MANAGEMENT AND QUALITY SYSTEM FOR GEOGRAPHIC INFORMATION BASED ON ISO TC/211 REGULATIONS

SERVICIO AEROFOTOGRAMETRICO

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SERVICIO AEROFOTOGRAMETRICO-SAF

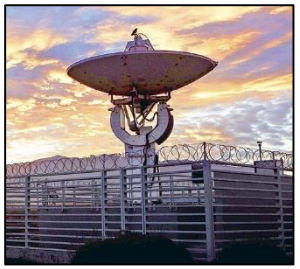
The Aerial Photogrammetric Service, dependent on the Chilean Air Force, is the body responsible for the capture of images, both areas and satellite of the national territory. It concentrates its efforts on the generation of products and services linked to Remote Sensing, Aerofotogrametry and Aeronautical Cartography, in addition to maintaining a historical archive of images.

Twin Otter

Lear Jet

Satellite Station

GOE



1974

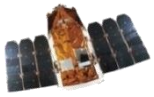
CAMERA RC-10

2000

CAMERA RC-30

Analog Process

2008



Eros-B, Spot-4, Modis

2009

Sensor Multiespectral

Sensor Láser

2011

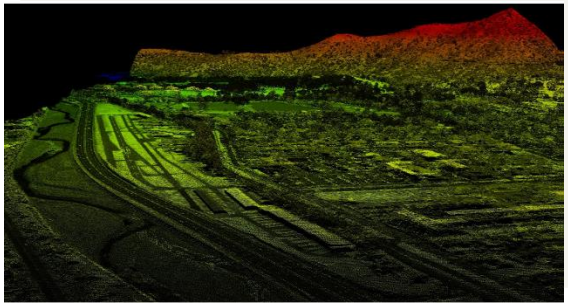
Fasat Charlie, Pleiades

Honor *Lealtad* *Cumplimiento del Deber* *Excelencia en el Servicio*

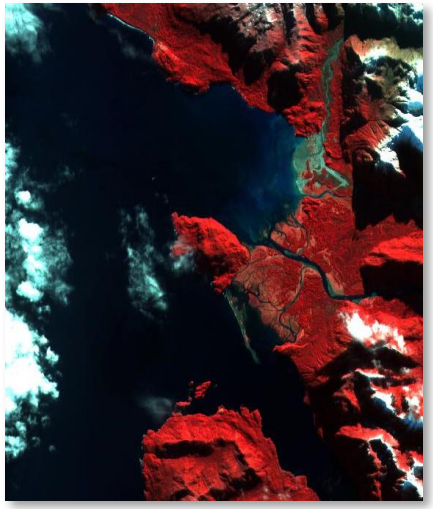
SERVICIO AEROFOTOGRAMETRICO: PRODUCT

ANALOG

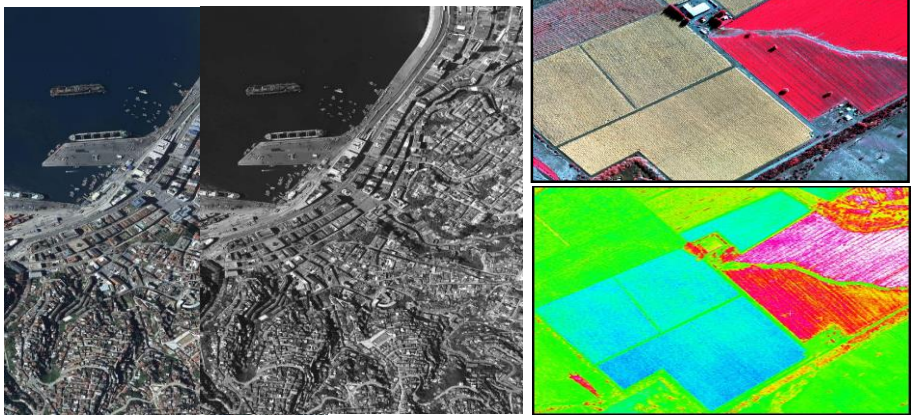
LIDAR



SATELLITE

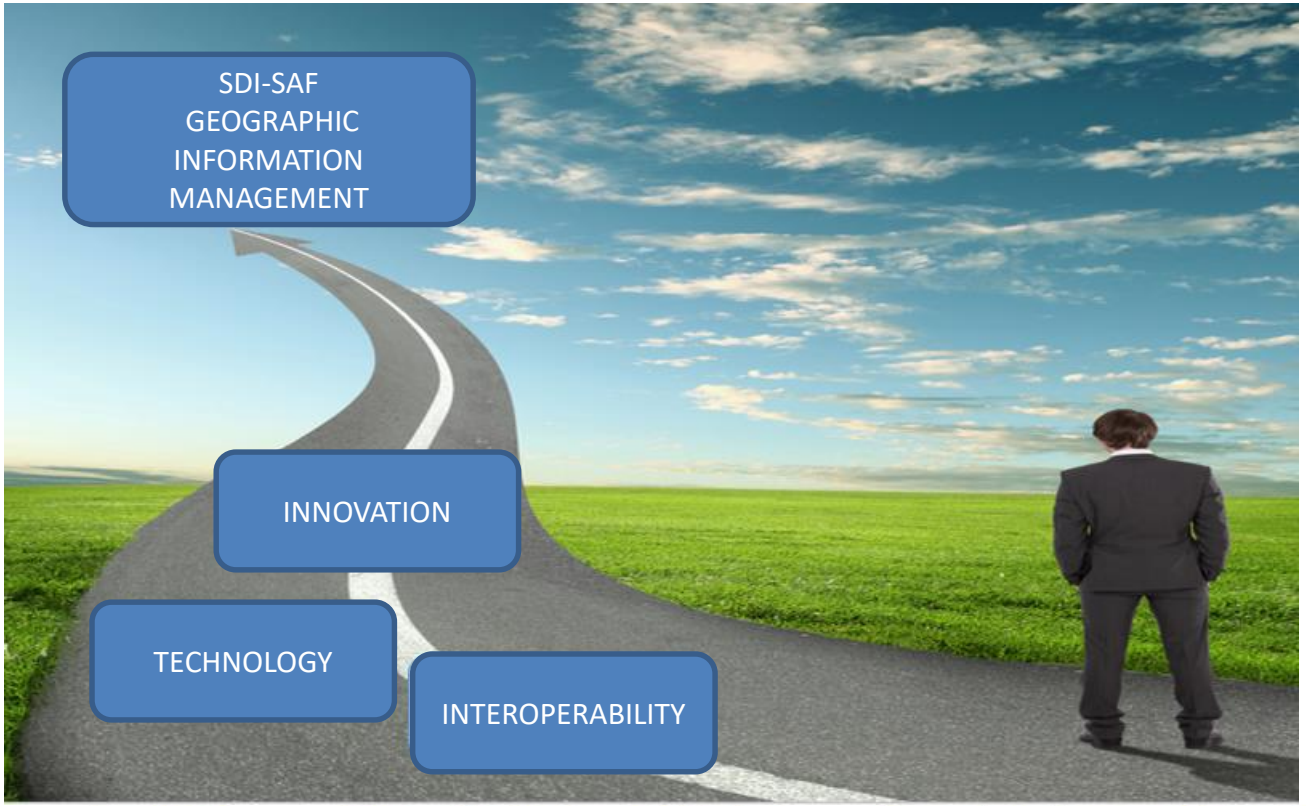


DMC



SDI CORPORATIVE

In a vision of the future, the SAF is currently implementing the SDI Corporative Project, that contemplates the implementation of a system of operational excellence based on regulations (ISO) and technologies associated with Spatial Data Infrastructure, oriented to the management, traceability and quality of geographic information, metadata and Services.



