

WORLD METEOROLOGICAL ORGANIZATION

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DOCUMENTATION, TEMPLATES AND LESSONS LEARNT DURING A WMO SPONSORED QMS PILOT PROJECT IN THE UNITED REPUBLIC OF TANZANIA (NOVEMBER 2008 – NOVEMBER 2009)

WMO supported a QMS Pilot Project with the Tanzania Meteorological Agency (TMA) for the provision of meteorological services to civil air navigation using consultancy services of a company with relevant experience, MSN Canada. It is envisaged that the experience WMO has gained through this project will simplify the process and probably reduce the costs for its implementation in other Member countries. Following below are the steps, milestones and examples of templates developed with the help of MSN Canada as the Consulting Company for TMA.

1. THE NECESSARY STEPS AND MILESTONES IN THE IMPLEMENTATION PLAN OF the QMS

Before embarking on a QMS implementation project, the following steps are seen as mandatory for a successful implementation:

1.1

- ***Clearly identify which section(s) of the NMHS are to seek certification under the ISO 9001:2008 Standard for Quality Management Systems.***
- ***Get firm commitment of the senior management, especially the CEO, for the project.***
- ***Identify the resources required and those available (a critical step!) to implement the strategies.***

It is very important that the management and the Chief Executive Officer of the NMHS are committed to the project and that a budget is provided for it. Even with external assistance, it is important that the NMHS sets aside funds for convening the training sessions and other local implementation activities. As was the case for TMA, there will be expenses for support of QMS maintenance and improvement for a reasonable length of time even after certification. These will include the provision of final implementation assistance and a mock verification audit by the Consultant to determine readiness for certification. For those Members with cost recovery for services to aviation in place, costs for the implementation and maintenance of a Quality Management System, following the elevation of the Recommended Practice to a Standard (2.2.2) in AMD 75 of ICAO Annex 3, will be fully cost recoverable.

1.2 *Write a comprehensive plan (including timelines and milestones) for the development and implementation of a QMS*

NMHSs cover a number of other activities different from aviation services and serve a range of users of their products. It is important to differentiate between the services, including the personnel and the facilities that are used to provide the services. In the case of TMA, the various tasks that were identified during gap assessment interviews were assigned to the Core QM Implementation Team with clearly defined milestones and timelines.

1.3 *Appointment of a Quality Manager at a senior level, ensuring this individual has an understanding, appreciation and most important of all, a desire to be involved in delivering the QMS*

When choosing the 'Core Quality Implementation Team' and the Quality Manager for the project, they should fulfil the following criteria:

- The **Management Representative** (the owner of the Management System) ensuring this individual has an understanding appreciation and most importantly of all, a desire to be involved in delivering the QMS.
- When selecting the '**Core QM Implementation Team**' (i.e. the people working directly with the Consultant, consider including key managers, supervisors, lead-hands and other resource persons that you rely on.

Note: To ensure a more successful project, this Team should have the following characteristics among its team members:

- Project management skills
- Enough authority for effective follow-up throughout the organization
- Competent word processing & spreadsheet skills
- Competent intranet skills (if you are going to use a web-based documentation system)
- Ability to set aside 4-hour blocks of time to work on the project
- Initiative
- Technical writing ability
- Facilitation skills to gather information from individuals and groups of people

1.4 *Provide introductory training for all staff of the sections involved in the QMS. The focus of this training is to "demystify" the ISO 9001:2008 Quality Management Standard for the staff and it will in turn assist in the overall acceptance and adoption of the QMS. The eight principles of Quality Management and their practical application in the workplace will be covered here.*

Provide comprehensive training for all staff on the eight principles of quality management and their practical application in the workplace. This will in turn assist in the overall acceptance and adoption of this QM approach. This training must be provided by persons with a strong and demonstrated background in QMS combined with proven training skills, and should preferably be undertaken in a facilitated workshop environment. Deployment of an expert from the consulting company with relevant experience, and if possible with a WMO Secretariat representative as an overseer, would ensure a smooth transition to certification. Typically, for this training, 3 to 5 days with a further 3 days for follow-up and consolidation of assigning tasks to individuals would suffice.

1.5 *Develop the QMS by identifying and describing the processes that will make it up. Review the organizations current performance against the eight principles of quality management - this is termed a "gap analysis"*

Review the organization's current performance against the eight principles of quality management in a facilitated workshop environment. Once the "gaps" are identified, develop strategies to close and eliminate any gaps in performance. In **ANNEX I**, ISO 9001:2008 Element 4.2.3 is an example of the identified gaps in TMA. In the gap assessment in TMA, all relevant ISO 9001: 2008 Requirements elements were used but only a few examples are listed in **ANNEX I**. Close follow-up by all parties is vital, both as you close the gaps and as a learning exercise for the core team.

1.6 *Implement the QMS and manage process performance by developing strategies to close and eliminate any identified gaps*

Flow charts for the different processes are developed; example METAR and SPECI observations, TAF, calibration of instruments, purchasing, corrective and preventive action, nonconforming weather data processes, internal audit processes, control of measuring equipment processes, airport forecasting and briefing processes, central forecasting office, communication, human resource (professional competence) and document and record control processes.

ANNEX II is an example of a flow chart and control procedure for observing station and airport forecasting processes.

Documents and work instructions that need to be included in the QMS are established and documented including procedures for control of infrastructure related activities. Templates for master list of calibrated instruments, management review meetings, evaluation of the effectiveness of the Quality Management System, master list of records and standards are also developed. Most of these procedures will be similar in most NMHSs and therefore can be used with slight adjustments to accommodate the identified differences e.g. automation, type of instruments, frequency of observations, type of office as per Chapter 3 of ICAO Annex 3, etc.

1.7 Continually review and, where appropriate, improve the processes

ISO 9001:2008 shall guarantee the following when successfully implemented:

- Ensures that there is a requirement and a customer for every process
- Ensures that services rendered satisfy customer requirements consistently
- Minimizes waste (rework, scrap) and maps activities onto requirements

It is therefore desirable to review the process through another gap analysis or internal audit (perhaps after 6 months) post the introduction of the QMS to see if there are still gaps or processes that were not adequately addressing the organizations' needs. If any are found, these are assigned as tasks with timelines to members of the Core QM Implementation Team. A few examples of the assessments done using ISO 9001:2008 element numbers and the objective evidence required are given in **ANNEX I**.

