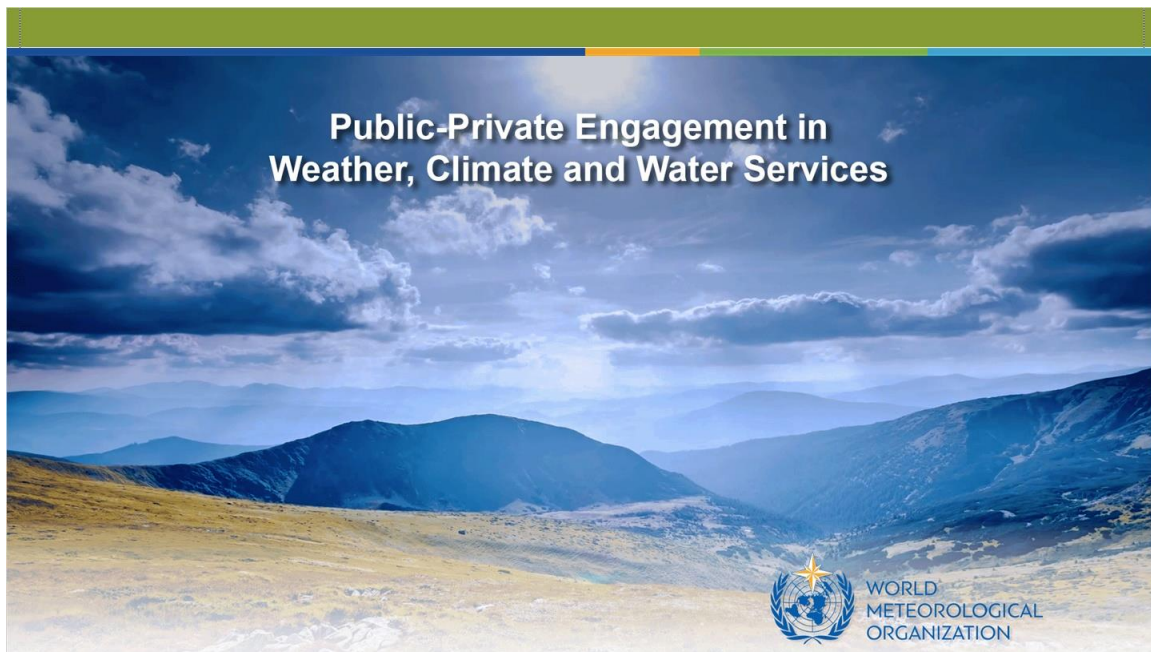


Public-Private Engagement in Weather, Climate and Water Services

1. Module 1: Introduction to Public-Private Engagement

1.1 *Public-Private Engagement Course*



Notes:

1.2 Course Welcome

Welcome

Welcome to this course on Public-Private Engagement in Weather, Climate and Water Services. This course is an initiative by the World Meteorological Organization (WMO) aimed at building effective communication and collaboration among stakeholders in the public, private and academic sectors as well as civil society in support of critical services in weather, climate and water around the world.

This course consists of four modules:

- Module One: Introduction to Public-Private Engagement
- Module Two: Legislative and Institutional Frameworks for PPE
- Module Three: Data Sharing
- Module Four: Approaches for PPE

The course is expected to require approximately 1.5 to 2 hours to complete although it may be taken in multiple sessions.

Please read this welcome statement to this course by Petteri Taalas, Secretary-General of WMO.




**Petteri Taalas, Professor
Secretary-General of WMO**

Welcome message from the Secretary-General of WMO
(Click to open)

zoom1 (Slide Layer)

Welcome

Click to close



**Petteri Taalas, Professor
Secretary-General of WMO**

Welcome message to the PPE training modules from the Secretary-General of WMO

It is a pleasure to present you this training resource, which was carefully prepared for you by the Public-Private Engagement, and the Education and Training Offices of WMO, aiming to support you exploring new potential pathways to enable developments that can help meeting the needs of the ever-evolving services you provide to society.

Why is Public-Private Engagement (PPE) so important to WMO? The scientific and technological advances of the past century have allowed us to develop very high-quality weather, climate and water services. The evolution of societies and economies, especially in trying to grapple with climate change, means that the demands on our meteorological community continue to increase. Quite simply, our public sectors cannot meet these demands alone.


Moving towards PPE brings some developments. The scope of activity for each National Meteorological and Hydrological Service (NMHS) needs to be clearly defined, ensuring that the critical public safety mandate is strengthened while also allowing a separate and distinct space for the activities of private sector meteorological companies.

Free and open weather data, excellent public services, and clarity of the interface between public and private will help to encourage investment in all sectors and an evolution towards better services and products for the good of all. WMO, and at a national level the NMHSs, have a key role in promoting and enabling the growth and development of all sectors of the meteorological community. We hope that these training modules will help you to explore fully the issues and opportunities around PPE.

1.3 Module Overview: What is Public-Private Engagement?





Module Overview: What is Public-Private Engagement?	
<p>In this module, we will dive into the definition of public-private engagement (PPE) in weather, climate and water services, the motivations driving it, some of the benefits and challenges involved and a bit of the history and involvement of WMO. To get started, please watch this video.</p>	 <p>Video</p>

1.4 Drivers Behind the Evolution to PPE




Drivers Behind the Evolution to PPE	
<p>Developments in technology have opened many new possibilities for greater engagement between all sectors active in meteorology. The falling cost of weather observing equipment, combined with inexpensive telecommunications, means that collecting weather observations is no longer the exclusive domain of the National Meteorological and Hydrological Services (NMHSs). Commercially-funded satellites now deliver key data on the upper atmosphere. The cost of computing power has also reduced; private firms now run sophisticated Numerical Weather Prediction (NWP) models.</p> <p>Technology has brought lower costs for developing and delivering weather services as well. Software processing can tailor the basic forecast data to the individual needs of user communities to provide them with vital decision-making information.</p> <p>The needs of society for meteorological information have also grown, becoming more varied and more complex. No NMHS can meet all of these needs by itself, especially as many are facing constraints in staffing and resources. Partnerships across the meteorological community are needed if we are, together, to meet the growing demands on all of us.</p> <p>References (for further information):</p>	 <p>European Space Agency (ESA) https://creativecommons.org/licenses/by-sa/3.0/igo/</p> <p>Hamartin, https://creativecommons.org/licenses/by-sa/3.0/</p> <p>shutterstock</p>

Notes:

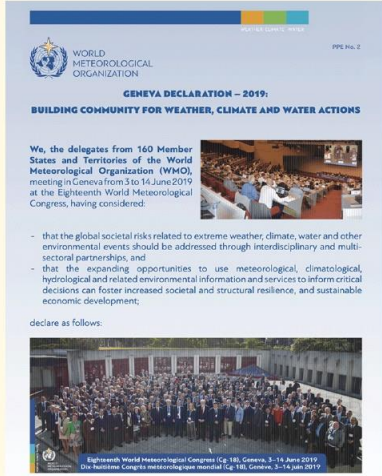
1.5 Opportunities and Benefits from PPE

Opportunities and Benefits from PPE	
<p>For the NMHS, engaging with a private-sector partner in the delivery of services offers the opportunity to reach users in new and innovative ways. Developing partnerships with media-based organisations (either traditional broadcast media or internet-based media) can greatly increase the range and reach of the NMHS, building its brand strength and supporting greater recognition of its expertise. Forming partnerships with academia offers the opportunity to influence the subjects taught in meteorology-related degree courses, as well as developing joint research projects in areas of common interest.</p> <p>For private-sector companies, developing partnerships with NMHSs can provide access not just to data but to scientific expertise and operational know-how. This can lead to an increased range of products and services that it can offer in the marketplace. Partnerships with academia can lead to joint research projects and the development of innovative techniques in topics such as forecasting and NWP post-processing.</p> <p>For academia, partnerships with an NMHS, or with a private sector meteorological company, can provide access to operational expertise, a link to “real-world” challenges that may form the basis for research projects, and a pipeline of job opportunities for graduates. Links to other organisations can</p>	   

1.6 Challenges of PPE

Challenges of PPE	
<p>When entering into any partnership, an NMHS must make sure that its key interests and activities are acknowledged, supported and, if possible, enhanced. These include the sustainability of the weather observation network and the authoritative position of the organisation in respect to issuing weather warnings. Another challenge may be the retention of key staff, as salaries in the public service can be significantly lower than those on offer in the private sector.</p> <p>In any partnership arrangement it is likely that the private sector partner will carry a significant proportion of the financial risk, as public bodies typically cannot invest capital funding into joint ventures. A private sector partner may also find that the public sector body is slower to accept innovative ideas out of such considerations as lack of funds, or the need to maintain operational stability. This can lead to frustrations and possibly increased costs. Partnerships will often require some measure of compromise on all sides.</p> <p>The primary areas of focus in academia must be on teaching and research and the need to concentrate on these, as well as attend to the necessary cycle of the academic year. This may limit the capacity of academics to engage fully with outside organisations.</p>	  

1.7 WMO Policy on PPE: The Geneva Declaration of 2019

WMO Policy on PPE: The Geneva Declaration of 2019	
<p>The Geneva Declaration 2019 represents an important evolution in the policy of WMO with respect to PPE.</p> <p>In 2019, the World Meteorological Congress adopted the Geneva Declaration. This represents an important evolution in the policy of WMO with respect to PPE. Entitled “Building Community for Weather, Climate and Water Actions” the document is a comprehensive statement by global leaders in meteorology that sets out a new vision for how all of the sectors in weather, climate and water services can work better together.</p> <p>In the Geneva Declaration, the Congress:</p> <ol style="list-style-type: none">1. Welcomes opportunities offered by collaboration between public, private and academic sectors to address societal needs.2. Urges stakeholders to promote fair, transparent international data sharing, with respect for ownership rights.3. Encourages stakeholders to support fair and transparent agreements that adhere to quality and service standards, supporting public good, and individual stakeholder needs.4. Encourages partnerships across sectors and borders to provide value, develop innovative data exchange mechanisms and incentives, and to build trust and	<p>Building Community for Weather, Climate and Water Actions</p>  <p>Click below to learn about the key parts of the Geneva Declaration.</p> <p>Summary of The Geneva Declaration, 2019</p>

Notes:

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WMO Policy on PPE: The Geneva Declaration of 2019

Click to close.

Summary of The Geneva Declaration of the WMO, 2019

Some key elements of the text of the Geneva Declaration are as follows:

Congress welcomes:

- The opportunities for all stakeholders and the broader user community that will result from a closer collaboration among public, private and academic sectors;
- The engagement of all sectors in addressing societal needs through weather, climate, water and other environmental services.

Congress urges all stakeholders to:

1. Respect shared values that create opportunities for innovation and growth based on science, leverage expertise to provide positive outcomes and solutions for all parties, support knowledge and technology transfer and uptake, invest in local research, and develop human capacity;
2. Promote the sustainability of the global infrastructure by seeking opportunities for multi-sector engagement that improve efficiency and better serve society;
3. Promote free and unrestricted international data sharing, based on national circumstances, with intellectual property rights duly respected;
4. Foster and maintain fair and transparent arrangements, adhere to quality and service standards, to advance collective objectives in delivering public goods and taking into account specific stakeholder needs;

• Seek integrity by engaging in mutually beneficial relationships and partnerships to the benefit of society.

Congress encourages:

1.8 A Roadmap for PPE: Guidelines for Public-Private Engagement

A Roadmap for PPE: Guidelines for Public-Private Engagement

When setting out on a new journey, a map is always helpful. For the journey towards successful PPE, WMO have published the "Guidelines for Public-Private Engagement" which provides such a roadmap, setting out the principles for engagement that underlie good PPE practices.

WMO has also established many technical guidelines, setting standards for the scientific work of meteorology. Following a set of agreed guiding principles and using common technical standards can help to ensure a good foundation for organisations who wish to work together in partnership.

Stated simply:

- The Geneva Declaration is a high-level statement of the WMO policy on PPE.
- The "Guidelines on Public-Private Engagement" provide a roadmap as to how this policy might be implemented.

Please click the button below and review the summary of the key guidelines for PPE from the WMO "Guidelines for Public-Private Engagement". On the next pages we will look more closely at the application of these guidelines.


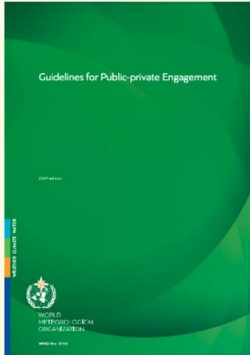
Summary of Key Guidelines for PPE

WMO "Guidelines for Public-Private Engagement" 2021

(Click to read)

Refer to the full documents for more information:

- Guidelines for Public-Private Engagement (WMO-No. 1258), https://library.wmo.int/?lvl=notice_display&id=21858
- Technical Regulations, Volume I: General Meteorological Standards and Recommended Practices (WMO - No. 49), https://library.wmo.int/?lvl=notice_display&id=14073



1.9 Evaluating a Roadmap for PPE

Evaluating a Roadmap for PPE

There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.

Roll your cursor over the items below for more information.

Case Example 1: KNMI with DTN in the Netherlands

#	PPE Guideline	Covered?		Explanation
		Yes	No	
1.	Put people first	✓		The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.
2.	Build fair and transparent relationships	✓		While not primarily aimed at relationship-building, this collaboration will strengthen relationships between sectors.
3.	Focus on mutual benefits	✓		Builds on complementary strengths, with forecast & observational data from the NMHS and specialised observations & service delivery from the private sector partner.
4.	Create shared values between partners	✓		Both partners bring scientific and technical innovation to meet a societal need.
5.	Promote sustainability		✓	Not applicable in this example.
6.	Ensure that no country gets left behind		✓	Not applicable in this example.
7.	Create a level playing field	✓		(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.
8.	Respect the sovereignty of WMO members		✓	Not applicable in this example.


feedback cover (Slide Layer)

Evaluating a Roadmap for PPE

There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.

Roll your cursor over the items below for more information.

Case Example 1: KNMI with DTN in the Netherlands



Alex van Herwijnen, <https://i11c.kr/p/FL4wuE>
<https://creativecommons.org/licenses/by-nc-nd/2.0/>

View Explanations

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#		PPE Guideline	
		Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Put people first</p> <p>Essential meteorological, climatological, hydrological and environmental information should focus on saving lives, protecting property and livelihoods, and improving economic productivity.</p>			
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#		PPE Guideline	
		Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Build fair and transparent relationships</p> <ul style="list-style-type: none"> Support the exchange of meteorological and related information between all sectors. Ensure the free and unrestricted international exchange of essential meteorological data and products. 			
<p>This collaboration will strengthen & observational data from the very from the private sector partner. ion to meet a societal need.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Explanation</p>			
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p>			
<p>Focus on mutual benefits</p>			
<p>Find models of engagement where each partner brings complementary strengths and where each sector can contribute to the success of the other.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Explanation</p>			
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p>			
<p>Create shared values between partners</p>			
<p>Recognise opportunities for innovation and growth, based on science, to meet societal needs.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Promote sustainability Maintain the global infrastructure of meteorology.</p>			
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p>			
<p>Roll your cursor over the items below for more information.</p>			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>Case Example 1: KNMI with DTN in the Netherlands</p>			
<p>Ensure that no country gets left behind Support technology transfer to less-developed countries — every country needs good weather and climate information.</p>			
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p>			
<p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p>			
<p>Not applicable in this example.</p>			

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Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p> <p>Roll your cursor over the items below for more information.</p>			
Case Example 1: KNMI with DTN in the Netherlands			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p> <p>this collaboration will strengthen</p> <p>& observational data from the</p> <p>ery from the private sector partner.</p> <p>tion to meet a societal need.</p> <p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p> <p>Not applicable in this example.</p>			

rollover 8 (Slide Layer)

Evaluating a Roadmap for PPE			
<p>There are many possible pathways for the effective implementation of the PPE concept. We will review two case examples of PPE, one in the Netherlands, and the other in Japan. Please click the button below to review the case example from the Netherlands. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click "View Explanations" when you are ready to review the explanations for this case.</p> <p>Roll your cursor over the items below for more information.</p>			
Case Example 1: KNMI with DTN in the Netherlands			
#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	✓	
2.	Build fair and transparent relationships	✓	
3.	Focus on mutual benefits	✓	
4.	Create shared values between partners	✓	
5.	Promote sustainability		
6.	Ensure that no country gets left behind		
7.	Create a level playing field	✓	
8.	Respect the sovereignty of WMO members		✓
<p>The service is aimed at the safety and efficiency of the public transport system, which is a benefit to all.</p> <p>this collaboration will strengthen</p> <p>& observational data from the</p> <p>ery from the private sector partner.</p> <p>tion to meet a societal need.</p> <p>(Yes/Mostly) While the level-playing field is not directly addressed, the close collaboration and mutual respect between partners support the concept.</p> <p>Not applicable in this example.</p>			

1.10 Activity: Evaluating a Roadmap for PPE

(Pick Many, 10 points, 2 attempts permitted)

Activity: Evaluating a Roadmap for PPE

In this activity, you will review the case example from Japan and decide which of the guidelines have been covered or not. Please click the button below to review Case Example 2. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click Submit when you are ready to proceed.

Roll your cursor over the items below for more information.

Case Example 2: JMA with JMBSC and WXBC in Japan

#	PPE Guideline	Covered?		Explanation
		Yes	No	
1.	Put people first	<input type="radio"/>	<input type="radio"/>	The promotion of innovation in private sector meteorology in Japan leads to a broader range of services available to the public.
2.	Build fair and transparent relationships	<input type="radio"/>	<input type="radio"/>	The legislative and administrative arrangements in Japan strongly support the building of fair and transparent relationships between partners.
3.	Focus on mutual benefits	<input type="radio"/>	<input type="radio"/>	The arrangements in Japan allow each sector to build complementary strengths within a clear, open and consistent framework.
4.	Create shared values between partners	<input type="radio"/>	<input type="radio"/>	The WXBC promotes innovation very directly through hosting workshops, training events, ideas workshops and similar.
5.	Promote sustainability	<input type="radio"/>	<input type="radio"/>	The use of high-qualified, certified, third-party observing systems in Japan helps to augment the global meteorological infrastructure.
6.	Ensure that no country gets left behind	<input type="radio"/>	<input type="radio"/>	Not applicable in this example.
7.	Create a level playing field	<input type="radio"/>	<input type="radio"/>	The legislative policy and the consequent administrative arrangements in Japan strongly support the concept of the "level playing field".
8.	Respect the sovereignty of WMO members	<input type="radio"/>	<input type="radio"/>	Japan's unique certification process for weather business personnel is an example of a member making appropriate meteorology governance arrangements to fit its own context.

Correct	Choice
X	q1y 1
X	q2y 1
X	Q3y 1
X	Q4y 2
X	Q5y
X	Q6n
X	Q7y
X	Q8y
	q1n 1
	Q2n 1

Q3n 1
Q4n 2
Q5n
Q6y
Q7n
Q8n

feedback cover (Slide Layer)


Activity: Evaluating a Roadmap for PPE

In this activity, you will review the case example from Japan and decide which of the guidelines have been covered or not. Please click the button below to review Case Example 2. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click Submit when you are ready to proceed.

Roll your cursor over the items below for more information.

#	PPE Guideline	Covered?	
		Yes	No
1.	Put people first	<input type="radio"/>	<input type="radio"/>
2.	Build fair and transparent relationships	<input type="radio"/>	<input type="radio"/>
3.	Focus on mutual benefits	<input type="radio"/>	<input type="radio"/>
4.	Create shared values between partners	<input type="radio"/>	<input type="radio"/>
5.	Promote sustainability	<input type="radio"/>	<input type="radio"/>
6.	Ensure that no country gets left behind	<input type="radio"/>	<input type="radio"/>
7.	Create a level playing field	<input type="radio"/>	<input type="radio"/>
8.	Respect the sovereignty of WMO members	<input type="radio"/>	<input type="radio"/>

Case Example 2: JMA with JMBSC and WXBC in Japan



Japanese Meteorological Business Support Centre

feedback (Slide Layer)

Activity: Evaluating a Roadmap for PPE

In this activity, you will review the case example from Japan and decide which of the guidelines have been covered or not. Please click the button below to review Case Example 2. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click Submit when you are ready to proceed.

The correct answers are shown below. Review the explanations and click Next to proceed when you are ready.

Case Example 2: JMA with JMBSC and WXBC in Japan

#	PPE Guideline	Covered?		Explanation
		Yes	No	
1.	Put people first	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The promotion of innovation in private sector meteorology in Japan leads to a broader range of services available to the public.
2.	Build fair and transparent relationships	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The legislative and administrative arrangements in Japan strongly support the building of fair and transparent relationships between partners.
3.	Focus on mutual benefits	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The arrangements in Japan allow each sector to build complementary strengths within a clear, open and consistent framework.
4.	Create shared values between partners	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The WXBC promotes innovation very directly through hosting workshops, training events, ideas workshops and similar.
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6.	Ensure that no country gets left behind	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Not applicable in this example.
7.	Create a level playing field	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The legislative policy and the consequent administrative arrangements in Japan strongly support the concept of the "level playing field".
8.	Respect the sovereignty of WMO members	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Japan's unique certification process for weather business personnel is an example of a member making appropriate meteorology governance arrangements to fit its own context.

rollover 1 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

In this activity, you will review the case example from Japan and decide which of the guidelines have been covered or not. Please click the button below to review Case Example 2. Think about whether each PPE guideline was covered and how. You can review the explanations for each Guideline by rolling over its name in the table below. Click Submit when you are ready to proceed.

Roll your cursor over the items below for more information.

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Put people first

Essential meteorological, climatological, hydrological and environmental information should focus on saving lives, protecting property and livelihoods, and improving economic productivity.

rollover 2 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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rollover 3 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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rollover 4 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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rollover 5 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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Case Example 2: JMA with JMBSC and WXBC in Japan

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		Yes	No	
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rollover 6 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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4.	Create shared values between partners	<input type="radio"/>	<input type="radio"/>	with hosting workshops, training events,
5.	Promote sustainability	<input type="radio"/>	<input type="radio"/>	living systems in Japan helps to
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rollover 7 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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rollover 8 (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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Correct (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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6.	Ensure that no country gets left behind	<input type="radio"/>	<input type="radio"/>	Not applicable in this example
7.	Create a level playing field	<input type="radio"/>	<input type="radio"/>	The legislative policy and support the concept of the
8.	Respect the sovereignty of WMO members	<input type="radio"/>	<input type="radio"/>	Japan's unique certification member making appropriate

Congratulations!

You have them all correct!

Good work!

Continue

Incorrect (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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Sorry. You do not have them all correct.
Click Continue for feedback.

Continue

Try Again (Slide Layer)

Activity: Evaluating a Roadmap for PPE

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Roll your cursor over the items below for more information.

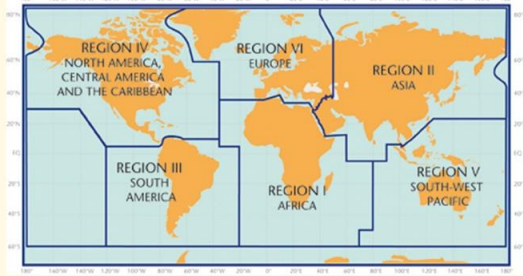
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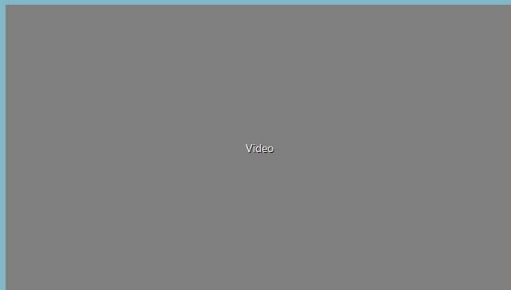
Sorry, you do not have them all correct.
Would you like to try again or continue to the correct answers?

