

International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Series Y
Supplement 52
(12/2018)

SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

**Methodology for building digital capabilities
during enterprises' digital transformation**

ITU-T Y-series Recommendations – Supplement 52

ITU-T



ITU-T Y-SERIES RECOMMENDATIONS

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS, NEXT-GENERATION NETWORKS, INTERNET OF THINGS AND SMART CITIES

GLOBAL INFORMATION INFRASTRUCTURE

General	Y.100–Y.199
Services, applications and middleware	Y.200–Y.299
Network aspects	Y.300–Y.399
Interfaces and protocols	Y.400–Y.499
Numbering, addressing and naming	Y.500–Y.599
Operation, administration and maintenance	Y.600–Y.699
Security	Y.700–Y.799
Performances	Y.800–Y.899

INTERNET PROTOCOL ASPECTS

General	Y.1000–Y.1099
Services and applications	Y.1100–Y.1199
Architecture, access, network capabilities and resource management	Y.1200–Y.1299
Transport	Y.1300–Y.1399
Interworking	Y.1400–Y.1499
Quality of service and network performance	Y.1500–Y.1599
Signalling	Y.1600–Y.1699
Operation, administration and maintenance	Y.1700–Y.1799
Charging	Y.1800–Y.1899
IPTV over NGN	Y.1900–Y.1999

NEXT GENERATION NETWORKS

Frameworks and functional architecture models	Y.2000–Y.2099
Quality of Service and performance	Y.2100–Y.2199
Service aspects: Service capabilities and service architecture	Y.2200–Y.2249
Service aspects: Interoperability of services and networks in NGN	Y.2250–Y.2299
Enhancements to NGN	Y.2300–Y.2399
Network management	Y.2400–Y.2499
Network control architectures and protocols	Y.2500–Y.2599
Packet-based Networks	Y.2600–Y.2699
Security	Y.2700–Y.2799
Generalized mobility	Y.2800–Y.2899
Carrier grade open environment	Y.2900–Y.2999

FUTURE NETWORKS

CLOUD COMPUTING

INTERNET OF THINGS AND SMART CITIES AND COMMUNITIES

General	Y.4000–Y.4049
Definitions and terminologies	Y.4050–Y.4099
Requirements and use cases	Y.4100–Y.4249
Infrastructure, connectivity and networks	Y.4250–Y.4399
Frameworks, architectures and protocols	Y.4400–Y.4549
Services, applications, computation and data processing	Y.4550–Y.4699
Management, control and performance	Y.4700–Y.4799
Identification and security	Y.4800–Y.4899
Evaluation and assessment	Y.4900–Y.4999

For further details, please refer to the list of ITU-T Recommendations.

Supplement 52 to ITU-T Y-series Recommendations

Methodology for building digital capabilities during enterprises' digital transformation

Summary

At present, propelling in-depth use of information and communication technologies (ICTs) and accelerating digital transformation to realize sustainable development have become the necessary choice for enterprises in smart sustainable cities. Many enterprises face problems and challenges to integrate ICT applications into business activities to enhance the digital capability during digital transformation. The methodology described in this Supplement can help enterprises to address these challenges and achieve the following during their digital transformation:

- making full use of ICTs to optimize business processes, improve organizational efficiency and strengthen the utilization of data resources;
- ensuring that ICT applications become consistent and coordinated with enterprises' strategies;
- using ICTs to build digital capabilities can increase the enterprises' economic benefits.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T Y Suppl. 52	2018-12-13	20	11.1002/1000/13866

Keywords

Digital capabilities; enterprises' digital transformation; integration of informatization and industrialization (III); smart sustainable city

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this publication, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this publication is voluntary. However, the publication may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the publication is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the publication is required of any party.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this publication may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the publication development process.