1.8 Develop the QMS documentation and ensure they reflect what the organization does

Test drivers for the different processes are identified and assigned the task of ensuring that the documentation really reflects what the process does inline with the organization and user requirement. It works well when the processes are test driven by different individuals at different situations and stations.

1.9 Prepare a quality manual (if possible by creating an electronic shell) that documents the procedures, describes the interaction between processes and defines the scope of the QMS

Typical elements of a Quality manual are:

Title & scope – define the organization and make specific reference to the QMS standard (i.e. ISO 9001) **E.g.** *This Quality Management System which meets the requirements of the International Standard ISO 9001: 2008 and ICAO documents applies to the following activities: “Provision of aviation weather services for international air navigation”.*

The Quality Manual is drafted in **stages** leaving gaps to be filled as the processes are identified and documentation for them developed. It will also have the usual table of contents, review, approval signatures & revision status (**document control information**).

Quality policy (commitment): These are the overall intentions and direction related to quality by top management and is usually consistent with overall policy of organization. It provides a framework for setting quality objectives. *E.g. “Provide professional meteorological service for international air navigation, aim at complying all relevant requirements, standards and regulations and ensuring continued enhancement of service levels, operations and effectiveness of QMS.”*

The **quality policy statement** developed for TMA was; *“TMA is dedicated to providing timely quality professional meteorological services to enable our customer’s to deliver their services in a safe, efficient and regular manner.”*

The **Quality objectives** (goals):

They are established at relevant functions and are consistent with quality policy. They have to be **SMART** (**S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**ime bound) and **Challenging**. For example,

“Over 95% of meteorological reports shall be filed for transmission within 5 minutes”

Techniques for preparing documentation:

- Simple and easily comprehended
- Short sentences preferred
- Unambiguous
- Responsibility well defined
- Clear work flow

TMA had come up with the following three ambitious quality objectives with their measuring methods and a frequency of quarterly year:

1. **Number of observations at aerodrome completed to schedule $\geq 98.0\%$;**
2. **A rate of satisfaction greater than 80% by the users of the services provided; and,**
3. **Over 95% of flight documentation to be available to the Airline Operators 3 hour before the scheduled time of departure.**

Prescribed Procedures:

Make sure all procedures written down are always executable? Below are some examples:

Procedure 1: Every morning **John** shall collect the meteorological reports issued the day before and have them properly filed. (*Here it is mentioned exactly **who** is going to do it!*)

Procedure 2: The **Quality Supervisor** shall **pass the TAF verification** results to the Quality Manager for review on the **first day of each month**. (*Who does what and when!*)

Is the evidence readily available for showing work stated in the procedure is actually done?

Procedure 3: Assistant Office Manager shall register **all incoming and outgoing** documents in the respective log books. *Who is in charge of what process?. The “When” question is implicit, i.e immediately after receipt or dispatch of documents).*

1.10 Develop and implement a document control system for the QMS implementation

A **Document Control System** for the QMS is developed for all the processes that were developed and documented. For the TMA case, it involved the introduction of observation operations log books, adding a remarks line in the METAR forms to accommodate amendments, sign-off forms for participants in daily weather conferences, sign-off forms for crew who receive verbal briefing, putting control features onto daily trend type graphs for Temperature and Pressure, etc.

All documents (e.g. quality manual, procedures, work instructions, job description, forms) required by the QMS shall be controlled. In the QMS context, “controlled” means that the following process shall be observed:

- **Approve** documents prior to issue
- **Review** as necessary & *re-approve*
- **Identify** *current revision* status
- **Make** documents readily available at points of use
- **Ensure** that documents are legible with proper identification
- **Enforce** that external documents (e.g. ICAO Annex 3, ANP, national AIP) identified & distribution controlled
- **Prevent** unintended use of *obsolete* documents

1.11 Maintain a comprehensive quality records system (Electronically if possible). At this point it would be appropriate to assess the organization's readiness to adopt the ISO 9001: 2008 Quality Management Standard by a mock audit and, when ready, seek certification

Internal auditor training is done at this stage and a mock audit to assess the organization's readiness to adopt the ISO 9001: 2008 Quality Management Standards can also be done as a hands-on exercise for the internal auditors. The selection of the audit team should be done very carefully remembering that ***no one shall audit his/her own work!***

It is therefore very important that these employees should have the following attributes:

- **Ethical** yet Open-Minded
- **Diplomatic**
- **Perceptive** and Versatile
- **Tenacious**
- **Observant** and Decisive
- **Self-reliant**

Audit results are used as **feedback** to refine the processes, close the **gaps** and act as **initiators** of reviews. Feedback can also be sought using short questionnaires to users.

In the case of the Pilot Project for the TMA, an internal audit found non-conformities in numerous tables, records and work instructions that were found at the Observing stations and Central Forecasting Office. These documents were not controlled and therefore did not have a defined retention time.



Fig. 1: Map of the United Republic of Tanzania, with the meteorological stations included in the QMS indicated in red (The seventh station is the Administrative office at the headquarters in Dar es Salaam).

Out of what the audit revealed, a list of new open issues with new deadlines and responsible officers was drawn. Corrective Action Requests (CARs) were filed and the scope of the QMS was re-defined to include only those stations offering briefing services as shown on the map of Tanzania above. An example of the audit report is **ANNEX III** and an example of a transmittal for control of documents is attached as **ANNEX IV**.

2. CERTIFICATION

TMA has received quotations from three registration bodies. During the last visit June 2009, a Management Review Meeting reinforced administration commitment and helped set the date for registration as from 30 October 2009. This is expected to sustain the current momentum that is absolutely necessary for a successful implementation of the QMS.

TMA has already calibrated **thermometers** and **digital barometers** operating in all seven stations. Where to calibrate **anemometers** is still not known and this might have a serious impact on the project timing. The Consultant had advised TMA to have prior discussion with the registrar to agree on the calibration of only the three most sensitive and safety related instruments to aviation i.e. thermometers, barometers and wind measuring instruments (anemometers). The nearest **WMO Regional Instruments Centres (RICs)** are in Nairobi, Kenya and Gaborone, Botswana; but at the time of the project both were not fully operational. Neighbouring countries

wishing to implement QMS in the near future are likely to face a similar problem.