Try Again Continue

1.11 WMO Regional Associations and PPE

WMO Regional Associations and PPE	
<p>Globally, WMO is driving the evolution towards PPE, and it is strongly supported by private sector representatives like The Association for the Hydro-Meteorological Industry (HMEI) and development agencies.</p> <p>The Regional Associations of WMO also play a pivotal role through organizing regional forums on PPE, collecting and promoting good practices in the region, and carrying out projects leveraging PPE mechanisms.</p> <p>WMO Regional Associations interface with their Members, liaise with other stakeholders, and designate and support regional centres in the delivery of regional services. To support engagement with actors in the private sector and with other stakeholders, regional associations take on other roles, including:</p> <ul style="list-style-type: none">(a) Gathering and disseminating information and guidance(b) Raising awareness and promoting the capacity development of Members(c) Exploring further cooperation in service provision at the regional and sub-regional levels <p>Further details of how PPE can be promoted at global, regional and national levels can be found in Section 5 of the WMO Guidelines for Public-Private Engagement:</p>	

1.12 Promoting PPE in Europe and the USA

Promoting PPE in Europe and the USA	
<p>In Europe, the ECOMET organisation (the “economic interest grouping of the National Meteorological Services of the European Economic Area”) manages many aspects of engagement between the public and private sectors in meteorology. Created in 1995, ECOMET provides a one-stop-shop for private firms to access European weather data and facilitates discussions between both sectors with the aim of opening up the market to all.</p> <p>In the United States of America, the American Meteorological Society (AMS) has been a strong voice advocating support for meteorological science and all sectors of weather services to American society. Please watch the videos to learn more.</p>	
<div><p>Video</p></div> <p>Willie McCairns, Chief Executive of ECOMET, explains some issues that arose in Europe around weather data charges, and how ECOMET helps to ensure that private sector firms can access weather data.</p> <p>Show Transcript</p>	<div><p>Video</p></div> <p>Jack Hayes, former director of the US National Weather Service, outlines issues that arose between private and public sectors in the US, and how the AMS plays a key role in this public-private relationship.</p> <p>Show Transcript</p>

willie-transcript (Slide Layer)

Promoting PPE in Europe and the USA

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In the United States of America, the American Meteorological Society (AMS and all sectors of weather services to American society. Please watch the v

Video

Willie McCairns, Chief Executive of ECOMET, explains some issues that arose in Europe around weather data charges, and how ECOMET helps to ensure that private sector firms can access weather data.

Show Transcript

Transcript: Willie McCairns, Chief Executive of ECOMET

What's the background to charges for meteorological data in Europe?

“In the 1990s, there was pressure from governments in Europe on the meteorological services to charge for their data and products. This was to recoup some of the costs of the investments in infrastructure. This was quite unpopular and caused some tension between the public and the private sector.”

Where did ECOMET come from and what role did it play?

“As a result of that, the meteorological services got together and formed ECOMET. ECOMET was formed so that all of the meteorological services who signed up agreed that they would operate in the same way. So they would follow a framework that would enable there to be a level playing field.”

Who does ECOMET talk to - is there a counterpart organisation it can deal with?

“On the private sector side, there was an organisation called PRIMET. This was basically a network of members who were all private meteorological service companies and ECOMET and PRIMET used to meet regularly. Basically this allowed us to discuss any

Close

jack-transcript (Slide Layer)

Promoting PPE in Europe and the USA

Transcript: Jack Hayes, former director of the US National Weather Service

What structures have been established in the US to mediate the relationships between the public and private sectors?

“Over the past six decades, weather and climate services in the United States have evolved from an almost exclusively public sector activity to one engaging all three sectors, public, private and academic. This has not been an easy journey. There was a lack of trust between the sectors and a lot of conflict. Soon after 2000, the US National Academy of Sciences took the initiative to set up the Committee on Partnerships in Weather and Climate, and they produced the Fair Weather Report from 2003, which made nine recommendations. These nine recommendations have helped to greatly improve the relationship between the sectors. Two in particular are noteworthy. Establishing an independent advisory committee to consider weather and climate service issues and finding a neutral host, in this case the American Meteorological Society, to host the committee.”

How has that relationship evolved and matured in recent decades?

“The first meeting of representatives from the three sectors under

Close

he National Meteorological Services of the European Economic Area”) ctors in meteorology. Created in 1995, ECOMET provides a one-stop-shop ns between both sectors with the aim of opening up the market to all.

s) has been a strong voice advocating support for meteorological science videos to learn more.

Video





Jack Hayes, former director of the US National Weather Service, outlines issues that arose between private and public sectors in the US, and how the AMS plays a key role in this public-private relationship.

Show Transcript

Close

1.13 Knowledge Check

Knowledge Check



Check your understanding of the information covered in this module by responding to the questions on the next few pages.

The knowledge checks at the end of each module serve to help you check on your learning. You may wish to use this information to choose whether to further review the information covered.

Click Next to start the questions.

1.14 Question 1

(Pick Many, 10 points, 1 attempt permitted)

Question 1 of 4

Which of the following are drivers behind the evolution of Public-Private Engagement in Meteorology? Choose all that apply.

- ☐ a) Decreasing costs of observation
- ☐ b) Increasing costs of computing power
- ☐ c) Decreasing costs of telecommunications
- ☐ d) More varied needs of users
- ☐ e) More limited sources of atmospheric data
- ☐ f) The urgency of addressing climate change

Click the Submit button when you are done.

Correct	Choice
X	Check Box 1 1
	Check Box 2 1
X	Check Box 3 1
X	Check Box 4 1
	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

Question 1 of 4

Which of the following are drivers behind the evolution of Public-Private Engagement in Meteorology? Choose all that apply.

- ☒ a) Decreasing costs of observation
- ☐ b) Increasing costs of computing power
- ☒ c) Decreasing costs of telecommunications
- ☒ d) More varied needs of users
- ☐ e) More limited sources of atmospheric data
- ☒ f) The urgency of addressing climate change

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 1 of 4

Which of the following are drivers behind the evolution of Public-Private Engagement in Meteorology? Choose all that apply.

- ☒ a) Decreasing costs of observation
- ☐ b) Increasing costs of computing power
- ☒ c) Decreasing costs of telecommunications
- ☒ d) More varied needs of users
- ☐ e) More limited sources of atmospheric data
- ☒ f) The urgency of addressing climate change

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

1.15 Question 2

(Pick Many, 10 points, 1 attempt permitted)

Question 2 of 4

Choose which of the three sectors is most likely to benefit from each of the potential PPE benefits listed below. Choose the best answer for each.

Potential PPE Benefit	Public	Private	Academic
Building better public weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joint funding applications for research grants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greater access to data and scientific expertise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increased range of services for the market	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Influencing subjects taught in degree courses in meteorology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greater access to operational expertise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click the Submit button when you are done.

Correct	Choice
X	Q1-1
	Q1-2
	Q1-3
	Q2-1
	Q2-2
X	Q2-3
	Q3-1
X	Q3-2
	Q3-3
	Q4-1
X	Q4-2
	Q4-3
X	Q5-1
	Q5-2
	Q5-3
	Q6-1
	Q6-2
X	Q6-3

Incorrect (Slide Layer)

Question 2 of 4

Choose which of the three sectors is most likely to benefit from each of the potential PPE benefits listed below. Choose the best answer for each.

Potential PPE Benefit	Public	Private	Academic
Building better public weather services	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joint funding applications for research grants	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Greater access to data and scientific expertise	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Increased range of services for the market	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Influencing subjects taught in degree courses in meteorology	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greater access to operational expertise	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 2 of 4

Choose which of the three sectors is most likely to benefit from each of the potential PPE benefits listed below. Choose the best answer for each.

Potential PPE Benefit	Public	Private	Academic
Building better public weather services	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Joint funding applications for research grants	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Greater access to data and scientific expertise	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Increased range of services for the market	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Influencing subjects taught in degree courses in meteorology	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greater access to operational expertise	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

1.16 Question 3

(Pick Many, 10 points, 1 attempt permitted)

Question 3 of 4

Which of these are key guidelines for PPE? Choose all that apply.

- ☐ a) Put people first
- ☐ b) Maximise private sector profits
- ☐ c) Restrict public sector weather data
- ☐ d) Create shared values between partners
- ☐ e) Respect the sovereignty of WMO member nations
- ☐ f) Enhance the status of meteorology in the universities
- ☐ g) Maximise public sector (NMHS) income

Click the Submit button when you are done.

Correct	Choice
X	Check Box 4
	Check Box 3
	Check Box 2
X	Check Box 1
X	Check Box 5
	Check Box 6
	Check Box 7

Incorrect (Slide Layer)

Question 3 of 4

Which of these are key guidelines for PPE? Choose all that apply.

- ☒ a) Put people first
- ☐ b) Maximise private sector profits
- ☐ c) Restrict public sector weather data
- ☒ d) Create shared values between partners
- ☒ e) Respect the sovereignty of WMO member nations
- ☐ f) Enhance the status of meteorology in the universities
- ☐ g) Maximise public sector (NMHS) income

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 3 of 4

Which of these are key guidelines for PPE? Choose all that apply.

- ☒ a) Put people first
- ☐ b) Maximise private sector profits
- ☐ c) Restrict public sector weather data
- ☒ d) Create shared values between partners
- ☒ e) Respect the sovereignty of WMO member nations
- ☐ f) Enhance the status of meteorology in the universities
- ☐ g) Maximise public sector (NMHS) income

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

1.17 Question 4

(Pick Many, 10 points, 1 attempt permitted)

Question 4 of 4

Which of these organisations have a role in promoting PPE? Choose all that apply.

- ☐ a) American Meteorological Society
- ☐ b) GLONASS
- ☐ c) PRIMET
- ☐ d) WMO Regional Associations
- ☐ e) UN Atmospheric Regulation Association
- ☐ f) ECOMET

Click the Submit button when you are done.

Correct	Choice
X	Check Box 4
X	Check Box 3
	Check Box 2
X	Check Box 1
	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

Question 4 of 4

Which of these organisations have a role in promoting PPE? Choose all that apply.

- ☒ a) American Meteorological Society
- ☐ b) GLONASS
- ☒ c) PRIMET
- ☒ d) WMO Regional Associations
- ☐ e) UN Atmospheric Regulation Association
- ☒ f) ECOMET

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 4 of 4

Which of these organisations have a role in promoting PPE? Choose all that apply.

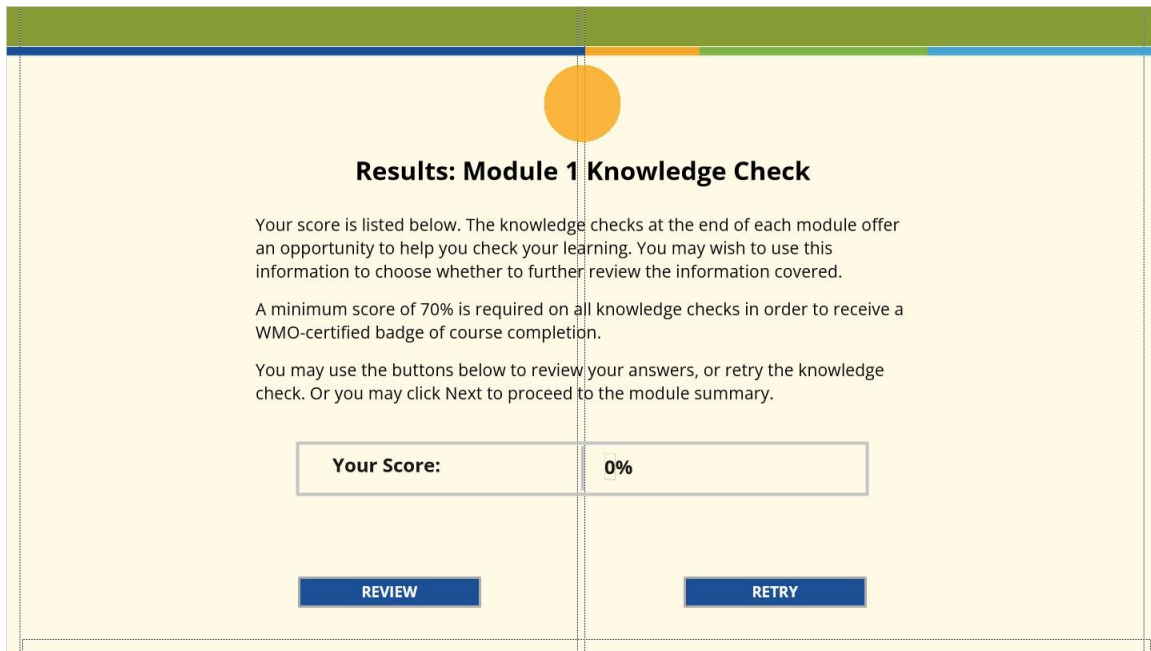
- ☒ a) American Meteorological Society
- ☐ b) GLONASS
- ☒ c) PRIMET
- ☒ d) WMO Regional Associations
- ☐ e) UN Atmospheric Regulation Association
- ☒ f) ECOMET

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

1.18 Results: Module 1 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



Results: Module 1 Knowledge Check

Your score is listed below. The knowledge checks at the end of each module offer an opportunity to help you check your learning. You may wish to use this information to choose whether to further review the information covered.

A minimum score of 70% is required on all knowledge checks in order to receive a WMO-certified badge of course completion.

You may use the buttons below to review your answers, or retry the knowledge check. Or you may click Next to proceed to the module summary.

Your Score:	0%
--------------------	-----------

[REVIEW](#)[RETRY](#)

Results for
1.14 Question 1
1.15 Question 2
1.16 Question 3
1.17 Question 4

Result slide properties


Passing

70%

Score

Notes:

1.19 Module One Summary

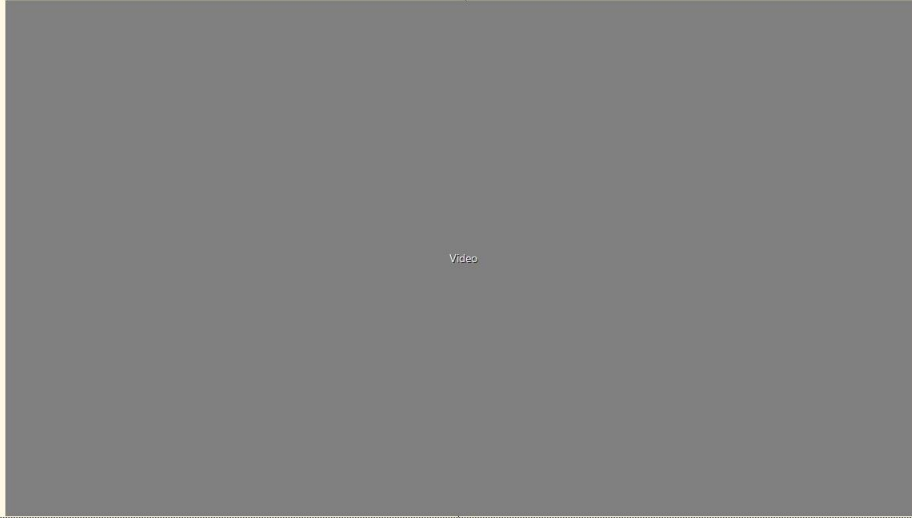
Module One Summary	
<p>Key points in Module One:</p> <ul style="list-style-type: none">• There are many drivers for increased public-private engagement in weather, water and climate services. Advances in technology is one of these drivers, transforming both the collection of weather data and the dissemination of weather services and products.• Improved meteorological science has greatly increased the potential usefulness of weather information to society, while the needs of society have grown ever more complex.• Engaging with PPE can bring great benefits to all of the parties involved – public, private and academic, but will also inevitably bring challenges.<ul style="list-style-type: none">• Some of these challenges for NMHSs include sustaining their basic observation infrastructure as well as their vital role in issuing weather warnings• Partnerships are key to achieving progress. It is important that each member of a partnership respects the key interests and activities of the other partners.• The Geneva Declaration was adopted in 2019 by WMO and guidelines for PPE derive from that key policy. The guidelines set down a number of key principles to inform a roadmap for	

2. Module 2: Legislative and Institutional Frameworks for PPE

2.1 Module Overview: Supporting PPE through Legislative and Institutional Frameworks

Module Overview: Supporting PPE through Legislative and Institutional Frameworks

In this module, we will look at options for legislative and institutional frameworks to support PPE, underlying principles and guidelines to be aware of, and the potential role of NMHS leadership in the process. To begin, please watch this video.



2.2 Principles for PPE Legislation

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. *Click on each box below to learn more. Review the two case examples by clicking the buttons at the bottom.*

Clarify Roles



Authoritative Voice of NMHS



Fair and Transparent Attribution



Fair Competition



Provide Resources for Research and Development



Foster and Support Innovations



Establish Plans to Meet International Obligations



Required Adherence to Technical Standards



Click on elements above to see descriptions.

Case 1: United States - No commercial activity by NMHS


Case 2: South Africa - Supportive rules for revenue generation by NMHS


Notes:


info1 (Slide Layer)


Principles for PPE Legislation


A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)


Clarify Roles

Meteomatics


Authoritative Voice of NMHS

MetService of New Zealand

Fair and Transparent Attribution

weatherzone® DTM Weatherzone

Fair Competition

Storyblocks

Provide Resources for Research and Development

NOAA/NSSL

Foster and Support Innovations

RIMES

Establish Plans to Meet International Obligations

RIMES

Required Adherence to Technical Standards

Farming Weather

Clarify Roles

Public sector
A clear definition of the mission and tasks of the NMHS, support for allocation of public funds, providing a base for strategic decision-making, and establishing the scope of freely-provided public weather services.

Private sector
Defining the boundaries around meteorological services that may be offered on a commercial basis. Ensuring access to public data and other key


Case 1: United States - No commercial activity by NMHS


Case 2: South Africa - Supportive rules for revenue generation by NMHS


info2 (Slide Layer)


Principles for PPE Legislation


A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)


Clarify Roles

Meteomatics

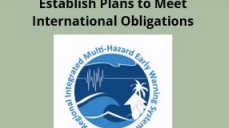
Authoritative Voice of NMHS

MetService of New Zealand

Fair and Transparent Attribution

weatherzone® DTM Weatherzone

Fair Competition

Storyblocks

Provide Resources for Research and Development

NOAA/NSSL

Foster and Support Innovations

RIMES

Establish Plans to Meet International Obligations

RIMES

Required Adherence to Technical Standards

Farming Weather

Authoritative Voice of NMHS

It is important to reinforce the role of the NMHS as the authoritative voice for severe weather warnings.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info3 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Fair and Transparent Attribution

Ensuring that attribution of meteorological information from all sectors is properly respected. Maintaining the authoritative voice of the public sector for weather warnings. Maintaining public awareness of the sources of weather information, whatever those may be.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info4 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Fair Competition

Underpinning fair competition through insisting that all stakeholders be treated equally, that anti-competitive behaviour is forbidden, that cross-subsidisation of commercial activities from the public purse is not allowed, and facilitating data exchange as required for the essential public-interest.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info5 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Provide Resources for Research and Development

Underpinning the provision of resources for research and development in the public, private and academic sectors. Promoting better understanding of the impacts of climate change and consequences for severe weather, so that mitigating actions can be planned and implemented.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info6 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. [Click on each box below to learn more.](#) [Review the two case examples by clicking the buttons at the bottom.](#)

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Foster and Support Innovations

Fostering and supporting innovations in meteorological, hydrological and climate services, thus increasing the benefits delivered to society. Innovation can come from any of the sectors.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info7 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. *Click on each box below to learn more. Review the two case examples by clicking the buttons at the bottom.*

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Establish Plans to Meet International Obligations

When countries join WMO or ICAO, or regional organisations such as ECMWF or RIMES, they take on international obligations in the area of meteorology, including provision for financial contributions. Legislation can establish how these obligations are met and resourced at a national level, ensuring that a country contributes fully to the international meteorological community.

Case 1: United States - No commercial activity by NMHS

Case 2: South Africa - Supportive rules for revenue generation by NMHS

info8 (Slide Layer)

Principles for PPE Legislation

A number of principles can be expressed in legislation to support or enable the successful collaborative engagement of public, private and academic sectors. *Click on each box below to learn more. Review the two case examples by clicking the buttons at the bottom.*

Clarify Roles

Authoritative Voice of NMHS

Fair and Transparent Attribution

Fair Competition

Provide Resources for Research and Development

Foster and Support Innovations

Establish Plans to Meet International Obligations

Required Adherence to Technical Standards

Required Adherence to Technical Standards

International obligations include adherence to appropriate technical standards in meteorology. Standards exist for everything from weather observation equipment to forecaster training and competence. A wide variety of standards are established by WMO but each country must apply them in their own territory through legislation, regulation or similar.

Case 1: United States - No commercial activity by NMHS


Case 2: South Africa - Supportive rules for revenue generation by NMHS

zoom1 (Slide Layer)

Principles for PPE Legislation

Click to close.

Case Study 1 – United States: No commercial activity by the NMHS



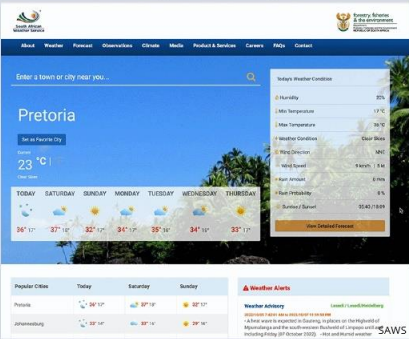
Freedom of information is a strong element of US government policy. All meteorological information, including weather observations, computer model output, forecasts and warnings, must be made freely available to all. There are also many pieces of legislation that relate specifically to meteorology. The Weather Service Organic Act defines the monitoring, reporting and forecasting responsibilities of the US National Weather Service (NWS). The Weather Forecasting and Innovation Act promotes a community approach to harness the best of government, academia and the private sector in advancing environmental modelling. There are also specific Acts dealing with topics such as Space Weather, Tsunami Warnings, Flood Control, Meteorological Support to Aviation, and an Act defining criminal penalties for those who knowingly issue false weather reports.

zoom2 (Slide Layer)

Principles for PPE Legislation

Click to close.

Case Study 2 – South Africa: Supportive rules for revenue generation by NMHS



The mandate of the South Africa Weather Service (SAWS) is derived from the South African Weather Service Act. The mission of SAWS includes:

- Provision of reliable weather services to support public good and the commercial ventures of the SAWS.
- Provision of aeronautical and marine meteorological services.
- Provision of ambient air quality services.

SAWS has a dual responsibility to provide services for the public good and to generate some commercial revenue. While a government grant covers a percentage of the overall expenditure, additional commercial revenue is needed to sustain the balance of SAWS operations.

2.3 Activity: PPE Elements To Be Defined by Policy

(Pick Many, 10 points, 2 attempts permitted)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

#	Element of PPE <i>(Roll over text below for description.)</i>	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click Submit when you are done.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

Correct	Choice
X	q1y
	q1n
X	q2y
	Q2n
	Q3y
X	Q3n
X	Q4y
	Q4n
X	Q5y
	Q5n

	q1y-support
X	q1part-support
	q2y-support
X	Q2part-support
	Q3y-support
	Q3part-support
X	Q4y-support
	Q4part-support
X	Q5y-support
	Q5part-support
	q1n-support
	q2n-support
	Q3n-support
	Q4n-support
	Q5n-support

intro (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Introduction

We can identify several essential elements that help to support the principles for legislation related to PPE and hydrometeorological services identified on the previous page. In this activity, you will have the chance to practice identifying these elements in a sample legislative document.

