



A Global Campus Roadmap
for the
World Meteorological Organization

A Report Prepared for WMO Congress 18, 2019

Draft 3, 28 February 2018

Education and Training Office
Development and Regional Activities Department
World Meteorological Organization
7 bis, avenue de la Paix, P.O. Box 2300, CH-1211 Geneva 2, Switzerland

A Global Campus Roadmap for the World Meteorological Organization

Contents

Acknowledgements	3
Executive summary	3
1. Introduction	4
1.1 Rationale and background.....	5
1.2 Development stages of the feasibility study.....	5
1.3 Objectives of the Roadmap	7
2. Benefits of a WMO Global Campus to Members	7
2.1 Direct benefits	7
2.2 Indirect benefits	7
3. Global Campus Priorities	8
3.1 Identification and design of Global Campus priority activities	8
3.2 Thematic focus areas and alignment with WMO priorities	10
3.3 Priority activity areas	11
3.4 Internal and external linkages and interactions	13
3.4.1 WMO technical guidance, including WMO-No. 49 Technical Regulations	14
3.4.2 WMO Service Delivery Strategy	14
3.4.3 WMO Capacity Development Strategy and Implementation Plan	15
3.4.4 WMO Programmes and Frameworks (e.g., GFCS, DRR, CSIS, etc.).....	16
3.4.5 Links to WMO Members, Commissions and Programmes.....	17
3.4.6 WMO Long-term Goals and Strategic Objectives (SO)	17
3.5 External Linkages and Interactions	18
4. Progress and plans for priority activities (2016-2019).....	18
4.1 Initial Priority Activities	21
4.2 Remaining Priority Areas	22
4.2.1 Building Clarity	22
4.2.2 Quality Assurance	22
4.2.3 Testing Processes for Translation of Content	22
4.2.4 Establish Process for Transfer of Academic Credit	22
4.2.5 Engaging New Global Partners	23
4.2.6 Provide E-learning Support to RTCs	23
4.2.7 Identify Constraints and Solutions for Implementation	23
4.2.8 Identify Human and Financial Resources	24
4.2.9 Collaboration	24
4.3 Communication and outreach	24
4.4 Monitoring and Evaluation.....	24

5. Implementation of the WMO Global Campus	25
5.1 Organization and Oversight	25
5.1.1 Vision and Mission.....	26
5.1.2 Accountability, Transparency and Traceability.....	26
5.1.2.1 Accountability	26
5.1.2.2 Transparency and Traceability.....	26
5.1.5 Human Resources.....	27
5.1.6 Financial and Resource Considerations of the WMO Global Campus.....	27
5.1.7 WMO Technical Commissions.....	28
5.2 WMO Global Campus User-Interface.....	28
6. Concluding remarks	29
Annex I WMO RTCs and RTC Components as of 2017	30
Annex II Guiding Principles for WMO Global Campus	32

Acknowledgements

This Global Campus Roadmap was developed by the WMO ETR Office and the Executive Council Panel of Experts on Education and Training. They were assisted by experts from Australia, Canada, China, Kenya, New Zealand, United Kingdom, and the United States of America, and were provided input by many others during the WMO Global Campus feasibility study. The feasibility study was facilitated by a two-year secondment of an expert by the United Kingdom to work with the WMO Education and Training Office on the initiative.

Executive summary

The WMO Global Campus is an initiative that intends to assist WMO Regional Training Centres and other WMO-Member Training Institutions to work together more collaboratively. The rationale for the WMO Global Campus is to assist WMO Members in meeting the growing range and depth of education and training demands required to develop their service capabilities and ensure the competence of personnel and institutions.

The WMO Global Campus Roadmap provides an overview of the Global Campus feasibility study that began in 2014 and plans for its implementation, if decided by Cg-18. This document provides an insight into the rationale behind the development of the WMO Global Campus initiative and describes the underpinning methodology, its proposed themes, priority activities, design and implementation.

The WMO Global Campus is based upon WMO's tried and tested practice of linking Members' existing facilities to create a coordinated, distributed network from the existing WMO-related education and training institutions. As with other WMO networking initiatives such as observations (WIGOS) and communications (WIS), the Global Campus proposes to establish a network of disparate institutions and a basis for collaboration that allows sharing of education and training resources and knowledge. An underlying

premise is ensuring that all interested institutions can contribute to, and benefit from, the proposed networking arrangements.

The WMO Global Campus initiative will complement the current work of WMO Regional Training Centres and other institutions that provide education and training to WMO Members. The initiative is expected to increase the effectiveness of the WMO Education and Training Programme as it helps the community to create and implement standards and best practices, promote offerings through shared communication mechanisms, share and reuse high quality learning resources, and encourage partnerships that can provide capacity that no individual Member could create.

1. Introduction

In response to a Cg-17 Resolution, the WMO Global Campus Roadmap has been drafted as a report to the Eighteenth World Meteorological Organization Congress (Cg-18) in 2019.

Following the introduction of the Global Campus concept at the 12th WMO Symposium on Education and Training (SYMET) in Toulouse, France in October of 2013, a survey distributed to all Members and revealed that, over the next 20 years, WMO Members will have a growing gap between demand and supply for the training of a global NMHS workforce of around 200,000 people. Consequently, it was concluded that the current global training infrastructure as it exists will not be able to meet this expected increase in demand without increasing the efficiency and effectiveness of collaborative efforts among training institutions and introducing new approaches to training.

At the 66th session of the WMO Executive Council (EC-66), it was recognized that collaboration in developing and sharing of the identified needs, training resources and expertise available from the Regional Training Centres (RTCs) and other training institutions represented a cost-effective approach to address the growing training deficit worldwide. WMO EC-66 agreed that a feasibility study for such a mechanism, a **WMO Global Campus**, should proceed.

The following specific issues were identified as challenges to be addressed :

1. Changes in workforce numbers, profiles, and roles
2. Expansion of existing and new services for NMHSs
3. Lack of training resources in some countries to support development and expansion of current capacity
4. The need for new training to facilitate meeting competency standards
5. Stresses to regular, statutory training budgets that require introduction of new training strategies, technologies, and delivery methods that can make training more efficient and cost-effective.

In view of these issues, the WMO Global Campus initiative was conceived as a way to enhance how WMO RTCs and other training institutions can work collaboratively to meet such challenges. The initiative is expected to build on the well-established WMO RTC network and WMO Education and Training Programme with a potential to significantly increase global access to training, both face-to-face and on-line. RTC Directors and the

WMO Global Campus Steering Committee established to guide this mechanism recommended the term “WMO Global Campus.”

1.1 Rationale and background

When WMO Global Campus was first introduced as a nascent concept during the WMO SYMET meeting in Toulouse, France, in October 2013, the following concerns were raised that have required further clarity:

- Was it a replacement or a supplement to the existing WMO RTCs?
- Did it represent a new programme to be governed?
- How would it be funded and how would it be governed?
- How would any new technical and material resources and expertise be acquired?
- Did it suggest a turning away from traditional training approaches?

Such questions led to a series of meetings in 2014 and early in 2015 to better articulate the concept and establish priorities. At a meeting of the Standing Committee of Heads of Training Institutions (SCHOTI) in September 2014, the WMO Global Campus concept was further defined in the following statement:

“The ‘Global Campus’ is a collaborative network of education and training institutions and NMHSs involved in the development and delivery of training in meteorology, climatology, hydrology and other related sciences. It is built on the synergies, sharing and cooperation between these institutions and will address global priorities and the growing and changing requirements and needs for training of the community.”

The vision behind the WMO Global Campus concept is to have a collaborative network of institutions working together to meet the growing education and training needs of WMO Members. It will build upon the existing network of the existing 27 RTCs (see Annex 1) but also recognize other contributing national and international organizations and academic institutions, promote the use of new training delivery mechanisms, and, as a priority, address new and emerging training needs. The WMO Global Campus framework will provide a coordination and communication system, as well as associated information and data tools that will enhance the sharing of resources, knowledge and expertise, as well as the efficiency and effectiveness of the overall network.

EC-66 decided that the EC Panel of Experts on Education and Training (EC Panel on ETR) should proceed with a feasibility study on the WMO Global Campus concept and listed a series of items that should be investigated. A detailed proposal for the establishment of, and implementation plans for, a WMO Global Campus was prepared and presented to the Seventeenth World Meteorological Congress (Cg-17) in May 2015. Cg-17 directed further investigation of the Global Campus concept by means of the feasibility study, the results of which would be presented to CG-18.

1.2 Development stages of the feasibility study

A summary of the evolution of the WMO Global Campus concept, the feasibility study, this Roadmap, as well as future decisions required is depicted in Figure 1.