An internal audit performed before engaging the Registrar showed a number of issues that necessitated another final visit by the MSN Consultant to clear. CerTech Registration Inc, Canada won the tender for certification of ISO 9001:2008 for TMA.

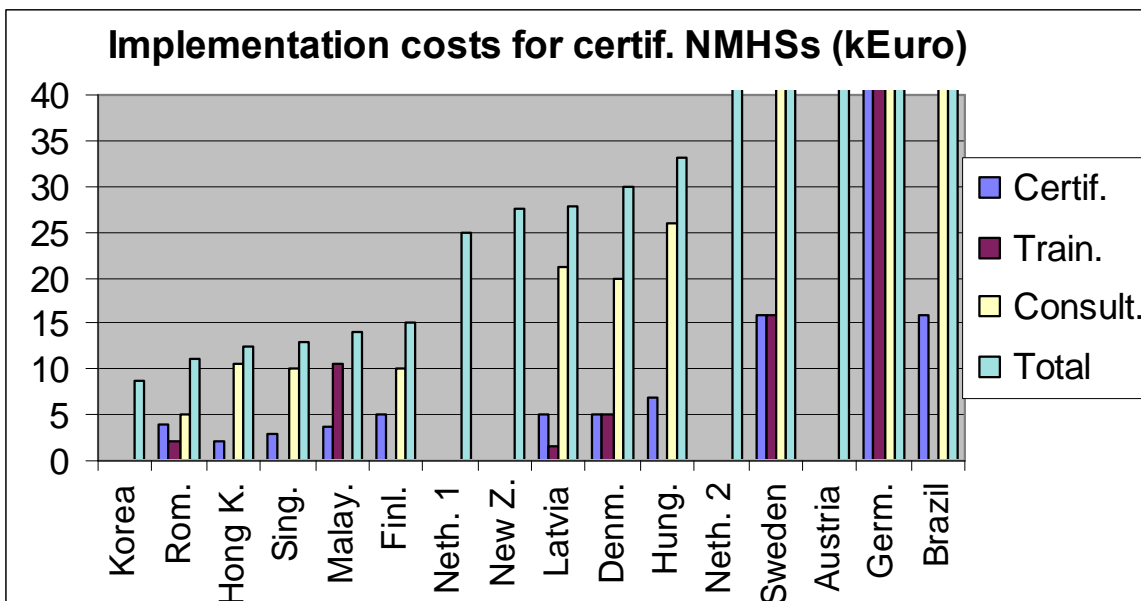
TMA intends to include these charges in the next review process of their cost recovery with their counterparts, the Tanzania Civil Aviation Authority (TCAA) and Tanzania Airports Authority (TAA), the international air navigation service providers.

3. THE WAY FORWARD AND FUNDING OPTIONS

Costs for training that were by the terms of the Contract payable by WMO totaled Can. \$ 47,400. Travel, visa and subsistence costs payable by TMA were Can. \$ 11,000, making the total project cost (excluding TMA and WMO staff costs!) Can \$ 58,400. The completion of this Pilot Project is expected to provide documentation that Developing Countries, Least Developed Countries and Small Island Developing States can use in their pursuit to implement QMS. When making best use of the pilot projects results, documentation and templates, costs could probably be reduced to about Can \$ 40,000 (equivalent to €24,225) per country (excluding registration) depending on the travel costs. The costs compare very well with those incurred by Latvia, Hungary and Denmark. By countries grouping together, the costs can be lowered further. Resource mobilization from donor agencies and Partners for regional implementation is another option. Cost recovery to enable Members fund sustainable implementation is also another source.

The last meeting of the CAeM Expert Team on Customer Relations (ET-CR) held in July 2009 in Austria agreed on the need for a development of regionalized implementation plans for Members. The Rapporteurs on Regional Aspects of the Aeronautical Meteorology Programme were assigned tasks of developing the Action Plans for their respective Regions in coordination with the WMO Secretariat. Mobilization of resources where feasible, would be done to speed up implementation. It was also pointed out that future QMS training events would have to be well planned if they are to be more effective and sample questions to would be trainees are attached as **ANNEX V**. As Members prepare to implement QMS, it was emphasized that the initial steps of the CEOs committing themselves to the Project in writing, appointment of the Core QMS Implementation Teams and the Quality managers did not immediately require external funding.

The chart below compares costs of implementation in some European NMHS's which shows that by far, the consulting fees are higher than those for certification and training. However, overall, the costs appear to have become lower recently.



4. CHANGES BROUGHT ABOUT BY AMD. 75 TO CHAPTER 2 OF ICAO ANNEX 3, APPLICABILITY NOV. 2010

GENERAL PROVISIONS:

2.2 Supply, use and quality management of meteorological information

2.2.2 Each Contracting State shall ensure that the designated meteorological authority referred to in 2.1.4 establishes and implements a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in 2.1.2.

2.2.3 **Recommendation.** — *The quality system established in accordance with 2.2.2 should be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and should be certified by an approved organization.*

Note. — The International Organization for Standardization (ISO) 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be formulated by each State and in most cases are unique to the State organization.

Guidance on the establishment and implementation of a quality system is given in the Manual on the Quality Management System for the Provision of Meteorological Service to International Air Navigation (Doc 9873).



GAP ASSESSMENT PROCEDURES USING ISO 9001:2008 REQUIREMENT ELEMENTS

El. No.	ISO 901: 2008 Requirements	Assessor Notes/ Objective Evidence
4.1	General Requirements	
	Has the organization established and documented a quality management system in accordance with the requirements of ISO 9001:2008?	ISO Certificate or Quality manual or Audit reports etc
	Has the organization implemented and maintained its established quality management system in accordance with the requirements of ISO 9001:2008?	As above
	Does the organization's quality management system: a) identify the processes needed for the quality management system and their application throughout the organization? b) determine the sequence and interaction of these processes? c) determine criteria and methods needed to ensure that both the operation and control of these processes are effective?	<p>a) <i>Processes have been identified,</i> b) <i>the sequence and interaction is established</i> c) <i>some criteria and methods for control are established but there may be some where the control is not explicitly defined</i></p>
	Does the organization's quality management system: a) ensure the availability of resources and information necessary to support the operation and monitoring of the processes needed for its quality management system? b) monitor, measure and analyze the processes needed for its quality management system? c) implement actions necessary to achieve planned results and continual improvement of the processes needed for its quality management system?	<p>a) <i>at the present time it does not appear as though the organization has the resources available to support the operation and monitoring of the processes needed within the QMS, examples high level monitoring using balloons, calibration, preventive maintenance</i> b) <i>there is no evidence to show that processes are monitoredng, measured and analysed</i> c) <i>there is no evicence to show that actions have been implemented to ensure that planned results are achieved</i> d) <i>there is no evidence that processes are in place to insure continuous improvement.</i></p>
	Does the organization manage the processes needed for its quality management system in accordance with the requirement of ISO 9001:2008?	
	Does the organization ensure control over outsourced processes that affects product conformity with requirements?	

