

IALA Guideline No. 1052

On the Use of Quality Management Systems for Aids to navigation Service Delivery

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Table of Contents

1	INTRODUCTION	4
2	SCOPE	4
3	QUALITY MANAGEMENT SYSTEMS (QMS)	5
3.1	SERVICE DEFINITION	5
3.2	SERVICE DELIVERY	6
3.3	ITEMS TO BE INCLUDED IN THE QMS.....	6
3.4	LEGAL FRAMEWORK	7
4	EVALUATION OF RISKS / CUSTOMER CONSULTATION	7
5	PROCESSES AND PROCEDURES	8
5.1	MANAGEMENT BY PROCESS.....	8
5.1.1	<i>Strategic (Management) Processes:</i>	9
5.1.2	<i>Key (Operational) Processes</i>	9
5.1.3	<i>Support (Generic) Processes:</i>	9
5.2	DOCUMENTATION AND RECORDS.....	9
5.3	MEASUREMENT, ANALYSIS AND IMPROVEMENT	9
5.3.1	<i>Performance Measurement</i>	10
6	APPENDIX A – PROCESS DIAGRAMS	13
A.1	TRINITY HOUSE.....	14
A.2	STATE PORTS - SPAIN.....	15
A.2.1	SPAIN – PUERTOS DEL ESTADO – EXAMPLE 1	16
A.2.2	PUERTOS DEL ESTADO – EXAMPLE 2.....	17
A.2.2.1	PROCESS: ATO _N DESIGN AND REVISION	17
	APPENDIX B – PURCHASING ELEMENTS IN AIDS TO NAVIGATION	18
B.1	SCOPE OF PURCHASING	18
B.2	SERVICES	18
B.3	EQUIPMENT PURCHASE	18
B.4	POLICY AND PRINCIPLES	19
B.5	PURCHASING PROCESS	19
B.6	SPECIFICATION.....	20
B.7	CONTRACTING	21
B.8	PERFORMANCE MONITORING AND REVIEW.....	21

THE USE OF QUALITY MANAGEMENT SYSTEMS FOR AIDS TO NAVIGATION SERVICE DELIVERY

1 INTRODUCTION

Although there are unique circumstances surrounding the work that aids to navigation (AtoN) authorities undertake, in many ways the overall objectives of all businesses are the same:

To perform satisfactorily and meet the customer's requirements.

In the case of the provision of AtoN, the main customer is the mariner and the aim is to assist the mariner in making safe and expeditious passage. The customer also requires consistency of performance, with confidence in the fact that the organisation delivers what it says it will deliver.

Many organisations are also recognising a need to operate more efficiently, with due regard for cost effectiveness and value for money. AtoN organisations need to identify best practices in service delivery to make optimum use of management and staff. In addition, this will assist in effective planning; ensuring that money is invested wisely in new technology; eliminating duplication and waste; and measuring performance to ensure that targets are met and also identify areas of weakness. Customers/users require higher and more visible levels of accountability. The result is a growing need to provide, and prove, quality service delivery, as evidenced through the development and maintenance of a Quality Management System (QMS).

2 SCOPE

This Guideline provides a basic platform for the implementation of a QMS so that Authorities can objectively evaluate compliance to established service levels depending on user needs and expectations, traffic and the risks associated to each area.

The main objective of a QMS is to provide the AtoN service effectively and efficiently. QMS certification demonstrates that the service is being provided in accordance with the published aims of the organisation and adds a level of trust between the AtoN Authority and the user. Certification should not be the main objective of implementing any QMS.

3 QUALITY MANAGEMENT SYSTEMS (QMS)

There are a number of internationally recognised QMS Standards. While the terminology used may differ, the basic principles are the same. The implementation of a QMS should be carried out by the organisation's own staff. While advisors may be used to support and provide guidance on organisational aspects, ownership of the system by the organisation is fundamental to its success. The QMS should properly represent the policies, goals and culture of the organisation.

The first steps in developing a QMS include:

- Defining the Mission, Vision and/or Values,
- Organisational Policy,
- Strategic Plan,
- Business Plan,
- Annual or multi-annual objectives or projects.

The Quality Manual is prepared in parallel to the Business Plan. This contains the identification of processes and procedures, technical instructions, indicators, records, forms of measurement, monitoring, analysis and improvement.

The Quality Manual is a part of the QMS of the AtoN Authority. The result of applying the QMS is the identification of strong points and areas of improvement. This cycle of continuous improvement will result in changes to the business plan and QMS.