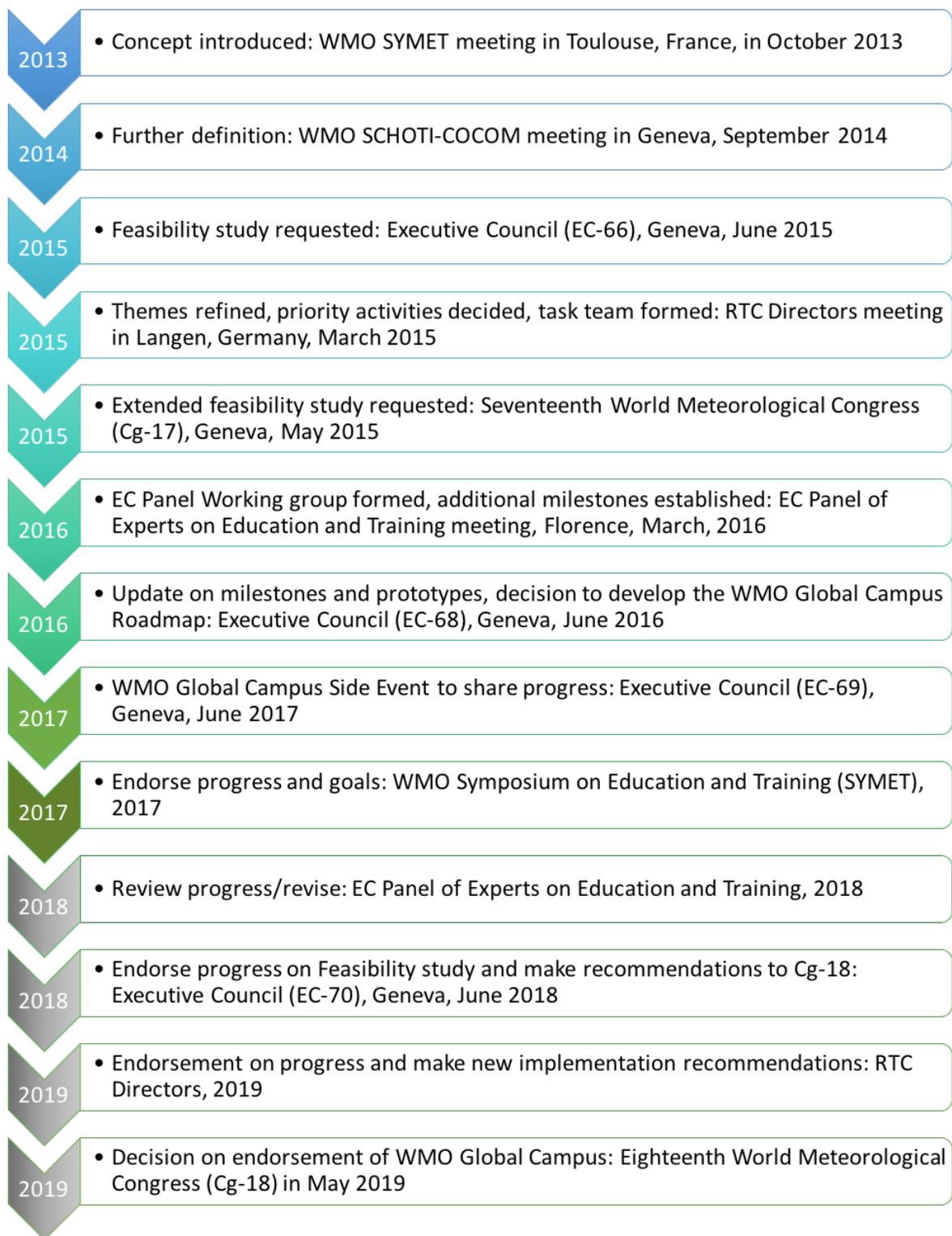


Figure 1: Key milestones in the WMO Global Campus feasibility study.

1.3 Objectives of the Roadmap

The Roadmap is intended to provide guidance on the concept of WMO Global Campus and how to derive maximum benefits from the initiative; how to leverage and utilize a WMO Global Campus to build capacity within specific areas of interest and responsibility; and the requirements of a WMO Global Campus and its potential benefits for WMO Members.

2. Benefits of a WMO Global Campus to Members

One goal of the WMO Education and Training Programme is to help align training delivery with UN goals. One of these goals is to support national strategies and increase resilience. Recognizing that capacities for NMHSs to service their national sectors vary, the implementation of the WMO Global Campus initiative, with its focus on increasing collaboration and cooperation, may help NMHSs to increase their engagement with training partners and capacity to support national strategic plans and policies, and ultimately contribute towards increased resilience.

The potential benefits of the WMO Global Campus initiative are both direct and indirect. Direct benefits include those with direct impacts on education and training capacity, while indirect benefits include the social, economic, and environmental benefits realized by having a capable, well function weather service.

2.1 Direct benefits

The direct benefits expected from the implementation of a WMO Global Campus include:

- Increased training opportunities to broaden the knowledge-base, skills and job competencies of NMHS staff, especially in Least Developed Countries (LDCs), Small Island Developing States (SIDS) and Developing Countries
- Increased cooperation among WMO RTCs and other training institutions and access to existing training for developing WMO competencies, resulting in streamlining the development of education and training programmes and resources
- Increased quality of training programmes and resources offered by training institutions
- Increased interaction with WMO programmes and Commissions and promotion of compliance with WMO standards
- Reduction in the overall cost of some training events, thus allowing more persons to receive high quality training
- Reduction in the environmental impact of training due to increased options for reuse and for distance learning

2.2 Indirect benefits

NMHSs and other WMO Members institutions contribute to the safety and well-being of society by providing weather, climate and hydrological/water information to sensitive sectors at the spatial and temporal scales necessary for informed planning of risk and decision making. The ability of NMHSs to develop and deliver the relevant information

and services to national, regional and international stakeholders is strongly dependent on their capacity of their human resources.

The WMO Global Campus initiative is intended, at its core, to address the challenge of providing increased access to capacity development opportunities to NMHSs to support building a critical mass of staff with the requisite expertise to sustainably deliver user-required products and services. It is expected that by increasing the sharing of identified training needs, resources, expertise and opportunities through open platforms, increasing collaboration in the development of high quality training materials and increasing low cost training delivery systems that the number of well-trained persons of Members can be increased to a sustainable critical mass, which offers a societal benefit of leveling capabilities across WMO Members. The increased opportunities and access to hydrometeorology and climate training materials could also aid in achieving gender balance within WMO Members.

The efficiencies expected from a WMO Global Campus through reduced duplicated efforts will generate economic benefits through cost savings that can be invested in other areas. It is also expected that the increased capacity resulting from the implementation of the WMO Global Campus will result in more accurate, timely and impact-oriented weather, climate, water and related environmental services from Members, from their NMHSs, and consequently make a significant contribution to economic stability, efficiency, and growth in many sectors.

WMO and its Members monitor the environment and changes in climate variables over time, providing insight into possible impacts on food and water security, natural ecosystems, and human health, among others. Changes are continuously occurring in rainfall and temperature, the chemical composition of the atmosphere, surface and groundwater availability, land cover and soil condition, the temperature and chemical balance of the oceans, and pollutants in the air, water, and soil. Subtle changes in these parameters can have profound consequences for ecosystems, biodiversity, and food production systems. An increase in capacity and competence of NMHS personnel anticipated from the additional impetus provided by a WMO Global Campus initiative is expected to increase understanding of changing weather patterns and the resulting environmental and societal impacts, particularly in Developing Countries, SIDS and LDCs. It is expected that the results of this increased capacity will improve planning and adaptation policies related to climate change, increased climate variability and extreme weather in countries around the world.

In these ways, WMO Global Campus activities can become valuable components of the broader capacity development activities of WMO and its partners. For the WMO Global Campus initiative to achieve its full potential, training centres and NMHSs in all countries should take an active role.

3. Global Campus Priorities

3.1 Identification and design of Global Campus priority activities

The WMO Global Campus has the potential to be a transformational initiative capable of increasing capacity, especially in LDCs, SIDS and Developing Countries, through the sharing of knowledge and know-how, learning resources, and enhanced collaboration between training institutions. This section will highlight the thematic focus areas and

priority activities that have been identified to help bring about increased training capacity.

