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**ASSOCIATION OF CARIBBEAN STATES (ACS)**

21ST MEETING OF THE SPECIAL COMMITTEE ON TRANSPORT
Port of Spain, Trinidad and Tobago, 20th and 21st September 2012

# PROGRESS REPORT ON QUALITY MANAGEMENT SYSTEMS IN AERONAUTICAL METEOROLOGICAL SERVICES

**Expert Mission Report**

# Strengthening Hydrometeorological Operations and Services in the Caribbean SIDS (SHOCS)
**(MFA intervention code:** 89886501**)**

## 1st Workshop on the implementation of a QMS to Aeronautical Meteorological services

Bridgetown, Barbados
9–13 May 2011

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## 1. Background

This was the first of two consecutive workshops being co-ordinated by the Finnish Meteorological Institute (FMI) and being part of the ICI project SHOCS. The project, funded by the Ministry for Foreign affairs of Finland, is carried out in partnership with the Association of Caribbean States (ACS) and FMI. The overall goal of SHOCS is to enhance the capacity of ACS on strategic planning of the entire process of Disaster Risk Reduction (DRR) and to enhance capacity of National Hydro-Meteorological Services (NMHSs) as well as DRR agencies to contribute to improved safety and preparedness against natural hazards.

Towards this goal, the project has defined the result area: 'Improved capacity of the NMHSs in the beneficiary SIDSs to support development of Quality Managements Systems (QMS). The workshops and guidance provided to NMHSs in aeronautical meteorology is considered as the first building block for NMHSs to further expand standardized quality management principles into all activities of the agency. Building on the experience from these training workshops the feasibility of quality management on the delivery of early weather warnings will be also analysed within the beneficiary SIDS in the next phase of the project.

Majority of Caribbean Meteorological Institutes/Offices are providers of aeronautical meteorological services. These services are regulated by the International Civil Aviation Organisation (ICAO). ICAO has stated that also meteorological service providers should have a Quality Management System in place by year 2012 to guarantee the highest quality, particularly in terminal weather observations and weather forecasts.

The present and remaining Activities on QMS training as specified in the SHOCS Project Document are as follows:

**Activity 2.4** 1st QMS workshop on building a roadmap to the ICAO requirements (this mission)

**Activity 2.5** Evaluation of the documentation prepared by participating NMHSs and online assistance to NMHSs (to be carried out in May-November 2011)

**Activity 2.6** 2nd QMS workshop, review of assignments and conclusions (tentatively scheduled to 5-9 Dec 2011)

## 2. Objectives of the 1st QMS workshop

The objectives of this 1st workshop were to

- analyze the existing degree of the ISO 9001:2008 Quality Management System (QMS) implementation among participating organization;
- give practical training what QMS is and how to implement a QMS to weather services;
- plan next steps needed in organizations in QMS implementation.

## 3. Workshop arrangements and documentation

The workshop was held at the Caribbean Institute of Meteorology and Hydrology (CIMH), in Bridgetown, Barbados. The announcements of the workshop were sent in February-March 2011 widely to all Governments and National Meteorological Institutes/Offices of the 25 ACS member states. Full support for travel, accommodation and daily subsistence allowance was offered for the 16 beneficiary SIDS of the SHOCS-project. Participation from other countries was welcomed, but they were advised to seek funding from other sources.

NMSs were asked to nominate a Quality Manager to participate in the training and to fill in a questionnaire on their present status as regards quality management applied in their institute. The quality managers were also invited to work on assignments during the intermediate period of workshops in order to lead the development of a QMS according to the ISO 9001-2008 in their Institute/Office.

A questionnaire was sent in advance along with the invitation to perform a 'Gap' analysis on the state of QMS blocks at each participating Meteorological Institute/Office. This questionnaire will be recirculated during the intermediate period and at the end of the 2nd workshop to evaluate the progress achieved.

All together 19 meteorological services/offices from the Caribbean SIDS participated:

- Countries (15) supported by the SHOCS project were: **Antigua and Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and Grenadines, Suriname** and **Trinidad and Tobago**;
- Participation of **Anguilla, British Virgin Islands** and **Cayman Islands** was supported by CMO.
- Participation of **Curacao** was supported by FMI.

The material related to the workshop is organised in the Appendices as follows:

**Appendix 1** Agenda

**Appendix 2** List of participants

**Appendix 3.** Article on The Barbados Advocate

**Appendix 4.** Photos

During the opening session addresses were delivered by the following speakers:

- Dr. David Farrell; Principal Caribbean Institute of Meteorology and Hydrology
- Ambassador Pasi Patokallio, Ministry of Foreign Affairs of Finland
- Mr. Hampden Lovell, Director of Meteorological Department, Government of Barbados
- Mr. Eduardo Gonzalez; Director of Transport and Disaster Risk Reduction, ACS
- Dr. Herbert Puempel, Chief of Aeronautical Meteorology Division, WMO
- Mr. Alain Boisvert, Chief of Quality Management, Meteorological Service of Canada
- Dr. Martti Heikinheimo, SHOCS project co-ordinator, FMI
- Mr. Heikki Juntti, Quality Manager, FMI

A press release was prepared in co-operation with FMI and ACS and the event was notified in next day's paper of The Barbados Advocate.

## 4. QMS situation in participating organizations

In the gap analysis the QMS implementation was divided 26 blocks. Each country estimated its level of readiness (0-10) in each block. Based on the questionnaire sent to the participants, an overall situation of the state of the QMS implementation is summarized in Table 1. At the bottom line of Table 1 the average stages of each block is given in percentages maximum possible. Similarly the average fulfilments of the blocks for each NMSs is indicated in the right most column of the table. This gives an estimate of the overall degree of implementation also indicated with different colours. This is a rough estimate, however, as the blocks are not similar in workload.

Table 1.Gap analysis on the state of QMS blocks at each participating Meteorological Institute/Office based on a questionnaire filled in prior to the workshop, (0 = element not started...10 = element completed/ in full use).

