <https://www.smartnation.gov.sg/what-is-smart-nation/initiatives>.

<ul style="list-style-type: none"> • Build common digital and data platforms • Operate reliable, resilient and secure systems • Raise digital capabilities to pursue innovation • Co-create with citizens and businesses, and facilitate the adoption of technology 	<p>secure application programming interfaces with their consent.</p> <ul style="list-style-type: none"> • <u>e-Authentic Court Order</u> system – A platform that simplifies the process of verifying court orders. • <u>OpenCerts</u> – A blockchain-based platform that offers an easy and reliable way to issue and validate tamper-resistant academic certificates. • <u>Single Sources of Truths</u> – Trusted centres designated to provide clean, verified and authoritative data fields commonly used for policymaking and service delivery and shared across whole-of-government. • <u>Commercial Cloud</u> – To modernize the government's ICT systems to reap the benefits of best-in-class commercial solutions, cheaper hosting, higher availability and greater ease of continually improving services. • <u>Work from Home</u> – Bandwidth and server to double the daily virtual private network logins from 60,000 to 120,000, and use of digital tools for virtual meetings and remote work arrangements.
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Learning Activity 1: Digital Transformation Strategy and Project

- Present a digital transformation project in your country or organization that demonstrates the value proposition of digital transformation to achieve the SDGs.
- Search the Internet for digital transformation projects that support the achievement of the SDGs:
 - Identify what the digital transformation project wants to achieve, maintain, prevent or eliminate for its stakeholders.
 - Identify the digital technologies in achieving the project objectives.

2. COMMON PROJECT ELEMENTS

Learning Objectives:

- Define “project” and describe the elements that make up a project.
- Define “stakeholders” and outline the processes of identifying, analysing and engaging with project stakeholders.
- Define “project organization” and examine the structures, roles, accountability and responsibility of the project organization.
- Explore the principles and processes of digital transformation projects.
- Discuss the risk of digital transformation projects, including project complexity and failure factors.
- Be aware of the tools available for project management and development.

2.1 Project as Defined by International Standards

2.1.1 ISO 21502:2020¹⁷ – Guidance on Project Management

A project is a temporary endeavour to achieve one or more defined *objectives*. It focuses on retaining or adding value or capability, for a sponsoring organization, stakeholders or users.

The project's objective is fulfilled by a combination of *deliverables, outputs, outcomes and benefits*, depending on the project's *context* and direction provided through *governance*.

The delivered project objective contributes to *outcomes* and *realization of benefits*. The benefit is the created advantage, value or other positive effects for the stakeholders, including the sponsoring organization, other internal and external interest parties, regulators and users.

The project is unique as it delivers new products or services that will add value to the service portfolio of the project sponsor and owner.

The project organization refers to government, private enterprise or interest group that pursues the goals of sustainable human development. Power and influencer are the project sponsor, owner or the governing body and executive management of the organization.

The project organization addresses the uniqueness of a project with an aligned management methodology to start, progress, control and close the creation of the

¹⁷ ISO, "ISO 21502:2020(en) Project, programme and portfolio management – Guidance on project management". Available at <https://www.iso.org/obp/ui/#iso:std:iso:21502:en>.

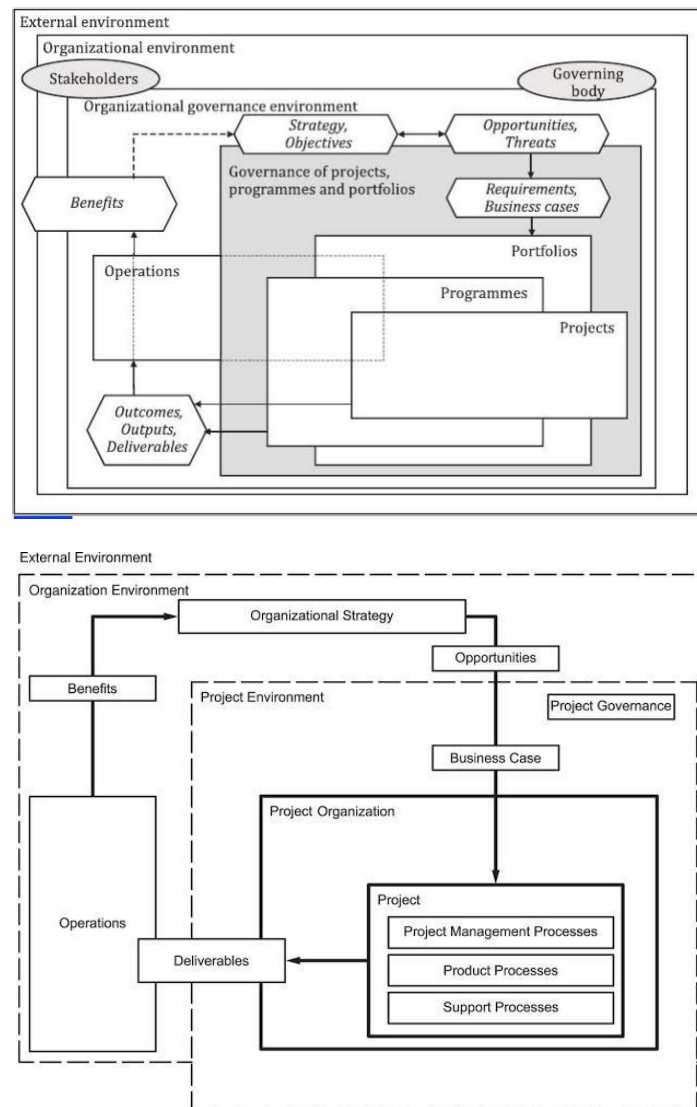
deliverables. The elements that describe the unique definition of the project are the following:

- Context of the project: External and organization environment, strategy, portfolio, programme and project of the project sponsors and stakeholders.
- Outcome of the project: Change resulting from the use of the output.
- Objectives of the project: Tasks to complete the delivery of the outcome.
- Outputs of the project: Aggregated tangible or intangible deliverables that form the project results.
- Impacted stakeholders: Persons, groups or organizations that have interest in, or can affect, be affected by, or perceive themselves to be affected by, any aspect of a portfolio, programme or project.
- Complexity of the project: Element and level of difficulty that affects the decision-making process.
- Constraints of the project: Limiting factors that have an impact on the effectiveness and efficiency of project delivery.
- Used processes or methods: Set of policies, procedures, techniques and tools of project delivery.
- Enabling resources: Resources come as policies, organizations, processes, competencies, funds, materials, services, people and technologies.
- Organization and sourcing: Service providers and the acquisition approach for the enabling resources of the project.

2.1.2 Project Context and Justification

ISO 21502:2022 provides the visualization of what composes understanding of project context (Figure 2). The project context includes the external environment, organizational, governance and project implementation context.

Figure 2: Visualization of project context



Source: Pier Luigi Guida and Maurizio Monassi, "The New ISO 21502", *PM World Journal*, vol. 10, no. 3 (March 2021). Available at <https://pmworldlibrary.net/wp-content/uploads/2021/03/pmwj103-Mar2021-Guida-Monassi-the-new-iso-21502.pdf>.

Project Business Case

A project is a justified and funded strategic action to actualize a business case. The project business case documents the worth of the project for the stakeholders. It communicates the level of acceptable risks and the enabling resources and partners. It outlines the invested activities, schedule, organization, compliance, procurement and

providers in achieving what the stakeholders want, and in the manner the stakeholders want to be satisfied.

To get started in creating a business case, a generic content template from internationally-recognized project management guidance can be used, such as:

- AXELOS Projects in Controlled Environments (PRINCE2)
- Association for Project Management (APM) Body of Knowledge

The openly-shared business case template of PRINCE2¹⁸ provides the key points for the formulation of a business case, as follows:

- Executive summary: Highlights the key points in the business case related to the important benefits and the return on investment.
- Reasons: Defines the reasons for undertaking the project and explains how the project will enable the achievement of corporate strategies and objectives.
- Business options: Analysis and reasoned recommendation for the base business options of – do nothing, do the minimal or do something.
- Expected benefits: The benefits that the project will deliver are expressed in measurable terms against the situation, as it exists before the project. Benefits should be both qualitative and quantitative.
- Expected dis-benefits: Outcomes perceived as negative by one or more stakeholders.
- Timescale: The period over which the project will run and the period over which the benefits will be realized.
- Costs: The project costs are based on the project plan, the ongoing operations and maintenance costs, and their funding arrangements.
- Investment appraisal: It compares the aggregated benefits and dis-benefits to the project costs and ongoing incremental operations and maintenance costs to address how the project will be funded.
- Major risks: The risks that may likely occur and will cause a disruptive impact on the project.

¹⁸ PRINCE 2 Wiki. Available at <https://prince2.wiki/theme/business-case/>.

The APM describes the business case in the seventh edition of its Body of Knowledge as the provision of “justification for undertaking a portfolio, programme or project. It evaluates the benefit, cost and risk of alternative options and provides a rationale for the preferred solution”.¹⁹ The project business case includes the following common content:

- Strategic context: The compelling case for change.
- Economic analysis: Return on investment based on investment appraisal of options.
- Commercial approach: Derived from the sourcing strategy and procurement strategy.
- Financial case: Affordability to the organization in the time frame.
- Management approach: Roles, governance structure, life cycle choice, etc.

Project Logical Framework

A project logical framework or logframe is a common documentation template to define, plan and monitor development projects (Figure 3). The logframe is best understood and created by using the templates provided by development project sponsors.

For projects that receive overseas development assistance from aid agencies of Australia, the European Union or the United State of America, or from the Asian Development Bank and the World Bank, project logframes are used in proposing projects for assistance.

A project logframe²⁰ details the following:

- The project’s hierarchy of objectives or the result/outcome chain.
- The key external factors that are critical to making the project successful.
- The preconditions and assumptions that influence the project definition.
- The monitoring and evaluation indicators and sources of verification.

¹⁹ APM, "What is a business case?" Available at <https://www.apm.org.uk/resources/what-is-project-management/what-is-a-business-case/>.

²⁰ Practical Concepts Incorporated, *The Logical Framework: A Manager's Guide to a Scientific Approach to Design & Evaluation* (Washington, D.C., 1979). Available at <https://www.usaid.gov/sites/default/files/documents/1865/The-Logical-Framework-A-Managers-Guide.pdf>.

Figure 3: Project logframe template

Logical Framework
for
Summarizing Project Design

Est. Project Completion Date _____
Date of this Summary _____

Project Title: _____

	NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Development Hypotheses	Program Goal: The broader objective to which this project contributes:			
	Project Purpose:			
	Outputs:			
Mangible Interest	Inputs: Activities and Types of Resources			

Source: Practical Concepts Incorporated, *The Logical Framework: A Manager's Guide to a Scientific Approach to Design & Evaluation* (Washington, D.C., 1979). Available at <https://www.usaid.gov/sites/default/files/documents/1865/The-Logical-Framework-A-Managers-Guide.pdf>.

Learning Activity 2: Project Justification

- The project template provider, Project Management Docs, provides a business case template to guide understanding of the common content to justify a project. Go to <https://www.projectmanagementdocs.com/template/project-initiation/business-case/>.
- Review the template and make a checklist of the content for a project business case applicable to your organization.
- Create a project logframe using a software developed by FACILIDEV available at <https://www.logframer.eu/>.

Project Charter and Terms of Reference

A project charter is a document that defines the project to its implementing organization or service provider. It outlines the following:²¹

- Value – The project's worth and benefits.
- Cost – Budget allocation for achieving the benefits and agreed deliverables.
- Schedule – Delivery time of the agreed deliverables.

²¹ Project Management Docs, "Project Charter (Multi Page Version)". Available at <https://www.projectmanagementdocs.com/template/project-initiation/project-charter-multi-page-version/>.

- Scope – The work and resources of the agreed deliverables and service level.
- Rule – Policies, regulations and standards of compliance.
- Supplier – Resources to acquire, the selected suppliers and procurement modality.
- Organization – The decision rights, roles, accountability and responsibility of experts and users.

A project terms of reference²² define what to acquire and deliver as project requirements. The terms of reference guide the creation and evaluation of the agreement contained in a project proposal offered to deliver the specified objectives, resources and acceptance metrics of the project.

The project-adopted project management standards or procurement regulatory requirements provide the generic project charter and terms of reference template.

Learning Activity 3: Terms of Reference

- Download a manual for preparing terms of reference available at <http://www.evropa.gov.rs/evropa/ShowDocument.aspx?Type=Home&Id=529>.

Review the manual and create a content outline of a project terms of reference
- Download the project documentation template of the International Telecommunication Union (ITU) available at <https://www.itu.int/en/ITU-D/Projects/Documents/ProjectDocumentTemplate.pdf>.

Review the template and identify the data requirements for a project terms of reference.

2.2 Project as Stakeholder Engagement

2.2.1 International Standards' Definition of Stakeholders

ISO 21502:2020 refers to stakeholders as: "Persons, groups or organizations that have interests in, can affect, be affected by or perceive themselves to be affected by any aspect of the project. The stakeholders can be internal or external to the project and the organization."

The Project Management Institute's Project Management Body of Knowledge (seventh edition) describes stakeholders as: "Individuals, groups or organizations that may affect, be affected by, or perceive themselves to be affected by a decision, activity or outcome

²² European Integration Office, Republic of Serbia Government, *Manual for Preparing Terms of Reference* (Belgrade, 2011). Available at <http://www.evropa.gov.rs/evropa/ShowDocument.aspx?Type=Home&Id=529>.

of a portfolio, programme or project. Stakeholders also directly or indirectly influence a project, its performance or outcome in either a positive or a negative way.”

Stakeholders are pivotal in the successful delivery of the project outcome. Project success requires the transparent and participative engagement of a person or entity representing power that underpins influence, interest and authority in the direction and control of project activities and enabling resources. They represent signing authority, fund source, enabling resources, requirement knowledge, product use, product provider or oversight function that underpin the successful environment of project delivery. The organized team of the project sponsor, owner, manager, service provider, specialists and users represents internal stakeholders whose interest and influence affect project delivery. Table 3 provides an example of identifying internal stakeholders’ interest, impact and priority.

Table 3: Example of identifying internal stakeholders’ interest, impact and priority

Stakeholder	Interests	Estimated Project Impact	Estimated Priority
Owner	Achieve targets Liability (avoid at all costs) Increase sales margin	Med + High - Med +	1
Sponsor	Successfully addresses needs of adjunct customer Appears competent among peers Provides new market to expand ventures	Low + Low - Med +	3
Team Memebers	New product excitement Demand end-of-year bonus Retain and expand skill level Strike (if basic demands aren't met with new process)	Med + ? Med + High -	2

Source: Larry W. Smith, "Stakeholder analysis: A pivotal practice of successful projects", paper presented at Project Management Institute Annual Seminars & Symposium, 7 September 2000. Available at <https://www.pmi.org/learning/library/stakeholder-analysis-pivotal-practice-projects-8905>.

2.2.2 Identification and Analysis of Stakeholders

The identification and analysis of stakeholders involve:²³

- Familiarization with stakeholders as to their impact on the project.
- Understanding of the network of stakeholders that works together to achieve project objectives.
- Balance of the stakeholders’ contribution to the needs of the project to achieve project results.
- Information distribution that matches the communication requirements of the stakeholders.
- Definition and agreement on the project goals, directions and deliverables.

²³ Goal Directed Project Management. Available at <https://www.gdpm.com/>.

Knowing the level of interest and influence of stakeholders determines who to engage and influence in achieving the project objectives. It also involves the identification of the knowledge, skills and attitude of the stakeholders who may positively contribute to the completion of the project. The understanding is critical to ensure their relevant participation in the authorization, planning, implementation, monitoring and acceptance of the project.

The APM Body of Knowledge²⁴ points out the following reasons for the identification of project stakeholders:

- Measure the relative power of the stakeholder to change the activities and results of the project.
- Measure the degree of interest that the stakeholder will demonstrate actively.
- Measure the likelihood the stakeholder will support the delivery of project results.