To complete this activity, carefully read through the description of a piece of meteorological legislation from a fictitious "Country X". Then, review the table of suggested elements for meteorological legislation. For each element listed, identify whether it has been covered or not in this sample legislation. Also, think about whether or not each element covered is supportive of PPE.

Meteorological legislation varies widely across different countries, reflecting different government policies towards the role of the public sector. The legislation presented here represents just one possible example of what such legislation might look like. As you complete this activity, reflect on how these key elements may apply, given the needs and the policy frameworks existing in your own country.

Close

		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click Submit when you are done.

zoom1 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Click to close.

Law on National Meteorological and Hydrological Policy for Country X

The National Meteorological and Hydrological Service (NMHS) of Country X functions in full compliance with the relevant national legislation regarding meteorology activity. In Country X, according to the provision of the law, the meteorological activity represents the totality of actions for a permanent surveillance and knowledge of the atmosphere, using specific observations and measurements regarding the weather condition and evolution, necessary for Country X's socio-economic development. The meteorological activity is of national public interest and specifically supports defence and national security. Meteorological activity is carried out in accordance with the recommendations of the World Meteorological Organization, with the agreements concluded by this organization with other international organizations, as well as with the provisions of the international conventions to which Country X is a party. The meteorological activities defined above have as their object the meteorological protection of life and goods and are carried out as follows:

- At national level:**
 - Developing meteorological observation and monitoring to inform the public and key decision-makers, in order to prevent or diminish the damage caused by dangerous meteorological phenomena;
- Providing the necessary meteorological information for air, river and marine navigation, road traffic and agriculture;
 - Meeting the research needs for development in the field, carrying out studies and services dedicated to civil safety, material production and national defence;
- Establishing and managing the National Meteorological Data Fund necessary for the meteorological input to the design, execution and operation of various economic and social objectives and for the elaboration of sustainable development strategies.
- At external level:**
 - Integration in the international exchange of meteorological data and information, in WMO's World Weather Watch System, to monitor and protect the atmospheric environment;
 - Fulfilment of the obligations deriving from the conventions and agreements to which Country X is a party.
- The NMHS carries out activities of public interest providing free of charge, on the basis of convention/agreement, specialized information, including general forecasts or warnings, to local and central public administration, special commands of the Ministry of National Defence, commissions and civilian organisations set up to combat disasters, academia, and public service broadcasters. For any other category of users, the National Meteorological Administration has the right to conclude economical or commercial contracts for the work or services that fall within its competence and scope.

Incorrect (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

#	Element of PPE <i>(Roll over text below for description.)</i>	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click Submit when you are done.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

Sorry. You do not have them all correct.
Click Continue for feedback.

Continue

Correct (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

#	Element of PPE <i>(Roll over text below for description.)</i>	Included?		Supportive?		
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2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click Submit when you are done.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

Congratulations!
You have them all correct!
Good work!

Continue

Try Again (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"

(Click to read document.)

Review Activity Introduction

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Click Submit when you are done.

Sorry, you do not have them all correct. Would you like to try again or continue to the correct answers?

Try Again Continue

feedback (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"

(Click to read document.)

Review Activity Introduction

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input checked="" type="radio"/>	(NA - not included)		
4.	Standards for observing systems	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

The correct answers are shown, along with an explanation for each. Click Next to proceed to a debrief/discussion when you are ready.

rollover 2 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

[Review Activity Introduction](#)

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Baseline Free Services, including Severe Weather Warnings

Basic public weather services should be freely and easily available to members of the public. The position of the NMHS as the single and authoritative source of weather warnings should be defined, with full attribution of the NMHS role mandated.

Click Submit when you are done.

rollover 1 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

[Review Activity Introduction](#)

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Weather Data Availability

Weather data should be freely available to the public and to commercial interests in the private sector.

Click Submit when you are done.

rollover 3 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Guidelines around commercial activities by the NMHS

There should be clear guidelines around NMHS commercial activity, to ensure that access to commercial data with use restrictions is treated equally by and between public and private sector entities.

Click Submit when you are done.

rollover 4 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement. Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

#	Element of PPE (Roll over text below for description.)	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Standards for observing systems

Ensuring the application of WMO technical regulations and standards to all appropriate observing systems in the country.

Click Submit when you are done.

rollover 5 (Slide Layer)

Activity: PPE Elements To Be Defined by Policy

Begin by reviewing the sample legislation by clicking the button on the right. For each element below, choose whether it has been covered, and whether you believe the coverage is done in a way that is supportive (or partly supportive) of public-private engagement.

Roll your cursor over the name of each element below to see a more complete description of its meaning.

Law on National Meteorological and Hydrological Policy for "Country X"
(Click to read document.)

Review Activity Introduction

#	Element of PPE <small>(Roll over text below for description.)</small>	Included?		Supportive?		
		Yes	No	Yes	Partly	No
1.	Weather data availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Baseline free services, including severe weather warnings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Guidelines around commercial activities by the NMHS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Standards for observing systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Provision of aviation weather services	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Provision of Aviation Weather Services
 Provision and regulation of weather services for aviation in accordance with ICAO requirements.

Click Submit when you are done.

2.4 Addendum: PPE Elements To Be Defined by Policy

Addendum: PPE Elements To Be Defined by Policy

While weather is universal, government and legislative systems are not. Each country will have its own philosophies and policies with respect to public services generally, some of them enshrined in national constitutions. Therefore, whether a country requires specific legislation on meteorological and hydrological services, and what form that legislation should take, will differ between nations. WMO strongly recommends that countries provide a national legislative framework for meteorological and hydrological services but recognises that such a framework will differ from one country to the next; there is no "one size fits all".

However countries which are Members of WMO - which is virtually every country - have made undertakings and commitments upon joining, and these commitments can be affirmed and strengthened through national legislation.

Other key areas which can also be covered by legislation include the provision of baseline free meteorological and hydrological services to citizens, to include weather warnings; the establishment of appropriate technical and scientific standards for meteorological and hydrological observations and for work in this area generally; the manner in which weather data might be made available and shared within the meteorological community of the nation and internationally; the provision and

Key Points:

- WMO strongly recommends a national legislative framework for meteorological and hydrological services
 - Such frameworks will differ; there is no "one size fits all"
- Commitments made through WMO can be affirmed and strengthened through national legislation
- Legislation may also cover key areas such as:
 - Provision of baseline free meteorological and hydrological service, including weather warnings
 - The establishment of technical and scientific standards for observations and related resources
 - Processes for sharing data within the meteorological community of the nation and internationally
 - Provision and regulation of weather services for aviation according to ICAO requirements
 - Prevention of unfair competition to commercial weather service entities
- The guiding principle should be to ensure the safety and security of citizens and their livelihoods, and to support economic activity

Notes:

2.5 NMHS Leadership in Developing Legislative Frameworks


NMHS Leadership in Developing Legislative Frameworks

In most countries, the Director General of the NMHS is also the Permanent Representative (PR) of that country with WMO. This is a separate and distinct role, as WMO Members are countries, and the PR of each WMO Member should represent all of Meteorology and Hydrology within that Member country.

The role of the PR therefore includes actively engaging with the private and academic sectors in their countries to take their perspectives into account, as well as leading their own NMHS. PRs may wish to position themselves as promoters and facilitators of national weather, climate and water services, representing the overall interests of meteorology both nationally and internationally.

PRs may therefore play an important role in supporting and enabling activity in meteorology and hydrology outside their own organisations. They can advocate for a legislative framework that supports PPE, working with colleagues within government to develop appropriate policies. These policies should reflect the interests of all stakeholders and promote cooperation and partnerships for the delivery of information and services in the public interest.

For these reasons the professional development training for the Director General or other senior officers of an NMHS might include the following elements:



Click on the examples below for more information.

[Case Study 1 – United States Private Sector](#)

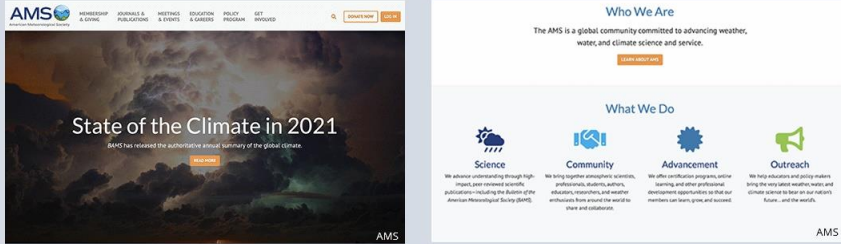
[Case Study 2 – Japan Meteorological Agency \(JMA\)](#)

zoom1 (Slide Layer)

NMHS Leadership in Developing Legislative Frameworks

Click to close.

Case Study 1 – United States Private Sector



In the US, a vigorous private sector has developed in meteorology, providing a wide range of specialised services as well as public information through broadcast organisations. The American Meteorological Society, which is a distinguished professional organisation, brings together the public, private and academic sectors and provides certification standards for consulting meteorologists and broadcast meteorologists.

Click on the examples below for more information.

[Case Study 1 – United States Private Sector](#)

[Case Study 2 – Japan Meteorological Agency \(JMA\)](#)

zoom2 (Slide Layer)

NMHS Leadership in Developing Legislative Frameworks

Click to close.

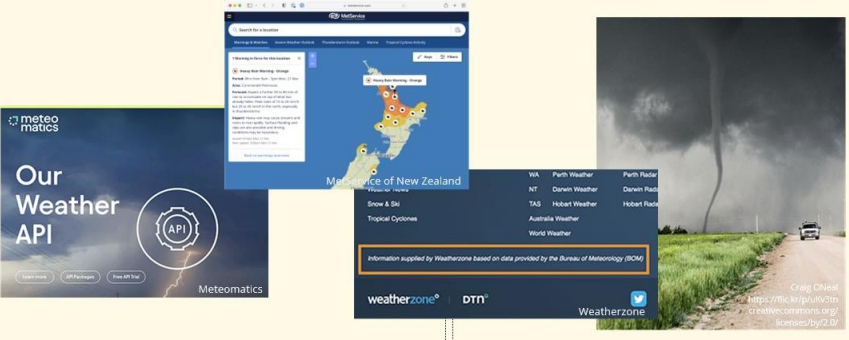
Case Study 2 - Japan Meteorological Agency (JMA)



In Japan, legislation gives the Japan Meteorological Agency (JMA) the task to “ensure the sound development of meteorological services”. This responsibility means that the JMA acts as the nation-wide organiser and regulator of meteorological services in a multi-stakeholder environment. The legislation clearly defines the role of JMA as the sole authority to issue weather warnings, but also allows for private sector engagement in weather observations and weather forecast services. This is achieved through measures whereby JMA can verify and authorise weather measurement equipment, and can award certified weather forecaster licences to those individuals who have succeeded at the appropriate examinations. In this way the standards and quality of weather observation and forecasting can be maintained. JMA also organises the Weather Business Consortium, which drives commerce involving intensive use of meteorological data allied to new technologies, via extensive joint efforts in the public, private and academic sectors.

2.6 Knowledge Check

Knowledge Check



Check your understanding of the information covered in this module by responding to the questions on the next few pages.

The knowledge checks at the end of each module serve to help you check on your learning. You may wish to use this information to choose whether to further review the information covered.

Click Next to start the questions.

2.7 Question 1

(Pick Many, 10 points, 1 attempt permitted)

Question 1 of 2

Which of the below are recommended principles for supporting PPE through legislative frameworks? Choose all that apply.

- ☐ a) Establishing clarity of roles for all of the sectors
- ☐ b) Protecting the market share of the NMHS
- ☐ c) Promoting fair and transparent attribution
- ☐ d) Fostering and supporting innovation
- ☐ e) Allowing advertising on NMHS websites
- ☐ f) Controlling publication of academic papers on meteorology
- ☐ g) Requiring adherence to appropriate technical standards

Click the Submit button when you are done.

Correct	Choice
X	Check Box 1
	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5
	Check Box 6
X	Check Box 7

Incorrect (Slide Layer)

Question 1 of 2

Which of the below are recommended principles for supporting PPE through legislative frameworks? Choose all that apply.

- ☒ a) Establishing clarity of roles for all of the sectors
- ☐ b) Protecting the market share of the NMHS
- ☒ c) Promoting fair and transparent attribution
- ☒ d) Fostering and supporting innovation
- ☐ e) Allowing advertising on NMHS websites
- ☐ f) Controlling publication of academic papers on meteorology
- ☒ g) Requiring adherence to appropriate technical standards

Click the Submit button when you are done.

**Sorry. You do not have them all correct.
Click Next to proceed to the next page.**

Correct (Slide Layer)

Question 1 of 2

Which of the below are recommended principles for supporting PPE through legislative frameworks? Choose all that apply.

- ☒ a) Establishing clarity of roles for all of the sectors
- ☐ b) Protecting the market share of the NMHS
- ☒ c) Promoting fair and transparent attribution
- ☒ d) Fostering and supporting innovation
- ☐ e) Allowing advertising on NMHS websites
- ☐ f) Controlling publication of academic papers on meteorology
- ☒ g) Requiring adherence to appropriate technical standards

Click the Submit button when you are done.

**Great! You have them all correct.
Click Next to proceed to the next page.**

2.8 Question 2

(Pick Many, 10 points, 1 attempt permitted)

Question 2 of 2

Which of these roles is generally the responsibility of the Permanent Representative of a Member country with WMO? Choose all that apply.

- ☐ a) Acting as the meteorological regulator in the Member state
- ☐ b) Leading the country's NMHS
- ☐ c) Representing that Member at WMO
- ☐ d) Supporting and enabling weather and hydrological activity
- ☐ e) Preparing curricula for meteorological training and education
- ☐ f) Promoting the commercial interests of specific private sector firms in meteorology
- ☐ g) Liaising with all national stakeholders in meteorology
- ☐ h) Advocating for proper legislative frameworks and appropriate national policies in meteorology

Click the Submit button when you are done.

Correct	Choice
	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5
	Check Box 6
X	Check Box 7
X	Check Box 8

Incorrect (Slide Layer)

Question 2 of 2

Which of these roles is generally the responsibility of the Permanent Representative of a Member country with WMO? Choose all that apply.

- ☐ a) Acting as the meteorological regulator in the Member state
- ☒ b) Leading the country's NMHS
- ☒ c) Representing that Member at WMO
- ☒ d) Supporting and enabling weather and hydrological activity
- ☐ e) Preparing curricula for meteorological training and education
- ☐ f) Promoting the commercial interests of specific private sector firms in meteorology
- ☒ g) Liaising with all national stakeholders in meteorology
- ☒ h) Advocating for proper legislative frameworks and appropriate national policies in meteorology

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 2 of 2

Which of these roles is generally the responsibility of the Permanent Representative of a Member country with WMO? Choose all that apply.

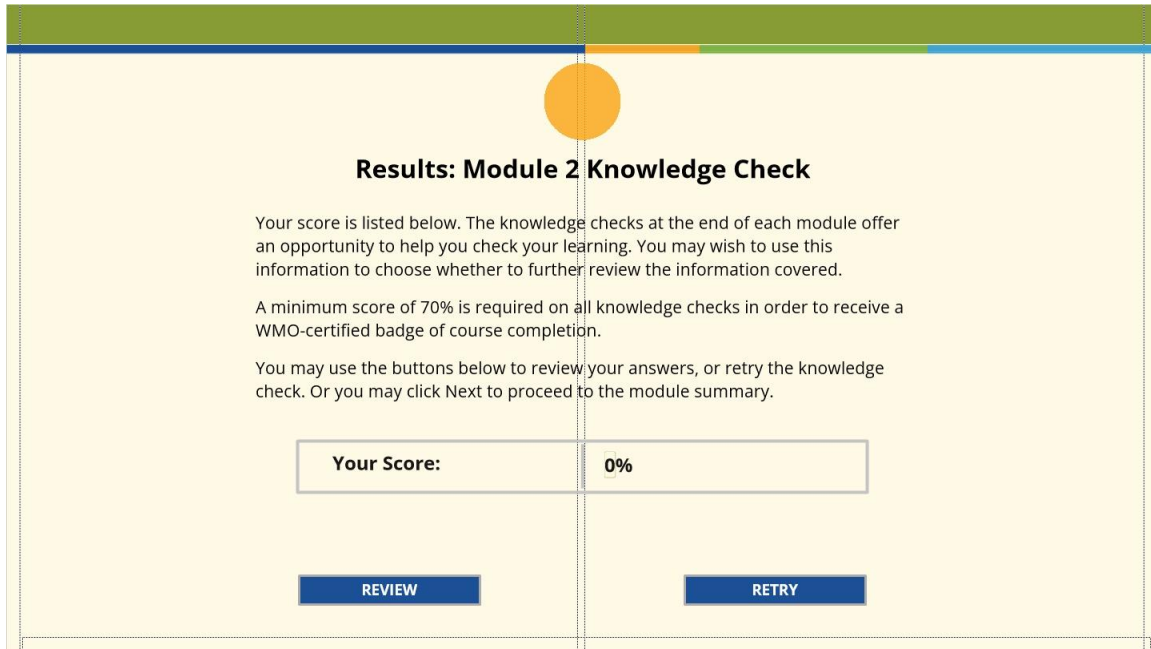
- ☐ a) Acting as the meteorological regulator in the Member state
- ☒ b) Leading the country's NMHS
- ☒ c) Representing that Member at WMO
- ☒ d) Supporting and enabling weather and hydrological activity
- ☐ e) Preparing curricula for meteorological training and education
- ☐ f) Promoting the commercial interests of specific private sector firms in meteorology
- ☒ g) Liaising with all national stakeholders in meteorology
- ☒ h) Advocating for proper legislative frameworks and appropriate national policies in meteorology

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

2.9 Results: Module 2 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



The slide features a green header bar with a blue and orange gradient. A large orange circle is positioned at the top center. The main content area is yellow and contains the following text:

Results: Module 2 Knowledge Check

Your score is listed below. The knowledge checks at the end of each module offer an opportunity to help you check your learning. You may wish to use this information to choose whether to further review the information covered.

A minimum score of 70% is required on all knowledge checks in order to receive a WMO-certified badge of course completion.

You may use the buttons below to review your answers, or retry the knowledge check. Or you may click Next to proceed to the module summary.

Your Score: 0%

REVIEW **RETRY**

Results for
2.7 Question 1
2.8 Question 2

Result slide properties

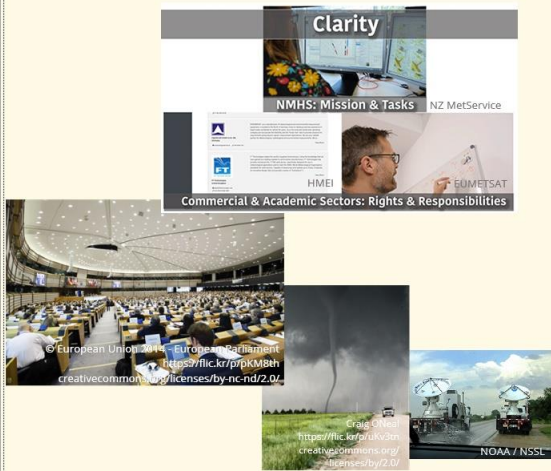
Passing

70%

Score

Notes:

2.10 Module Two Summary

Module Two Summary	
<p>Key points in Module Two:</p> <ul style="list-style-type: none">• Legislative and institutional frameworks can enable — or inhibit — the successful pursuit of PPE.• Legislation can provide clarity as to the roles of the different sectors, insisting on fair competition, fair and transparent attribution, and support for research, development and innovation.• Adherence to appropriate technical standards is key, as is respect for the role of NMHSs in weather warnings and respect for the international obligations of nations in the field of weather and climate.• NMHSs play a key leadership role in promoting PPE.• There are several essential elements that help to support the principles for legislation related to PPE and hydrometeorological services. Some of these include:<ul style="list-style-type: none">• Weather data availability• Baseline free services, including severe weather warnings• Guidelines around commercial activities by the NMHS• Standards for observing systems• Provision of aviation weather services• The Permanent Representative to WMO plays a key role in representing the interests of the country's entire meteorological community both nationally and	

3. Module 3: Data Sharing

3.1 Module Overview: Data Sharing

Module Overview: Data Sharing

In this module, we focus on data sharing issues, challenges, benefits and approaches. To begin, please watch this video.

Video

3.2 The Changing Landscape of Data Gathering and Sharing

The Changing Landscape of Data Gathering and Sharing

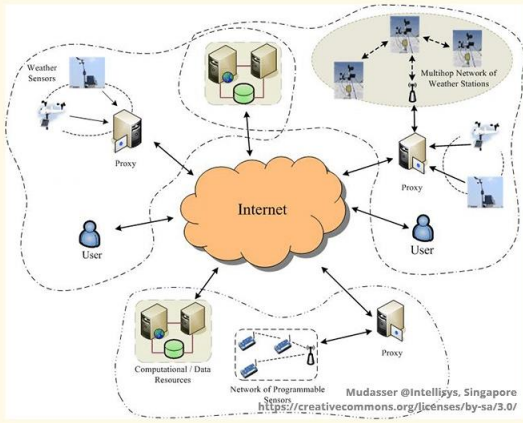
The revolution in communications technology continues to drive down the cost of data transmission and increase the capacity of data networks. From a time when six-hourly weather reports were transmitted by telex in five-digit groups, we can now download data every few seconds from Automatic Weather Stations.

Weather instruments have also become much less expensive, so dense local weather observation networks can be established which complement the “gold standard” synoptic weather stations; those operated by National Meteorological Services, and which meet the highest WMO specifications. Crowd-sourcing of weather observations from smartphones allows literally almost everyone to act as a weather observer. Of course, not all weather data is of the same quality, but now we can collect so much data that it is easier to identify and eliminate the poor data.

Weather radars and weather satellites also generate huge volumes of data. We now have the technology to collect and organise this data in real-time, providing up-to-the-minute information on the evolving weather.

This vast amount of weather information can be of tremendous value to society if it can be shared and used in a timely manner.