| Country | Customer requirements are known and described in written format | Directors are committed to use Quality Management principles, e.g. managing activities through processes? | Your organisation has nominated a Quality Manager? | Quality policy exists and it is communicated through the organization | Quality objectives have been defined and written in Quality Manual | Process descriptions have been completed | Interaction between processes have been described | Customer communication process exists | Corrective and preventive action process is described and working | Corrective actions have been followed up and their effectiveness measured | Purchasing process is in control It means that you have speded requirements for data (observations, model output etc) and services you need for your production | Personnel competence requirements have been defined and the personnel meets them (e.g. for observers and forecasters minimum requirement is WMO 258 + supplement requirements) | Organization chart has been drawn | Responsibilities for each task/position have been defined | Management review (look at ISO 9001 standard, chapter 56) is in active use | Audit plan exist and Internal audits are used as management tool | Control of documents is described and is working in practice | Work instructions are documented and maintained Procedures and responsibilities for | Records required by the standard exists and are maintained | Quality Manual is written and communicated | Quality measures have been defined They are consistent with quality policy and measurable | Your organization measures customer satisfaction | You have specified indicators to measure the quality of products and services | Human resources to support QMS are allocated | Training on QMS issues is in control (ie your managers, staff, auditors etc are trained for their tasks) | Financial resources to develop/maintain QMS are allocated | Need for external consultancy to establish QMS in your organisation | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Anguilla | 7 | 5 | 10 | 7 | 8 | 8 | 8 | 9 | 7 | 4 | 4 | 6 | 10 | 6 | 4 | 5 | 6 | 6 | 0 | 6 | 3 | 2 | 4 | 5 | 3 | 3 | 4 | 56 |
| Antigua & Barbuda | 5 | 10 | 10 | 2 | 7 | 5 | 5 | 9 | 1 | 5 | 5 | 10 | 10 | 5 | 0 | 0 | 2 | 2 | 4 | 0 | 0 | 2 | 5 | 10 | 5 | 0 | 0 | 46 |
| Bahamas | 5 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 10 | 10 | 3 | 0 | 2 | 0 | 0 | 0 | 3 | 0 | 0 | 10 | 3 | 5 | 10 | 32 |
| Barbados | 5 | 5 | 10 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| Belize | 7 | 7 | 10 | 0 | 0 | 2 | 0 | 8 | 2 | 0 | 5 | 8 | 10 | 9 | 0 | 0 | 4 | 5 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 |
| British Virgin Islands | 5 | 10 | 10 | 6 | 8 | 5 | 5 | 5 | 5 | 0 | 8 | 8 | 10 | 6 | 5 | 6 | 8 | 8 | 8 | 5 | 6 | 6 | 8 | 6 | 6 | 6 | 6 | 65 |
| Cayman Islands | 1 | 8 | 10 | 5 | 3 | 5 | 0 | 5 | 0 | 0 | 0 | 9 | 8 | 7 | 0 | 4 | 4 | 6 | 7 | 2 | 4 | 0 | 4 | 4 | 4 | 9 | 0 | 42 |
| Curacao | 5 | | 0 | 0 | 5 | 5 | 5 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | | 0 | 0 | 5 | 0 | 5 | 5 | 19 |
| Cuba | 8 | 10 | 0 | 8 | 8 | 10 | 7 | 10 | 0 | 0 | 0 | 10 | 10 | 10 | 0 | 0 | 0 | 6 | 5 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 41 |
| Dominica | 4 | 8 | 3 | 5 | 0 | 4 | 0 | 5 | 1 | 1 | 0 | 10 | 8 | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 5 | 5 | 0 | 0 | 1 | 1 | 0 | 25 |
| Dominican Republic | 10 | 10 | 10 | 8 | 7 | 7 | 8 | 8 | 10 | 10 | 10 | 10 | 10 | 8 | 10 | 10 | 10 | 10 | 9 | 7 | 8 | 10 | 10 | 8 | 8 | 8 | 8 | 90 |
| Grenada | 5 | 4 | 8 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 1 | 6 | 9 | 4 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 | 20 |
| Guyana | 7 | 10 | 10 | 8 | 10 | 5 | 8 | 5 | 5 | 5 | 10 | 10 | 10 | 7 | 4 | 3 | 4 | 8 | 4 | 1 | 5 | 0 | 5 | 6 | 4 | 0 | 3 | 59 |
| Jamaica | 5 | 10 | 10 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 6 | 8 | 8 | 0 | 0 | 0 | 2 | 3 | 5 | 0 | 0 | 0 | 4 | 5 | 2 | 6 | 5 | 29 |
| St Kitts & Nevis | 8 | 0 | 2 | 8 | 0 | 0 | 0 | 3 | 4 | 4 | 2 | 9 | 2 | 0 | 0 | 0 | 0 | 8 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 21 |
| St Lucia | 6 | 10 | 0 | 8 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 3 | 3 | 0 | 0 | 0 | 0 | 6 | 6 | 10 | 10 | 25 |
| St Vincent & Grenadines | 8 | 10 | 10 | 8 | 10 | 7 | 8 | 0 | 3 | 4 | 0 | 10 | 10 | 10 | 4 | 0 | 7 | 10 | 7 | 8 | 10 | 7 | 9 | 0 | 0 | 1 | 0 | 62 |
| Suriname | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 10 | 10 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 8 | 0 | 8 | 10 | 0 | 0 | 31 |
| Trinidad & Tobago | 5 | 9 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 5 | 7 | 8 | 8 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 1 | 1 | 2 | 1 | 5 | 9 | 37 |
| | 56 | 76 | 67 | 46 | 37 | 35 | 30 | 53 | 22 | 19 | 33 | 72 | 87 | 51 | 18 | 16 | 28 | 51 | 33 | 18 | 27 | 22 | 29 | 36 | 29 | 31 | 36 | 39 |

## 5. Results of the activity

After this 1st workshop it was expected that the participating organizations have good knowledge about the structure of the ISO 9001:2008 standard and ideas on how it has been implemented at other NMS. The organizations have also started making a project plan or a roadmap on actions needed to achieve their stated goal for a QMS.

Countries at starting stage in QMS implementation are:

- Barbados
- Curacao
- Dominica
- Grenada
- Jamaica
- St. Kitts (and Nevis)
- St. Lucia

Countries that have done some work, but are still at an early stage of QMS implementation, are:

- Antigua and Barbuda
- Bahamas
- Belize
- Cayman Islands
- Cuba
- Suriname
- Trinidad and Tobago

Countries that have started QMS, but less than half of it has been completed, are:

- Anguilla
- British Virgin Islands
- Guyana
- St Vincent and Grenadines

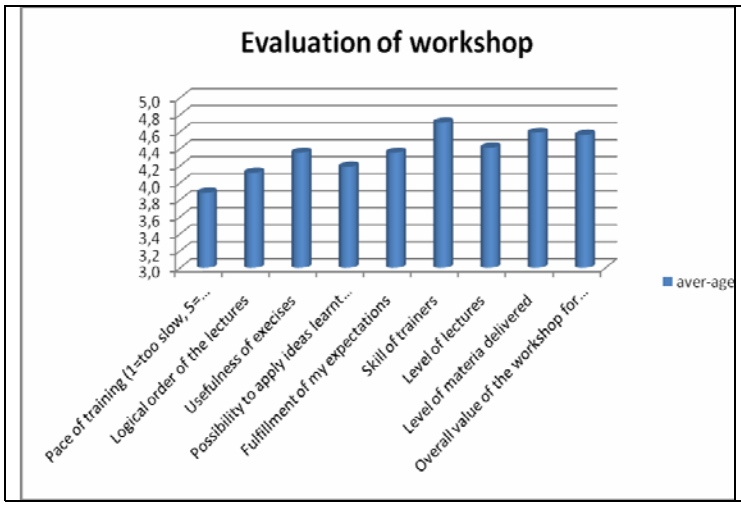
Of the countries participated, only Dominican Republic was nearly ready for certification.

## 6. Feedback from workshop participants

Based on an evaluation questionnaire delivered after the workshop, the feedback from participants was overall very positive in the covered aspects. On the other hand, participants commented on 'too fast pace' of the training and expressed their frustration on the 'very long transport time' from the accommodation to the training site. The overall ratings (using scaling: 1=poor … 5= excellent) in different categories are illustrated in Figures 1 and 2. and the summary data is presented in the Table 3.