The long-term success of the WMO Global Campus initiative will be determined by how well it helps WMO achieve its strategic objectives, especially in its 2016-19 priority areas of

1. Capacity Development;
2. Disaster Risk Reduction;
3. WMO Integrated Global Observing System;
4. Aviation Meteorological Services;
5. Polar and High Mountain Regions;
6. Global Framework for Climate Services; and
7. WMO Governance.

As a result, a critical feature of the WMO Global Campus Roadmap is the support of WMO priority areas and activities. The Roadmap must be flexible and forward-looking to anticipate and adjust to changing WMO priorities, as well as the ranking of priorities, because education and training underpins all capacity development and technology infusion efforts of the WMO. WMO is continuously evolving in response to changes in technology, new opportunities and changes in the rules and regulations in user industries that are dependent on the products and services of WMO Members. Therefore, the WMO Global Campus must be built on principles that facilitate large-scale availability of training that can be delivered in rapid response to changing needs.

This section describes the principles behind the identification and design of priority activities for the WMO Global Campus Roadmap (both generic and project-specific) in areas aligned with WMO Goals and Strategic Objectives, the WMO Strategy for Service Delivery, defined thematic areas, other internal and external linkages and interactions. It is recognized that ongoing support to WMO Priority Areas is essential if the WMO Global Campus is to be a sustainable initiative. Section 4 outlines the work plan and status of the feasibility study at the time of the development of the Roadmap, as well as milestones through 2019.

For consistency, the used in the WMO DRR Roadmap has been adopted to illustrate how the WMO Global Campus initiative will seek to work collaboratively with existing and planned or potential future programmes, projects, and frameworks, and where appropriate, in partnership with third-party initiatives.

3.2 Thematic focus areas and alignment with WMO priorities

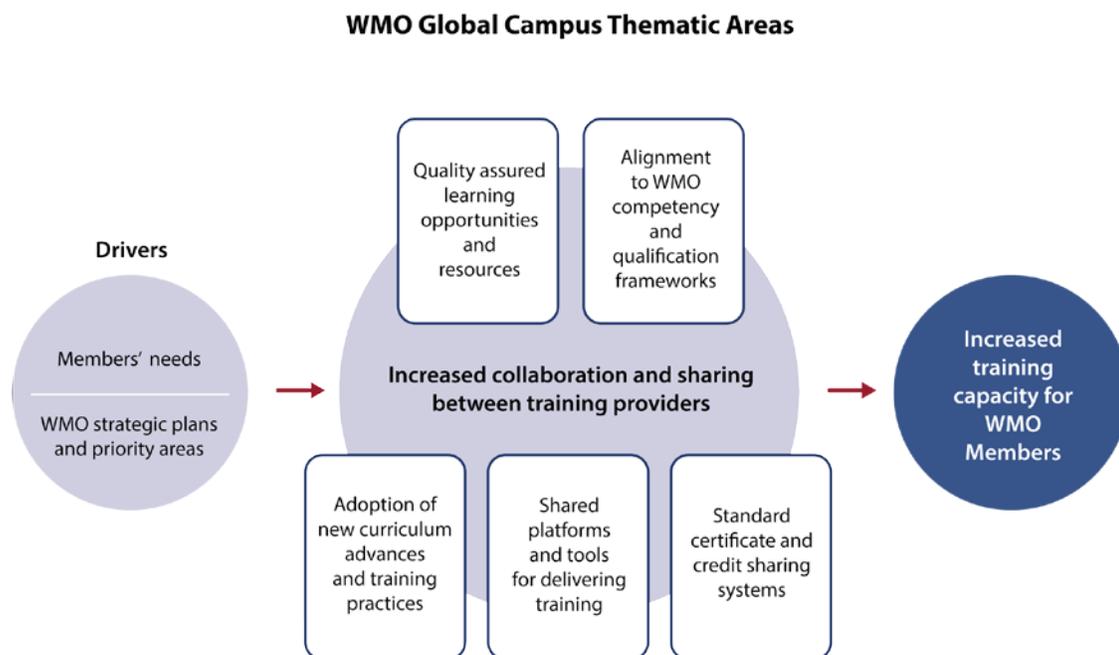


Figure 2. WMO Global Campus thematic areas

Figure 2 shows the foundational thematic focus areas, derived from the request of EC-66, guiding WMO Global Campus activities. These are driven by WMO Members needs as articulated by Congress, Executive Council and its panels, technical commissions, and the relevant strategic plans and priorities put forth by these bodies. The themes include:

1. **stronger linkages to WMO strategic plans priority areas, regulations, and education and training standards**
2. **increased collaboration among training providers, including collaborative projects, exchange of experts and sharing of best practices**
3. **sharing of quality assured learning opportunities and training resources aligned to WMO competency and qualification frameworks,**
4. **increased communication to encourage awareness, research and adoption of new curriculum advances and training practices**
5. **development of and training on the use of shared platforms and tools for delivering training**
6. **elective use of standard certification and credit sharing systems for more flexible attainment and documentation of qualifications and competencies**

As described further in section 3.4, these thematic areas are directly linked to WMO Goals and Strategic Objectives, WMO Service Delivery Strategy and the WMO Capacity Development Strategy, and designed to aid advancements in all WMO priority areas, the human resources capacity development activities requested by all WMO Technical

Commissions and carried out by WMO technical programmes, and the capacity development projects initiated by the WMO Development and Regional Activities Programme. The activities of these WMO programmes overlap and are coordinated in productive ways, and the WMO Global Campus seeks to support their implementation.

3.3 Priority activity areas

At a meeting of the RTC Directors, WMO established eleven initial priority areas, and these were further refined by EC-66 when they requested that the EC Panel on ETR proceed with a feasibility study on the WMO Global Campus. EC-66 (Resolution 4.6(1)/3) requested that the feasibility study include the following areas:

1. Building clarity of the concept of the WMO Global Campus and its potential benefits to WMO Members;
2. Investigating options to develop a trial WMO Global Campus registry of resources and activities, and as exploring possible modes of distribution, while considering infrastructure and IT capabilities of Members (Calendar and Catalog);
3. Establishing basic criteria for partners and providers to list resources and activities on the registry (Quality criteria) and developing ways to actively solicit and encourage organizations to offer their resources to WMO Members;
4. Testing and implementing new arrangements/processes that have the potential to provide more resources in multiple languages at modest cost;
5. Investigating ways to assure the quality of resources and activities available via the Global Campus;
6. Examining issues surrounding the acceptance of courses and academic credits from a dispersed set of providers by surveying representative users;
7. Engaging with at least one new global partner as a way of increasing the capacity for WMO education and training activities;
8. Seeking additional resources for supporting education and training opportunities, especially in climate services, aviation, and hydrology, that can be made available to WMO Members;
9. Examining and testing ideas for providing training and support to RTCs so that they could:
 - a. Make an increasing contribution to providing resources, particularly for eLearning, to the WMO Global Campus; and
 - b. Benefit from the resources available via the WMO Global Campus;
10. Identifying and recognizing potential constraints/challenges in the implementation of the Global Campus and where possible, propose ways of overcoming them;
11. Identifying the human and financial resources required, along with possible resourcing arrangements, for implementation of the WMO Global Campus in terms of both initiation and maintenance.

The eleven EC-66 priority areas derive from the thematic areas shown in Figure 2

The WMO Global Campus feasibility study will be conducted through various demonstration projects designed to address as many of the 11 priority areas as is feasible, thereby enhancing the availability of training to Members. The WMO Global Campus Working Group has produced a WMO Global Campus Searchable Calendar (WMO Learn Events Calendar at <http://learningevents.wmo.int>) and is in the process of

finalizing a choice of software to maintain a learning resource catalog (Area 2), identification and delivery of aviation competency training and the expansion of training and learning resources for the Climate Services competencies (Area 8). In order for these areas to be addressed, Areas 1 (Building clarity), 3 (Quality criteria) and 11 (Identifying resources) were also addressed. Implementation work in these priority areas will be advanced while the WMO ETR Office and the Global Campus Working Group continue to focus incrementally on the others as well. These activities are expected to have a notable impact on the quantity and access to training activities for WMO Members. Impacts of the initial demonstration efforts will be reported to Cg-18 in 2019.

Figure 3 shows the initial priority activities being carried out in the demonstration project (in bold), as well as the associated activities being initiated, all linked through pathways required for implementation of the roadmap. These include activities related to the organization of the WMO Global Campus partners and communication methods used to build community, as well as activities related to the implementation of new tools and technologies. These are not independent, however, and finally merge toward common goals.