As of the date of approval of this publication, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this publication. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

© ITU 2019

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Table of Contents

	Page
1 Scope.....	1
2 References.....	1
3 Definitions	1
3.1 Terms defined elsewhere	1
3.2 Terms defined in this Supplement	1
4 Abbreviations and acronyms	2
5 Conventions	2
6 Core concepts for building digital capability of enterprises	2
7 General considerations for building digital capability of enterprises	2
7.1 Considerations for strategic management and control	3
7.2 Considerations for systematic solution.....	3
7.3 Considerations for closed-loop control of digital capability-building process	3
8 The methodology for building digital capability of enterprises	3
8.1 Realization method of strategic management and control	4
8.2 Implementation method of systematic solution.....	4
8.3 Closed-loop management and control method of capability-building process	5
Bibliography.....	6

Introduction

The rapid development of emerging ICTs and their application in industrial processes is accelerating the process of evolution from an industrial society to information society, boosting the rapid development of digital economies, which gradually become the new engine of economic growth. Moreover, this brings new opportunities and challenges for smart sustainable cities (SSCs).

Being major contributors to economic activities, enterprises are indispensable for the development of SSCs. Furthermore, it is a crucial task for SSCs to build and enhance enterprises' digital capabilities continuously in order to accelerate their digital transformation.

In order to build the digital capability based on emerging ICTs, enterprises could consider the businesses' development patterns and characteristics in the context of both industrialization and informatization processes. Enterprises could focus on production, change management and business process optimization brought about by digital capability-building activities.

This Supplement proposes a general methodology for enterprises to build digital capabilities in the context of integration of informatization and industrialization (III), which can be used to guide enterprises to make full use of emerging ICTs, to effectively explore the value of data resources as a driving factor of innovation, business process re-engineering and organizational efficiency. This Supplement can serve as a reference and basis for enterprises to accelerate digital transformation and build digital capabilities so as to achieve coordinated development in the context of building smart sustainable cities.

Supplement 52 to ITU-T Y.4000-series

Methodology for building digital capabilities during enterprises' digital transformation

1 Scope

This Supplement provides a methodology to guide enterprises to adopt digital transformation and build digital capabilities through ICT applications. The Supplement intends to help enterprises to integrate ICT applications into business activities, thus building digital capabilities. Furthermore, this Supplement will provide a methodology for enterprises to build digital capabilities in a systematic manner.

2 References

- [ITU-T X.902] Recommendation ITU-T X.902 | ISO/IEC 10746-2 (2009), *Information technology – Open Distributed Processing – Reference model: Foundations*.
- [ITU-T Y.4900] Recommendation ITU-T Y.4.900/L.1600 (2016), *Overview of key performance indicators in smart sustainable cities*.

3 Definitions

3.1 Terms defined elsewhere

This Supplement uses the following terms defined elsewhere:

3.1.1 city [ITU-T Y.4900]: An urban geographical area with one (or several) local government and planning authorities.

3.1.2 smart sustainable city [ITU-T Y.4900]: A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental, as well as cultural aspects.

3.1.3 data [ITU-T X.902]: Data are the representations of information dealt with by information systems and users thereof.

3.2 Terms defined in this Supplement

This Supplement defines the following terms:

3.2.1 integration of informatization and industrialization: The integration of informatization and industrialization (III) is an interaction, converging and merging process of informatization development course and industrialization development course, and is also the evolution path of transformation from industrial society to information society. Focusing on building new competitiveness in all areas of economy and society, the III emphasizes the interactive innovation and systematic transformation of productivity and production relationship enabled by the in-depth application of emerging ICTs, during which the data resources gradually become a new driven factor.

3.2.2 enterprise digital capability: Enterprise digital capability is the ability to provide goods and services more efficiently through technology innovation and management optimization enabled by application of emerging ICTs, under the rapidly changing market environment in the digital economy era.

4 Abbreviations and acronyms

This Supplement uses the following abbreviations and acronyms:

ICTs	Information and Communication Technologies
III	Integration of Informatization and Industrialization
PDCA	Plan-Do-Check-Adjust
SSCs	Smart Sustainable Cities

5 Conventions

None.