Table 3. Results on workshop evaluation.

| | | 1 | 2 | 3 | 4 | 5 | | |
|---|---|---|---|---|---|---|---|---|
| | Question | use-less | poor | useful | good | excel-lent | aver-age | ans-wers |
| 1 | Pace of training (1=too slow, 5= too fast) | | | 3 | 13 | 1 | 3,9 | 17 |
| 2 | Logical order of the lectures | | | 1 | 13 | 3 | 4,1 | 17 |
| 3 | Usefulness of execises | | 1 | | 8 | 8 | 4,4 | 17 |
| 4 | Possibility to apply ideas learnt during the workshop | | | 2 | 9 | 5 | 4,2 | 16 |
| 5 | Fulfillment of my expectations | | 1 | 1 | 6 | 9 | 4,4 | 17 |
| 6 | Skill of trainers | | | | 5 | 12 | 4,7 | 17 |
| 7 | Level of lectures | | | 1 | 8 | 8 | 4,4 | 17 |
| 8 | Level of materia delivered | | | 1 | 5 | 11 | 4,6 | 17 |
| 9 | Overall value of the workshop for QMS development | | | 1 | 5 | 10 | 4,6 | 16 |
| **Average** | | | | | | | **4,4** | |
| | Question | use-less | poor | useful | good | excel-lent | aver-age | ans-wers |
| 10 | Quality of accommodation | | | 4 | 11 | 2 | 3,9 | 17 |
| 11 | Quality of catering services | | | | 8 | 9 | 4,5 | 17 |
| 12 | Quality of transportation | | | 1 | 7 | 9 | 4,5 | 17 |
| 13 | Quality of venue | | | 4 | 9 | 4 | 4,0 | 17 |
| 14 | Overall quality of arrangements | | | | 12 | 5 | 4,3 | 17 |
| **Average** | | | | | | | **4,2** | |



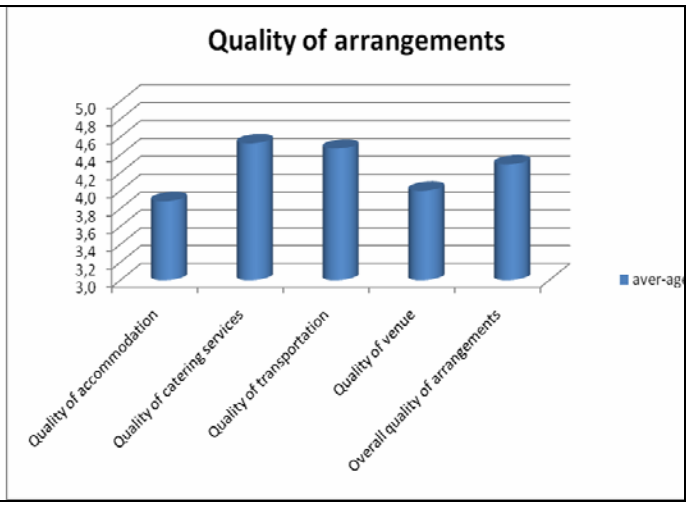




Figure 1. Overall satisfaction on the training.

Figure 2. Overall satidfaction on the arrangements.

Main findings from the evaluation are as follows (+ positive, - to improve):

**+ exercises**
**+ group work**
**+ exchange of opinions with others**
**+ expertise of trainers**
**+ presentations, easy to understand, practical**
**- air condition in classroom**
**- journey from hotel to training place**
**- internet connection slow**

Wishes for next workshop were:

- **Timing 4-6 months + possibility consultation before that**
- **Same format as now**
- **Some other island (proposed locations: St Lucia, Dominica)**
- **1 week workshop**

7. Support still needed and plans to continue the activity

There are still some basic elements of QMS, which were not included in the 1st workshop. In the coming 2nd workshop, these elements will be covered and more in-depth attention will be given to those quality management blocks that are most demanding to implement.

Based on the gap reports given by the participating organizations, it seems that the least covered areas in QMS implementation are:

- Corrective actions have been followed up and their effectiveness measured
- Management review is in active use
- Audit plan exist and internal audits are used as management tool
- Quality Manual is written and communicated
- Corrective and preventive action process is described and working
- Control of documents is described and is working in practice
- Quality measures have been defined and they are consistent with quality policy and measurable
- Organization measures customer satisfaction
- Organization has specified indicators to measure the quality of products and services
- Training on QMS issues is in control (managers, staff, auditors etc. are trained for their tasks)

Next steps in this part of project are as follows:

- **New gap analysis done by the organizations by July 2011**
- **Project plan / roadmap to implementation by August 2011**

On line support will be given to the organizations to produce these as well as advising them how to go on during the time between workshops 1 and 2.

The preliminary agenda of the 2nd workshop will include at least the following topics:

- **Progress of participating organizations**
- **Roadmaps of organizations**
- **Audits**
- **Customer satisfaction**
- **Improving (measures, handling of nonconformities etc.)**

- **Comparison of the QMSs between the organizations**

The 2nd workshop will be held at the beginning of December on one the Caribbean islands. For the successful implementation of QMS it is considered essential that the participating countries send the same persons who were present at the 1st workshop to participate the 2nd workshop. At the 2nd workshop the venue and accommodation will be at the same location, eliminating the need for daily transport and creating an atmosphere of unity.

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**Appendix 1. Workshop agenda**

## 1st Workshop on the implementation of a QMS to Aeronautical Weather Services

### Agenda

Caribbean Institute of Meteorology and Hydrology
Bridgetown, Barbados 9–13 May 2011

Refreshment breaks: Tea/coffee 10:30 Lunch 13:00-13:45 Tea/coffee 15:00

| | |
|---|---|
| **Monday 9 May** 09:00 – 16:30<br><br>• Opening remarks<br>• Group photo<br>• Introduction of participants<br>• About FMI and QMS, **Mr. Heikki Juntti, FMI**<br>• Roles of international organizations in QMS implementation**,Dr. Herbert Puempel, WMO**<br>• Experiences on a QMS at Meteorological Service Canada**, Mr. Alain Boisvert. MSC**<br>• Participant presentations on the status of QMS in the Caribbean NMSs (15 min/country):<br><br>18:30 Ice Breaker (BBQ Buffet) at Hotel Accra Beach Fig Tree restaurant | **Thursday 12 May** 09:00 – 15:00<br>Training sessions and working groups:<br>• Monitoring and measuring (30 min)<br>• Case example: handling of nonconformities and improvements in Environment Canada, **Mr. Alain Boisvert**<br>• Internal audits<br>• Management review<br>• Continuous improvement<br>• Documentation in QMS<br>• GAP analysis of NMS situation against ISO 9001:2008 certification requirements<br>• Planning to fill the gaps for each country and writing a roadmap<br><br>**Time for sightseeing, shopping etc. in Bridgetown** |
| **Tuesday 10 May** 09:00 – 16:30<br>Training sessions and working groups:<br>• What is the Quality Management System (QMS)?<br>• How to implement ISO 9001 QMS to weather services?<br>• Customer focus | **Friday 13 May** 09:00 – 14:30<br>Conclusions and preparing the roadmap:<br>• Internal audit exercise<br>• Roadmap to future. How to go on?<br>• Workshop feedback<br>• Workshop closure |
| **Wednesday 11 May** 09:00 – 16:30<br>Training sessions and working groups:<br>• Invited presentation: Applying QMS in extreme weather warning services;**Mr. Patrick Van Grunderbeeck**, **Météo-France**, Inter-Régional pour les Antilles et la Guyane<br>• Quality policy and quality objectives | **Acronyms:**<br><br>ACS= Association of Caribbean States<br>QMS = Quality Management System<br>NMS = National Meteorological Service<br>FMI = Finnish Meteorological Institute<br>DRR = Disaster Risk Reduction<br>EWS= Early warning Service<br>MSC= Meteorological Service Canada |

**Appendix 1. Workshop agenda**

| | |
|---|---|
| • Competence requirements<br>• Processes<br>• Management commitment<br>• Production | CIMH= Caribbean Institute of Meteorology and Hydrology<br>CMO= Caribbean meteorological Organisation |

**Contact info of organisers:**

| | |
|---|---|
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| **Ms. Sandra Fonseca**<br>Workshop Secretary<br>Directorate for Transport and Disaster Risk Reduction<br>Association of Caribbean States<br>5-7 Sweet Briar Road<br>P.O. Box 660 Port of Spain<br>Trinidad and Tobago<br>E-mail: sfonseca@acs-aec.org<br>Tel: +868 622 9575 Ext 251<br>Fax: +868 622 1653<br>(Stay at Hotel Accra Beach) | **Caribbean Institute for Meteorology and Hydrology (CIMH) Bridgetown - RTC Barbados**<br>Husbands, St. James, P.O. Box 130<br>BRIDGETOWN, Barbados, W.I.<br><br>Tel: 246 425-1362/65<br>FAX: 246 424 4733<br><br>**Principal: Dr. David Farrell**<br>Email: dfarrell@cimh.edu.bb |

**Appendix 1. Workshop agenda**

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**Appendix 2. List of Participants, trainers and secretariat**

## List of participants, trainers and secretariat.

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[1] Invited as a SHOCS beneficiary country. Could not participate.

