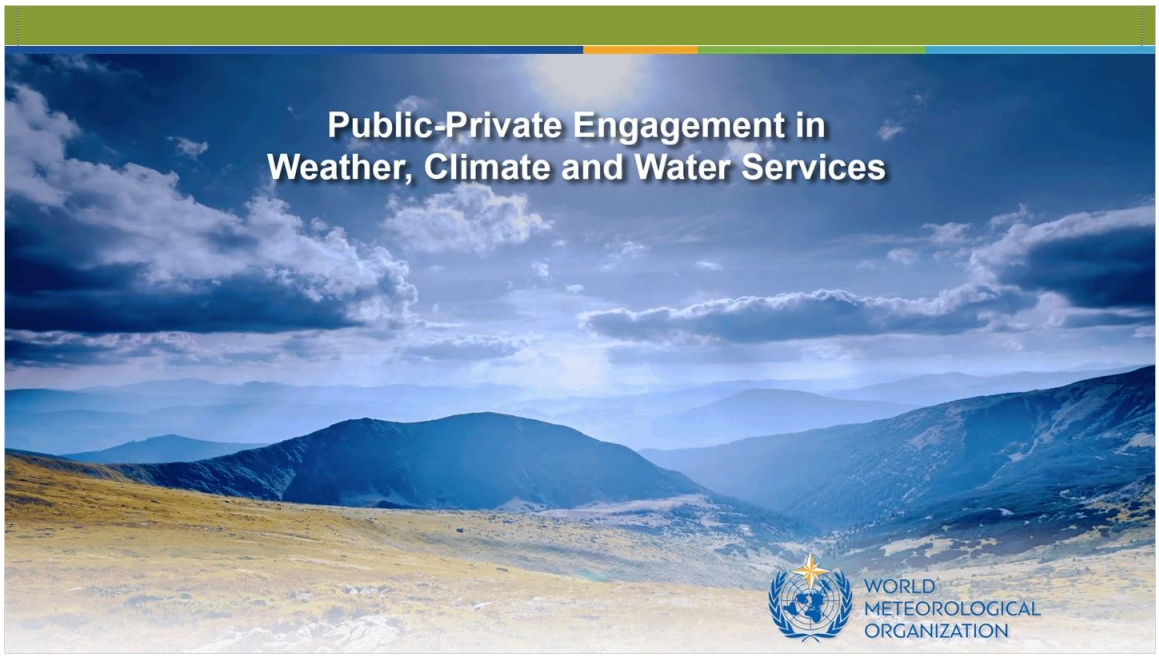
Public-Private Engagement in Weather, Climate and Water Services

1. Module 1: Introduction to Public-Private Engagement

1.1 Public-Private Engagement Course



Notes:

1.2 Course Welcome

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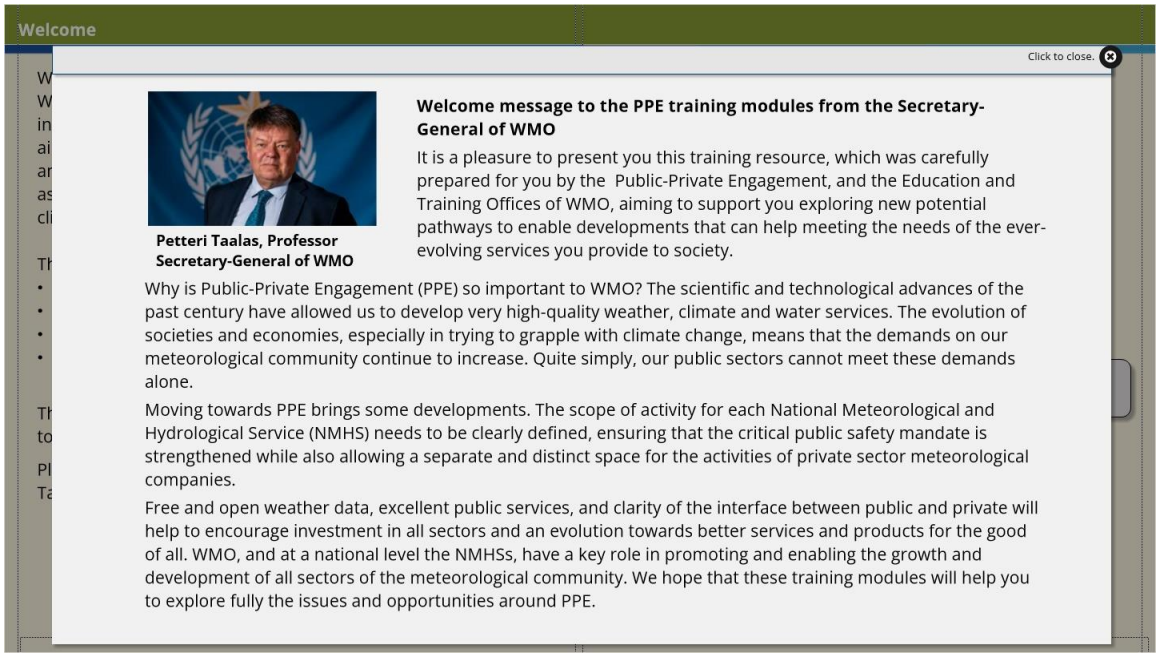
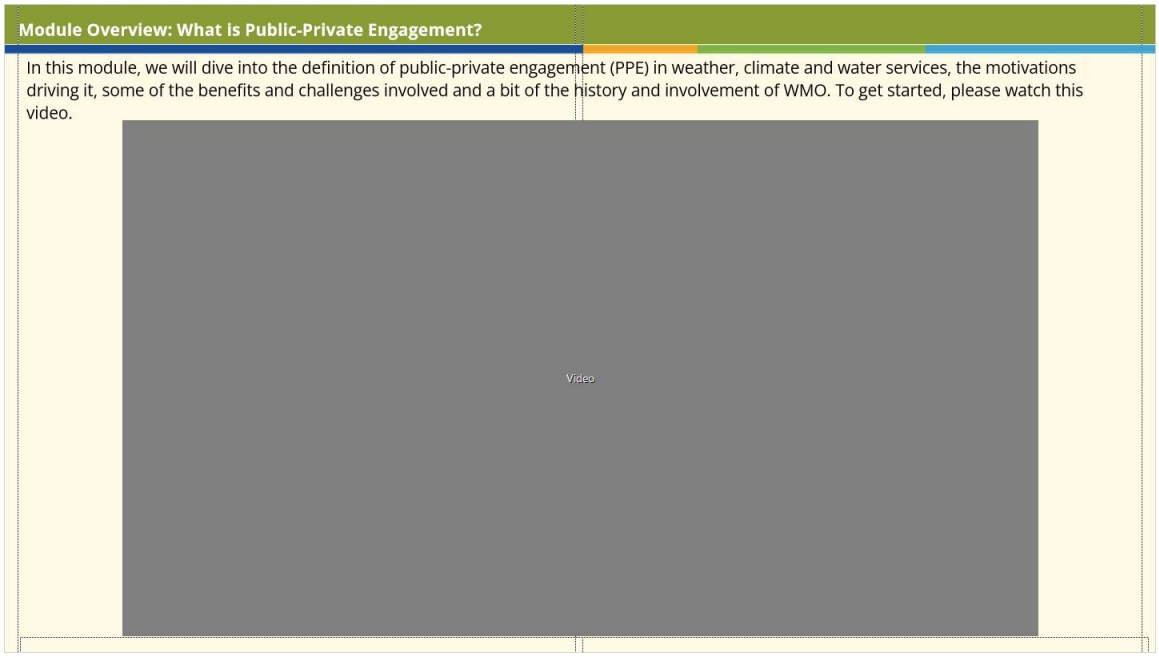
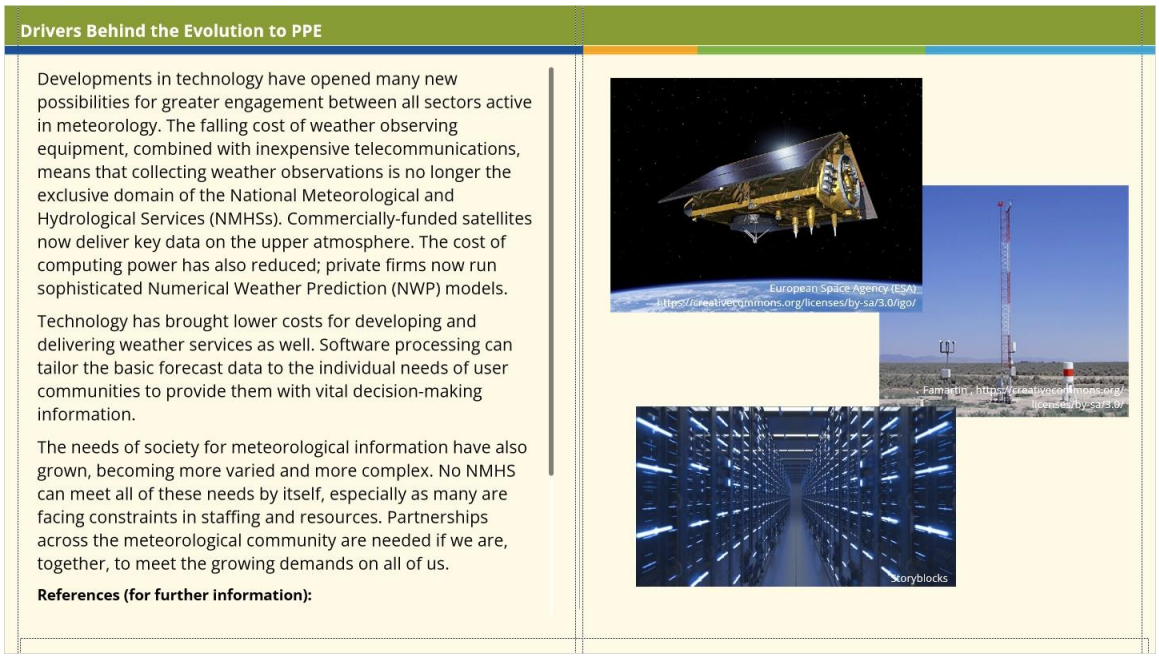


1.3 Module Overview: What is Public-Private Engagement?



1.4 Drivers Behind the Evolution to PPE



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1.5 Opportunities and Benefits from PPE

Opportunities and Benefits from PPE

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.

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.

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

1.6 Challenges of PPE

Challenges of PPE

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.

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.

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.

1.7 WMO Policy on PPE: The Geneva Declaration of 2019

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The Geneva Declaration 2019 represents an important evolution in the policy of WMO with respect to PPE.

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.

In the Geneva Declaration, the Congress:

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

Building Community for Weather, Climate and Water Actions

Click below to learn about the key parts of the Geneva Declaration.

Summary of The Geneva Declaration, 2019

Notes:

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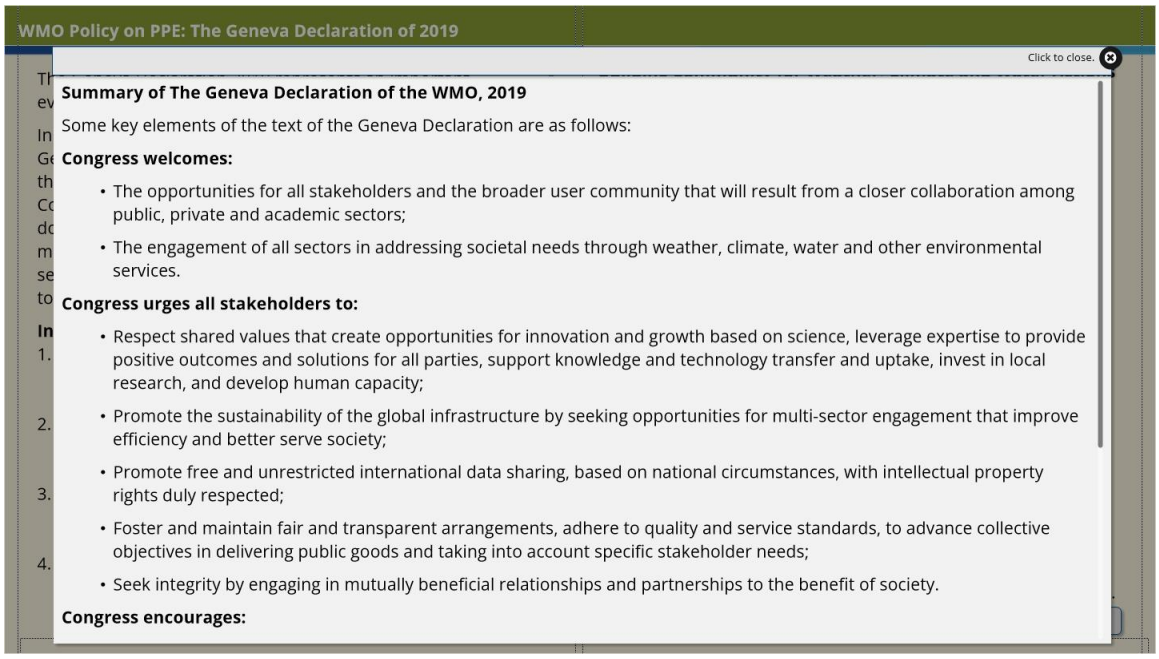
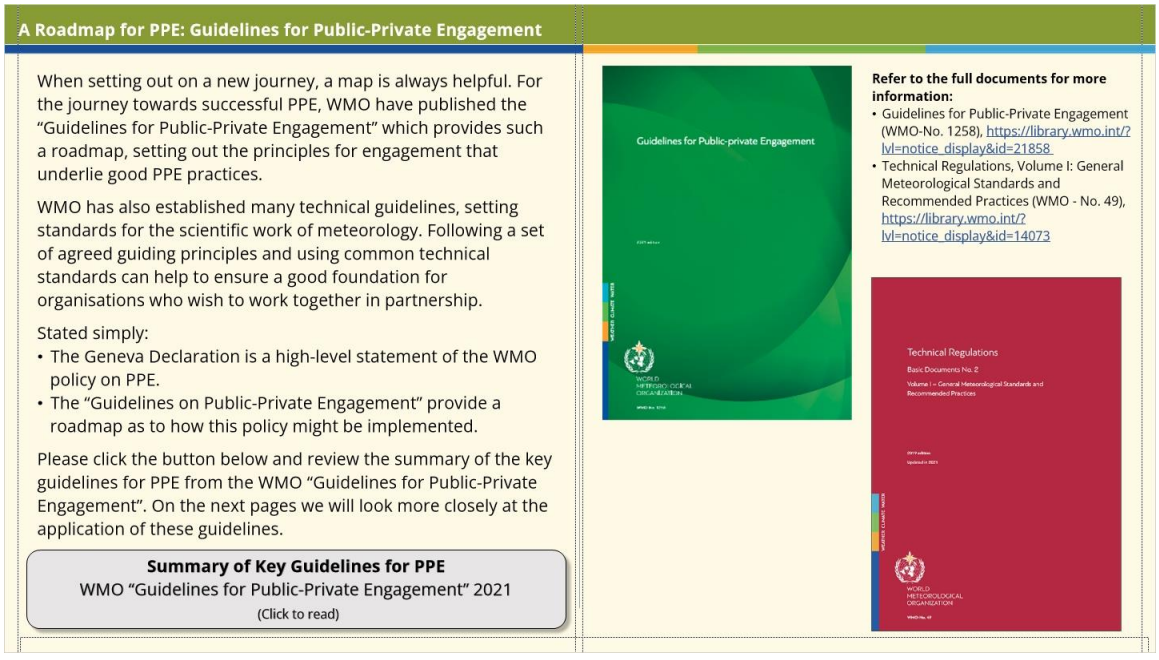


1.8 A Roadmap for PPE: Guidelines for Public-Private Engagement



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.

Case Example 1: KNMI with DTN in the Netherlands

Roll your cursor over the items below for more information.

#	PPE Guideline	Covered? Yes	Covered? No	Explanation
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

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Case Example 1: KNMI with DTN in the Netherlands

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#	PPE Guideline
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**

View Explanations

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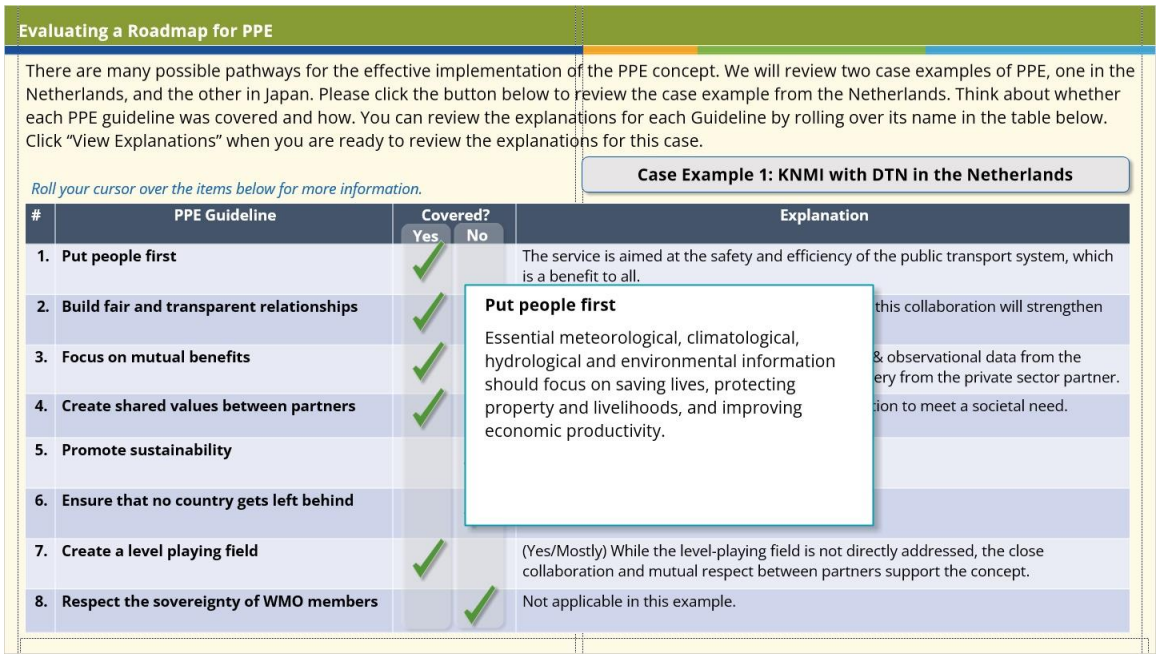

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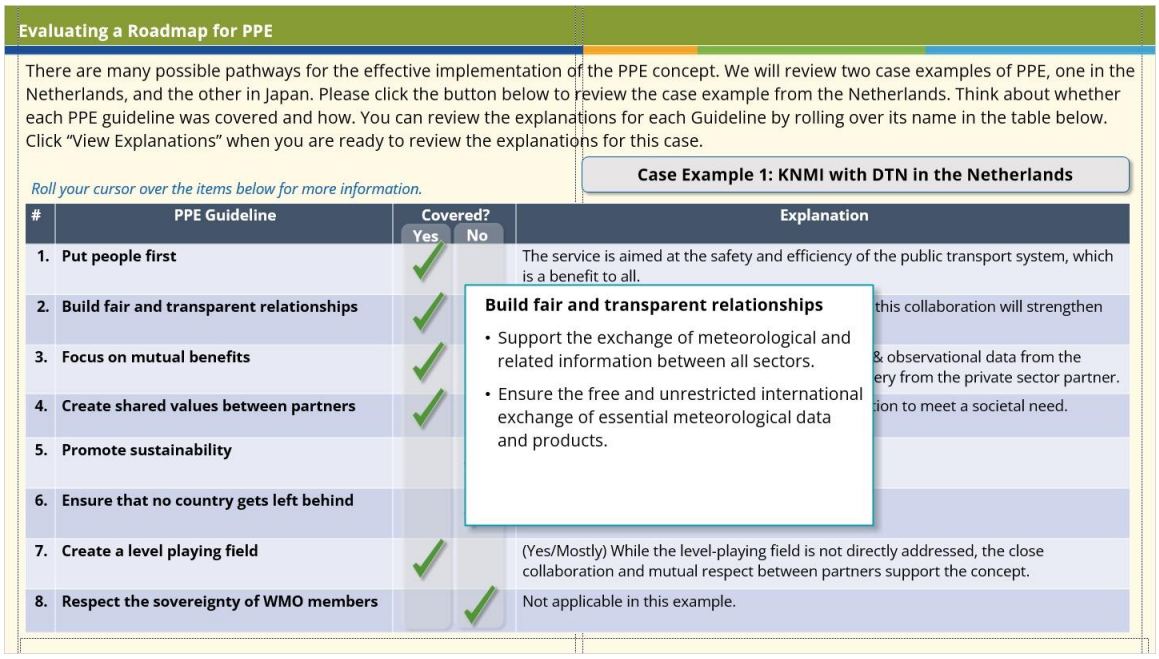

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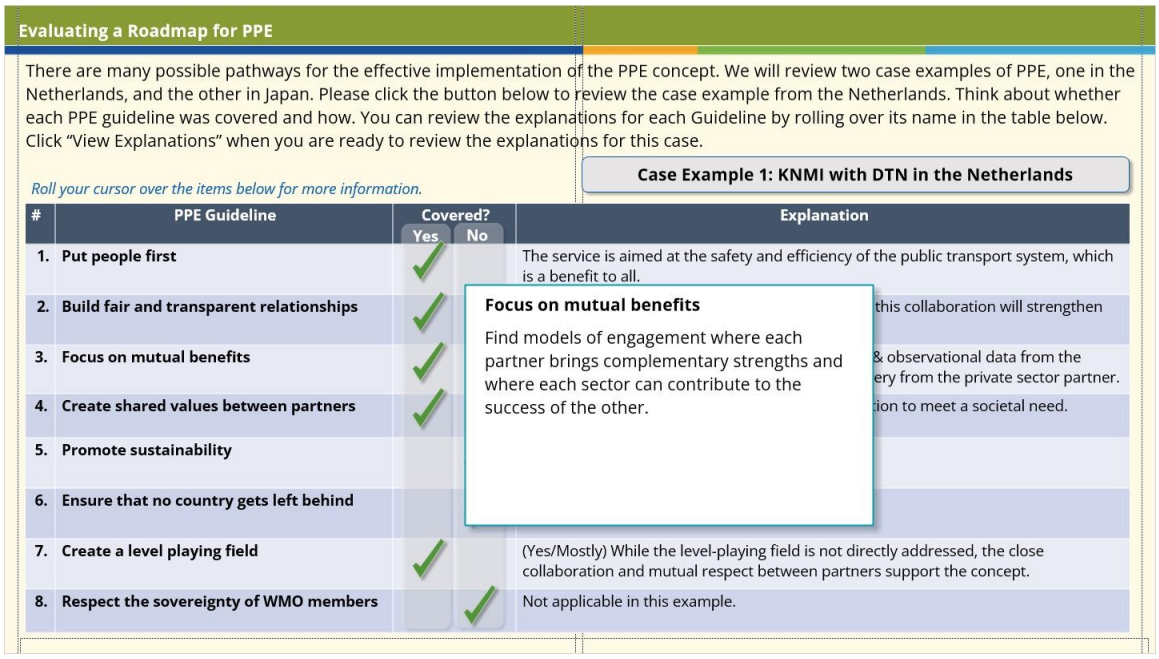

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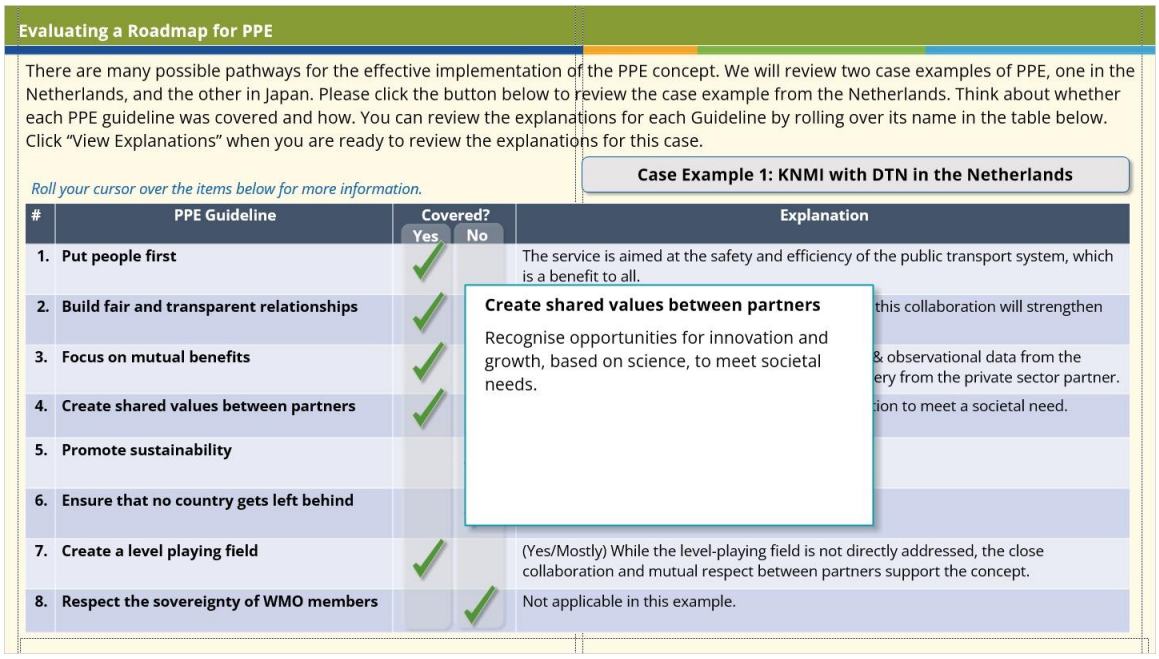