SDI CORPORATIVE-STANDARD

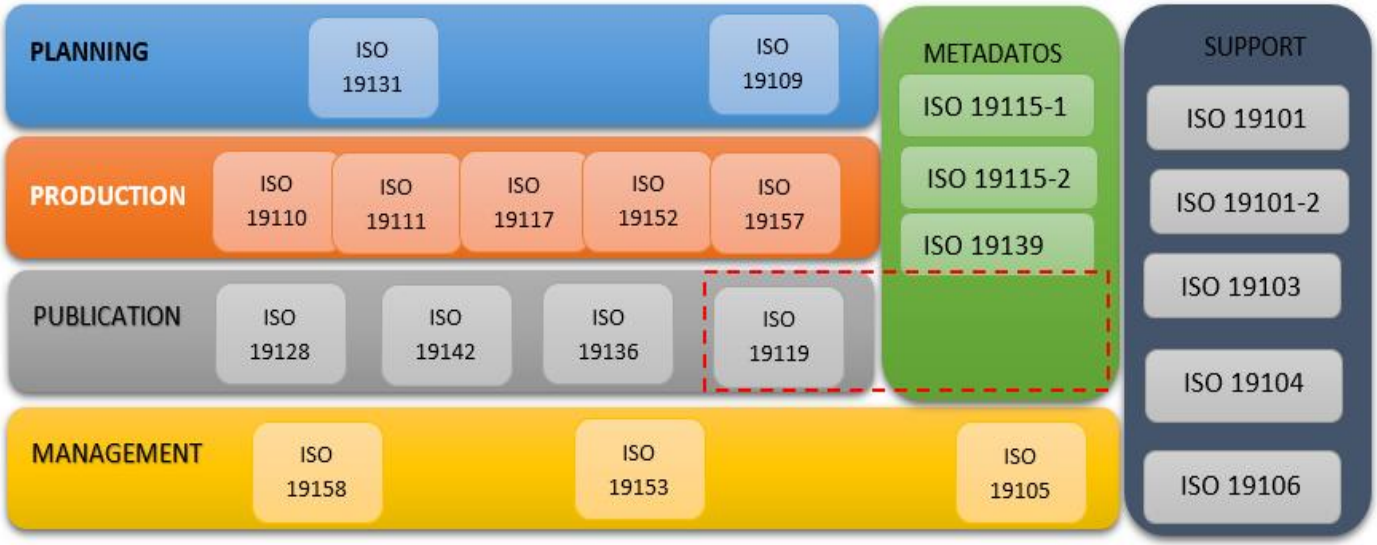
To standardize, a high level of implementation of specific regulations for Geographic Information is required, for this reason within the SDI-SAF project, the implementation of a geographic information management system was considered, with the objective of having a model that regulate the design, traceability, quality control and publication of the products.

BREAK WITH THE TRADITIONAL/ INNOVATE

MODEL MANAGEMENT

The implementation of an Integrated System of Quality Management specific to geographic information requires a structure that allows integrating the regulations within the production lines of the organization, for this the life cycle of a cartographic product will be used (Planning, production, operation and publication), as a logical support of said implementation .

To structure this, the standards will be classified according to the life cycle of a product, depending on how each of them collaborates with some stage of the Productive cycle



Source: Own preparation.