## Appendix 4. Photos

# Meteorological services embark on training

By Tanya Lightbourne

METEOROLOGICAL services throughout the Caribbean region are working towards being ISO (International Organisation for Standardisation) certified by 2012.

To achieve this, officials are meeting this week at the Caribbean Institute of Meteorology and Hydrology in Husbands, St. James to take part in the first of two workshops initiated through a new project which was signed between the Association of Caribbean States (ACS) and the Finnish Meteorological Institute in March this year.

During the opening ceremony yesterday, it was explained that the first workshop will aim at building capacity meteorological institutes and offices with the 20 Caribbean Small Island Developing States (SIDS), to establish a Quality Management System (QMS) for their Aeronautical Meteorological Services.

According to Dr. Hampden Lovell, Director of the Barbados Meteorological Services, the region has been urged to receive this certification by next year.

He acknowledged that SHOCS, as it is called, will be strengthening the hydro-meteorological operations and services in the Caribbean SIDS.

"These QMS training workshops will be carried out in

WORKSHOPS on Page 4



# Implications for aviation safety

WORKSHOPS from Page 1

co-operation with the World Meteorological Organisation (WMO), the Caribbean Meteorological Organisation (CMO) and the International Civil Aviation Organisation (ICAO), as they help to build the road map towards a standardised QMS as required by the civil aviation providers by 2012," he said.

Dr. Lovell pointed out that the objective of a meteorological service to air navigation is to contribute toward the safety, regularity and efficiency of air navigation.

"A major component of the WMO Quality Management Framework is therefore the close co-operation with the International Civil Aviation Organisation, in ensuring that the Meteorological Services provided for air navigation are the highest quality, particularly Terminal Weather Observations and Terminal Weather Forecasts."

He further noted that during the workshop participants will also look at GAP analysis of the various Meteorological Services so as to evaluate the present systems and how best to move these towards international standards.

# Finland aids in strengthening regional meteorological operations

**THE Government of Finland, through the Finnish Meteorological Institute (FMI), continues to help strengthen the operations of meteorological services in the Caribbean region.**

Their commitment was once again signalled yesterday by Ambassador Pasi Patokallio, Special Representative of the Minister for Foreign Affairs, during the opening of the first of two workshops organised by the FMI, being held at the Caribbean Institute of Meteorological and Hydrology, Husbands St. James.

Addressing the regional participants, Ambassador Pasi recalled that his country's support to the Caribbean goes back ten years, with projects initiated at improving weather observation networks.

According to the Ambassador, training and capacity building is at the heart of all the FMI's projects supported by Finland.

He acknowledged that the Strengthen Hydro-meteorological Operations and Services in the Caribbean SIDS (SHOCS) project being embarked on this week is an important endeavour.

"An important part of the SHOCS project will be assistance in setting up a quality management system for aviation weather services. Such a system will soon be an International Civil Aviation Organisation (ICAO) requirement. The training offered under SHOCS starting this week, will go a long way towards meeting the ICAO requirement," he explained.

The Ambassador further indicated how important aviation and the attendant weather services are to this region's unique meteorological conditions; which include storms, hurricanes, flooding and even earthquakes.

"A quality management system (QMA) is a necessary tool to ensure that weather warnings, for example, are received and properly interpreted, and broadcasted to the general public in a timely fashion. It plays a key role in the broader context of early warning and disaster management," he stated. (TL)

From left: Dr. Hampden Lovell, Director of the Barbados Meteorological Services, speaking with Principal of the Caribbean Institute of Meteorology and Hydrology, Dr. David Farrell, during the first workshop on the Implementation of Quality Management System (QMS) for Aviation weather services, yesterday at the Institute.

From left: Ambassador Pasi Patokallio, Special Representative of the Minister for Foreign Affairs, and Dr. Hampden Lovell, Director of the Barbados Meteorological Services, during the first workshop on the Implementation of Quality Management System (QMS) for Aviation weather services, yesterday at the Institute.

**Expert Mission Report**
**v. 1.1**

# 2nd Workshop on the implementation of a QMS to Aeronautical Meteorological services

Rodney Bay, Saint Lucia
5–9 December 2011

**prepared by**

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## 1. Background

This was the second of two consecutive workshops being co-ordinated by the Finnish Meteorological Institute (FMI) and being part of the SHOCS. The project, funded by the Ministry for Foreign affairs of Finland, is carried out in partnership with the Association of Caribbean States (ACS) and FMI. The overall goal of SHOCS is to enhance the capacity of ACS on strategic planning of the entire process of Disaster Risk Reduction (DRR) and to enhance capacity of National Hydro-

Meteorological Services (NMHSs) as well as DRR agencies to contribute to improved safety and preparedness against natural hazards.

Included within this overall goal, is the following project result outcome: 'An improved capacity of the NMHSs beneficial to the SIDSs (Small Island Developing State) to support their development of Quality Managements Systems (QMS).

The Activities on QMS training as specified in the SHOCS Project Document are as follows:

**Activity 2.4** 1st QMS workshop on building a roadmap to the ICAO requirements (9-13 May, 2011)

**Activity 2.5** Evaluation of the documentation prepared by participating NMHSs; online assistance to NMHSs

**Activity 2.6** 2nd QMS workshop, review of assignments and conclusions (5-9 Dec, 2011)

## 2. Objectives of the 2nd QMS workshop

The objectives of this 2nd workshop were to:

- Analyse the existing status of the ISO 9001:2008 Quality Management System (QMS) implementation among participating organization;
- Deliver practical training on what a QMS is and how to implement a QMS for weather services, concentrating on the areas where the biggest gaps in the implementation are. Specific training on the use of internal audit as a management tool will also be delivered.
- Discuss among the countries what additional assistance might be needed for QMS implementation.
- Build a community of best practices and a network amongst the participating countries.

## 3. Workshop arrangements and documentation

The workshop was held at the Bay Gardens Hotel in Saint Lucia. The feedback received following the 1st workshop that it would be more efficient to have the workshop venue in the same place where the accommodation is. The location of the workshop was very efficient, all logistic arrangements performed well and the staff of the resort was very helpful. The place was ideal for establishing a network and

mutual interaction between participants, which was also the one objective of the workshop.

The key note speakers at the opening session were:

- Dr. Martti Heikinheimo, SHOCS Project Co-ordinator Finnish Meteorological Institute.
- Ambassador Mikko Pyhälä, Ministry of Foreign Affairs for Finland
- Ambassador Luis Andrade Falla, Director General, ACS
- Mr. Tyrone Sutherland, Coordinating Director Caribbean Meteorological Organization
- Dr. Herbert Puempel, Chief, Aeronautical Meteorology Division WMO.
- Mr. Alain Boisvert, Quality Manager, Meteorological Service of Canada
- Mr. Heikki Juntti, Lead Trainer of the QMS workshop

The Honorary Consul of Finland in St. Lucia, Mrs. Berthia M. Parle, also attended the opening session.