6 Core concepts for building digital capability of enterprises

In the context of continuous evolution and deepening of III, and rapid construction of digital economy systems, enterprises in SSCs should value digital transformation and digital capability building from a strategic perspective and establish a set of systematic approaches. This is used to standardize and stimulate advanced applications of emerging ICTs in enterprises' business activities, and enhance the uniformity and coordination of data value exploitation, technology application, business process re-engineering and organizational efficiency. Thus, the enterprises' reformation and innovation of production and service pattern can be accelerated, forming and continuously optimizing their digital capability and coping with the anticipated demand of a digital economy with respect to SSC.

Core concepts for enterprises to build digital capabilities are as follows:

- **Focusing on attaining sustainable competitive advantage:** In order to achieve sustainable development, it is a necessary choice for enterprises to obtain and maintain dynamic competitive advantages through building and enhancing digital capabilities.
- **Data-driven:** In the context of III, data has become a new type of production factor, and its value as enterprises' core asset is gradually being established. In order to build digital capabilities, enterprises should constantly strengthen the utilization of data resources and explore its potential as the driving force of innovation. Enterprises should also promote effective resource allocation and coordination among data, technology, business process and organizational efficiency.
- **Open and collaborative:** The application of emerging ICTs opens up opportunities and innovation potential for enterprises. Enterprises should gradually explore the value network in the digital economy era, so as to build digital capabilities based on the full use of internal and external resources.
- **Process management:** The process of digital capability building is of high complexity and very explorative. Enterprises should adopt the process method to manage digital capability-building activities, thereby ensuring that it is a sustainably and effectively controlled process.

7 General considerations for building digital capability of enterprises

The ultimate goal of promoting digital transformation and continuously building digital capability is facilitating enterprises' strategic transformation in the digital economy era. Therefore, building digital capabilities is a complex system of engineering, covering all the layers and all sorts of enterprises' activities.

Focusing on digital capability building in the digital economy era, enterprises should comprehensively consider three aspects, namely strategy, solution and process management, and

should clarify the considerations for related departments and personnel to collaboratively build digital capability. Considerations are as follows.

7.1 Considerations for strategic management and control

For the strategy aspect, enterprises should follow the rapid change in technologies and the attendant innovation in the digital economy era. This is to dynamically manage and control their strategies, so as to ensure that the strategies can be accurately identified, flexibly adjusted and effectively realized.

Enterprises should take data resource as the driving factor and take competitive advantages attainment as focus, to build digital capabilities, which are the important path and necessary means for strategy realization and continuous improvement. Hence, enterprises should convert their strategies to a series of digital capability-building activities to achieve strategic goals and ensure the uniformity and coordination between digital capability building and strategy.

7.2 Considerations for systematic solution

For the solution aspect, the realization of enterprises' digital capability is the result of combined action of data value exploitation, innovative application of emerging ICTs, business process re-engineering and organizational change, by taking data resources as the core driving factor. Therefore, for digital capability building, enterprises should develop systematic solutions covering multiple aspects including data, technology, business process and organizational efficiency, and during digital capability building, enterprises should ensure mutually matching and collaborative optimization of data value exploitation, technologies' innovative application, business process re-engineering and organizational efficiency.

7.3 Considerations for closed-loop control of digital capability-building process

For the process management aspect, based on "plan–do–check–adjust" (PDCA) approach, enterprises should construct closed-loop control and a continuous improvement mechanism for digital capability building, conduct whole-process closed-loop control over all activities of the digital capability-building life cycle, and to fully engage leaders and related personnel at all levels, conduct overall management of various resources input, and ensure the effective implementation and continuous improvement of digital capability building.

8 The methodology for building digital capability of enterprises

Based on the core concepts in clause 6 and the general considerations in clause 7, this clause further specifies the framework and methodology for building digital capability of enterprises (illustrated in Figure 1).