MODEL MANAGEMENT

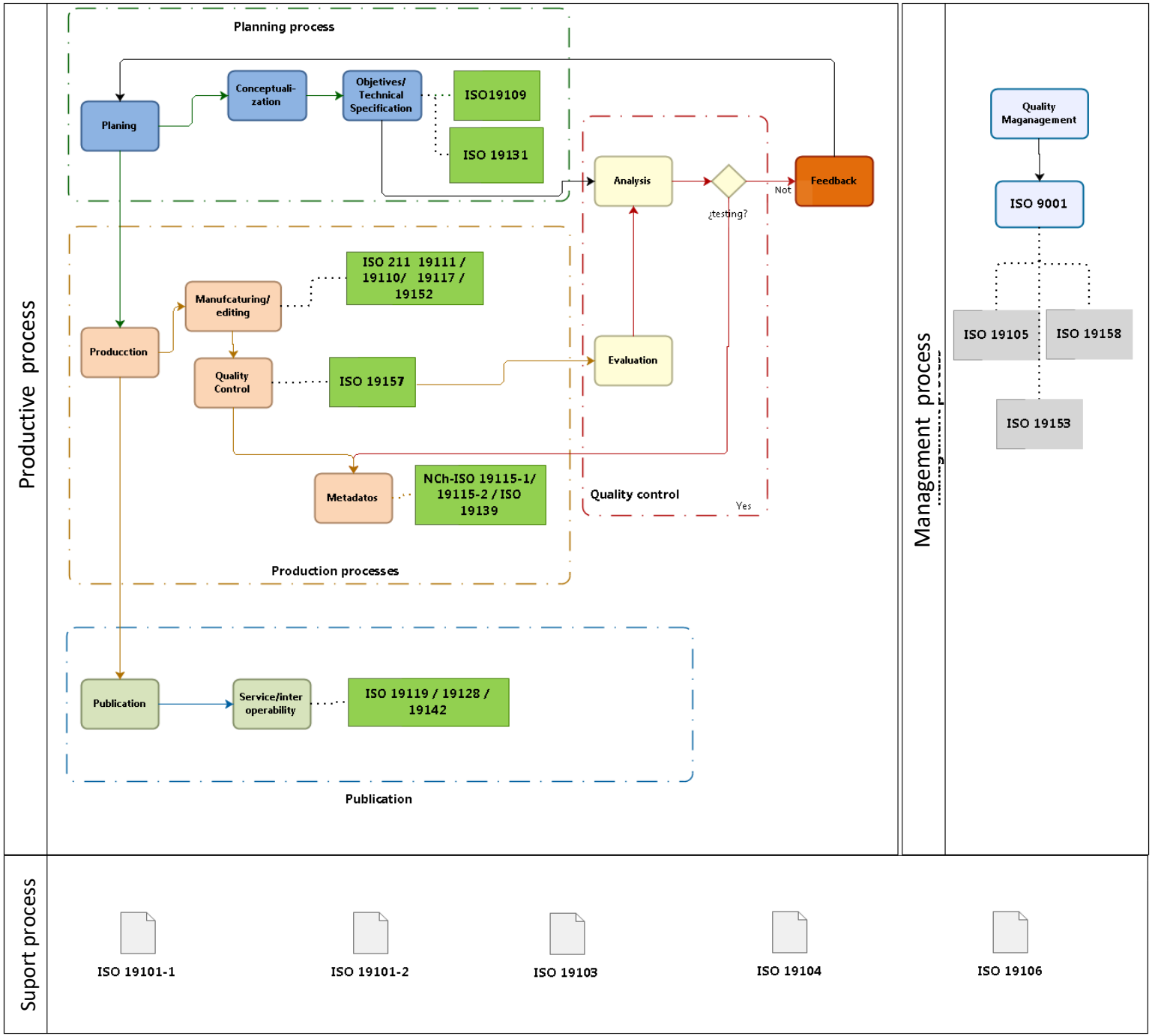
Once the standards have been classified, it is proposed to implement a model designed according to the life cycle and the specific characteristics of each product. It begins with the stage associated with the design of the product, in which the objectives, the conceptual design and the technical specifications are determined (these will be the basis of productive management).

Then, the production stage begins with the main tasks to execute the processes of production and quality control in each stage, the levels of conformity are determined in accordance with the technical specifications (of the design stage), then, if the Quality is accepted, the product must be cataloged by creating metadata.

Finally, and if the product design requires it, we proceed to publish through the web services.

In parallel, to ensure the operation of the model, there must be a quality management system, in this case, based on standards such as ISO 9001 and ISO 19158, which will allow to manage the system, control it and determine improvements in a continuous manner to provide feedback to the system.