All together 19 Meteorological Services/Offices from the Caribbean SIDS participated:

- Countries (14) supported by the SHOCS project were: **Antigua and Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and Grenadines, Suriname** and **Trinidad and Tobago**;
- Participation of **British Virgin Islands** and **Cayman Islands** was supported by CMO.
- Participation of **Curacao** was supported by FMI.
- Two new countries, not present in the 1st workshop were **Aruba** and **St Maarten** were supported by WMO.
- Two countries (**Guyana and Anguilla)**, which participated to the first workshop were not represented at this workshop.

The material related to the workshop is organised in the Appendices as follows:

**Appendix 1** Agenda

**Appendix 2** List of participants

**Appendix 3** Evaluation of the workshop

**Appendix 4** Results of gap analysis on the degree of implementation of separate QMS elements for Aeronautical meteorological Services of the participating Caribbean NMSs during the 2nd workshop (12/2011).

## 4. Assessment of the progress of QMS implementation

### 4.1 Results of the GAP analysis

After the 1st workshop (5/2011) online support was made available to participating countries, this included consultation on the roadmaps (towards fulfilling the requirements of the Standard), process charts and quality manuals delivered in advance. Documents were reviewed and commented by the workshop trainers remotely. Unfortunately, only a few of the participants took advantage of this opportunity. It was noticed during the on-line support phase and at the 2nd the workshop that some organizations had a tendency to copy the text directly from The Standard to their quality manual. This is not the purpose of the quality manual and this practice is strongly discouraged. There was further evidence that some consultation companies were advising organizations to do that.

In the beginning of the 2nd workshop we had a quick revision on the status of QMS implementation, focusing on issues showing biggest gaps. Another major theme was to train the participants to acquire the skills needed to start conducting internal audits within their organization. This was achieved mostly by interactive hands-on exercises. During the last two days the participants were guided through the construction of process charts for their organizations. Participants were allocated in three working groups:

1. NMSs producing only observations

2. NMSs producing observations and forecasts, but only covering the national area

3. NMSs producing observations and forecasts, and also providing services to other (category 1) NMSs.

Sharing of the draft documentation and experiences interactively within working groups enhanced the learning of participants to develop process descriptions.

Table 1. Degree of QMS implementation for the participating NMSs (right) expressed as percentage of full implementation required for certification. The assessment was based on a gap analysis performed after the 1st workshop (5/11) and during the 2nd workshop (12/11). Table on the left shows the percentage of NMSs in three readiness categories (see text).

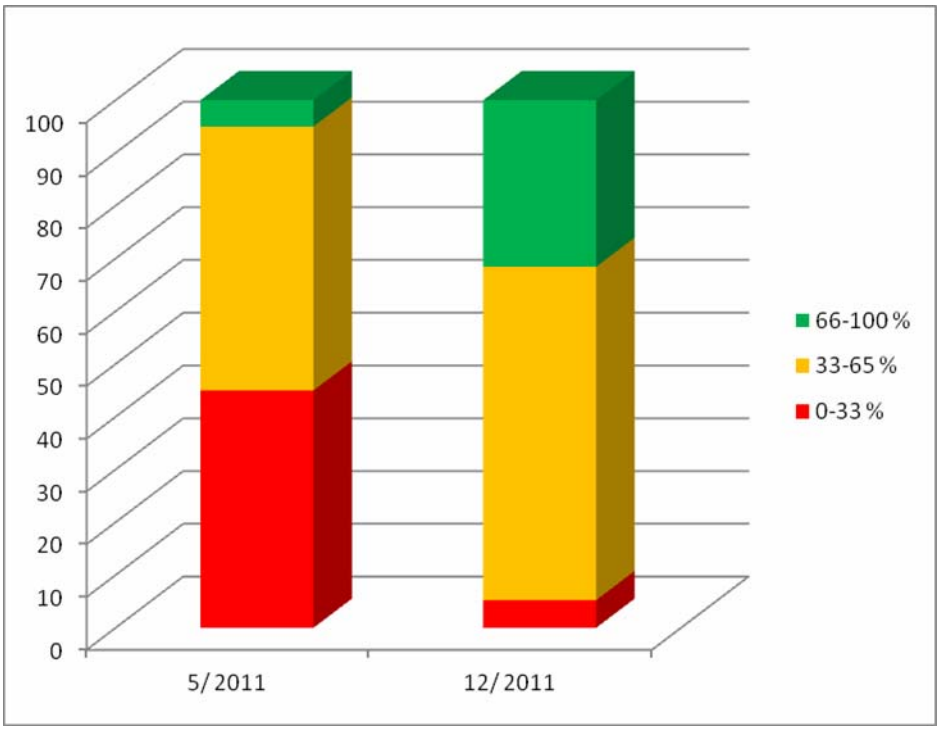
| | | |
|---|---|---|
| Anguilla | 56 | |
| Antigua & Barbuda | 46 | 54 |
| Aruba | | 84 |
| Bahamas | 32 | 58 |
| Barbados | 15 | 36 |
| Belize | 30 | 51 |
| British Virgin Islands | 65 | 74 |
| Cayman Islands | 42 | 58 |
| Curacao | 48 | 63 |
| Cuba | 41 | 70 |
| Dominica | 25 | 41 |
| Dominican Republic | 90 | 76 |
| Grenada | 20 | 57 |
| Guyana | 59 | |
| Jamaica | 29 | 18 |
| St Kitts & Nevis | 21 | 34 |
| St Lucia | 25 | 57 |
| St Maarten | | 57 |
| St Vincent & Grenadines | 62 | 76 |
| Suriname | 31 | 76 |
| Trinidad & Tobago | 37 | |

| Level of QMS implementation | Workshop | | |
|---|---|---|---|
| | **5/ 2011** | **12/ 2011** | |
| 0-33 % | 45 | 5 | % |
| 33-65 % | 50 | 63 | % |
| 66-100 % | 5 | 32 | % |
| | 100 | 100 | |

To evaluate the progress of implementation of the QMS elements, a so called gap analysis was performed two times during the workshops: (1) after the 1st workshop (see report on the 1st workshop) and (2) during the 2nd workshop. The gap analysis performed during the 2nd workshop was based on a questionnaire produced by the WMO (Bryan Boase, Bureau of Meteorology, Australia). This analysis covered the same main elements as the one used for the 1st workshop, but contained more sub-elements for evaluation[1]. To quantify the ratings on the degree of QMS implementation, a 10-category (1-10) and a 3-category scale (1-3) was originally used for the gap analyses at the time of the 1st and 2nd workshops, respectively. In comparing the results between the workshops, all ratings were re-scaled into percentages between 0 - 100%. For a coarse overview, ratings were further categorized as: 'Low level': 0-32%, 'Mid level': 33-66% and 'High level': 67-100% of implementation. The ratings analysed here represented a qualitative estimate performed by the participants themselves on their own organisation.

The level of QMS implementation of the NMSs at the time of 2nd workshop and the progress made after the 1st workshops was evaluated by using the coarse three category rating; see Table 1 and Figure 1. For example, the overall number of NMSs rated as starters (0-32%) decreased from 45% to 5% by the time of the 2nd workshop. The corresponding increase of NMSs in the 'most advanced' (67-100%) category increased from 5% to 32%.