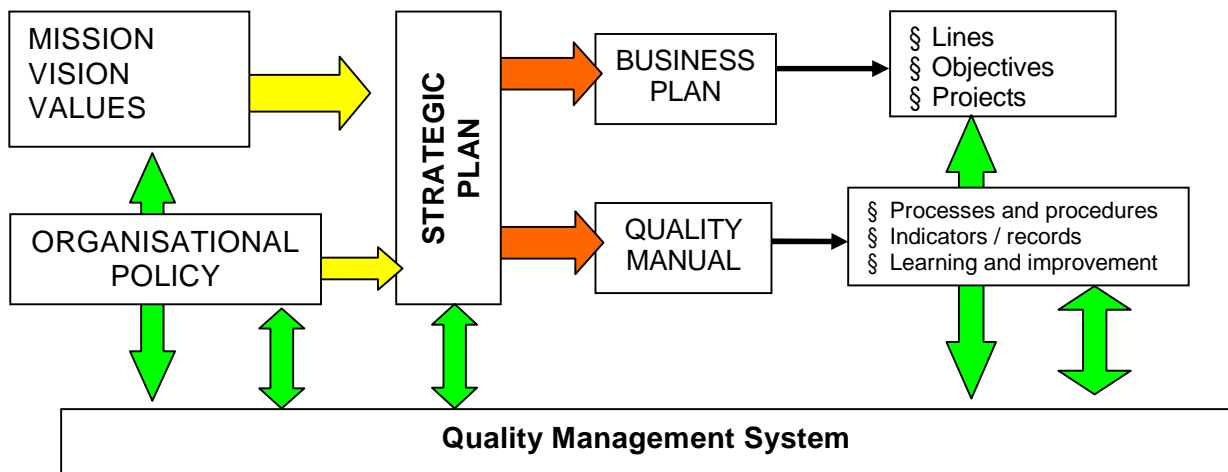


Figure 1 – Quality Management System

3.1 Service Definition

For the purpose of identifying its scope of activity, the AtoN Authority should prepare a basic document explaining its role and responsibilities and the statutory or other basis for its powers.

3.2 Service Delivery

Traditionally called maritime signals, all visual, acoustic, electronic or radioelectronic devices that are meant to improve navigation safety, facilitating traffic and preserving the environment, are considered aids to navigation (AtoN).

The service that provides and maintains these devices is called the AtoN service. To exist as such, it requires interaction in time and space between the service provider and the user (i.e. the mariner).

User satisfaction exists when the user receives the service in the expected terms.¹ These terms should be defined as quality commitments beyond the minimum accepted legal terms. A service level commitment may be associated to every single AtoN or to a combination of AtoN.

The International Convention for the Safety of Life at Sea (SOLAS), Chapter V, Regulation 13², *Establishment and operation of aids to navigation*:

- 1 *Each Contracting Government undertakes to provide, as it deems practical and necessary, either individually or in co-operation with other Contracting Governments, such aids to navigation as the volume of traffic justifies and the degree of risk requires.*
- 2 *In order to obtain the greatest possible uniformity in aids to navigation, Contracting Governments undertake to take into account the international recommendations and guidelines³ when establishing such aids.*
- 3 *Contracting Governments undertake to arrange for information relating to aids to navigation to be made available to all concerned. Changes in the transmissions of position-fixing systems which could adversely affect the performance of receivers fitted in ships shall be avoided as far as possible and only be effected after timely and adequate notice has been promulgated.*

There should be uniformity not only in the AtoN themselves, but also in the level of service provided to ensure similar standards throughout the maritime community, with particular emphasis in areas that serve as international boundaries.

The AtoN Authority should use flow processes and diagrams, to represent the different actions involved in the management of an AtoN system. (Section 6 and Appendix A refer)

3.3 Items to be included in the QMS.

- Scope and objectives of the AtoN service,
- Geographic limits, area of responsibility,
- Regulating National Authority,
- Authorities or agencies providing the service,

¹ Refer to IALA Recommendation O-130 on Categorisation and Availability Objectives for Short Range Aids to navigation (December 2004) and IALA Guideline 1035 (Ed. 2) on Availability and reliability of Aids to Navigation (December 2004).

² SOLAS Consolidated Edition, 2004

³ Refer to the appropriate Recommendations and guidelines of IALA and to SN/Cir. 107, Maritime buoyage system.

- Organisational structure,
- Possible alliances,
- Customers,
- Mandatory and reference documentation,
- Measurement,
- Records,
- Internal and external audits,
- Mechanisms for dealing with non-compliances,
- Training needs,
- Supplier management,
- Improvement actions.

3.4 Legal framework

The statutory basis for each AtoN Authority should be set out in a way that specifies the legal basis for the provision of the service and/or the regulating activity. The legal powers from which the responsibility flows should also be clearly identified.

4 EVALUATION OF RISKS / CUSTOMER CONSULTATION

AtoN Authorities should respond to criteria based on an evaluation of risks in the area under analysis, take the needs and expectations of users and the impact on other customers into account. Customers include all those affected by the AtoN service. For this reason, one of the first tasks should be customer identification.