The methodology for building digital capability of enterprises mainly includes three parts, namely; strategic management and control method, systematic solution implementation method, closed-loop management and control method of the capability-building process.

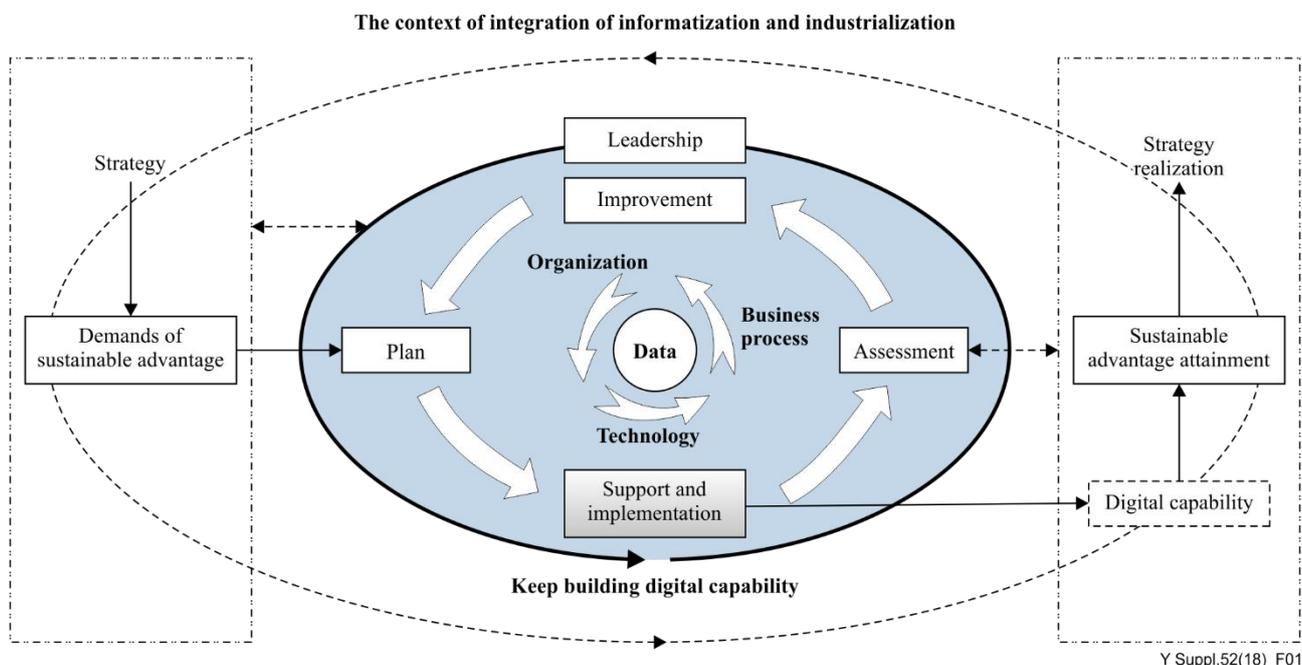


Figure 1 – The framework for building digital capability of enterprises¹

8.1 Realization method of strategic management and control

Enterprises can manage and control strategies effectively starting with two aspects; one is to improve the correctness and suitability of the direction of digital capability building, and the other is to enhance the effectiveness of the achievements derived from digital capability building. Specific methods are as follows:

- **Method of accurately identifying demands of digital capability building:** Enterprises should construct a step-by-step identification mechanism of "strategy – competitive advantage demands – digital capability demands", to accurately identify and dynamically optimize the strategy. This could then be followed by the identification of the demands of competitive advantages matched with strategy based on market benchmarking, and further identify the demands and goals of digital capability building centred on the demands of competitive advantages. This will ensure the correctness and suitability of the direction of digital capability building.
- **Method of enhancing the effectiveness of digital capability-building achievements:** Enterprises should construct a step-by-step confirmation mechanism of "fulfilment of digital capability goals – attainment of competitive advantage - realization of strategy", which can be used to successively confirm the accomplishment of digital capability goals, the attainment of competitive advantage and the realization degree of strategy. At the same time, enterprises should identify their corresponding improvement opportunities. This mechanism will ensure that the achievements of digital capability building are as expected.