[1] The QMS elements evaluated for the gap analyses are listed in the summary tables appearing in the Appendices of the two workshop reports.




Picture 1. Graphical illustration on the degree of QMS implementation for data in Table 1, right side.

Of those countries that participated in both workshops, greatest increase in the scores (>25 %-units), was achieved by Bahamas, Cuba, Grenada, St Lucia and Suriname. The lowered scores of Jamaica and Dominican Republic only show the uncertainty of the method rather than real decrease of the stage of implementation. It is noted that the 2nd rating by Jamaica may not have been representative because of the change of person between the workshops. As regards Dominican Republic, it is noted the degree of implementation remained nevertheless at a high level. The conclusion in case of Jamaica and Dominican Republic is that the implementation remained nearly at the same level between the workshops. Missing values (n/a) signify that either the country did not participate or did not submit a gap assessment. Finally, NMSs being relatively close the certification (rating 67 or more) were: Aruba, British Virgin Islands, Cuba, Dominican Republic, Saint Vincent and The Grenadines and Suriname

## 4.2 Conclusions on the experiences by participants and trainers

Based on the discussions during the workshops it was felt that NMSs with sound commitment by directors and managers were best able to make progress in implementing a QMS. For example, if at the start of implementation the managing culture differs significantly from the one outlined by a QMS, if not addressed carefully, this situation can raise internal conflicts in the management of production/service processes. This can only be overcome by having the directors to

fully follow the principles of a QMS. Only then it will be possible for the organization to develop a QMS that is fully integrated and benefited.

During the two workshops every QMS element of the ISO9001:2008 Standard was covered by introducing a lot of examples and exercises. From the training point of view, emphasis was given on good knowledge on requirements of the Standard and demonstrating practical methods on how to implement procedures to meet these requirements. Along with the progress of QMS implementation after these workshops, it is expected that more practical questions will be raised by many NMSs. As a consequence we can expect that further requests for support will be required.

These workshops offered the participants a great opportunity to build a contact network to be benefited in the future. The situation of the NMS was quite similar and they clearly benefited of the sharing and learning from each other. This was also facilitated by the division into three working groups during the 2nd workshop.

The experiences of the participants and trainers for the QMS implementation can be summarised as follows:

- It is beneficial to have an officially named person (normally a quality manager) responsible for QMS issues within the organization
- The executive directors play a key role in defining the management structures and tools: processes, audits etc.
- Senior managers and executive directors need to be well informed and committed (preferably through training and information sessions) on how to use the QMS efficiently; e.g. how to apply improvements and how to fully integrate QMS principles and methods within the entire organization.
- The participants of this workshop have acquired sufficient knowledge to carry out the QMS implementation in their services. There is no need for further training workshops, however, some countries will still need targeted hands-on guidance for implementation.
- It appears that issues related to organisation culture may hinder use of QMS principles efficiently.
- If an organization uses an external consultant for QMS implementation, one must ensure that the consultant really tailors a QMS to reflect the business/mission of the particular meteorological organization.

## 5. Evaluation of the workshop

The level of satisfaction of the participants was evaluated using a questionnaire distributed at the end of the workshop. The results are summarized in Appendix 3. This workshop attained an average satisfaction score of 4.1 (out of 5), compared to the score of the first workshop of 4.4. It was not clear why the rating this time was lower. Perhaps it was because during the first workshop we concentrated on the basics of QMS, whereas in this second one, the participants needed to be more

active and really work by themselves, this was more demanding than just listening to a series of presentations. It was perceived that at this workshop the pace of the training was convenient, whereas in the first workshop the participants felt it was too fast.

Based on written comments, participants felt that the exercises were most useful and facilitated their learning. The question ”Possibility to apply ideas learnt during the workshop” got highest points (4.3). It also appears that the objective for interaction with each other and sharing experiences worked very well.

Satisfaction on the practical arrangements was very good (4.4) and better than after the first workshop (4.2). All trainers were rated ‘good’, but Alain was rated to be best.

## 6. Support still needed and plans to continue the activity

As many of the NMSs had participated in QMS workshops prior to this project, the basic level of knowledge on applying QMS to the aeronautical services amongst the Caribbean SIDS was already at a relatively high level. However, the level of implementation of these principles and standards appeared to be low. As already noted above, a factor to facilitate efficient implementation of QMSs is the commitment of Executive Directors. Any future activity in promoting QMS as an inherent part of organization management should involve active participation and support by the Directors.

Having 19 countries participating at the same time, it was not possible to handle all challenges of an individual organization at a detailed level. In continuation, detailed follow-up by an external expert or certified auditor is required help complete and to maintain a certified quality management system. Auditing is not just a mandatory part of a QMS, but organisations will benefit from audits made by experienced auditors. The auditing exercise will make the organisation aware of significant gaps that may hinder obtaining the specified level of quality in services. Based on the auditor’s reports it will also be easier to prepare development projects or related actions to fill-in the gaps and thereby improve performance. The auditing also facilitates continuous on-the-job learning as the auditors will be able to provide consultation on issues relating to the various elements of the QMS.

On a long term, it would be useful to create a lead auditor team consisting of experienced Quality Managers of NMSs of the Caribbean SIDSs. To address this need, special training could be organised for selected participants. This team could then be used to audit the NMSs within their region. The organisation of this activity could be under a regional organization such as CMO or WMO RAIV.

**Appendix 1. Workshop agenda**

Refreshment breaks: Tea/coffee 10:00 Lunch 12:15-13:00 Tea/coffee 14:00

| | |
|---|---|
| **Monday 5 Dec** 08:00 – 16:30<br><br>08:00 – 09:00 Opening Session<br><br>09:00 – 16:30<br>• Group photo<br>• WMO activities in QMS<br>• Revision of QMS and ISO 9001:2008 standard requirements<br>• Progress of QMS in the participating organizations<br>o table of readiness of QMS, based on information collected beforehand<br>o group work with comparisons of the gap analysis<br><br>18:00 Ice Breaker | **Tuesday 6 Dec** 08:30 – 15:30<br><br>08:30 – 10:30 Work with processes 4.1, 7.1 - 7.4, 8.2.3, 8.3, 8.5<br><br>10:15 – 12:00 Work with performance indicators 8.2.3<br><br>13:00 – 14:00 Discussion about the customer satisfaction measures based on the experiences of participating organizations 8.2.1<br><br>14:15-15:30 Audit training- basics 8.2.2 |
| **Wednesday 7 Dec** 08:30 – 13:00<br><br>08:30 – 09:15 Audit training – applications in MCS 8.2.2<br><br>09:15 – 10:00 Results of the paper audits<br><br>10:15 – 12:15 Audit exercise, management<br><br>13:00 – 18:00 Sightseeing / networking of participants | **Thursday 8 Dec** 08:30 – 15:30<br><br>08:30 – 09:15 Audit exercise, customer relations<br><br>09:15 – 10:00 Audit exercise, forecasting<br><br>13:00 – 14:00 Work with Continual Improvement, 8.5.<br><br>14:15 – 15:30 Exercise of process descriptions |
| **Friday 9 Dec** 09:00 – 14:00<br><br>08:30 – 14:00<br>• Evaluation of process descriptions<br>• Feedback from gap analysis action list<br>• How to move on?<br>• workshop feedback<br>• closing ceremonies | **Acronyms:**<br><br>ACS= Association of Caribbean States<br>QMS = Quality Management System<br>NMS = National Meteorological Service<br>FMI = Finnish Meteorological Institute<br>DRR = Disaster Risk Reduction<br>EWS= Early warning Service<br>MSC= Meteorological Service Canada<br>CIMH= Caribbean Institute of Meteorology and Hydrology |