The customers of the AtoN service are:

- *Mariners:*
 - Independent of the activity (including commercial traffic, fishing vessels and pleasure craft), mariners should be considered as the main users of the marine AtoN service, to the extent that such a service is used to facilitate their navigation and improve their safety.
- *Others – include, but not limited to:*
 - Coastal Pilots
 - Port Community (including: Harbour Authorities, Ship Brokers, Agents, etc.)
 - Related Agencies (including: Hydrographic Institutes, Marine Search and Rescue, marine structure agencies, Organisations representing Fishermen and Leisure interests, etc.)
 - Community in General (including: those affected by the environmental impact of the AtoN or heritage value).
 - Staff of the AtoN Authority
 - Government or regulating authority

In evaluating risks, the IALA Guideline 1018 on Risk Management (June 2001), should be taken into account, along with the tools developed for the application of Risk Assessment Procedures⁴.

The participation of mariners and other customers may be achieved in different ways, but should be documented in the QMS.

5 PROCESSES AND PROCEDURES

The marine AtoN service is the result of a series of elements and actions provided for the user. This is best represented through the management by process method, involving Strategic Processes, Key Processes and Support Processes, or Sub-Processes.

5.1 MANAGEMENT BY PROCESS

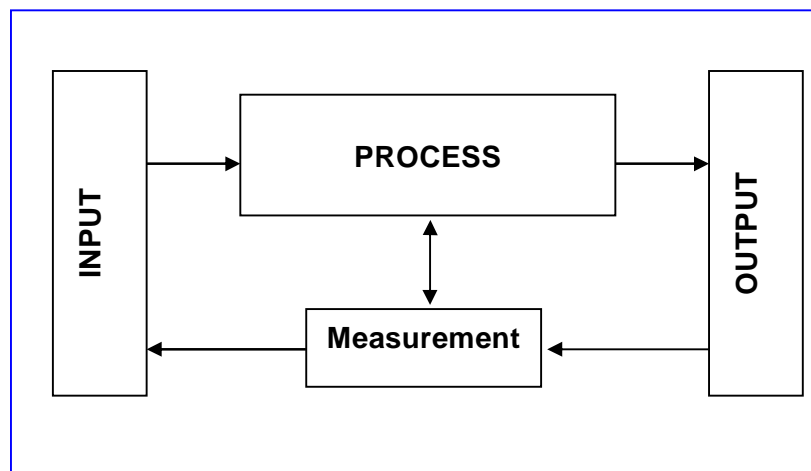


Figure 2 – Management by Process

All processes (including Strategic, Key and Support processes or Sub-Processes), as explained in this section, should follow the scheme in the Figure 2. Each process identifies input and output elements and should be assigned a “process owner” responsible for the activity, its management, and its improvement. The process should also determine regulating framework, necessary resources, specific tasks and any sub-processes required. The process should clearly define measurement, recording points and the target values for each aspect, so that the entire process is auditable. This ensures that the process has traceability and may be reviewed by third parties.

Within the process, the user should be clearly identified. It is important to determine the user’s needs and expectations and the aim of the process should be to satisfy these needs through quality management criteria.

To identify processes, the AtoN Authority should state its mission and carry out a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. From this analysis areas for improvement should be identified to assist with the definition of the strategic and other processes in support of the mission.

⁴ The IALA Risk Assessment Model (PASWA and IWRAP) refer

To implement the core business, key (operational/direct) and Support (generic) processes should be developed. The following are examples of processes that, among others, should be considered in the Aids to Navigation Marine Service.

5.1.1 Strategic (Management) Processes:

- Study and review customer requirements,
- Study and review Aids to Navigation technology,
- Preparation of standards and recommendations,
- Management control (costs/results /resources),
- Communication, image and presence in Society,
- Organisation structure.

5.1.2 Key (Operational) Processes

- Design, build and revision of Aids to Navigation,
- Deployment of Aids to Navigation,
- Monitoring and inspection of Aids to Navigation (Service Operation),
- Maintenance and corrective action of Aids to Navigation.

5.1.3 Support (Generic) Processes:

- Purchase and service subcontracting management,
- Information systems and databases,
- Finance and cost accounting,
- Legal assessment,
- Personnel management and training,
- Surveys, records and auditing,
- Logistics (transport, facilities),
- Health and safety.

Processes should unfold through flow diagrams that define each one of the different activities. Each AtoN Authority should prepare its own Process Maps. Examples of Process Maps are given in Appendix A.

5.2 Documentation and Records

Documentation and records are basic elements in any quality system. Without documents and records, it is difficult to consider any kind of improvement action.

Resources assigned to the process should be considered independently. These resources may be owned by the entities responsible for the process, may be subcontracted, or may be identified by some other type of indirect transaction.

The basic objectives of the service should respond to specific normative, mandatory, and reference documentation. These references should be composed of international and national standards, and, if applicable, regional or local standards.