The Goal Directed Project Management guidance provides the following basic elements in the analysis of stakeholders who will affect project performance:²⁵

- Stakeholder identity: Authority or role to associate in the project.
- Area of interest: Concern about the project.
- Contribution: Input or enabling resources to provide in the project.
- Expectation: Assumption on what and how to succeed.
- Power: Influence or authority to affect the result of the project.
- Strategy: Approach to engage the stakeholder.
- Responsible person: The person who is tasked to engage with the stakeholder.

At every phase, sequence or iteration in the project life cycle, the project owner, sponsor, manager, team, user and the third party should participate with transparency. It means the project stakeholders communicate their common, clear, coherent, complete and consistent agreement on the following known elements of a project.

- Value: Agreed benefits
- Risk: Determined risk appetite
- Design: Analysed requirements
- Cost: Authorized budget
- Schedule: Accepted time frame
- Scope: Planned work
- Enabler: Assigned resources
- Sourcing: Opted acquisition

²⁴ APM, *APM Body of Knowledge*, seventh edition (Buckinghamshire, 2019). Available at <https://www.apm.org.uk/media/35296/ampbok7-sample.pdf>.

²⁵ Goal Directed Project Management. Available at <https://www.gdpm.com/>.

- Organization: Agreed roles, accountability and responsibility structure
- Metrics: Accepted quality criteria
- Compliance: Complied laws and adopted standards
- Technology: Opted methodology, technical tools and technology platform for the solution

Stakeholder engagement, according to the APM Body of Knowledge is: “The systematic identification, analysis, planning and implementation of actions designed to influence stakeholders.”²⁶ A stakeholder engagement strategy identifies the needs of key groups, and the sponsor plays a vital role in ensuring those business needs are met.

PRINCE2 identifies the following three primary stakeholders to engage in a project:

1. Business sponsor: Person or entity that assures investment and provision of resources for the project to deliver value for money.
2. User: Person or entity whose interest is the product or service to be created and whose benefits are to be realized by the project outcome.
3. Supplier: Person or entity that provides materials, services, goods and expertise for the project to produce the new product or service.

Engaging the project stakeholders means the provision of definitive processes to manage the participation of the stakeholders in the activities and results of the project. Table 4 gives a summary of the processes for engagement with stakeholders for adoption by the project management team.

Table 4: Processes and outputs for the engagement with project stakeholders

Process	Description	Essential Output
Identify stakeholders	The identification of people or entities whose interests and benefits are going to be affected by the project's decision, approach, activity or outcome. It analyses and documents the necessary information about their interest, influence, authority, involvement, relationship and impact on the project.	Stakeholder mapping and analysis

²⁶ APM, "What is stakeholder engagement?" Available at <https://www.apm.org.uk/resources/find-a-resource/stakeholder-engagement/>.

Plan engagement with stakeholders	The determination and planning for an appropriate strategy to engage the stakeholders throughout the project life cycle with due consideration of their power, interest and impact on the project activities and results.	Stakeholder engagement plan
Manage engagement with stakeholders	Communication and working with the stakeholders to achieve agreed results, as well as handling the resolution of issues that arises in the different phases of the project life cycle.	Change request and communication plan
Monitor engagement with stakeholders	Monitoring the execution of planned stakeholder engagement. It may involve an adjustment in the agreed strategy to engage the stakeholders with due consideration of evaluated changes to keep the positive relationship in moving forward the results of the project.	Work performance information

Source: Bernie Roseke, "Project Stakeholder Management According to the PMBOK", Project Engineer, 31 August 2018. Available at <https://www.projectengineer.net/project-stakeholder-management-according-to-the-pmbok/>.

The ways in which the project management team relates with project stakeholders affect their productive engagement in the project. The APM Body of Knowledge provides the following stakeholder engagement principles:²⁷

- **Communicate:** Understand the stakeholders to work with and rely on in the different phases of the project life cycle. Share information that matches the stakeholders' interest.
- **Consult, early and often:** Early and regular consultation with the stakeholders must be done to ensure agreement with requirements and to negotiate the acceptance of the project deliverables with the majority of the stakeholders.
- **Remember, they are only human:** Recognize that humans may fail to behave rationally, reasonably, consistently and with predictability, therefore the root cause of the stakeholder behaviour must be assessed to properly apply mitigating measures that maintain a productive relationship. Be aware of the human feelings and potential personal agenda of the stakeholder in managing communication.

²⁷ Royal Institution of Chartered Surveyors, *Stakeholder Engagement: RICS Guidance Note*, first edition (London, 2014). Available at https://www.apm.org.uk/media/6673/stakeholder_engagement_1st_edition_pgguidance_2014.pdf.

- Plan it: Be conscientious and able to measure stakeholder engagement. Careful planning is required to engage with effectiveness and efficiency.
- Relationships are key: Increase the stakeholders' trust by developing a positive relationship that increases confidence across the project environment, minimize uncertainty, and perform with immediacy problem-solving and decision-making.
- Simple, but not easy: Foresight to anticipate risks, and take simple and timely action to improve project delivery.
- Just part of managing risk: Consider stakeholders as a potential source of risks that when managed properly provide the opportunity to move forward the project's objectives.
- Compromise: Establish an acceptable baseline to handle the stakeholders' diverse expectations and priorities. Assess the relative importance of stakeholders and create their weighted hierarchy of importance to the project requirements agreed by the project sponsor.
- Understand what is success: Determine what the stakeholders consider as their common indicators of project success. The perception of what is successful must be elicited, elaborated, analysed and documented.
- Take responsibility: Responsibilities and roles must be understood. Engagement roles, responsibilities and expectations must be clear from the start of the project.

Stakeholder analysis is a critical activity in engaging the project stakeholders. It is about identification, elaboration, documentation, analysis and evaluation of the stakeholders' power and influence. It reports the negative or positive impact of the identified stakeholders on the delivery of the project objectives. This includes the opportunities that their participation provides in achieving project results.

*Power*²⁸ is about the stakeholders' resources and ability to affect the project options and decisions. Measuring the stakeholders' power in the mobilization of resources uses the following indicators:

- High: The stakeholder can make decisions regarding the use of the resources in his or her organization or area.

²⁸ Kammi Schmeer, "Stakeholder Analysis Guidelines", in *Policy Toolkit for Strengthening Health Sector Reform*, Latin America and Caribbean Regional Health Sector Reform Initiative (2000). Available at https://www.paho.org/hq/dmdocuments/2010/47-Policy_Toolkit_Strengthening_HSR.pdf.

- **Moderate:** The stakeholder is one of several persons that can make decisions regarding the use of resources.
- **Low:** The stakeholder cannot decide on the use of the resources.

*Interest*²⁹ is about the impact of project results on the stakeholders' identity, purpose or outcome. Interest is demonstrated influence in the stakeholders' power to persuade or coerce others into making the decision and to follow a certain course of action.³⁰

Stakeholders' prominence to influence a project can be analysed with the use of the Salience Model³¹ to classify stakeholders, as follows:

- **Power:** The stakeholder has authority and influence in the determination of the project organization and outcomes.
- **Legitimacy:** The stakeholder's involvement is appropriate following law, regulation, ethics, policies and standards. Participation or involvement in the project "really counts".
- **Urgency:** The stakeholder represents the pressing need that requires immediate attention. Urgency is based on the following:
 - Time-sensitivity – when stakeholder's need is time-sensitive.
 - Criticality – when the need is critical to the stakeholder.

In the identification of stakeholders, the project management team gathers stakeholder data associated with direction of influence, and maps the stakeholders' influence in directing project activities and results (Table 5).

Table 5: Stakeholder classification based on direction of influence

Direction of Influence	Description	Stakeholders
Upward	Stakeholders who control resources and whose decision on the requirement matters	Project owner, governing board, project sponsor

²⁹ ITtoolkit.com, "The Project Stakeholder Analysis: Roles, Interests and Influence". Available at <https://www.ittoolkit.com/articles/stakeholder-analysis>.

³⁰ Wageningen University & Research, "Stakeholder Analysis". Available at <https://mispguide.org/2022/03/18/stakeholder-analysis/>.

³¹ Ronald K. Mitchell, Bradley R. Agle and Donna J. Wood, "Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts", *The Academy of Management Review*, vol. 22, no. 4 (October 1997), pp. 853-886. Available at https://www.jstor.org/stable/259247?seq=1#metadata_info_tab_contents.

Downward	Stakeholders who provide the goods, services and expertise	Project team, supplier, contractor
Outward	Stakeholders whose results and benefits have to be satisfied	Client, end-user, regulator, stakeholder outside of the project
Sideward	Stakeholders who compete with the project for scarce resources	Project manager's peer, a community of practice

The stakeholder analysis provides a view of stakeholders' levels of engagement,³² including the quality of participation and impact of stakeholders in the integrated project activities of overseeing, directing, initiating, planning, making the delivery, controlling and closure of the project. Stakeholders' engagement can be divided into the following levels:

- Unaware: The stakeholder is not aware of the project and its potential impacts.
- Resistant: There is awareness of the project and potential impacts, and the stakeholder resists change.
- Neutral: There is awareness of the project, but the stakeholder is neither supportive nor resistant to achieving the project objectives.
- Supportive: There is awareness of the project and potential impact, and the stakeholder accepts change.
- Leading: There is awareness of the project and potential impact, and the stakeholder is actively engaged in ensuring the success of the project.

MindTools³³ provides the following common steps in stakeholder analysis to guide the deliberate understanding of the person or entity who is going to be affected or may affect the delivery process of the project:

- Identify the stakeholder: List and describe the people who are affected by or may affect the work and results of the project. Identify the person or entity that has power, influence and interest in enabling the success of the project.
- Analyse and prioritize the stakeholder power: Create a power/interest grid for stakeholder prioritization that represents the following:

³² Project-Management.info, "Stakeholder Engagement Assessment Matrix: Uses & Example". Available at <https://project-management.info/stakeholder-engagement-matrix/>.

³³ MindTools, "Stakeholder Analysis". Available at https://www.mindtools.com/pages/article/newPPM_07.htm.

and interest in the project:

- High power, highly interested people – to be managed closely.
- High power, less interested people – to be kept satisfied.
- Low power, highly interested people – to be kept informed.
- Low power, less interested people – to be monitored.

- Understand the stakeholder's power and influence that may have an impact on the success of the project:

- What is the stakeholder's interest in achieving the project outcome?
- What is the stakeholder's primary motivation to support the project?
- What is the authority of the stakeholder in determining the project requirements and enablers?
- What kind of information do the stakeholder want and the manner it is going to be communicated?
- What influences the opinion of the stakeholder about the project requirements, policies, processes and deliverables?
- What are the risks the stakeholder represents that provide the opportunity for the project and resolution of a threat?

Learning Activity 4: Stakeholder Engagement

- Create a stakeholder registry by using the free template of SmartSheet available at <https://www.smartsheet.com/free-stakeholder-analysis-templates#stakeholder-register-template>.
- Create a simple stakeholder analysis matrix that identifies the project stakeholders by using the free template of SmartSheet available at <https://www.smartsheet.com/free-stakeholder-analysis-templates>.
- Create a mapping of stakeholders' influence and interest by using the free templates of TemplateLab available at <https://templatelab.com/stakeholder-map/>.

2.3 Project as Organization of Decision Rights, Roles, Accountability and Responsibility

2.3.1 International Standards' Description of Project Organization

ISO 21502 provides a standard description of project organization, as follows:

- A project is a temporary structure that includes project roles, responsibilities and levels of authority. It defines the boundaries of accountability, responsibility and reporting lines recognized by all stakeholders of the project.

- The structuring of the organization depends on the legal, commercial, interdepartmental or other arrangements that exist among the project stakeholders.

The APM Body of Knowledge³⁴ describes the organization as the management structure applicable to the portfolio, programme or project, and the organizational environment within which it operates. Project organization is a structuring of roles and responsibilities relative to the project life cycle and decision rights associated with the project procedures.

A project is a structured organization to transition change as planned in the approved business case of the organization to create value or execute continual improvement of service delivery.

The temporary organization provides the governance and management requirements to lead, direct and control the successful delivery of the project objectives. The project deliverables have a person or entity with affirmed accountability, responsibility and competency to create the value that achieves the strategic outcome or continual improvement request of the stakeholders.

The organizational structure of a project determines the required leadership and oversight, accountability and responsibility roles, clear reporting line and work interface, and the flow of information and decision-making.

The British Standard 6079³⁵ provides the following guiding questions for developing the project organization:

- Who provides oversight to ensure the project's objectives are aligned with the sponsoring organization's strategic objectives, and its outcomes meet the defined business need?
- Who directs the project in pursuit of the project's objectives?
- Who manages the project on a day-to-day basis, ensuring that the outputs are appropriate to the delivery of the desired outcomes?
- Who undertakes the specialist work on the project?

2.3.2 Project Organization Roles

The organization of a project assigns decision rights and supporting roles to execute the project objectives. Project objectives are a set of tasks that result in the activities of the adopted quality management in a project.

The project has a defined structure of decision rights to start, progress and close a project. It represents the roles, accountability, responsibility, specialist and user that are put

³⁴ APM, "APM Body of Knowledge: Definitions". Available at <https://www.apm.org.uk/media/1605/final-proof-bok-6-definitions.pdf>.

³⁵ British Standards Institution, "BS 6079:2019 Project Management - Principles and Guidance". Available at <https://www.bsigroup.com/en-GB/standards/bs-6079-project-management/>.

together to enable and perform the tasks of completing the activity outcome of the project. It specifies the relationship of the varied project stakeholders in the provision of leadership, direction and control of what to achieve, maintain, prevent and eliminate in the delivery of the project outcome.

The project organization of project delivery, according to ISO 21502:2020, is composed of the following roles:

- Sponsoring organization: Higher level of authority of project direction
- Project board: Governance body representing higher authority
- Project sponsor: Champion of project business case
- Project assurance: Project oversight
- Project manager: Implement the project scope and lead the project
- Project office: Project management office
- Work package leader: Team manager to deliver assigned project outputs
- Project team member: Perform activities to deliver work packages
- Project stakeholders: Person or entity with interest in or affected by the project
- Project support: Enterprise project management office

Figure 4: ISO 21502's project organization structure

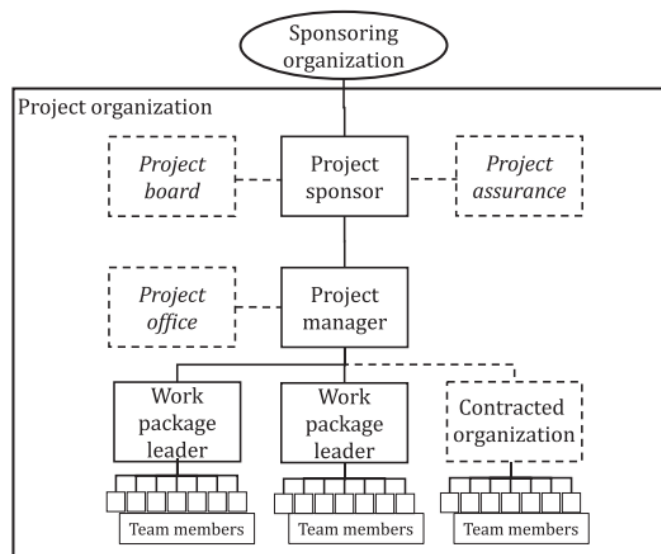
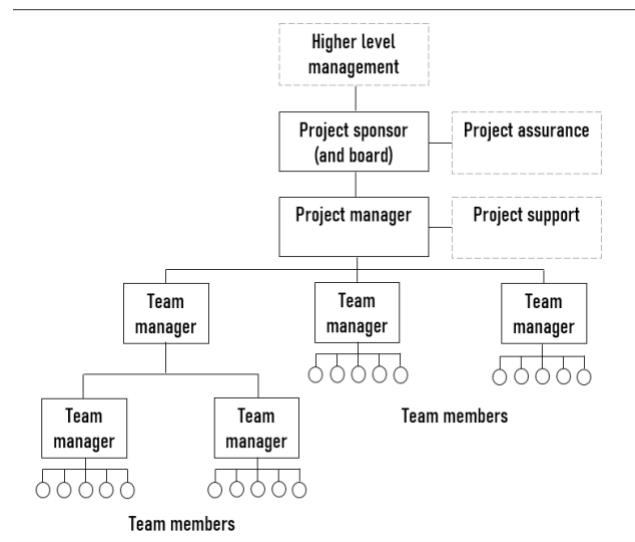


Figure 5: British Standard 6079's project organization structure



2.3.3 Project Organization Models

The adopted project organization model sets the conditions for the exercise of decision rights and the participation of stakeholders who are to affect the project results. The opted project development approach, sourcing strategy and interest of the business functional unit determine the configuration of project organization.