**Appendix 1. Workshop agenda**

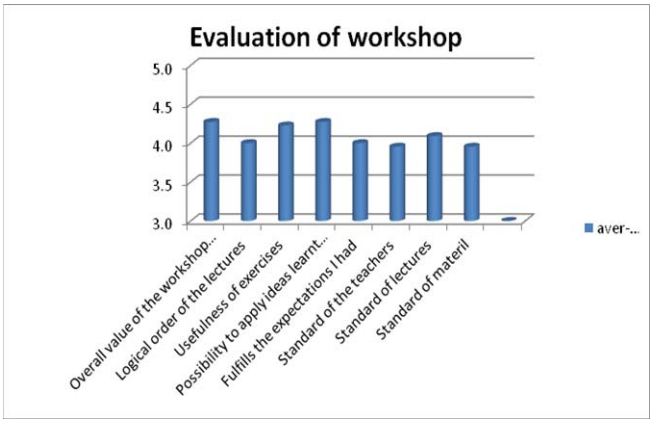
| | |
|---|---|
| | CMO= Caribbean meteorological Organisation |

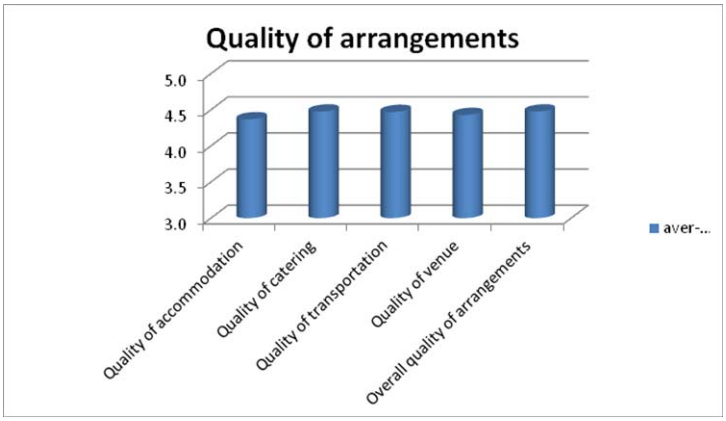
**Appendix 2. List of participants**

| Country/Organization | Name of participant | Sponsor of Hotel&Travel |
|---|---|---|
| **ACS** | Sandra Fonseca | SHOCS |
| **ACS** | Luis Fernando Andrade Falla | SHOCS |
| **Antigua&Barbuda** | Vidette Simone Brown | Antiqua & Barbuda Meteorological Service |
| **Antigua&Barbuda** | George Christopher Braithwaite | SHOCS |
| **Aruba** | Marck Oduber | WMO |
| **Bahamas** | Jeffrey Simmons | SHOCS |
| **Barbados** | Clairmonte Williams | SHOCS |
| **Belize** | Derrick Rudon | SHOCS |
| **British Virgin Islands** | Lydia Rubaine | CMO |
| **Meteorological Service Canada** | Alain Boisvert | MSC |
| **Cayman Islands** | Kerry Powery | CMO |
| **Cuba** | Moisés Luciano Amaro Arguez | SHOCS |
| **Curacao** | David Barkmeyer | Finnish Meteorological Institute |
| **Dom Republic** | Rafael Antonio Carbera Clase | SHOCS |
| **Dominica** | Fitzroy Pascal | SHOCS |
| **FMI** | Alberto Blanco | SHOCS |
| **FMI** | Heikki Juntti | SHOCS |
| **FMI** | Martti Heikinheimo | SHOCS |
| **Grenada** | Fimber Frank | SHOCS |
| **Grenada** | David Robertson | Grenada Meteorological Service |
| **Jamaica** | Ronald Moody | SHOCS |
| **Saint Kitts&Nevis** | Vincia Browne | SHOCS |
| **Saint Maarten** | Rignald Eugenio | WMO |
| **Saint Vincent&Grenadines** | Billy Jeffers | SHOCS |
| **Suriname** | Dwight Samuel | SHOCS |
| **Trinidad&Tobago** | Marlon Noel | SHOCS |
| **WMO** | Herbert Puempel | WMO |

## Appendix 3. Evaluation of the workshop

| | | 1 | 2 | 3 | 4 | 5 | | |
|---|---|---|---|---|---|---|---|---|
| | Question | use-less | poor | usef ul | good | excel-lent | aver-age | ans-wers |
| 1 | Overall value of the workshop for QMS development | | | 2 | 12 | 8 | 4.3 | 22 |
| 2 | Logical order of the lectures | | | 3 | 16 | 3 | 4.0 | 22 |
| 3 | Usefulness of exercises | | | 3 | 11 | 8 | 4.2 | 22 |
| 4 | Possibility to apply ideas learnt during the workshop | | | 1 | 14 | 7 | 4.3 | 22 |
| 5 | Fulfills the expectations I had | | 1 | 3 | 13 | 5 | 4.0 | 22 |
| 6 | Standard of the teachers | | 1 | | 15 | 5 | 4.0 | 21 |
| 7 | Standard of lectures | | | 1 | 18 | 3 | 4.1 | 22 |
| 8 | Standard of materil | | | 5 | 13 | 4 | 4.0 | 22 |
| 9 | The sped of training 1-too low, 5=too fast | | | 15 | 5 | | 3.0 | 20 |
| **Average** | | | | | | | **4.1** | |
| | Question | use-less | poor | usef ul | good | excel-lent | aver-age | ans-wers |
| 10 | Quality of accommodation | | | 1 | 10 | 8 | 4.4 | 19 |
| 11 | Quality of catering | | | 1 | 9 | 11 | 4.5 | 21 |
| 12 | Quality of transportation | | | 2 | 5 | 10 | 4.5 | 17 |
| 13 | Quality of venue | | | 1 | 10 | 10 | 4.4 | 21 |
| 14 | Overall quality of arrangements | | | 1 | 9 | 11 | 4.5 | 21 |
| **Average** | | | | | | | **4.4** | |




The skill of trainers:

| | |
|---|---|
| **Heikki** | **4.05** |
| **Alberto** | **4.09** |
| **Herbert** | **4.50** |
| **Alain** | **4.68** |

**Appendix 4. Results of gap analysis on the degree of implementation of separate QMS elements for Aeronautical meteorological Services of the participating Caribbean NMSs during the 2nd workshop (12/2011).**