5.3 Measurement, Analysis and Improvement

The AtoN Authority should define its strategic plan. The plan will also include key performance measures that link to the strategic goals and objectives and overall business

risks. Performance measures should be monitored and reported through a management review process.

Performance indicators should be:

- Representative of the process,
- Objective,
- Verifiable by third parties,
- Controllable by the service provider.

The AtoN authority should plan and implement the monitoring, measurement, analysis and improvement processes needed to:

- Demonstrate conformity of the service (or product),
- Ensure the conformity of the QMS, and
- Continually improve the effectiveness of the QMS.

This plan should include determination of applicable methods, including statistical techniques, and the extent of their use.

5.3.1 Performance Measurement

Performance measurement is a management tool that can be used to measure, analyse and monitor the performance of a network of aids to navigation and/or specific systems and equipment. The information obtained can be used to:

- Demonstrate accountability to government and customers;
- Demonstrate the efficiency and effectiveness of the service being provided;
- Compare the performance of:
 - Similar systems or equipment in different locations,
 - Contract services and internally provided services.
- Assess and improve:
 - System designs,
 - Procurement decisions,
 - Equipment choices,
 - Maintenance procedures and practices.
- Increase or reduce maintenance effort;
- Review maintenance intervals;
- Improve customer satisfaction;
- Increase awareness and staff morale.

5.3.1.1 Measurement Areas

There are four monitoring and measurement areas that need to be considered by the AtoN Authorities when implementing a QMS. The performance measurement of these areas provides a systematic method and approach to continual improvement:

- 1) Service Delivery – (Monitor and Measurement of Service):

The AtoN authority should monitor and measure the characteristics of the service to verify that service requirements have been met. This should be carried out at appropriate stages of the service realisation process in accordance with the planned arrangements.

2) Customer Satisfaction:

As one of the measurements of the performance of the QMS, the AtoN authority should monitor information relating to customer perception as to whether the organisation has met customer requirements. The methods of obtaining and using this information should be determined locally.

3) Monitoring and Measurement of Processes:

The AtoN authority should apply suitable methods for monitoring and, where applicable, measurement of the QMS processes. These methods should demonstrate the ability of the processes to achieve planned results. When planned results are not achieved, correction and corrective action should be taken, as appropriate, to ensure conformity.

4) Internal Audit:

The AtoN authority should conduct internal audits at planned intervals to determine whether the QMS:

- a) Conforms to the planned arrangements and to the QMS requirements established by the AtoN authority; and
- b) Is effectively implemented and maintained.

5.3.1.2 Activities to be Measured

Each AtoN authority should develop performance measures that include a description of the activity to be measured, the basis for the measurement relative to that activity so that results can be assessed and reviewed. Some potential measures an AtoN authority can implement are:

- AtoN Availability
‘the probability that an aid to navigation or a system of aids to navigation as defined by the Competent Authority is performing its specified function at any randomly chosen time. This is expressed as a percentage of total time that an aid to navigation or a system of aids to navigation should be performing their specified function.’⁵

The availability of an AtoN may be calculated using IALA recommendation O-130 Categorisation and Availability Objectives for Short Range Aids to Navigation December 2004 and IALA Guidelines No. 1035 IALA Guide to Availability and Reliability Theory and Examples, Dec. 2004.

- Continuity:

Continuity is mainly used in reference to radionavigation systems and is:

‘the probability that an aid to navigation or system will perform its specified function without interruption during a specified time.’⁴

⁵ As adapted from the IALA Guidelines 1035 on Availability and Reliability of Aids to Navigation.

- **Maintenance management:**
The AtoN authority has a preventive maintenance plan, with actions for programmed revision that include periodic actions depending on the type of aid and technological characteristics.
- **Interval for service restoration:**
The AtoN authority defines necessary actions with a service restoration interval from detection of breakdown.
- **Inspection:**
The AtoN authority prepares a plan that reflects the content and frequency of inspections.
- **Communication of breakdowns and incidents:**
The AtoN authority immediately either notifies the appropriate agency or the mariner through navigational warnings.
- **Training and Competency:**
The AtoN authority should determine the necessary competence for personnel performing work that affects service quality.