In practice, the following scheme is proposed

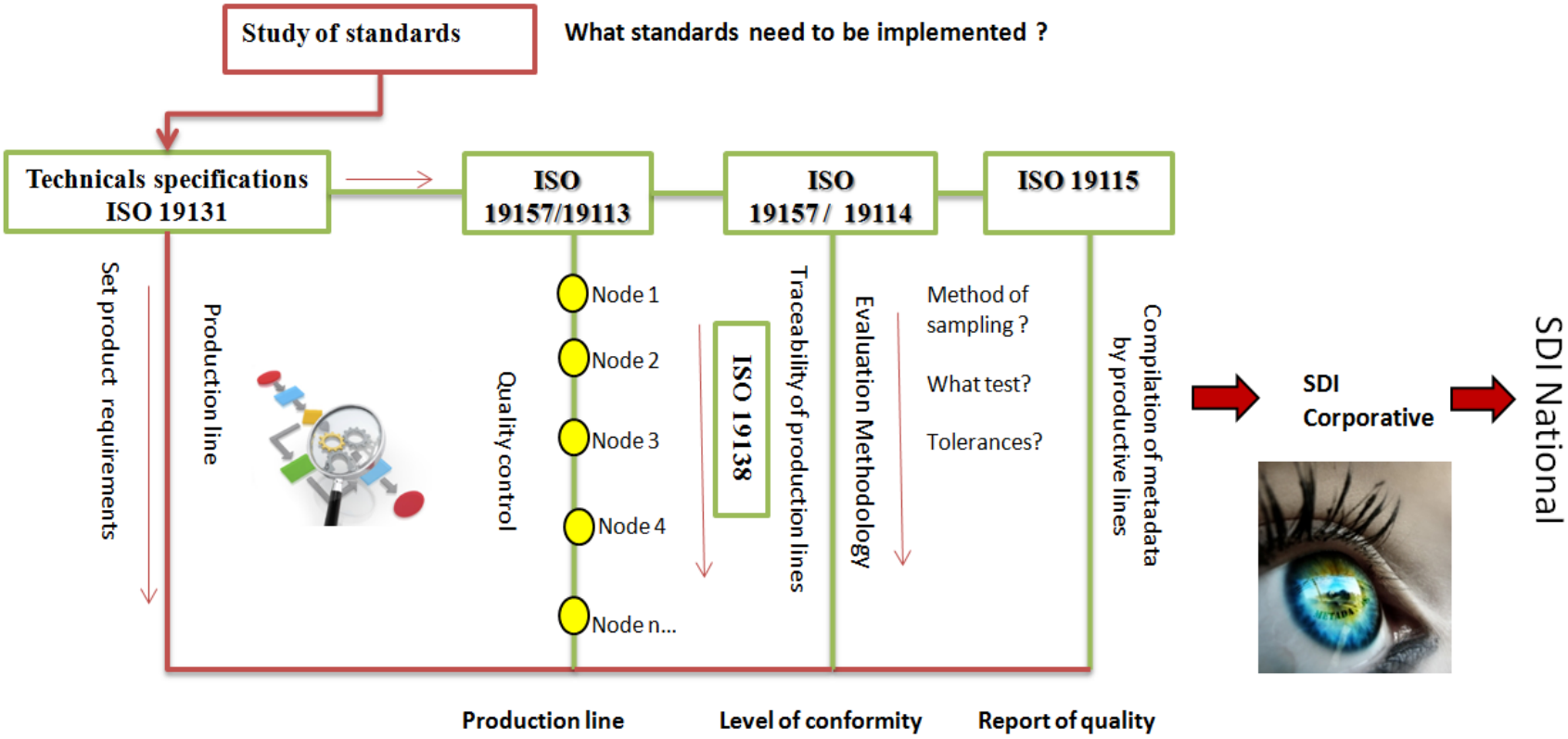

Productive process
Planning process
Planing
Conceptuali-zation
Objetives/ Technical Specification
ISO19109
ISO 19131
Analysis
¿testing?
Not
Yes
Feedback
Quality control
Production processes
Producction
Manufcaturing/ editing
ISO 211 19111 / 19110/ 19117 / 19152
Quality Control
ISO 19157
Evaluation
Metadatos
NCh-ISO 19115-1/ 19115-2 / ISO 19139
Publication
Publication
Service/inter operability
ISO 19119 / 19128 / 19142
Management process
Quality Maganagement
ISO 9001
ISO 19105
ISO 19158
ISO 19153
Suport process
ISO 19101-1
ISO 19101-2
ISO 19103
ISO 19104
ISO 19106

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

Quality control in the SDI's should be during the generation of the product, the level of complexity of these controls varies according to the cartographic product that we are produceing, it is not the same control mapping generated with existing information than generation of a mosaic or a digital map obtained from a Aerophotogrametrical flight, their respective planning, survey control, process guidance, restitution, field classification, etc. Perform these quality controls based on regulations and standards are fundamental to ensuring certain statistical parameters of the product that finally give confidence levels to us depending on this quality.

As applicable, the following image summarizes some quality controls associated with different types of cartographic products.