3.3 Sources and Distribution of Weather Data

Sources and Distribution of Weather Data	
<p>Historically, almost all operational weather data was collected by government organisations, so they could decide whether, and on what basis, data could be shared, or made publicly available. Today the picture is much more complex. Weather data is also collected by private companies, by municipal authorities, and by broadcast companies. Global tech companies have access to vast amounts of weather data.</p> <p>Not all weather data is the same — but not all of the needs for weather information are the same. For example, weather information relating to the risk of rain over the coming few hours is not the same as weather information destined for a climatological database.</p> <p>We can distinguish between different levels of accuracy, precision and reliability in weather data. Only when we have easy access to all weather data can we ensure that the very different needs for weather information can be met with the best and most suitable available data. Ideally all weather data should be shared openly and freely, but there are many reasons why this can be a challenge, both in terms of policy and in terms of logistics.</p>	

3.4 Activity: Differing Needs, Concerns and Perspectives

(Pick Many, 10 points, 2 attempts permitted)

Activity: Differing Needs, Concerns and Perspectives		
<p>Each sector involved in weather, climate and water services may have different needs, concerns and perspectives when it comes to data sharing. Listen to the three short audio interviews below from members of different sectors to learn more about each point of view.</p> <p><i>After listening, click Begin Activity to complete a brief activity comparing the perspectives.</i></p>		
<div><p>Public Sector</p><p>Marianne Thyrring Director, Danish Meteorological Institute</p><p>Click to Play</p></div>	<div><p>Academic Sector</p><p>Dave Parsons Director Emeritus, School of Meteorology, University of Oklahoma, United States Former Chief, World Weather Research Division, WMO</p><p>Click to Play</p></div>	<div><p>Private Sector</p><p>Tomas Molina Chief Meteorologist of Televisió de Catalunya, Barcelona</p><p>Click to Play</p></div>
<p>Begin Activity</p>		


Correct	Choice
X	pub1
X	pub2
	pub3
	pub4
	pub5
	pub6
	aca1
	aca2
X	aca3
X	aca4
	aca5
	aca6
	priv1
	priv2
	priv3
	priv4
X	priv5
X	priv6


Notes:


feedback (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Each sector involved in weather, climate and water services may have different needs, concerns and perspectives when it comes to data sharing. Listen to the three short audio interviews below from members of different sectors to learn more about each point of view.
*After listening, click **Begin Activity** to complete a brief activity comparing the perspectives.*

Public Sector

Marianne Thyrring
Director, Danish Meteorological Institute
[Click to Play](#)

Academic Sector

Dave Parsons
Director Emeritus, School of Meteorology, University of Oklahoma, United States
Former Chief, World Weather Research Division, WMO
[Click to Play](#)

Private Sector

Tomas Molina
Chief Meteorologist of Televisió de Catalunya, Barcelona
[Click to Play](#)

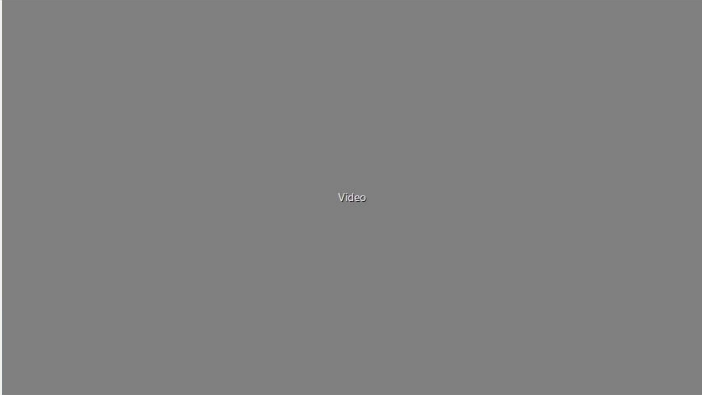
The correct answers are shown. Note these only represent an example of reasons different sectors may have for supporting open data access. Click **Next** to proceed when you are ready.

<input checked="" type="checkbox"/> More relevant now due to climate change	<input checked="" type="checkbox"/> More relevant now due to climate change	<input checked="" type="checkbox"/> More relevant now due to climate change
<input checked="" type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property
<input type="checkbox"/> Supports research/improves forecasts	<input checked="" type="checkbox"/> Supports research/improves forecasts	<input type="checkbox"/> Supports research/improves forecasts
<input type="checkbox"/> Cooperation brings benefits for research	<input checked="" type="checkbox"/> Cooperation brings benefits for research	<input type="checkbox"/> Cooperation brings benefits for research
<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input checked="" type="checkbox"/> Enhances the visibility of public and academic sectors
<input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> Provides better services to the public	<input checked="" type="checkbox"/> Provides better services to the public

video1 (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Public Sector


Video

Transcript: Marianne Thyrring

- Climate change & green transition increase relevance
- Open weather data is needed for new solutions
- Need open data as a public good
- Use data in co-creation of new products

Due to climate changes and green transition, the weather plays a more and more important role for both the public and private sector. Open weather data is needed for everyone to come up with new solutions on the climate changes and green transition. We need to have open weather data as a public good and to use these data in co-creation between the public and private sector of new products.

- Crucial to protection of life and property
- Open dialogue leads to best solutions
- NMHSs should invite other sectors into open collaboration

Weather data is crucial to the protection of life and property. The Danish experience regarding open

[Close](#)

video2 (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Academic Sector

Video

Transcript: Dave Parsons

- **Data access is a key resource for education, training, research**

Hello. Let me start by saying that access to weather data, observations, modeling, forecast products are a key resource for education, training and research. Cooperation between the private, public and academic sectors will benefit all sectors and make a difference in people's lives.

- **A major benefit for education and training Increases insights and understanding**

We need to realize that for education and training, the use of weather data has many benefits. Bringing current models and observations in for a local or major weather event in the news into the classroom excites students. It's a positive thing for education. We're increasing their insights into understanding weather patterns and events that are impacting your location. You're helping to develop software and coding skills to be able to work with your data. And you're essentially educating and training students for careers in your forecast office or your company. It's a path for success. Occasionally, there'll be ideas that come out for improvements in forecast products

[Close](#)

video3 (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Private Sector

Video

Transcript: Tomas Molina

- **Primary goals are better forecasts and service to users**
- **This requires economically sustainable processes for:**
 - **Earth and atmosphere observations**
 - **Advances in science and technological development**
 - **The impulse for providing the best possible service**
- **All sectors can work independently but interconnected toward common goals**

1. Better forecasts and better service to the users, these are the primary goals of the meteorological community. These goals have to be achieved through a sustainable economical process that involves earth and atmosphere observations, advances in science and technological development, but most importantly, the impulse of providing the best service possible to the users. This service is the main attraction of financial stability to the system. This is a cooperative system where National services, academia and the private sector can work separately, but interconnected, using the strengths of every party for the common goals

[Close](#)


Correct (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Each sector involved in weather, climate and water services may have different needs, concerns and perspectives when it comes to data sharing. Listen to the three short audio interviews below from members of different sectors to learn more about each point of view.

*After listening, click **Begin Activity** to complete a brief activity comparing the perspectives.*

Public Sector



Marianne Thyrring
Director, Danish Meteorological Institute

[Click to Play](#)


Academic Sector



Dave Parsons
Director Emeritus, School of Meteorology, University of Oklahoma, United States
Former Chief, World Weather Research Division, WMO

[Click to Play](#)

Private Sector



Tomas Molina
Chief Meteorologist of Televisió de Catalunya, Barcelona

[Click to Play](#)

Activity Instructions: For each sector, choose the reasons given in support of open data access. Click Submit when you are done.

Begin Activity

Public	Academic	Private
<input type="checkbox"/> More relevant now due to climate change	<input type="checkbox"/> More relevant now due to climate change	<input type="checkbox"/> More relevant now due to climate change
<input type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property
<input type="checkbox"/> Supports research/improves forecasts	<input type="checkbox"/> Supports research/improves forecasts	<input type="checkbox"/> Supports research/improves forecasts
<input type="checkbox"/> Cooperation brings benefits for research	<input type="checkbox"/> Cooperation brings benefits for research	<input type="checkbox"/> Cooperation brings benefits for research
<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input type="checkbox"/> Enhances the visibility of public and academic sectors
<input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> Provides better services to the public

Congratulations!
You have them all correct!
Good work!

[Continue](#)


Try Again (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Each sector involved in weather, climate and water services may have different needs, concerns and perspectives when it comes to data sharing. Listen to the three short audio interviews below from members of different sectors to learn more about each point of view.

*After listening, click **Begin Activity** to complete a brief activity comparing the perspectives.*


Public Sector



Marianne Thyrring
Director, Danish Meteorological Institute

[Click to Play](#)


Academic Sector



Dave Parsons
Director Emeritus, School of Meteorology, University of Oklahoma, United States
Former Chief, World Weather Research Division, WMO

[Click to Play](#)

Private Sector



Tomas Molina
Chief Meteorologist of Televisió de Catalunya, Barcelona

[Click to Play](#)

Activity Instructions: For each sector, choose the reasons given in support of open data access. Click Submit when you are done.

Begin Activity

Public	Academic	Private
<input type="checkbox"/> More relevant now due to climate change	<input type="checkbox"/> More relevant now due to climate change	<input type="checkbox"/> More relevant now due to climate change
<input type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property	<input type="checkbox"/> Protects life and property
<input type="checkbox"/> Supports research/improves forecasts	<input type="checkbox"/> Supports research/improves forecasts	<input type="checkbox"/> Supports research/improves forecasts
<input type="checkbox"/> Cooperation brings benefits for research	<input type="checkbox"/> Cooperation brings benefits for research	<input type="checkbox"/> Cooperation brings benefits for research
<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input type="checkbox"/> Enhances the visibility of public and academic sectors	<input type="checkbox"/> Enhances the visibility of public and academic sectors
<input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> Provides better services to the public

Sorry, you do not have them all correct.
Would you like to try again or continue to the correct answers?

[Try Again](#) [Continue](#)

Incorrect (Slide Layer)

Activity: Differing Needs, Concerns and Perspectives

Each sector involved in weather, climate and water services may have different needs, concerns and perspectives when it comes to data sharing. Listen to the three short audio interviews below from members of different sectors to learn more about each point of view.

*After listening, click **Begin Activity** to complete a brief activity comparing the perspectives.*


Public Sector



Marianne Thyrring
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[Click to Play](#)

Academic Sector



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Former Chief, World Weather Research Division, WMO

[Click to Play](#)

Private Sector



Tomas Molina
Chief Meteorologist of Televisió de Catalunya, Barcelona

[Click to Play](#)

Activity Instructions: For each sector, choose the reasons given in support of open data access. Click Submit when you are done.

Public	Academic	Private
<input type="checkbox"/> More relevant now due to climate change <input type="checkbox"/> Protects life and property <input type="checkbox"/> Supports research/improves forecasts <input type="checkbox"/> Cooperation brings benefits for research <input type="checkbox"/> Enhances the visibility of public and academic sectors <input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> More relevant now due to climate change <input type="checkbox"/> Protects life and property <input type="checkbox"/> Supports research/improves forecasts <input type="checkbox"/> Cooperation brings benefits for research <input type="checkbox"/> Enhances the visibility of public and academic sectors <input type="checkbox"/> Provides better services to the public	<input type="checkbox"/> More relevant now due to climate change <input type="checkbox"/> Protects life and property <input type="checkbox"/> Supports research/improves forecasts <input type="checkbox"/> Cooperation brings benefits for research <input type="checkbox"/> Enhances the visibility of public and academic sectors <input type="checkbox"/> Provides better services to the public

Sorry. You do not have them all correct.
Click **Continue** for feedback.

[Continue](#)

3.5 Building Value from Data


Building Value from Data

For most users, raw weather data has little or no intrinsic value. Like most other raw materials, it needs to be processed. In the case of weather data, this means creating products and services that can be used to help in the making of decisions.


Value can be added to weather data in many ways, from simple visualisations that reveal trends and patterns to using input data to improve sophisticated weather forecast models. Services and products can serve a wide-audience, such as for national or city-wide forecasts, or they can be focused on a small number of weather-sensitive users, such as the case of alerts for strong winds for crane operators on construction sites. The free and unrestricted sharing of data allows the best possible products and services to be developed for specific and specialised audiences — whether this is done by the public NMHSs or by the private sector.

In 2007, the European Union (EU) agreed on a directive establishing an "Infrastructure for Spatial Information in the European Community", commonly known as the INSPIRE Directive. INSPIRE, which encompasses weather data, directed all EU member countries to work towards making all environmental information freely available to citizens.

The European meteorological community subsequently adopted the [Open Data Directive](#) to ensure that weather data is freely available to citizens.



Open Data Server



INSPIRE KNOWLEDGE BASE

© European Union, 1995-2022

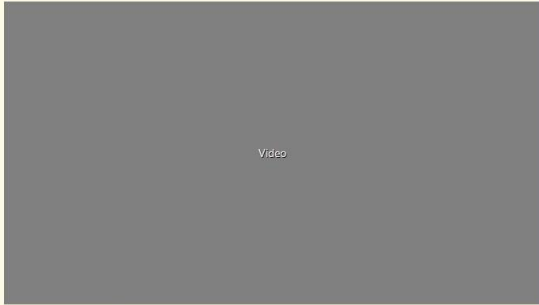
3.6 WMO Unified Data Policy

WMO Unified Data Policy

At an Extraordinary World Meteorological Congress in 2021, Members of WMO adopted the Unified Data Policy (UDP). This broadens and deepens the scope of the previous policies to encompass data relating to the atmosphere, oceans, the cryosphere and space weather; in short, all earth-system components.

The UDP provides guidance on the formulation of national policies in relation to meteorological data exchange. It emphasises the important role that NMHSs can play in openly sharing their publicly-financed data. It recognises the significant expansion in the number and diversity of weather data providers, including the growing role played by the private sector. It affirms the importance of broadening and enhancing the free and unrestricted international exchange of public-sector data to meet the growing needs of society...whilst assisting the private sector and stimulating business opportunities.

The UDP also encourages the private sector to consider reciprocal approaches to data sharing where it can be economically justified, especially in relation to saving lives and protecting property. Finally, the UDP encourages respect for the interests of originators of any shared data. The UDP aims to support all sectors of weather and climate services in



WMO Unified Data Policy Resolution video

For the full text of the WMO Unified Policy for the International Exchange of Earth System Data (the "WMO Unified Data Policy", or "Resolution 1") see: https://library.wmo.int/index.php?vl=notice_display&id=22100#

3.7 Data Availability

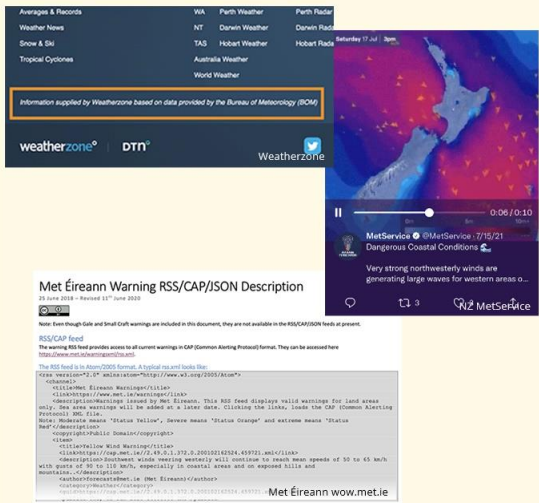
Data Availability

Weather data and information can be made freely available under a number of different licensing arrangements. Different licensing may attach certain conditions that must be respected by the data users.

- For example, weather warnings can be provided to broadcasters and others on the explicit understanding that they cannot be changed or amended in any way, but must be delivered to end users as they are received.
- Data can be provided to a commercial company under the license provision that it may not subsequently be charged for; only the value added by that company may be used as the basis for setting a price on their product or service.

In all cases, license arrangements should make provision for the proper acknowledgement and attribution of all data, products and information, respecting the rights of all parties. In this way, the originator of the data can retain some control over how it is used, through ensuring that the conditions attached to the data are respected.

Another very important aspect of data accessibility is the technical means by which it is made discoverable and available. Data must be provided in formats that the user can easily interpret. Establishment of the necessary technical



Learn more: The Creative Commons Licensing Approach

Notes:

zoom1 (Slide Layer)

Data Availability

Click to close. ✕

The Creative Commons Licensing Approach

Creative Commons is a global nonprofit organization that enables sharing and reuse of content through the provision of free legal tools. These tools help those who want to encourage reuse of their works by offering them for use under generous, standardized terms.

CC licences are copyright licences. They are legal tools that creators and other rights holders can use to offer certain usage rights to the public, while reserving other rights. Those who want to make their output (which could be data, or forecast and warning information) available to the public, defining the kinds of use that can be made of it while preserving their copyright, may want to consider using CC licences.

Some examples of NMHSs making use of Creative Commons licensing:

- Deutsche Wetterdienst (DWD) https://www.dwd.de/DE/leistungen/naturgefahrenforschung/nutzungsrecht_ot.html?lsbid=568038
- Finnish Meteorological Institute <https://en.ilmatiiteenlaitos.fi/open-data-licence>
- Royal Netherlands Meteorological Institute (KNMI)

The screenshot shows the Creative Commons Attribution 4.0 International (CC BY 4.0) license page. At the top, there's an orange header with the Creative Commons logo and navigation links: 'Share your work', 'Use & remix', 'What We Do', and 'Blog'. Below this is a green 'Donate Now' button. A line of text indicates the page is available in English. The main content area has a blue header with the CC logo and the text 'Attribution 4.0 International (CC BY 4.0)'. Below this, it states: 'This is a human-readable summary of (and not a substitute for) the license. [Full license](#).' The page then lists the freedoms: 'You are free to: Share -- copy and redistribute the material in any medium or format; Adapt -- remix, transform, and build upon the material for any purpose, even commercially.' It also states: 'The licensor cannot revoke these freedoms as long as you follow the license terms.' Under the heading 'Under the following terms:', it explains the attribution requirement: 'You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your work.' It also mentions that no additional restrictions can be applied. At the bottom, it provides the Creative Commons URL: <https://creativecommons.org/licenses/by/4.0/>.

3.8 Knowledge Check

The collage features several key elements: the EUMETSAT logo, a satellite in orbit, a globe, a screenshot of the INSPIRE Knowledge Base website, a screenshot of the Data Portal (DL) website, and a screenshot of the Met Eireann RSS/CAP/JSON Description page.

3.9 Question 1

(Pick Many, 10 points, 1 attempt permitted)

Question 1 of 3

Weather data is collected by which of the following? Choose all that apply.

☐ a) NMHSs

☐ b) Private Companies

☐ c) Municipal Authorities

☐ d) Universities

☐ e) Broadcast Companies

☐ f) Amateur enthusiasts

Click the Submit button when you are done.

Correct	Choice
X	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
X	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

Question 1 of 3

Weather data is collected by which of the following? Choose all that apply.

- ☒ a) NMHSs
- ☒ b) Private Companies
- ☒ c) Municipal Authorities
- ☒ d) Universities
- ☒ e) Broadcast Companies
- ☒ f) Amateur enthusiasts

Click the Submit button when you are done.

**Sorry. You do not have them all correct.
Click Next to proceed to the next page.**

Correct (Slide Layer)

Question 1 of 3

Weather data is collected by which of the following? Choose all that apply.

- ☒ a) NMHSs
- ☒ b) Private Companies
- ☒ c) Municipal Authorities
- ☒ d) Universities
- ☒ e) Broadcast Companies
- ☒ f) Amateur enthusiasts

Click the Submit button when you are done.

**Great! You have them all correct.
Click Next to proceed to the next page.**

3.10 Question 2

(Drag and Drop, 10 points, 1 attempt permitted)

Question 2 of 3

Read the three descriptions below.

Drag each one to the organisation it represents.

Click Submit when you are done.

Oslo Declaration

This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.

INSPIRE Directive

Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.

Unified Data Policy

This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.

Descriptions: (Drag to the appropriate box.)

Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.

This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.

This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.

Drag Item	Drop Target
Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	dropzone2
This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.	dropzone1
This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.	dropzone3

Drag and drop properties

Snap dropped items to drop target (Stack random)

Allow only one item in each drop target

Delay item drop states until interaction is submitted

Correct (Slide Layer)

Question 2 of 3

Read the three descriptions below.
Drag each one to the organisation it represents.
Click Submit when you are done.

Oslo Declaration	INSPIRE Directive	Unified Data Policy
This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.	Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.

Descriptions: (Drag to the appropriate box.)

Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.	This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.
---	---	--

Great! You have them all correct.
Click Next to proceed to the next page.

Incorrect (Slide Layer)

Question 2 of 3

Read the three descriptions below.
Drag each one to the organisation it represents.
Click Submit when you are done.

Oslo Declaration	INSPIRE Directive	Unified Data Policy
This is a commitment by the European meteorological community to increase direct access to meteorological data and products to maximise societal benefits.	Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.

Descriptions: (Drag to the appropriate box.)

Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	This builds on previous WMO guidance on the creation of national policies for meteorological data exchange, emphasising the role of NMHSs in openly sharing their publicly-financed data.	This is a commitment by the European meteorological community
---	---	---

Sorry. You do not have them all correct. The correct answers are shown. Your correct answers are indicated by a check. Click Next to proceed to the next page.

3.11 Question 3

(Pick Many, 10 points, 1 attempt permitted)

Question 3 of 3

The use of the Creative Commons Licensing framework implies which of the following?
Choose all that apply.

- ☐ Releasing all rights and ownership of data
- ☐ Allowing the reuse of data or other assets by other parties
- ☐ Providing control over how data can be used, amended and re-shared
- ☐ Providing requirements for attribution of data sources
- ☐ Ensuring that all data will be paid for

Click the Submit button when you are done.

Correct	Choice
	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5

Incorrect (Slide Layer)

Question 3 of 3

The use of the Creative Commons Licensing framework implies which of the following?
Choose all that apply.

- ☐ Releasing all rights and ownership of data
- ☒ Allowing the reuse of data or other assets by other parties
- ☒ Providing control over how data can be used, amended and re-shared
- ☒ Providing requirements for attribution of data sources
- ☐ Ensuring that all data will be paid for

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 3 of 3

The use of the Creative Commons Licensing framework implies which of the following?
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- ☐ Releasing all rights and ownership of data
- ☒ Allowing the reuse of data or other assets by other parties
- ☒ Providing control over how data can be used, amended and re-shared
- ☒ Providing requirements for attribution of data sources
- ☐ Ensuring that all data will be paid for

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

3.12 Results: Module 3 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)

Results: Module 3 Knowledge Check

Your score is listed below. The knowledge checks at the end of each module offer an opportunity to help you check your learning. You may wish to use this information to choose whether to further review the information covered.

A minimum score of 70% is required on all knowledge checks in order to receive a WMO-certified badge of course completion.

You may use the buttons below to review your answers, or retry the knowledge check. Or you may click Next to proceed to the module summary.

Your Score:	0%
--------------------	-----------

REVIEW **RETRY**

Results for
3.9 Question 1
3.10 Question 2
3.11 Question 3

Result slide properties

Passing 70%

Score

Notes:

3.13 Module Three Summary

Module Three Summary

Key points in Module Three:

- Data-sharing within meteorology and hydrology is a critical and sometimes challenging component of PPE.
- The landscape of data gathering is evolving, with many new techniques enabling the collection of vast amounts of weather data at varying degrees of quality, particularly in terms of different levels of accuracy, precision and reliability.
 - While not all data is of the highest quality, not all services required by users demand high-quality data.
 - Easy access to all weather data helps ensure that different needs can be met with the most suitable available data
- There are variations in the needs, concerns and perspectives of the public, private and academic sectors, although there is also much overlap.
- The free availability of data is important to the wider health of weather, water and climate services. Value in services can be built from making data more easily and widely available.
- The Unified Data Policy, adopted by WMO in 2021 provides guidance on the formulation of national policies in relation to meteorological data exchange. Key points

The collage features several key elements: a satellite dish at the top; a map of Europe with weather data overlays; a diagram showing various data formats (NetCDF, BUFR, GRIB, HDF5, CEOS, SAFE, UAVSAR) and a 'Storyblocks' logo; a screenshot of a 'Met Éireann Warning RSS/CAP/JSON Description' document; and a logo for the 'WORLD METEOROLOGICAL ORGANIZATION UNIFIED DATA POLICY RESOLUTION' with the text 'Data Exchange for Earth System Monitoring and Prediction in the 21st Century' and 'WMO'.