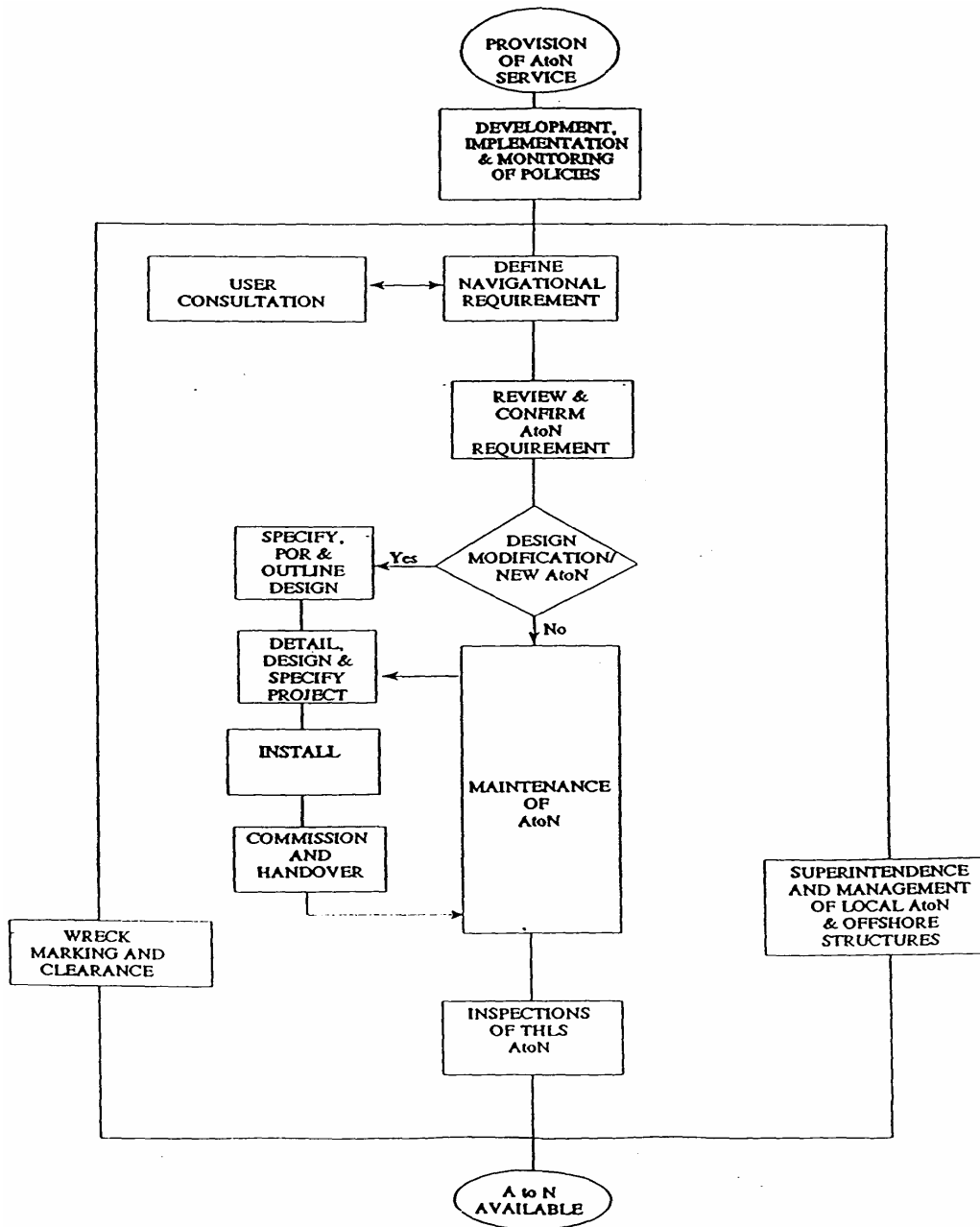
6 Appendix A – Process Diagrams

The sample diagrams have been provided, with permission, by IALA members. These are included to assist in the development of individual process diagrams. For further information on specific diagrams, please contact the AtoN organisation directly.

A.1 Trinity House

For example, the following diagram represents the core business (key processes), according to Trinity House Lighthouse Service.