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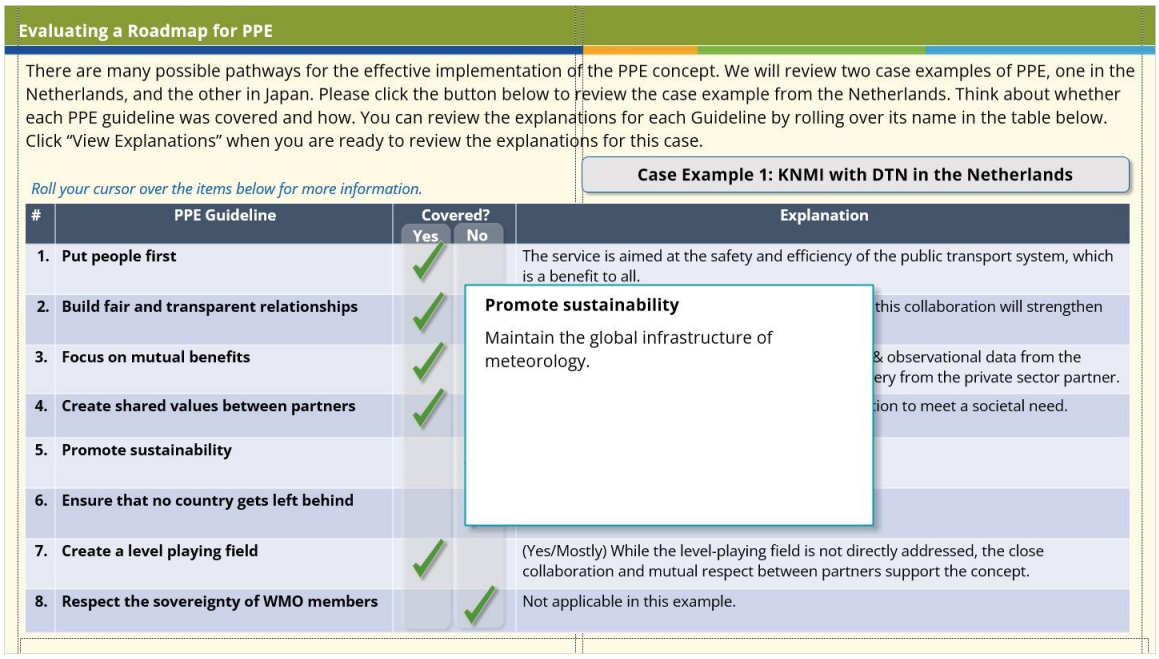

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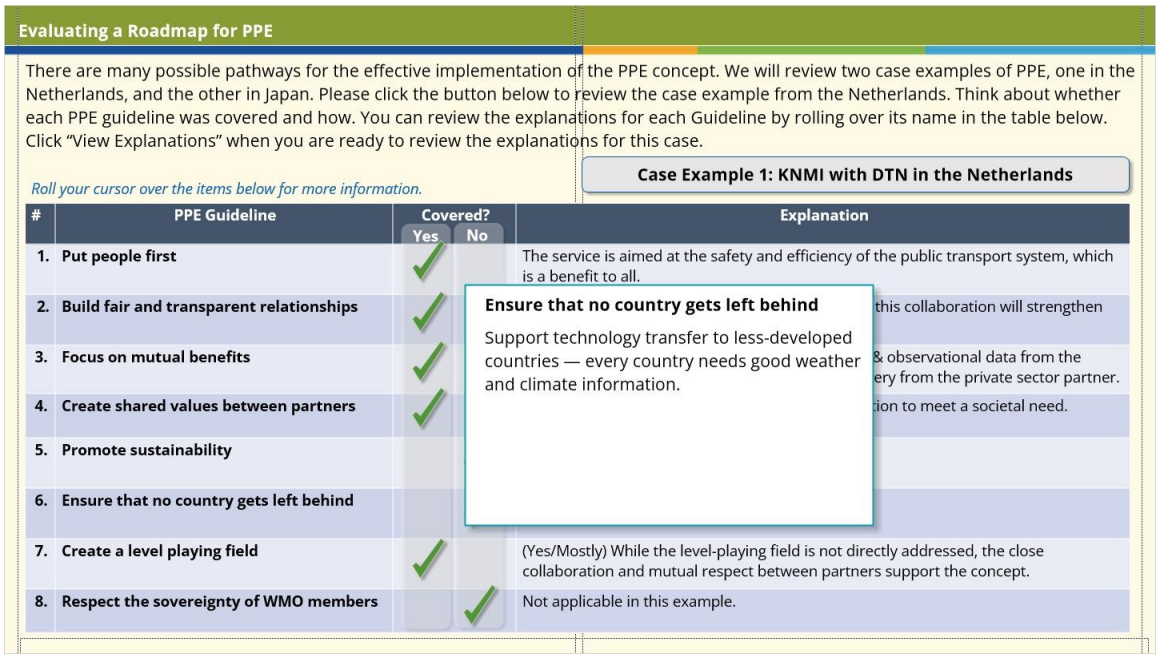

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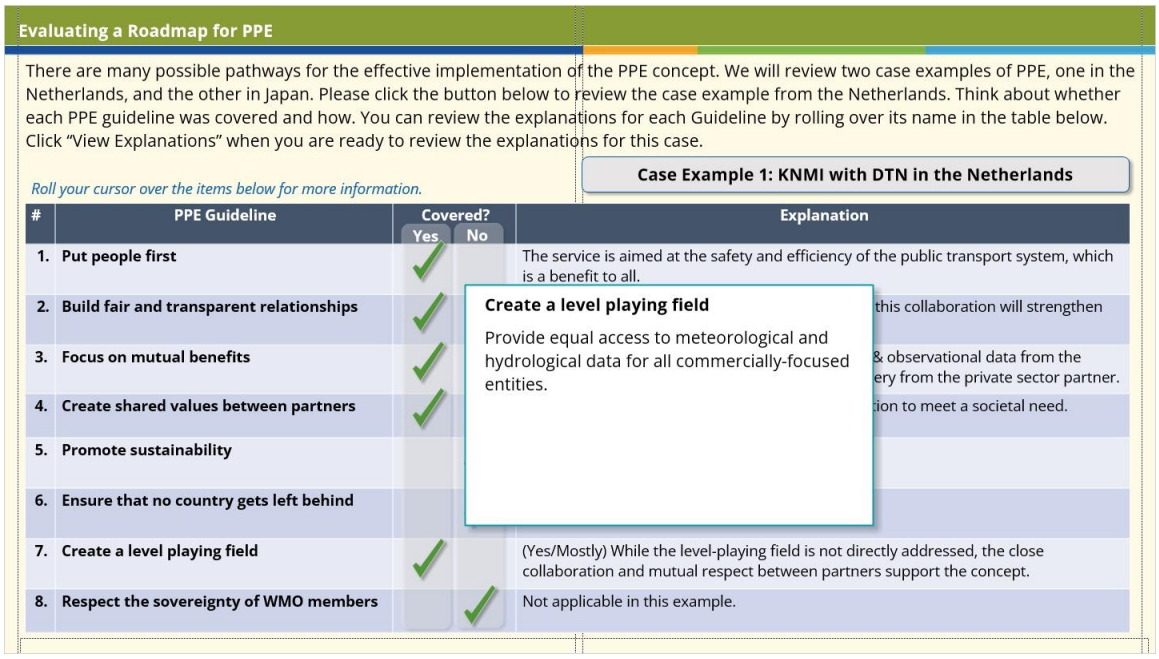

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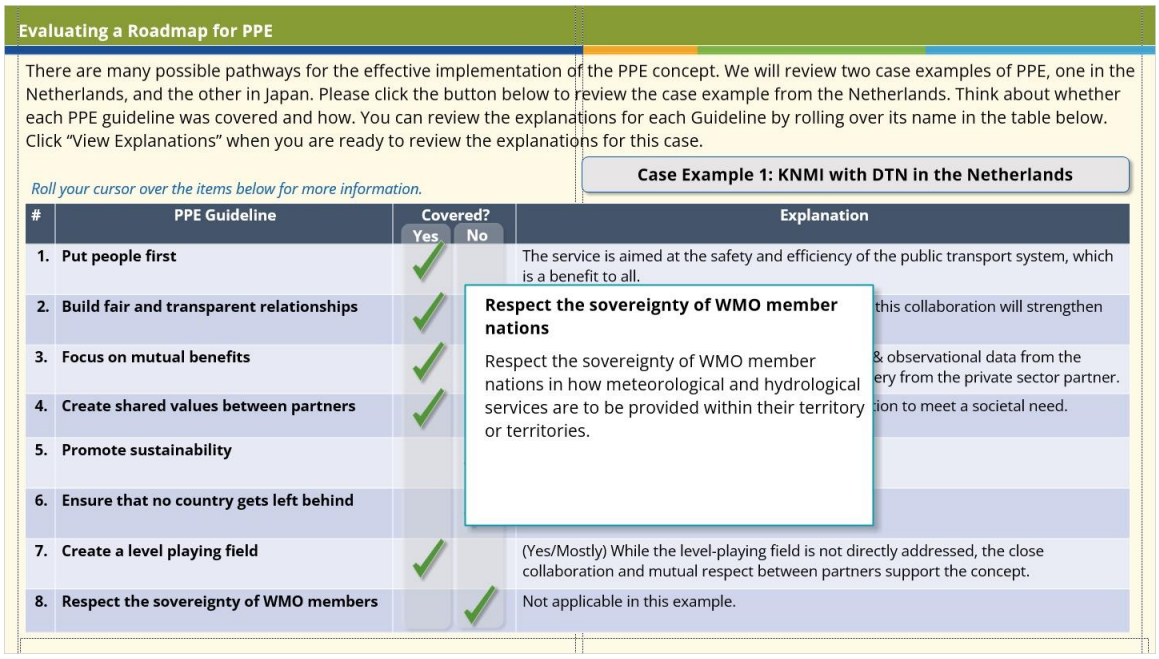
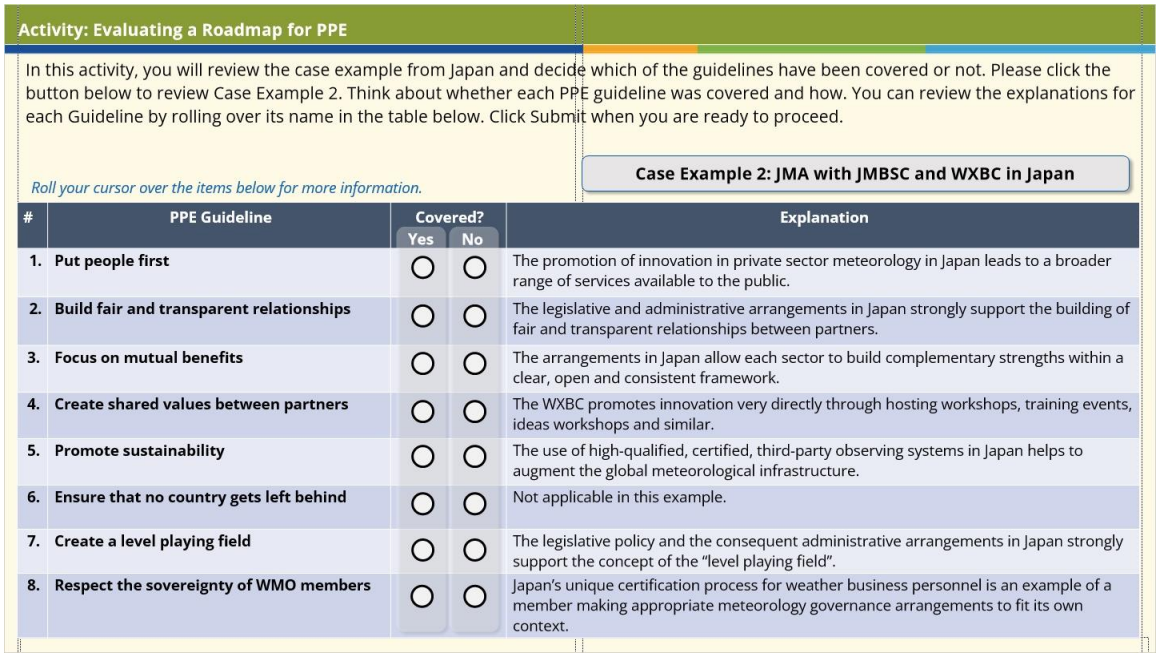


1.10 Activity: Evaluating a Roadmap for PPE

(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? Yes	Covered? No	Explanation
1.	**Put people first**	○	○	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**	○	○	The legislative and administrative arrangements in Japan strongly support the building of fair and transparent relationships between partners.
3.	**Focus on mutual benefits**	○	○	The arrangements in Japan allow each sector to build complementary strengths within a clear, open and consistent framework.
4.	**Create shared values between partners**	○	○	The WXBC promotes innovation very directly through hosting workshops, training events, ideas workshops and similar.
5.	**Promote sustainability**	○	○	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**	○	○	Not applicable in this example.
7.	**Create a level playing field**	○	○	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**	○	○	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

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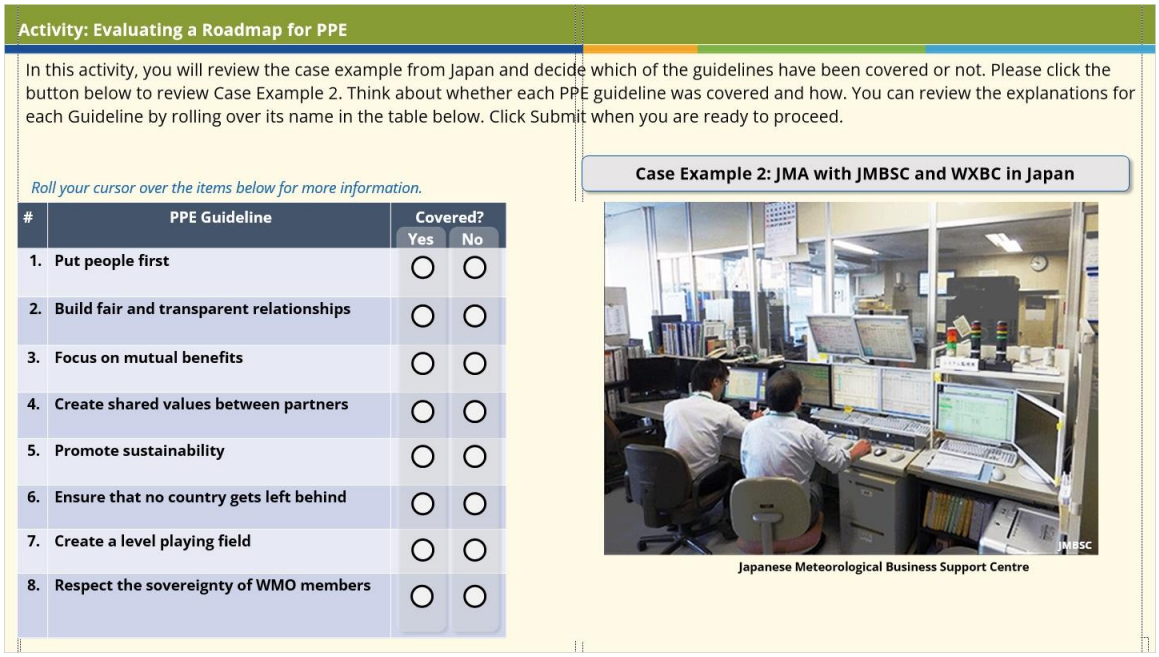

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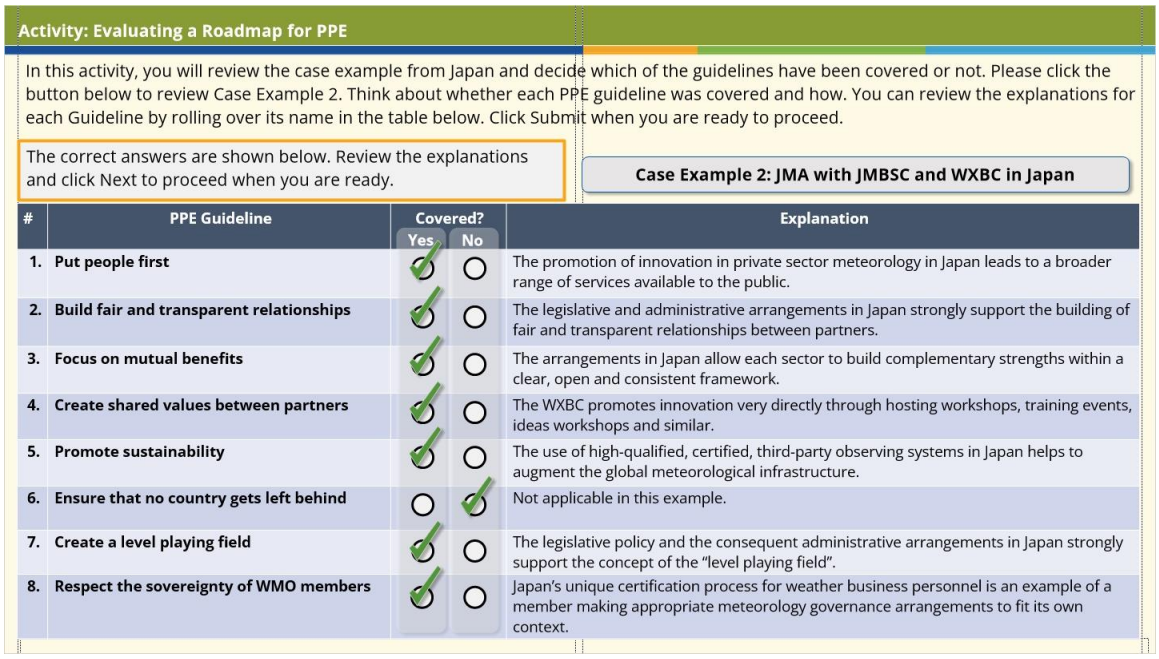

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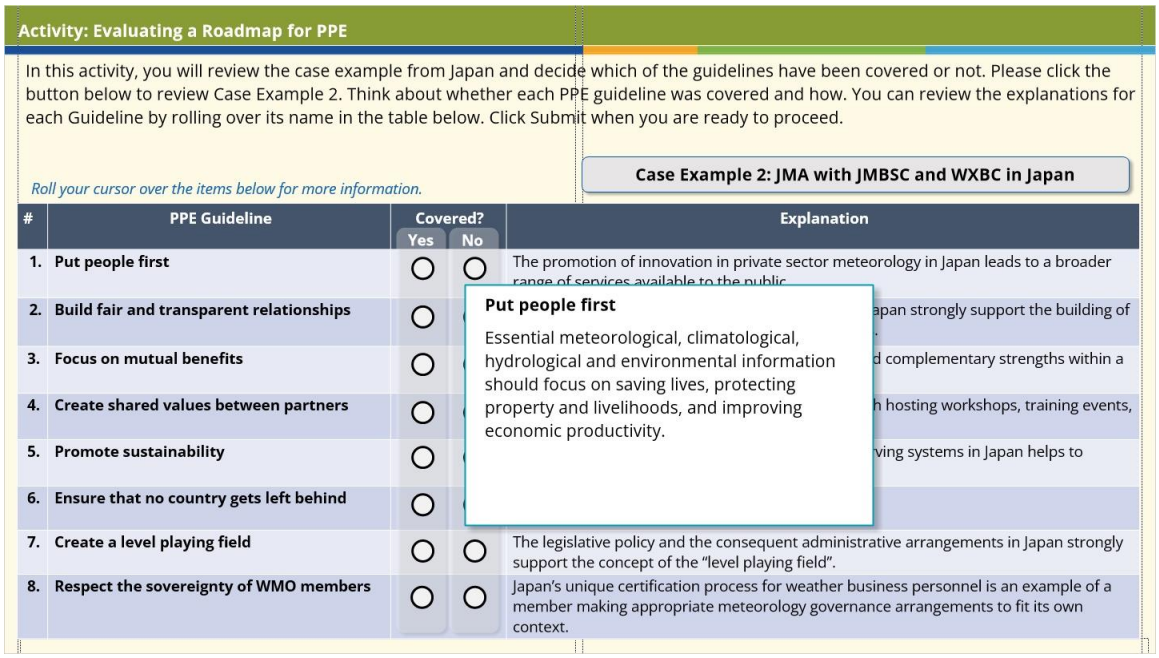

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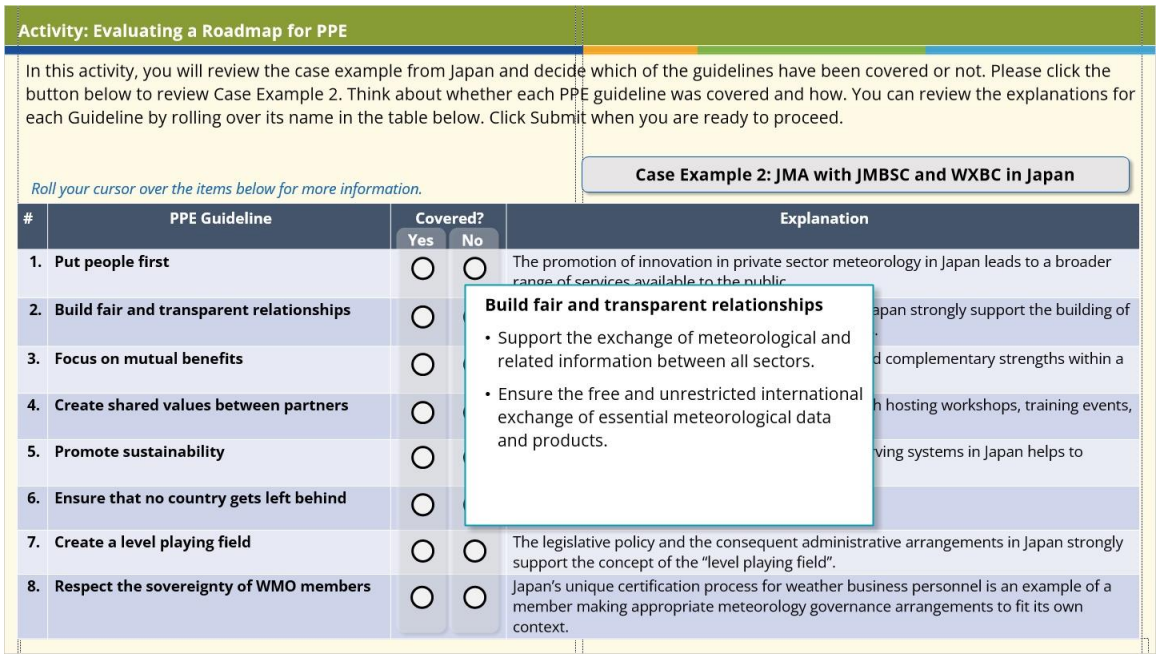

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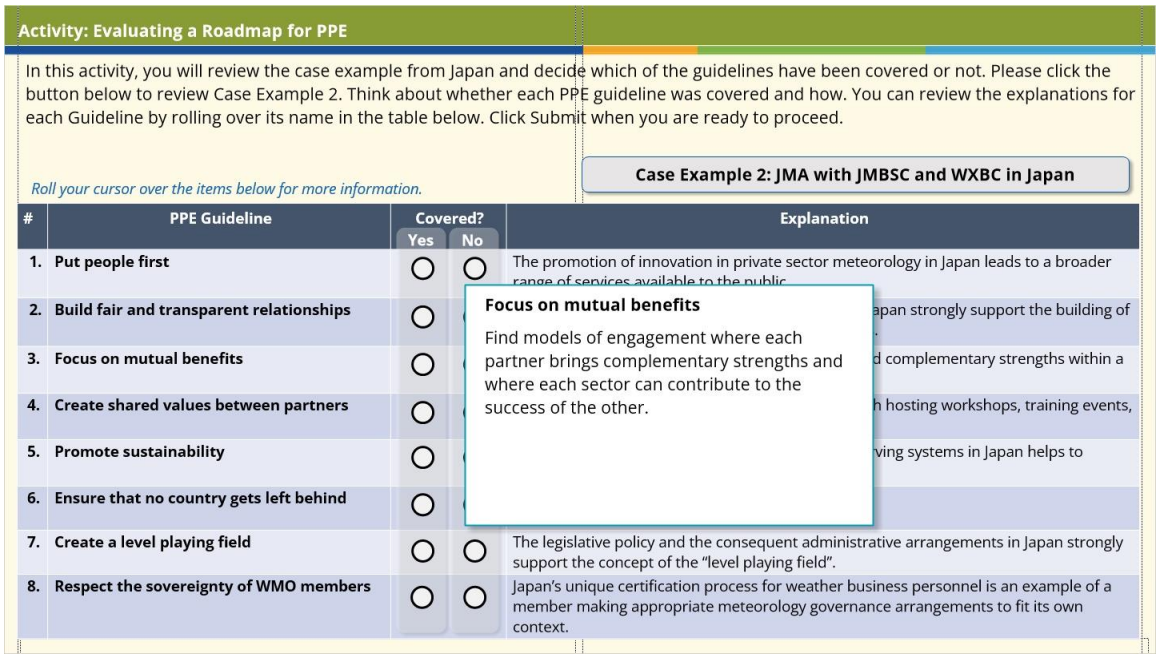