4. Module 4: Approaches for PPE

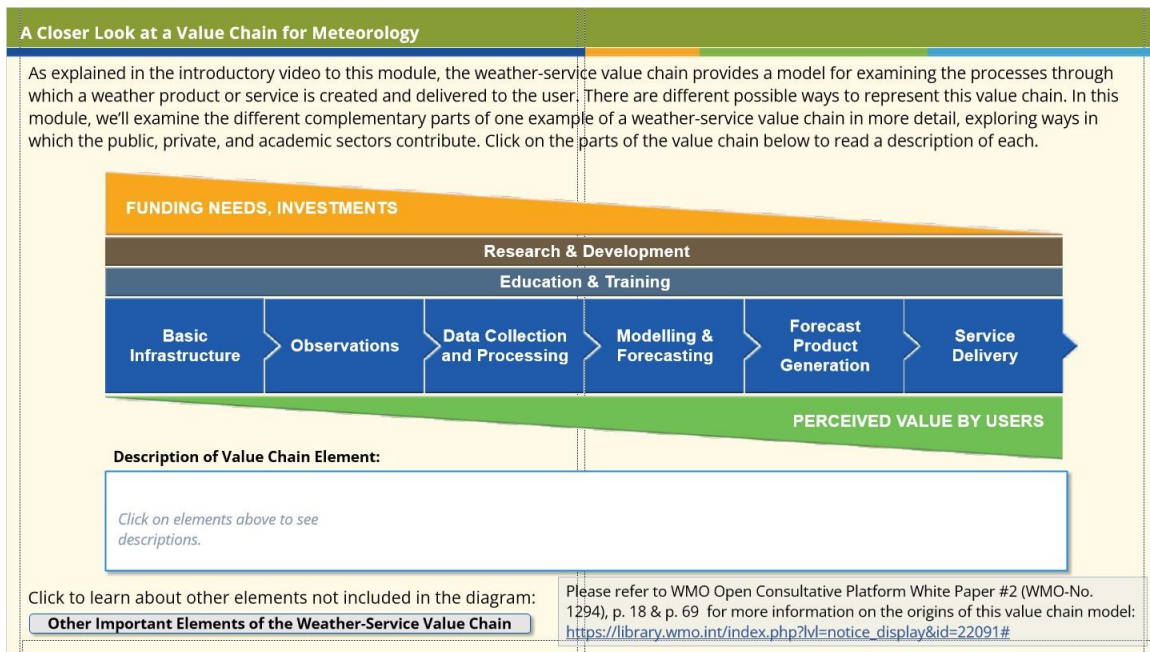
4.1 Module Overview: Approaches for PPE

Module Overview: Approaches for PPE

In this module, we look at the important role of the public sector in initiating and supporting PPE. We will explore the weather-service value chain model, along with different possible approaches for implementation of PPE. To begin, please watch this video.

Video

4.2 A Closer Look at a Value Chain for Meteorology



Notes:

zoom1 (Slide Layer)

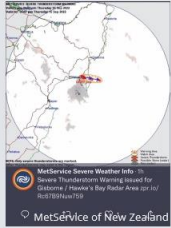

A Closer Look at a Value Chain for Meteorology

Click to close.

As explained in the introductory video to this module, the weather-service value chain provides a model for examining the processes through which a weather product or service is created and delivered to the user. There are different possible ways to represent this value chain. In this module, we'll examine the different complementary parts of one example of a weather-service value chain in more detail, exploring ways in which the public, private, and academic sectors contribute. Click on the parts of the value chain below to read a description of each.



Other Important Elements of the Weather-Service Value Chain

As well as the core elements of the Value Chain, there are other activities that tend to be more sector-specific.

The issuance of **Official Watches and Warnings** is always the responsibility of the NMHS, although private-sector forecasters may issue specifically tailored risk advice to their clients based on the information in the official warnings.

Business Data and Integration is primarily an activity carried out by private-sector meteorological businesses, although a few NMHSs are also active in this area.

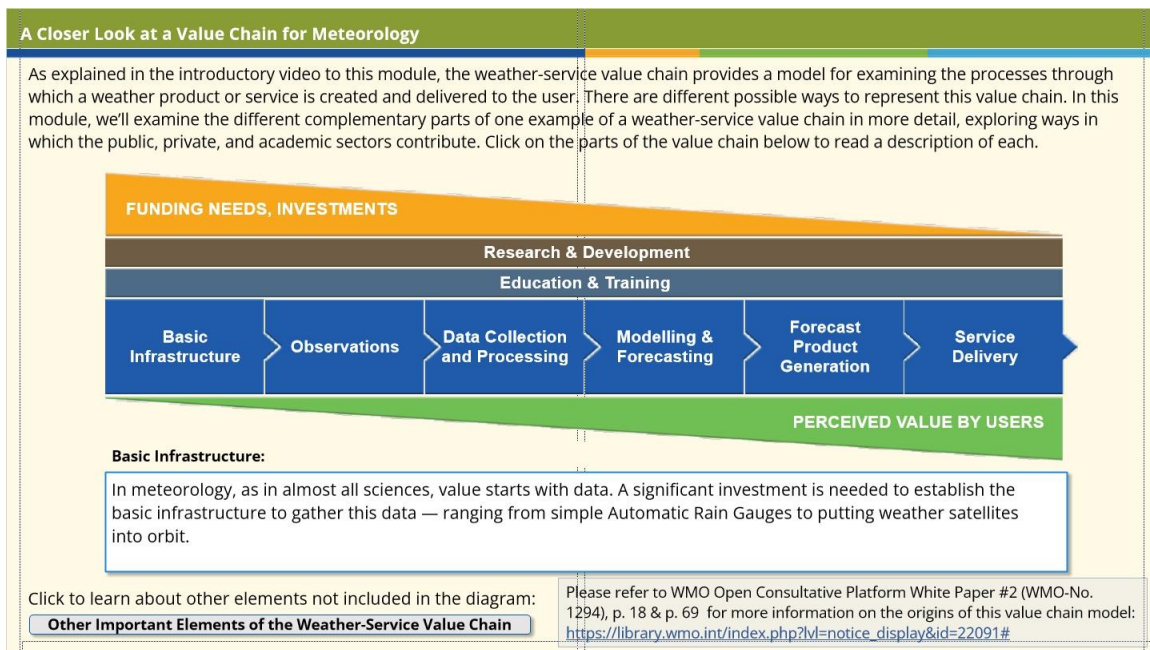



Click to learn more about other elements not included in the diagram:

Other Important Elements of the Weather-Service Value Chain

WMO-No. 1294, p. 18 & p. 69 for more information on the origins of this value chain model: https://library.wmo.int/index.php?lvl=notice_display&id=22091#

Basic (Slide Layer)



Observations (Slide Layer)

A Closer Look at a Value Chain for Meteorology

As explained in the introductory video to this module, the weather-service value chain provides a model for examining the processes through which a weather product or service is created and delivered to the user. There are different possible ways to represent this value chain. In this module, we'll examine the different complementary parts of one example of a weather-service value chain in more detail, exploring ways in which the public, private, and academic sectors contribute. Click on the parts of the value chain below to read a description of each.

Observations:

Data consists of observations of the state of the atmosphere. Data can encompass a multitude of parameters, in three dimensions, and at short time intervals to capture the dynamics of the atmosphere.

Click to learn about other elements not included in the diagram:

[Other Important Elements of the Weather-Service Value Chain](#)

Please refer to WMO Open Consultative Platform White Paper #2 (WMO-No. 1294), p. 18 & p. 69 for more information on the origins of this value chain model: https://library.wmo.int/index.php?lvl=notice_display&id=22091#

Data (Slide Layer)

A Closer Look at a Value Chain for Meteorology

As explained in the introductory video to this module, the weather-service value chain provides a model for examining the processes through which a weather product or service is created and delivered to the user. There are different possible ways to represent this value chain. In this module, we'll examine the different complementary parts of one example of a weather-service value chain in more detail, exploring ways in which the public, private, and academic sectors contribute. Click on the parts of the value chain below to read a description of each.

Data Collection and Processing:

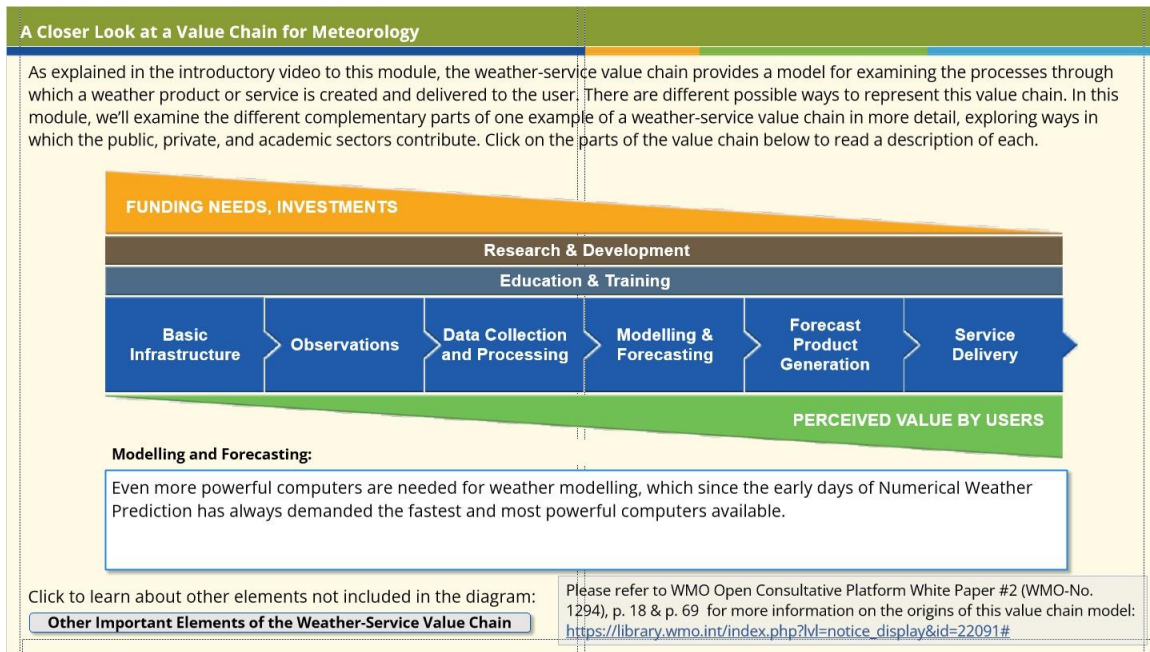
Data volumes are huge, therefore, the business of collecting and processing the observation data needs fast communication links, very large databases, and powerful computing facilities.

Click to learn about other elements not included in the diagram:

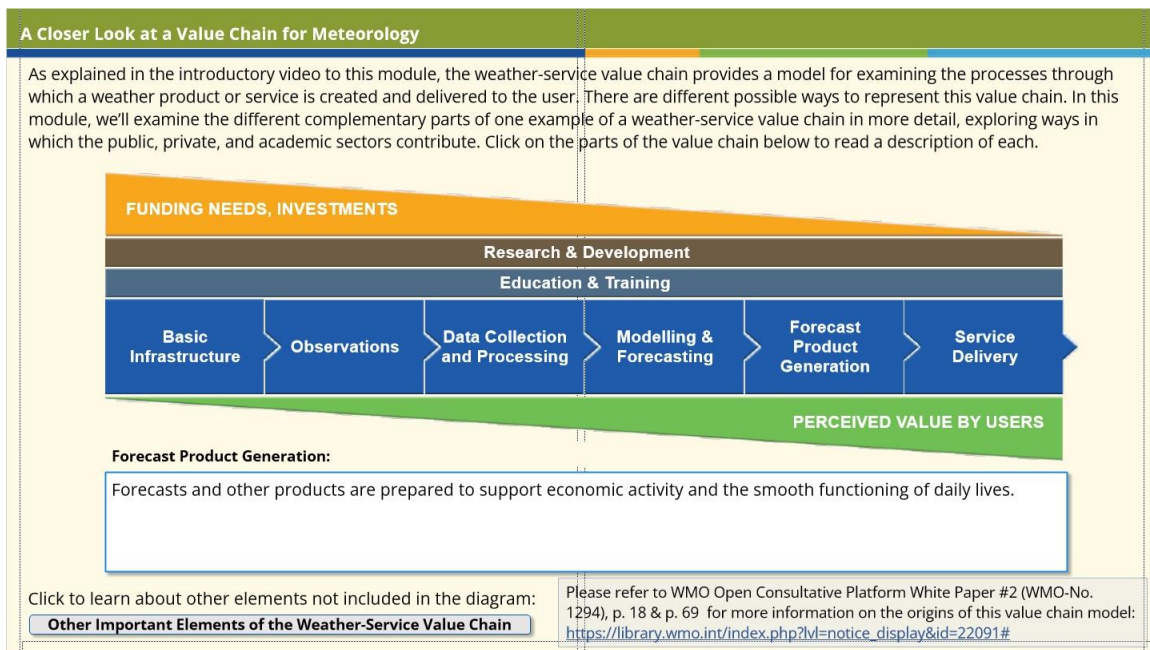
[Other Important Elements of the Weather-Service Value Chain](#)

Please refer to WMO Open Consultative Platform White Paper #2 (WMO-No. 1294), p. 18 & p. 69 for more information on the origins of this value chain model: https://library.wmo.int/index.php?lvl=notice_display&id=22091#

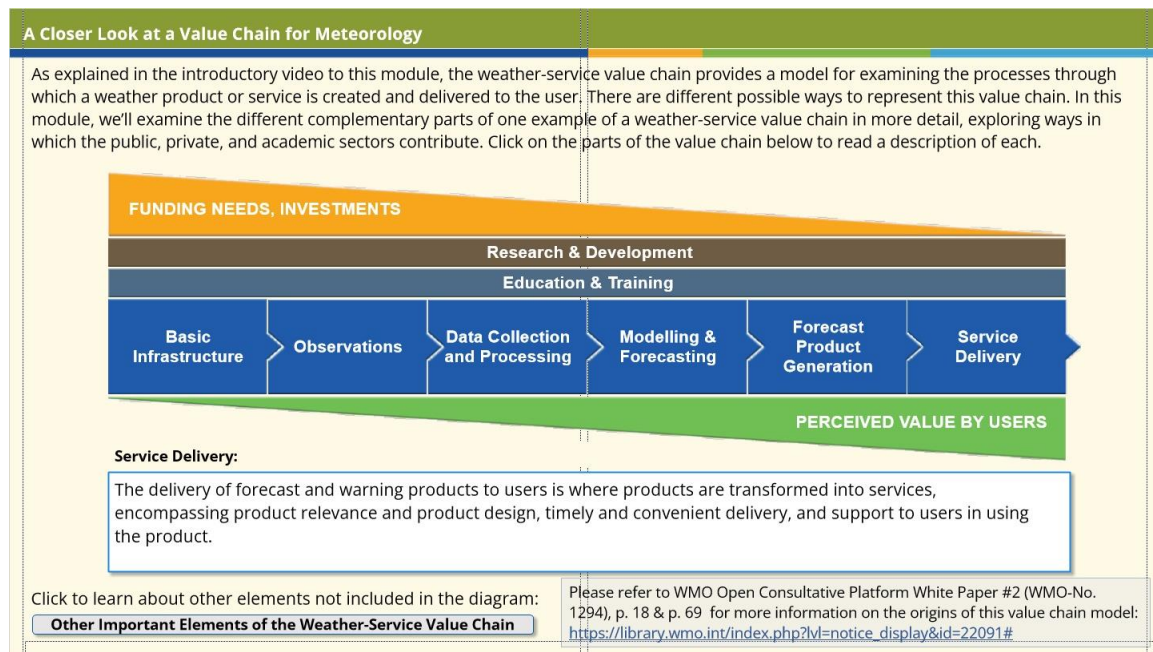
Modelling (Slide Layer)



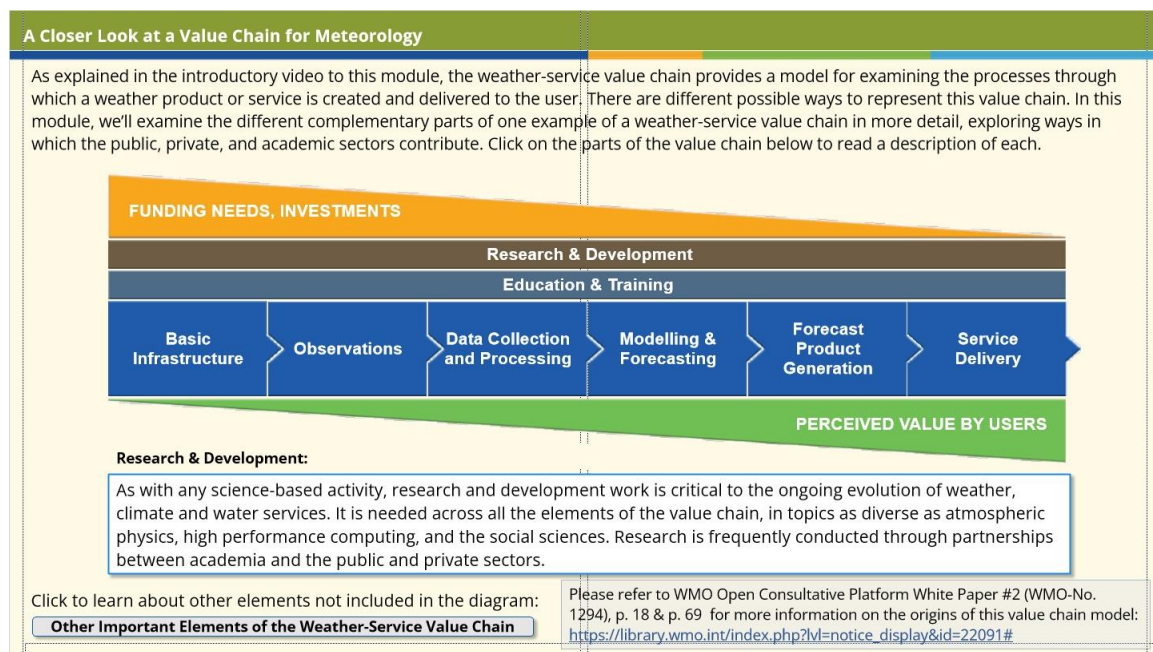
Forecast (Slide Layer)



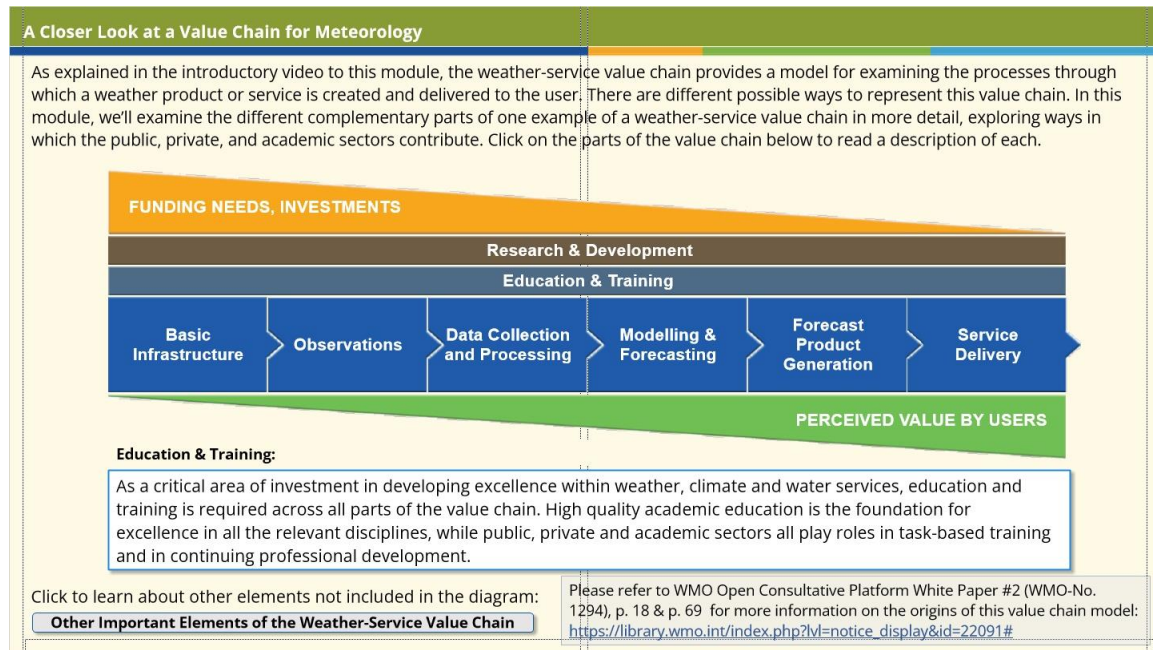
Service (Slide Layer)



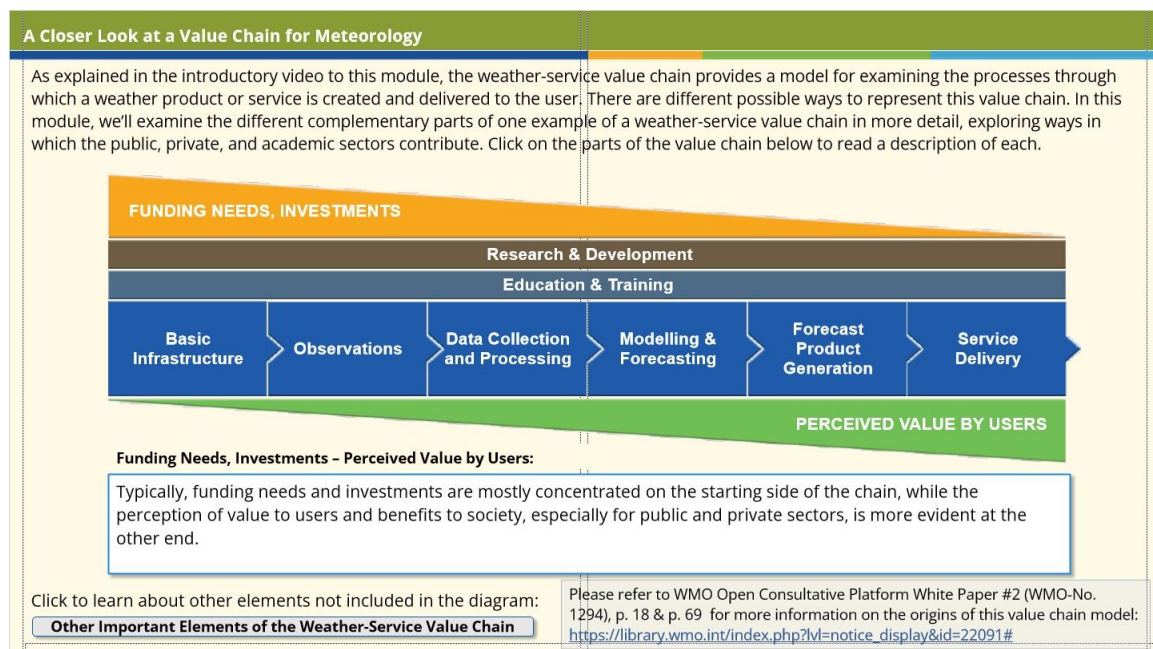
Research (Slide Layer)