Core business (key processes), of Trinity House

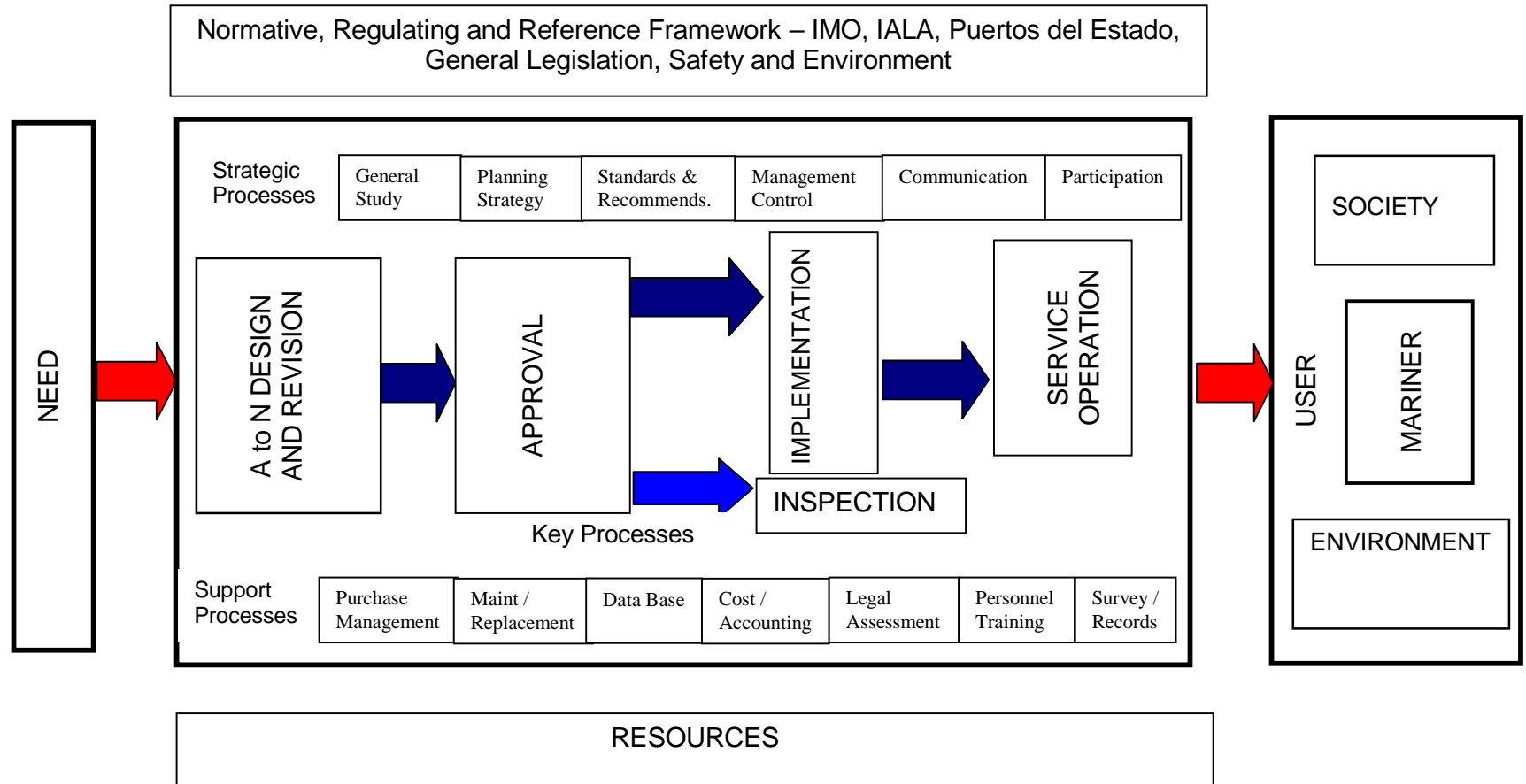


A.2 State Ports - Spain

The following example, is the process map for the marine aids to navigation service of State Ports (Spain). The Process Map is a matrix in which “horizontal” relationships cross over a “vertical” structure. The process relationships, reflected high, medium and low involvement, of the strategic and support processes through the key processes.

General Regulation specific to AtoN (OMI, IALA, PDE)	User Participation	Communication, image, presence in Management Control	Preparation of standards and	Strategic planning for the service	"State-of-the-art" study and review on	KEY PROCESSES	Purchase and service subcontracting management	Infrastructure maintenance management and	Information systems and Databases	Cost accounting	Legal assessment	Personnel management and Training	Surveys, records and auditing.	General regulation infrastructures, safety and Environment
X	X	O	O	X	X	BEACONING DESIGN AND REVISION	--	O	O	O	O	X	X	X
O						BEACONING APPROVAL						X	X	
X	--	--	--	X	--	IMPLANTATION OF AIDS	X	O	X	X	X	X	X	X
O	X	X	X	X	--	SERVICE OPERATION	X	X	X	X	X	X	X	X
O	--	--	--	X	--	INSPECTION AND MONITORING	O	O	X	--	X	X	X	X
STRATEGIC PROCESSES							SUPPORT PROCESSES							
						X=High	O=Medium							--=Low

A.2.1 Spain – Puertos del Estado – Example 1



A.2.2 Puertos del Estado – Example 2

A.2.2.1 Process: AtoN Design and Revision

OWNER:

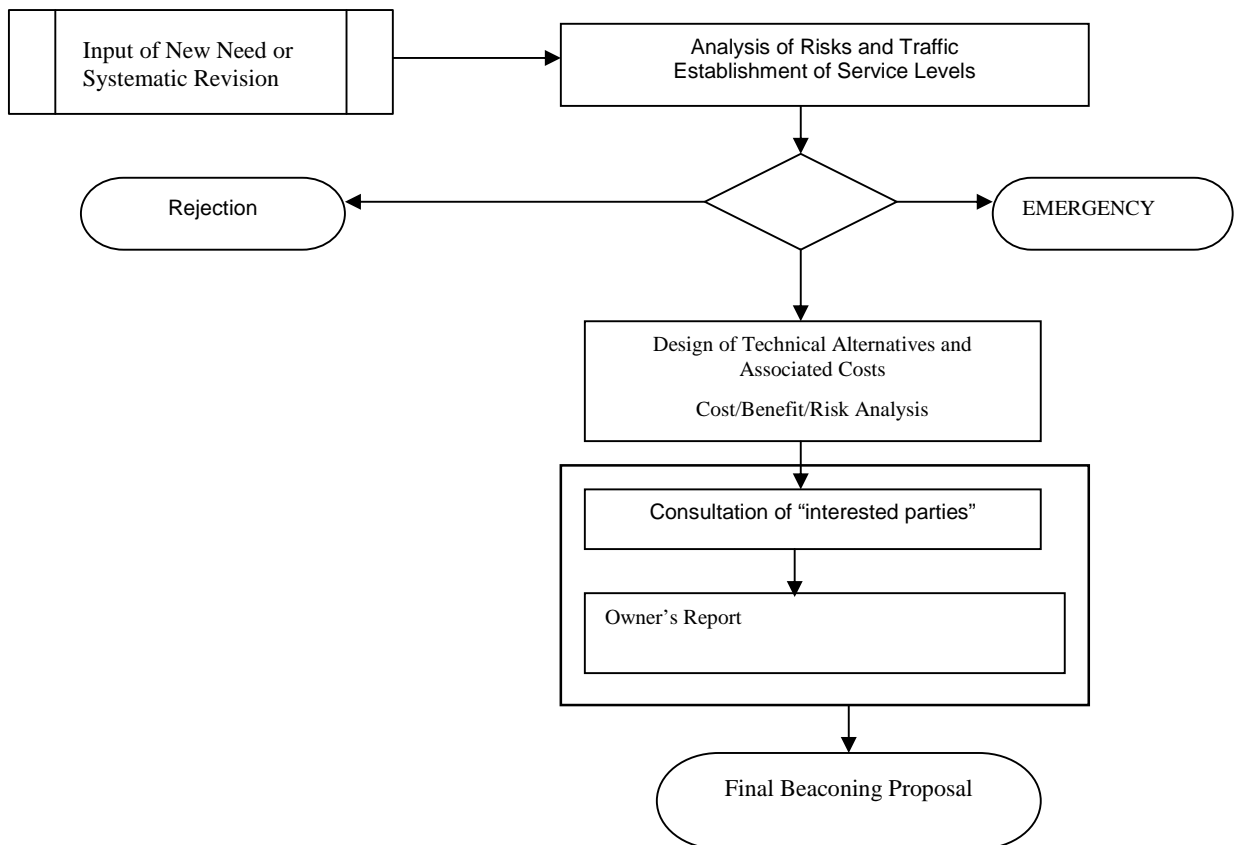
State port area of influence: PORT AUTHORITY

State non-port area: STATE PORTS

INPUT: New need or revision of AtoN in the area under consideration.

OUTPUT: Proposal for Aids to Navigation, (upgrade)

Process Diagram



A procedure should be developed, resources assigned and the points of measurement and recording identified for each process.

Appendix B – Purchasing elements in Aids to Navigation

This appendix is concerned with the purchase of products and services critical to the provision of Aids to Navigation. It is recognised that this element is, in many instances, unique to AtoN. Reference should always be made regional, national and international purchasing objectives and constraints.

B.1 Scope of Purchasing

The purpose of this appendix is to identify the key characteristics of purchasing as they relate to aids to navigation.

Purchasing for the aids to navigation function covers two broad areas, service provision and equipment purchase.

Approved suppliers and qualified equipment lists may reduce the purchasing risk to an AtoN Authority by ensuring minimum equipment or service standard is maintained and promotes continuity and standardisation. Cost savings can be achieved by removing the need to validate the quality of the equipment or service currently in use for each purchase event.

B.2 Services

The range of services that could be expected to be purchased, include:

- AtoN maintenance;
- AtoN construction, removal or demolition;
- Logistics;
 - Vessels/helicopters/aircraft,
 - Land transport,
 - Infrastructure (berthing, depots, workshops, etc),
 - Environmental services e.g. recycling, disposal.
- Advisory services including engineering and other design, environmental, cultural and heritage, Occupational Health and Safety experts to address issues such as radiation hazards and site contamination (e.g. mercury, diesel, asbestos);
- Training – external training providers covering new equipment, QMS etc.;
- Certification auditors;
 - Services,
 - Equipment,
 - Logistics and infrastructure.

B.3 Equipment Purchase

AtoN equipment purchasing can include the following categories:

- Capital Assets e.g. ships;

- Inventory e.g. lamps, solar panels, moorings;
- Environmental e.g. Hazardous Waste disposal / recycling equipment.