Project Organization based on the Development Approach

The development approach in a project provides the view of the development life cycle and processes to create a product. An example of a project development approach is agile project management. Agile Scrum project management, an agile framework to manage a project, usually software development, views project organization as a self-organizing team with the following core and non-core roles:³⁶

- Core Scrum roles –
 - Product owner: Represents target users and other stakeholders. S/he organizes and manages the product backlog, a prioritized task list of all the work items needed for the product.
 - Scrum master: Accountable for the Scrum team's effectiveness by enabling the Scrum team to understand Scrum theory and practice. S/he is responsible for coordinating the team and ensuring that processes run smoothly.

³⁶ SCRUMstudy, "SCRUMstudy™ Membership". Available at <https://www.scrumstudy.com/sbokguide>.

- Development team: People in the Scrum team that are committed to creating any aspect of a usable increment for each sprint (a period in which to complete a set amount of work).
- Non-core Scrum roles –
 - Stakeholders: The collective term to associate customers, users and sponsors that interface with the Scrum core team.
 - Vendors: The external individuals or organizations providing products and/or services that are not within the core competencies of the project organization.
 - Development team: An optional role, which generally consists of a set of documents and/or a group of experts who are typically involved with defining objectives related to quality, government regulations, security and other key organizational parameters.

Learning Activity 5: Agile Scrum Project Organization Roles
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- | |
|---|
| <ul style="list-style-type: none"> • Go to https://scrumguides.org/scrum-guide.html#developers. • Using the guide, create the project task list of a project owner, project manager and development team. |
|---|

Project Organization based on Sourcing Strategy and Business Function

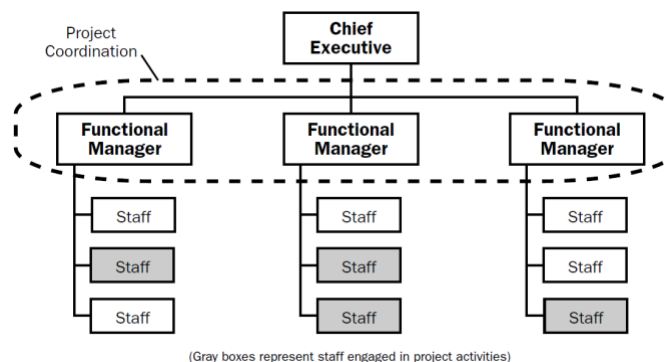
Sourcing strategy is the approach used in acquiring resources to support the development and deployment activities of the project. It affects the provision of knowledge, decision and work of the project. Options for project organization include the following:

- In-sourcing: Internal subject matter experts and management team are organized for the project.
- Out-sourcing: Third-party service provider is commissioned to manage the project delivery from start to closure.
- Mixed: The project management team is composed of internal and third-party subject matter experts and service providers to deliver project objectives.

Project organization is also influenced by business function, the project owner, and the specialization and coordination among the project's internal stakeholders. Some common models of project organization include the following:

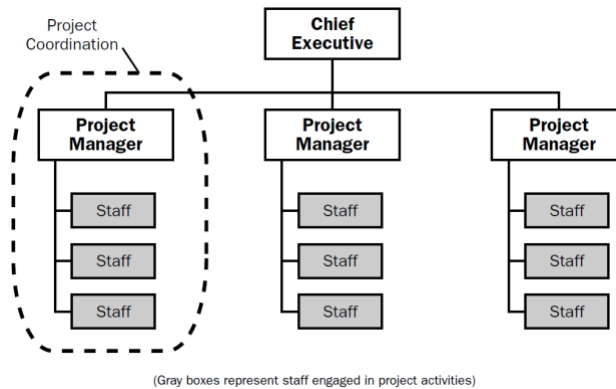
- **Functional:** In this model, the functional manager assumes the role of the project manager in addition to regular roles. The functional manager leads, directs and controls the project but needs to coordinate with other functional units for staffing and resource support (Figure 6).
- **Project:** Project management is a function of the organization. The project manager has formal authority over those involved in the project. This includes authority over the project's budget, schedule and team (Figure 7).
- **Programme:** Each programme manager has decision rights on the project. The project team is under the direction and control of the programme manager while the designated project manager implements with its staff and assigned resources (Figure 8).
- **Matrix:** People are drawn from the functional units of a hierarchical business organization to compose the project organization. One of the functional units serves as the project manager. The project team members are sourced from various units to perform the temporary activities of project delivery (Figure 9). In a strong matrix (Figure 10), a functional unit is dedicated to managing the project in the organization. The project manager reports to the manager of project managers but the project team is composed of staff provided by other units.
- **Composite:** The project team of the functional unit and the project-oriented organization performs the management of project managers (Figure 11).

Figure 6: Functional project organization



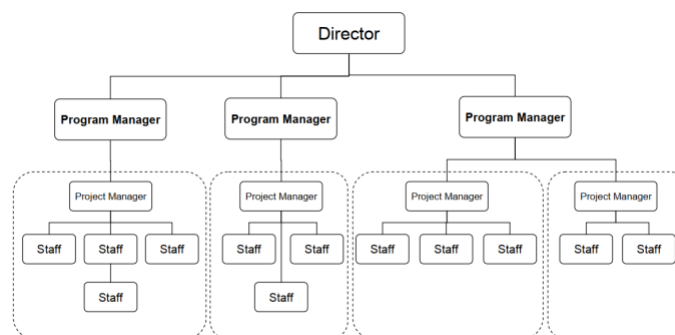
Source: Bernie Roseke, "The 4 Types of Project Organizational Structure", Project Engineer, 16 August 2019. Available at <https://www.projectengineer.net/the-4-types-of-project-organizational-structure/>.

Figure 7: Project-oriented organization



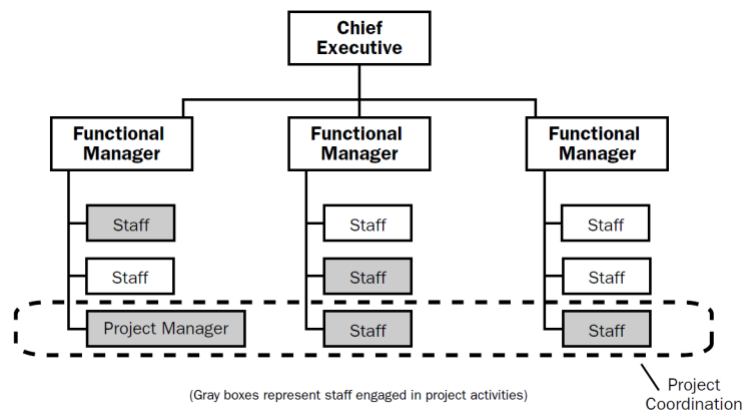
Source: Bernie Roseke, "The 4 Types of Project Organizational Structure", Project Engineer, 16 August 2019. Available at <https://www.projectengineer.net/the-4-types-of-project-organizational-structure/>.

Figure 8: Programmatic project organization



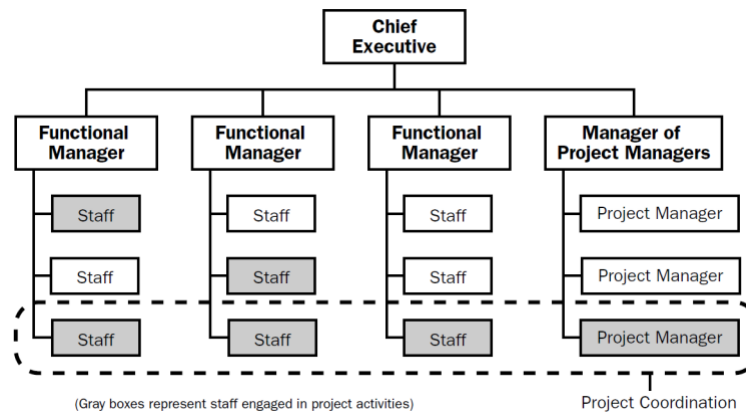
Source: PM4DEV Project Management for Development Organizations. Available at <https://www.pm4dev.com/>.

Figure 9: Matrix project organization



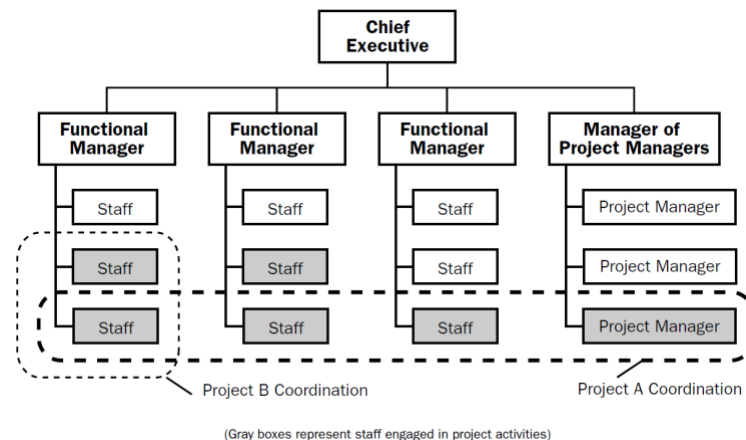
Source: Bernie Roseke, "The 4 Types of Project Organizational Structure", Project Engineer, 16 August 2019. Available at <https://www.projectengineer.net/the-4-types-of-project-organizational-structure/>.

Figure 10: Strong matrix project organization



Source: Bernie Roseke, "The 4 Types of Project Organizational Structure", Project Engineer, 16 August 2019. Available at <https://www.projectengineer.net/the-4-types-of-project-organizational-structure/>.

Figure 11: Composite project organization



Source: Bernie Roseke, "The 4 Types of Project Organizational Structure", Project Engineer, 16 August 2019. Available at <https://www.projectengineer.net/the-4-types-of-project-organizational-structure/>.

The Project Role, Accountability and Responsibility Matrix

The project organizational structure represents the division of activities and the associated roles with assigned accountability and responsibility in achieving the project work. Table 6 provides an example of a responsibility chart.

Table 6: Responsibility chart

Project Activity	X	D	d	C	I	P
Initiation	Manager	Sponsor	Manager	Specialist	User	Manager
Planning	Analyst	Sponsor	Manager	Regulator	User	Manager

Notes:

X = who **eX**ecutes the work?
D = who takes **D**ecision solely or ultimately
d = who takes **d**ecision jointly or partly
C = who must be **C**onsulted
I = who must be **I**nformed
P = who manages work and controls **P**rogress

Source: Goal Directed Project Management Guidance, "GDPM Key Elements". Available at <https://www.gdpm.com/method/key-elements>.

Project Management Office³⁷

A project operates with administrative, legal and technical support provided by an independent project management office. It supports the institutional or per project requirements for a project manager and team. It provides training on policy, methodology and technologies on the adopted project management guidance of the organization.

The project management office, according to ISO 21502, serves as an administrative interface with the project sponsor, project owner, and other internal and external stakeholders of the project.

The project management office provides the following services:

- Project analytical tools
- Project methodology
- Project management training
- Project planning and monitoring
- Information management system
- Project coordination with internal and external stakeholders
- Administrative support – human resources, finance, procurement, etc.

The governance of an organization creates a project management office in any of the following configurations:

- Enterprise project management office – An organization-wide single point of contact on project management services.
- Project-based project management office – A temporary project organization identified per project.
- Training project management office – A learning centre in the organization for onboarding and training project managers and teams.

An enterprise or project-based project management office serves the following purposes:

³⁷ Simone Theeboom, "What Is PMO? A Guide to Project Management Office", Toptal, no date. Available at <https://www.toptal.com/project-managers/project-management-consultant/project-management-office-guide>.

- Shared and coordinated resources across all projects administered by the project management office.
- Identification and development of project management methodology, best practices and standards.
- Clearinghouse and management for project policies, procedures, templates and other shared documentation.
- Centralized configuration management for all projects administered by the project management office.
- Centralized repository and management for both shared and unique risks for all projects.
- The central office for operation and management of project tools, such as enterprise-wide project management software.
- Central coordination of communication management across projects.
- A mentoring platform for project managers.
- Central monitoring of all project timelines and budgets, usually at the enterprise level.
- Coordination of overall project quality standards between the project manager and any internal or external quality personnel or standards organization.

A project management office as a learning centre provides knowledge resources for project team onboarding and upskilling. Onboarding is a socialization activity in the project team. It is a gathering of minds to discuss and agree on the principles, performances and practices of project delivery. It involves the transparent and participating acquisition of common knowledge, skills and behaviours that are necessary to start, progress, control and close the delivery of project objectives.

The project team meets to learn and affirm the deliverables of the assigned roles and responsibilities, and the required competency level to complete the work as planned. They collectively study the impact of the project owner's requirements and the enabling resources of the project sponsor on their deliverables.

The project team agrees on the management and development methodology derived from adopted best practices. The project team recognizes and agrees on the following:

- Project goals: Value to be created and maintained by the project's product or service for the stakeholders.
- Project risks: Project complexity factors to keep watch and control, and failure factors to prevent or eliminate.
- Project approach: Management and development methodology to deliver the project deliverables as valued, costed, scheduled, ruled and supplied.
- Project technologies: The supplier and materials of the project's product or service requirement, design, code, test and deployment.

- **Project authority:** The functional organization of project delivery relates results to who is accountable, responsible, consulted and informed.

Learning Activity 6: Project Management Office

- Download a project management office terms of reference template available at https://www.mastering-project-management.com/support-files/pmo_charter_template.pdf.
- Make a checklist of the activities that a project management office performs in supporting a project.

2.4 Project as Delivery System to Direct and Control the Development and Deployment of a New Product or Service

A project is a value delivery system. It provides the administrative and development platform to bring about the unique or new product or service that satisfies target users and protects stakeholders' interest. "Administrative" refers to the organizational and business support aspects of a project, and "development" refers to the approach and technologies in the creation and deployment of the new product or service.

The project delivers with a set of principles, activities, tasks, tools and artifacts to direct and control the integrated practice of starting, progressing and closing the intended project outcome. The project delivery platform embodies the acquired development approach, life cycle and technology in supporting effectiveness, efficiency and security in producing the unique product or service of a project.

The adopted management principles, processes and risks of project delivery validate and verify the effectiveness and efficiency of project direction and control.

2.4.1 Principle-based Project Management

Principle-based management of a project is the systematic provision of stakeholders' shared agreement on the set of beliefs that defines the value, quality, effectiveness, efficiency, security and continuity of performance.

The project approach, technology and personality may differ, but the outcome as defined by the documented and communicated principles provide the common reference that defines performance requirements and practices in moving forward the collaborative achievement of the project's strategic intention.

The claimed quality of business management and solution development in a project ensues from the adopted principles of the project sponsor, owner, manager, specialist and user. The project principles provide quality indicators in measuring the successful performance of project governance and management.

Project Management Principles

British Standards' project principles:³⁸

- Be driven by needs and benefits
- Engage stakeholders throughout the project
- Having a single point of accountability is critical throughout the project
- Promote collaborative working
- Governance and management should be appropriate and proportionate
- Experience and lessons should be captured, shared and applied
- Define working methods for specialist deliverables and outputs
- Take a gated approach in project

Project Management Body of Knowledge's project principles:³⁹

- Stewardship – Be a diligent, respectful and caring steward
- Team – Build a culture of accountability and respect
- Stakeholders – Engage stakeholders to understand their interests and needs
- Value – Focus on value
- Holistic thinking – Recognize and respond to system's interaction
- Leadership – Motivate, influence, coach and learn
- Tailoring – Tailor the delivery approach based on context
- Quality – Build quality into processes and results
- Complexity – Address complexity using knowledge, experience and learning
- Adaptability and resiliency – Be adaptable and resilient
- Change management – Enable change to achieve the envisioned future state

PRINCE 2's project principles:⁴⁰

- Continued business justification

³⁸ British Standards Institution, "Project management – Principles and guidance for the management of projects", 2019. Available at https://webstore.ansi.org/preview-pages/BSI/preview_30395913.pdf.