| Country | 4.1 General requirements | 4.2.1 Documentation general | 4.2.2 Quality manual | 4.2.3 Control of documents | 4.2.4 Control of records | 5.1 Management commitment | 5.2 Customer focus | 5.3 Quality policy | 5.4.1 Quality objectives | 5.4.2 Quality management system planning | 5.5.1 Responsibility and authority | 5.5.3 Internal communication | 5.6 MANAGEMENT REVIEW | 6.1 Provision of resources | 6.2 HUMAN RESOURCES | 6.3 INFRASTRUCTURE | 6.4 Work environment | 7.1 Planning of product realization | 7.2.1 Determination of requirements related to the product | 7.2.2 Review of requirements related to the product | 7.2.3 Customer communication | 7.3 DESIGN AND DEVELOPMENT | 7.4 PURCHASING | 7.5.1 Control of production and service provision | 7.5.2 Validation of processes for production and service provision | 7.5.3 Identification and traceability | 7.5.4 Customer property | 7.5.5 Preservation of product | 8.1 MEASUREMENT, ANALYSIS AND IMPROVEMENT, general | 8.2.1 Customer satisfaction | 8.2.2 Internal audit | 8.2.3 Monitoring and measurement of processes | 8.2.4 Monitoring and measurement of product | 8.3 Control of nonconforming product | 8.4 Analysis of data | 8.5.1 Continual improvement | 8.5.2 Corrective action | 8.5.3 Preventive action | Average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Anguilla** | Not participated in the 2nd workshop | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Antigua & Barbuda** | 70 | 70 | 90 | 90 | 90 | 80 | 70 | 100 | 95 | n/a | 100 | 50 | 0 | n/a | 90 | 60 | 60 | 90 | 90 | 70 | 80 | n/a | 80 | 70 | 40 | 60 | n/a | 60 | 0 | 75 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54 |
| **Aruba** | 40 | 60 | 80 | 70 | 100 | 100 | 30 | 80 | 90 | 100 | 100 | 100 | 70 | 100 | 100 | 100 | 100 | 80 | 100 | 90 | 100 | 90 | 90 | 20 | 100 | 70 | 100 | 100 | 80 | n/a | 20 | 80 | 90 | 90 | 80 | 100 | 100 | 100 | 84 |
| **Bahamas** | 60 | 70 | 20 | 50 | 90 | 80 | 80 | 80 | 90 | 100 | 70 | 80 | 10 | 100 | 70 | 100 | 100 | 100 | 80 | 60 | 80 | n/a | 0 | 50 | 100 | 100 | n/a | 100 | 50 | 100 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 58 |
| **Barbados** | 50 | 40 | 20 | 70 | 70 | 50 | 70 | 90 | 90 | 50 | 70 | 80 | 10 | 80 | 90 | 100 | 100 | 50 | 90 | 50 | 50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 |
| **Belize** | 30 | 20 | 40 | 30 | 80 | 70 | 80 | 50 | 80 | 70 | 70 | 40 | 20 | 60 | 60 | 100 | 100 | 70 | 70 | 50 | 80 | 20 | 30 | 50 | 70 | 70 | n/a | 100 | 20 | 50 | 0 | 50 | 60 | 50 | 30 | 30 | 0 | 0 | 51 |
| **British Virgin Islands** | 70 | 70 | 70 | 100 | 100 | 95 | 60 | 70 | 95 | 100 | 50 | 100 | 90 | 100 | 90 | 100 | 100 | 100 | 60 | 80 | 50 | 70 | 70 | 70 | 100 | 100 | 100 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 74 |
| **Cayman Islands** | 80 | 90 | 80 | 60 | 50 | 40 | 40 | 70 | 90 | 90 | 90 | 50 | 10 | 100 | 70 | 60 | 80 | 80 | 70 | 20 | 10 | n/a | 30 | 100 | 100 | 100 | 100 | 100 | 50 | 30 | 0 | 0 | 0 | 50 | 0 | 50 | 70 | 20 | 58 |
| **Curacao** | 70 | 80 | 100 | 90 | 100 | 90 | 70 | 80 | 60 | 50 | 90 | 90 | 50 | 100 | 100 | 70 | 60 | 70 | 100 | 60 | 70 | 50 | 50 | 50 | 100 | 100 | n/a | 100 | 20 | 80 | 30 | 0 | 30 | 0 | 60 | 20 | 0 | 0 | 63 |
| **Cuba** | 80 | 60 | 55 | 40 | 40 | 75 | 85 | 85 | 60 | 80 | 85 | 90 | 50 | 70 | 95 | 95 | 95 | 70 | 75 | 75 | 90 | 80 | 95 | 85 | 80 | 85 | n/a | n/a | 80 | 70 | 40 | 80 | 80 | 40 | 45 | 40 | 30 | 25 | 70 |
| **Dominica** | 40 | 50 | 20 | 20 | 70 | 60 | 70 | 70 | 40 | 30 | 50 | 50 | 40 | 60 | 90 | 60 | 60 | 40 | 30 | 40 | 40 | 30 | 10 | 20 | 40 | 50 | 50 | 50 | 50 | 50 | 0 | 50 | 20 | 0 | 40 | 50 | 0 | 0 | 41 |
| **Dominican Republic** | 70 | 90 | 70 | 70 | 80 | 90 | 90 | 80 | 90 | 90 | 80 | 80 | 60 | 70 | 80 | 80 | 80 | 60 | 70 | 80 | 70 | 70 | 70 | 80 | 60 | 70 | 70 | 70 | 80 | 80 | 100 | 70 | 70 | 70 | 90 | 70 | 80 | 70 | 76 |
| **Grenada** | 40 | 50 | 10 | 60 | 60 | 10 | 70 | 100 | 100 | 20 | 80 | 50 | 30 | 60 | 80 | 60 | 70 | 40 | 75 | 70 | 50 | 30 | 90 | 60 | 50 | 60 | 100 | 70 | 80 | 80 | 0 | 30 | 30 | 50 | 60 | 60 | 70 | 70 | 57 |
| **Guyana** | Not participated in the 2nd workshop | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Jamaica** | 30 | 0 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 100 | 70 | 0 | 40 | 70 | 30 | 80 | 20 | 40 | n/a | 30 | n/a | 80 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 18 |
| **St Kitts & Nevis** | 20 | 60 | 30 | 30 | 90 | 40 | 30 | 60 | 80 | 60 | 20 | 30 | 30 | 60 | 60 | 50 | 90 | 30 | 80 | 30 | 50 | n/a | 40 | 70 | 60 | 30 | n/a | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 34 |
| **St Lucia** | 50 | 60 | 20 | 60 | 90 | 90 | 80 | 100 | 90 | 90 | 40 | 80 | 40 | 90 | 80 | 80 | 90 | 60 | 90 | 90 | 80 | 0 | 20 | 0 | 20 | 100 | 80 | 100 | 50 | 60 | 0 | 0 | 50 | 20 | 30 | 80 | 0 | 0 | 57 |
| **St Maarten** | 30 | 30 | 30 | 70 | 50 | 50 | 60 | 40 | 40 | 40 | 70 | 60 | 40 | 60 | 60 | 80 | 80 | 50 | 60 | 60 | 70 | 60 | 70 | 70 | 60 | 80 | 70 | 70 | 50 | 70 | 50 | 50 | 70 | 50 | 60 | 50 | 50 | 50 | 57 |
| **St Vincent & Grenadines** | 100 | 90 | 90 | 60 | 100 | 80 | 60 | 60 | 90 | 100 | 100 | 60 | 60 | 100 | 50 | 100 | 100 | 50 | 100 | 50 | 100 | n/a | 50 | 50 | 50 | 100 | 100 | 100 | 50 | 70 | 80 | 50 | 50 | 60 | 60 | 80 | 80 | 80 | 76 |
| **Suriname** | 80 | 80 | 70 | 80 | 90 | 90 | 60 | 100 | 80 | 80 | 100 | 60 | 70 | 80 | 80 | 80 | 70 | 80 | 80 | 80 | 60 | n/a | 60 | 80 | 70 | n/a | n/a | 80 | 70 | 80 | 40 | n/a | n/a | n/a | n/a | 80 | 80 | 80 | 76 |
| **Trinidad & Tobago** | not available (n/a) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Average | 56 | 59 | 50 | 58 | 75 | 67 | 61 | 73 | 76 | 68 | 76 | 68 | 38 | 78 | 79 | 78 | 84 | 63 | 76 | 62 | 64 | 45 | 52 | 51 | 61 | 69 | 70 | 68 | 43 | 56 | 23 | 32 | 37 | 31 | 36 | 42 | 34 | 30 | 58 |