B.4 Policy and Principles

AtoN Authorities should be aware of and take into consideration, where appropriate:

- International trading agreements;
- National requirements (e.g. purchasing policies);
- Legislation and other regulatory processes applicable to product /services and the impact of compliance (e.g. Environmental, cultural, local communities, heritage);
- Corporate social responsibilities;
- Compliance with a recognised QMS (e.g. ISO 9001:2000);
- IALA Recommendations and Guidelines (e.g. Guideline 1005 Contracting Out Aids to Navigation Services, Guideline 1034 Certification of Marine Aids to Navigation Products).

B.5 Purchasing Process

The AtoN Authorities should ensure that the purchased product and/or services conform to specified requirements. The type and extent of control applied should reflect the criticality to the AtoN Authority of the product and/or services provided.

The AtoN Authority should evaluate and select suppliers based on their ability to supply product and/or services in accordance with the AtoN Authority's requirements. Criteria for selection, evaluation and re-evaluation should be established. Records of the results of evaluations and necessary actions arising from the evaluation should be maintained.

AtoN purchasing is a continuous improvement process where equipment and supplier performance over the life of a contract is used to refine future specifications, as shown in Figure 3.

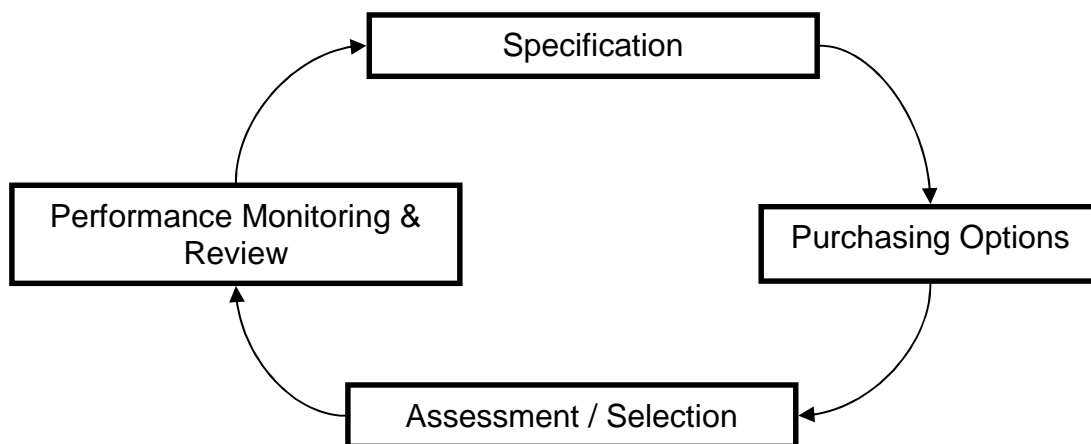


Figure 3 – Purchasing Model

The purchasing process should comprise the following elements where appropriate:

- Specification,
- Purchasing options,
- Product / supplier evaluation and selection,
- Contracting,
- Product / service monitoring and review.

B.6 Specification

In developing the specification of the product or service the AtoN Authority should give consideration to the following:

- Industry standards,
- Criticality – as determined by risk assessment,
- Budgetary constraints ,
- Appropriate design standards which take into account cost benefit analysis and fit for purpose criteria.

The specification should include the following where appropriate:

- Clear description of service or product to be purchased,
- Performance criteria,
- Warranty requirements,
- Definition of the process for approval of product / service to be purchased.

It is important that purchasing terms and conditions form part of the purchasing documentation e.g. request for tender (RFT)

Purchasing options could include:

- Open tender / Quotation (request for quote (RFQ)),
- Restricted tender/ Quotation,
- Single source (sole supplier/preferred supplier/panel contract),
- Multiple suppliers (Dependant on e.g. geographic location),
- Price basis e.g. fixed price, time and materials,
- Turn key solution.

Product/supplier evaluation should consider:

- Required specifications,
- Recognised QMS,
- IALA certified product or supplier,
- Vetting of suppliers e.g. assessment questionnaires, site visits, independent reviewers,
- Evaluation plan (scoring system / selection criteria, price, risk, financial viability, safety, quality),
- Previous experience/ known supplier,
- International and national standard marks.

B.7 Contracting

The IALA Guideline 1005 on “Contracting Out Aids to Navigation Services” should be taken into consideration when drafting contract terms:

B.8 Performance Monitoring and Review

Product/service performance monitoring and review needs to occur over the life of the contract and should encompass the following:

- Specification and regular monitoring of performance indicators,
- Audit/inspection plan,
- Acceptance testing, ongoing monitoring of equipment performance,
- Identify areas of greatest risk and allocate contract management resources accordingly,
- Regular contract performance reviews including comprehensive feedback ensuring no surprises for suppliers if performance incentives/penalties apply.

Preferably any Management plans, work programmes, or performance indicators should be agreed and in place at the commencement of the contract.