8.2 Implementation method of systematic solution

The effective implementation of a digital capability building's systematic solution relies on the efficient and coordinated conduct of data development and utilization, technologies' innovative application, business process re-engineering and organizational change. Specific methods are as follows.

¹ Figure 1 is derived from Figure 1 of [b-GB/T23000-2017], which is a national standard of the People's Republic of China, named Integration of informatization and industrialization management systems—Fundamentals and vocabulary.

- **Method of data development and utilization management:** Enterprises should establish a long-term mechanism for data development and utilization, define the persons responsible, timing, methods, etc. of data development and utilization, promote the effective collection, analysis and mining of data resources, as well as ensure that data development and utilization can be matched and coordinated with the innovative application of emerging ICTs, business process re-engineering and organizational efficiency optimization.
- **Method of technologies' innovative application management:** Enterprises should establish a long-term mechanism for the application of emerging ICTs by reasonably scheduling the persons responsible timing, contents, etc. of the application of technologies. Enterprises should also effectively control technologies' application risks, as well as ensure that the application of emerging ICTs can be matched and coordinated with data development and utilization, business process re-engineering and organizational efficiency optimization.
- **Method of business process re-engineering management:** Enterprises should establish a long-term mechanism for business process re-engineering, define the persons responsible, timing, contents, methods, etc. of business process re-engineering, effectively control risks of optimizing business processes, and ensure that the business process re-engineering can be matched and coordinated with data development and utilization, application of emerging ICTs and organizational efficiency optimization.
- **Method of organizational structure optimization:** Enterprises should establish a long-term mechanism for optimization of organization and post setting, define the persons responsible, timing, contents, methods, etc. of organizational efficiency optimization, effectively control risks of optimization of organizational efficiency, and ensure that the setting of organizational structure, department and post can be matched and coordinated with data development and utilization, application of emerging ICTs and business process re-engineering.

8.3 Closed-loop management and control method of capability-building process

Enterprises should achieve closed-loop management and control of capability building through various management means including leadership inspiration, resources input management, and end-to-end control. Specific methods are as follows.

- **Method of leadership inspiration:** In order to inspire leaders at all levels, enterprises should construct an organizational system for digital capability building, covering managers from different layers and different departments. Furthermore, enterprises should identify responsibilities and authorities of related personnel, especially the senior leaders, and establish a coordination and communication mechanism covering all the departments.
- **Method of resources input management:** Enterprises should adopt a resource input mechanism covering capital, talent, physical infrastructure, ICT infrastructure, information resources and information security. In addition, the various resources should be coordinated, so as to ensure the suitability and effectiveness of input resources.
- **Method of end-to-end control:** Enterprises should adopt an end-to-end control mechanism to achieve effective control over the series of related activities including planning, implementation, assessment and improvement in the digital capability-building life cycle.

Bibliography

- [b-GB/T23000-2017] National Standard of the People's Republic of China, GB/T23000-2017, *Integration of informatization and industrialization management systems – Fundamentals and vocabulary.*
- [b-ISO 9001] ISO 9001: 2015, *Quality management systems – Requirements.*

SERIES OF ITU-T RECOMMENDATIONS

Series A	Organization of the work of ITU-T
Series D	Tariff and accounting principles and international telecommunication/ICT economic and policy issues
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	Telecommunication management, including TMN and network maintenance
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling, and associated measurements and tests
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks, open system communications and security
Series Y	Global information infrastructure, Internet protocol aspects, next-generation networks, Internet of Things and smart cities
Series Z	Languages and general software aspects for telecommunication systems