
Geographic information — Quality assurance of data supply

Information géographique — Assurance qualité relative à l'approvisionnement de données

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 19158 was prepared by Technical Committee ISO/TC 211, *Geographic information/Geomatics*.

Introduction

This Technical Specification provides a quality assurance framework for the producer and customer in their production relationship. It identifies methods of managing the quality of production more efficiently and effectively. It enables innovation and continual improvement within the context of existing:

- geographic information quality principles and quality evaluation procedures, and
- quality management systems.

With ever increasing demands in value and quality in the Geographic Information (GI) market the framework facilitates the production of a product that meets requirements in terms of cost, quantity, quality and timeliness.

Through the application of the framework there are opportunities for:

- better understanding of requirements by all involved in production and update especially within multiple producer environments,
- reduced data throughput time,
- reduced rework,
- improved data quality, and
- increased confidence within a mutually beneficial relationship leading to lower costs for both supplier and organization.

ISO 19157 establishes the principles for the description of geographic data quality and specifies components for reporting quality information as well as procedures for the evaluation of geographic data quality.

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The quality assessment procedure, as defined in this Technical Specification, is a second-party (customer) conformity assessment activity.

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Geographic information — Quality assurance of data supply

1 Scope

This Technical Specification provides a framework for quality assurance specific to geographic information. It is based upon the quality principles and quality evaluation procedures of geographic information identified in ISO 19157 and the general quality management principles defined in ISO 9000 [2].

The framework defined in this Technical Specification enables a customer to satisfy itself that its suppliers, both internal and external, are capable of delivering geographic information to the required quality. Fundamental to the framework is the assurance of the supplier's ability to understand and meet the quality requirements. Through the quality assurance framework both the customer and the supplier are able to consider the quality required at the earliest opportunity in the production/update process.

Principles and responsibilities of the relationship between the customer and the supplier that facilitate the framework are provided. The responsibility for the quality assessment procedure is shared between the customer and the supplier.

This Technical Specification is applicable to customers and suppliers of all geographic information where the quality of the product may be impacted upon by the supplier's processes in any of the following scenarios:

- there is an agreement or legislation for the supply of data acquisition services,
- data acquisition services are being tendered for, and
- one or more suppliers exist in the supply chain.

This Technical Specification is not applicable for the supply of legacy datasets or 'off the shelf' products where there is no further data production or update activity to manage.

2 Conformance

Any organization claiming conformance with this specification shall pass all of the requirements described in the abstract test suite presented in Annex A.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 19157:—¹⁾, *Geographic information — Data quality*

4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1) To be published.

4.1

customer

organization or person that receives a product (4.3)

[SOURCE: ISO 9000:2005, definition 3.3.5]

NOTE The customer can be internal or external to the supplier (4.11) organization.

4.2

process

set of interrelated or interacting activities which transforms inputs into outputs

[SOURCE: ISO 9000:2005, definition 3.4.1]

NOTE The process may be broken down further into elemental activities [sub-process (4.10)] as is deemed necessary to control the quality (4.4) of the process.

4.3

product

result of a process (4.2)

[SOURCE: ISO 9000:2005, definition 3.4.2]

4.4

quality

degree to which a set of inherent characteristics fulfils requirements

[SOURCE: ISO 9000:2005, definition 3.1.1]

NOTE For the purposes of this Technical Specification the quality characteristics of a product (4.3) include:

- data quality (the elements of which are described by ISO 19157),
- volume of delivery,
- schedule of delivery, and
- cost of production and/or update.

4.5

quality assessment procedure

procedure by which a customer (4.1) assures that its suppliers (4.11) are capable of consistently delivering the product (4.3) to the required quality (4.4)

NOTE The assessment procedure is a second-party (customer) conformity assessment activity.

4.6

quality assessment result

output of the quality assessment procedure (4.5)

4.7

quality assurance

part of quality (4.4) management focused on providing confidence that quality requirements will be fulfilled

[SOURCE: ISO 9000:2005, definition 3.2.11]

4.8

quality assurance level

assurance level achieved is an outcome of the quality assessment procedure (4.5)

NOTE Three quality assurance levels can be achieved as part of the quality assurance framework: basic, operational and full.

4.9**quality control**

part of quality (4.4) management focused on fulfilling quality requirements

[SOURCE: ISO 9000:2005, definition 3.2.10]

4.10**sub-process**

activity elements of a process (4.2)

NOTE Sub-processes can be broken down even further as is deemed necessary to control the quality (4.4) of the process.

EXAMPLE In the case of photogrammetric survey, aerial triangulation can be considered a sub-process.

4.11**supplier**

organization or person that provides a product (4.3)

[SOURCE: ISO 9000:2005, definition 3.3.6]

NOTE 1 The supplier can be internal or external to the customer organization.