Key activities required to develop the Roadmap and for its continuing design and implementation include, but are not limited to:

- i. Stakeholder identification and engagement through a consultative process designed to elicit information on needs;
- ii. Review and alignment of training offerings with WMO policies and guidance materials;
- iii. Review of the objectives of the various WMO programmes and commissions to identify training needs and strategic objectives;
- iv. Reviews of WMO publications, regional reports, and other available reports that provide information on current and future training needs; and
- v. Consultations with WMO Executive Council and technical commission expert panels.

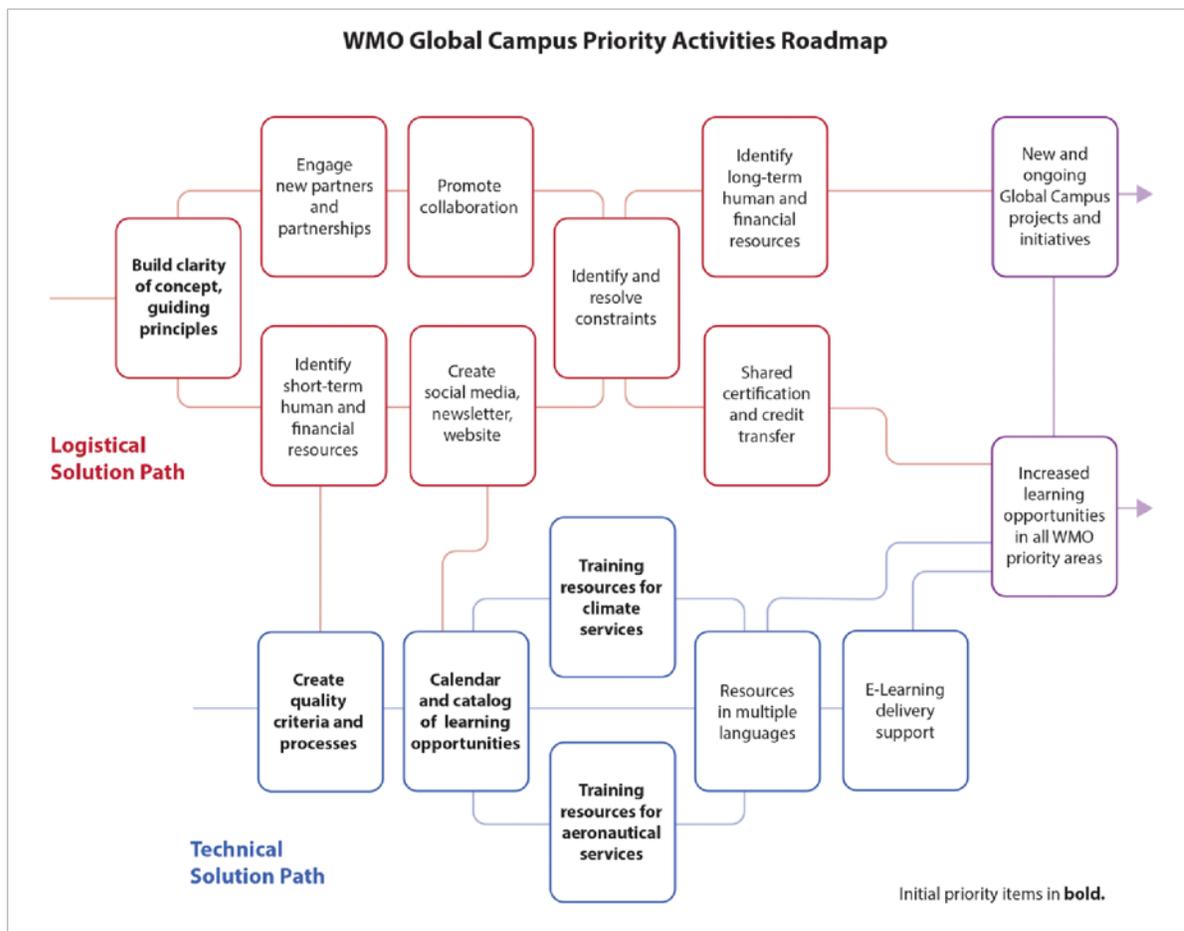


Figure 3: WMO Global Campus Roadmap - conceptual overview

Following the initial demonstration projects, future work will begin to address all WMO Priority areas.

3.4 Internal and external linkages and interactions

The following are key linkages for guiding development of the Roadmap, determination of themes, and design of activities. These linkages represent sources of influence for the Global Campus feasibility study activities and areas of alignment within other WMO activities and plans, which will ensure that the initiative meets its goals to help WMO Members meet the growing range and depth of education and training demands required to develop their service capabilities and ensure the competence of personnel and institutions as a whole.

3.4.1 WMO technical guidance, including WMO-No. 49 Technical Regulations

The WMO Global Campus activities are driven in part by the need for Members to access cost-effective training that allows them to build the required competencies in their services to comply with the standards and recommended practices described in the WMO Technical Regulations and the various Manuals and Guides produced by the WMO Technical Commissions. Education and training resources developed and disseminated through the WMO Global Campus will be reviewed and endorsed as being compliant with, and aiding in the implementation of the regulations and competency frameworks described in these publications. The WMO Global Campus mechanisms will include quality assurance processes based on those outlined in WMO-No.

1114, Guidelines for Trainers in Meteorological, Hydrological and Climate Services.

3.4.2 WMO Service Delivery Strategy

The WMO Service Delivery Strategy (http://www.wmo.int/pages/prog/amp/pwsp/documents/WMO-SSD-1129_en.pdf) sets forth the cyclical stages for developing and delivery meteorological, hydrologic, and climate services (see Figure 4).



Figure 4. WMO Service Delivery Strategy.

The WMO Service Delivery Strategy informs the operations of the education and training component of any NMHS, as well as other institutions supporting the development of NHMS staff. For this reason, the WMO Global Campus links to it through both direct and indirect benefits.

The Global Campus directly supports the (4) *Evaluation and Improvement stage*. In this stage, the ability of members to meet the needs of their stakeholders in an effective and efficient manner is assessed. Where deficiencies related to the competence of staff are identified, a cost-effective human resources capacity development programme that

complies with national and international standards can be designed and delivered, taking advantage of the content offered and partnerships that might be developed within the WMO Global Campus.

The WMO Global Campus also supports the **(1) *User Engagement and Developing Partnerships stage*** by facilitating greater user engagement and participation of other Members and the general public in the education and training process through collaboration and online sharing of educational and training materials and advertisement of opportunities. Co-development of training materials and courses represents a key mechanism for strengthening existing partnerships and developing new innovative partnerships. Such co-development supports sharing knowledge and know-how, bridging the north-south gaps that are frequently observed in education and training. Finally, an increasing number of students from differing institutions participating in more broadly disseminated learning events increases sharing, fosters ongoing collaboration at the participant level, and leads to partnerships that could result in increased benefits to stakeholders.

The Global Campus supports the **(3) *Delivery stage***, in this case the delivery of education and training services. The Global Campus represents an attempt to improve the delivery of high-quality education and training services to a large segment of Members. Increasing the competence of staff in NMHSs is expected to lead to an improvement in the quality of products and services delivered to stakeholders.

The Global Campus supports the **(2) *Service Design and Development stage*** as greater opportunities to participate in the education and training process will lead to new ideas to design/redesign and develop/redevelop services and products that will further address the needs of stakeholders. Greater efficiencies may result.

Of the six (6) elements necessary for moving toward a more service-oriented culture listed above (see Figure 4), the WMO Global Campus has direct linkages to three:

Element 3 - Evaluate and monitor service performance and outcomes

Element 5 - Develop skills needed to sustain service delivery

Element 6 - Share best practices and knowledge.

The global collaboration and sharing promoted and supported by the WMO Global Campus will facilitate these key elements.

3.4.3 WMO Capacity Development Strategy and Implementation Plan

The WMO Global Campus, with its emphasis on aiding Members to be compliant with WMO standards regarding performance levels of staff members, particularly through collaboration between global and regional centres for education and training, aids the WMO Capacity Development Strategy WMO-No. 1133, particularly in its Objectives 1, 3, 5 and 6.

1. Objective 1, 'Define required capacities and identify deficiencies', will be aided by the sharing of best practices regarding learning needs assessment and competency assessment.

2. Objective 3, 'Optimize knowledge management', will be aided through the WMO Global Campus mechanisms for sharing best practices and best learning opportunities.
3. Objective 5, 'Strengthen global, regional, and sub-regional mechanisms', will be aided through strengthening of the WMO Regional Training Centre network, as well as involving other institutions and WMO centres involved in education and training activities for WMO Members.
4. Finally, Objective 6, 'Increase education and research opportunities', will be directly aided through mechanisms for raising awareness of and access to events and available learning resources, as well as stimulating collaborative development of learning opportunities as a mechanism to increase options and reduce costs.