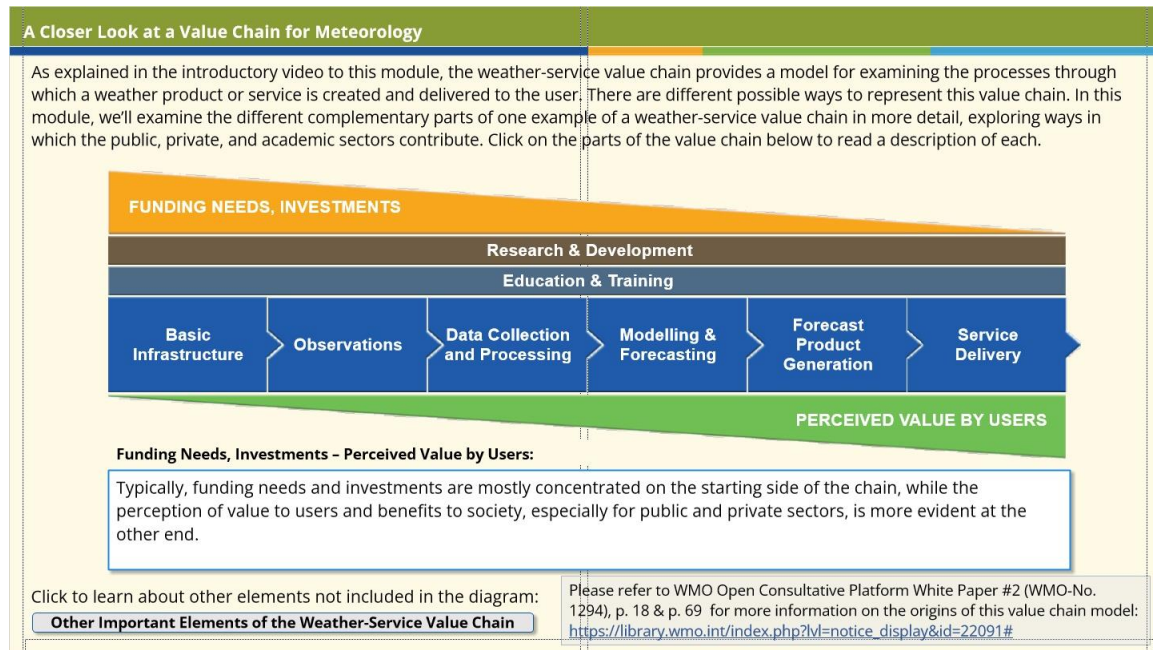
Education (Slide Layer)



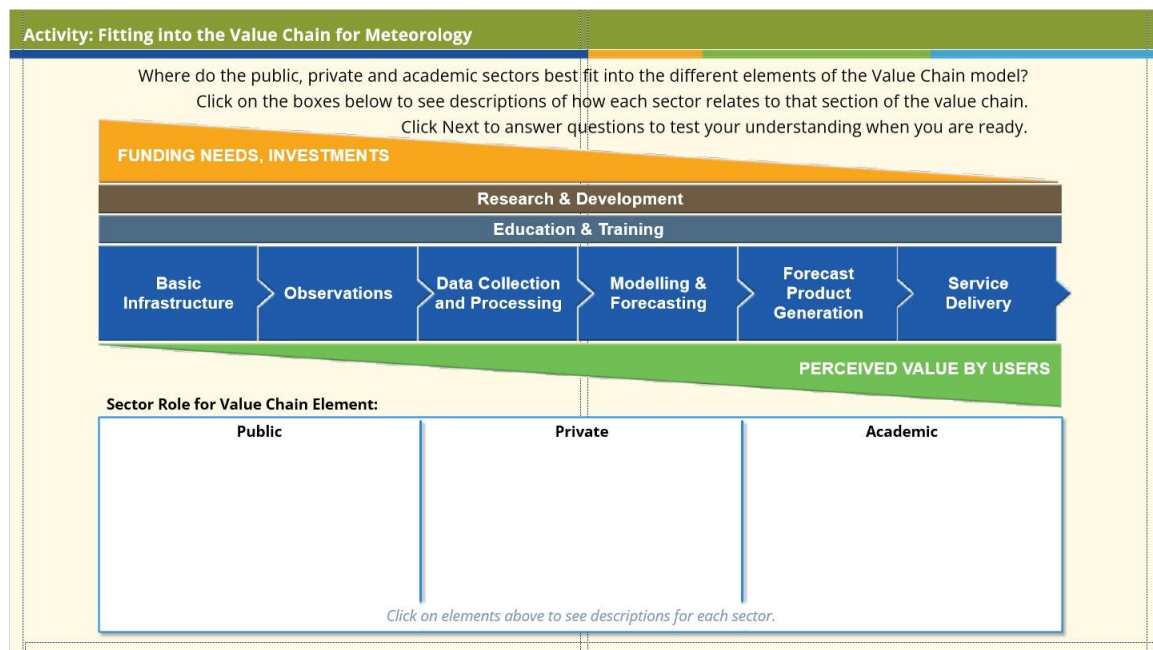
Funding (Slide Layer)



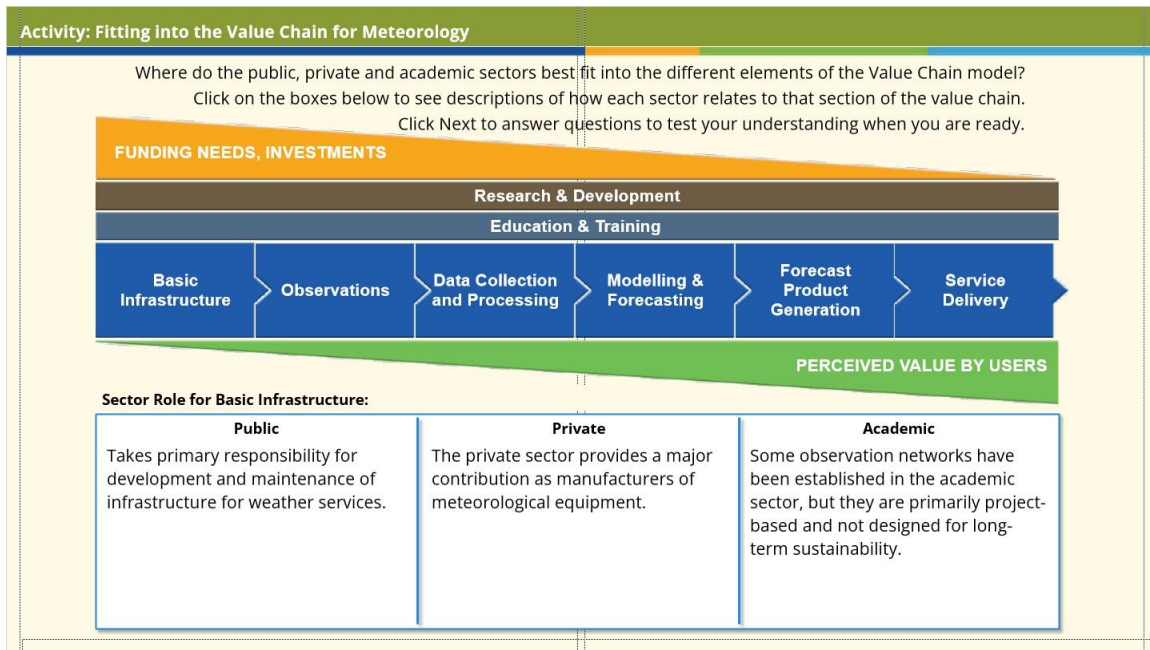
Perceived (Slide Layer)



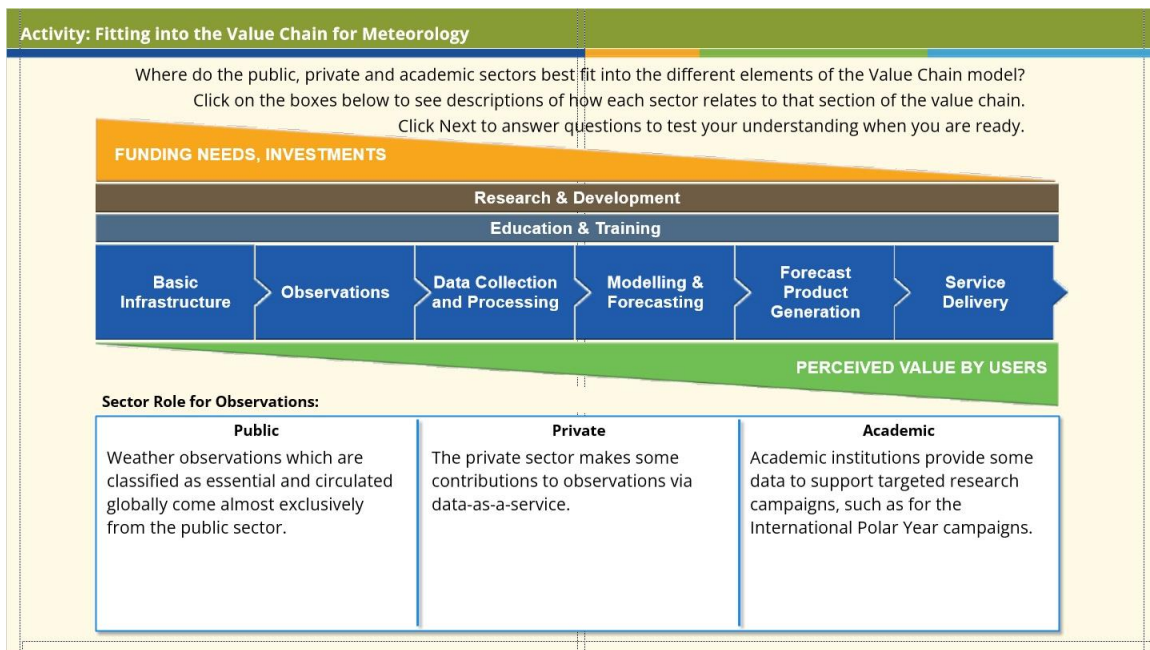
4.3 Activity: Fitting into the Value Chain for Meteorology



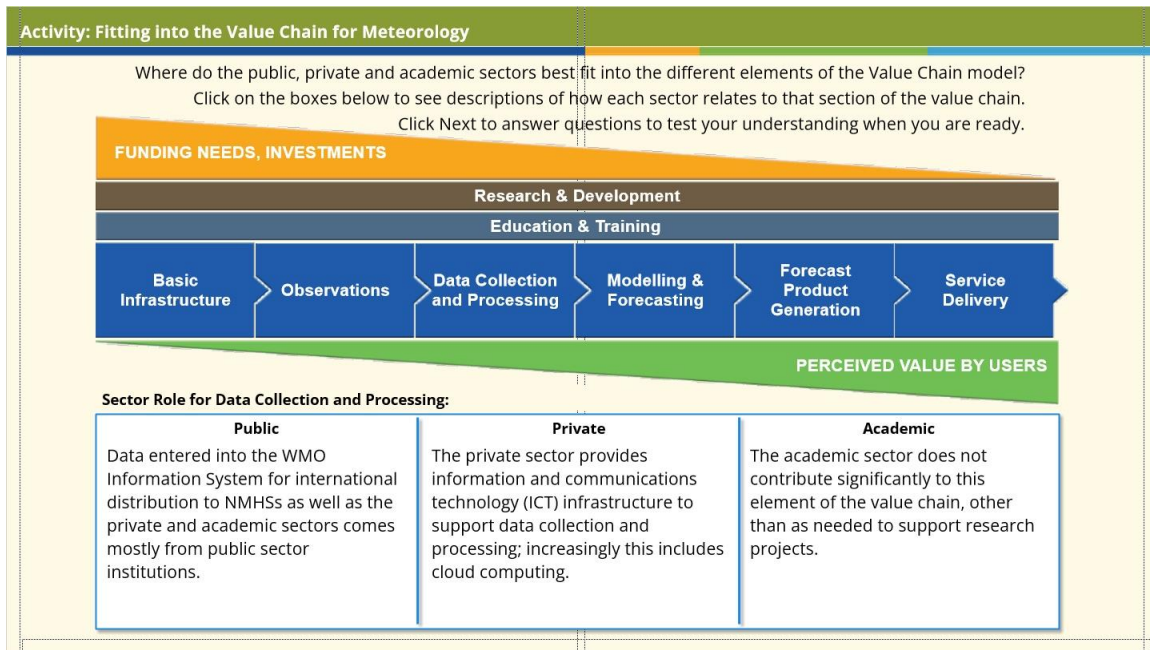
Basic (Slide Layer)



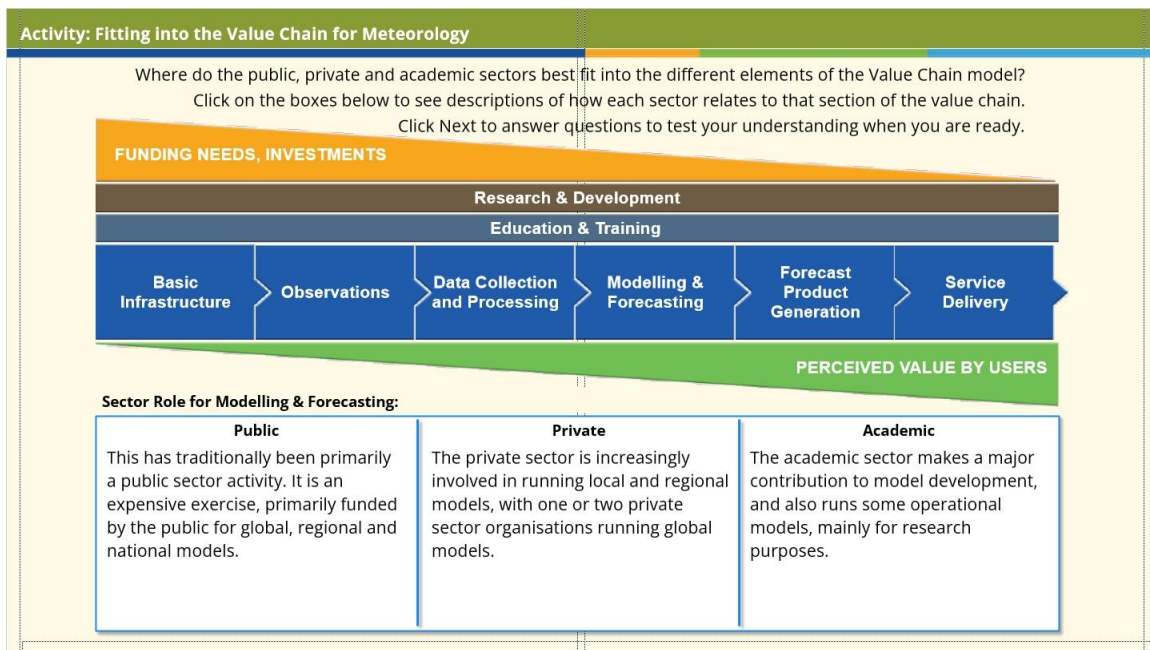
Observations (Slide Layer)



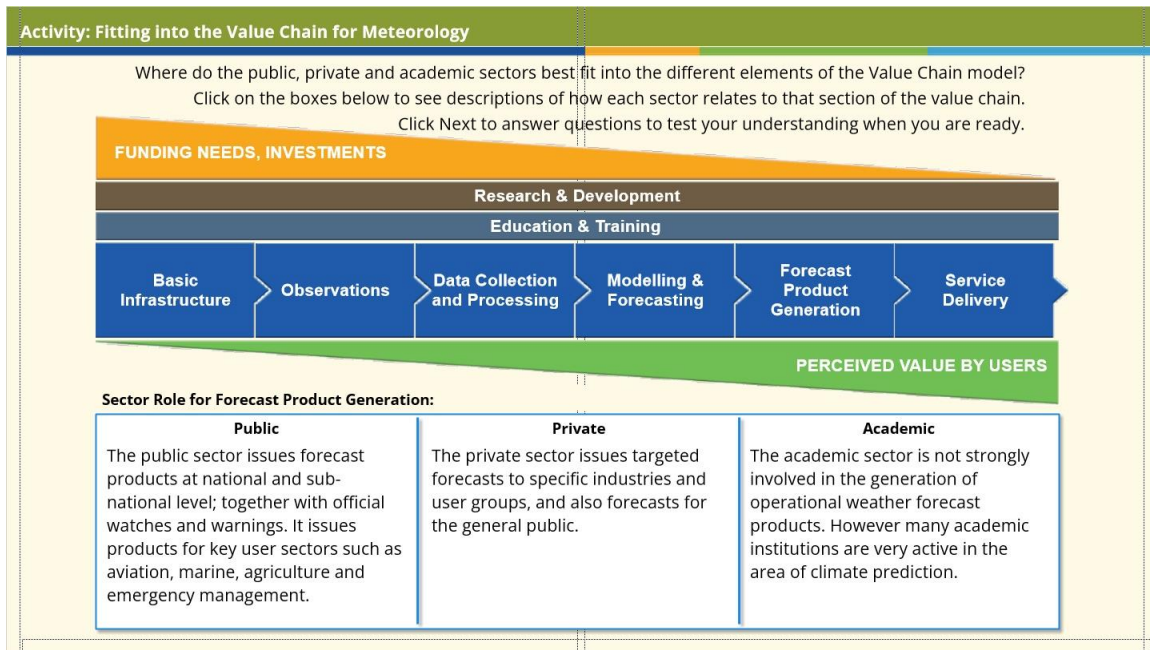
Data (Slide Layer)



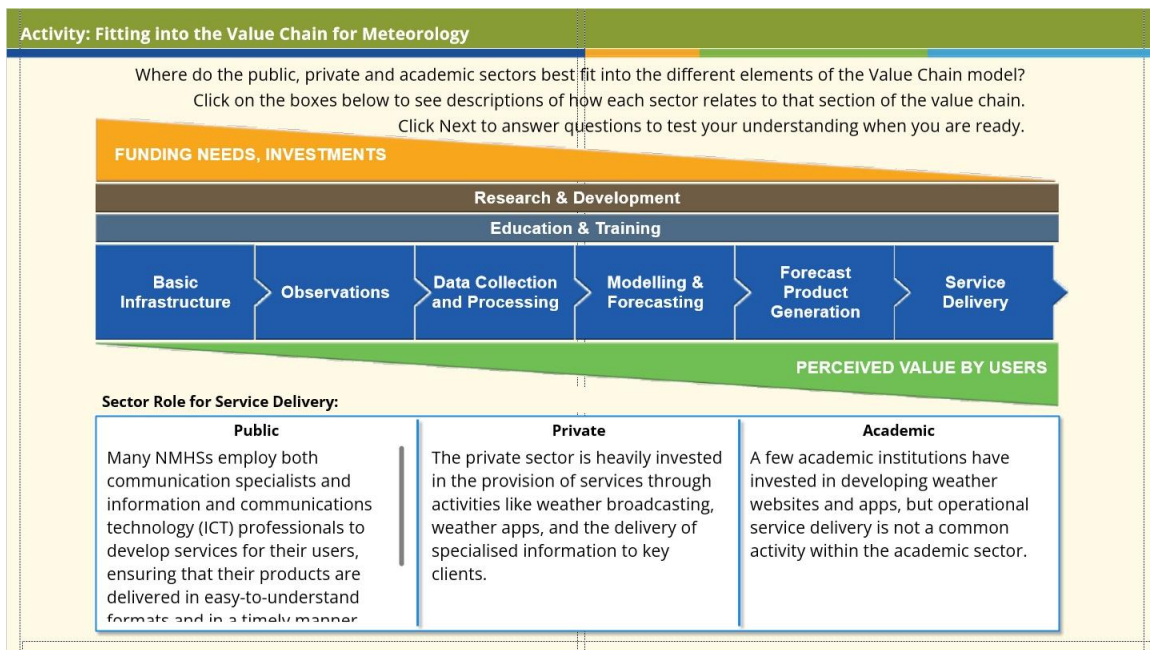
Modelling (Slide Layer)



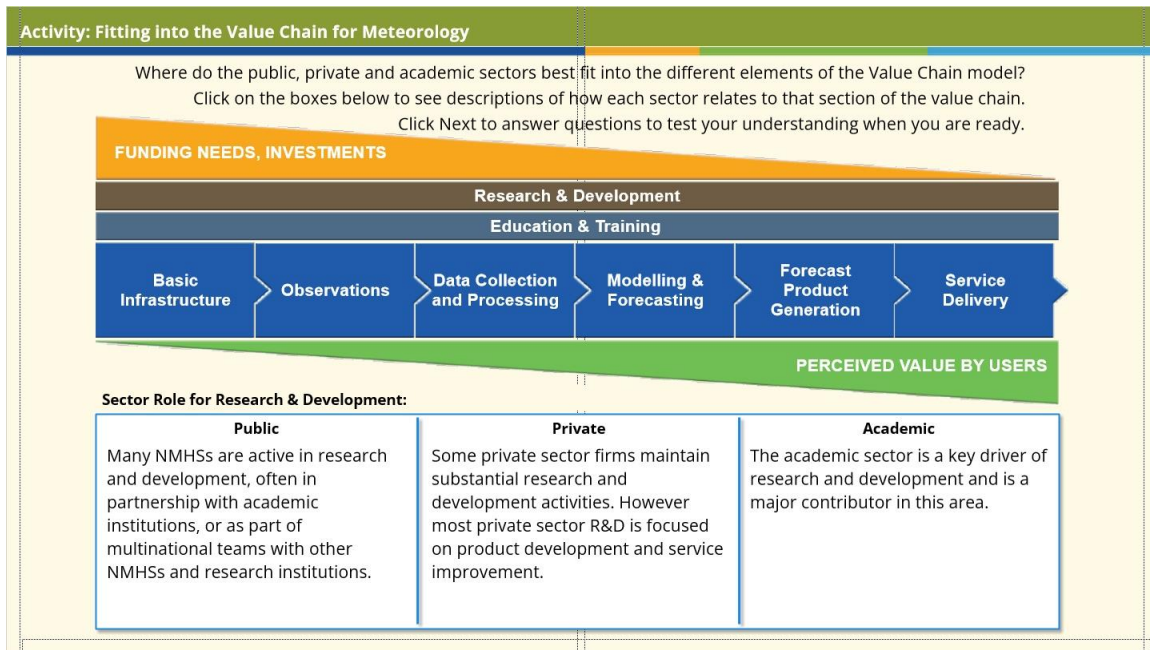
Forecast (Slide Layer)



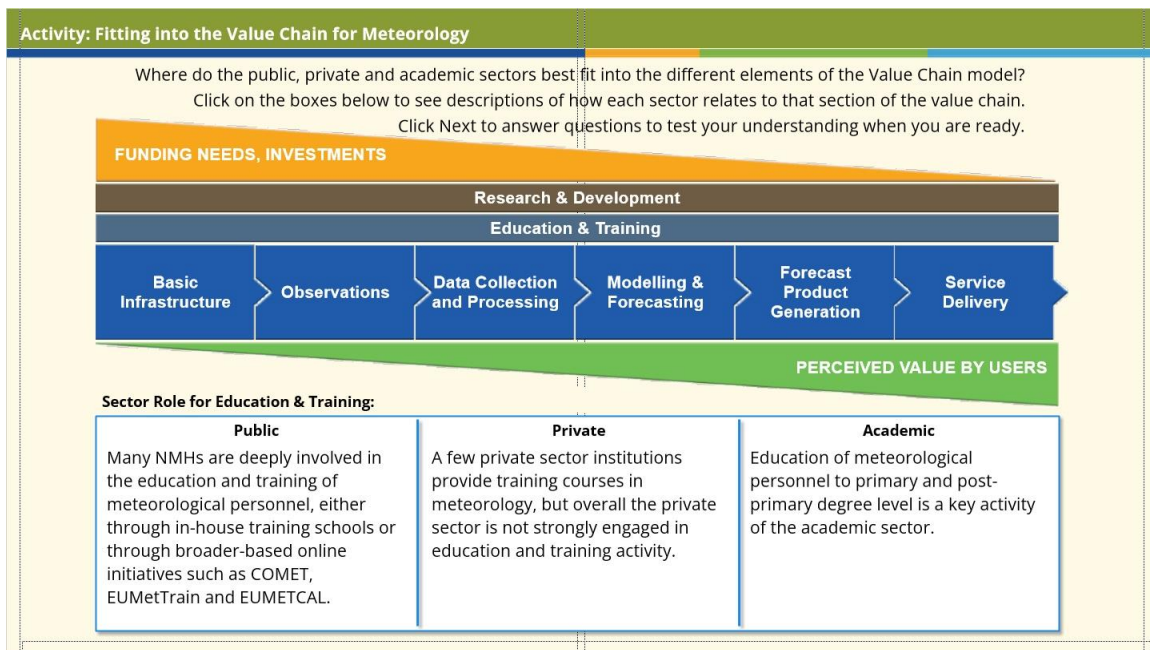
Service (Slide Layer)



Research (Slide Layer)



Education (Slide Layer)



4.4 Value Chain Roles Question 1

(Pick One, 10 points, 2 attempts permitted)

Activity: Fitting into the Value Chain

This next series of questions will help you check on your understanding of the value chain for meteorology. Click the button below to review the sector roles in the value chain.