	Is the control of the organization's outsourced processes that affects product conformity with requirements identified within the quality management system?	
4.2.1	General	
	Does the quality management system documentation include the following: a) documented statements of a quality policy and quality objectives? b) a quality manual? c) documented procedures required by ISO 9001:2008? d) documents needed by the organization to ensure the effective planning, operation and control of its processes? e) records required by ISO 9001:2008 (see element 4.2.4)?	<ul style="list-style-type: none"> a) <i>Presence of a quality policy of the organisation</i> b) <i>Availability of a Quality Manual</i> c) <i>The quality manual should have them</i>
4.2.2	Quality Manual	
	Has the organization established and maintained a quality manual that includes: a) the scope of the quality management system, including details of and justification for any exclusions (see section 1.2 of ISO 9001:2008)? b) the documented procedures established for the quality management system, or reference to them? c) a description of the interaction between the processes of the quality management system?	<i>Look for a), b) and c) in the Quality Manual</i>
4.2.3	Control of Documents	
	Does the organization control the documents required by the quality management system?	<i>There are numerous examples of procedures, work instructions and blank forms that are being used at this time which do not have the required document control features.</i>

	<p>Has the organization established a documented procedure to define controls needed:</p> <p>a) to approve documents for adequacy prior to issue?</p> <p>b) to review and update as necessary and re-approve documents?</p> <p>c) to ensure that changes and the current revision status of documents are identified?</p> <p>d) to ensure that relevant versions of applicable documents are available at points of use?</p> <p>e) to ensure that documents remain legible and readily identifiable?</p> <p>f) to ensure that documents of external origin are identified and their distribution controlled?</p> <p>g) to prevent the unintended use of obsolete documents, and to apply suitable identification to them if they are retained for any purpose?</p>	<p><i>There is not a documented procedure that defines the control needed:</i></p> <p>a) <i>to approve documents</i></p> <p>b) <i>to review and approve updated documents</i></p> <p>c) <i>there is not a defined document control feature in place</i></p> <p>d) <i>there is not a process that ensures distribution to the relevant points of use of documents (for example how copies of WMO ANNEX 3 have been distributed internally, who has them, how do we ensure that all holders of the document get updates</i></p> <p>e) <i>There is no definition of the points of use.</i></p> <p>f) <i>legible should be an issue</i></p> <p>g) <i>there is no defined process to ensure that the most recent version of applicable external documents are controlled see comment d) above</i></p> <p>h) <i>what is the process for removing OBSOLETE documents, what is the process for identifying obsolete documents retained for historical, knowledge or legal purposes?</i></p>
4.2.4	Control of Records	
	<p>Has the organization established and maintained records to provide evidence of conformity to requirements and of the effective operation of the quality management system?</p>	<p><i>Entire process needs to be developed.</i></p> <p><i>Management Support Network will provide the templates and process for documenting details related to record keeping.</i></p>
	<p>Are records legible, readily identifiable and retrievable?</p>	
	<p>Has the organization established a documented procedure to define the controls needed for the identification, storage, protection, retrieval, retention time and disposition of records?</p>	
	<p>Does the organization treat quality records as a special type of document and control them according to the requirements given in 4.2.4.</p>	
5.1	Management Commitment	<i>TMA and Management Support Network will need to document the procedure</i>
	<p>Does top management have evidence of providing commitment to the development and implementation of its quality management system?</p>	

	<p>Does the organization's top management have evidence of providing commitment to continually improving its quality management system effectiveness by</p> <ul style="list-style-type: none"> a) communicating to the organization the importance of meeting customer as well as statutory and regulatory requirements? b) establishing the quality policy? c) ensuring that quality objectives are established? d) conducting management reviews? e) ensuring the availability of resources? 	
5.2	Customer Focus	
	Does top management ensure that customer requirements are determined and fulfilled with the aim of enhancing customer satisfaction?	
5.3	Quality Policy	
	<p>Does top management ensure that the quality policy:</p> <ul style="list-style-type: none"> a) is appropriate to the purpose of the organization? b) includes a commitment to comply with requirements and continually improve the effectiveness of the quality management system? c) provides a framework for establishing and reviewing quality objectives? d) is communicated and understood within the organization? e) is reviewed for continuing suitability? 	
5.4	Quality Objectives	
	Does the organization's top management ensure that quality objectives, including those needed to meet requirements for product (see section 7.1 of the ISO 9001:2008 technical specification) are established at relevant functions and levels within the organization?	
	Are the organization's quality objectives measurable and consistent with the quality policy?	
5.4.2	Quality Management System Planning	

	<p>Does top management of the organization ensure that</p> <p>a) the planning of the quality management system is carried out in order to meet the general quality management system requirements stated in section 4.1 of ISO 9001::2008, as well as the quality objectives?</p> <p>b) the integrity of the quality management system is maintained when changes to the quality management system are planned and implemented</p>	
5.5.1	Responsibility & Authority	
	<p>Does the organization's top management ensure that the responsibilities and authorities are defined and communicated within the organization?</p>	
5.5.2	Management Representative	
	<p>Did the organization's top management appoint a member of management who, irrespective of other responsibilities, shall have responsibility and authority that includes</p> <p>a) ensuring that processes needed for the quality management system are established, implemented and maintained?</p> <p>b) reporting to top management on the performance of the quality management system and any need for improvement?</p> <p>c) ensuring the promotion of awareness of customer requirements throughout the organization?</p>	
5.5.3	Internal Communication	
	<p>Does top management ensure that appropriate communication processes are established within the organization?</p>	
8.3*	Non-conforming product	
	<p>Does the organization deal with nonconforming product by one or more of the following ways:</p> <p>a) by taking action to eliminate the detected nonconformity?</p> <p>b) by authorizing its use, release or acceptance under concession by a relevant authority and, where applicable, by the customer?</p> <p>c) by taking action to preclude its original intended use or application?</p>	