³⁹ Ricardo Vargas, "Ricardo Vargas Explains the PMBOK® Guide Seventh Edition Published by PMI", YouTube video, 3 September 2021. Available at <https://www.youtube.com/watch?v=HVIrxOQoSUw>.

⁴⁰ PRINCE2.com, "The 7 Principles, Themes and Processes of PRINCE2", 19 September 2016. Available at <https://www.prince2.com/uk/blog/the-7-principles-themes-and-processes-of-prince2>.

- Learn from experience
- Define roles and responsibilities
- Manage by stages
- Manage by exception
- Focus on products
- Tailor to the environment

ISO 10006's project principles:⁴¹

- Customer focus
- Leadership commitment
- Engagement of people
- Process approach
- Continual Improvement
- Evidence-based decision-making
- Relationship management

Product Development Principles of the Digital Transformation Project

Principles for digital development:⁴²

- Design with the user
- Understand the existing ecosystem
- Design for scale
- Build for sustainability
- Be data-driven
- Use open standards, open data, open source and open innovation
- Reuse and improve
- Address privacy and security

Agile development project principles:⁴³

- Satisfy users through early and continuous delivery
- Welcome changing requirements even late in the project
- Deliver value frequently
- Break the silos of the project

⁴¹ ISO, *International Standard ISO 10006 – Quality management – Guidelines for quality management in projects*, third edition (Geneva, 2017). Available at <https://www.sis.se/api/document/preview/922848/>.

⁴² Principles for Digital Development. Available at <https://digitalprinciples.org/>.

⁴³ Kanbanize, "What Are the 12 Principles of Agile Project Management?" Available at <https://kanbanize.com/agile/project-management/principles>.

- Build projects around motivated individuals
- The most effective way of communication is face-to-face
- Working software is the primary measure of progress
- Maintain a sustainable working pace
- Continuous excellence enhances agility
- Simplicity is essential
- Self-organizing teams generate most value
- Regularly reflect and adjust the way of working to boost effectiveness

Enterprise architecture principles of the digital transformation project:⁴⁴

- Primacy of principles
- Maximize benefit to the enterprise
- Information management is everybody's business
- Business continuity
- Data is an asset
- Data is shared
- Data is accessible
- Control technical diversity

Data privacy principles of the digital transformation project:⁴⁵

- Consent and choice
- Purpose legitimacy and specification
- Collection limitation
- Data minimization
- Use, retention and disclosure limitation
- Accuracy and quality
- Openness, transparency and notice
- Individual participation and access
- Accountability
- Information security
- Privacy compliance

⁴⁴ TOGAF, "The TOGAF Standard, Version 9.2: Part III: ADM Guidelines & Techniques – Architecture Principles". Available at <https://pubs.opengroup.org/architecture/togaf9-doc/arch/chap20.html>.

⁴⁵ ISO, "ISO/IEC 29100:2011 Information technology – Security techniques – Privacy framework". Available at https://standards.iso.org/ittf/PubliclyAvailableStandards/c045123_ISO_IEC_29100_2011.zip.

Learning Activity 7: Project Management and Development Principles

Management Principles

- Identify the common project management principles in the provided references above.
- Make a prioritized listing of project management principles to associate the value, effectiveness and efficiency in the provision of direction and control in a project.
- Identify the project issues or problems that may arise when the identified principles are undermined by the project organization.

Development Principles

- Compare the different development principles provided above, and create a list of common principles to guide the product development process with effectiveness, efficiency and security.

2.4.2 Process-based Project Management

Process-based management of a project is the systematic definition and management of processes and the interactions that must exist to achieve the intended results following the quality policy and strategic direction of the organization.

It is the schematic representation of the project's integrated business and development processes, and the demonstration of how the elements interact to provide the competency requirements, enabling resources, and the monitoring and measuring checkpoints, which are necessary to control related risks of performance.

The project organization adopts and implements the project life cycle, process and practice that are associated with project management, development and support of a project. The processes are based on the subscribed project principles of the organization.

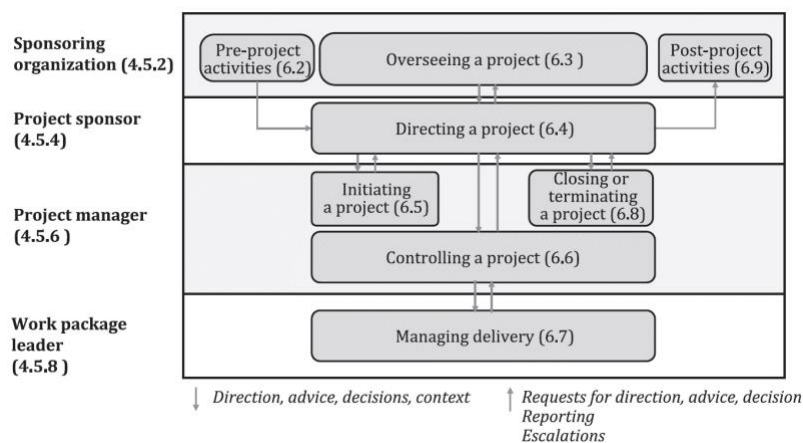
The published guidance on project management in ISO 21502⁴⁶ identifies the following integrated practices in managing a project:

⁴⁶ ISO, *International Standard ISO 21502 – Project, programme and portfolio management – Guidance on project management*, first edition (Geneva, 2020). Available at <https://cdn.standards.iteh.ai/samples/74947/d2f2b2e60a8249ab88240adc92be71ad/ISO-21502-2020.pdf>.

- Pre-project activities: Development and approval of project business case and other authorization support document.
- Overseeing a project: Set up of the organization that is accountable for providing direction and control of the project.
- Directing a project: Provision of policies, metrics and enabling resources for the delivery of the project objectives.
- Initiating a project: Team mobilization, agreement on management and development approach, project justification and project planning.
- Controlling a project: Providing progressive justification, managing project performance, monitoring the start and closing of a project phase and development stages of work packages.
- Managing delivery: Defining the required project outputs and outcomes, and the planning and implementation of delivery activities.
- Closing a project or phase: Confirming the completion of the project scope.
- Post-project activities: Capturing lessons learned.

ISO 21502 – Project Management Guidance provides a visualization of the integrated project management practices relative to the project organization roles (Figure 12).

Figure 12: Project management practices relative to the project organization roles



Source: Pier Luigi Guida and Maurizio Monassi, "The New ISO 21502", *PM World Journal*, vol. 10, no. 3 (March 2021). Available at <https://pmworldlibrary.net/wp-content/uploads/2021/03/pmwj103-Mar2021-Guida-Monassi-the-new-iso-21502.pdf>.

The ISO defines the process in a project as: “Any activity or set of activities that use resources to transform inputs into outputs.” The project organization determines, describes, documents and demonstrates the adopted management and development processes with the following documentation elements:

- Outcome: Something good to achieve or maintain, and risk to prevent or eliminate.
- Activity: The function to do the right things in realizing the outcome.
- Task: The assigned step or procedure to delivery activity results.
- Output: The deliverable and artifact to successfully close the delivery process. Exit requirements define the output.
- Input: The enabling factors and resources to start the delivery process. Entry requirements define the input.
- Validation: Indicator to test something is done right in the input-task-output (test criteria).
- Verification: Indicator to attest the right thing to do is done in the input-task-output (acceptance criteria).
- Responsible: The assigned role and competency to act in the delivery process.
- Location: The site of implementing the process.
- Approach: The adopted method, technique and technology to execute the input, task and output of the process.

The Project Processes to Direct and Control the Delivery of Results

The management processes involve the administrative activities and results to support the project authorization, initiation, planning, implementation, monitoring, control and closure. Quality management in a project, according to ISO 10006,⁴⁷ involves the following common processes:

- Resource-related processes: Resource planning and control
- Personnel-related processes: Organizational structure and team
- Interdependent processes: Interaction and change management
- Scope-related processes: Definition and control of activities

⁴⁷ ISO, *International Standard ISO 10006: Quality management – Guidelines for quality management in projects*, third edition (Geneva, 2017). Available at <http://parsetraining.com/wp-content/uploads/2018/07/BS-ISO-10006-2017.pdf>.

- Time-related processes: Schedule development and control
- Cost-related processes: Cost estimate, cost control and budgeting
- Communication-related processes: Communication plan and control
- Risk-related processes: Risk identification, assessment and control
- Procurement processes: Procurement planning, contracting and control

The development processes involve the activities and results of product analysis and planning, design and development, deployment and implementation, and monitoring and evaluation. ISO 15288 – System Engineering Lifecycle Process and System Engineering Body of Knowledge⁴⁸ identifies the following common technical processes:

- Stakeholder requirement definition process
- Requirement analysis process
- Architectural design process
- Implementation process
- Integration process
- Verification process
- Transition process
- Validation process
- Operation process
- Maintenance process
- Disposal process

The Project Management Body of Knowledge (sixth edition)⁴⁹ identifies and describes the processes and their interactions in a project management life cycle, as follows:

- Project initiation
 - Develop a project charter
 - Identify stakeholders
- Project planning
 - Plan the scope management
 - Collect requirements
 - Define project scope
 - Create work breakdown schedule
 - Plan the schedule management
 - Define project activities

⁴⁸ Guide to the Systems Engineering Body of Knowledge, "ISO/IEC/IEEE 15288", 14 October 2021. Available at https://www.sebokwiki.org/wiki/ISO/IEC/IEEE_15288.

⁴⁹ Ricardo Vargas, "PMBOK® Guide Processes Flow". Available at <https://ricardo-vargas.com/pmbok6-processes-flow/>.

- Sequence the activities
 - Estimate activity duration
 - Develop project schedule
- Plan the cost management
 - Estimate cost
 - Determine project budget
- Plan the resource management
 - Determine resource requirements
- Plan the procurement management
 - Identify sourcing approach
 - Determine procurement requirements
- Plan the quality management
 - Determine project quality indicator
- Plan the stakeholder management
 - Determine project stakeholder
 - Perform stakeholder analysis
- Plan the risk management
 - Determine project risk criteria
 - Perform risk assessment
 - Identify and map risk response
- Compose the project management plan for approval
- Project execution
 - Acquire resources
 - Develop and manage the project team
 - Conduct procurement
 - Manage stakeholders
 - Implement risk response
 - Manage communication
- Project monitoring and control
 - Validate and control scope
 - Control schedule, cost, resources, quality and procurement
 - Monitor stakeholders, risks and communication

- Compose or adopt project monitoring report template
- Project closure
 - Handover product to operation
 - Close contracts
 - Reflect on lessons learned

Learning Activity 8: Project Management Processes

- Download the European Commission's Project Management Methodology Guide available at <https://www.pm2alliance.eu/wp-content/uploads/2019/05/PM%C2%B2-project-management-methodology.pdf>.
- Identify the categorization of project management processes used in the guide and make a list of the project tasks to complete a project delivery.

The PRINCE2⁵⁰ guide provides the following categorization of project management processes that support successful project delivery:

- | | |
|------------------------------|--|
| • Directing a project: | Governance providing project authorization, direction and control. |
| • Starting up a project: | Project mandate and organization is agreed upon for initiation. |
| • Initiating a project: | Project strategy is determined and planned for execution. |
| • Controlling a stage: | Project assigns work, risk is monitored and change is controlled. |
| • Managing product delivery | Planning the delivery requirements and the development of the product. |
| • Managing a stage boundary: | Progress reporting, evaluation and risk mitigation. |
| • Closing a project: | User acceptance and retrospection. |

⁵⁰ PRINCE2.com, "PRINCE2 Processes". Available at <https://www.prince2.com/uk/prince2-processes>.

Learning Activity 9: Project Management Activities

- Go to the PRINCE2 wiki page available at <https://prince2.wiki/>.
- Review and compare the project management activities of PRINCE2 in the adopted practice of your organization in directing and controlling project delivery.

2.4.3 Product Development

A project plans, designs, develops, tests and releases a new product. It adopts a common development life cycle and processes to release a product. The Software Engineering Body of Knowledge⁵¹ is an example of generic guidance that provides the common processes for the development of a product, particularly software, as follows:

- Requirement: Requirement elicitation, analysis, specification and validation
- Design: Design concept, principles and process
- Construct: The building process, technologies and tools
- Testing: The testing process, test level, test criteria, test technique and testing tools
- Deploy and maintain: Deployment and maintenance process, technique and tools
- Configuration management: Configuration identification, control, auditing, release and delivery process
- Quality management: Quality models, assurance, validation and verification
- Security management: Security and privacy modelling

The development aspect of project management adopts its appropriate methodology to start, build and release a new product or service.

The development approach⁵² in a project can be categorized into: (1) predictive, linear and sequential development life cycle; and (2) adaptive, incremental and iterative development life cycle.

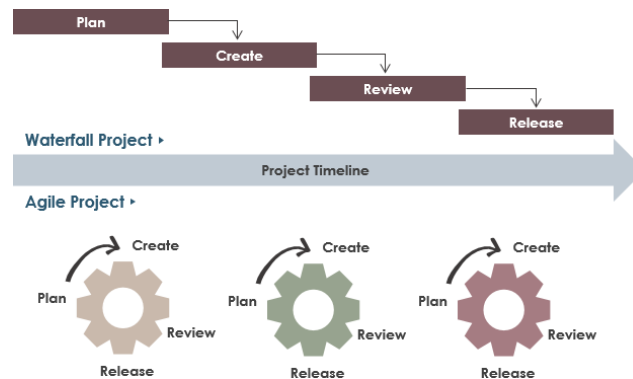
⁵¹ IEEE Computer Society, "SWEBOK Guide V3 Topics". Available at <https://www.computer.org/education/bodies-of-knowledge/software-engineering/topics>.

⁵² Visual Paradigm, "What is Software Development Lifecycle?" Available at <https://www.visual-paradigm.com/guide/software-development-process/what-is-a-software-development-lifecycle/>.

Predictive, Linear and Sequential Development Life Cycle

The waterfall project methodology demonstrates the predictive development life cycle. It is associated with traditional system development methodology like the traditional V-Model approach of the software development life cycle.⁵³

Figure 13: The traditional waterfall project compared with the agile project



Source: Visual Paradigm, "What is Software Development Lifecycle?" Available at <https://www.visual-paradigm.com/guide/software-development-process/what-is-a-software-development-lifecycle/>.

Adaptive, Incremental and Iterative Development Life Cycle

Agile project methodology is associated with adaptive system development like Scrum, Kanban and Extreme Programming.

Learning Activity 10: Project Development Processes

- Go to the website of the International Association of Project Manager – Agile Project Managers' Guide available at <https://www.iapm-cert.net/documents/apmg-en/index.html>.
- Identify and make a list of the common development processes used by agile project methodologies like Scrum, Kanban and Extreme Programming.

⁵³ W3schools of Technology, "SDLC V-Model". Available at <https://www.w3schools.in/sdlc-tutorial/v-model/>.

2.4.4 Risk-based Project Management

The ISO 31000 – Risk management guidance is an international standard reference for the common understanding of the concept and practice of managing risk. According to ISO 31000: “Risk is the effect of uncertainty on objectives. The effect is a deviation from the expected.”

The risk-based management of a project provides the systematic identification, analysis and evaluation of the complexity factors or failure sources that come with undermining the known risk control criteria of a successful project.

It provides the risk assessment methodology and risk mitigation approaches in controlling the uncertainty or harm in completing the project outputs and achieving the project outcomes. The evaluated risk determines the appropriate control measures and competency requirements to assure the quality delivery of the released product or service.