3.4.4 WMO Programmes and Frameworks (e.g., GFCS, DRR, CSIS, etc.)

It is expected that the WMO Global Campus initiative will provide capacity development opportunities for all members, cutting across all WMO programmes. The ability is demonstrated in the following examples:

1. GFCS Climate Service Information System

The competence of persons building and providing climate products and services under the CSIS of the GFCS is critical as many of these products and services will guide planning and policy actions essential for adaptation to climate change and increasing variability at either community, national or regional levels. Because climate change and increasing climate variability will impact SIDS and Least Developed Countries disproportionately, and due to the limited human resources available in many of these countries, low cost access to education and training is needed to improve decisions on adaptation if these countries are to achieve sustainable development goals.

2. Aviation

Safety is the cornerstone of the aviation industry. Underpinning this safety are quality management systems that stress, among other things, the competence of individuals providing service to the industry. As meteorology services provide critical support to the aviation sector, and because the level of service is expected to increase in the future, the competence of meteorological personnel supporting the aviation sector is critical. The WMO Global Campus provides a mechanism to facilitate access to up-to-date low-cost learning opportunities and information.

3. Water Resources Management

Access to water is critical for sustainable development. Although managing water resources is an essential consideration for all countries, unfortunately many Least Developed Countries and SIDS lack sufficient capacity to effectively manage their water resources. This challenge is becoming greater due to the increasing frequency of severe weather, climate change and increasing climate variability. This situation will be aided by new competency standards in the water sector globally. The WMO Global Campus provides a low-cost mechanism for such

countries to access training, information and partnerships essential for building competence in the water sector.

3.4.5 Links to WMO Members, Commissions and Programmes

The WMO Global Campus initiative will assist the WMO Secretariat in its work to ensure all Members meet the standards and best practices described in WMO Technical Regulations by improving access to guidance and training. It will support the WMO Technical Commissions and Technical Programmes by providing avenues for providing the courses and resources they promote to meet their strategic objectives. The strengthened collaborative training network that is created can aid in identifying training needs, creating effective training solutions, and generating cost-saving partnerships for meeting objectives.

3.4.6 WMO Long-term Goals and Strategic Objectives (SO)

For the current WMO Strategic plan, 2016-2019, the Global Campus feasibility study is initially most directly working to support the following key three priority areas through activities designed to increase access to education and training opportunities:

2. Implement climate services under the Global Framework for Climate Services.
4. Improve the ability of NMHSs to provide sustainable high-quality services to support the safety, efficiency and regularity of air traffic management worldwide.
6. Enhance the capacity of NMHSs to deliver on their mission.

In the draft WMO Strategic Plan 2020-2023 (Decision 16.2(1)/1, EC-69), a set of goals and strategic objectives for the coming quadrennial are articulated, to be refined for further consideration by EC-70. The draft goals are presented below:

1. Better serve societal needs: Delivering actionable, authoritative, accessible, user oriented and fit-for-purpose services
2. Enhance Earth system observation and predictions: Strengthening the technical foundation for the future
3. Advance targeted research: Leveraging leadership in science
4. Close the gap on service: Enhancing and leveraging existing capabilities among all WMO Members to bring capability to all
5. Work smarter: Supporting effective policy- and decision-making and implementation in WMO

To the extent that each of these draft goals depends upon human resources capacity development efforts, the WMO Global Campus initiative has the potential support all through increased access and lower-cost learning opportunities. It will particularly assist in meeting draft Goal 4, through mechanisms to better understand learning needs of developing countries, providing opportunities to strengthen core competencies and expertise, and establishing strategic partnerships to help in achieving these. It also represents an attempt to “Work smarter” (draft Goal 5) in the context of the existing WMO Education and Training Programme through supporting collaboration and sharing.

3.5 External Linkages and Interactions

The following represent several of the external linkages that should be cultivated in the WMO Global Campus initiative:

1. The WMO Global Campus should consider partnerships with other international training organizations such as UNESCO IHE, UNITAR, UNESCO-IOC, GEO and GWP among others to (i) expand global awareness of opportunities, (ii) increase catalog content, (iii) co-develop new cross-cutting products and services, (iv) develop and implement quality standards and (v) facilitate resource mobilization. Consultations with UNESCO-IOC and UNITAR have already contributed to the development of this road map.
2. The WMO Global Campus initiative may provide increased support to international development programmes (e.g., Sendai Framework for Disaster Risk Reduction 2015-2030, Paris, SAMOA Pathway and the UN Sustainable Development Goals among others) as key activities for the success of many of these agreements include capacity development (particularly in SIDS, Developing Countries and Least Developed Countries) and development and transfer of technology and know-how (through north-south and south-south partnerships) in areas of weather, climate and water to improve community, national and regional decision-making. The key activities in the areas mentioned, already being addressed by the WMO Secretariat, are well aligned with the core activities and principles of the WMO Global Campus and will benefit significantly from the initiative given that it promotes inexpensive training opportunities through the sharing and collaboration.
3. International and national standards on Education & Training, such as ISO 29990, quality standard frameworks for academic content, international education and training organizations and professional societies identify best practices in education and training, including training solutions, instructional technologies, implementation of competency frameworks, standard certification methods, and ways for developing the skills of training professionals. These offer sources for potential solutions to address WMO Global Campus activities. Academic organizations must work with their Permanent Representatives to gain approval for their individual programs in meeting the WMO-No.1083 standards. Each country Permanent Representative must approve the academic programs that support their workforce. These programs should be reviewed, revised if necessary, and documented as compliant with WMO-No.1083. In the case of aeronautical forecast personnel, for example, this is critical to meet ICAO standards.
4. Credit transfer systems such as ERASMUS and many other regional networks of institutions that promote freedom of choice and movement in reaching required educational levels can serve as models, or be leveraged, to achieve WMO Global Campus initiative goals.

4. Progress and plans for priority activities (2016-2019)

Section 4 discusses the plans and priority activities for the WMO Global Campus feasibility study for the Period 2016-2019 and the annual progress made during this period.

The plans and priority areas for the WMO Global Campus result from numerous contributions from WMO RTC Directors, the WMO ETR Office, other departments of the WMO Secretariat, the WMO EC Panel on ETR , EUMETSAT, the COMET Program, CIMH, theMET Office College, and many others. The history of this development is outlined in section 1.2 of this Roadmap. The WMO EC Panel on ETR in their capacity as the WMO Global Campus Working Group holds monthly meetings to monitor the progress and discuss the activities associated with the WMO Global Campus Workplan.

Table 1 shows the WMO Global Campus Workplan currently being executed through 2019, when the feasibility study is expected to end. Under the columns identified by calendar year is a list of the annual accomplishments.

Table 1: Global Campus Workplan through 2019, depicting planned actions and milestones ahead of Cg-18.

Priority Area	2016	2017	2018	2019
Calendar and Catalogue	<ol style="list-style-type: none"> 1. MOODLE: CIMH hosted a prototype with work starting 1 May 2016. 2. EC Panel Demo – EC panel to have loaded courses onto the Calendar prototype. 3. Progress and refine Metadata and QA processes 4. Operational Prototype by end of 2016 by a technical team. 5. Technical team to begin a user guide. 6. The focus will be on submissions related to aviation and climate services training 7. WIS: Request through EC for CBS to investigate calendar metadata 	<ol style="list-style-type: none"> 1. CMIH will maintain the Moodle prototype and members will add content. 2. EC panel to work with CBS to explore the use of WIS for the Calendar and Catalogue. 3. Technical team will explore additional platform options for the final implementation 4. Recommend to EC the final platform for calendar (MySQL, VLab system). 	<ol style="list-style-type: none"> 1. EC demonstration of the working calendar 2. Continual improvements to the calendar based on initial adoption and feedback. 3. Procurement and implementation of the learning resources catalogue 4. Expansion of the systems through promotion with Members and Technical Commissions. 	<ol style="list-style-type: none"> 1. Expansion of the systems into other WMO Priority Areas. 2. Promotion of the use of the Calendar and Catalogue by all learning services providers