	Does the organization maintain records of the nature of nonconformities and any subsequent actions taken, including concessions obtained (see element 4.2.4 of ISO 9001:2008)?	
	When nonconforming product is corrected, does the organization re-verify to demonstrate conformity to the requirements?	
	When nonconforming product is detected after delivery or use has started, does the organization take action appropriate to the effects, or potential effects, of the nonconformity?	
8.4	Analysis of data	
	Does the organization determine, collect and analyze appropriate data to demonstrate the suitability and effectiveness of the quality management system and to evaluate where continual improvement of the effectiveness of the quality management system can be made?	
	Does the organization's data analysis include data generated as a result of monitoring and measurement and from other relevant sources?	
	Does the organization's analysis of data provide information relating to: a) customer satisfaction (see element 8.2.1 of ISO 9001:2008)? b) conformance to product requirements (see element 7.2.1 of ISO 9001:2008)? c) characteristics and trends of processes and products including opportunities for preventive action? d) Suppliers?	
8.5.1	Continual improvement	
	Does the organization continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results, analysis of data, corrective and preventive actions and management review?	
8.5.2	Corrective action	
	Does the organization take action to eliminate the cause of non-conformities in order to prevent recurrence?	

	Are the organization's corrective actions appropriate to the effects of the nonconformities encountered?	
	Has the organization established a documented procedure to define requirements for: a) reviewing non-conformities (including customer complaints)? b) evaluating the need for action to ensure that non-conformities do not recur? c) determining and implementing action needed? d) records of the results of action taken (see element 4.2.4 of ISO 9001: 2008) e) reviewing corrective action taken?	
8.5.3	Preventive action	
	Does the organization determine action to eliminate the causes of potential non conformities in order to prevent their occurrence?	
	Are the organization's preventive actions appropriate to the effects of the potential problems?	
	Has the organization establish a documented procedure to define requirements for: a) determining potential nonconformities and their causes? b) evaluating the need for action to prevent occurrence of nonconformities? c) determining and implementing action needed? d) records of results of action taken (see element 4.2.4 of ISO 9001:2008)? e) reviewing preventive action taken?	

*
that the
reflects some
standard
requirements
ISO

Please note
above only
of the
element
contained in
9001:2008

Example of process flow charts

QP 7.5.01 OBSERVATION STATION AND AIRPORT FORECASTING PROCESSES

Purpose

The purpose of this procedure is to ensure that the activities involving weather observations and reporting of weather observations are controlled.

Scope

All weather stations within the Global Telecommunication System (GTS) are included see master list.

Process Owner: Director of Forecast Services (DFS)

<p>Inputs:</p> <ul style="list-style-type: none"> • Schedule of required observations (per ICAO Annex 3) • Weather observations from manual, semi or fully automated equipment • Abrupt changes in weather conditions (thunderstorms, volcanic activity, etc.) • Emergency events <ul style="list-style-type: none"> • Accidents • Search & rescue 	<p>Outputs:</p> <ul style="list-style-type: none"> • METAR data • SPECI data
<p>Process Requirements:</p> <ul style="list-style-type: none"> • See flowchart 	<p>Process Metrics:</p> <ul style="list-style-type: none"> •
<p>Human Resources:</p> <ul style="list-style-type: none"> • Met Observer (at weather station) • Duty Forecaster at MWO 	<p>Materials & Equipment:</p> <ul style="list-style-type: none"> • Schedule of required observations (per ICAO Annex 3) • Equipment as per ICAO Annex 3 and applicable appendices • Weather station equipment installed as per CIMO Guide requirements
<p>Linked Processes / Documents:</p> <ul style="list-style-type: none"> • ICAO Annex 3 & Appendices • QP 4.2.3 – Control of Documents and Records • QP 8.3 – Control of Nonconforming Weather related data 	<p>Associated Records:</p> <ul style="list-style-type: none"> • Form # 393 – Station Observation report • Form # 366 - METAR / SPECI data report • Form # 646 – Monthly record of METAR / SPECI reports • Form # 259A - Observers Operation Log book

NOTE:

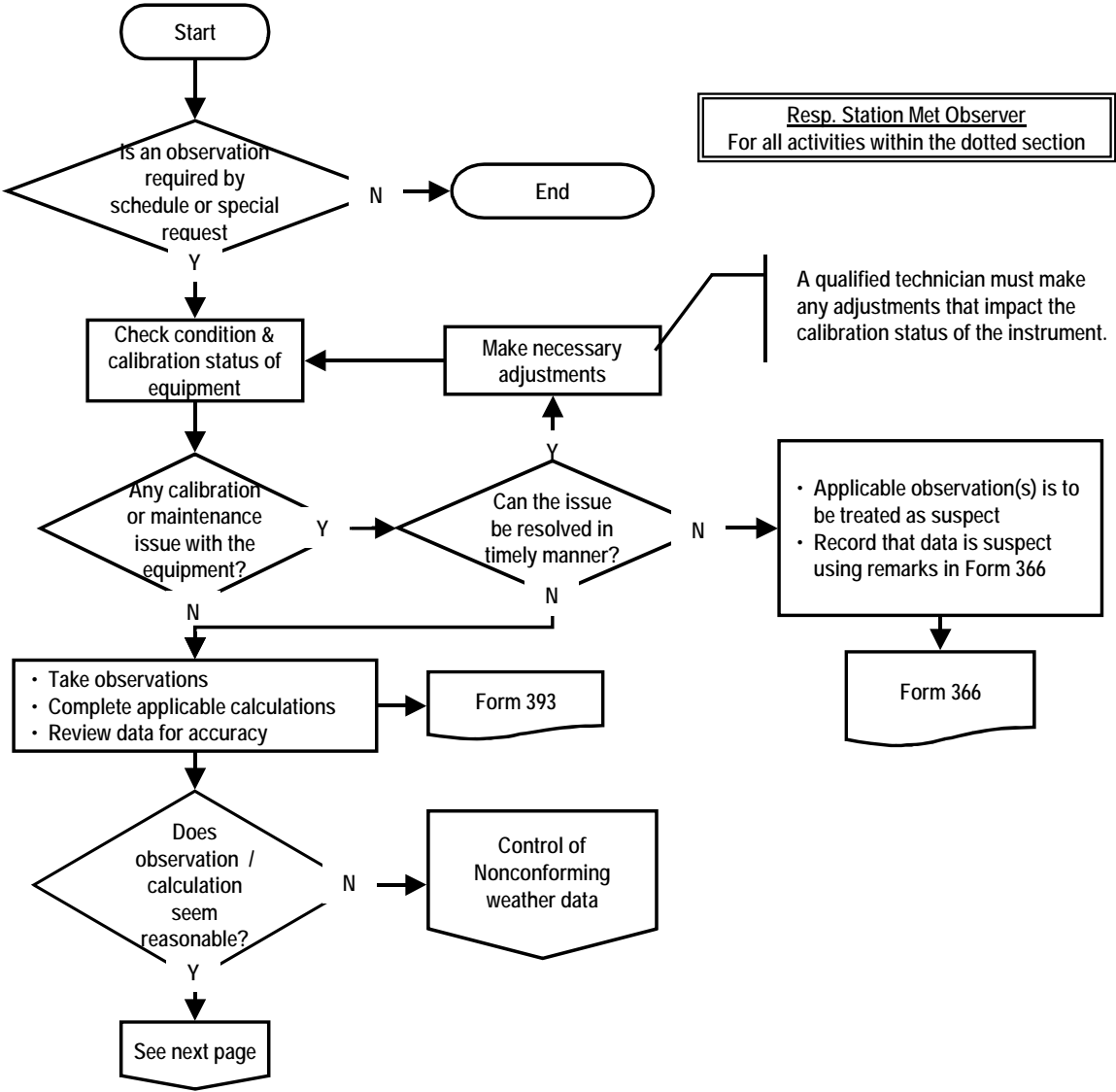
- All entries to observation forms, logs, etc must be made using indelible ink.
- All amendments, deletions or corrections to data must be initialed and dated by the individual making the amendment, deletion or correction.
- The original data must be crossed out – **DO NOT** erase or cover the data up in any manner.
- Form numbers are for TMA only