Project risk-based management is the systematic provision of the risk criteria and assessment tools to prevent uncertainty, harm or failure in managing the administrative, product and support aspects of a project. It evaluates the threat sources, potential events, their consequences and their likelihood.

The project organization performs the identification, analysis, evaluation and mitigation of risk against the triggering indicators provided by an adopted project management risk criteria. The documented understanding and action of risk management represents the clear, coherent, complete and consistent view of the following questions:

- What are the project enablers that are considered an asset but are vulnerable to exploitation by known threat agents or when undermined become a complexity factor?
- What are the risk control criteria to be used in the assessment and mitigation of project failure, disruption and legal liability?
- What are the adopted policies, procedures and tools in risk identification, risk analysis, risk evaluation and risk mitigation?
- How are the project risks related to the administration and development approach of the project to be documented and communicated?

Uncertainty in the quality, budget, schedule, scope, rule and resources of the project are risks that must be addressed. Enabling project asset provides the project organization with the capability and capacity to address risks, including the complexity factors or failure sources. The people, product, policy, process and provider of managing the project results compose the project asset, as follows:

- **People:** Persons of the project organization, including project sponsor, owner, manager, specialist, team, stakeholder, oversight and regulator.

- **Product:** Goods, services, expertise, methodologies and technologies that are acquired and used in project administration and product development.
- **Policy:** Directives, rules, standards and controls that validate and verify the right things to do in starting, progressing, controlling and closing a project.
- **Process:** Organized functions and tasks with the associated inputs, procedures, outputs, policies, data and technologies to compose the acceptable deliverables of the project outcomes.
- **Providers:** Suppliers of the required goods, services, methodologies and technologies to support the project delivery objectives.

Knowledge of the project risk criteria and control measures is a pre-requisite in the identification, measurement and prioritization of what to watch, prevent and respond to as risk event of a project.

The risk event is an activity situation or issues of deviation in observing the success factors. The undermined project complexity factors trigger the harmful incident or issues that may cause failure in the project delivery. The adopted risk criteria provide a view of the assessment and mitigation of a risk event. Understanding of the risk criteria supports the identification, analysis, mapping and application of project management practice to direct and control the delivery of the project's positive outcome.

Project management examines project uncertainty by evaluating the complexity factors of performance. The Crawford-Ishikura factor table for evaluating roles⁵⁴ provides the following indicators for evaluating complexity factors:

- Stability of the overall project context.
- Number of distinct disciplines, methods or approaches involved in performing the project.
- Magnitude of legal, social or environmental implications from performing the project.
- Overall expected financial impact (positive or negative) on the project's stakeholders.
- The strategic importance of the project to the organization or organizations involved.
- Stakeholder cohesion regarding the characteristics of the product of the project.
- Number and variety of interfaces between the project and other organizational entities.

The direction and control of a project involve the identification, analysis, evaluation and mitigation of risk sources that may cause project failure. The assessment of project risk requires complete and documented terms of reference against which the significance of risk is evaluated. The risk criteria represent the protected organization's values, policies and objectives. It comes from adopted standards, laws, policies and stakeholders'

⁵⁴ Global Alliance for Project Performance Standards, *A Framework for Performance Based Competency Standards for Global Level 1 and 2 Project Managers* (Sydney, 2007). Available at https://www.pmprofessions.org/_files/ugd/78f060_0c414a9c90ae4fe0b26887e4d61cf6a4.pdf.

specifications of requirements associated with the critical success factors of achieving results.

Table 7 provides an example of indicators of project failure from the United Kingdom National Audit Office.

Table 7: Possible causes of project failure

Type of Project Failure	Description
Design and definition failures	<ul style="list-style-type: none"> • Required outputs not described with sufficient clarity – no scope definition before authorization • Over-ambition – sweeping into a single project all "good ideas – all deliverable in one chunk" • Project is seen as an ICT project, not as part of a wider process to deliver business objectives • End-goal too distant with too few review points to confirm the business case
Decision-making failures	<ul style="list-style-type: none"> • Prime responsibility rests with committees • Consensus must be achieved on all issues • No single individual in authority – project manager makes decisions in absence of sponsor
Project discipline failures	<ul style="list-style-type: none"> • Project documentation replaces project management • Milestones are too distant – slippage is not managed • Weak arrangements to identify and evaluate risks and allocate them to managers with authority • Requirements changes not reflected in fixed deadlines • Contingency planning is weak or unrealistic • Project beyond the experience and capability of the project manager
Supplier management failures	<ul style="list-style-type: none"> • Project has little understanding of supplier commercial imperatives (e.g., in fixed-price contracts) • Supplier not selected on a value for money basis • Projects are launched without an agreed contractual completion date, acceptance criteria and cost limit • Insufficient transparency of management information between client and supplier • Supplier managed to limit cost rather than risk – no validation of supplier's assumptions

Source: INTOSAI EDP Audit Committee, "Why IT Projects Fail". Available at https://www.intosaicommunity.net/document/articlelibrary/Why_IT_Projects_Fail_-_Best_Practice_Guidance.pdf.

Learning Activity 11: Project Complexity and Failure Factors

Complexity Factors

Using the Crawford-Ishikura factor available at https://www.projectmanagement.com/content/attachments/Primus1_201011023434.pdf as a reference, make a list of common problems that a project encounters associated with a complexity factor.

Failure Factors

Using the failure factors available at https://www.intosaicommunity.net/document/articlelibrary/Why_IT_Projects_Fail_-_Best_Practice_Guidance.pdf as a reference, make a checklist of the common project failure factors to be addressed in the tailoring of a project management methodology.

The identification, analysis and evaluation of the complexity or failure factors enable the project organization to plan the appropriate mitigation to reduce or eliminate the impact of known complexity or risk. The formulation of mitigation measures can be guided by the following commonly-cited risk control references:

- The Standish CHAOS Report⁵⁵ identifies the following success indicators to overcome project failure –
 - User involvement
 - Executive management support
 - Clear statement of requirements
 - Proper planning
 - Realistic expectations
 - Smaller project milestones
 - Competent staff
 - Ownership
 - Clear vision and objectives
 - Hardworking and focused staff
- The Global Alliance for Project Performance Standards⁵⁶ provides the following key performance indicators to control the complexity of a project –
 - Manage stakeholders' relationship:
 - Ensure that stakeholder interests are identified and addressed.

⁵⁵ The Standish Group, CHAOS Report 2015, 2015. Available at https://www.standishgroup.com/sample_research_files/CHAOSReport2015-Final.pdf.

⁵⁶ Global Alliance for Project Performance Standards, *A Framework for Performance Based Competency Standards for Global Level 1 and 2 Project Managers* (Sydney, 2007). Available at https://www.pmprofessions.org/_files/ugd/78f060_0c414a9c90ae4fe0b26887e4d61cf6a4.pdf.

- Promote effective individual and team performance.
 - Manage stakeholder communication.
 - Facilitate external stakeholder participation.
- Manage the development of the project plan:
 - Define the work of the project.
 - Ensure the plan for the project reflects relevant legal requirements.
 - Document risks and risk responses for the project.
 - Confirm project success criteria.
 - Develop and integrate project baselines.
- Manage project progress:
 - Monitor, evaluate and control project performance.
 - Monitor risks to the project.
 - Reflect on practice.
- Manage product acceptance:
 - Ensure the product of the project is defined.
 - Ensure changes to the product of the project are monitored and controlled.
 - Secure acceptance of the product of the project.
- Manage project transition:
 - Manage project start-up.
 - Manage transition between project phases.
 - Manage project closure.
- Evaluate and improve project performance:
 - Develop a plan for project evaluation.
 - Evaluate the project based on the plan.
 - Capture and apply learnings.

Learning Activity 12: Project Complexity and Failure Controls
<ul style="list-style-type: none"> • Make a list of the most common complexity factors in a project. • Identify the critical success factors to control project complexity.

2.4.5 Management and Development Tools

Quality performance in a project means the delivery of the outputs that achieves outcomes and realizes benefits. A project adopts an appropriate set of tools in making decisions and in creating the artifacts of its deliverables.

Project tools support the management and development processes to create understanding and achieve objectives. Tools usually come as modelling framework, problem-solving technique, reporting template and application software. They help to

resolve a need, accomplish a requirement, construct a product, control the risk, or communicate agreement, status and results.

The quick understanding and action to perform the project tasks with appropriate tools are aided by the method, procedure and content provided by adopted international standards or professional bodies of knowledge.

The adopted project management guidance provides the appropriate modelling tools, problem-solving techniques and documentation template associated with the process deliverables of the identified project performance domain.

The modelling framework provides a tool to elicit, visualize and analyse the project process, communication, requirements, design, risks or organization. Examples of common project modelling tools include:⁵⁷

- Organization model
- Requirement model
- Risk model

The problem-solving technique provides a tool to handle project estimation concerns, data analytics, meeting events, risk assessment, performance measurement or stakeholder communication. Examples of common project estimation include:⁵⁸

- Effort estimation
- Cost estimation
- Resource estimation

Reporting template provides the documentation format and content requirement to support the input, output and validation requirements of project processes. Examples of common project templates include:⁵⁹

- Project justification template
- Project management plan template
- Project activity reporting template

Application software provides the information and communication to support project data generation, collection, storage, utilization, sharing and disposal. It provides digital services to support project scheduling, documentation, communication, monitoring, tracking, control and information security. Examples of common project management software include:

⁵⁷ Visual Paradigm. Available at <https://www.visual-paradigm.com/>.

⁵⁸ Simplilearn, "6 Successful Project Estimation Techniques in 2022", 7 March 2022. Available at <https://www.simplilearn.com/project-estimation-techniques-article>.

⁵⁹ Project Management Docs, "Free Project Management Templates". Available at <https://www.projectmanagementdocs.com/>.

- Microsoft Project ⁶⁰
- Wrike⁶¹
- Redmine⁶²

The selection of project tools aligns with accomplishing the objectives of the identified activity domain of a project. The activity domain represents the categorized set of tasks associated with project authorization, initiation, planning, designing, implementation, monitoring, controlling, releasing, closing and lessons learned.

The Project Management Body of Knowledge (seventh edition),⁶³ has a list of common project artifacts to support the documented input or output of project activity, as follows:

- Strategy artifact: Business case, project charter, business model
- Logs and registers: Assumption logs, risk register, issue logs, stakeholder register
- Plans: Project management plan, procurement plan
- Hierarchy charts: Organization breakdown structure, resource breakdown structure
- Baseline: Budget, scope baseline, milestone schedule
- Visual data: Affinity diagram, cause and effect diagram
- Reports: Status report, risk report
- Agreement and contract: Service level agreement, fixed-priced contract
- Others: Bid documents, user stories, backlogs

The Scrum Body of Knowledge⁶⁴ also has a list of common project artifacts to support the documented input or output of agile product development activity, as follows:

- Prioritized product backlog – List of product features
- Sprint backlog – List of tasks

⁶⁰ Microsoft Project. Available at <https://www.microsoft.com/en-us/microsoft-365/project/project-management-software>.

⁶¹ Wrike. Available at <https://www.wrike.com/>.

⁶² Redmine. Available at <https://www.redmine.org/>.

⁶³ Project Management Institute, "Models, Methods & Artifacts". Available at <https://www.pmi.org/-/media/pmi/documents/public/pdf/pmbok-standards/models-methods-artifacts-explainer.pdf?v=e54837c4-097e-4957-aa9b-dc6d647e901b>.

⁶⁴ SCRUMstudy, "Scrum Framework – Artifacts that Matter", 25 April 2020. Available at <https://blog.scrumstudy.com/scrum-framework-artifacts-that-matter/>.

- Sprint deliverables and definition of done – List of deliverables and done criteria

The use of internationally-recognized project management standards enables the project organization to identify, analyse, map and apply a reusable method and documentation templates for the tailoring of a project management methodology.

Project onboarding for the project team becomes meaningful to the collaborative and immediate achievement of objectives when provided with sets of tools to address the elicitation, visualization, analysis, documentation, agreement and reporting requirement of the administration, development and support aspects of project delivery.

Learning Activity 13: Project Management and Development Tools
<ul style="list-style-type: none">• Download the ITU project management manual available at https://www.itu.int/en/ITU-D/Projects/Documents/ProjectManagementGuidelinesandTemplates.pdf.• Review the manual and identify the project activities and the related tools required to generate the input or output of the identified project task.

3. GOVERNANCE AND MANAGEMENT OF DIGITAL TRANSFORMATION PROJECTS

Learning Objectives:

- Examine the governance and management standards and principles to guide the successful leadership, direction and control of digital transformation projects.
- Define “project management” and identify the performance areas.

3.1 Governance in Digital Transformation Projects

According to ISO 38500, governance is a system of directing and controlling. Governance authorizes, directs, empowers, provides oversight and limits the actions of management, as defined by ISO/IEC 21505:2017.

The governance of a project represents the values and principles that govern the activity and results of the project organization. Governance provides the limiting conditions to indicate the quality of performance. It includes the enabling resources to support the strategic intent of the project's governing body. According to ISO 21505, the project governing body is accountable and responsible for the following:

- Comply with the objectives, values and principles agreed.
- Address the requirements of stakeholders.
- Develop, maintain and monitor policies, procedures and processes.
- Delegate authority to the project management to achieve objectives.
- Monitor conformance with policy and legal requirements.
- Provide final decision on escalated critical issues.

Table 8: The objectives and actions for the governance of a project

	Objective	Action
Value generation	Determine the purpose, mission, vision, organization ethos, organizational value and culture to give the organization direction.	Establish how the organization generates value over time.
Strategy	Drive the strategy and provision of appropriate resources to achieve the organization's purpose.	Direct the organization and steer its strategy.
Oversight	Oversee the organization's performance, compliance and viability.	Oversee the assurance that the organization achieves its objectives within the parameters set by the governing body.

Accountability	Engage and be accountable to stakeholders.	Demonstrate accountability to the organization's stakeholders.
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Source: ISO, *International Standard ISO 37000: Governance of organizations – Guidance*, first edition (Geneva, 2021). Available at <https://www.sis.se/api/document/preview/80031170/>.

Governance includes the reporting of outcomes to realize the legally-registered purpose of the organization, as follows:

- **Effective performance:** The declared purpose is achieved and performance complies with its promulgated policies.
- **Responsible stewardship:** The resources are used responsibly, appropriately, efficiently and optimally.
- **Ethical behaviour:** The reporting of performance and resource stewardship is with accountability, accuracy and timeliness, and the project engages with competence, fairness, integrity and transparency.

Governance in digital transformation addresses the following questions:

- **Effective performance –**
 - Does the project organization achieve the declared true purpose and value with the stakeholder, beneficiary and regulator?
 - Does the project organization perform in compliance with its policies and agreed requirements of the stakeholder and external interest party?
- **Responsible stewardship –**
 - Does the project organization use the already available and newly acquired resources responsibly, appropriately and efficiently to ensure value, effectiveness, sustainability and security?
 - Does the project organization motivate and enable the project team to collaboratively work and deliver quality products or services?
- **Ethical behaviour –**
 - Does the project organization demonstrate accountability, accuracy and timeliness in the reporting of performance and stewardship of resources?

- Does the project organization engage stakeholders with competence, fairness, integrity and transparency?
- Does the project organization perform with competence and probity in the manner in which it makes decisions?

Governance achieves its objectives by its integrative relationship with management. Management works within the constraints set by the organization's governance to achieve the organization's objectives. ISO 21505 identifies the impact of successful integration of governance and management, as follows:

- Strategic alignment
- Continuous justification
- Appropriate framework
- Stakeholders' engagement and communication
- Clear roles and responsibility, authority and accountability
- Appropriate planning and management
- Continuous improvement

Governance and management integration approach facilitates the resolution of project issues, namely:

- Lack of common understanding on organization strategies, objectives, plans and roadmaps.
- Inability to focus on the realization of the strategic objectives.
- Absence of transparency and alignment of contributions to the strategic objectives.
- Weakness in facilitating communication.
- Inadequacy to communicate progress through consistent reporting, decision gates and escalation procedure.