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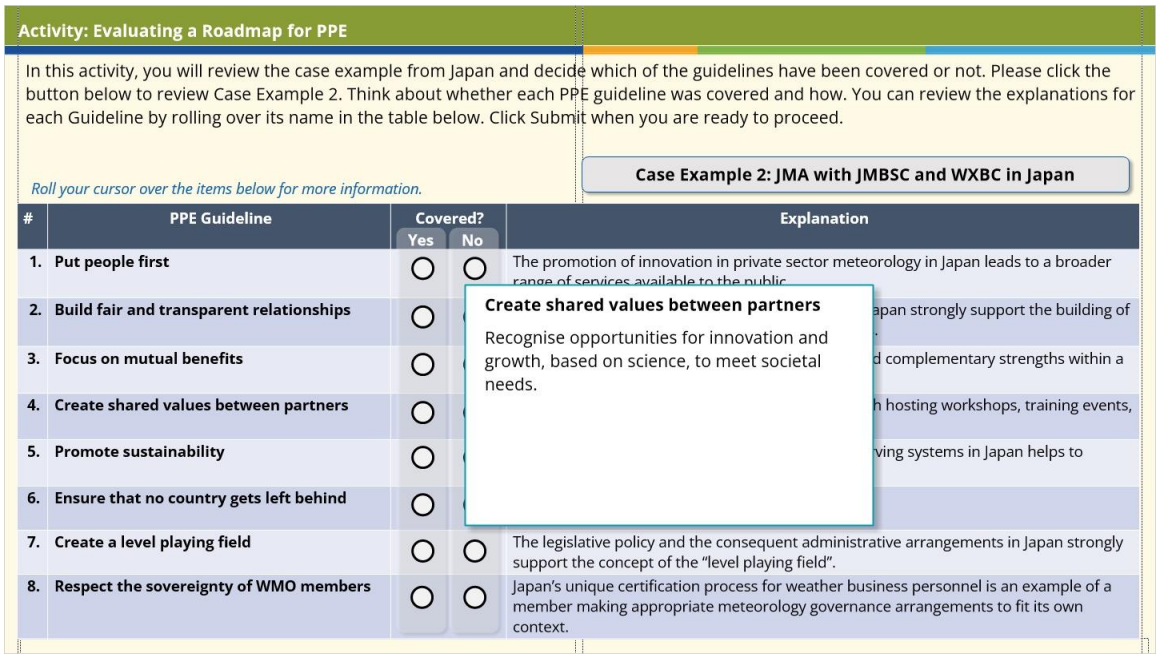

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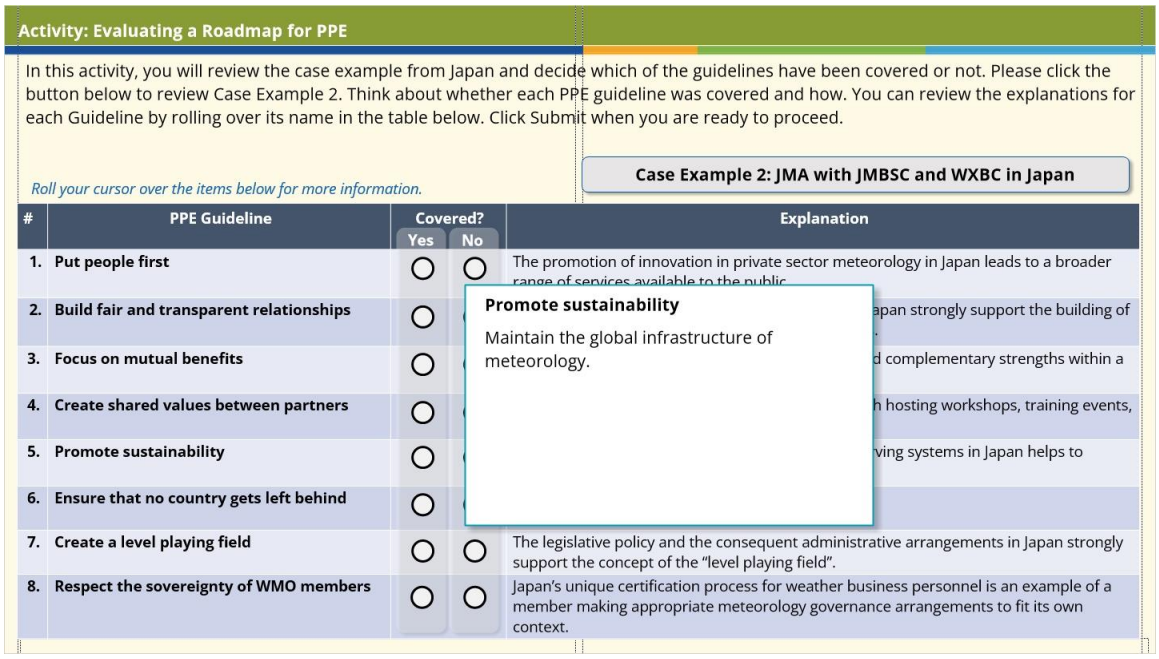

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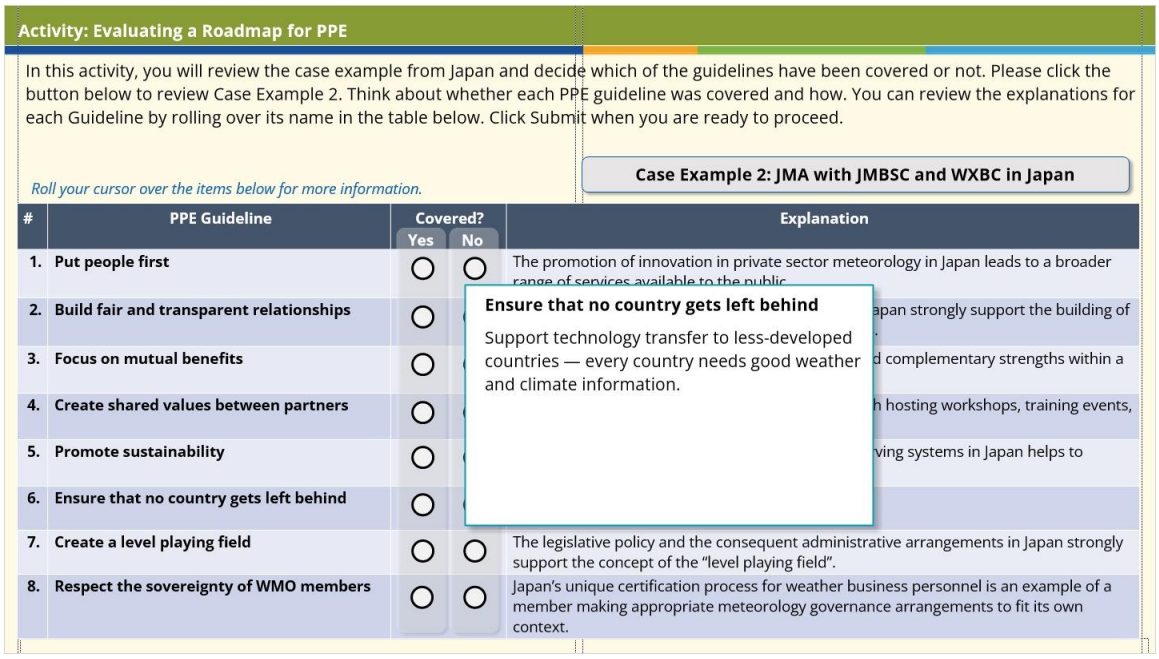

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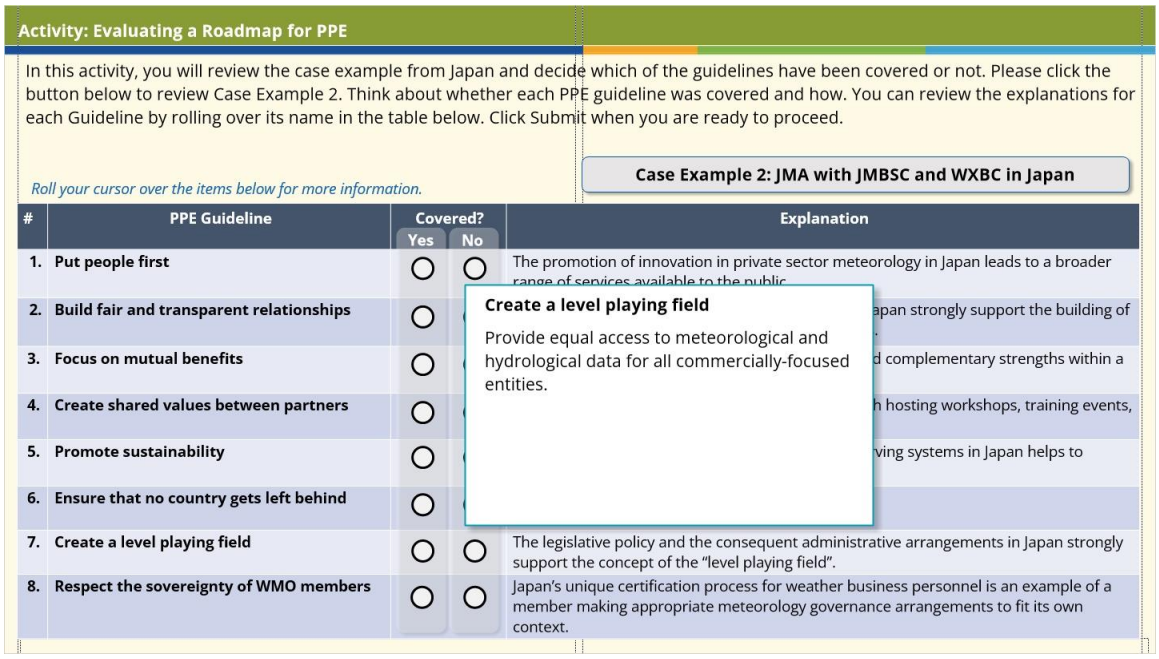

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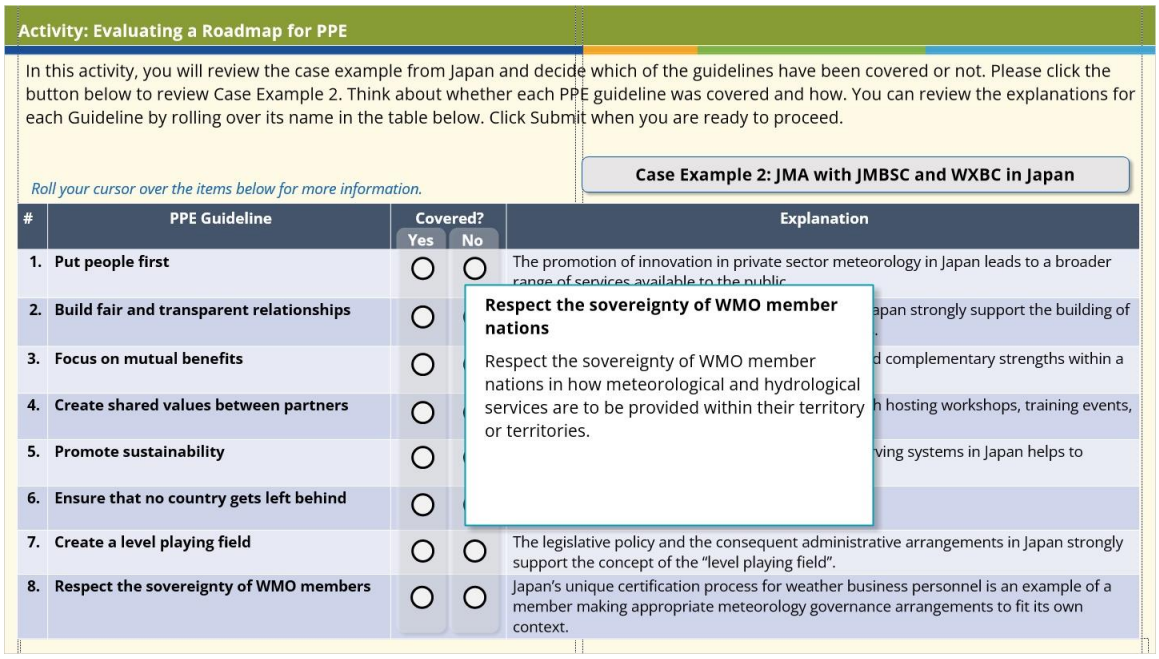

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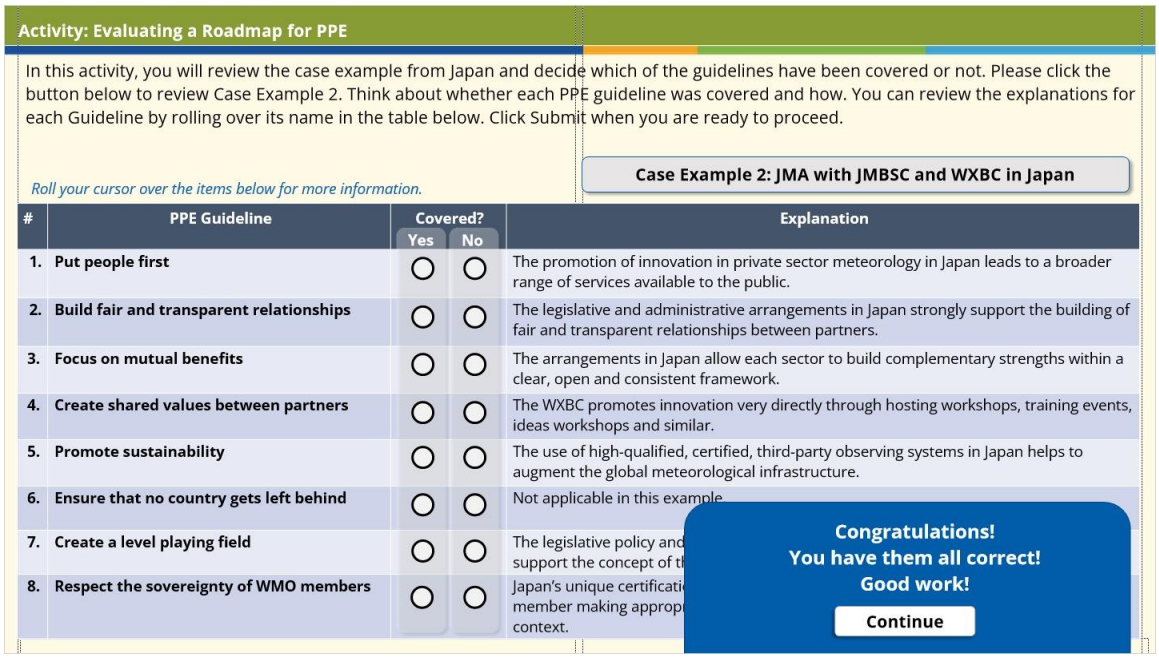

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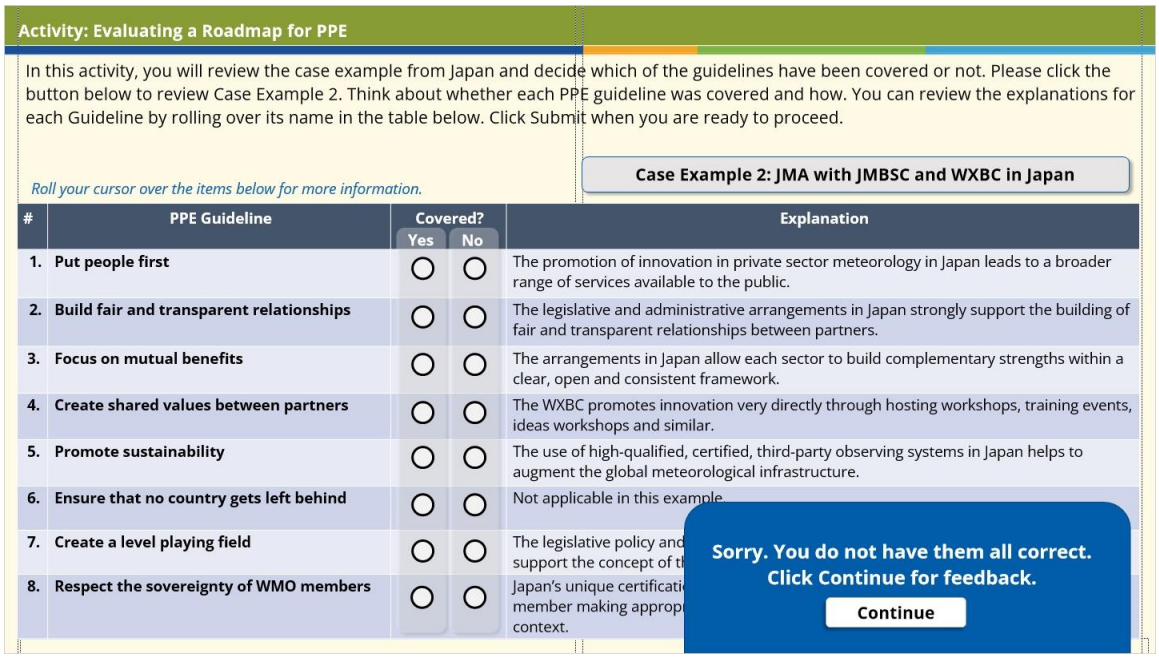

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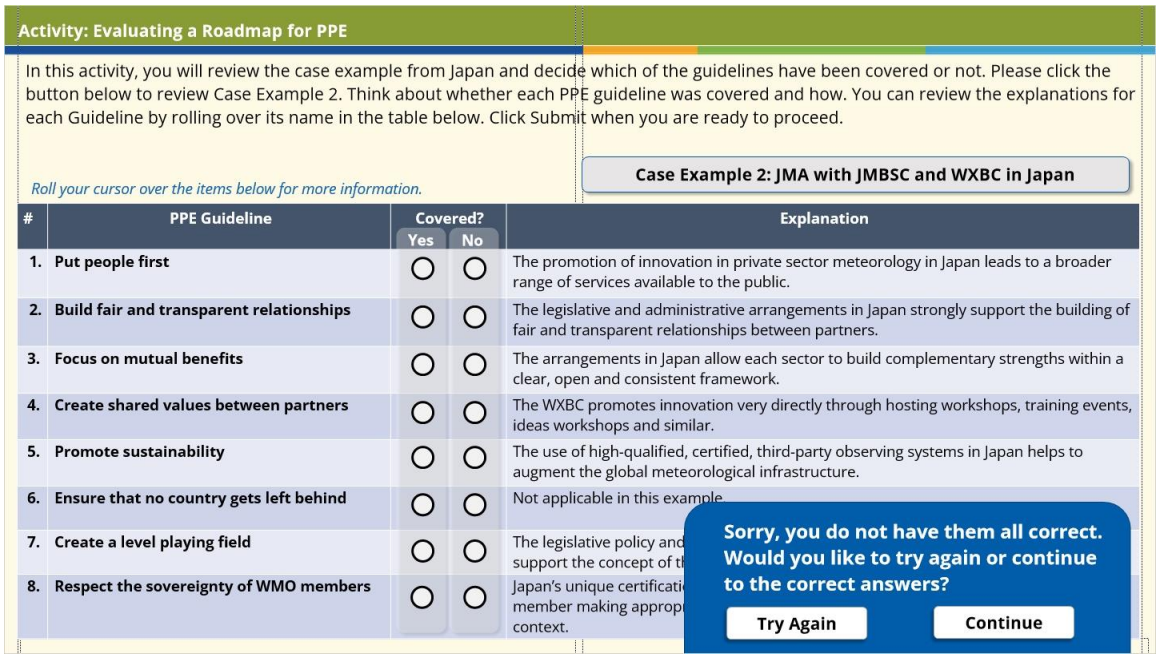


1.11 WMO Regional Associations and PPE

WMO Regional Associations and PPE

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.

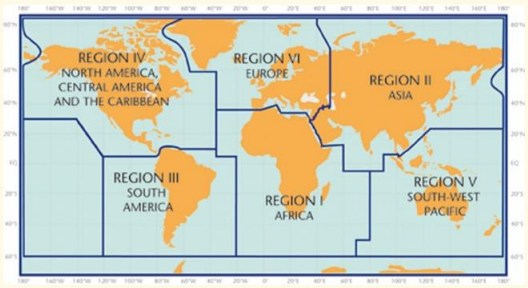
The Regional Associations of WMO also play a pivotal role through organizing regional forums on PPE, collecting and promoting good practices in the region, and carrying out projects leveraging PPE mechanisms.

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:
(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

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:



1.12 Promoting PPE in Europe and the USA

Promoting PPE in Europe and the USA

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.

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.

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.

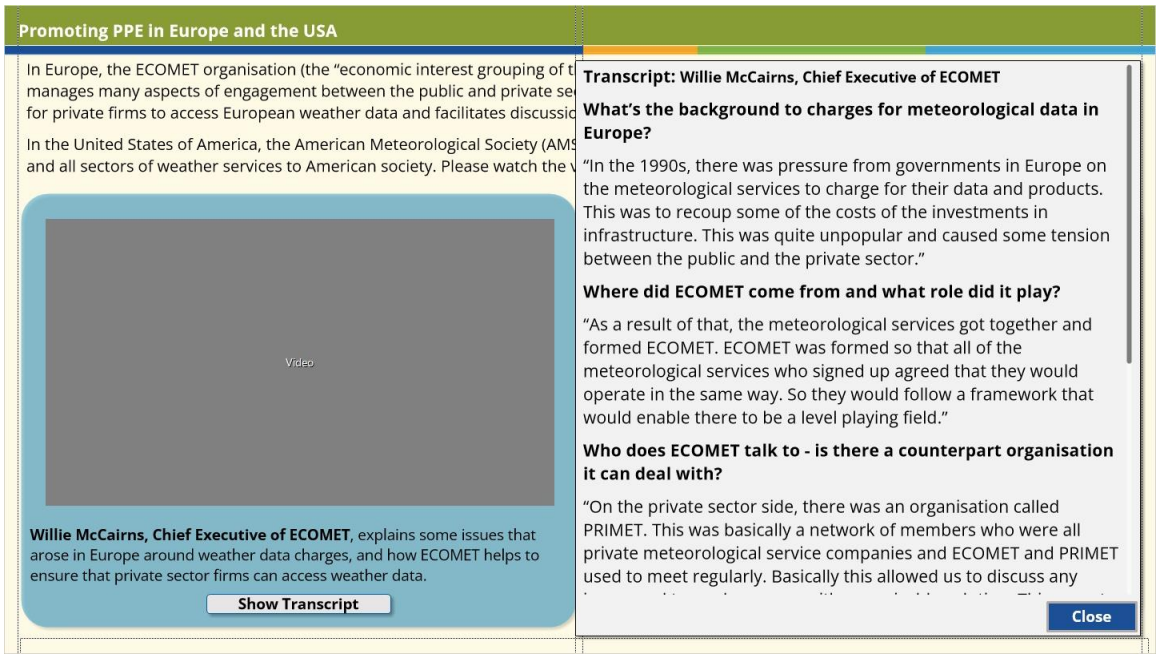
Show Transcript

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

willie-transcript (Slide Layer)