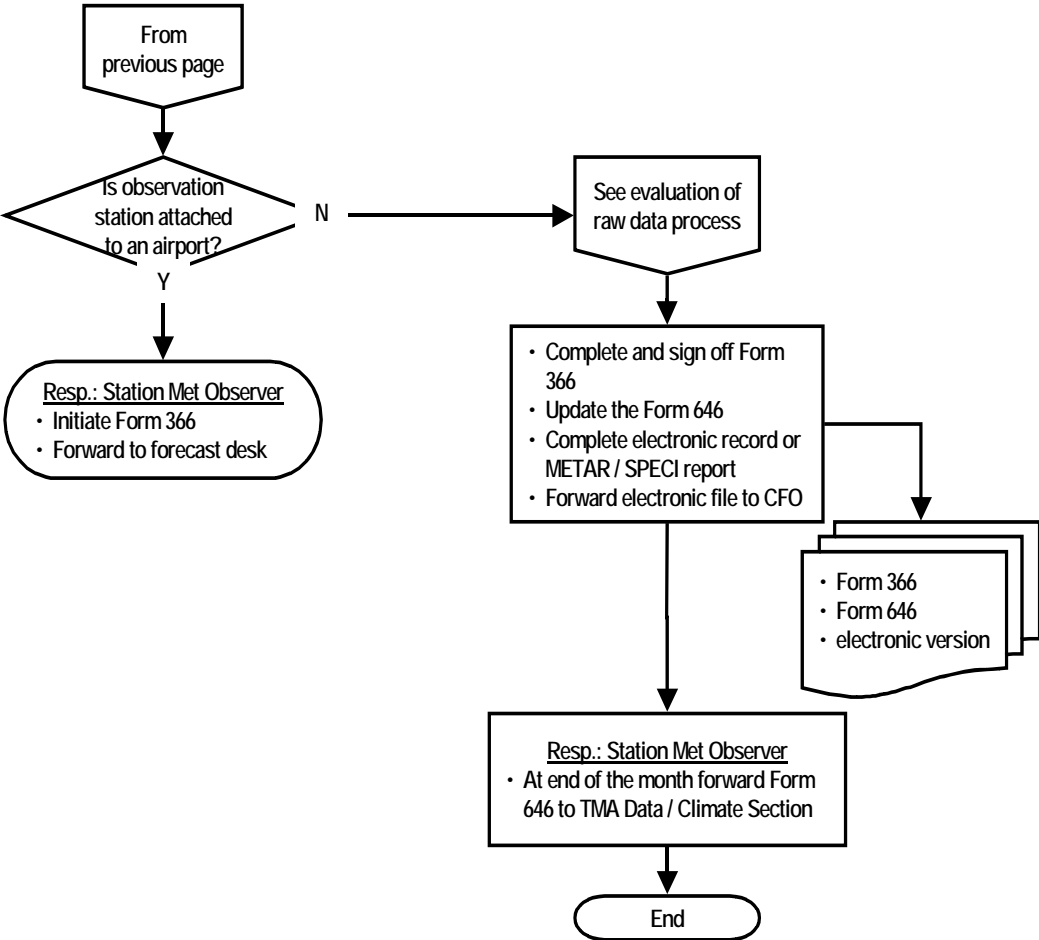
7.5.2 – Validation of processes

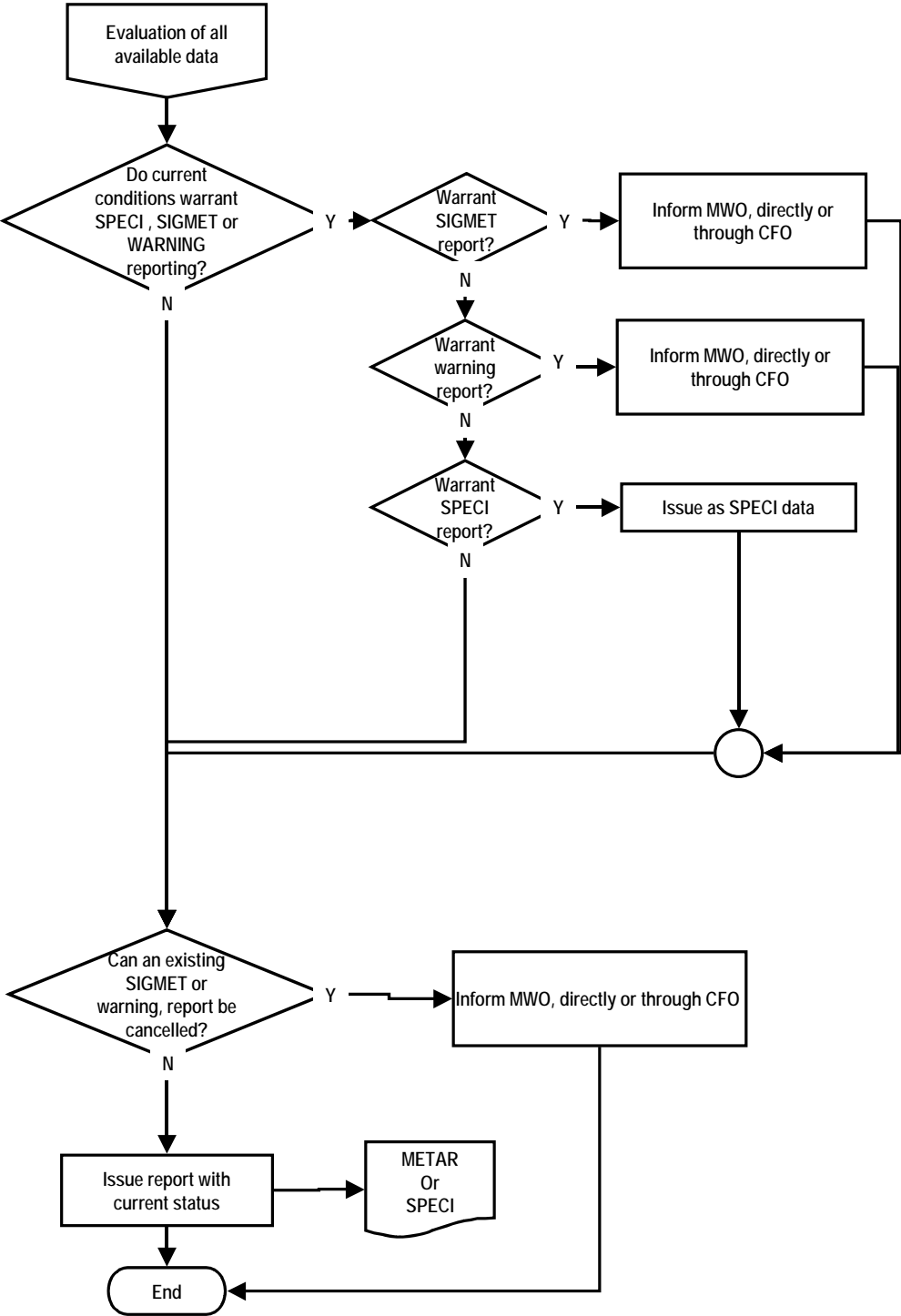
- Validation of the forecaster's data involves a comparison of the actual weather conditions found against the predicted conditions provided by the forecaster.
- OR
- Based on customer feedback.

7.5.3 – Identification and Traceability

- The inspection status of the weather reports is based on sign-offs by the observer and as applicable the duty forecaster at the stations.
- The Traceability of weather related documents and data is maintained using the date and the time (based on GMT) when the observations were made.







DOCUMENT HISTORY

Detailed History of Changes

Latest issue Date	Description of Changes	Reviewed by QMR	Approved by Process Owner
Jan. 22, 2009	Initial Issue		

EXAMPLE OF AN AUDIT REPORT

<p>Procedure No.</p>	<p>If not effectively implemented - Detail non-conformance condition / what should have happened with reference to, CAR #, or observations for opportunities for improvement. Attach copies of procedures, checklists & CAR's audited to this report</p>	
	<p>Objective: <input checked="" type="checkbox"/> Compliant with ISO 9001 std <input checked="" type="checkbox"/> Compliance with documented QMS</p>	<p>Audit date(s): June 3 – 5, 2009 &</p>
<p>400 Rev Or Issue date</p>	<p>Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: Comment: If Observation provide details</p>
<p>423 Rev Or Issue date</p>	<p>Within this audit's scope Audited by: Monica & Geofrid Effectively Implemented & Maintained? Needs Improvement</p>	<p>NC Condition(s): CAR No.: 09-01 numerous tables and work instructions were found at the Observation station, Central Forecasting Office, numerous records were found that were not controlled and therefore do not haved a defined retention time Comment: If Observation provide details</p>
<p>500 Rev Or Issue date</p>	<p>Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: Comment: If Observation provide details</p>
<p>620 Rev Or Issue date</p>	<p>Within this audit's scope Audited by: & Effectively Implemented & Maintained? Needs Improvement</p>	<p>NC Condition(s): CAR No.: 09-02 could not confirm that the professional / educational requirements for the forecastors interviewed existed- no certificates as issued by the educational institute within employee files Comment: If Observation provide details</p>

Procedure No.	If not effectively implemented - Detail non-conformance condition / what should have happened with reference to, CAR #, or observations for opportunities for improvement. Attach copies of procedures, checklists & CAR's audited to this report	
<p>630 Rev Or Issue date</p>	<p>Within this audit's scope Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: 09-03 NC -1 - The layout of the weather station at Dar Es Salaam airport does not meet the requirements of the CIMO guidelines Comment: If Observation provide details</p>
<p>720 Rev Or Issue date</p>	<p>Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: Comment: If Observation provide details</p>
<p>740 Rev Or Issue date</p>	<p>Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: Comment: If Observation provide details</p>
<p>743 Rev Or Issue date</p>	<p>Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: Comment: If Observation provide details</p>