Digital transformation is a strategy, programme, project or operation provided with direction and control by a governing body and executive management to create new value. Governance provides the principles, policies and framework for the digitization of data and digitalization of services.

Digital transformation is governance creating the innovative management system that optimizes the organization's value creation potential with the technologies that drive the digital economy of a networked society. Innovation is about the new or changed entity that realizes or redistributes value for the organization. It comes as product, service, model, method or approach, which can include digitized data, electronic record, digital application service, the Internet, mobile technology, social web application, cloud computing, Internet of Things, big data, smart technology, process automation, service outsourcing and agile project management.

The developmental roadmap of digital transformation is an agreement between governance and management to reconstruct or recompose the business model of

creating new value, effectiveness, efficiency, security and continuity with the digitization of data and digitalization of services. The roadmap represents the organization's adopted quality governance and management systems to deliver and support the service objectives with disruptive technologies associated with digital enterprise or government.

Digital technologies in digital transformation differentiate the stakeholders' experience in the following:

- Value creation
- Exercise of power
- Productivity and creativity
- Ease of doing business
- Inclusivity of services
- Content distribution
- Knowledge formation
- Relationship building
- Community mobilization
- Information security

The project provides a governance system to support the realization of its mandated outcome. The project organization guarantees the organized support of enabling quality in product development, stakeholder relationship, resource planning, performance control, safety and security.

The quality of governance enables the management system in a project to deliver results. It involves a clear, current and complete value model, governance framework, risk assessment, requirement matrix, technology acquisition and adopted practice to deliver the intended results by the project owner, sponsor, manager and team in a collaborative manner. The methodology and technology of project governance and management may differ to achieve objectives, but they share common principles in project delivery.

Project governance results include:

- Project decision
- Project assurance
- Management policies, processes and methods
- Project roles and responsibilities
- Project reporting
- Project contracts with suppliers or users
- Regulatory oversight

Project assurance is the accountability of project governance and management. According to BS 6079:2019, assurance is the systematic set of actions necessary to provide confidence to senior leaders and stakeholders. The essential questions to communicate project assurance are the following:

- Is the project aligned with the organization's strategy?
- Is the project under control?
- Is the project likely to realize the required benefits?
- Is the project likely to deliver the desired outcomes?

- Is the project likely to deliver outputs that satisfy requirements?
- Is the project operating at an acceptable level of risk?

Project assurance reports the following:

- Project agreement with the business case
- Control of project cost, schedule, scope and resources
- Validated and verified project quality requirements
- The accepted risks are mitigated

The following are the control items and associated issues in a project:

- Scope – Unclear requirement, lack of agreement and scope creep.
- Time – Error time estimation and delayed schedule.
- Cost – Error in cost estimation and budget overspending.
- Risks – Disregarded “what-ifs” and mitigating actions.
- Resources – Availability, capability and supplier issues.
- Expectation – User experience and perception.
- Communication – Stakeholder relationship, message and messenger issues.
- Quality – Standards and metrics application.
- Change – Event handling and problem management.
- Security – Confidentiality, integrity, availability and privacy issues.

3.2 Management of Service Delivery and Digital Transformation

The management of the value delivery system fulfils the objectives and conditions to deliver the legally-registered purpose of the organization. According to ISO 38500, management is an exercise of control and supervision within the authority and accountability established by governance.

A value delivery system brings the conception, development, deployment and maintenance of a product or service that embodies the protected interest and benefits of the target users and stakeholders. It speaks of economic, social, political, cultural, personal, community or global interest. The benefit is associated with human rights, security, safety, growth, continuity and sustainability.

A value delivery system demonstrates the preferred manner or means that stakeholders or target users want to be satisfied in the delivery and use of the proposed product or service. The value delivery system satisfies stakeholders’ wants by setting up the appropriate organizations, policies, rules, standards, procedures, competencies, technologies and suppliers to deliver quality products and services.

The adopted quality indicators provide reference to report quality product or service of digital transformation. The ISO 25011⁶⁵ provides international guidance for quality indicators, as follows:

- Effectiveness – Accuracy and completeness with which users achieve specified goals.
- Efficiency – Resources expended concerning the accuracy and completeness with which users achieve goals.
- Satisfaction – Usefulness, trust, pleasure and comfort.
- Freedom from risk – Economic, health, safety, environment and privacy.
- Context – Flexibility and completeness.

A quality management system guarantees the quality delivery of products and services, and attests to the trustworthiness and reliability of the service provider. It operates within the governance view of the context, leadership, planning, operation and improvement.

The claimed success of a value delivery system means the ability of management to deliver the agreed results that make real the strategic intention of the governing body and realize the legally-registered purpose of the service delivery organization.

The service delivery challenges in the networked society of a digital economy are how to satisfy the citizen or target users in the digital social network through reaching, influencing, interacting and delivering the product or service of value creation on the Internet, mobile devices, social web applications and other ICTs.

Governance of digital transformation invests in innovation projects that transform service delivery with the digital platform of data generation, collection, storage, utilization, sharing and disposal. Governance authorizes management of digital transformation to exercise the control and supervision, based on the authority and accountability set by the governing body to realize the outcomes and benefits of a digital technology-enabled service delivery system.

The assessment of what may fail or succeed in digital transformation projects comes from known management-related risk criteria and control measures associated with the following management areas of the value delivery system:

- Quality management – Managing excellence
- Innovation management – Managing the introduction of something new
- Risk management – Managing uncertainty
- Project management – Managing the development of new product or service
- Cloud computing – Managing computing infrastructure in the cloud
- Master data management – Managing the master data of integrated process

⁶⁵ ISO/IEC, *Technical Specification ISO/IEC TS 25011: Information technology – Systems and software Quality Requirements and Evaluation (SQuaRE) – Service quality models*, first edition (Geneva, 2017). Available at <https://cdn.standards.iteh.ai/samples/35735/f41e7a8a41cd41808a12487edf19f62b/ISO-IEC-TS-25011-2017.pdf>.

- Data-driven approach – Evidence-based decision-making
- Sourcing management – Managing resource acquisition
- Data privacy management – Managing privacy and security of data
- Cybersecurity management – Managing the security of cyberspace

The following published laws and locally-adopted international standards provide the indicators for quality performance of digital transformation governance:

- ISO/TC 176 – Quality management and quality assurance
- ISO/TC 279 – Innovation management
- ISO/TC 262 – Risk management
- ISO/TC 258 – Project, programme and portfolio management
- ISO/IEC JTC 1/SC 38 – Cloud computing and distributed platforms
- ISO/IEC JTC 1/SC 27 – Information security, cybersecurity and privacy protection

The project organization with transformational leadership can determine, describe, document and demonstrate the acceptance criteria that define a successful delivery of the project objectives, namely:

- Value – The accepted worth or benefit of the authorized project for the organization's interest parties or stakeholders, which is communicated in the planned service strategy, portfolio, programme and project. Value is examined in the use of the product or service to bring about the expected outcome.
- Quality – The identified inherent characteristics of the project that fulfil the requirements specification of achieving the experience of the outcome. Quality is examined in the behaviour of governance, process, product, people, information, technology and providers through the delivery of project results and user experience.
- Effectiveness – The “right things to do” that affect the quality management of a project, where the planned result is achieved with its documented activities. Effectiveness is examined based on adopted risk criteria and planned work of mitigation.
- Efficiency – The user experience of the agreed capability “to do the right things right” in the use of the resources to achieve results. Efficiency is examined following operational metrics of cost, speed, reach, simplicity, availability and capacity.
- Competency – The knowledge, skills and behaviour that fit the delivery requirements of the project objectives. Competency is examined against the agreed work terms of references.
- Compliance – The full agreement of a project with regulatory requirements and practice standards of valid performance. Compliance is examined based on the acceptance criteria of regulators and standards bodies.
- Security – The assurance that the information associated with the developed product or service is protected from the uncertainty that threatens confidentiality, integrity,

availability and privacy of information. Security is examined in the pieces of evidence of managed cybercrime and privacy violations.

3.3 Governance and Management Principles for Digital Transformation

The methodology and technologies may differ to achieve project objectives but the following governance and management principles are the underpinning standards that validate and verify the shared belief of value, effectiveness, efficiency and security in the value delivery system:

- ITIL Service Management Principles⁶⁶ –
 - Focus on value
 - Start where you are
 - Progress iteratively with feedback
 - Collaborate and promote visibility
 - Think and work holistically
 - Keep it simple and practical
 - Optimize and automate
- ISO 38500 – Governance of IT for the Organization⁶⁷ –
 - Responsibility
 - Strategy
 - Acquisition
 - Performance
 - Conformance
 - Human behaviour
- Project Management Body of Knowledge (seventh edition) Project Management Principles⁶⁸ –
 - Be a diligent, respectful and caring steward
 - Create a collaborative project team environment
 - Effectively engage with stakeholders
 - Focus on value
 - Recognize, evaluate and respond to system interaction
 - Demonstrate leadership behaviours
 - Tailor based on context
 - Build quality into processes and deliverables
 - Navigate complexity
 - Optimize risk responses

⁶⁶ Global Knowledge, "ITIL 4 Guiding Principles in 30 Minutes", YouTube video, 22 February 2021. Available at <https://www.youtube.com/watch?v=pHajYtu6N3c>; and Joseph Mathenge and Jon Stevens-Hall, "The Seven ITIL 4 Guiding Principles", BMC Blogs, 7 May 2019. Available at <https://www.bmc.com/blogs/itil-guiding-principles/>.

⁶⁷ PECB, "Corporate Governance of IT Implementation Based on ISO IEC 38500 and COBIT5", YouTube video, 25 June 2015. Available at <https://www.youtube.com/watch?v=ztEwx2xFAkc>.

⁶⁸ Ricardo Vargas, "Ricardo Vargas Explains the PMBOK® Guide Seventh Edition Published by PMI", YouTube video, 3 September 2021. Available at <https://www.youtube.com/watch?v=HVlrXOQoSUw>.

- Embrace adaptability and resiliency
- Enable change to achieve the envisioned future state
- PRINCE2 Project Management Principles⁶⁹ –
 - Continued business justification
 - Defined roles and responsibilities
 - Focus on products
 - Learn from experience
 - Manage by exception
 - Manage by stages
 - Tailor to suit the project environment
- Lean Project Management Principles⁷⁰ –
 - Identify value
 - Map value stream
 - Create flow
 - Establish pull
 - Continue to improve
- Agile Project Management Principles⁷¹ –
 - Our highest priority is to satisfy the user through early and continuous delivery of valuable software.
 - Welcome changing requirements, even late in development. Agile processes harness change for the user's competitive advantage.
 - Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale.
 - Business people and developers must work together daily throughout the project.
 - Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done.
 - The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
 - Working software is the primary measure of progress.
 - Agile processes promote sustainable development. The sponsors, developers and users should be able to maintain a constant pace indefinitely.
 - Continuous attention to technical excellence and good design enhances agility.
 - Simplicity – the art of maximizing the amount of work not done – is essential.
 - The best architectures, requirements and designs emerge from self-organizing teams.

⁶⁹ PRINCE 2 Wiki. Available at <https://prince2.wiki/>.

⁷⁰ Asana, "What is lean project management? 5 principles explained", 4 November 2021. Available at <https://asana.com/resources/lean-project-management>.

⁷¹ Agile Alliance, "The 12 Principles behind the Agile Manifesto". Available at <https://www.agilealliance.org/agile101/12-principles-behind-the-agile-manifesto/>.

- At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.
- Principles for Digital Development⁷² –
 - Design with the user
 - Understand the existing ecosystem
 - Design for scale
 - Build for sustainability
 - Be data-driven
 - Use open standards, open data, open source and open innovation
 - Reuse and improve
 - Address privacy and security
 - Be collaborative

3.4 Project Management

3.4.1 Definitions of Project Management

ISO 21502:2020⁷³

Project management is a coordinated activity to direct and control the accomplishment of agreed objectives. It is an integrated practice to direct, initiate, plan, monitor, control and close the project. It is a system with a set of processes, methods and practices for the project organization to deliver the project requirements of the project owner, sponsors and stakeholders.

APM⁷⁴

Project management is the process by which projects are defined, planned, monitored, controlled and delivered such that the agreed benefits are realized. Projects are unique, transient endeavours undertaken to achieve the desired outcome. Projects bring about change and project management is recognized as the most efficient way of managing such change.

Project Management Institute

Project management is the application of knowledge, skills, tools and techniques to project activities to meet or exceed stakeholder needs and expectations. Project management provides the coordinated activities to direct and control the accomplishment

⁷² Principles for Digital Development, "Principles". Available at <https://digitalprinciples.org/principles/>.

⁷³ ISO, "ISO 21502:2020(en) Project, programme and portfolio management — Guidance on project management". Available at <https://www.iso.org/obp/ui/#iso:std:iso:21502:en>.

⁷⁴ APM, "APM Body of Knowledge: Definitions". Available at <https://www.apm.org.uk/media/1605/final-proof-bok-6-definitions.pdf>.

of the agreed unique and verifiable deliverables that are required to be produced with project governance.

The project management team works within the constraints set by the organization's governance to achieve the organization's strategic objectives in the unique product or service to be developed by a project. Project constraints are declared in the approved value of the project, budget allocation, delivery schedule, scope of work, sourcing approach and quality metrics.

The overseeing, directing, initiating, closing, controlling and managing delivery are core and integrated activities in a successful operation of the delivery life cycle of the opted project management methodology and product development approach.

The project is supported by the following categories of delivery processes that are executed by the project owner, sponsor, manager, team and specialist:

- Project management process
- Product development process
- Administrative support process

The project management delivery life cycle is associated with starting, progressing and closing the project. The commonly-recognized project management life cycle is presented as follows:

- Initiating phase
- Planning phase
- Implementing phase
- Controlling phase
- Closing phase

The product development life cycle is defined relative to the adopted development approach, namely:

- Predictive, linear, sequential and waterfall related approach
- Adoptive, incremental, iterative and agile related approach

3.4.2 Performance Areas of Project Management

The project management organization is authorized, composed and provided with clearly identified and agreed key performance areas to complete the project terms of reference and deliver stakeholders' results. Key performance areas represent what the project management is accountable and responsible for in the delivery of project results. The

adopted project management methodology provides a coherent, complete and consistent view of what to perform and the indicators to measure performance.

The key performance areas stated in the Project Management Body of Knowledge (seventh edition) include the following:⁷⁵

- Team: Foster team development that encourages leadership behaviour and sharing ownership for the outcomes.
- Stakeholders: Engage stakeholders in project decision-making and implementation.
- Life cycle: Determine the most appropriate development approach such as a predictive, adaptive or hybrid approach.
- Planning: Identify the functions and activities that are associated with delivering the project deliverables and outcomes. Plan upfront and throughout the project depending on the product, development approach, environment and stakeholders.
- Navigate uncertainty and ambiguity: Identify and control the uncertainties and ambiguity of project delivery, which are sources of threats and opportunities that the project team must identify, analyse, evaluate and mitigate throughout the project life cycle.
- Delivery: Deliver the requirements, scope, compliance and quality expectations of the expected outputs that will drive intended outcomes.
- Performance: Assess the project performance and implement appropriate responses to maintain acceptable and optimal performance.
- Project work: Establish the processes and perform the works that enable the project team to deliver the expected value and outcomes. It includes communication, engagement, managing physical resources, procurement and other work to keep project operations running smoothly.

⁷⁵ ProjectManagement.com, "Getting Under the Hood of the PMBOK® Guide – Seventh Edition", 5 June 2020. Available at https://www.projectmanagement.com/contentPages/video.cfm?ID=637478&thisPageURL=/videos/637478/Getting-Under-the-Hood-of-the-PMBOK--Guide---Seventh-Edition#_=_.