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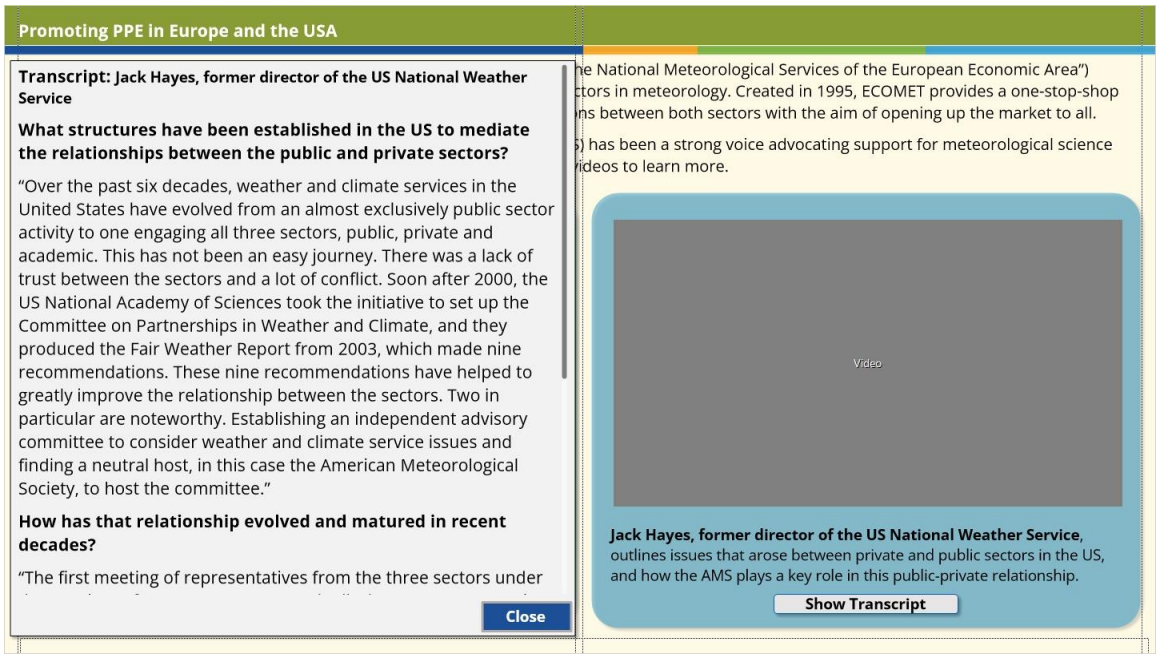
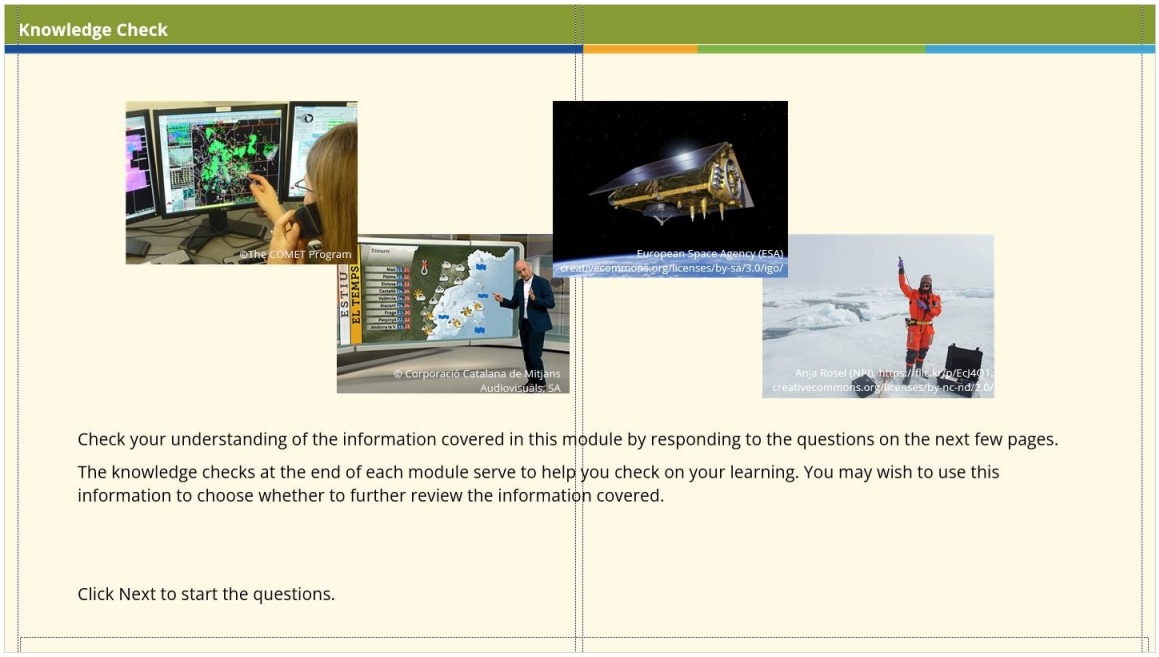
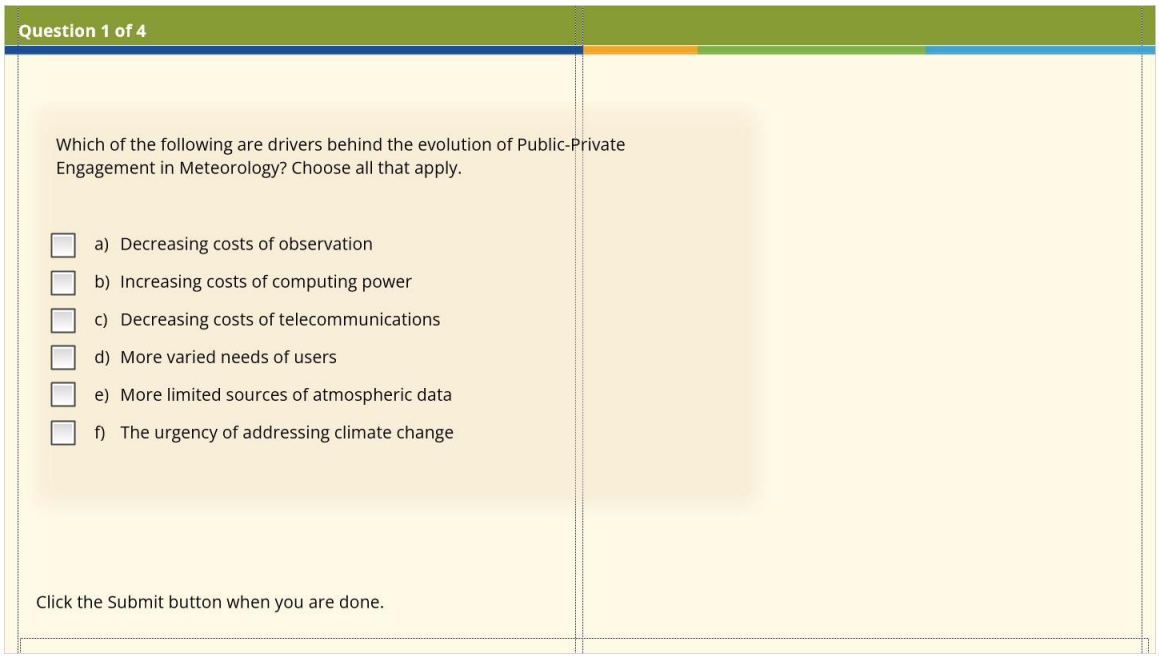


1.13 Knowledge Check



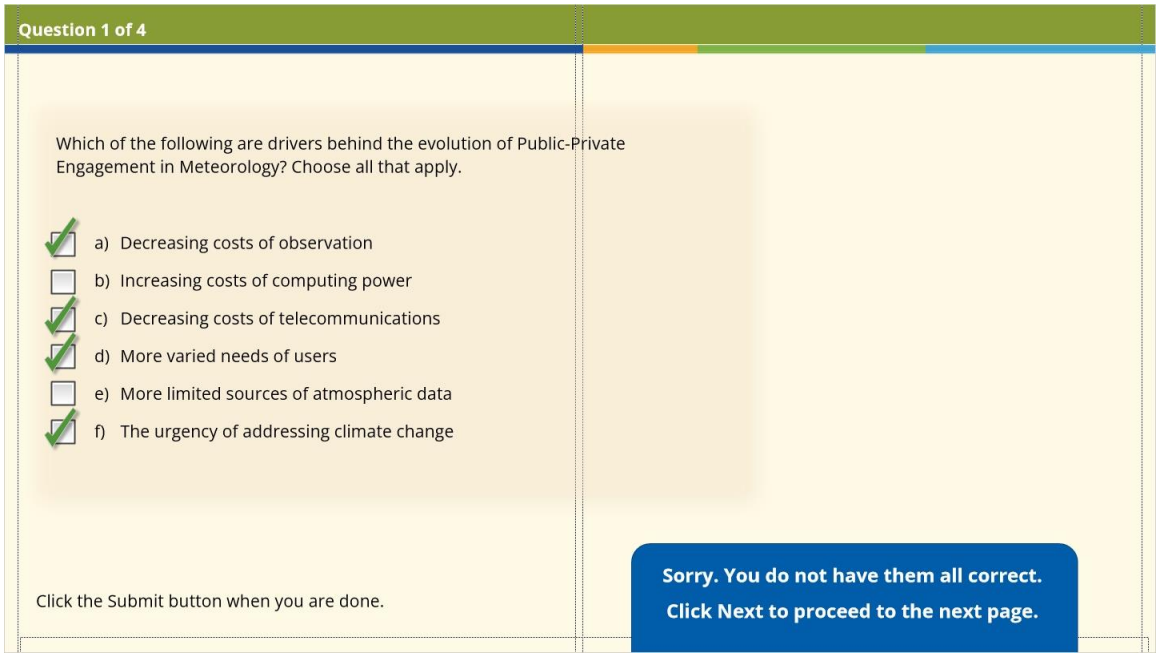
1.14 Question 1

(Pick Many, 10 points, 1 attempt permitted)



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)



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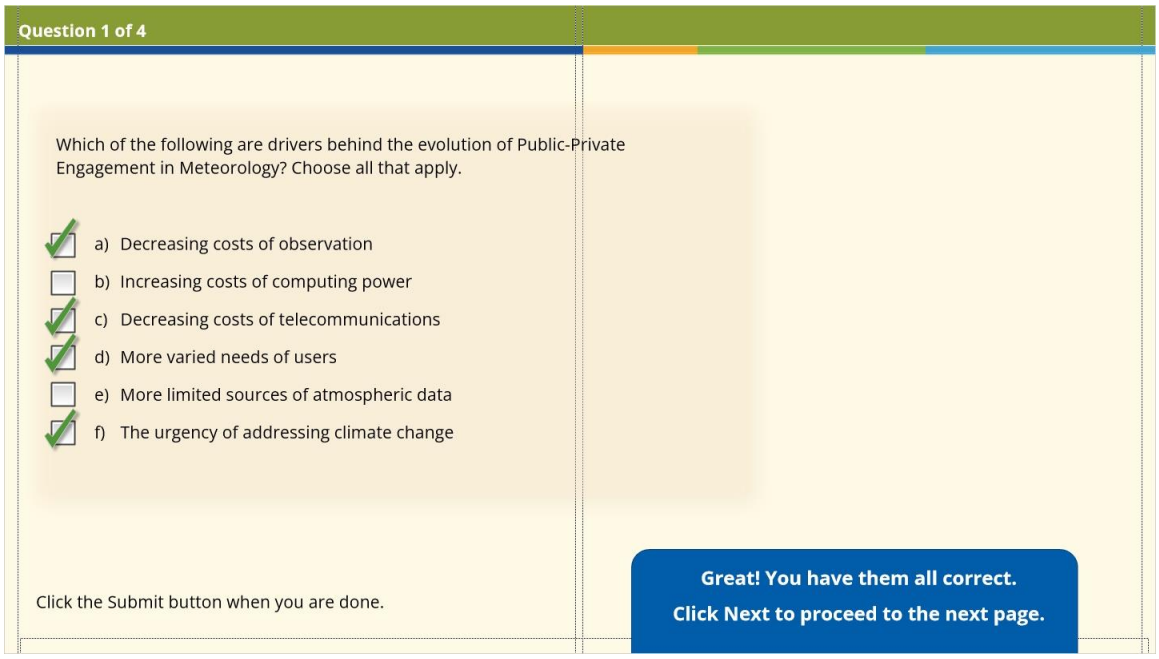
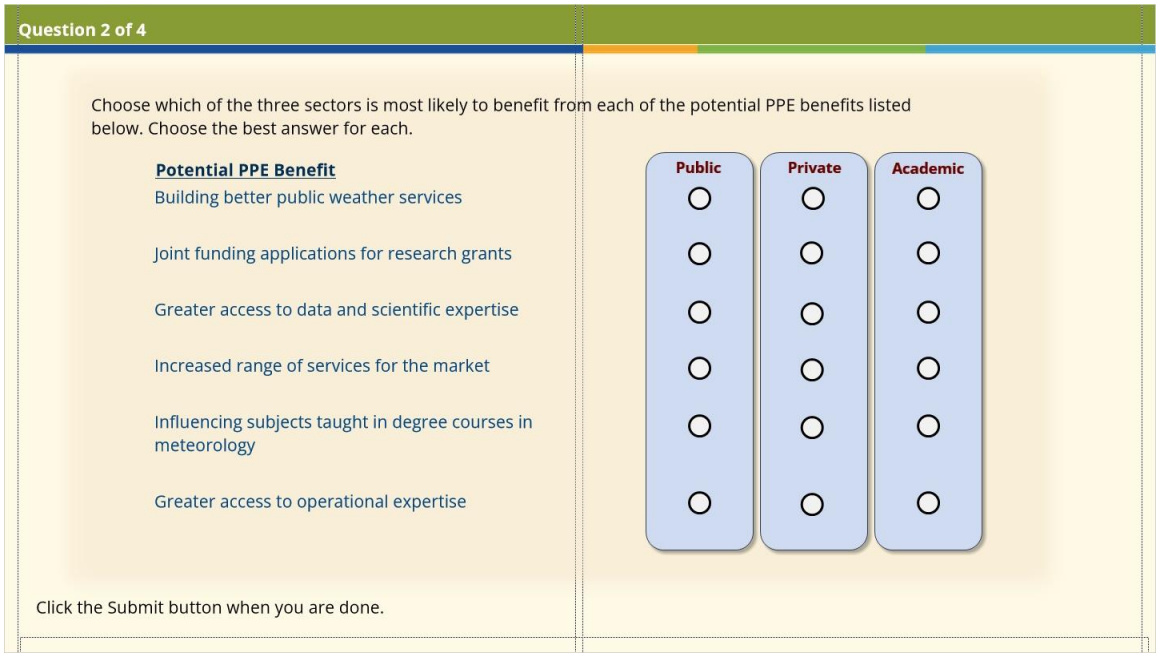


1.15 Question 2

(Pick Many, 10 points, 1 attempt permitted)



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

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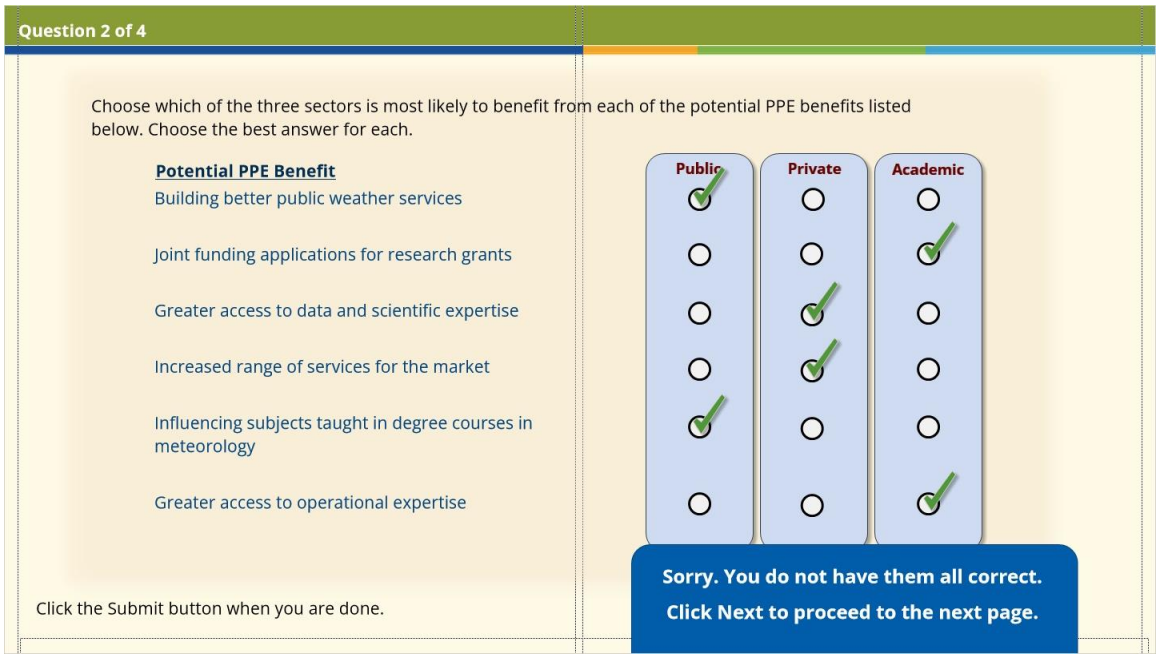

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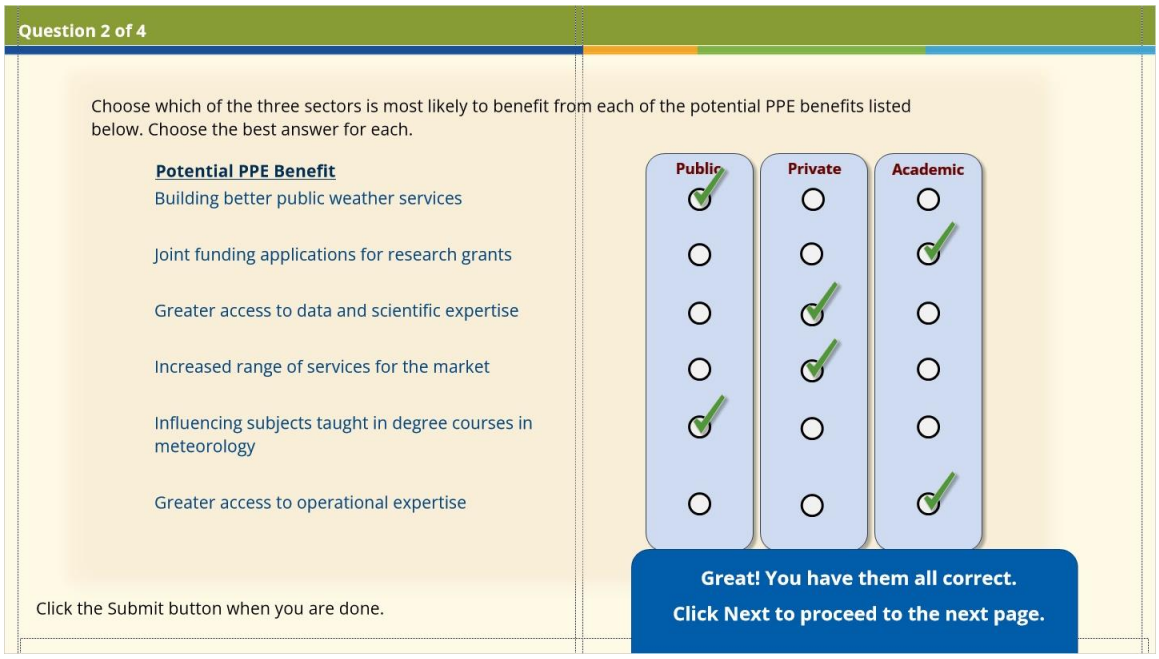
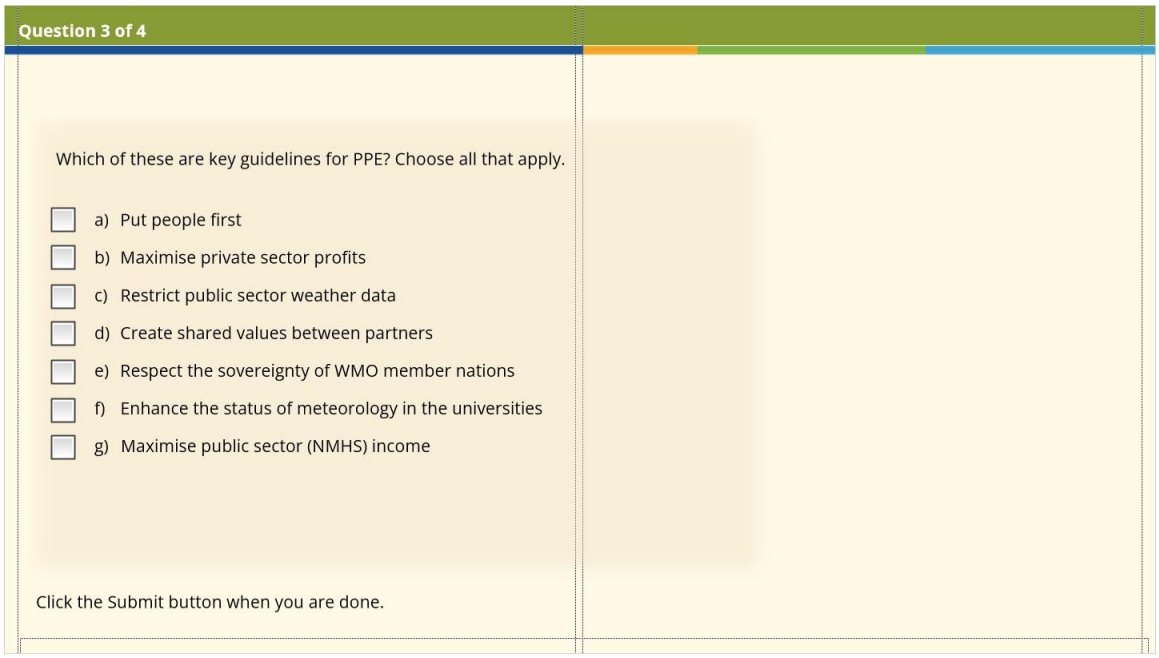


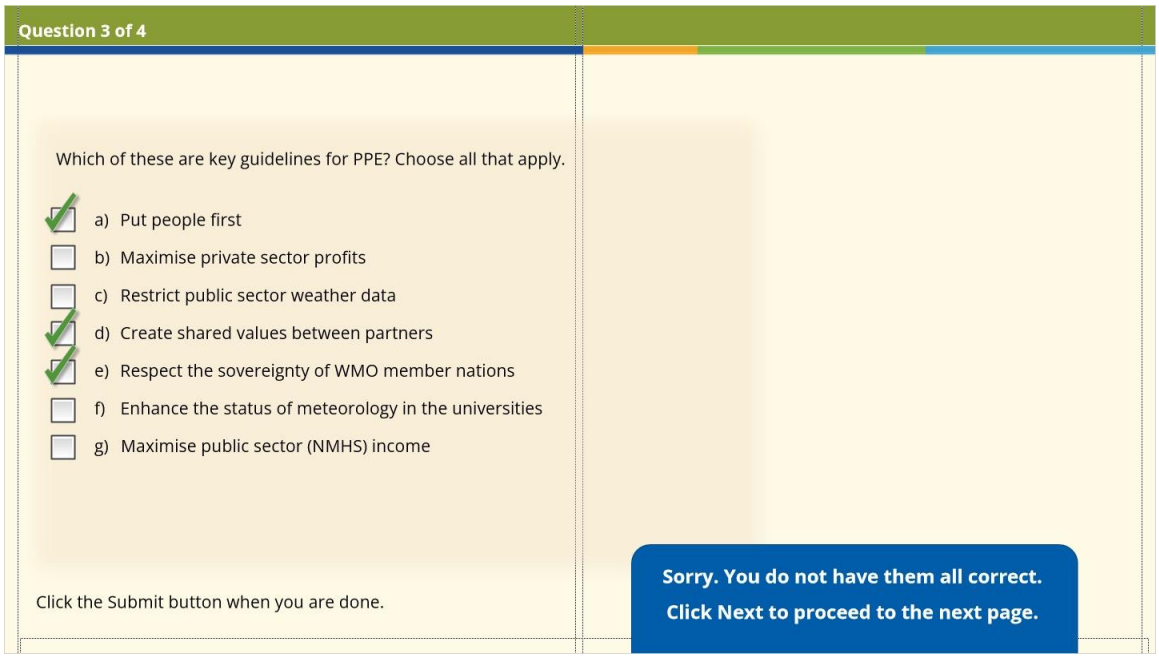
1.16 Question 3

(Pick Many, 10 points, 1 attempt permitted)

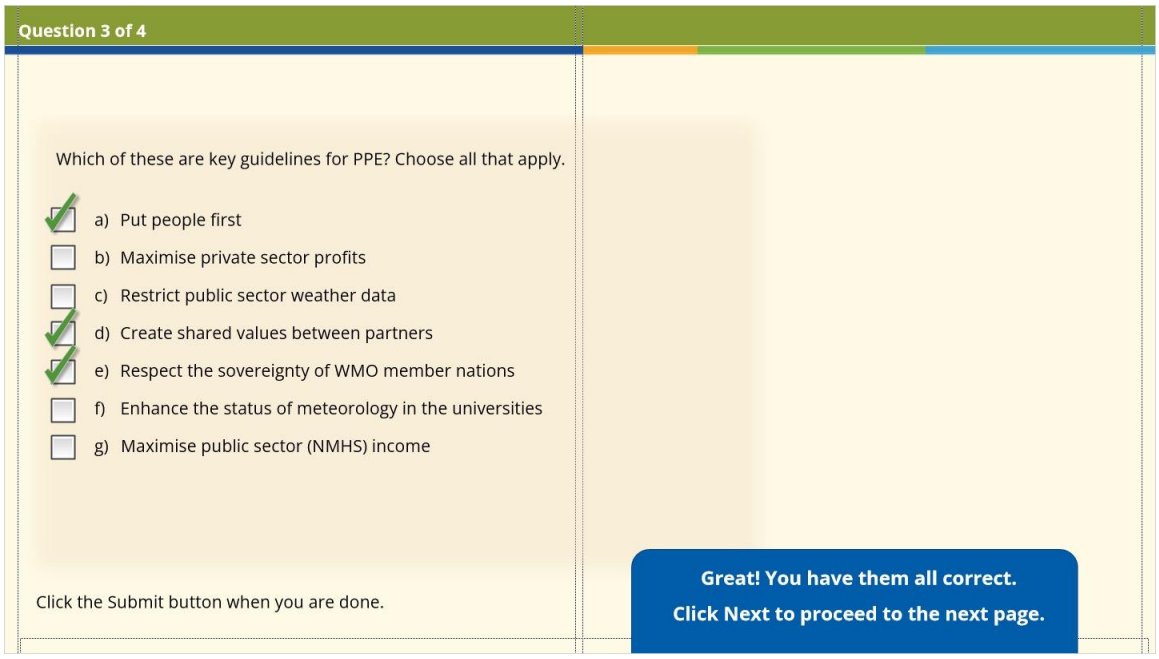


Correct	Choice
X	Check Box 4
	Check Box 3
	Check Box 2
X	Check Box 1
X	Check Box 5
	Check Box 6
	Check Box 7