Aviation Services	1. Begin documenting learning opportunities	1. Begin collection of Aviation Services learning opportunities in Calendar	1. Growing collection of Aviation Services learning opportunities	1. Ongoing collection and utilization of Aviation Services learning opportunities
Climate Services	1. Begin documenting learning opportunities	1. Begin collection of Climate Services learning opportunities in Calendar	1. Growing collection of Climate Services learning opportunities 2. Begin outreach to more providers.	1. Ongoing collection and utilization of Climate Services learning opportunities
WMO Global Campus Roadmap	1. Draft the Global Campus Roadmap	1. External review and finalization of the Roadmap	1. EC presentation on the roadmap and host on WMOLearn	1. Update the Roadmap
Communications	1. Create a Global Campus Reference and Promotion Webpage on the WMO Website. 2. Develop a Global Campus Roadmap 3. Define other communications options, 4. Identify and address challenges and risks 5. Define feedback mechanisms	1. Implement all communication options, including the WMOLearn Public website, Facebook and LinkedIn social media. 2. Side-meeting on Global Campus at EC-69	1. Continued and explore new communication options 2. EC papers and presentations on WMO Global Campus	1. CG 18 papers and presentations 2. Ongoing communications through established media.
SYMET	1. Input to the SYMET Business case	1. Involvement in development, delivery and reporting of SYMET 2. Session at SYMET on WMO Global Campus activities status	1. Report SYMET outcomes to EC-70 2. Addressing actions resulting from SYMET.	1. Ongoing actions resulting from SYMET

Quality processes	1. Informal Review Panel recommendations	1. Formal Review Panels processes are implemented and refined	1. Review the Review Panel processes for effectiveness policies 2. Form Review Panels for Aviation and Climate Services 1. Form 3. Review Panels in additional priority areas	1. Ongoing implementation of the Review Panels
Human and Financial Resources	1. Create a Technical Task Team for the Calendar/Catalogue implementation 2. Seek additional funding for 2017	1. Seek funding partners and human resources	1. Seek funding partners and human resources	1. Seek funding stability through partners for infrastructure and human resources
	2016	2017	2018	2019

4.1 Initial Priority Activities

Early in the development of the WMO Global Campus concept it was determined that initially it would be prudent to undertake only a subset of the priority activities. During the 2015 RTC Director's Meeting recommendations determined the **three key activities/demonstrations** of the feasibility study, and these were later endorsed by the EC Panel on ETR. These suggested desirable features for a phase one of the feasibility study.

1. Global searchable calendar of events and catalogue of resources

The WMO Learn Events Calendar (<http://learningevents.wmo.int>) has been developed by the Caribbean Institute for Meteorology and Hydrology (CIMH) in collaboration with the technical task team and is being populated with offerings from RTCs and other training institutions. A second platform is being investigated for implementation of the WMO Global Campus catalog of learning resources. A task team will also advise on investigation of WIS integration as approved at EC-68. The initial focus of both the calendar and the catalog will be training in support of WMO competency frameworks and other priority areas (first addressing Aeronautical Meteorology personnel and Climate Services). The Working Group will actively solicit and encourage organizations to submit their courses and resources to these databases.

2. Aeronautical offerings

The WMO Commission for Aeronautical Meteorology has developed a list of training materials mapped to WMO competencies (<http://www.caem.wmo.int/moodle/course/view.php?id=7>). In addition, a WMO Global Campus Aviation Task Team has developed an initial list of courses and academic programmes that address the BIP-M

qualifications required of aeronautical forecasters. In 2016, the WMO President and Secretary General sent a letter to Permanent Representatives encouraging Members to take advantage of these courses and materials. In 2018, these courses and resources will be augmented and submitted to the WMO Learn Events Calendar and Catalogue

3. Climate Services

The CCI Expert Team on Education and Training developed the Competencies for Climate Services, which were approved by EC-68 for inclusion in WMO-No 49 Technical Regulations. The group has developed draft guidelines on implementation and is working to identify available learning opportunities to be listed in the WMO Learn Calendar and Catalogue.

4.2 Remaining Priority Areas

In addition to the initial priority activities, additional development activities are being pursued. A description of these is provided below.

4.2.1 Building Clarity

The WMO ETR Office has sponsored numerous presentations and discussions to clarify the goals and potential benefits of the WMO Global Campus concept. These were presented at a EC-68 WMO Global Campus side. Discussion by EC-68 Members indicated a collective understanding of the concept and suggested that clarity on the goals and benefits is growing among WMO Members. During EC-69 in 2017 another WMO Global Campus side meeting was held to announce the initial draft of the WMO Global Campus Roadmap and provide a status update on all the priority areas. The WMO Learn Events Calendar was also demonstrated. A side meeting at SYMET 13, 2017 provided an additional update, and a planned side meeting at EC-70 will do the same. Feedback received by members continue contribute to refinement of the concept and goals. New communications mechanisms are also being implemented (see section 4.3 below).

4.2.2 Quality Assurance

The WMO Global Campus Working Group has established a Review Panel to develop the processes and criteria to establish and validate the Quality Assurance requirements for listing content and courses via WMO Global Campus mechanism. These quality criteria are being put in place for the Calendar and Catalogue of learning resources, and will be tested as organizations increasingly inform about their courses and share resources.

4.2.3 Testing Processes for Translation of Content

WMO, Canada and the United States have developed a Guide to Translation Project Management, which was introduced to WMO RTCs at the Train-the-Trainer workshop in Buenos Aires in 2016. In 2017, a Translation Resource Centre was established at COMET to host the Translation Resource Guide and other translation templates and resources.

4.2.4 Establish Process for Transfer of Academic Credit

This action is still being evaluated by the EC Panel on ETR. Model systems used by other groups will be investigated as models. An 2018 ERASMUS+ project proposal for a collaboratively offered blended BIP-M curriculum was prepared with the participation of some Working Group Members.

4.2.5 Engaging New Global Partners

WMO Marine Meteorology and ETR Offices have engaged the Intergovernmental Oceanographic Commission to begin discussions on collaboration and leveraging content to be utilized in the WMO Global Campus. More details will follow.

4.2.6 Provide E-learning Support to RTCs

WMO ETR Office is conducting an annual series of Courses for Trainers for training providers in each WMO Region. It has been offered in four WMO languages. These workshops include a focus on best practices in utilizing e-learning content in the classroom and are delivered in a blended learning format. The core assignment of the workshop requires participants to utilize the WMO Competencies for Training Providers to develop a training plan for classroom or e-learning delivery as a key part of the workshop outcomes.

The course contains a unit on developing and accessing online learning resources, and promotes the utilization of shared content between RTCs and other affiliated training institutions supporting WMO. Future courses will identify WMO Learn and WMO Global Campus as significant resources for initial development of new instructor-led and blended-learning courses, as well as self-directed learning. A future course focused entirely on distance learning delivery is also being considered.

4.2.7 Identify Constraints and Solutions for Implementation

Every institution wanting to contribute learning resources to the WMO Global Campus will be encouraged to share, to the extent they are able, and to adhere to whatever copyright policies exist within their institution. Institutions will be encouraged to offer open copyright licenses that allow reuse and adaptation (including translation) of materials offered, and will be shown methods to do this, but this is not mandatory. Those that offer open copyright licenses could see more adoption and adaptation of their resources, which could in turn increase their reach and impact.

Recent research suggests that sequential micro learning pathways, or methods of linking small units of instruction, may increase the utilization of shared training resources between organization. This could require a plan for standard micro-learning pathways between organizations. Alignment of learning pathways with WMO Competency Frameworks may aid in the development of micro-learning pathways that can be shared between RTC's.

The WMO Global Campus will also promote face-to-face education and training options. While an increase in the amount and quality of on-line training being developed and delivered to assist WMO Members is expected, there will always be a critical role for face-to-face delivery. The Global Campus will encourage high-quality face-to-face offerings to increase as well.

Each of the WMO Global Campus initiative priority activities create change management challenges. The WMO Global Campus Working Group and its task teams are focused on developing ways to overcome the limitations and implement solutions that will enhance utilization.

4.2.8 Identify Human and Financial Resources

While the human resources required for the feasibility study have come from many volunteers and some small short-term contracts made possible primarily by VCP Trust Funds, the long-term needs are being studied and carefully controlled. Resource mobilization combined with careful implementation to minimize resource needs will be an ongoing challenge.

4.2.9 Collaboration

With the implementation of WMOLearn resources and communication mechanisms, the potential for effective collaboration between RTC's and other training institutions will be enhanced. A new priority of WMO ETR and the EC Panel on ETR will focus on enabling effective collaborations and partnerships between learning providers.

4.3 Communication and outreach

It is expected that the ETR Office will take the lead in raising the profile of the WMO Global Campus within the wider educational community. Those participating in the feasibility study will be encouraged to assist in these efforts.