Procedure No.	If not effectively implemented - Detail non-conformance condition / what should have happened with reference to, CAR #, or observations for opportunities for improvement. Attach copies of procedures, checklists & CAR's audited to this report	
<p>750 Rev Or Issue date</p>	<p>Audited by: & Effectively Implemented & Maintained?</p>	<p>NC Condition(s): CAR No.: 09-04 to 08</p> <p>7.5.01 - Observation - May 22, 2009</p> <p>NC 1 - the documented process does not include the various tables and correction factors used by the observers</p> <p>NC 2 procedure references Annex III as the source for the weather station layout should be CIMO Guidelines</p> <p>NC - 4 - the Observers log was being completed on the form itself not in the logbook - form was intended to be the template that the logbook would be laid out</p> <p>7.5.02 - Airport Forecasting Process January 28, 2009</p> <p>NC 1 - there were a number of METARS (366) that were not signed by the forecaster indicating that the QC check had been completed as well there were a number where the date and time of the observation was not recorded - this can lead to a lose of traceability</p> <p>NC - 2 - forecaster's version of ANNEX III is not the latest version</p> <p>NC - 3 - the forecasters are completing form 481 Meteogram this record is not referenced within the documented procedure</p> <p>NC - 4 - the Meteogram record for the day had a lot of missing information for example information from Kilimanjaro observations were missing, many stations shown on the form with no data collected</p> <p>NC - 5 - the instructions for colour coding the information on the Meteogram were not controlled, nor were the forecasters colour coding the Meteogram as per the instructions posted</p> <p>7.5.04 - Briefing Office Process - May 22, 2009</p> <p>NC - 1 - surveys completed by the flight crews are not being forwarded to the Marketing functions in a timely manner</p> <p>NC - 2 - there was no evidence that forms 291A & B were being used</p> <p>NC - 3 - the communication process does not address when the flight crew requests an update on the TAF / METAR / SIGMET information - no way of contacting the forecast office</p> <p>7.5.03 - Central Forecasting May 20, 2009</p> <p>NC - 1 - Forecasters were recording information on Meteogram forms - not documented within the procedure</p> <p>NC - 2 - Daily Weather Summary report is uncontrolled</p> <p>7.5.02 - Communication Process January 28, 2009</p> <p>NC - 1 - Data Monitoring form was being used - not controlled</p> <p>Comment:</p> <p>7.5.01 - there may be some confusion in the documented procedure as to the</p>

Procedure No.	If not effectively implemented - Detail non-conformance condition / what should have happened with reference to, CAR #, or observations for opportunities for improvement. Attach copies of procedures, checklists & CAR's audited to this report	
760	Within this audit's scope Audited by: & Effectively Implemented & Maintained?	NC Condition(s): CAR No.: 09-09 calibration issues with instruments found at the observation station Comment: If Observation provide details
822	Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?	NC Condition(s): CAR No.: Comment: If Observation provide details
830	Within this audit's scope Audited by: & Effectively Implemented & Maintained?	NC Condition(s): CAR No.: 09-10 NC - 1 – the fact that a number of METAR reports were found without proper identification and traceability features but were still considered to be good data –indicates that the employee do not have an understanding of what constitutes nonconforming data. These reports should have been completed or set aside and then the procedure for Nonconforming Product initiated. Comment: If Observation provide details
852	Not included in the scope of this audit Audited by: & Effectively Implemented & Maintained?	NC Condition(s): CAR No.: Comment: If Observation provide details
	Is entire Quality Management System effectively implemented & Maintained?	Auditor(s): _____ Date: ___/___/___

DOCUMENT TRANSMITTAL FORM

Distribution:

-
- Arusha (one manual used by observation station, forecasting desk and briefing desk)
- Bukoba (one manual used by observation station and briefing desk)?
- Dar Es Salaam – Observation station Forecasting desk Briefing Desk
- Dodoma (one manual used by observation station, forecasting desk and briefing desk)
- Kilimanjaro – Observation station Forecasting Desk Briefing Desk
- Mbeya - (one manual used by observation station, forecasting desk and briefing desk)
- Mwanza – (one manual used by observation station, forecasting desk and briefing desk)
- Tabora – (one manual used by observation station, forecasting desk and briefing desk)
- Zanzibar - (one manual used by observation station, forecasting desk and briefing desk) Director's office
- Corporate Level 3 East (Quality Assurance) Corporate Level 3 West (Customer Relations office)
- Corporate Level 4 East (Human Resources) Corporate Level 4 West (Research)
- Corporate Level 5 (future)
- Corporate Level 10 East (CFO) Corporate Level 10 West (Technical Section)
- Other: please specify _____

NEW REVISED DOCUMENT NUMBER _____

LATEST ISSUE DATE: _____ RECALLED ISSUE DATE: _____

Brief Description of Change:

PREPARATORY QUESTIONS TO CANDIDATE PARTICIPANTS OF QMS TRAINING WORKSHOPS

For training involving several Member countries, it is important that that before coming to the QMS training, each candidate gets answers to the following typical questions with respect to their Country.

A: IN PREPARATION FOR QMS IMPLEMENTATION

1. What are your countries' plans for QMS implementation?
2. Has the administration set aside a budget line for QMS?
3. Has the administration earmarked who the Quality Manager would be?
4. Has it appointed the Quality Core Team?
5. Do you have a Quality Policy? Quality objectives?
6. Are the processes followed in the production of data, products and services documented and have you defined persons responsible for these (process owners)
7. Do you have regular meetings with aviation customers and stakeholders? Do you record their satisfaction with services?

B: ADMINISTRATIVE

1. Does your National meteorological Service have a legal framework? E.g. Formed by an act of parliament
2. In your country, who is the Meteorological Authority in accordance with paragraph 2.1.4 in Annex 3?
3. Do you have any service level agreements with the Civil Aviation Authority? With any of the Users of your services?
4. Are you implementing cost recovery for aeronautical meteorological services?

C: OPERATIONAL

1. Are your instrument enclosures laid down according to CIMO Guide? I.e. dimension, Layout, etc?
2. Do you have a Maintenance and calibration record for your instruments?
3. Are the instructions tables and documents available in operational offices? E.g. Annex 3, latest current edition etc?

D: TRAINING

1. Is your staff trained and qualified according to the required qualifications as laid down in WMO No. 258?
2. Do you have a record of staff qualifications, on-the job trainings and refresher courses attended by them?
3. If your staff has obtained training outside your country, do you have any records and certificates of the trainees and the training institutions?