Incorrect (Slide Layer)

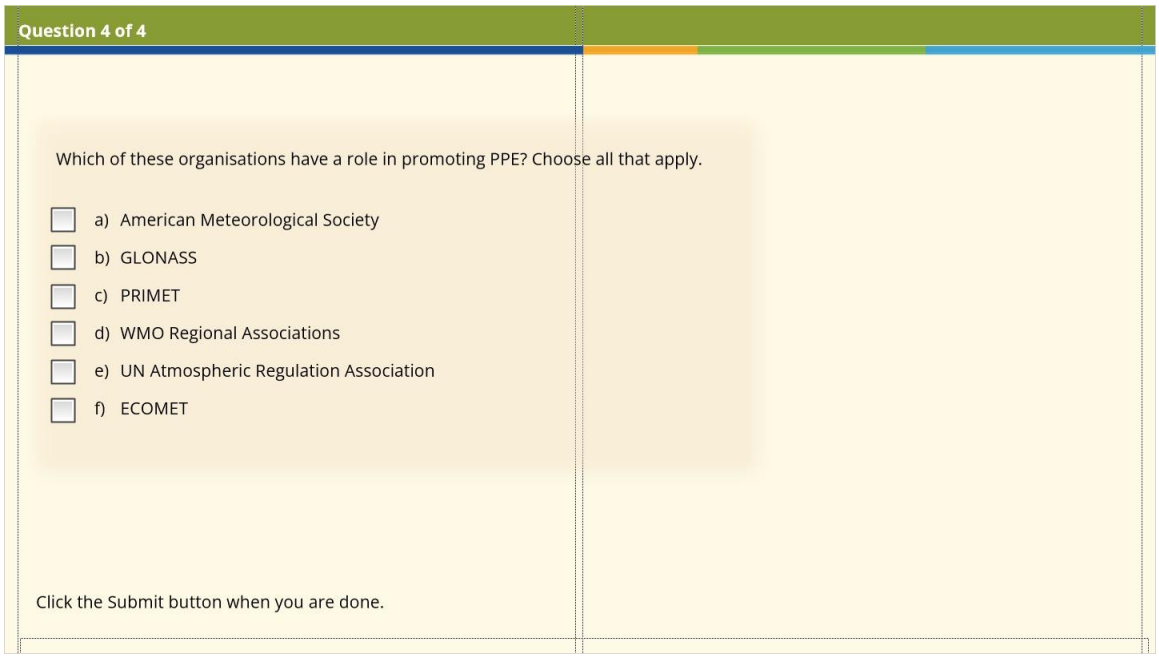


Correct (Slide Layer)



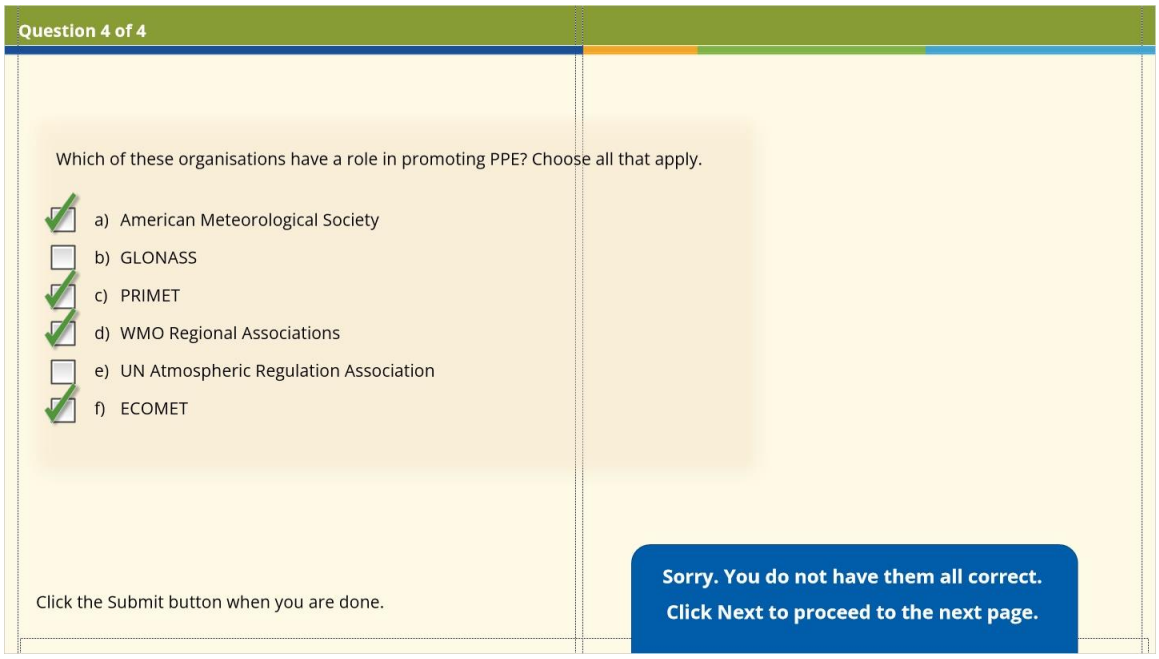
1.17 Question 4

(Pick Many, 10 points, 1 attempt permitted)

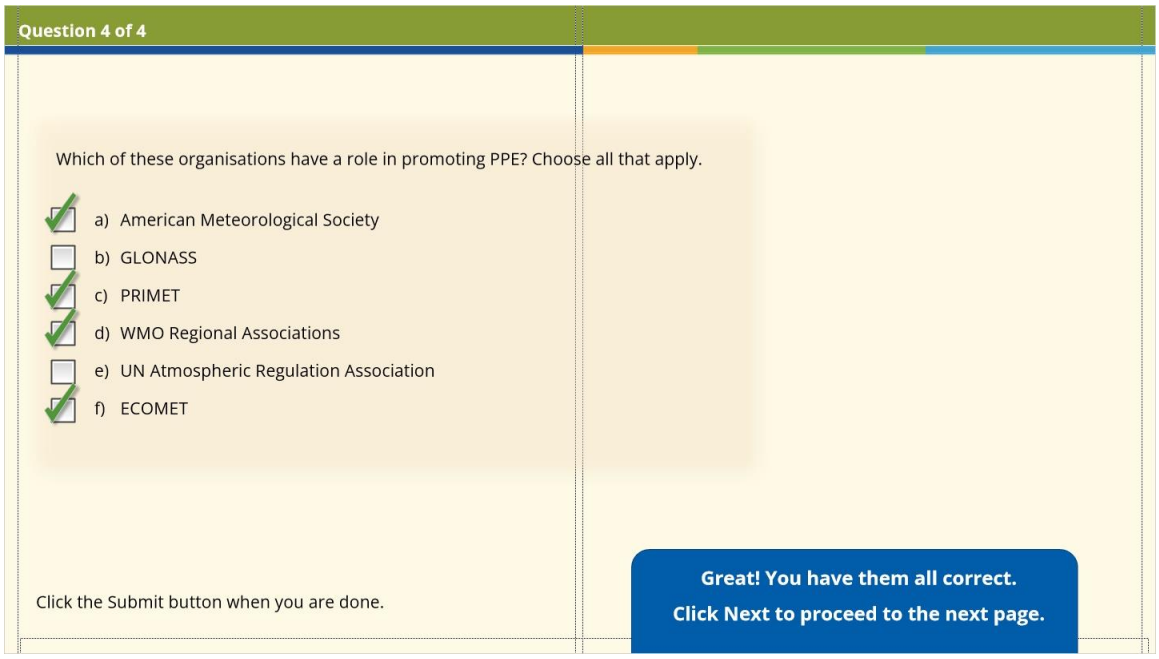


Correct	Choice
X	Check Box 4
X	Check Box 3
	Check Box 2
X	Check Box 1
	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

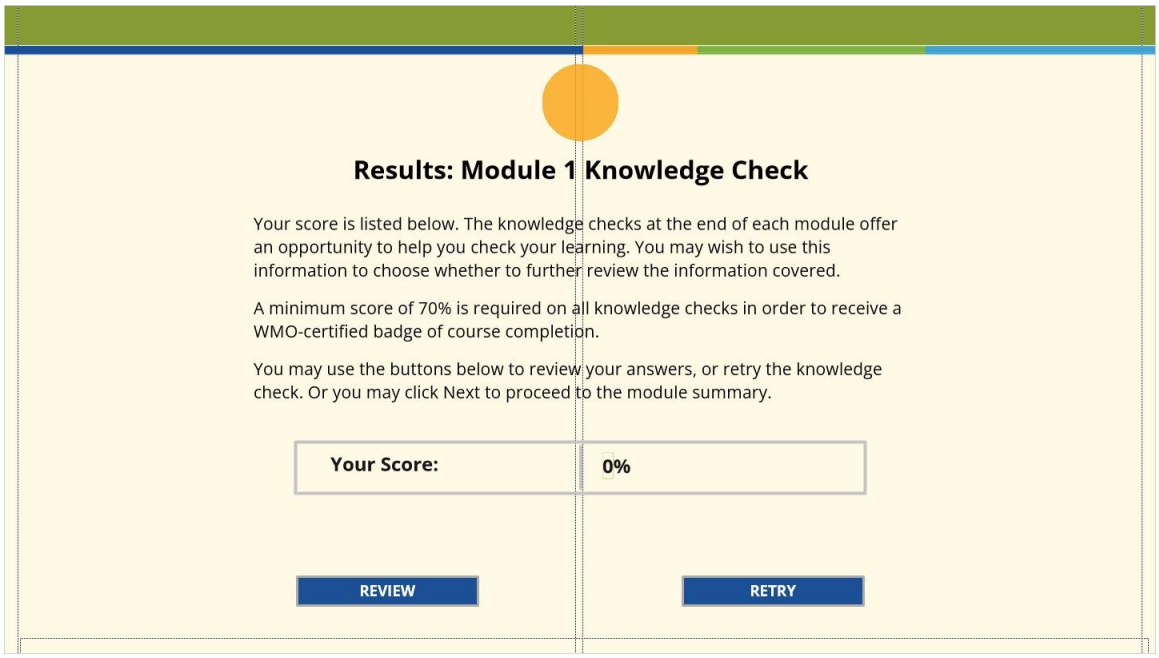


Correct (Slide Layer)



1.18 Results: Module 1 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



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

Result slide properties

Passing 70%

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Score

Notes:

1.19 Module One Summary

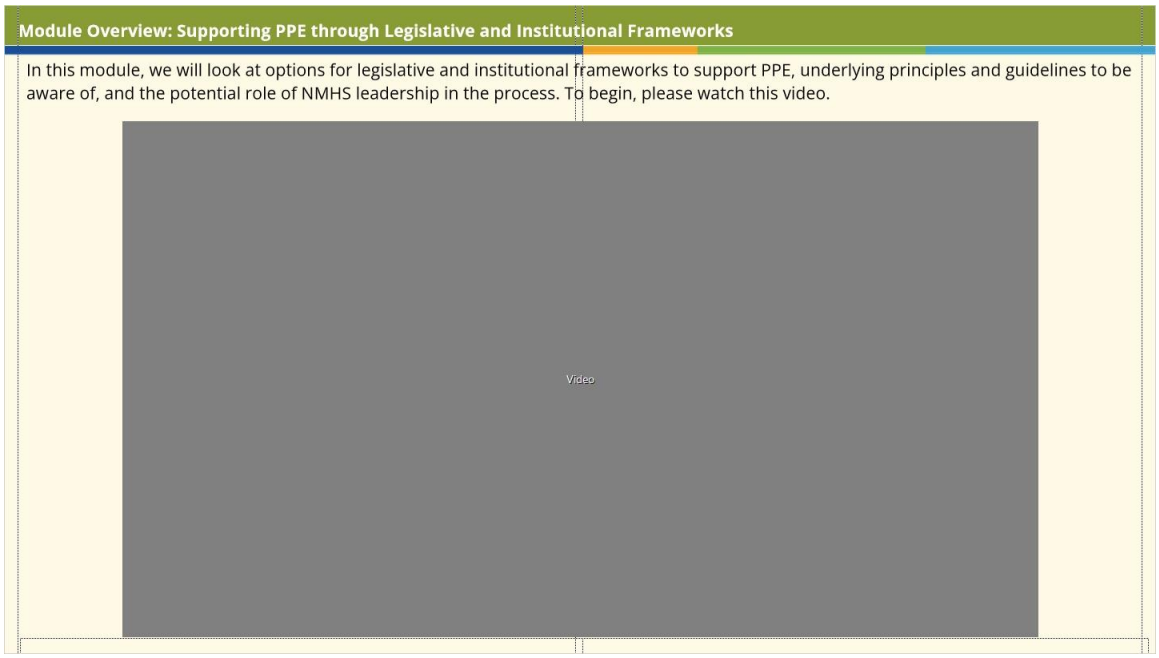
Module One Summary

Key points in Module One:

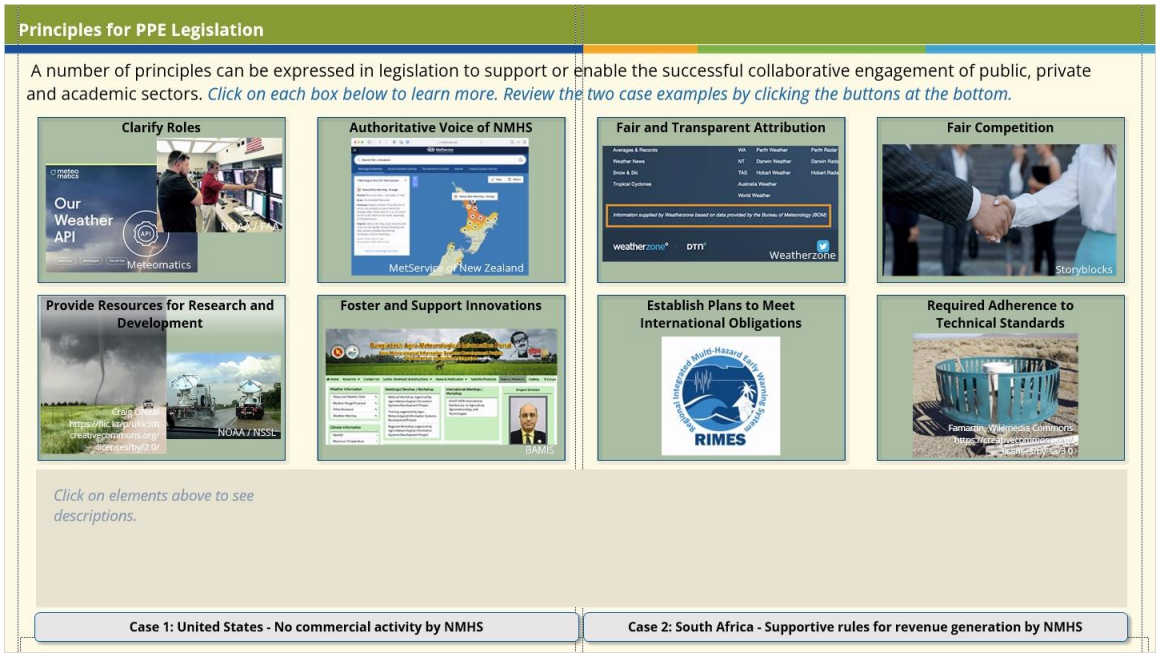
- There are many drivers for increased public-private engagement in weather, water and climate services. Advances in technology is one of these drivers, transforming both the collection of weather data and the dissemination of weather services and products.
- Improved meteorological science has greatly 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.
    - 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

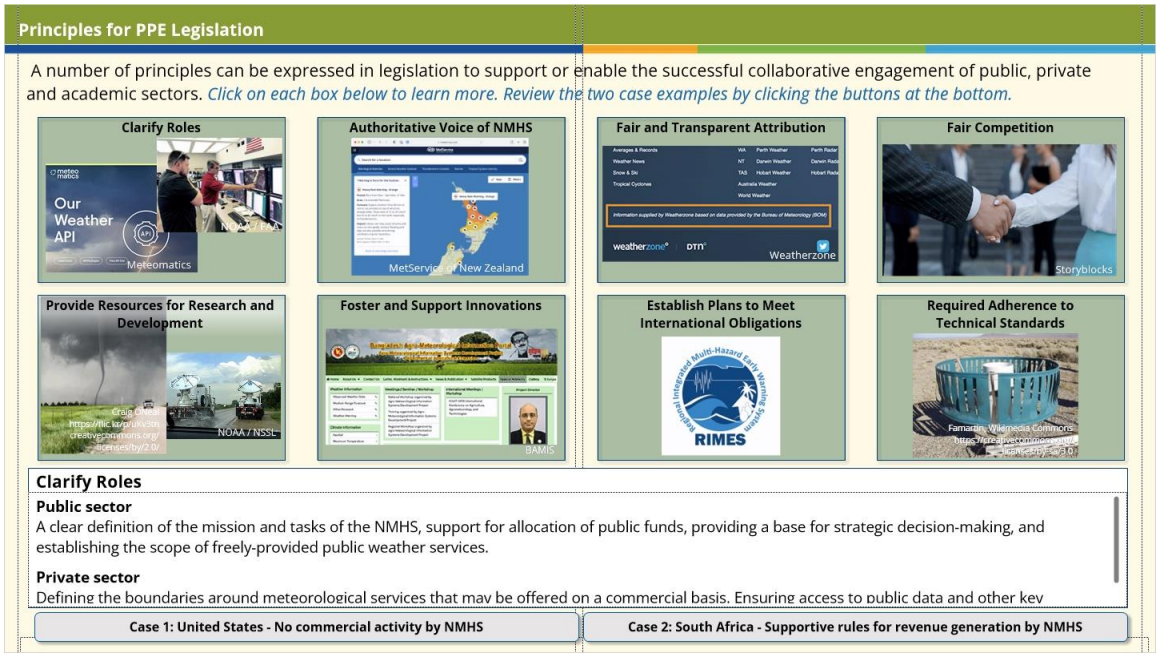


2.2 Principles for PPE Legislation

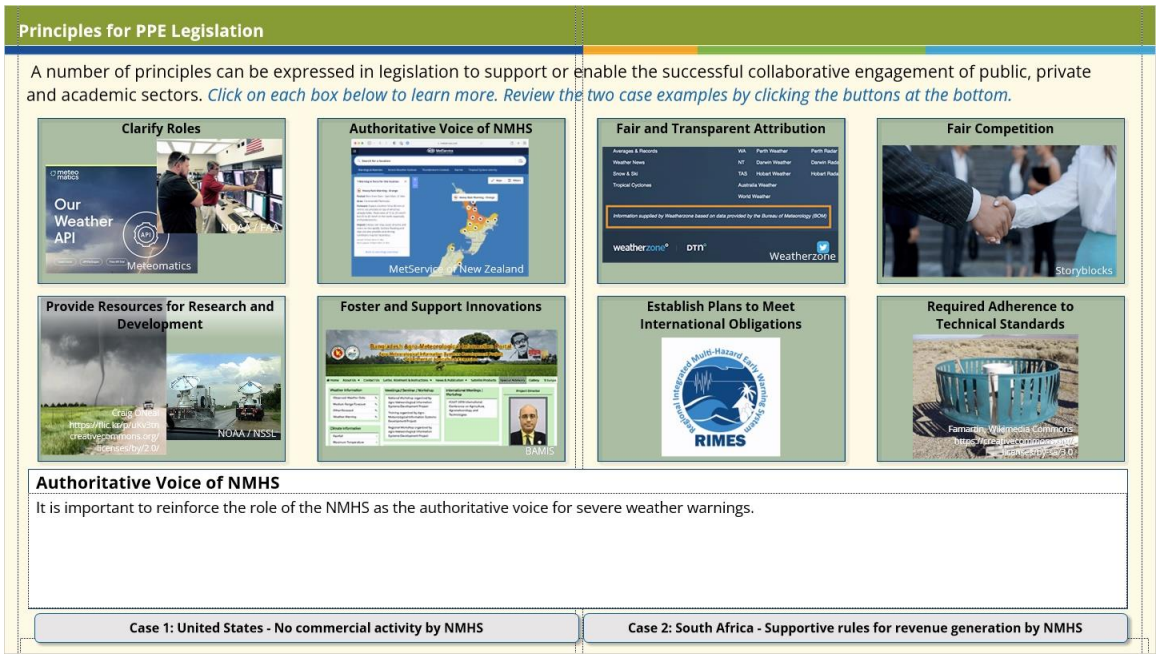


Notes:

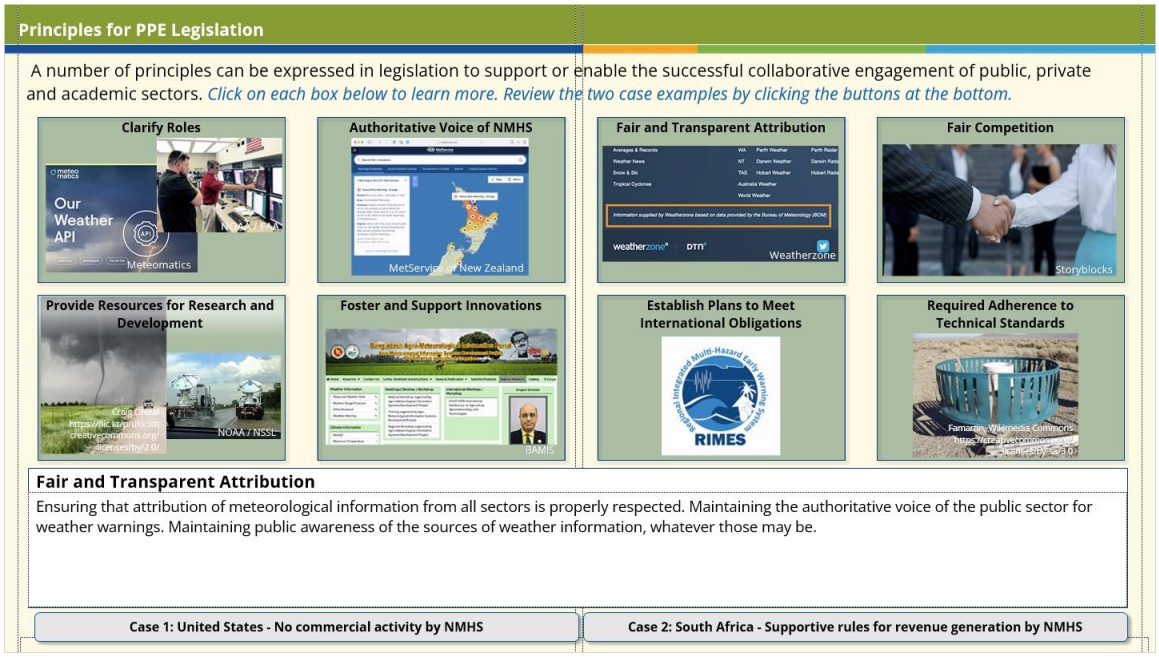
info1 (Slide Layer)



info2 (Slide Layer)



info3 (Slide Layer)