To ensure that Members are kept abreast of the progress of the WMO Global Campus, the WMO ETR established a promotional portal in collaboration with the WMO Communications Office. This new portal, WMOLearn, on the WMO public website (<http://learn.wmo.int>), will provide access to other WMO Global Campus communication and collaboration tools, including the Calendar, Catalog, and social media forums. It will also provide success stories to inspire others. The social media sites will provide a user forum and collaboration mechanism for users to ask questions of other WMO Global Campus users and to leverage lessons learned. The goal is to increase understanding of the value of a WMO Global Campus to strengthen the WMO Education and Training Programme.

4.4 Monitoring and Evaluation

Monitoring and evaluation of the progress and impact of the WMO Global Campus feasibility study and, particularly, a future implementation, requires establishment of new learning metrics that might include:

1. degree of utilization of WMO Global Campus tools and platforms, such as the calendar, catalog, and media platforms, to access information and resources
2. numbers of submissions to the calendar and catalog
3. reports of time savings through collaboration and sharing of content
4. reports of cost savings by utilization of courses and content provided by other learning sites
5. expansion of the global learning capacity through utilization of WMO Global Campus calendar and catalogue in all regions
6. expansion of the learning and certification attained aligned to the WMO Competencies
7. changes in funding requests to WMO for education and training support
8. evidence of changes in the quality and nature of courses being offered by RTCs and other training providers

These impacts are expected to occur through maximizing utilization of existing global learning capacity. More metrics may be determined as this section is expanded in the future.

The initial monitoring and evaluation of the WMO Global Campus during the feasibility phase has focused on attainment of workplan activities (milestones) outlined in Table 1. During the feasibility study, the routine monitoring of the metrics and progress evaluation is accomplished through monthly meetings of the Global Campus Working Group, discussions at SYMET13, presentations and side meetings at the WMO EC and CG and through routine progress reports to the WMO ETR.

The following activities are used to monitor progress of the WMO Global Campus feasibility study.

1. The Executive Council ETR Panel of Experts monitors progress of the WMO Global Campus work plan through monthly calls where issues are discussed and progress is demonstrated. The work plan activities being monitored are listed in the monthly call agenda and include:
 - a) WMO Global Campus Calendar Development
 - b) WMO Global Campus Catalogue Development
 - c) WMO Global Campus Roadmap Development
 - d) Aviation Training Identification and Promotion
 - e) Climate Services Training Identification and Promotion
 - f) Advertisement and Promotion of the WMO Global Campus initiative
 - g) Review Panel and Quality Criteria development
 - h) SYMET13 activities related to WMO Global Campus
 - i) Identification of Additional Resources to Support Global Campus
2. Demonstrations of the Calendar and Catalogue systems at the Regional Association Meetings and at the Executive Council side meetings will be used to identify strengths and weaknesses through feedback.
3. Monitoring the number of collaborations and how many resources are shared between WMO Global Campus users.
4. Monitoring the utilization of training resources and events made available in the Events Calendar and catalogue.

5. Implementation of the WMO Global Campus

Implementation of a WMO Global Campus as a long-term initiative of the WMO Education and Training Programme to effectively achieve the desired outcomes will require a structure and related processes that allow it to conduct its activities efficiently, yet also remain sufficiently flexible to address evolving priorities and needs. This section addresses key considerations in the implementation of a WMO Global Campus.

5.1 Organization and Oversight

The activities that develop as a result of the WMO Global Campus should honor the underlying guiding principles developed by the Working Group and contained in Annex II of the Roadmap. These principles recognize that a WMO Global Campus can provide a critical good to all WMO Members only if all have the potential to contribute and benefit, and if collaboration and sharing is conducted fairly. It is essential that the organization

and oversight mechanisms support these principles and facilitate the sustainability of the initiative.

5.1.1 Vision and Mission

As stated in section 1, that the vision behind the WMO Global Campus concept is to have a coordinated and collaborative network of institutions that work together to meet the growing education and training needs of WMO Members. The mission of the Global Campus initiative will extend the mission of the existing WMO Education and Training Programme to increase emphasis on using collaboration mechanisms to meet the growing range and depth of education and training demands of WMO Members.

5.1.2 Accountability, Transparency and Traceability

Accountability, transparency and traceability mechanisms of the WMO Global Campus will follow existing and evolving WMO mandates, which ensure rigor but recognize the need to evolve into new priority areas and to engage new partners.

5.1.2.1 Accountability

The WMO Congress governs the implementation of the WMO Global Campus as it does all initiatives that arise from WMO programmes and commissions. The WMO Congress has requested the WMO Executive Council to monitor and direct the activities of the WMO Global Campus during the feasibility study. It is expected that this governance arrangement will continue given a decision by Congress 18 to continue the WMO Global Campus initiative.

During the feasibility study, the EC Panel on ETR has established a WMO Global Campus Working Group to oversee activities. The Terms of Reference for the Working Group are those of the EC Panel on ETR, since panel members comprise the group. Three specialized but interconnected task teams currently report to the Working Group on technical matters and on the priority areas of aeronautical meteorology and climate services. Additional task teams will be identified to implement additional activities, such as those communicated as priority areas in Section 3.

Through the WMO ETR Office, the Working Group and its task teams will report on its activities to EC and Congress.

5.1.2.2 Transparency and Traceability

Actions undertaken on behalf of the WMO Global Campus should be transparent and consistent with WMO rules governing transparency, as well as standard industry practice in the absence of clear guidance from the WMO. The following bullets outline some areas where transparency is important in the operation of the WMO Global Campus:

- The WMO ETR Office will ensure that any financial arrangements (establishment and use of trust funds, use of special services agreements and procurements) will be consistent with WMO rules and practices.
- The decisions of the editorial committees on content to be included in the catalogue and calendar should be documented.
- Meetings of the Working Group and task teams should be documented.
- The WMO Global Campus Roadmap should be kept up-to-date and available to Members

5.1.3 Quality Assurance and Review Panels

Because collaboratively developing and sharing education and training content requires shared values regarding quality, a quality assurance process that involves experts from appropriate technical disciplines will assess and filter content submitted for publication to the WMO Events Calendar and the Catalogue of Resources.

The WMO Global Campus Working Group has developed the processes and criteria for Quality Assurance for making available content and courses via WMO Global Campus mechanisms. Post implementation, the responsibility for the establishment of Review Panels will have to include the relevant technical commissions. Clear Terms of Reference outlining the roles and responsibilities of the Review Panels and their membership will need to be determined.

5.1.4 Monitoring, Evaluation and Reporting

Periodic monitoring, evaluation and reporting on the activities of the initiative is critical for determining if it is achieving its objectives. The processes for monitoring, evaluation and reporting on the performance of the WMO Global Campus will be defined by the WMO Education and Training Office (WMO ETR) and the Development and Regional Activities Department (DRA), with the support and advice from the EC Panel on ETR, within the requirements established by the WMO Secretariat. The WMO Global Campus Roadmap and WMO Learn are mechanisms for reporting to Members, as well as documents prepared for constituent body meetings.

5.1.5 Human Resources

The WMO Global Campus vision will be realized (i) by utilizing to the extent possible existing WMO mechanisms, activities, programmes and projects, (ii) through new partnerships with global, regional and national stakeholders and (iii) through the acquisition of resources from traditional and non-traditional resources external to WMO.

Secretariat services (including the coordination of activities) for the WMO Global Campus are being provided by the WMO ETR Office. The UK Met Office previously seconded a staff member to the WMO ETR Office to provide support, and the USA VCP programme provided a trust fund to support some activities. Currently, a significant amount of the human resources required to complete tasks under the WMO Global Campus work programme is being provided by Members and affiliate institutions, similar to the way that technical commissions operate. This arrangement will continue throughout the feasibility study and beyond, if implementation is decided. Such long-term support from Members will be critical to achieving the WMO Global Campus vision, and is in keeping with its vision of collaboration.

5.1.6 Financial and Resource Considerations of the WMO Global Campus

The finances dedicated to activities of the WMO Global Campus initiative will be managed by the WMO ETR Office in accordance with the financial and procurement rules and regulations of the WMO, unless otherwise directed by the WMO Executive Council or the WMO Congress.

Implementing the WMO Global Campus is not expected to increase costs to WMO Members through assessed contributions. Instead, some cost savings to Members are expected. The WMO Global Campus is intended to increase access and sharing of tools, opportunities, practices and experiences. In this way, successful implementation of the WMO Global Campus will hopefully reduce costs in some areas as development is shared amongst institutions. It may also reduce costs by attracting additional external funding through donors, although attracting this funding is an additional challenge.

Individuals and institutions accessing courses and learning opportunities via the WMO Global Campus may be required to pay the providing institutions for these services to the institutions providing them. Institutional costing structures for education and training already in place need not be altered by implementation of the WMO Global Campus.