NOTE 2 In the context of this Technical Specification, the supplier has provided a product via a process that can have some impact on quality (4.4).

5 Abbreviated terms

AQL	Acceptance Quality Limit (ISO 3534-2 [1]) sometimes referred to as Acceptable Quality Level
GI	Geographic Information https://standards.iteh.ai/catalog/standards/sist/d784290c-6f38-44c1-8c61-918e63e048b5/iso-ts-19158-2012
KPI	Key Performance Indicators
QC	Quality Control
QA	Quality Assurance

6 General principles**6.1 Quality assurance in production and update**

Customers can provide data product specifications to suppliers expecting them to deliver data according to that specification with little or no input into the supplier's processes. Delivery is expected on time and to the volumes requested with data at the required quality level. This approach creates risks, as until the final product is delivered, there is limited confidence in the supplier's ability to achieve this. These risks are getting worse with the requirement for:

- more complex data,
- increased speed to market, and
- outsourced production and update (external to the customer).

Figure 1 identifies that a product is created from the culmination of several interrelated processes combining outputs to produce a final product. By introducing quality evaluation processes to the

data outputs from each process, sub-process, teams and individuals, according to the requirements of ISO 19157, it is possible to determine how the quality of the final product will be affected.

EXAMPLE A process is employed to correct numerous data defects. The output from this process is then passed to another process tasked with further data enhancements. Through measuring the quality of the output of both processes the error introduced into the product will be more accurately understood than by measuring the product alone. In complex production and/or update processes it is not always clear where an error has been created it is therefore not easy to resolve.

ISO 19157 identifies that data quality elements can be evaluated in various ways and at different stages of the lifecycle of a dataset. In this instance that stage is the production and update stage where the objective is to assure the customer that the product can be built and maintained to the required quality.

Figure 1 identifies that each individual, team, sub-process or process can be seen to be creating a dataset. It is this dataset that forms the scope for any testing. The scope will only include those data quality elements, based on ISO 19157, that can be affected by the individual, team, sub-process or process. In general all elements relevant to the final product will be considered. In all cases feedback on testing will be provided to ensure the required quality is achieved and maintained. This procedure may be managed within a framework provided by a quality management system.

NOTE In many cases the assurance of quality starts with the definition and design of a product. This aspect is covered in general terms in ISO 9001 [3] and more specifically with regard to GI in ISO 19131 [5].

6.2 Data quality evaluation

This Technical Specification differentiates between data testing undertaken by the supplier and the customer as quality control (QC) and data quality assurance (QA) respectively. With this differentiation, and specific supplier responsibilities, the product is built on the concept of quality.

QC data quality evaluation is built in to the production process, monitoring and controlling the output of individuals, sub-processes and processes. The sampling regime of QC is designed to take into consideration the knowledge and skill of the operators and the complexity of the tasks. QC data quality results will then provide strong indications of the likely quality of the product to be delivered to the customer. With quality assurance throughout the production process it is possible to check against customer requirements and to inform the product design process.

Once data is delivered to the customer it can be tested as product (data QA). In this instance the customer's sampling regime will take into consideration the experience of the supplier, the complexity of the task, the supplier's QC data quality results, quality plan and training records. The aim will be to reduce the requirement for data QA without creating further risk.