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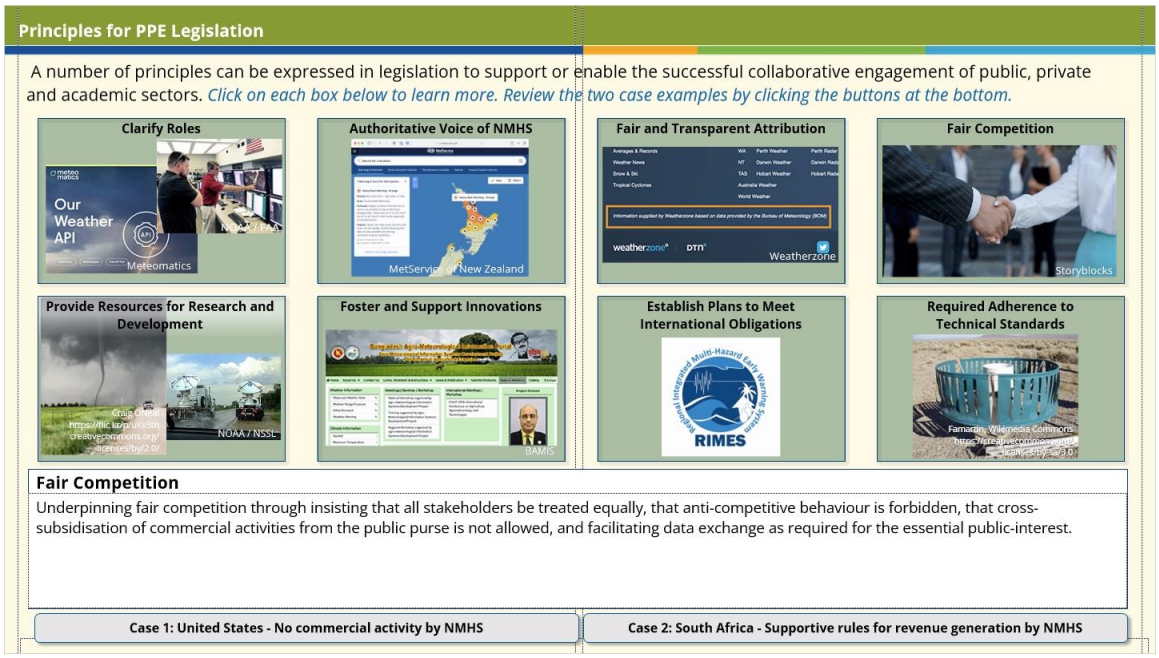
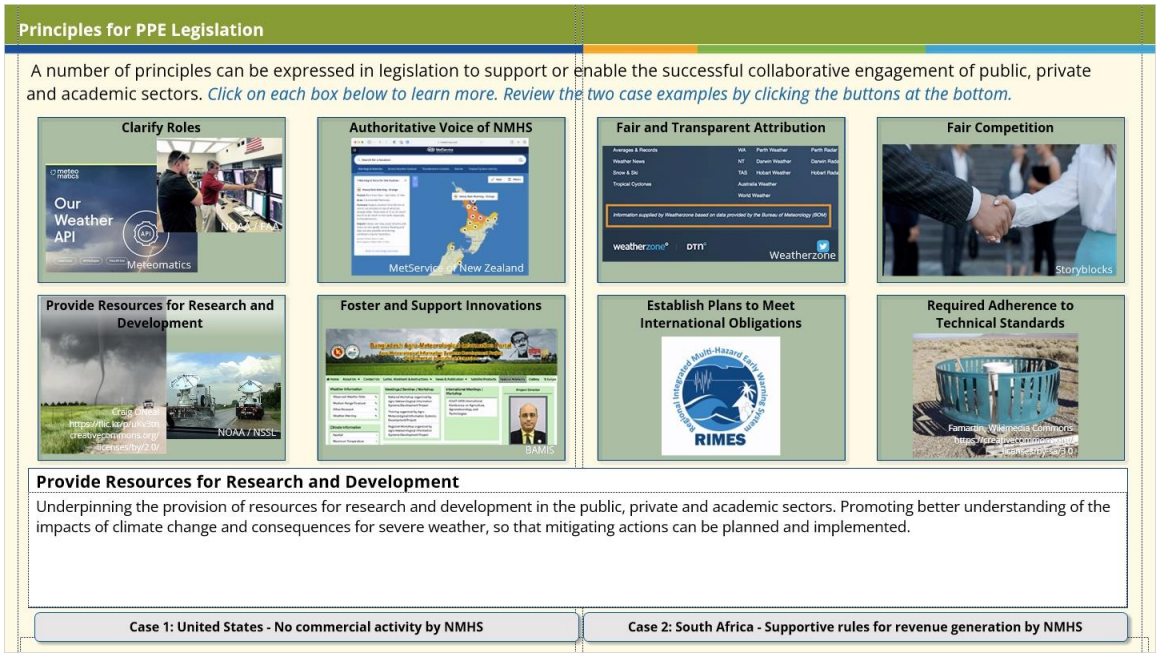
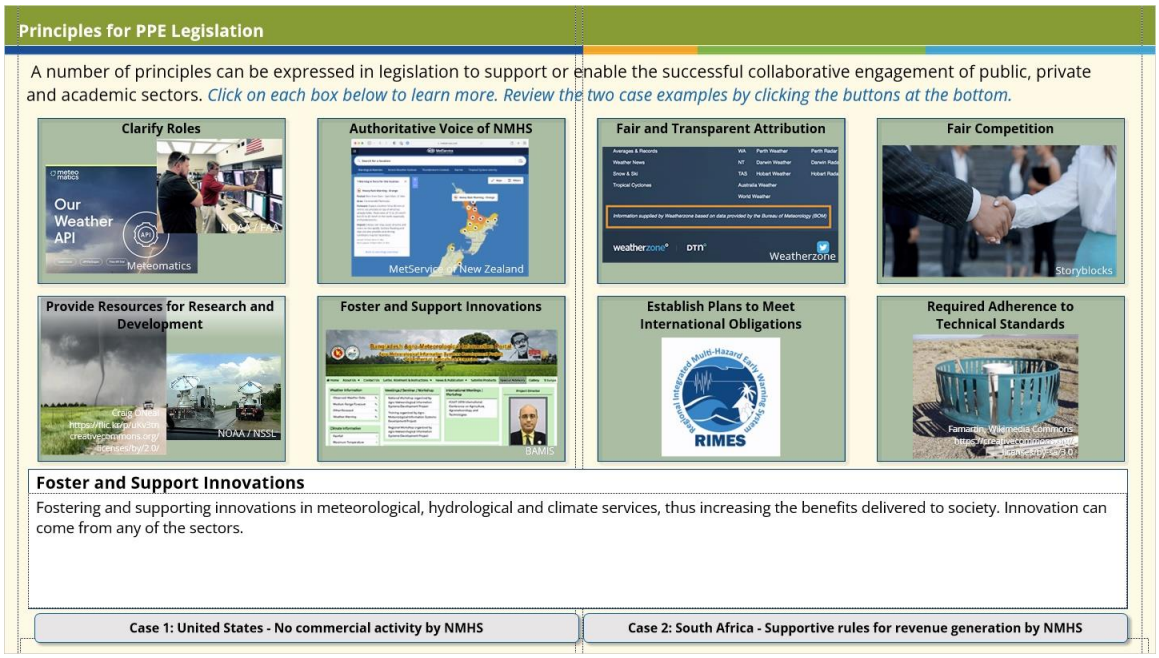


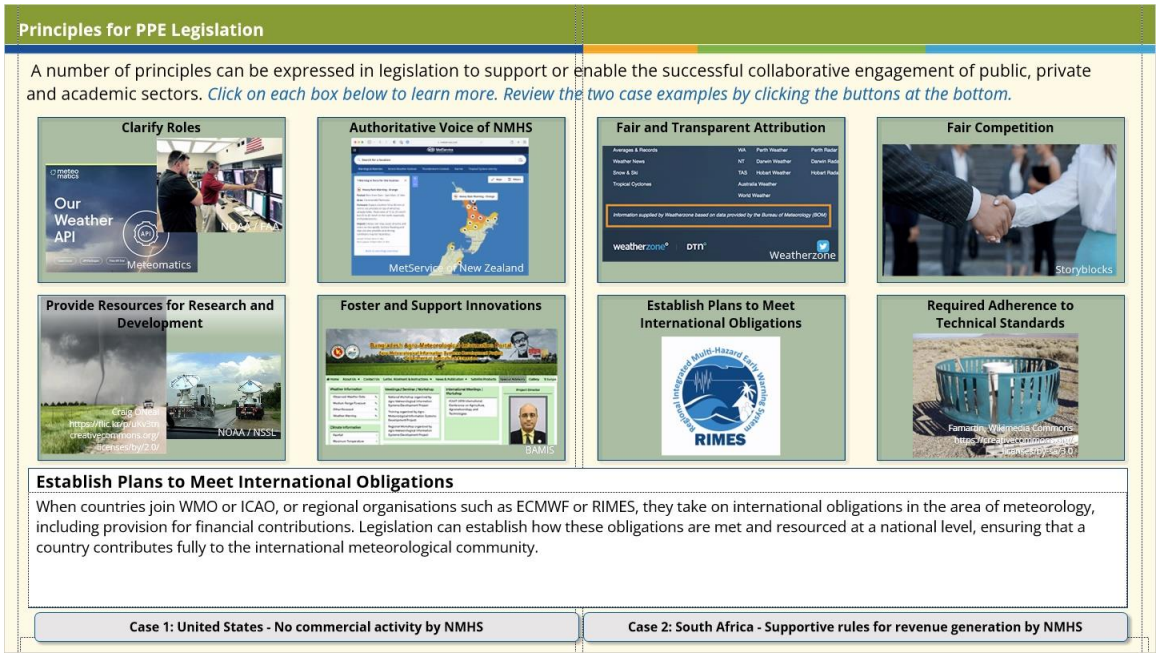
info5 (Slide Layer)



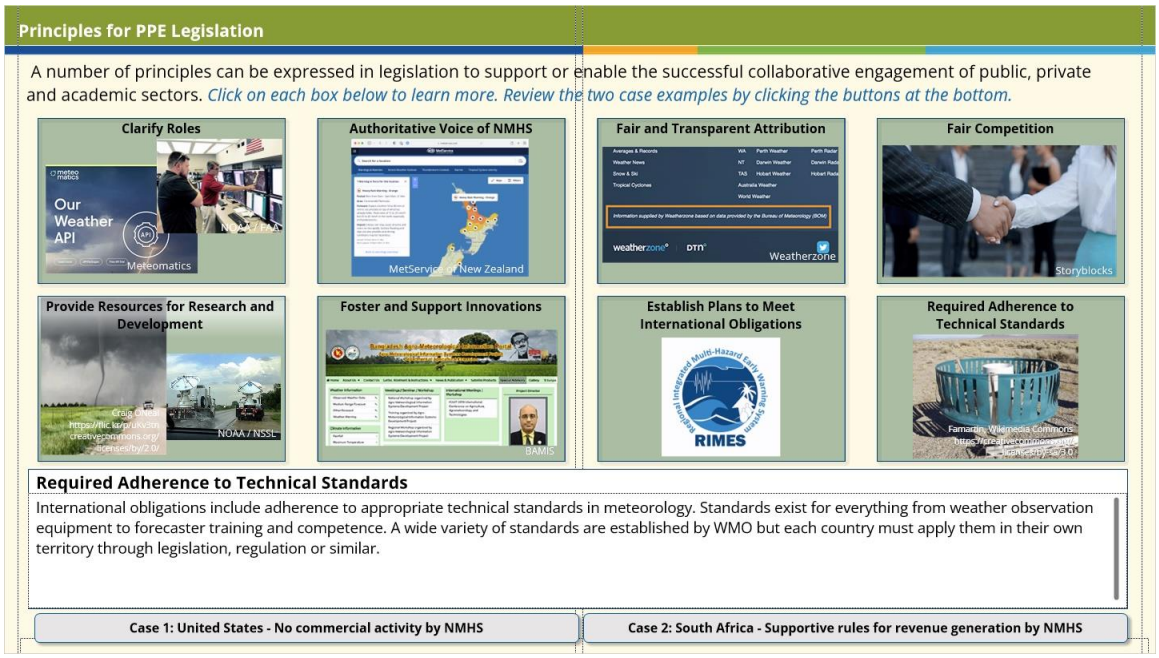
info6 (Slide Layer)



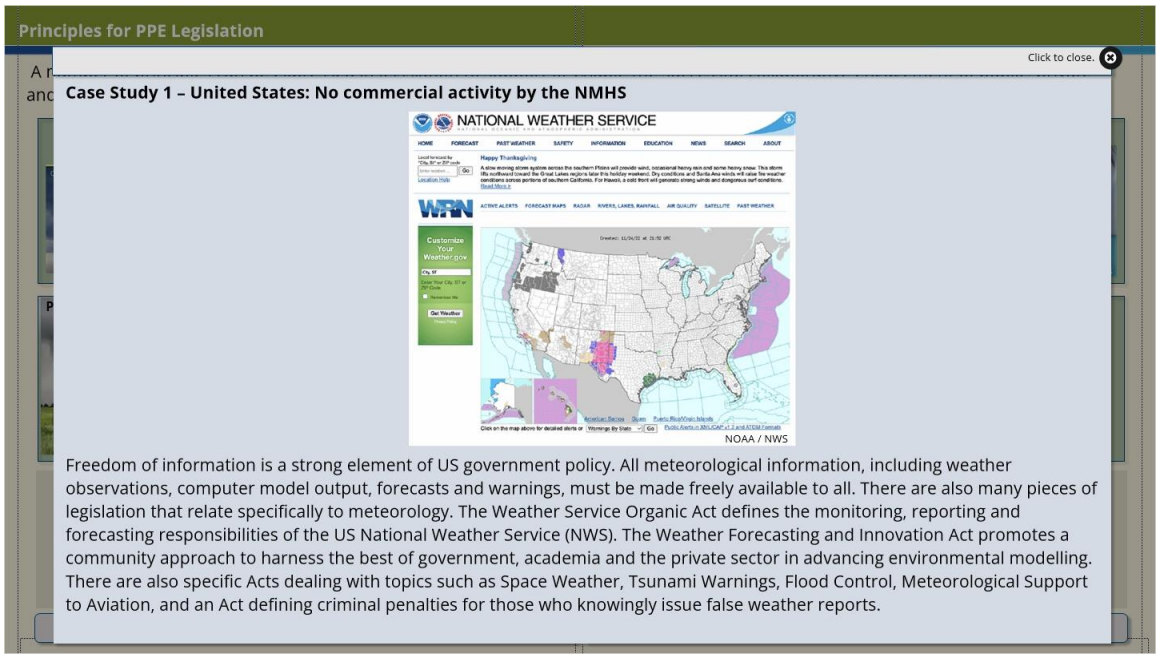
info7 (Slide Layer)



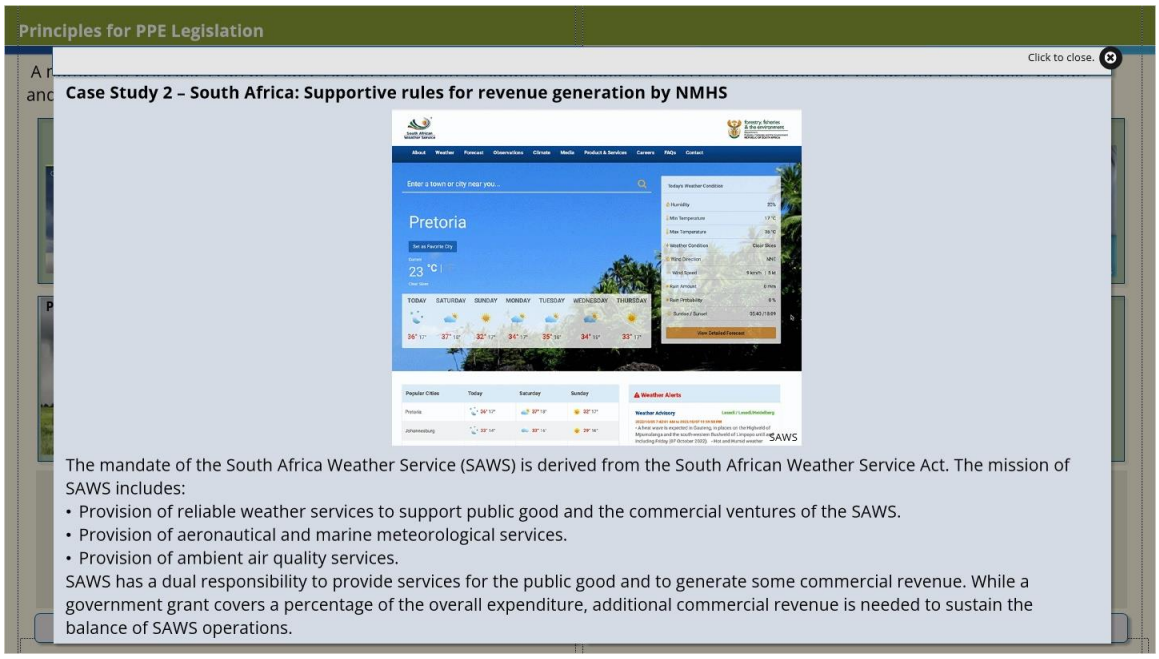
info8 (Slide Layer)



zoom1 (Slide Layer)

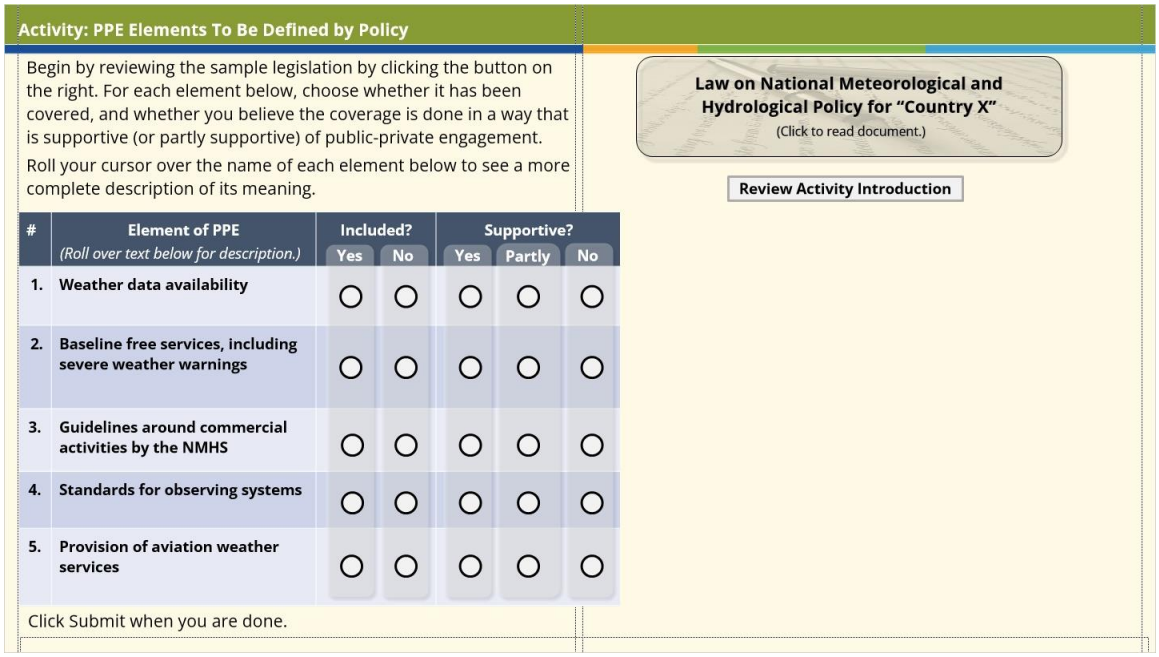


zoom2 (Slide Layer)



2.3 Activity: PPE Elements To Be Defined by Policy

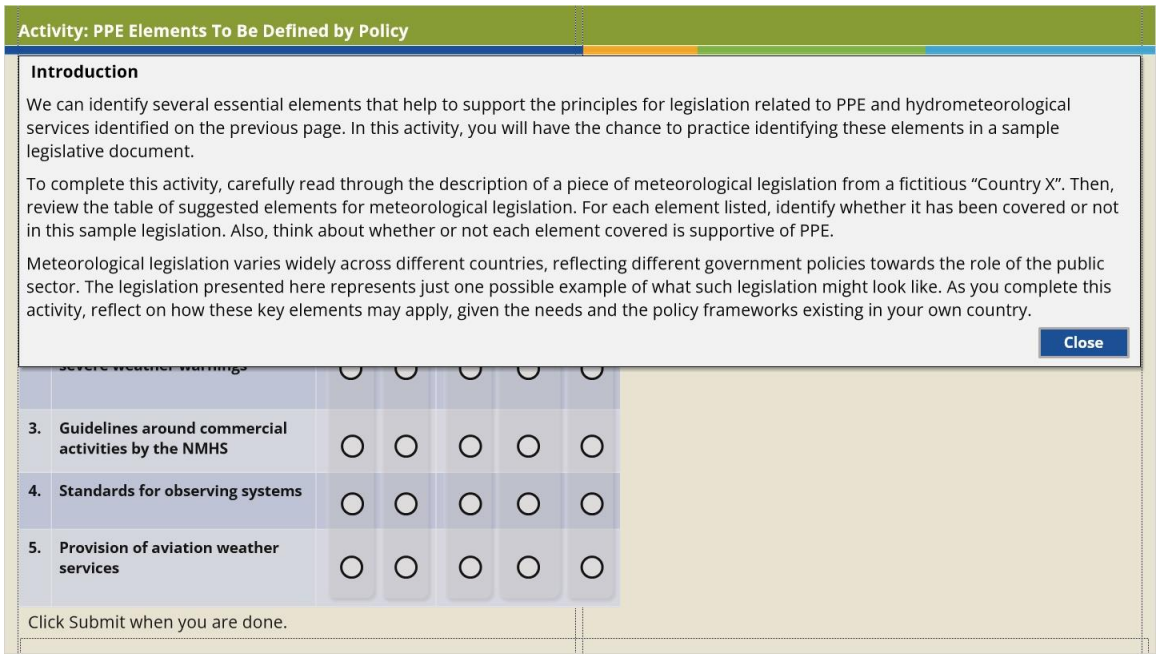
(Pick Many, 10 points, 2 attempts permitted)



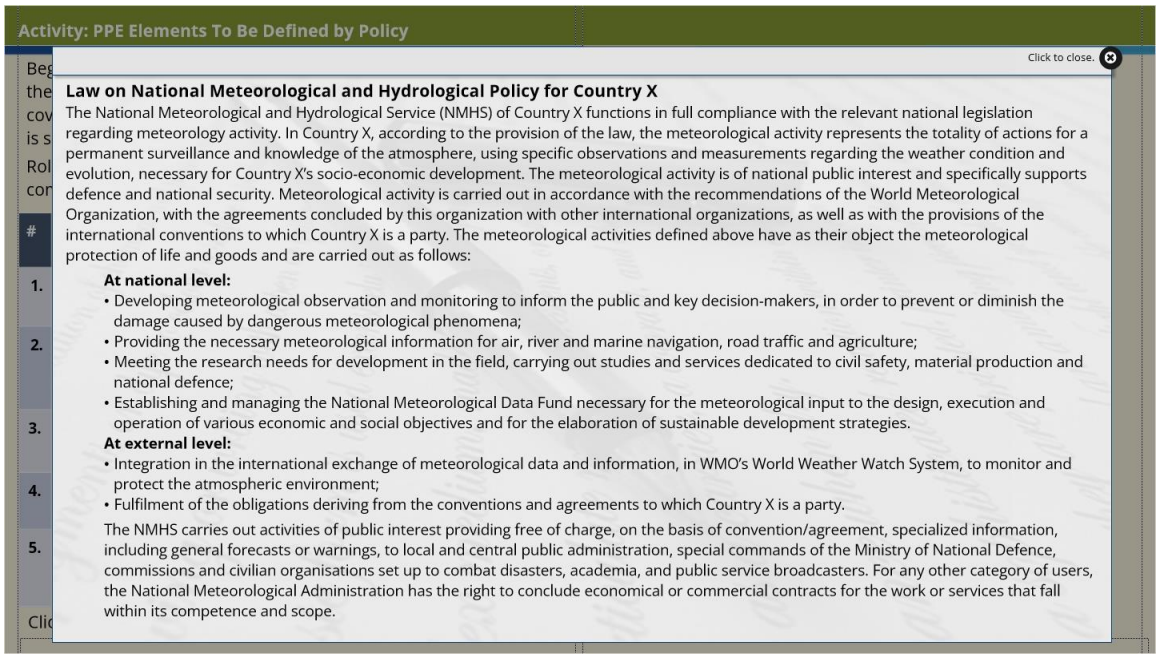
Correct	Choice
X	q1y
	q1n
X	q2y
	Q2n
	Q3y
X	Q3n
X	Q4y
	Q4n
X	Q5y
	Q5n

	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

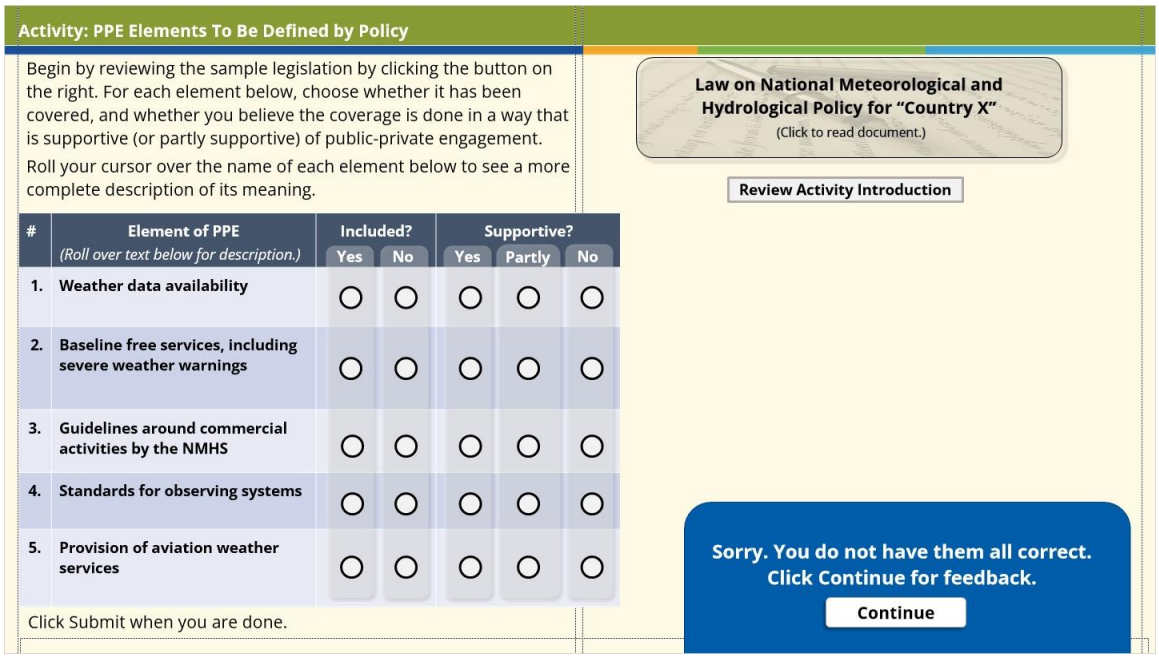
intro (Slide Layer)