The success of the WMO Global Campus feasibility study will be assessed by WMO Congress in 2019, who will determine whether it should be implemented. While implementation of the WMO Global Campus will for the most part follow current funding modalities, the development of operational, strategic and business plans for some activities will be required to ensure the sustainability of the initiative. The development of these plans for presentation to Congress in 2023 would be guided EC during the intersessional period from 2019 through 2023.

5.1.7 WMO Technical Commissions

Technical Commissions play an important advisory role in WMO. It is expected that most, if not all, Technical Commissions will play important roles in the WMO Global Campus. Currently, the Commission on Climatology and the Commission on Aeronautical Meteorology are demonstrating the utility of the Global Campus to increase accessibility of training programmes in climatology and aeronautical meteorology that meet requisite quality assurance standards. Once these demonstrations have been successfully reported, it is expected that other Commissions will utilize the WMO Global Campus mechanisms in similar and new ways.

5.2 WMO Global Campus User-Interface

Critical to the implementation of the WMO Global Campus initiative is its ability to connect providers of training and related services with consumers through efficient and cost-effective mechanisms. This makes its user-interface (UI) a primary concern.

Education and training focal points in regional associations, technical commissions and other entities, ensure coordination with constituent bodies and provide advice on the implementation of ETR related activities in WMO. Annual meetings and joint meetings of Presidents of Regional Associations and the Presidents of Technical Commissions offer additional forums for guidance and exchange. These will be critical to a successful WMO Global Campus.

Addressing user needs for training and mechanisms for collaboration is central to the establishment of a WMO Global Campus. User needs for training, collaboration and technical exchange are identified through reports of the RAs, surveys by the ETR Office, country requests, feedback from annual meetings of the Presidents of RA and TCs, as well as through analysis of data in the country database. Options for meeting training

needs are often announced through disparate mechanisms, including existing WMO ETR Office channels. The WMO Global Campus is attempting to provide more centralized information and mechanisms to supplement these existing mechanisms.

A robust UI that utilizes online mechanisms along with more traditional forms of user-interactions is essential. An important part of the Global Campus user-interface is its WMOLearn website (<http://learn.wmo.int>) which currently hosts a WMOLearn Events Calendar, this Roadmap, and other information on WMO Global Campus activities. Expansion of this component of the WMO Global Campus UI to host training content, discussion forums and collaboration opportunities is foreseen. Traditional components of the UI are supported through exchanges of knowledge and know-how at events such as WMO SYMET, RTC Director's Meetings, CoCOM and CALMet. Interfacing is also facilitated through meetings of RAs and TCs and meetings with other international, regional and national agencies and programmes.

As noted, the ETR Office is expected to provide critical support for the WMO Global Campus. For example, it is expected that the ETR Office will facilitate lines of communication between the Global Campus Working Group and WMO Constituent bodies, the training community and the donor community. It is also expected that the WMO ETR Office will promote the WMO Global Campus through its various national, regional and international partnerships.

6. Concluding remarks

Through implementation of a WMO Global Campus, we envision a future WMO education and training programme where global training institutions increasingly collaborate fully to support the education and training of the global workforce. The "WMO Global Campus 2030" concept aligns with the current performance period of the UN Sustainable Development Goals that it supports. The WMO Global Campus is not strictly a technology solution, but a collaborative network of institutions that share education and training materials, staff and technical expertise, and provide cost-effective education and training services for meteorology, hydrology, and climate services. The quality of training offerings is also expected to increase through shared standards and practices, and learning outcomes will be performance-based, focusing on the required certifications of competency and qualifications, in all WMO languages, and aligned to current products and services.

The WMO Global Campus will evolve with time. New projects and initiatives will emerge as ideas come forth and new needs arise. As noted earlier in this roadmap, the EC Panel, The ETR Office, and the RTC Directors have set themselves a target during the feasibility study of developing three demonstration activities and investigating others. Success of these is dependent on the commitment and interest of the RTCs, other training institutions and all WMO Members in increasing the range and scope of education and training opportunities delivered by them and to Members.

As WMO Members see benefits from the feasibility study in the form of improved cooperation and collaboration that lead to increased learning opportunities, and as details on the feasibility study activities that EC-66 requested are developed, Members will have more confidence that the Global Campus concept is a success and look to Cg-18 to approve continued implementation.

Annex I WMO RTCs and RTC Components as of 2017

ALGERIA	Institut Hydrométéorologique de Formation et de Recherches (IHFR)
ANGOLA	Instituto Nacional de Meteorologia e Geofisica (INAMET)
ARGENTINA	Universidad de Buenos Aires (UBA)
ARGENTINA	Servicio Meteorológico Nacional (SMN)
BARBADOS	Caribbean Institute for Meteorology and Hydrology (CIMH)
BRAZIL	Centro Virtual de Ensino e Treinamento em Meteorologia (CVEM)
CHINA	Nanjing University of Information, Science and Technology (NUIST)
CHINA	China Meteorological Administration Training Center (CMATC)
COSTA RICA	Universidad de Costa Rica (UCR)
EGYPT	The Egyptian Meteorological Authority (EMA)
INDIA	India Meteorological Department Training Centre (IMD-New Delhi)
INDIA	Central Training Institute (IMD-Pune)
INDIA	National Water Academy (NWA-Pune)
INDIA	Indian Institute of Technology Roorkee (IIRT-Roorkee)
INDONESIA	Agency for Meteorology, Climatology and Geophysics (BMKG)
INDONESIA	Research Centre for Water Resources (RCWR)
IRAN	Islamic Republic of Iran Meteorological Organization (IRIMO)
IRAQ	Iraqi Meteorological Organization (IMO)
ISRAEL	Postgraduate Training Centre for Applied Meteorology (PTCAM)
ITALY	National Research Council Institute of Biometeorology (CNR-IBIMET)
KENYA	University of Nairobi (UON)
KENYA	Institute for Meteorological Training and Research (IMTR)
MADAGASCAR	Ecole Supérieure Polytechnique à Antananarivo (ESPA)
MADAGASCAR	Ecole Nationale d'Enseignement de l'Aéronautique et de la Météorologie (ENEAM)

NIGER	Centre Régional Agrhymet (AGRHYMET)
NIGER	Ecole Africaine de la Météorologie et de l'Aviation Civile (EAMAC)
NIGERIA	Federal University of Technology, Akure (FUTA)
NIGERIA	Meteorological Research and Training Institute (MRTI)
PERU	Universidad Nacional Agraria La Molina (UNALM)
PHILIPPINES	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
PHILIPPINES	University of the Philippines (UP)
REPUBLIC OF KOREA	Korea Meteorological Administration (KMA)
QATAR	Qatar Aeronautical College (QAC)
RUSSIAN FEDERATION	Advanced Training Institute of Roshydromet (ATI)
RUSSIAN FEDERATION	Russian State Hydrometeorological University (RSHU)
RUSSIAN FEDERATION	Moscow Hydrometeorological Technical School (MGMTEH)
TURKEY	Turkish State Meteorological Service (TSMS)
SOUTH AFRICA	South Africa Weather Service (SAWS)
UZBEKISTAN	Tashkent Hydrometeorological Profesional College (THMPC)
VENEZUELA	Universidad Central de Venezuela (UCV)

Annex II Guiding Principles for WMO Global Campus

1. Open participation: All education and training providers to WMO Members are encouraged to contribute and collaborate.
2. Shared responsibility: All participants should strive to bring value to the initiative.
3. Shared improvement goals: Participants will work toward continual improvement in education and training for WMO Members.
4. Shared collaboration goals: Participants will seek opportunities for collaboration and partnership.
5. Fairness in collaboration: Those collaborating will treat each other fairly and strive for mutually beneficial outcomes.
6. Shared quality goals: Those submitting offerings through WMO Global Campus mechanisms will recognize and follow agreed quality assurance principles.
7. Open sharing encouraged: All contributors will share as much as possible within the limits of institutional copyrights, intellectual property and any commercial considerations.
8. Respecting rights: All users of WMO Global Campus resources will respect and abide by the copyright and intellectual property of others.
9. Open source: Shared platforms will have community ownership and coordination for accessibility and sustainability.
10. Operates within WMO mechanisms: The WMO Global Campus operates within WMO bodies and mechanisms as an initiative of the WMO Education and Training Office, with guidance by the EC Panel of Experts on Education and Training. Institutions and cooperatives outside WMO structures are welcome participants.
11. Guidance for participation: Participants can seek the advice of the WMO Education and Training Office, EC Panel of Experts on Education and Training, or other WMO bodies and mechanisms when needed.