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES



Quality management system ISO 9001/ISO 19158

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

As we can see in the above scheme the geographic information quality relates to various standards such as 19157, 19158, 19115, among others. These have to work together and applied on the structure of production lines, quality control, traceability and metadata. This implementation should not be standard, but well adapted to the production design of each company.

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

In order to implement these quality control systems, the following is proposed:

1. - That the system be supported by base management regulations such as ISO 9001 and ISO 19158, that allows to make enforceable the quality control considering that the only certifiable standard is ISO 9001.

2. - All products to generate must have technical specifications which may be based on ISO 19131 and in accordance with these will determine the technical requirements for quality control.

3. Once established requirements should study the production lines and determining at each node the quality control that will be perform, this control may be qualitative or quantitative, see examples inTable1. Quantitative quality controls should be based on a statistical basis; you can use various methods of sampling and tests designed specifically for this purpose, as Positional Accuracy (ASPRS, NSSDA, EMAS, etc.)

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

4. Once defined quality control in a specific production node their impact must be analyzed either positive (about the quality of the product) or negative (costs associated with this). Based on these two variables should be determined the benefit cost. This is not to dismiss quality control; this is to find the best way to carry out its implementation.

5. Then theoretical quality should be calculated (derives from the technical specifications) and compare it with the actual quality (derived from Quality control) to finally determine whether it complies with the technical specifications. This must be done in each production node in order to control the product and detect deviations in time to get a final product that meets customer requirements, preventing or reducing costs for Non Quality.

6. Given the results in each node must enter to the software information that corresponding to quality control, traceability and their respective metadata, this as it creates the product and not at the end of the production.

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

7. Finally known the quality and metadata we can upload the product and all its additional information to Corporate SDI, which will exploit the benefits of the system using smart searches (semantics) and specially designed services for the Service and external customers, such as Chile SDI.

With this methodology can be controlled and properly manage the geographic information within any institute or mapping company. In addition to optimizing processes and finally be more efficient and effective.

Finally, the quality controls that are part of this model are included below, some under international norms and another by internal regulations (next table).

QUALITY CONTROL PROPOSAL THROUGHOUT PRODUCTION LINES

Process	Quality Control	Regulations
Photogrammetric flight	Flight Control - Parámetros Control. - Flown v/s planned control.	Own metodologies.
Image control.	- Image quality control (shadows, scratches, atmospheric effects etc.). - Radiometric control.	Own metodologies.
Topographic control.	- Adjustment result.	Standard metodologies..
Point Cloud control, with Lidar sensor.	- Coverage. - Number of points per square meter - Vertical Positional Accuracy	- Own metodologies. - ISO 19157 / ISO 19138.
Mosaic	- Coverage - Matching - Devices - Horizontal Positional Accuracy.	- Own metodologies. - ISO 19157 / ISO 19138.
Orientation	- Quality control orientation through positional accuracy test. - Adjustment Statistical Control	- Own metodologies. - SO 19157 / ISO 19138.
Digital Map	- Vertical and Horizontal Positional Accuracy. - Completeness. - Thematic Accuracy.	- Own metodologies. - SO 19157 / ISO 19138.
Satellite image Clasification	- Thematic Acuracy, Satellite image Clasification.	- Own metodologies. SO 19157 / ISO 19138.

CONCLUSION

With advanced technology and new market demands, Geographic information has become a fundamental pillar (support) in making decisions for different matters related to geographic activities, economic and human, among others, contributing to the sustainable development of the nations. For this reason, the implementation of specific norms for cartographic products has become a priority to start with good practice in these areas and having reliable and quality information by the time of making a decision, for the result be a real contribution for people's economic and social welfare.

The implementation of these norms is not a simple task when there are no national implementation references (guidelines), because these are generic and demand time for their study, apart from the analysis of the critical points in every level of the process of the product, to then design a work methodology. To ensure the correct practice of these norms, it is important to have as a base a quality management system in conformity with ISO 9001, thinking of it as a support for the management and the right practice of CT/211 norms more than an obligation.

Metadata generation is also important in this development because it allows knowing our own products in detail, and to share this information with the users, benefiting a better taking decision process.

SERVICIO AEROFOTOGRAMETRICO DE LA FUERZA AEREA DE CHILE