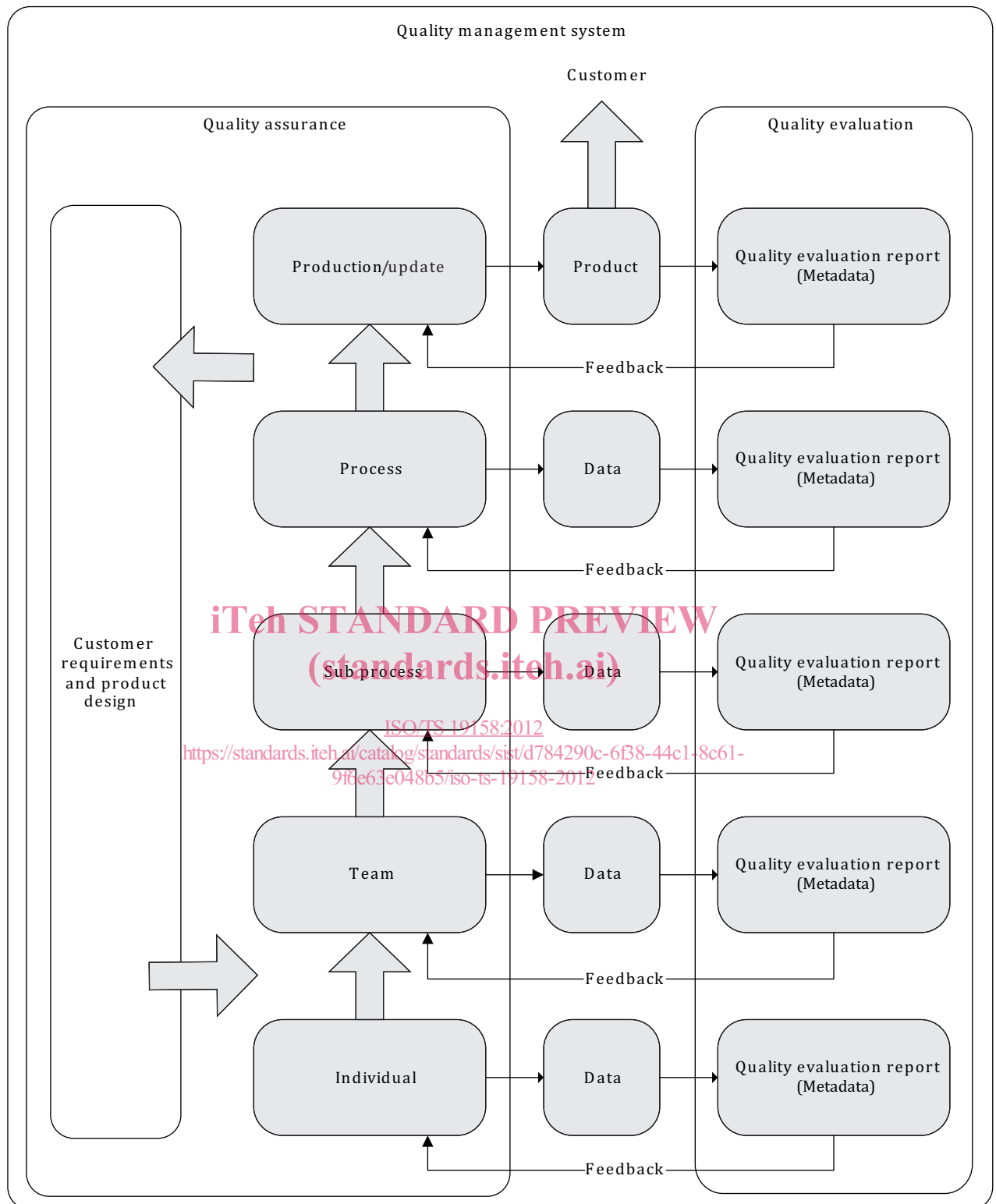


Figure 1 — Quality evaluation and quality assurance in production and update

6.3 Quality assurance framework

The quality assurance framework provides the opportunity for assuring quality at production points within the production and/or update environments as identified in 6.1.

Quality in this instance refers to the

- data quality as defined by ISO 19157,
- volume of delivery,
- schedule of delivery, and
- cost of production and/or update.

Three levels of quality assurance are described in this Technical Specification: basic, operational and full (Clause 8). With each increment there are greater opportunities for quality assurance, thereby mitigating risk to the quality of the product. For example, basic quality assurance may only assure a customer of supplier intent, whilst operational quality assurance will assure capability in the supplier's operating environment.

Assurance of quality is gained through this staged approach. This ensures that the quality of the product is well understood before it is even delivered. Clause 8 identifies the supplier responsibilities within the quality assessment procedure. Further guidance on supplier responsibilities is provided in Annex B.

Once quality assurance is gained the applicable levels of assurance within the supplier's data production or update process are considered to be quality assured. The aim then is to maintain this assurance for the life of the production process. The quality assessment procedure shall be designed to develop and improve supplier capabilities.

7 Requirements

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7.1 Production and/or update quality assurance

All processes necessary for the creation of the product shall be identified (see 6.1). The quality requirement for each process and sub-process necessary for the creation of the product shall be identified. Quality in this instance refers to data quality according to the requirements of ISO 19157 as well as:

- volume of delivery,
- schedule of delivery, and
- cost of production and/or update

The quality evaluation procedure according to the requirements of ISO 19157 shall be applied to all relevant processes or sub-process outputs, where the process or sub-process can impact on data quality, as identified in 6.1.

All processes and sub-processes shall inform subsequent processes and sub-processes of input data quality.

NOTE If a price for services has already been agreed, which is recommended, it is not necessary to include the 'cost of production and/or update' as part of the quality assessment procedure.

7.2 Quality assurance levels

The appropriate level of quality assurance, as identified in Clause 8, shall be used to assess process, sub-process and individuals within the production and/or update element of the product cycle.

All supplier production processes, relevant to the delivery of product to the customer, shall have been assessed or shall be in the process of being assessed as identified in Clause 8.