The key performance areas stated in the APM Body of Knowledge (seventh edition) include the following:

- Set up project success:
 - Implementing strategy
 - Life cycle options and choice
 - Establishing governance and insight
- Prepare for change:
 - Shaping the early life cycle
 - Assurance, learning and maturity
 - Transition into use
- Manage people and behaviour:
 - Engaging stakeholders
 - Leading teams
 - Working professionally
- Plan and manage deployment:
 - Defining outputs
 - Integrated planning
 - Controlling deployment

The assessment of a project manager, according to the Global Alliance for Project Professions, asks the following essential questions:

- How does the project manager handle stakeholder relationship?
- How does the project manager develop the project plan?
- How does the project manager lead and direct project progress?
- How does the project manager assure the acceptance of the project deliverable?
- How does the project manager control project transition at each stage of the project life cycle and iteration?
- How does the project manager evaluate and improve project performance, and celebrate accomplishment?

Learning Activity 14: Governance and Management Performance Baseline
<ul style="list-style-type: none">• Download the International Project Management Association's Individual Competence Baseline for Project, Programme and Portfolio Management available at https://products.ipma.world/wp-content/uploads/2016/03/IPMA_ICB_4_0_WEB.pdf.• Create a checklist of the performance areas of project management.

4. PROJECT MANAGEMENT AND DEVELOPMENT PRACTICE STANDARDS

Learning Objectives:

- Provide an overview of the project management and development practice standards, including those from ISO and professional bodies of knowledge that are relevant for digital transformation projects.

4.1 Description of a Standard

The ISO⁷⁶ describes standard as a formula for doing something. It presents the best way to make a product, manage a process, deliver a service or supply materials in the organization of value creation.

The guidance provided by a standard represents the distilled wisdom of people representing the country and sector as subject matter experts. They are recognized for the experience of knowing the needs of the organization or business sector they represent as manufacturer, seller, developer, distributor, etc.

The Project Management Institute⁷⁷ sees standard as the document guidance created by consensus and approved by a recognized body in performing the activities or in delivering the result of value creation. It is composed of the common, repeated use, rules, guidelines or characteristics of doing things right the first time.

A project is an agreement between a project sponsor, owner, manager, specialist and other interest parties to deliver a new or unique product or service. The delivery has to be made successful within the authorized requirements, budget, schedule, scope, rules, supply and organization. The achievement of the commitment is measured in the realized intention and benefits. It includes the rated differentiation of target user experience on the quality of product or service.

The ability to demonstrate fitted competency to manage a project as specified in the terms of reference, user requirement and service agreement is in the results supported by using the organization's identified, analysed, evaluated, mapped and applied international practice standards of acceptable, actionable and auditable performance.

⁷⁶ ISO, "Standards". Available at <https://www.iso.org/standards.html>.

⁷⁷ Project Management Institute, "About Standards". Available at <https://www.pmi.org/pmbok-guide-standards/about>.

Government agencies, private enterprises and interest groups that claim quality in the management of digital transformation projects report their activity outputs with clarity, coherence and completeness with their adopted standards references that support valid and verifiable understanding, decision and work.

4.2 International Organization for Standardization

Project standards derived from the ISO are normative references for different aspects of project governance and management as follows:

- Governance concepts and practices –
 - ISO 37000 – Governance of organization – Guidance
 - ISO 38500 – Governance of IT for the organization
- Innovation management concepts and activities –
 - ISO 56002 – Innovation management system – Guidance
- Project principles, performances and practices –
 - ISO 21502 – Guidance on project management
 - ISO 10006 – Guidelines for quality management in projects
- Project system development life cycle and processes –
 - ISO 15288 – System life cycle processes
 - ISO 90003 – Guidelines for the application of ISO 9001 to computer software
- Project system requirement –
 - ISO 29148 – Life cycle processes – Requirements
- Project user requirement documentation –
 - ISO 26515:2018 – Developing information for users in an agile environment
- Project outsourcing –
 - ISO 37500 – Guidance on outsourcing
- Project assurance of quality in the products and services –
 - ISO 25000 – Systems and software quality requirements and evaluation (SQuaRE)
– Guide to SQuaRE
- Risk management concepts and methodologies –
 - ISO 31000 – Risk management
 - ISO 31010 – Risk assessment techniques
- Privacy by design and by default –
 - ISO/IEC 29100 – Privacy framework

- ISO 29151 – Privacy security controls
- ISO 27550 – Privacy engineering for system life cycle processes
- Project information security –
 - ISO 27002 – Information security control
 - ISO 27033 – Network security
 - ISO 27040 – Storage security
 - ISO 27034 – Application security
 - ISO 27036 – Supplier security
 - ISO 27017 – Cloud security
 - ISO 27018 – Cloud privacy
 - ISO 27032 – Cybersecurity framework
 - ISO 27005 – Risk management
- Project cloud computing approach of providing the technology platforms for digital transformation –
 - ISO/IEC 22123 – Cloud computing vocabulary and concepts
 - ISO 23167 – Cloud computing – Common technologies and techniques
 - ISO/IEC 19944 – Cloud computing and distributed platforms – Data flow, data categories and data use
 - ISO 19941 – Cloud computing – Interoperability and portability
 - ISO 19086 – Cloud computing – Service level agreement framework

4.3 Professional Bodies of Knowledge

Normative references on project management may also come from the professional body of knowledge. The body of knowledge refers to the core teachings and skills required to work in a particular field or industry, and is usually defined by professional associations or societies.⁷⁸ The body of knowledge can also be referred to as a peer-developed compendium of what a competent professional in their respective field must know, including the skills, techniques and practices that are routinely employed.⁷⁹

The body of knowledge determines, describes, documents and demonstrates the core competencies that are required to perform the accountability and responsibility of managing a successful project. It is developed, maintained and improved by professional organizations with members and users coming from different kinds of organizations and industry sectors around the world.

The professional body of knowledge developed by an international professional organization and competency certification authority on project management and development approaches provides ready-to-use documented guidance on the common

⁷⁸ Julia Kagan, "Body of Knowledge (BOK)", Investopedia, 8 August 2020. Available at <https://www.investopedia.com/terms/b/body-of-knowledge.asp>.

⁷⁹ (ISC)², "The (ISC)² CBK". Available at <https://www.isc2.org/Certifications/CBK>.

risks, approaches, methodology and artifacts to successfully execute the activities and deliver the results that achieve project outcomes. The subsections below summarize the globally-cited and publicly available bodies of knowledge.

4.3.1 Project Management Body of Knowledge

The Project Management Body of Knowledge (seventh edition)⁸⁰ is published by the Project Management Institute. It provides guidance on project management based on a set of principles, and the associated performance domains and tools to deliver project results that fulfil stakeholders' outcomes. It provides knowledge on project context, project management organization, project risks, specifications of key result areas, project modelling and computational tools.

4.3.2 APM Body of Knowledge

The APM Body of Knowledge⁸¹ provides guidance on managing a successful project. It identifies and elaborates the strategic context of a project, the life cycle configuration, project governance and oversight, and ways to manage the people and team aspect of a project.

4.3.3 PRINCE2

PRINCE2⁸² is a project management guidance published by AXELOS. It provides the project organization to contextually define a project, and presents the principles and associated processes that underpin a successful project.

4.3.4 International Association of Project Managers' Guides

The International Association of Project Managers published a Project Managers' Guide⁸³ and an Agile Project Managers' Guide.⁸⁴ They provide simple guidance on the components that enable direction and control of a successful project, including common concepts and procedures to compose the organizational and activity requirements of project delivery.

⁸⁰ Project Management Institute, "PMBOK® Guide". Available at <https://www.pmi.org/pmbok-guide-standards/foundational/PMBOK>.

⁸¹ APM, "APM Body of Knowledge Seventh Edition". Available at <https://www.apm.org.uk/book-shop/apm-body-of-knowledge-7th-edition/>.

⁸² PRINCE2.com, "What is PRINCE2?" Available at <https://www.prince2.com/uk/what-is-prince2>.

⁸³ International Association of Project Managers, "The Project Managers' Guide (IAPM)". Available at <https://www.iapm.net/en/certification/certification-bases/pm-guide-2-0/>.

⁸⁴ International Association of Project Managers, "The Agile Project Managers' Guide (IAPM)". Available at <https://www.iapm.net/en/certification/certification-bases/agile-pm-guide-2-0/>.

4.3.5 Goal Directed Project Management

The Goal Directed Project Management: Effective Techniques and Strategies⁸⁵ is a project management guidance developed by Erling S. Andersen, Kristoffer V. Grude and Tor Haug that provides the methodologies associated with project planning, delivery and reporting.

4.3.6 Agile Practice Guide

The Project Management Institute and Agile Alliance partnered in the development of the Agile Practice Guide.⁸⁶ It provides essential knowledge on how the agile manifesto is implemented by various adaptive project development methodologies.

4.3.7 Scrum Body of Knowledge

The Scrum Body of Knowledge Guide⁸⁷ is published by SCRUMstudy, a global accreditation body for Scrum and Agile certifications. It provides essential knowledge on implementing the agile project principles, and presents the agile project organization and the specifications for agile project life cycle and processes.

4.3.8 IEEE Systems Engineering Body of Knowledge

The Institute of Electrical and Electronics Engineers (IEEE) published the Guide to the Systems Engineering Body of Knowledge that supports the knowledge requirement in the use of ISO/IEC/IEEE 15288:2015 – System life cycle processes.⁸⁸

4.3.9 IEEE Software Engineering Body of Knowledge

The IEEE published the Guide to the Software Engineering Body of Knowledge⁸⁹ that provides details of the concepts and practices in software development, particularly the life cycle, processes and performance areas. It is adopted by the ISO as ISO/IEC TR 19759:2015 – Software Engineering – Guide to the software engineering body of knowledge.

⁸⁵ Goal Directed Project Management, "Goal Directed Project Management Summary". Available at <https://www.gdpm.com/method/gdpm>.

⁸⁶ Project Management Institute, "Agile Practice Guide", September 2017. Available at <https://www.pmi.org/pmbok-guide-standards/practice-guides/agile>.

⁸⁷ SCRUMstudy, "SCRUMstudy™ Membership". Available at <https://www.scrumstudy.com/sbokguide>.

⁸⁸ Guide to the Systems Engineering Body of Knowledge, "ISO/IEC/IEEE 15288". Available at https://www.sebokwiki.org/wiki/ISO/IEC/IEEE_15288.

⁸⁹ IEEE Computer Society, "Software Engineering Body of Knowledge (SWEBOK)". Available at <https://www.computer.org/education/bodies-of-knowledge/software-engineering>.

4.3.10 PM² Project Management Methodology

The European Commission published the PM² Methodology Guide⁹⁰ to support the project organization in the effective management of any type of projects and deliver solutions. The knowledge provided is derived from the project experience of European organizations and the application of globally-accepted project management best practices.

4.3.11 ITU Project Management Guidelines and Templates

The project management guidelines and templates published by the ITU provide a common understanding of the principles, rules, policies, procedures and practices governing the design, planning, implementation and closure of projects.⁹¹

To conclude, the successful start, progress, control and closure of a digital transformation project is claimed by a project organization with the use of common references associated with valid and verifiable practices. The governance and management of a project share the common problem statement of performance and its related published international community-driven practice standards.

Learning Activity 15: Project Management Standards Review

- Go to the ISO Online Browsing Platform at <https://www.iso.org/obp/ui/#search:>
 - Locate and open the related project standards on project management and system development.
 - Summarize the purpose of the available standards that support quality management and development in a project.
- Go to the PM² Alliance website at <https://www.pm2alliance.eu/publications/>:
 - Download a copy of the PM² Methodology Guide.
 - Review the content of the guide and make a list of the project principles and key result areas.
- Go to the International Association of Project Managers website at <https://www.iapm-cert.net/documents/pmg-en/>:
 - Download and study the Project Managers' Guide.
 - Make a checklist of the common project management activities and artifacts.
- Go to the APM website at <https://www.apm.org.uk/media/35296/ampbok7-sample.pdf>:

⁹⁰ PM² Alliance, "The PM² Methodology: Europe's Methodology". Available at <https://www.pm2alliance.eu/what-is-pm2/>.

⁹¹ ITU, *ITU Project Management Manual* (Geneva, 2020). Available at <https://www.itu.int/en/ITU-D/Projects/Documents/ProjectManagementGuidelinesandTemplates.pdf>.

- Download and study the content of the APM Body of Knowledge (seventh edition).
 - Make a checklist of the project manager's responsibilities.
- Go to the website of SCRUMstudy at <https://www.scrumstudy.com/sbokguide> or http://www.cs.vsu.ru/~svv/spm/SBOK_Guide_3rd_edition_English_Sample.pdf:
 - Download and read the Scrum Body of Knowledge Guide.
 - Make a list of the project principles and development process.
 - Make a role matrix of the Scrum project organization.
- Go to the website of the Systems Engineering Body of Knowledge at [https://www.sebokwiki.org/wiki/Guide_to_the_Systems_Engineering_Body_of_Knowledge_\(SEBoK\)](https://www.sebokwiki.org/wiki/Guide_to_the_Systems_Engineering_Body_of_Knowledge_(SEBoK)):
 - Download and read the guide.
 - Make a list of the activities that compose a system life cycle and processes.
- Go to the website of the IEEE Computer Society on Software Engineering Body of Knowledge at <https://www.computer.org/education/bodies-of-knowledge/software-engineering>:
 - Download and read the guide.
 - Make a list of the activities that compose a software development life cycle and processes.

5. TAILORING ICT PROJECT MANAGEMENT METHODOLOGY

Learning Objectives:

- Discuss the need for tailoring a project management methodology.
- Highlight issues to address in tailoring traditional project management, system development and agile project management methodologies.

5.1 The Need for Tailoring a Project Management Methodology

The methodology determines the “what and how to” deliver the project objectives that are linked to the agreed stakeholders' outcomes. It applies the accepted principles, organization, compliance, process, documentation, technologies and competencies to direct the project and control the project risks associated with the products, people, policies, procedures and providers of service delivery.

The project has a tailored project management methodology crafted to match the operational context of project delivery. It is the guidance for project onboarding, collaborative decision-making and work of the project team.

Tailoring project management methodology is a critical act of governance and management to provide the project organization with a common view of the principles, policies, performances and practices to deliver the project results. Activity guidance is necessary to direct and control the creation of a new product or service that realizes the stakeholders' benefits. The benefit is the created advantage, value or other positive effects that come from the release of a new product or service of the project.

According to PRINCE 2, tailoring a project management methodology has the following purposes:⁹²

- Ensure the project method relates to the project's environment.
- Ensure the project's controls and the way progress is measured are based on the project's scale, complexity, importance, capability and risk.

The project's internal and external environments dictate the condition underlying the start, progress, control and closure of the project. The project management approach is tailored to match the organization's assessment of needs, risk appetite, regulatory context, people competency and sourcing strategy.

⁹² PRINCE2 Wiki, "Tailor to Suit the Project Environment". Available at <https://prince2.wiki/principles/tailor-to-suit-the-project-environment/>.

Each project context has its project complexity factors. Contextual threats must be properly examined and remedial measures applied with appropriate approaches to resolve delivery issues. The project organization must be able to tailor the what, why, how, who, when and where of the project delivery with the use of commonly-recognized standards and from lessons learned offered by professional bodies of knowledge.

The project management methodology represents the definitive guide for the project sponsor, owner, stakeholder, controller and team to perform the appropriate measures to control the project constraint, uncertainty or ambiguity in starting, progressing and closing a project successfully. A project management methodology achieves the following objectives:

- Establish a common way of working on projects
- Provide structure to projects
- Standardize projects and provide consistency
- Provide common project language and vocabulary
- Enhance the quality of project management
- Circulate best practices and lessons learned (avoid reinventing the wheel)
- Define roles and responsibilities
- Facilitate effective collaboration

The knowledge sources in tailoring a project management methodology may come from the following:

- Public-domain materials, such as project management standards
- Commercial project management methodologies
- Documented lessons learned of the organization on project implementation
- Materials from successful project experiences
- An organization's assets

The creation of project management methodology considers the following steps:

- Identify organizational background, culture and circumstances likely to affect methodology development and use.
- Understand the outcomes expected from the methodology used.
- Identify already existing (often informal) practices within the organization that contribute to the expected outcomes.

- Fit the methodology with the elements most likely to provide expected outcomes.
- Populate the methodology with the elements most likely to provide expected outcomes.
- Guide tailoring and applying the methodology to specific project contexts.