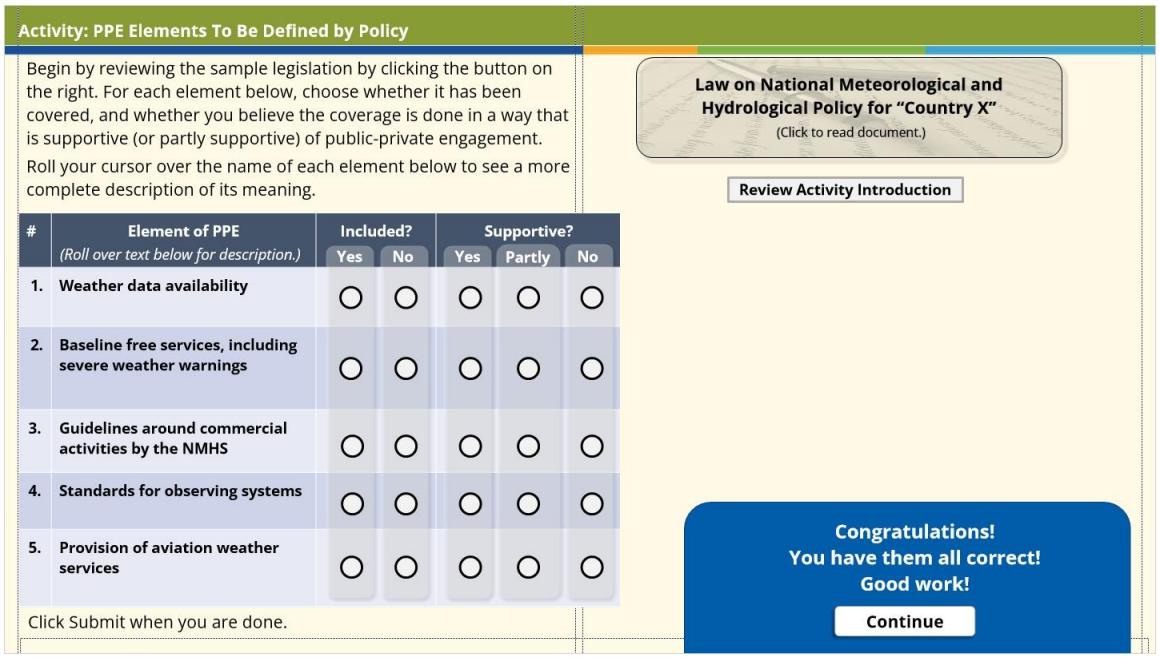
zoom1 (Slide Layer)



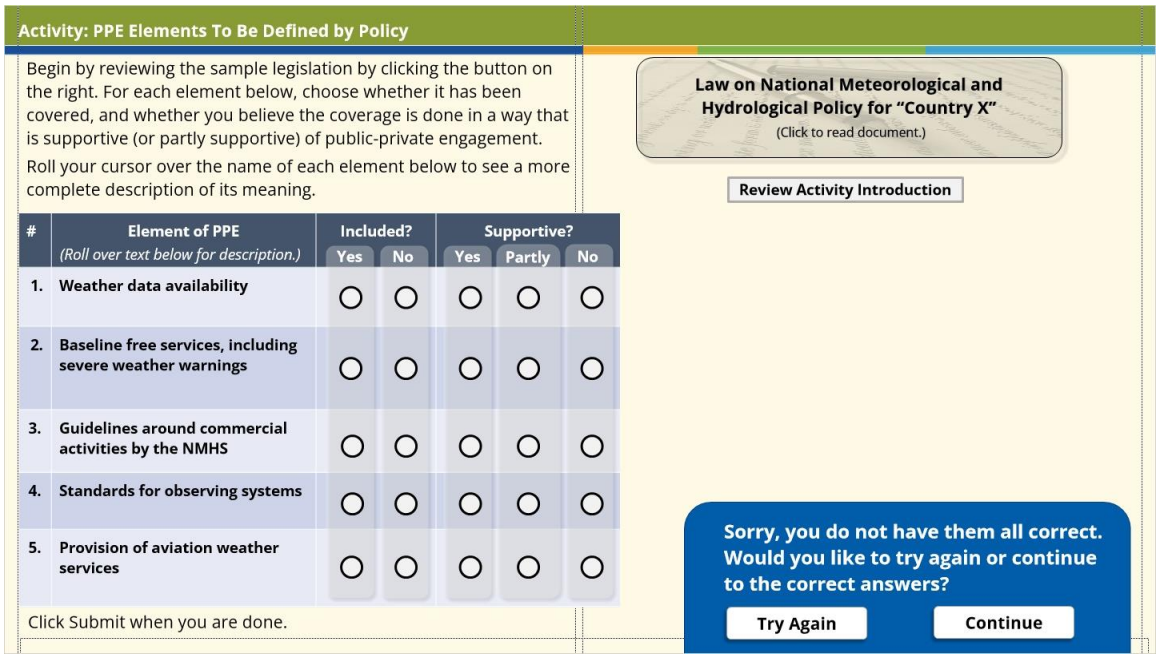
Incorrect (Slide Layer)



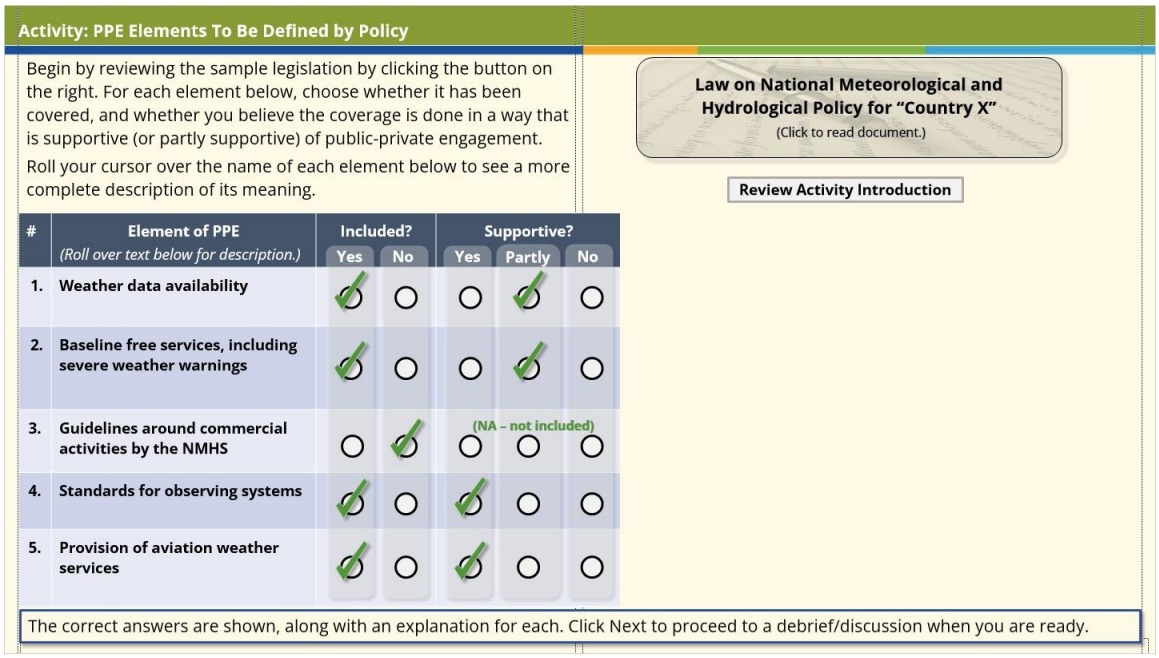
Correct (Slide Layer)



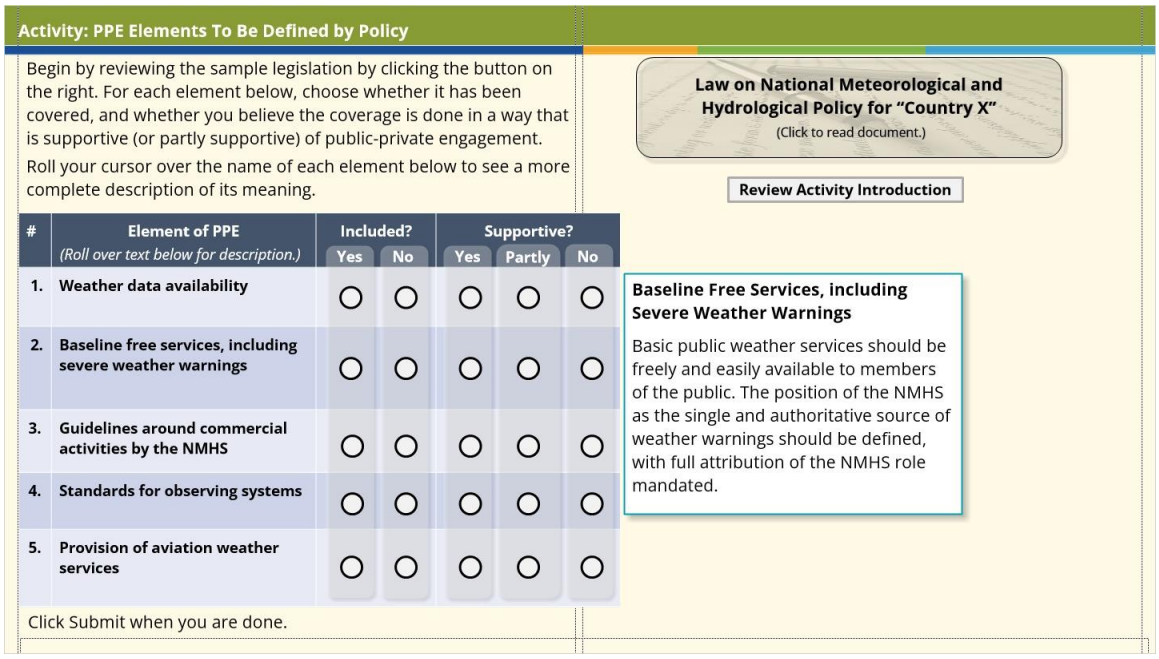
Try Again (Slide Layer)



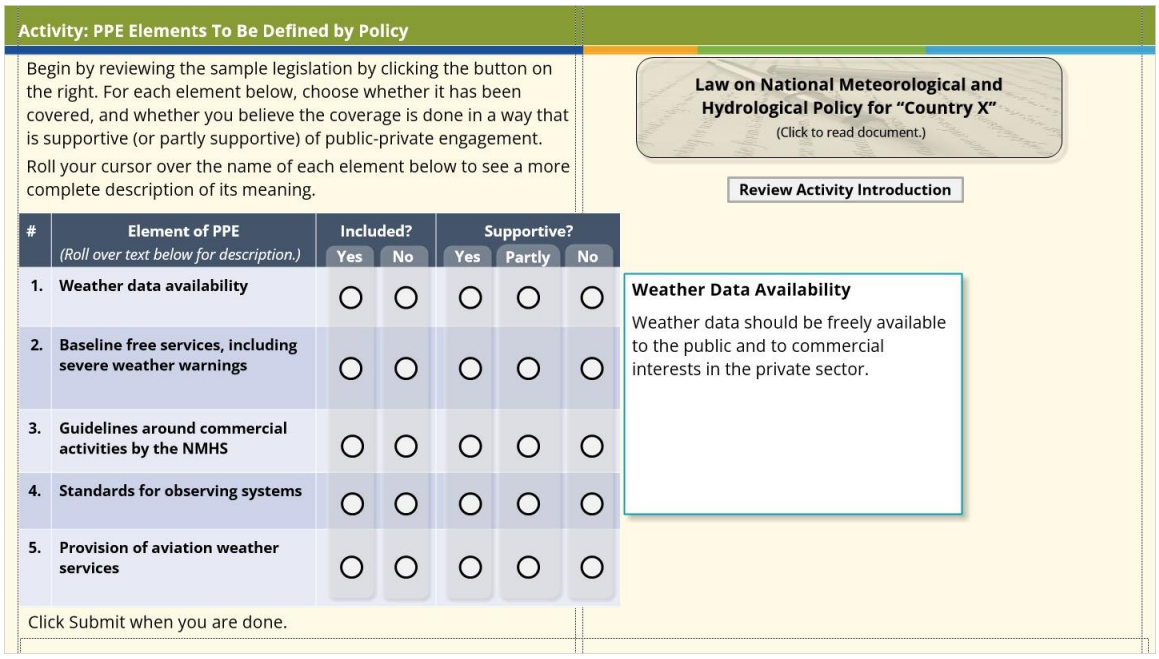
feedback (Slide Layer)



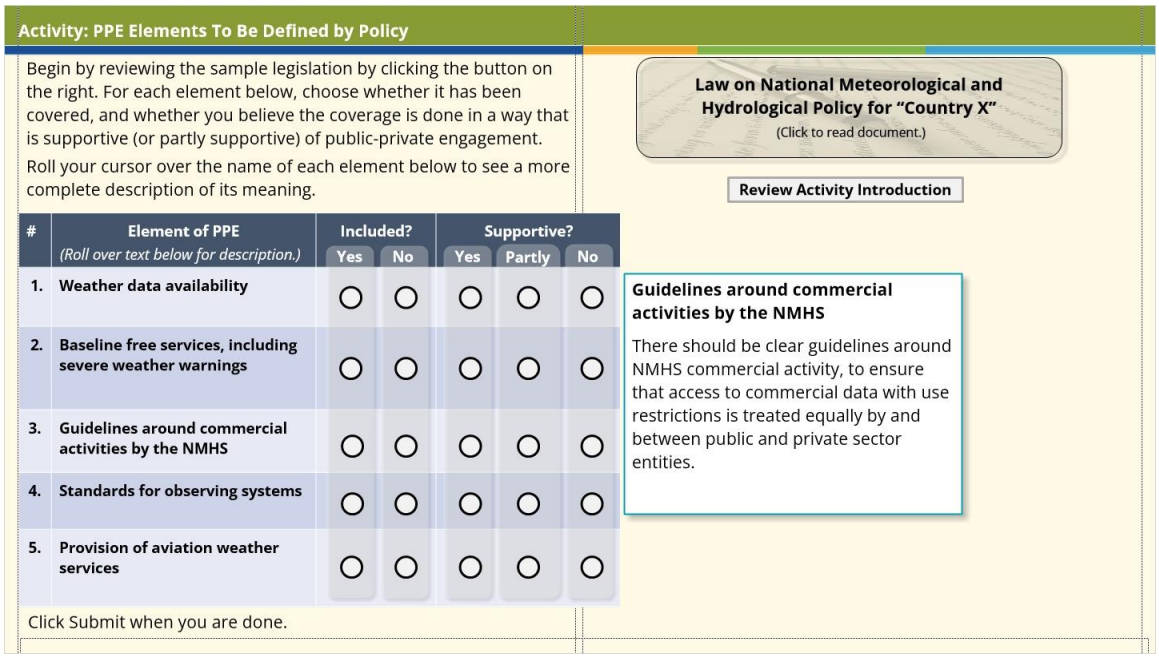
rollover 2 (Slide Layer)



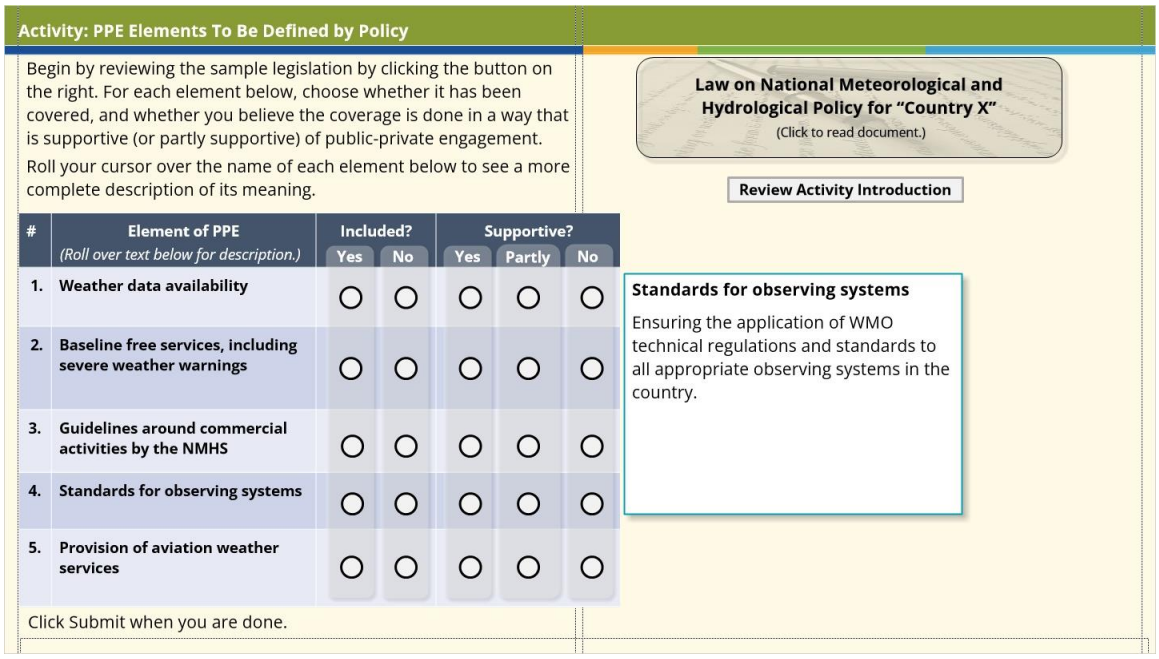
rollover 1 (Slide Layer)



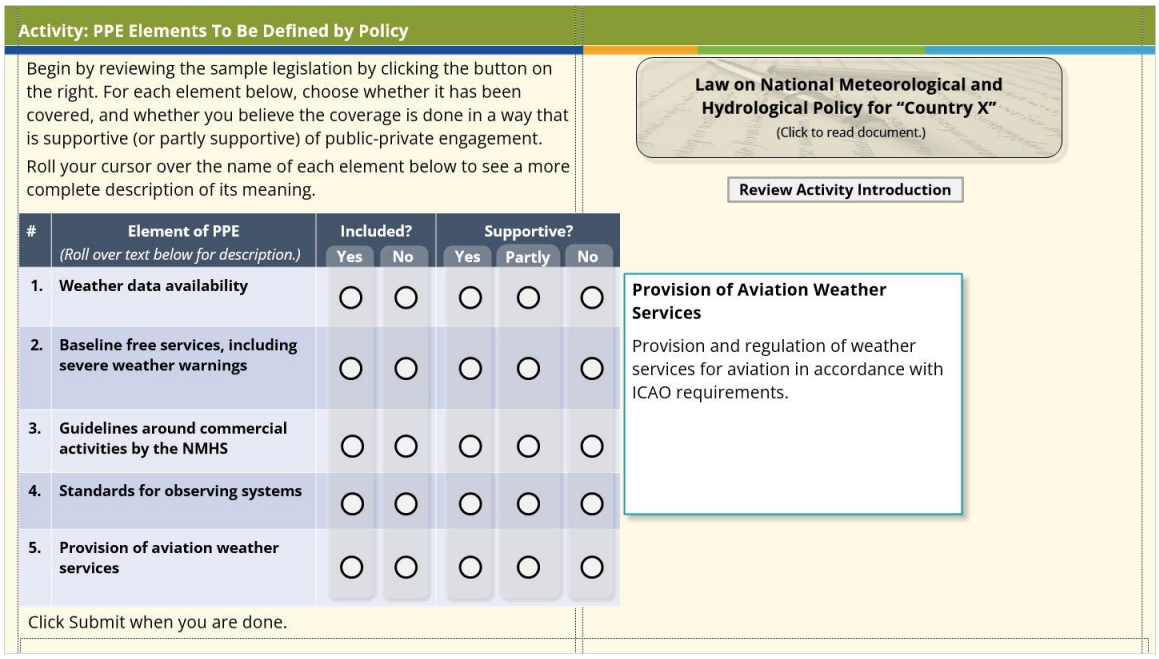
rollover 3 (Slide Layer)



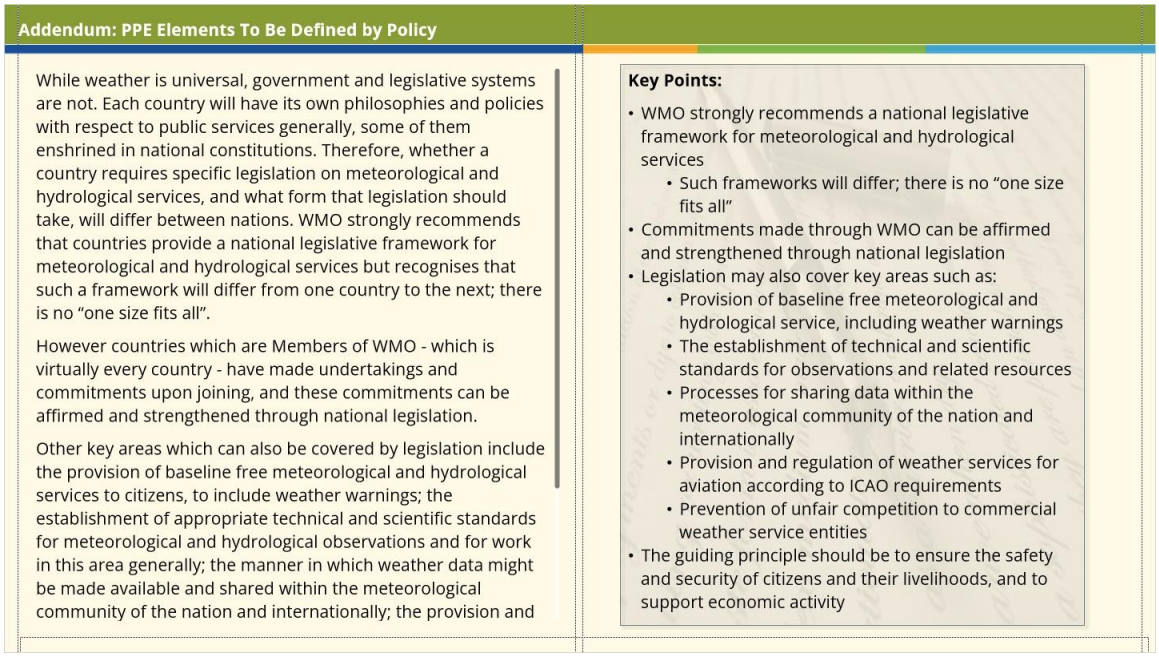
rollover 4 (Slide Layer)



rollover 5 (Slide Layer)