Click the Submit button when you are done.

Which sector is responsible for producing the bulk of weather observations?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☐ d) All of the above

Review "Fitting into the Value Chain for Meteorology"

Correct	Choice
	a1
X	a2
	a3
	a4

Try Again (Slide Layer)

Activity: Fitting into the Value Chain

This next series of questions will help you check on your understanding of the value chain for meteorology. Click the button below to review the sector roles in the value chain.

Click the Submit button when you are done.

Which sector is responsible for producing the bulk of weather observations?
Choose the best answer.

- ☐ a) Academic
- ☐ b) Public
- ☐ c) Private
- ☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry, you do not have them all correct.
Would you like to try again or continue to the correct answers?

[Try Again](#)[Continue](#)

Incorrect (Slide Layer)

Activity: Fitting into the Value Chain

This next series of questions will help you check on your understanding of the value chain for meteorology. Click the button below to review the sector roles in the value chain.

Click the Submit button when you are done.

Which sector is responsible for producing the bulk of weather observations?
Choose the best answer.

- ☐ a) Academic
- ☐ b) Public
- ☐ c) Private
- ☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry. You do not have them all correct.
Click Continue for feedback.

[Continue](#)

Correct (Slide Layer)

Activity: Fitting into the Value Chain

This next series of questions will help you check on your understanding of the value chain for meteorology. Click the button below to review the sector roles in the value chain.

Click the Submit button when you are done.

Which sector is responsible for producing the bulk of weather observations?
Choose the best answer.

- ☐ a) Academic
- ☐ b) Public
- ☐ c) Private
- ☐ d) All of the above

Congratulations!
You have them all correct!
Good work!

Continue

Review "Fitting into the Value Chain for Meteorology"

feedback (Slide Layer)

Activity: Fitting into the Value Chain

This next series of questions will help you check on your understanding of the value chain for meteorology. Click the button below to review the sector roles in the value chain.

Click the Submit button when you are done.

Which sector is responsible for producing the bulk of weather observations?
Choose the best answer.

- ☐ a) Academic
- ☒ b) Public
- ☐ c) Private
- ☐ d) All of the above

Feedback:
The public sector is responsible for producing the bulk of weather observations.

Review "Fitting into the Value Chain for Meteorology"

4.5 Value Chain Roles Question 2

(Pick One, 10 points, 2 attempts permitted)

Activity: Fitting into the Value Chain

Click the Submit button when you are done.

Which of the sector(s) have an involvement in Modelling & Forecasting?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Correct	Choice
	a1
	a2
	a3
X	a4

Notes:

Try Again (Slide Layer)

Activity: Fitting into the Value Chain

Click the Submit button when you are done.

Which of the sector(s) have an involvement in Modelling & Forecasting?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry, you do not have them all correct.
Would you like to try again or continue
to the correct answers?

[Try Again](#) [Continue](#)

Incorrect (Slide Layer)

Activity: Fitting into the Value Chain

Click the Submit button when you are done.

Which of the sector(s) have an involvement in Modelling & Forecasting?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry. You do not have them all correct.
Click Continue for feedback.

[Continue](#)

Correct (Slide Layer)

Activity: Fitting into the Value Chain

Click the Submit button when you are done.

Which of the sector(s) have an involvement in Modelling & Forecasting?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Congratulations!
You have them all correct!
Good work!

Continue

feedback (Slide Layer)

Activity: Fitting into the Value Chain

Click the Submit button when you are done.

Which of the sector(s) have an involvement in Modelling & Forecasting?
Choose the best answer.

☐ a) Academic

☐ b) Public

☐ c) Private

☒ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Feedback:
All sectors have an involvement in
Modelling & Forecasting.

4.6 Value Chain Roles Question 3

(Pick Many, 10 points, 2 attempts permitted)

Activity: Fitting into the Value Chain

Looking at the differences in forecast product generation, choose which sector is described by each statement below. Note that some statements may describe more than one sector. Choose all that apply.

Click the Submit button when you are done.

Forecast Product Generation Role	Public Sector	Private Sector	Academic Sector
Issues forecast products at national and sub-national level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues official watches and warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues products for key user sectors such as aviation, marine, agriculture and emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues targetted forecasts to specific industries and user groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues forecasts for the general public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not strongly involved in the generation of operational weather forecast products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very active in the area of climate prediction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Review "Fitting into the Value Chain for Meteorology"

Correct	Choice
X	a1a
	a1b
	a1c
X	a2a
	a2b
	a2c
X	a3a
	a3b
	a3c
	a4a

X	a4b
	a4c
X	a5a
X	a5b
	a5c
	a6a
	a6b
X	a6c
	a7a
	a7b
X	a7c

Try Again (Slide Layer)

Activity: Fitting into the Value Chain

Looking at the differences in forecast product generation, choose which sector is described by each statement below. Note that some statements may describe more than one sector. Choose all that apply.
Click the Submit button when you are done.

Forecast Product Generation Role	Public Sector	Private Sector	Academic Sector
Issues forecast products at national and sub-national level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues official watches and warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues products for key user sectors such as aviation, marine, agriculture and emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues targetted forecasts to specific industries and user groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues forecasts for the general public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not strongly involved in the generation of operational weather forecast products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very active in the area of climate prediction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry, you do not have them all correct. Would you like to try again or continue to the correct answers?

[Try Again](#) [Continue](#)

Correct (Slide Layer)

Activity: Fitting into the Value Chain

Looking at the differences in forecast product generation, choose which sector is described by each statement below. Note that some statements may describe more than one sector. Choose all that apply.
Click the Submit button when you are done.

Forecast Product Generation Role	Public Sector	Private Sector	Academic Sector
Issues forecast products at national and sub-national level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues official watches and warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues products for key user sectors such as aviation, marine, agriculture and emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues targetted forecasts to specific industries and user groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues forecasts for the general public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not strongly involved in the generation of operational weather forecast products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very active in the area of climate prediction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Review "Fitting into the Value Chain for Meteorology"](#)

Congratulations!
You have them all correct!
Good work!

[Continue](#)

Incorrect (Slide Layer)

Activity: Fitting into the Value Chain

Looking at the differences in forecast product generation, choose which sector is described by each statement below. Note that some statements may describe more than one sector. Choose all that apply. Click the Submit button when you are done.

Forecast Product Generation Role	Public Sector	Private Sector	Academic Sector
Issues forecast products at national and sub-national level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues official watches and warnings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues products for key user sectors such as aviation, marine, agriculture and emergency management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues targetted forecasts to specific industries and user groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues forecasts for the general public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not strongly involved in the generation of operational weather forecast products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Very active in the area of climate prediction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry. You do not have them all correct. Click Continue for feedback.

[Continue](#)

feedback (Slide Layer)

Activity: Fitting into the Value Chain

Looking at the differences in forecast product generation, choose which sector is described by each statement below. Note that some statements may describe more than one sector. Choose all that apply. Click the Submit button when you are done.

Forecast Product Generation Role	Public Sector	Private Sector	Academic Sector
Issues forecast products at national and sub-national level	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues official watches and warnings	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues products for key user sectors such as aviation, marine, agriculture and emergency management	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues targetted forecasts to specific industries and user groups	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Issues forecasts for the general public	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Not strongly involved in the generation of operational weather forecast products	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Very active in the area of climate prediction	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

[Review "Fitting into the Value Chain for Meteorology"](#)

Feedback:
Suggested answers are shown. Again, keep in mind there may be overlap in roles between sectors.

4.7 Value Chain Roles Question 4

(Pick Many, 10 points, 2 attempts permitted)

Activity: Fitting into the Value Chain

Select the true statements below about the involvement of the sectors in education and training. Choose all that apply.
Click the Submit button when you are done.

- ☐ a) The academic sector plays a relatively minor role in meteorological education.
- ☐ b) Very few NMHSs are deeply involved in education and training of meteorological personnel.
- ☐ c) Some private sector institutions provide courses in meteorology, but overall it is not strongly engaged in education and training.
- ☐ d) All of the above

Review "Fitting into the Value Chain for Meteorology"

Correct	Choice
	a4
X	a3
	a2
	a1

Notes:

feedback (Slide Layer)

Activity: Fitting into the Value Chain

Select the true statements below about the involvement of the sectors in education and training. Choose all that apply.
Click the Submit button when you are done.

- ☐ a) The academic sector plays a relatively minor role in meteorological education.
- ☐ b) Very few NMHSs are deeply involved in education and training of meteorological personnel.
- ☒ c) Some private sector institutions provide courses in meteorology, but overall it is not strongly engaged in education and training.
- ☐ d) All of the above

Feedback:
The correct answer is shown. The academic sector and public sectors are generally quite involved in education and training. While they do provide some education, the private sector has not been as engaged in this area.

[Review "Fitting into the Value Chain for Meteorology"](#)

Try Again (Slide Layer)

Activity: Fitting into the Value Chain

Select the true statements below about the involvement of the sectors in education and training. Choose all that apply.
Click the Submit button when you are done.

- ☐ a) The academic sector plays a relatively minor role in meteorological education.
- ☐ b) Very few NMHSs are deeply involved in education and training of meteorological personnel.
- ☐ c) Some private sector institutions provide courses in meteorology, but overall it is not strongly engaged in education and training.
- ☐ d) All of the above

Sorry, you do not have them all correct. Would you like to try again or continue to the correct answers?
[Try Again](#) [Continue](#)

[Review "Fitting into the Value Chain for Meteorology"](#)

Correct (Slide Layer)

Activity: Fitting into the Value Chain

Select the true statements below about the involvement of the sectors in education and training. Choose all that apply.
Click the Submit button when you are done.

- ☐ a) The academic sector plays a relatively minor role in meteorological education.
- ☐ b) Very few NMHSs are deeply involved in education and training of meteorological personnel.
- ☐ c) Some private sector institutions provide courses in meteorology, but overall it is not strongly engaged in education and training.
- ☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Congratulations!
You have them all correct!
Good work!

[Continue](#)

Incorrect (Slide Layer)

Activity: Fitting into the Value Chain

Select the true statements below about the involvement of the sectors in education and training. Choose all that apply.
Click the Submit button when you are done.

- ☐ a) The academic sector plays a relatively minor role in meteorological education.
- ☐ b) Very few NMHSs are deeply involved in education and training of meteorological personnel.
- ☐ c) Some private sector institutions provide courses in meteorology, but overall it is not strongly engaged in education and training.
- ☐ d) All of the above

[Review "Fitting into the Value Chain for Meteorology"](#)

Sorry. You do not have them all correct.
Click Continue for feedback.

[Continue](#)

4.8 Operating Models for NMHSs

Operating Models for NMHSs

One of the key factors which will determine the degree to which a National Met and Hydro Service can engage with partners in the private sector and academia is their operating model, or how they are established legally.

Examine the graphic depicting five different possible operating models for an NMHS, labeled A through E.

The left-hand column defines a “purely public sector” organisation, fully embedded in a government ministry.

Moving to the right, there are different stages of increased autonomy, reaching right across to a fully-privatised model of operation with no budgetary support from the public purse.

The position of an NMHS on this spectrum will help to inform its capacity to engage in PPE, and the shape of that engagement. The political and administrative philosophy of the relevant government will also be an important consideration.

Below are examples of three different operating models used by meteorological services. Click on each to learn more.

Model A: Ireland

Model C: Czech Republic

Model D: New Zealand

NMHS Operating Models

	A	B	C	D	E
	Directly controlled	Indirectly controlled			
	Departmental unit	Contract agency	Public body	State-owned enterprise	Privatized company
Type of task	Public service provision	Public service provision	Public service provision	Public service provision	Public service provision
Own legal personality	No	No	Partially or fully separate	Yes	Yes
Legal basis	Public law	Public law	Public law	Public law	Public law
Finances	State budget	State budget; own revenues possible	State budget and own revenues	Own revenues	Own revenues
Control mechanisms	Direct political	Framework document	Statutes law	Market intervention	Regulation
Ministerial responsibility	Yes	Yes	Partial	Type of task	No

Autonomization →

Rogers and Tirkunov 2013; Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

Notes:

zoom1 (Slide Layer)

Operating Models for NMHSs

One of the key factors with a National Met and Hydro... the private sector and acc... they are established legal... Examine the graphic depi... models for an NMHS, lab... The left-hand column def... organisation, fully embed... Moving to the right, there... autonomy, reaching right... operation with no budget... The position of an NMHS... capacity to engage in PPE... The political and adminis... government will also be a... Below are examples of th... meteorological services. C...

Model A: Met Éireann

Met Éireann (The Irish Meteorological Service) is a line division of a government ministry. All income is returned to the central exchequer and all costs are met from the ministerial budget. However Met Éireann can make use of fellowship and grant funding to support research work.

Model D: New Zealand

zoom2 (Slide Layer)

Operating Models for NMHSs

One of the key factors with a National Met and Hydro... the private sector and acc... they are established legal... Examine the graphic depi... models for an NMHS, lab... The left-hand column def... organisation, fully embed... Moving to the right, there... autonomy, reaching right... operation with no budget... The position of an NMHS... capacity to engage in PPE... The political and adminis... government will also be a... Below are examples of th... meteorological services. C...

Model C: Czech Republic

CHMI is somewhat autonomous from its parent ministry and has a separate budget. About one-third of its funding comes from commercial activity and from research funding.

Model D: New Zealand

zoom3 (Slide Layer)

Operating Models for NMHSs

One of the key factors with a National Met and Hydro the private sector and acc they are established legal

Examine the graphic depicting models for an NMHS, lab

The left-hand column defines organisation, fully embed

Moving to the right, there autonomy, reaching right operation with no budget

The position of an NMHS capacity to engage in PPE

The political and administrative government will also be a

Below are examples of the meteorological services. C

Model D: New Zealand

Met Service of New Zealand is a state-owned enterprise which has its own Board of Directors and revenues. The government pays the organisation an agreed sum to cover the costs of the basic infrastructure and the provision of certain public weather services, but the Met Service has an enhanced level of freedom to develop commercial services and earn revenue for these activities while not losing sight of the public-good services it provides to the citizens of New Zealand as its primary mission.

Model D: New Zealand

4.9 Potential Benefits from PPE for Your NMHS

Potential Benefits from PPE for Your NMHS

In determining what approach is best for any NMHS, it is important to determine what benefits the NMHS wishes to gain from the arrangements.

Better communication of forecast and warning information

Better dissemination of NMHS forecast and warning information is a significant benefit that can be gained through partnerships with media organisations, websites and similar. It benefits the NMHS to have its products communicated through as many channels as possible, with appropriate attribution.

Build brand strength

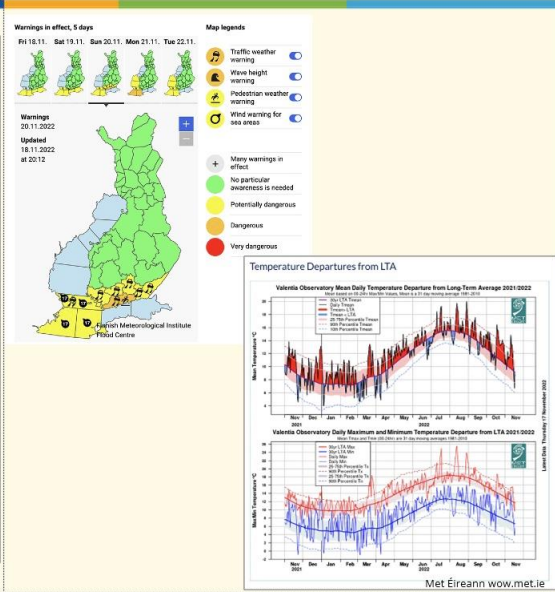
Greater dissemination of forecast and warning information leads to building the brand strength of the NMHS, helping to make it more recognisable and increasing the trust and credibility placed in the organisation.

Revenue

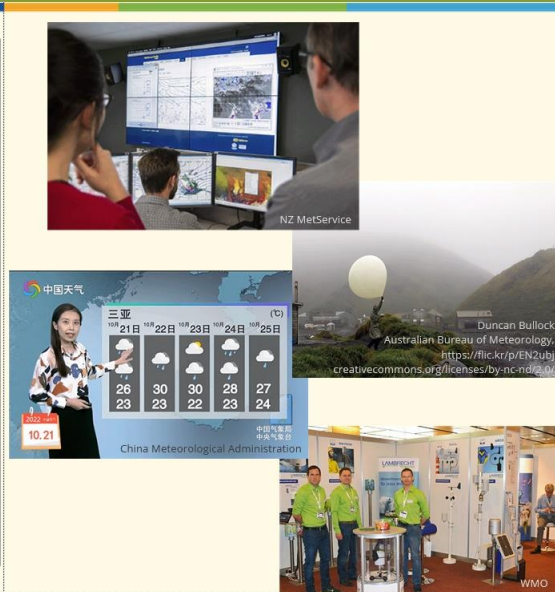
In some circumstances, generation of revenue can be a key benefit from partnerships between an NMHS and the private sector. Every partnership will have associated costs in NMHS staff time and resources, so the revenue should exceed these costs for a net benefit to accrue. Sharing of costs in joint

Notes:

4.10 Ensuring Sustainability of Critical Meteorological Services

Ensuring Sustainability of Critical Meteorological Services	
<p>As well as looking for possible benefits in PPE arrangements, it is important that an NMHS identifies the critical aspects of its services that must be maintained and strengthened in any partnership with other parties.</p> <p>Critical NMHS services that should be maintained and strengthened:</p> <p>Observation infrastructure</p> <p>Chief among these is to sustain – and if possible improve – the data observation infrastructure. It is a key NMHS responsibility to gather high quality information about the weather and climate in its own country.</p> <p>Quality-control & archiving of data</p> <p>Another very important service is to quality-control and archive weather data so that it can be used for climatological research and to generate climate services.</p> <p>Watches and warnings</p> <p>The capacity to monitor and forecast upcoming weather conditions, and to issue watches and warnings to the public, is a key duty of NMHSs and no arrangement which might weaken this capability should be considered. The first responsibility of any NMHS is to the citizens of its own</p>	

4.11 Building on Complementary Strengths

Building on Complementary Strengths	
<p>What are the strengths that different types of organisations, from the public, the private and the academic sectors, can bring to PPE, and what strengths should each seek in a partner?</p> <p>NMHSs</p> <p>The basic strength of an NMHS lies in its scientifically-trained staff, its knowledge and understanding of weather conditions, its access to current and past weather data, and its 24/7 operational capacity.</p> <p>Among the strengths that an NMHS may lack are presentation of information, and marketing and promotion. These are often strengths to be found in private sector organisations.</p> <p>Media</p> <p>Broadcast and media-focused organisations can make excellent partners for NMHSs as they are typically strong in presentation skills but weak in scientific capacity. A partnership between an NMHS and a broadcaster can provide added value to both organisations, helping the broadcaster to deliver high-quality content while raising the profile of the NMHS.</p> <p>Academia</p> <p>For smaller NMHSs the capacity to maintain an active research group may be challenging. Partnering with a research group in academia can lead to the development of new and improved</p>	

4.12 Activity: Choosing an Approach to PPE

(Pick One, 10 points, 1 attempt permitted)

Activity: Choosing an Approach to PPE

The potential challenges involved in implementing PPE will vary for every country. In this activity, you will review a specific situation faced by "Country X" and consider what potential approach you might recommend to meet their challenges. To begin, read the case example below.

Case Example: "Country X"

The NMHS of Country X has an operating model aligned with Type A as shown earlier in this training module. This means that the NMHS does not have its own budget, and cannot keep any revenue it generates.


The NMHS is approached by a mobile phone operator. This company is facing a problem with lightning strikes on mobile phone masts, which disrupt the service they provide to clients. They would like the NMHS to provide a forecast of lightning risk that would allow them to protect their equipment from damage, and offer to pay for this service. While the NMHS can charge for the service, it cannot keep the income for its own budget.

How do you think the NMHS should respond? Take a few minutes to think about possible partnership arrangements that could be mutually beneficial.

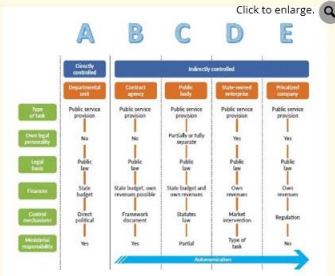
Below are three possible approaches to this problem. Think about the benefits and risks of each. **Choose which approach you think would be the best clicking on it below:**

1. The NMHS could provide the forecast of lightning risk for a fee.
2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.
3. The NMHS could ask the mobile phone company to finance a lightning detection network.

Click Next to proceed when you are ready.



Clive D. <https://flic.kr/p/cCoRyE>
/creativecommons.org/licenses/by-sa/2.0/



Rogers and Tirkunov 2013. Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

[Click to enlarge.](#)

Review Feedback

Correct

Choice

1. The NMHS could provide the forecast of lightning risk for a fee.

2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.

3. The NMHS could ask the mobile phone company to finance a lightning detection network.

zoom1 (Slide Layer)

Activity: Choosing an Approach to PPE

The potential challenges involved in implementing PPE will vary for every country. In this activity, you will review a specific situation faced by "Country X" and consider which approach to PPE you might recommend to meet their challenges. To begin...

Case Example: "Country X"

The NMHS of Country X has an operating model aligned with this training module. This means that the NMHS does not keep any revenue it generates.

The NMHS is approached by a mobile phone operator, who, with lightning strikes on mobile phone masts, which disorient clients. They would like the NMHS to provide a forecast to them to protect their equipment from damage, and offer the NMHS can charge for the service, it cannot keep the income.

How do you think the NMHS should respond? Take a few minutes to consider possible partnership arrangements that could be mutually beneficial.

Below are three possible approaches to this problem. Think about each. **Choose which approach you think would be the most appropriate.**

1. The NMHS could provide the forecast of lightning risk for a fee.
2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.
3. The NMHS could ask the mobile phone company to finance a lightning detection network.

Click Next to proceed when you are ready.

Review Feedback

The diagram illustrates five approaches (A-E) to PPE, categorized by control type and autonomy. The categories are: Directly controlled (A, B), Indirectly controlled (C, D, E). The approaches are: Departmental unit (A), Contract agency (B), Public body (C), State-owned enterprise (D), and Privatized company (E). The diagram shows the flow of public service provision, legal basis, financials, control mechanisms, and ministerial responsibility for each approach. A blue arrow at the bottom indicates the level of 'Autonomisation' from left to right.