Project management methodology represents a set of knowledge, skills and behaviour, which according to the International Project Management Association, supports the competencies that determine:

- Personal and interpersonal relationship
- Technical ability to manage the project from beginning to end
- Methods, tools and techniques of interacting with the project environment

Project management methodology determines, describes, documents and demonstrates the project's view of successful project delivery in what the project leadership and organization have adopted as their project principles, performance areas and delivery practices.

The ISO 21502:2020 describes the integrated project management practice and its link to specific roles and performance areas that apply the project principles and use of appropriate delivery methods and tools. The integrated project management practice is composed of the following elements:

- Preliminary and post-project activities
- Overseeing a project
- Initiating and closing a project
- Controlling a project at each stage of its project delivery
- Managing the delivery of the project output

The project leadership and organization, according to ISO 21502:2020, must have the ability to properly align project management practices and systems in their delivery environment. They need to appropriately address the following:

- Functional and physical organizational structures
- Conflicting procedures, processes, plans and systems
- Technology availability and access
- Communication methods and cycles
- Context of operations of the organization
- Administrative and authorization systems
- Sustainability and oversight requirements

The essential content of tailored project management methodology to lead, direct and control the delivery of the project objectives that realize the value to be created by the project stakeholders, are the following:

- Project management common definitions
- Regulatory and standards references
- Project management and development principles
- Project management and development organization
- Project development approaches
- Project life cycle and integrated processes
- Project documentation
- Project management technology use
- Project roles and competency requirements
- Project risks criteria

The project management methodology represents the system of what, how, why, who, when and where of initiating, planning, directing, overseeing, delivering, monitoring, controlling and closing a temporary and unique endeavour.

The *what* of the project represents the value to be created or accepted work packages of the delivery objectives, and the enabling resources of the intended results.

The *how* of the project demonstrates the activities to be performed and the manner it is to be delivered. A development approach is chosen. It lists down the processes, procedures, methods, techniques, templates and digital tools of the practice.

The *why* of the project communicates the motivation and principles that determine the views that influence value, effectiveness, efficiency and security in directing and controlling the project.

The *who* of the project provides the fitted competency and ability to achieve the project objectives and prevent the project risk. It is shown as the organization of roles, accountability, responsibility, expertise and participation to create value.

The *when* of the project tells the timing of achieving the project objectives. It shows the project life cycle and the required schedule of resource provisioning to create the results as needed.

The *where* of the project is the location of project development that determines the working environment and availability of resources.

There is no one-size-fits-all project management framework and methodology to claim a successful project. However, the use of community-driven international standards,

professional bodies of knowledge and published regulations can contribute to projects' success.

The project owner, sponsor, manager, specialist and interest party need to share their contextual views of a project. They also need to elicit, analyse and document the critical success factors, result indicators and evaluated risks.

The tailored project management communicates to the project organization the common understanding of the following delivery concerns:

- Interest: ○ Stakeholders' mandated revenue, development and regulatory outcomes.
- Effectiveness: ○ Right competencies, methods and technologies for the delivery and support of mandated function.
- Efficiency: ○ Reduce cost, effort and time.
 ○ Increase returns and reach with optimized time, effort and resources.
 ○ Maintained provisioning of capability, capacity and availability of target users' experience.
- Security: ○ Confidentiality, integrity, availability and privacy assurance in the process, data, application and infrastructure of doing business.
- Accountability: ○ Decision rights, compliance and participation.

5.2 Project Issues to Address in Tailoring a Project Management Methodology

A project involves a team of varied competencies to collaboratively control project risk and deliver the requirements that complete the release of a new product or service. A documented guidance is necessary to assure project collaboration that delivers results.

An adopted project management methodology makes the project team communicate a common understanding of the principles, processes and risks that affect the successful direction and control of project delivery. The project sponsor, owner, manager, team, specialist and other interest parties must share their common view of what composes the delivery of the project objectives to realize the outcomes expected by the stakeholders.

The common understanding of the value of the project is composed of the following:

- The problem needs to be resolved by the product or service to be developed by the project.
- The resolution model and the enabling factors.

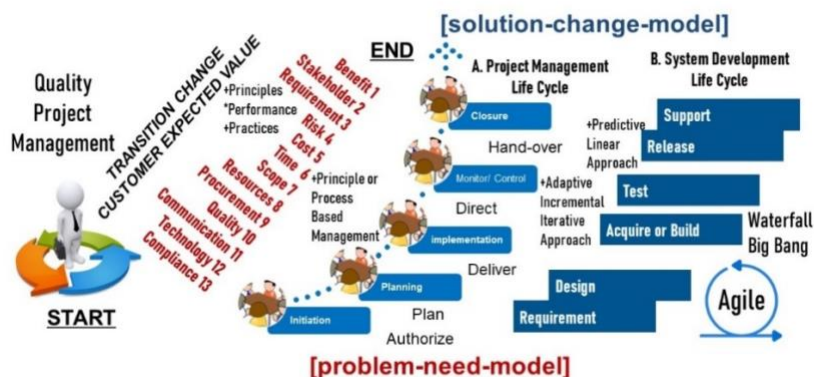
- The requirements and acceptance criteria of developing the new product or service.
- The start and completion date to deliver the requirements of producing the new product or service.

Figure 14: An overview of the value of the project



The project onboarding of people who are assigned to specific project roles must share a common understanding of the adopted principles, performance areas and practices to deliver the project objectives throughout the project life cycle in a collaborative manner. This includes managing the administrative aspects of the project and developing the product or service.

Figure 15: The project management and system development life cycles in quality project management



5.2.1 Project Management Life Cycle Components

Table 9 gives an example of eliciting and elaborating the activities associated with a project management life cycle.

Table 9: Tasks and outputs in a project management life cycle

Phase	Tasks	Outputs
Initiating	<ul style="list-style-type: none">• Gather data for baseline information to define the need for the project, value justification of the project, solution, requirements and available options.• Agree on project methodology, estimation tools and financial valuation formula.• Elaborate the needs, key performance indicators, critical success factors and financial valuation metrics.• Formulate and approve the business case.• Compose, approve and release the request for proposal with project terms of reference.• Accept, review and approve project proposal.• Compose, approve and release project contracts and project implementation terms of reference based on the approved project proposal.• Set up project organization and appoint project manager.	<ul style="list-style-type: none">• Research data and information• Approved business case• Request for proposal• Project terms of reference• Approved project proposal• Project contracts• Project implementation terms of references• Project manager appointment
Planning	<ul style="list-style-type: none">• Define the tasks and requirements to be planned for execution and utilization.• Elaborate and agree on the applicable inputs, procedures, methodologies and tools to be used in planning the project.• Compose the project management plan that integrates the following plans:<ul style="list-style-type: none">○ Work plan – Work and organization breakdown schedules.○ Resource plan – Organization, skills needs, recruitment, people training and deployment schedules.	<ul style="list-style-type: none">• Work breakdown schedule• Organization breakdown schedule• Estimation techniques• Project management plan• Issues and problem management plan• Change management organization

	<ul style="list-style-type: none"> ○ Procurement plan – Bills of materials, acquisition strategy and contract handling. ○ Communication plan – Reporting instruments, kinds of communication, audience definition and information needs. ○ Risk management plan – Risk identification, and mitigation and action requirements. ○ Budget plan – Budget items, cost and scheduling. ○ Quality plan – Quality assurance procedures and tools specifications. ○ Training plan – Capability requirement matrix, training design and schedules. ○ Technology plan – Technology items, approaches, standards, delivery, installation, configuration and testing schedules. ○ Change management plan – Requests for change as a result of the problem, incident, etc. 	
Implementing	<ul style="list-style-type: none"> ● Define solutions requirement. ● Design the solution model. ● Create the solution model prototype. ● Validate and verify solution model prototype. ● Build the beta version of the solution. ● Internal team validates and verifies beta version of the solution. ● Train users to test the beta version release. ● Test and approve the beta version. ● Integrate and normalize the final version. ● Test and approve the final version. ● Handle incident, problem and change requests. 	<ul style="list-style-type: none"> ● Process model ● Information model ● Technology model ● Work packages ● Delivery reports ● Accomplishment reports ● Minutes of meetings ● User's approval, sign-in and sign-off document ● Training report ● Configuration documentation ● User manual
Monitoring / Controlling	<ul style="list-style-type: none"> ● Monitor work plan execution. ● Institute and enforce compliance report. ● Document issues reporting and change management handling. 	<ul style="list-style-type: none"> ● Compliance checklist ● Issues documentation ● Attendance reporting

		<ul style="list-style-type: none"> • Testing and quality report • Change request documents
Closing	<ul style="list-style-type: none"> • Document lessons learned. • Close contracts. • Handover solutions. • Archive project documents. 	<ul style="list-style-type: none"> • Lessons learned document • Payment • Project acceptance documentation • Handover documentations

5.2.2 System Development Life Cycle Components

Table 10 gives an example of eliciting and elaborating the activities associated with a system development life cycle.

Table 10: Tasks and outputs in a system development life cycle

Stage	Tasks	Outputs
Visioning	<ul style="list-style-type: none"> • Set goals, strategy, approach, configuration and plan for developing the solution based on the approved business case and project proposal. 	<ul style="list-style-type: none"> • Vision statement and commitment • Outcome and acceptance criteria
Requirement analysis	<ul style="list-style-type: none"> • Elicit information to compose the input, process, output and technology architecture specifications of the proposed solution. • Analyse and define the functional and non-functional requirements of the proposed solution. 	<ul style="list-style-type: none"> • Business, information and technology configuration documentation • Functional and non-functional requirement checklists • Requirement traceability matrix
Design and plan	<ul style="list-style-type: none"> • Draw the application, data and technology model, and develop prototype of the solution. • Generate mock-ups and prototypes of processes, screens and reports. 	<ul style="list-style-type: none"> • Process, application, data and technology models • Application conceptual model • Database model

	<ul style="list-style-type: none"> • Validate, verify and approve the visual drawing and prototype. 	<ul style="list-style-type: none"> • Technology platform model • Work plan
Acquire or build	<ul style="list-style-type: none"> • Procure the product as specified in the approved requirement document. • Code the approved application, data and technology prototype. • Internally test the conformance of the coded solution to approved design of the solution requirements. 	<ul style="list-style-type: none"> • Work packages • Conformance testing report • Revision report
Testing	<ul style="list-style-type: none"> • Validate and verify the functional and non-functional requirements of the alpha version of the application model and database tables. • Report on issues and change requests. 	<ul style="list-style-type: none"> • List of approved work packages • Change requests
Integration	<ul style="list-style-type: none"> • Put together the functionally-accepted modules, databases, network services and security services to run the integrated version of the solution. • Integration testing to validate and verify the inter-operational performance. 	<ul style="list-style-type: none"> • Integrated work package • Beta version testing report • Change requests
Acceptance	<ul style="list-style-type: none"> • Conduct user training on using the functional beta version of the solution. • Perform user's testing and acceptance of the completed solution version. • Assess business readiness of the final solution version for release. 	<ul style="list-style-type: none"> • Training design • Testing scripts • Testing reports • Change requests • List of accepted functional and non-functional features
Release	<ul style="list-style-type: none"> • Normalize configuration requirements for the solution's final version release. • Deploy by installing and configuring the release version of the solution to the business production area. • Train users. 	<ul style="list-style-type: none"> • Final release version of the work packages • User manual • List of locations and users for deployment, and status of installation and configuration • User training schedules

Support	<ul style="list-style-type: none"> • Set up the organization and procedures for incident, problem and change handling. • Accept incidents and problems for documentation, reporting, analysis and resolution. 	<ul style="list-style-type: none"> • Service desk
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5.2.3 Agile Project Management Life Cycle Components

Table 11 gives an example of eliciting and elaborating the activities associated with an agile project management life cycle based on the Scrum body of knowledge.

Table 11: Tasks and outputs in an agile project management life cycle

Phase	Tasks	Outputs
Initiation	<ul style="list-style-type: none"> • Create project vision. • Identify Scrum master and stakeholder(s). • Form Scrum team. • Develop epic(s). • Create prioritized product backlog. • Conduct release planning. 	<ul style="list-style-type: none"> • Project organization • Product backlog
Plan and estimate	<ul style="list-style-type: none"> • Create user stories. • Approve, estimate and commit user stories. • Create tasks. • Estimate tasks. • Create sprint backlog. 	<ul style="list-style-type: none"> • User story • Work plan • Work estimate
Implement	<ul style="list-style-type: none"> • Create deliverables. • Conduct daily standup. • Groom prioritized product backlog. 	<ul style="list-style-type: none"> • Scrum meeting minutes • Burndown chart • Work packages • Change requests
Review and retrospect	<ul style="list-style-type: none"> • Convene Scrum of Scrums. • Demonstrate and validate sprint. • Retrospect sprint. 	<ul style="list-style-type: none"> • Test reports • Change requests
Release	<ul style="list-style-type: none"> • Ship deliverables. • Retrospect project. 	<ul style="list-style-type: none"> • Accepted work packages • Lessons learned

The following questions can help to tailor a project management methodology:

- How to determine the value and authorization of the project and its impact on stakeholders' legally-registered purpose?
- How to assess, report and manage the complexity/failure factors and risk control indicators of the project?
- How to recognize and engage the affected person or entity in the creation of authorized value and user focus delivery requirements?
- How to engage the interest party of the project to properly resolve complexity factors and activate the critical success factors of the project?
- How is the value creation organized to be fitted with appropriate roles, relationships and competencies to support the project decision rights and work responsibilities?
- How to determine and communicate the project principles of thinking and behaving effectively, efficiently, securely and sustainably in the delivery management system called project?
- How to choose the appropriate project management and development approaches to implement the project principles in the adopted activities, techniques and artifacts of a successful project?
- How to elicit and analyse the appropriate project life cycle and practice to start, progress, control and close a project?
- How to set up the quality assurance indicators and regulatory compliance checklist of the project?

Learning Activity 16: Project Management Methodology Review
<ul style="list-style-type: none">• Download the ITU project management manual available at https://www.itu.int/en/ITU-D/Projects/Documents/ProjectManagementGuidelinesandTemplates.pdf.• Review the manual and identify the issues to consider when tailoring a project management methodology.

SUGGESTED READINGS AND ONLINE RESOURCES

Project Terms and Definitions

APM. APM Glossary of Project Management Terms. Available at <https://www.apm.org.uk/resources/glossary/>.

AXELOS. PRINCE2® Fifth Edition Glossaries of Terms. Available at <https://www.axelos.com/resource-hub/glossary/prince2-5th-edition-glossaries-of-terms>.

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ISO. *Quality Management Principles*. Geneva, 2015. Available at <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100080.pdf>.

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Professional Body of Knowledge and Practice Guidance

Agile Alliance. *The 12 Principles Behind the Agile Manifesto*. Available at <https://www.agilealliance.org/agile101/12-principles-behind-the-agile-manifesto/>.

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APCICT

The Asian and Pacific Training Centre for Information and Communication Technology for Development (APCICT) was inaugurated on 16 June 2006 as a regional institute of the Economic and Social Commission for Asia and the Pacific (ESCAP), and is located in Incheon, Republic of Korea. Guided by the 2030 Agenda for Sustainable Development and other internationally agreed development goals, APCICT's objective is to build and strengthen the capacity of members and associate members of ESCAP to leverage information and communication technology for socioeconomic development. APCICT's work is focused on training, knowledge sharing, and multi-stakeholder dialogue and partnership.

<http://www.unapcict.org>

ESCAP

The Economic and Social Commission for Asia and the Pacific (ESCAP) is the most inclusive intergovernmental platform in the Asia-Pacific region. ESCAP promotes cooperation among its 53 member States and 9 associate members in pursuit of solutions to sustainable development challenges. ESCAP is one of the five regional commissions of the United Nations.

The ESCAP secretariat supports inclusive, resilient and sustainable development in the region by generating action-oriented knowledge, and by providing technical assistance and capacity-building services in support of national development objectives, regional agreements and the implementation of the 2030 Agenda for Sustainable Development.

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