	A	B	C	D	E
Control type	Directly controlled	Directly controlled	Indirectly controlled	Indirectly controlled	Indirectly controlled
Entity type	Departmental unit	Contract agency	Public body	State-owned enterprise	Privatized company
Type of task	Public service provision	Public service provision	Public service provision	Public service provision	Public service provision
Own legal personality	No	No	Partially or fully separate	Yes	Yes
Legal basis	Public law	Public law	Public law	Public law	Public law
Finances	State budget	State budget; own revenues possible	State budget and own revenues	Own revenues	Own revenues
Control mechanisms	Direct political	Framework document	Statutes law	Market intervention	Regulation
Ministerial responsibility	Yes	Yes	Partial	Type of task	No

Rogers and Tirkunov 2013. Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

feedback (Slide Layer)

Activity: Choosing an Approach to PPE

Feedback:

As you might have suspected, there is no "right" answer to this problem, but there are considerations for each possible solution:

- 1. The NMHS could provide the forecast of lightning risk for a fee.**
 - This would require the use of forecaster time and resources. But because of the current laws, there would be no benefit to the organisation, as the fee would be taken back into the government accounts.
- 2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.**
 - Mobile phone masts incorporate power and communication capacity. While the readings might not meet the highest WMO standards, they can still augment the synoptic network and provide useful extra data to forecasters.
- 3. The NMHS could ask the mobile phone company to finance a lightning detection network.**
 - Using their towers for the antennae, the company could finance this network and share the data with the NMHS in exchange for the forecast service. This would allow the mobile phone network to deal directly with the suppliers of a lightning detection network, absorbing the cost and getting essential real-time data. They could share the data with the NMHS in return for a forecast service. For the NMHS, there is no capital outlay or ongoing maintenance costs, but there is an ongoing cost related to the provision of the forecast service.

In the case of options 2 and 3, the NMHS gains more data, which is always a benefit, and the client gains an improved forecast service. When considering possible opportunities for PPE, think about where the services you can offer would make a real difference, and think also of what a partner can bring in the form of complementary expertise. What degree of PPE is possible within your legislative and administrative arrangements? If possible, identify and pursue a pilot project with a suitable partner. Start small, but be prepared to grow your PPE efforts steadily as more partners realise the benefits of working with you.

Click Next to proceed to the next page, or click Close to close this feedback window.

Close

Incorrect (Slide Layer)

Activity: Choosing an Approach to PPE

The potential challenges involved in implementing PPE will vary for every country. In this activity, you will review a specific situation faced by "Country X" and consider what potential approach you might recommend to meet their challenges. To begin, read the case example below.


Case Example: "Country X"
 The NMHS of Country X has an operating model aligned with Type A as shown earlier in this training module. This means that the NMHS does not have its own budget, and cannot keep any revenue it generates.
 The NMHS is approached by a mobile phone operator. This company is facing a problem with lightning strikes on mobile phone masts, which disrupt the service they provide to clients. They would like the NMHS to provide a forecast of lightning risk that would allow them to protect their equipment from damage, and offer to pay for this service. While the NMHS can charge for the service, it cannot keep the income for its own budget.

How do you think the NMHS should respond? Take a few minutes to think about possible partnership arrangements that could be mutually beneficial.

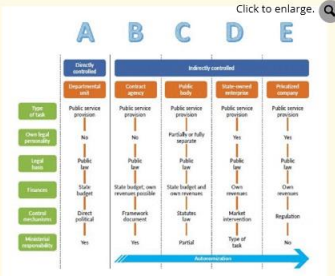
Below are three possible approaches to this problem. Think about the benefits and risks of each. **Choose which approach you think would be the best clicking on it below:**

1. The NMHS could provide the forecast of lightning risk for a fee.
2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.
3. The NMHS could ask the mobile phone company to finance a lightning detection network.

Click Next to proceed when you are ready.



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 /creativecommons.org/licenses/by-sa/2.0/



Click to enlarge.

Rogers and Tirkunov 2013. Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

Review Feedback

Correct (Slide Layer)

Activity: Choosing an Approach to PPE

The potential challenges involved in implementing PPE will vary for every country. In this activity, you will review a specific situation faced by "Country X" and consider what potential approach you might recommend to meet their challenges. To begin, read the case example below.


Case Example: "Country X"
 The NMHS of Country X has an operating model aligned with Type A as shown earlier in this training module. This means that the NMHS does not have its own budget, and cannot keep any revenue it generates.
 The NMHS is approached by a mobile phone operator. This company is facing a problem with lightning strikes on mobile phone masts, which disrupt the service they provide to clients. They would like the NMHS to provide a forecast of lightning risk that would allow them to protect their equipment from damage, and offer to pay for this service. While the NMHS can charge for the service, it cannot keep the income for its own budget.

How do you think the NMHS should respond? Take a few minutes to think about possible partnership arrangements that could be mutually beneficial.

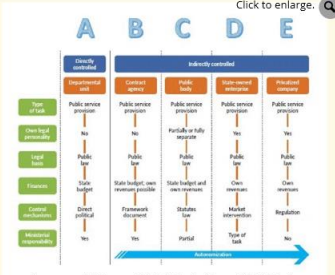
Below are three possible approaches to this problem. Think about the benefits and risks of each. **Choose which approach you think would be the best clicking on it below:**

1. The NMHS could provide the forecast of lightning risk for a fee.
2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.
3. The NMHS could ask the mobile phone company to finance a lightning detection network.

Click Next to proceed when you are ready.



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 /creativecommons.org/licenses/by-sa/2.0/



Click to enlarge.


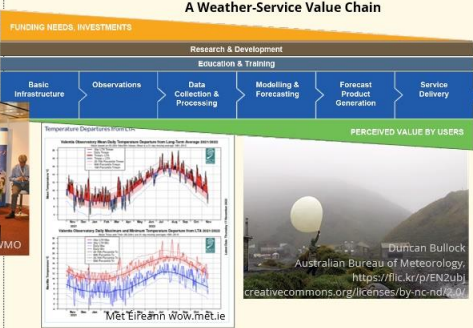
Rogers and Tirkunov 2013. Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

Review Feedback

4.13 Activity: Your Roadmap to PPE

Activity: Your Roadmap to PPE	
<p>What challenges do you face in your own country around the implementation of a PPE approach? Every country, every context is different. The solutions which you will identify must be grounded in your own situation, reflecting the limitations and opportunities of your own context.</p> <p>Think about a similar situation to the one faced by Country X in the previous activity. It might also be related to lightning forecasting, or it could be a different topic. For each prompt below, think about the possibilities of PPE in your own country. Write down some of your thoughts based on your situation.</p> <p>This is a reflection activity. There are no right or wrong answers. Click the Print button to print, or save your answers to a PDF file.</p> <p>1. How would you analyse the situation in your own country? Are there legislative impediments to PPE, or any other strong external reason why PPE could not work effectively?</p> <div style="border: 1px solid black; height: 60px; margin-top: 5px;"></div>	
<p>2. Are there users of weather data who would pay for it? Would it make sense to take in revenue or to arrange for sharing?</p> <div style="border: 1px solid black; height: 60px; margin-top: 5px;"></div>	
Print	

4.14 Knowledge Check

Knowledge Check	
	<p style="text-align: center;">A Weather-Service Value Chain</p> 
<p>Check your understanding of the information covered in this module by responding to the questions on the next few pages.</p> <p>The knowledge checks at the end of each module serve to help you check on your learning. You may wish to use this information to choose whether to further review the information covered.</p> <p>Click Next to start the questions.</p>	

4.15 Question 1

(Drag and Drop, 10 points, 1 attempt permitted)

Question 1 of 5

Drag each element onto the Value Chain below in the correct order. Click Submit when you are ready.

Value Chain Element: (Drag to the appropriate box.)

- Modelling & Forecasting
- Service Delivery
- Observations
- Data Collection and Processing
- Forecast Product Generation
- Basic Infrastructure

Drag Item	Drop Target
Basic Infrastructure	
Observations	
Data Collection and Processing	
Modelling & Forecasting	
Forecast Product Generation	
Service Delivery	

Drag and drop properties
Snap dropped items to drop target (Stack random)

Allow only one item in each drop target

Delay item drop states until interaction is submitted

Correct (Slide Layer)

Question 1 of 5

Drag each element onto the Value Chain below in the correct order. Click Submit when you are ready.

The Value Chain diagram consists of a central horizontal sequence of six blue boxes connected by right-pointing chevrons: **Basic Infrastructure**, **Observations**, **Data Collection and Processing**, **Modelling & Forecasting**, **Forecast Product Generation**, and **Service Delivery**. Above this sequence are two horizontal bars: an orange one labeled **FUNDING NEEDS, INVESTMENTS** and a grey one labeled **Research & Development**. Below the sequence is a green bar labeled **PERCEIVED VALUE BY USERS**. Below the diagram, the text **Value Chain Element:** (Drag to the appropriate box.) is followed by five draggable boxes: **Modelling & Forecasting**, **Service Delivery**, **Observations**, **Data Collection and Processing**, and **Forecast Product Generation**. A large blue box at the bottom right contains the text: **Great! You have them all correct. Click Next to proceed to the next page.**

Incorrect (Slide Layer)

Question 1 of 5

Drag each element onto the Value Chain below in the correct order. Click Submit when you are ready.

Value Chain Element: (Drag to the appropriate box.)

Modelling & Forecasting Service Delivery Observations

Data Collection and Processing Forecast Product Generation

Sorry. You do not have them all correct. The correct answers are shown. The ones you got right are marked with a check. Click Next to proceed to the next page.

4.16 Question 2

(Pick Many, 10 points, 1 attempt permitted)

Question 2 of 5

Which of these are potential benefits to an NMHS from PPE? Choose all that apply.

- ☐ a) More control over the private sector
- ☐ b) Building brand strength
- ☐ c) Access to better quality observations
- ☐ d) Better communication of forecast and warning information
- ☐ e) Improved maintenance of infrastructure

Click the Submit button when you are done.

Correct	Choice
	Check Box 1
X	Check Box 2
	Check Box 3
X	Check Box 4
X	Check Box 5

Incorrect (Slide Layer)

Question 2 of 5

Which of these are potential benefits to an NMHS from PPE? Choose all that apply.

- ☐ a) More control over the private sector
- ☒ b) Building brand strength
- ☐ c) Access to better quality observations
- ☒ d) Better communication of forecast and warning information
- ☒ e) Improved maintenance of infrastructure

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 2 of 5

Which of these are potential benefits to an NMHS from PPE? Choose all that apply.

- ☐ a) More control over the private sector
- ☒ b) Building brand strength
- ☐ c) Access to better quality observations
- ☒ d) Better communication of forecast and warning information
- ☒ e) Improved maintenance of infrastructure

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

4.17 Question 3

(Pick Many, 10 points, 1 attempt permitted)

Question 3 of 5

Which of the following describe critical NMHS services that need to be maintained and strengthened, especially when implementing PPE? Choose all that apply.

- ☐ a) Maintain quality-control & archiving of data for climatological research
- ☐ b) Maintain nightly weather forecasts on the evening TV news
- ☐ c) Support private industry needs for specific local forecasting
- ☐ d) Ensure the capacity to issue forecasts, watches and warnings to the public
- ☐ e) Advance next-generation meteorological and hydrological research
- ☐ f) Sustain and improve the data observation infrastructure

Click the Submit button when you are done.

Correct	Choice
X	Check Box 1
	Check Box 2
	Check Box 3
X	Check Box 4
	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

Question 3 of 5

Which of the following describe critical NMHS services that need to be maintained and strengthened, especially when implementing PPE? Choose all that apply.

- ☒ a) Maintain quality-control & archiving of data for climatological research
- ☐ b) Maintain nightly weather forecasts on the evening TV news
- ☐ c) Support private industry needs for specific local forecasting
- ☒ d) Ensure the capacity to issue forecasts, watches and warnings to the public
- ☐ e) Advance next-generation meteorological and hydrological research
- ☒ f) Sustain and improve the data observation infrastructure

Click the Submit button when you are done.

Sorry. You do not have them all correct.
Click Next to proceed to the next page.

Correct (Slide Layer)

Question 3 of 5

Which of the following describe critical NMHS services that need to be maintained and strengthened, especially when implementing PPE? Choose all that apply.

- ☒ a) Maintain quality-control & archiving of data for climatological research
- ☐ b) Maintain nightly weather forecasts on the evening TV news
- ☐ c) Support private industry needs for specific local forecasting
- ☒ d) Ensure the capacity to issue forecasts, watches and warnings to the public
- ☐ e) Advance next-generation meteorological and hydrological research
- ☒ f) Sustain and improve the data observation infrastructure

Click the Submit button when you are done.

Great! You have them all correct.
Click Next to proceed to the next page.

4.18 Question 4

(Pick Many, 10 points, 1 attempt permitted)

Question 4 of 5

NMHSs can benefit from developing partnerships with which of the following? Choose all that apply.

- ☐ a) Academia
- ☐ b) Broadcasters
- ☐ c) Private Sector weather providers
- ☐ d) Technology companies
- ☐ e) Other NMHSs

Click the Submit button when you are done.

Correct	Choice
X	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
X	Check Box 5

Incorrect (Slide Layer)

Question 4 of 5

NMHSs can benefit from developing partnerships with which of the following?
Choose all that apply.

- ☒ a) Academia
- ☒ b) Broadcasters
- ☒ c) Private Sector weather providers
- ☒ d) Technology companies
- ☒ e) Other NMHSs

Click the Submit button when you are done.

**Sorry. You do not have them all correct.
Click Next to proceed to the next page.**

Correct (Slide Layer)

Question 4 of 5

NMHSs can benefit from developing partnerships with which of the following?
Choose all that apply.

- ☒ a) Academia
- ☒ b) Broadcasters
- ☒ c) Private Sector weather providers
- ☒ d) Technology companies
- ☒ e) Other NMHSs

Click the Submit button when you are done.

**Great! You have them all correct.
Click Next to proceed to the next page.**

4.19 Question 5

(Drag and Drop, 10 points, 1 attempt permitted)

Question 5 of 5

We have looked at some of the strengths different types of organisations can bring to PPE. Drag each key strength below under the type of organisation it is most associated with.

Click Submit when you are done.

NMHSs	Broadcast media companies	Academic institutions	Technology companies

Key strengths: *(Drag to the appropriate box.)*

Strong brand recognition	24/7 Operations	Large pool of young scientists
Commitment to ensure public safety	Computing expertise	Access to advanced communication technology
Active research groups	High level of presentational skills	

Drag Item	Drop Target
Strong brand recognition	dropzone2
Commitment to ensure public safety	dropzone1
Active research groups	dropzone3
24/7 Operations	dropzone1
Computing expertise	dropzone4
High level of presentational skills	dropzone2
Large pool of young scientists	dropzone3
Access to advanced communication technology	dropzone4

Drag and drop properties
Snap dropped items to drop target (Tile)
Delay item drop states until interaction is submitted

Correct (Slide Layer)

Question 5 of 5

We have looked at some of the strengths different types of organisations can bring to PPE. Drag each key strength below under the type of organisation it is most associated with.

Click Submit when you are done.

NMHSs	Broadcast media companies	Academic institutions	Technology companies

Key strengths: (Drag to the appropriate box.)

- Strong brand recognition
- Commitment to ensure public safety
- Active research groups
- 24/7 Operations
- Computing expertise
- High level of presentational skills
- Large pool of young scientists
- Access to advanced technology

Great! You have them all correct.
Click Next to proceed to the next page.

Incorrect (Slide Layer)

Question 5 of 5

We have looked at some of the strengths different types of organisations can bring to PPE. Drag each key strength below under the type of organisation it is most associated with.

Click Submit when you are done.

NMHSs	Broadcast media companies	Academic institutions	Technology companies

Key strengths: (Drag to the appropriate box.)

- Strong brand recognition
- Commitment to ensure public safety
- Active research groups
- 24/7 Operations
- Computing expertise
- High level of presentational skills
- Large pool of young scientists
- Access to advanced technology

Show Correct

Sorry. You do not have them all correct. The answers that you have correct are shown with checks.
Click Show Correct to view the correct answers.
Click Next to proceed to the quiz results.

final correct (Slide Layer)

Question 5 of 5

We have looked at some of the strengths different types of organisations can bring to PPE. Drag each key strength below under the type of organisation it is most associated with.

Click Submit when you are done.

NMHSs	Broadcast media companies	Academic institutions	Technology companies
Commitment to ensure public safety	Strong brand recognition	Active research groups	Computing expertise
24/7 Operations	High level of presentational skills	Large pool of young scientists	Access to advanced communication technology

Key strengths: (Drag to the appropriate box.)

The correct answers are shown.
Click Next to proceed to the quiz results.

4.20 Results: Module 4 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)

Results: Module 4 Knowledge Check

Your score is listed below. The knowledge checks at the end of each module offer an opportunity to help you check your learning. You may wish to use this information to choose whether to further review the information covered.

You must have 70% of the question correct on all knowledge checks in order to receive a WMO-certified badge of course completion.

You may use the buttons below to review your answers, or retry the knowledge check. Or you may click Next to proceed to the module summary.

Your Score:	0%
--------------------	-----------

REVIEW **RETRY**

Results for
4.15 Question 1
4.16 Question 2
4.17 Question 3
4.18 Question 4
4.19 Question 5

Result slide properties

Passing

70%

Score

Notes:

4.21 Module Four Summary

Module Four Summary

Key points in Module Four:

- A “Value Chain” of meteorology may be used to outline the various steps between the collection of raw data and the delivery of services. The basic steps included in this model include:
 - Basic infrastructure
 - Observations
 - Data collection & processing
 - Modelling & forecasting
 - Forecast product generation
 - Service delivery
- Research & development and education & training span across all of these stages.
- Each sector — public, private and academic — brings diverse strengths to PPE at different stages of the Value Chain. The complementary strengths of the partners can enhance and strengthen the Value Chain to the benefit of all.
- A variety of possible operating models exist for NMHSs and these can have a significant influence on the role which an NMHS can take within the PPE environment.
- It is important to consider which benefits an NMHS may wish

A Weather-Service Value Chain

NMHS Operating Models

Rogers and Tirkunov 2013. Adapted from Gill 2002; Greve, Flinders, and Van Thiel 1999

4.22 Course Wrap-up

Course Wrap-up

Congratulations on completion of this course. Please watch this video for a concluding message.

Video





Refer to the WMO PPE home page for more information and updates:
<https://public.wmo.int/en/our-mandate/how-we-do-it/public-private-engagement-ppe>

Click Next to finalize the course and see your status for receiving a course completion badge.

Notes:

4.23 Course Completion

Course Completion



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Mudassar@intellisys, Singapore
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Google Play

To be eligible to receive WMO-certified badge of course completion for this course you must pass each knowledge check with 70% of the answers correct. You must also have viewed all of the pages visible from the left side menu. Your scores for each module are shown below, along with the number of pages you have viewed. Feel free to retry any knowledge checks, and return to view any missed pages.

Module	Score	
Module One: Introduction to Public-Private Engagement	0 %	RETRY
Module Two: Legislative and Institutional Frameworks for PPE	0 %	RETRY
Module Three: Data Sharing	0 %	RETRY
Module Four: Approaches for PPE	0 %	RETRY

You have completed 0 of the 61 slides in this course.



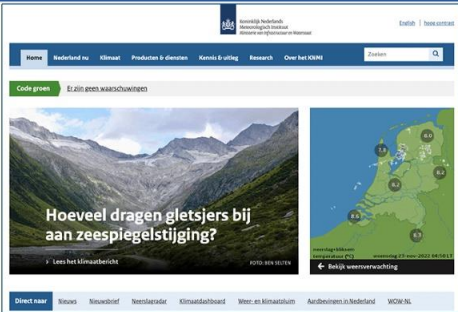
When you are ready to leave the course and return to the WMO Education and Training Programme site, click the Exit activity button above and to the right of this course window. 

Notes:

5. lightboxes


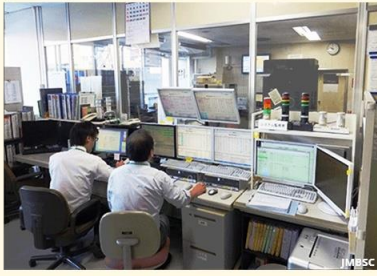
5.1 Case Example 1: Strong Wind Alerting System for a High Speed Train in the Netherlands

Case Example 1: Strong Wind Alerting System for a High Speed Train in the Netherlands

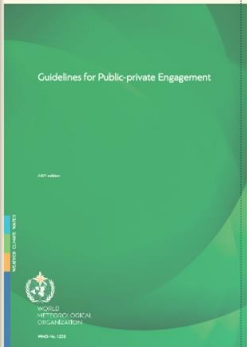


KNMI, the national meteorological service of the Netherlands, has cooperated with the private meteorological service provider DTN in developing a wind alerting system for high speed trains on an exposed bridge crossing. KNMI provides observations, radar data and ECMWF forecast data. DTN install and maintain extra wind sensors on the bridge, perform applied research into the relevant wind thresholds, and provide a fully-automated alerting service to the train operators.

5.2 Case Example 2: Support for the Private Meteorological Sector in Japan

Case Example 2: Support for the Private Meteorological Sector in Japan	
 <p>Japan Meteorological Agency, Tokyo</p>	 <p>Japanese Meteorological Business Support Center</p>
<p>The Japanese Meteorological Agency (JMA) actively promotes the sound development of private meteorological services through a variety of initiatives, including the Japanese Meteorological Business Support Center (JMBSC), and the Weather Business Consortium (WXBC). These initiatives are supported by the Meteorological Service Act of Japan, established in 1952 and updated frequently since then.</p> <p>JMBSC is entrusted by JMA with the conduct of the Certified Weather Forecaster examination, with data sharing to the private sector, and with verification of non-JMA instruments. 647 companies make use of their online data sharing. All those who wish to offer forecast services in the Japanese market must employ appropriately certified forecasters and obtain a forecasting license from JMA, ensuring the quality of services offered to the public.</p> <p>The WXBC, which has more than 800 members, organises weather-for-business workshops, seminars for meteorological data users, idea contests, training sessions and issues best-practice bulletins, helping to drive commerce that involves intensive use of weather data.</p>	

5.3 Summary: WMO “Guidelines for Public-Private Engagement” 2021, Section 4: Key guidelines for PPE

Summary of Key Guidelines for PPE (from WMO “Guidelines for Public-Private Engagement” 2021, Section 4)	
<ol style="list-style-type: none"> 1. Put people first Essential meteorological, climatological, hydrological and environmental information should focus on saving lives, protecting property and livelihoods, and improving economic productivity. 2. Build fair and transparent relationships Support the exchange of meteorological and related information between all sectors. Ensure the free and unrestricted international exchange of essential meteorological data and products. 3. Focus on mutual benefits Find models of engagement where each partner brings complementary strengths and where each sector can contribute to the success of the other. 4. Create shared values between partners Recognise opportunities for innovation and growth, based on science, to meet societal needs. 5. Promote sustainability Maintain the global infrastructure of meteorology. 6. Ensure that no country gets left behind Support technology transfer to less-developed countries — every country needs good weather and climate information. 7. Create a level playing field Provide equal access to meteorological and hydrological data for all commercially-focused entities. 8. Respect the sovereignty of WMO member nations Respect the sovereignty of WMO member nations in how meteorological and hydrological services are to be provided within their territory or territories. 	 <p>Refer to the full document for more information:</p> <ul style="list-style-type: none"> Guidelines for Public-Private Engagement (WMO-No. 1258), https://library.wmo.int/?lvl=notice_display&id=21858