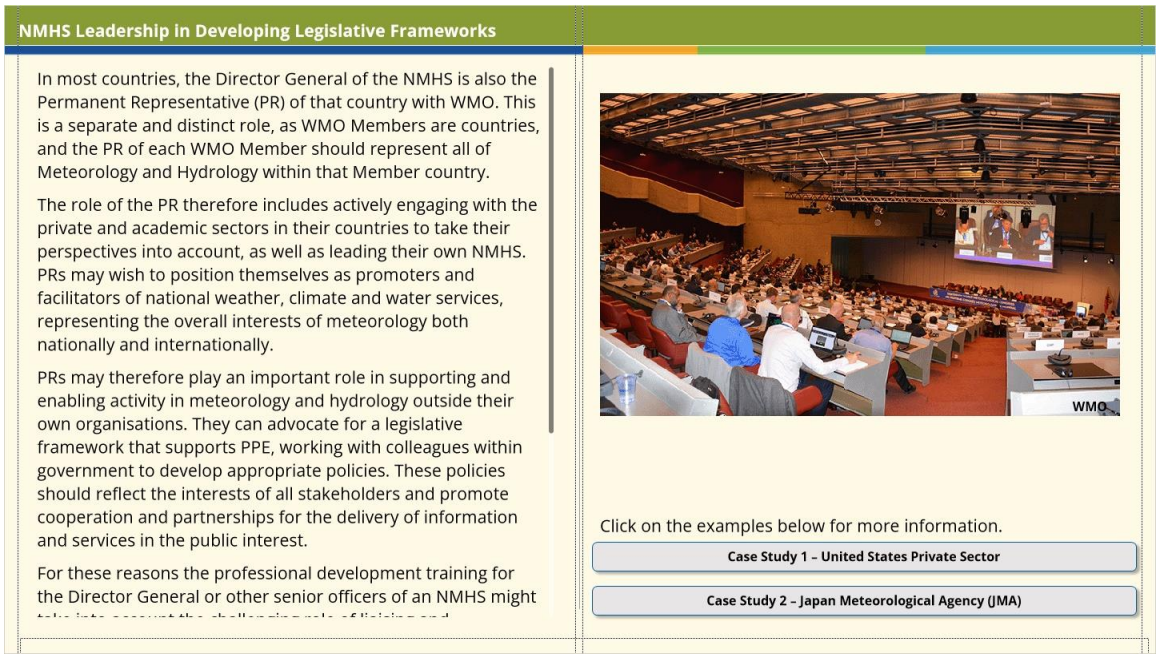


2.4 Addendum: PPE Elements To Be Defined by Policy

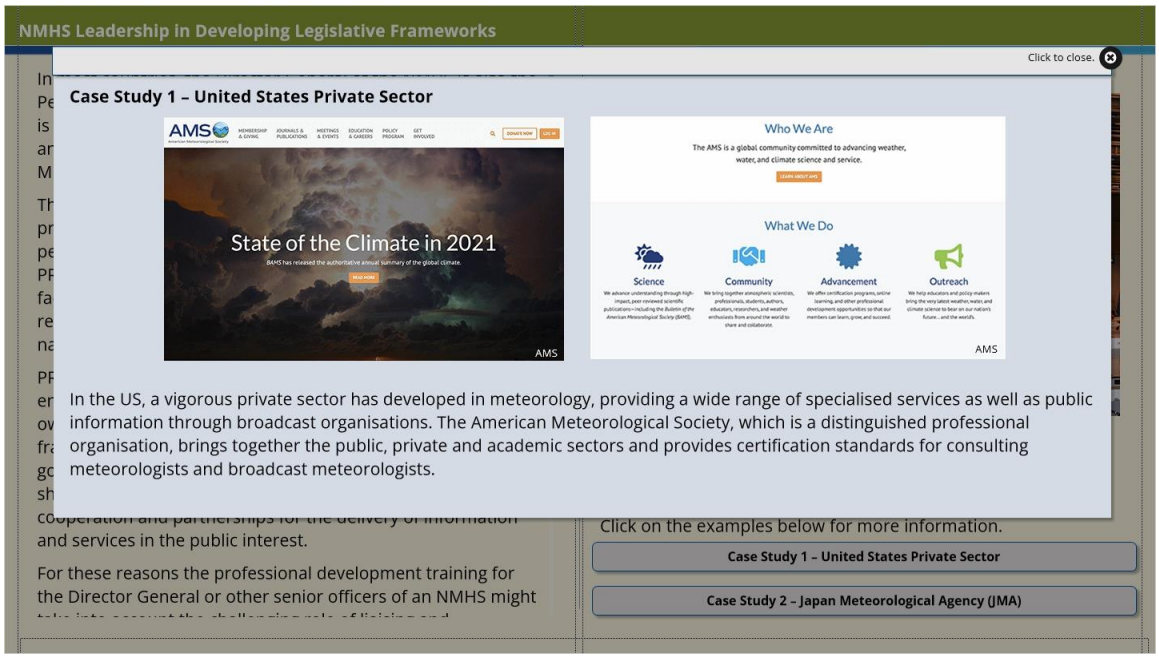


Notes:

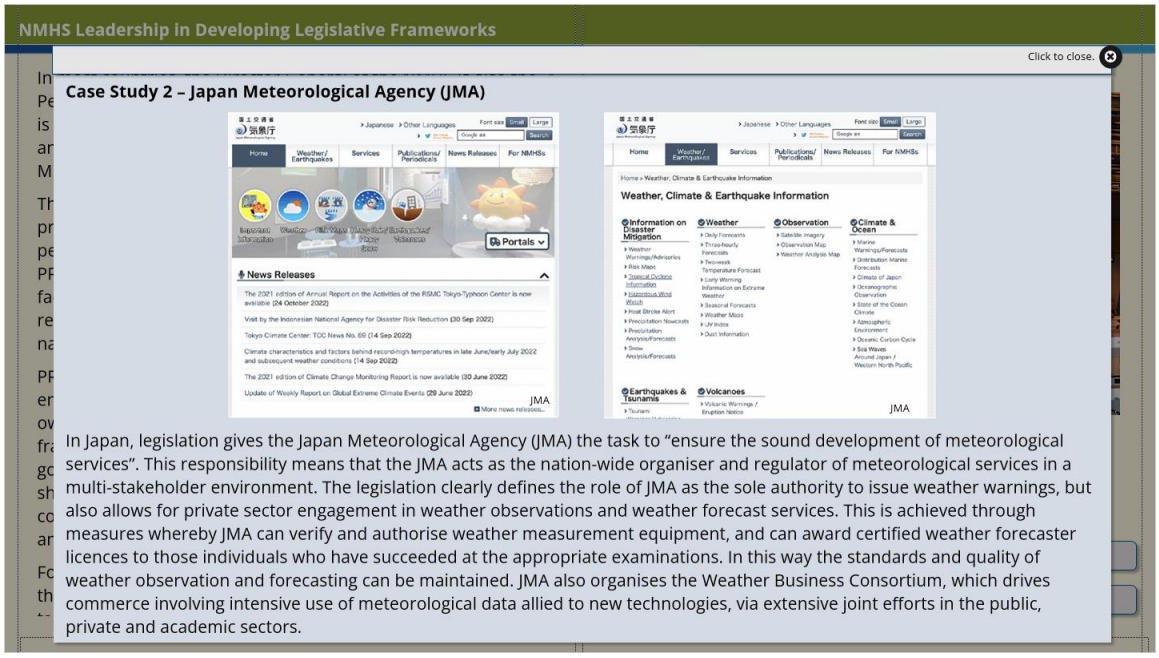
2.5 NMHS Leadership in Developing Legislative Frameworks



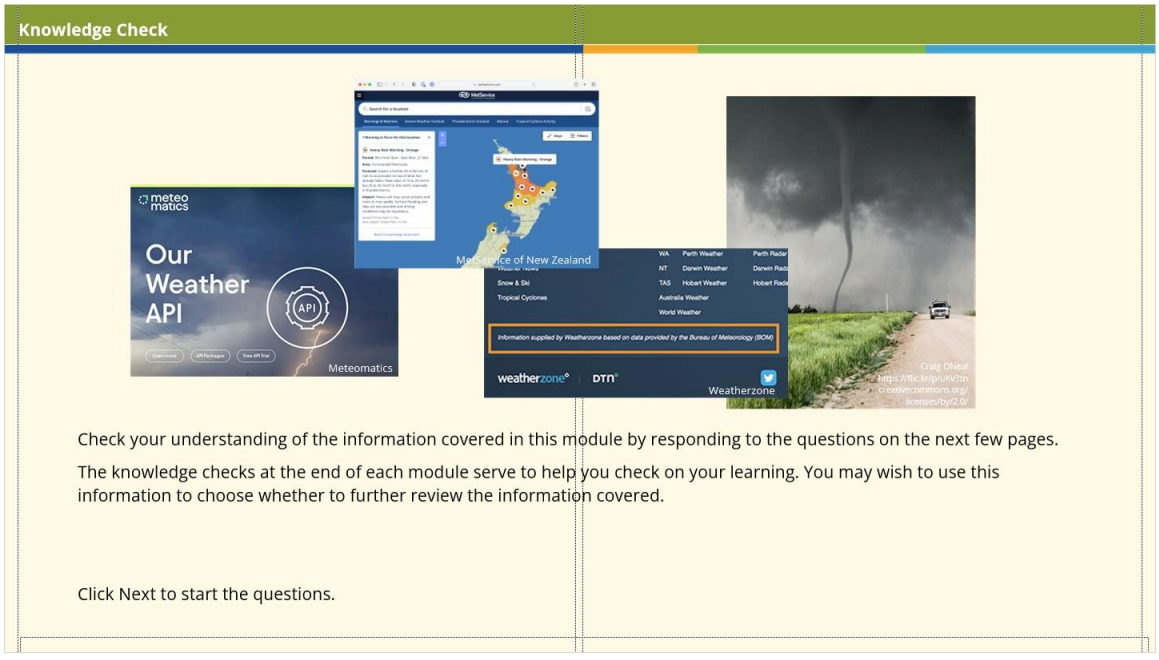
zoom1 (Slide Layer)



zoom2 (Slide Layer)

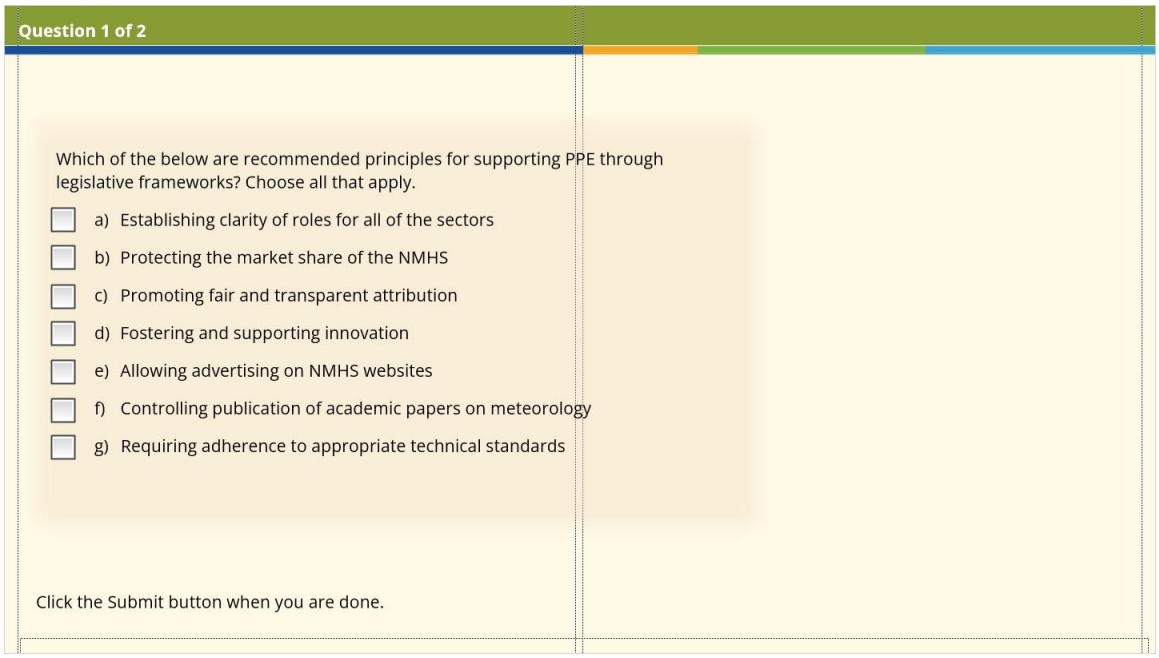


2.6 Knowledge Check



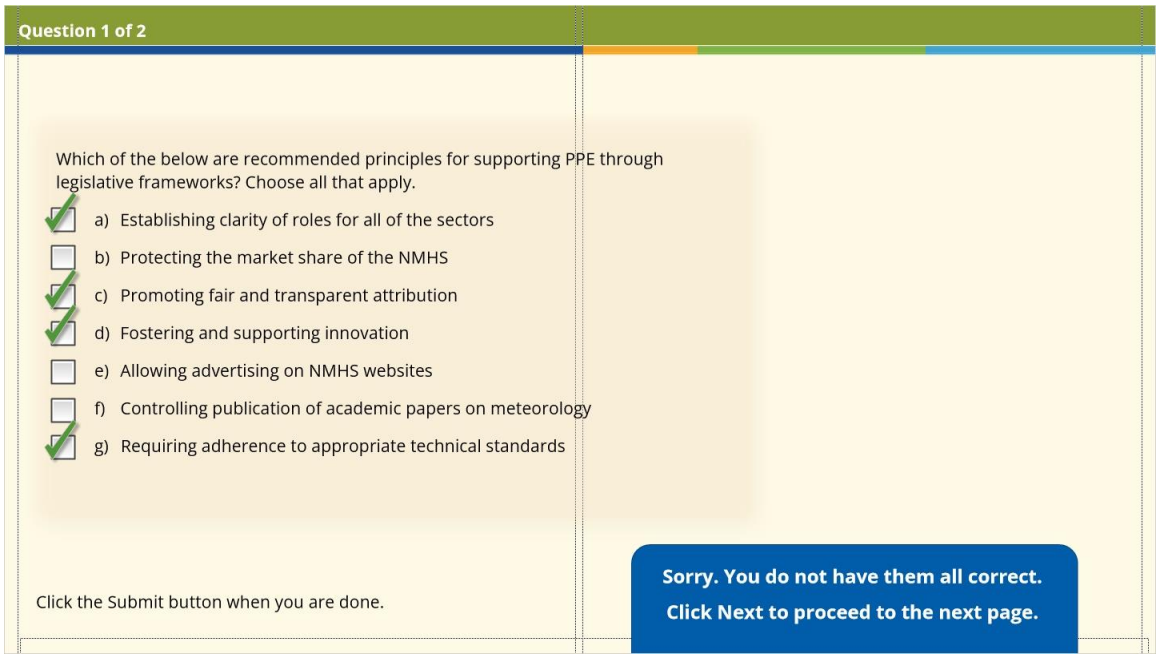
2.7 Question 1

(Pick Many, 10 points, 1 attempt permitted)

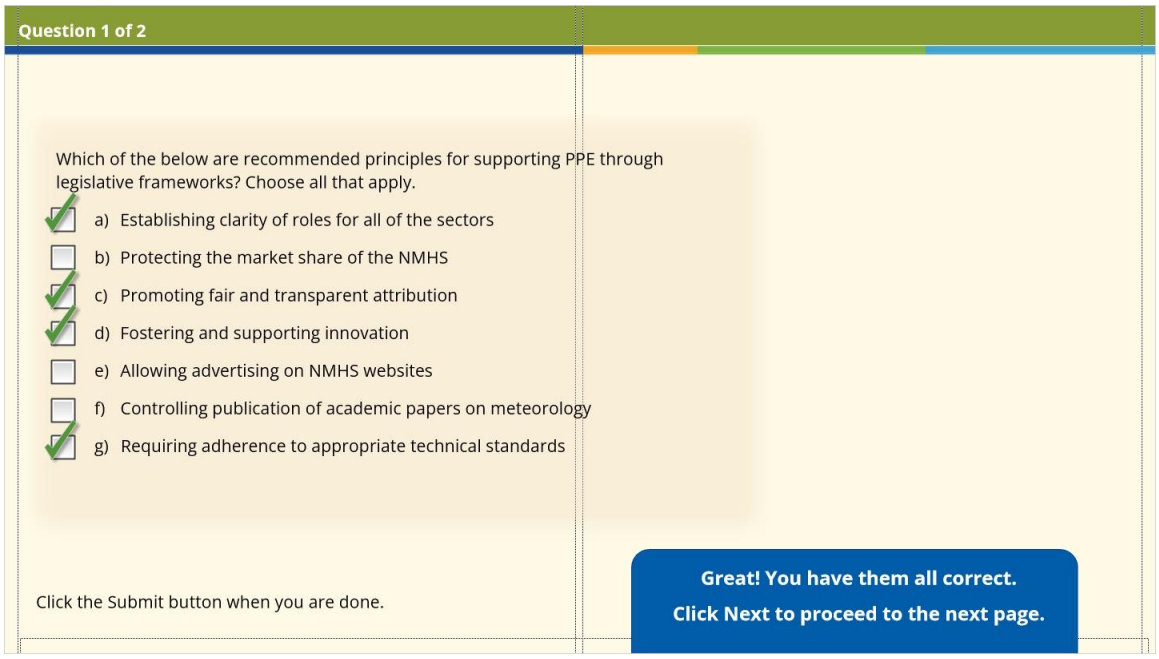


Correct	Choice
X	Check Box 1
	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5
	Check Box 6
X	Check Box 7

Incorrect (Slide Layer)

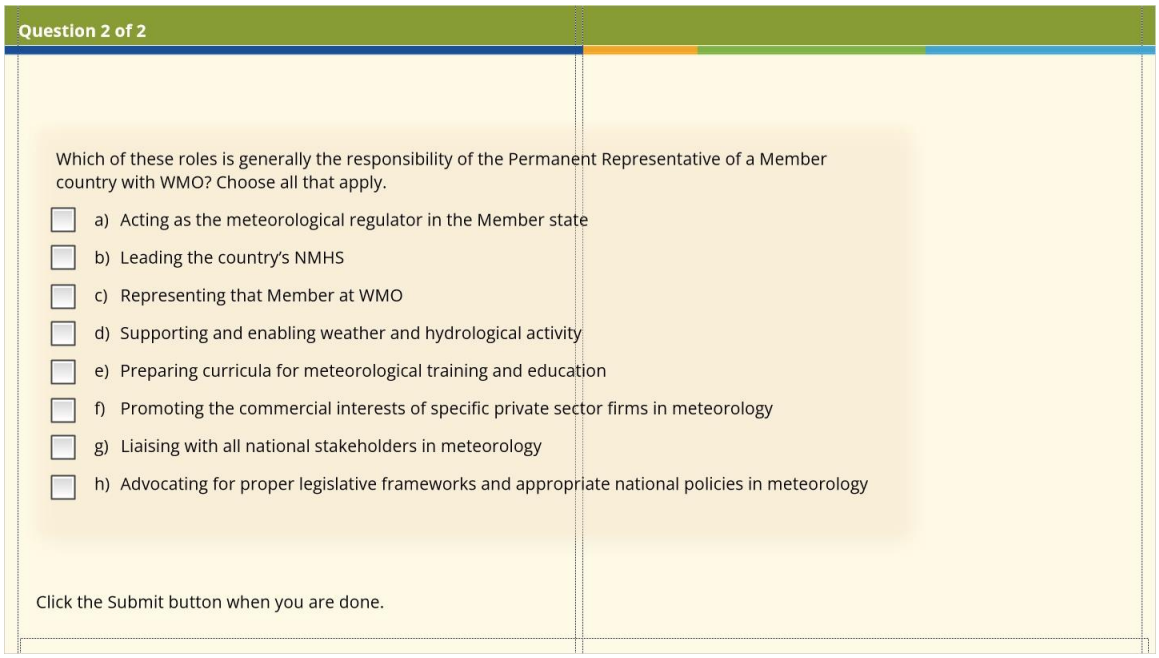


Correct (Slide Layer)



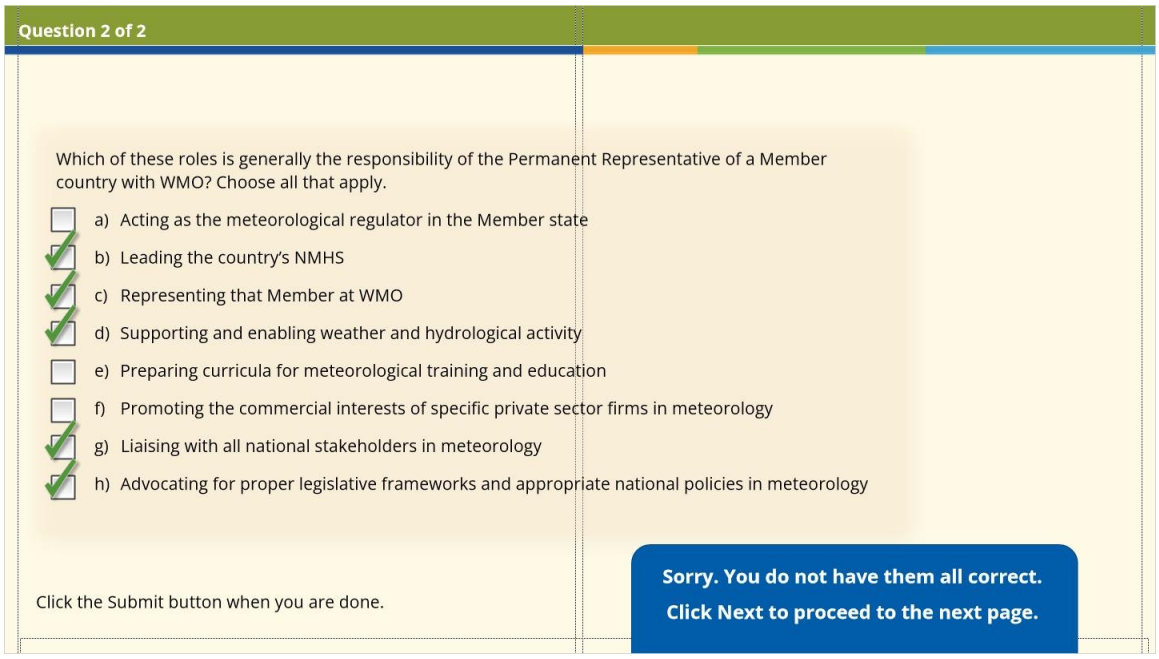
2.8 Question 2

(Pick Many, 10 points, 1 attempt permitted)

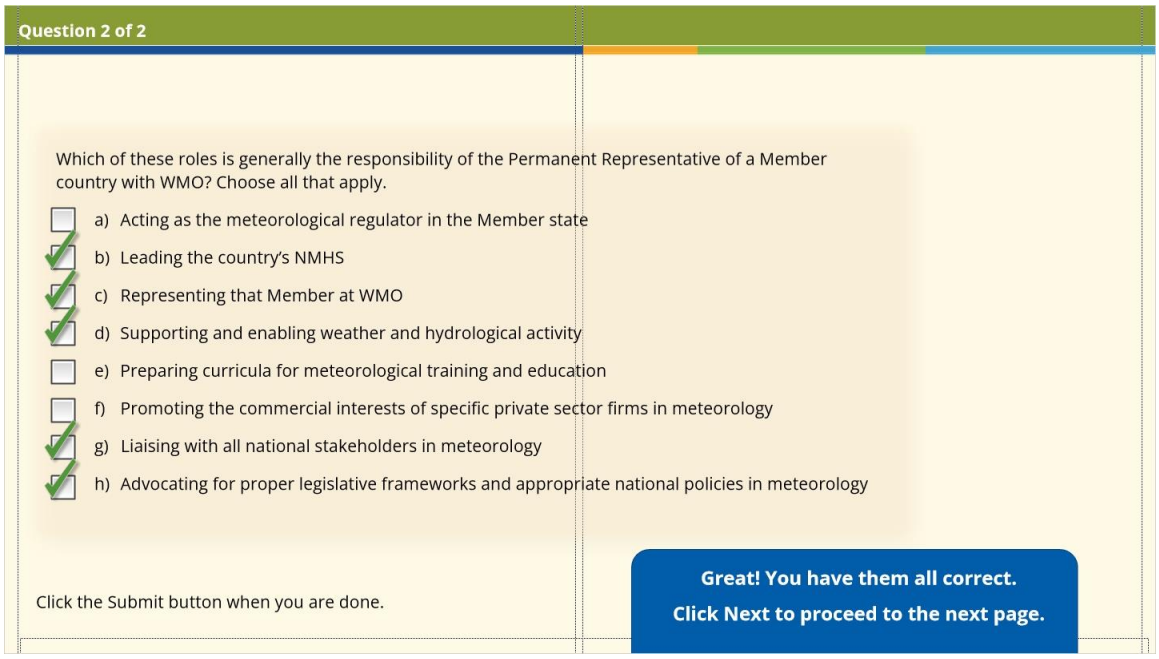


Correct	Choice
	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5
	Check Box 6
X	Check Box 7
X	Check Box 8

Incorrect (Slide Layer)

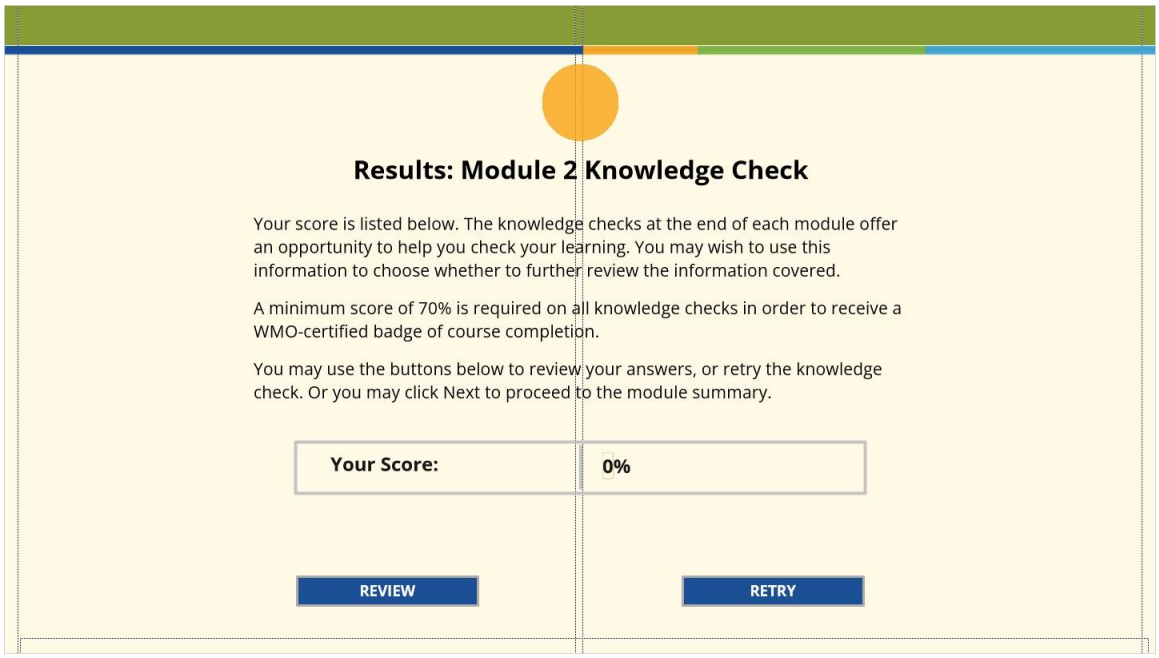


Correct (Slide Layer)



2.9 Results: Module 2 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



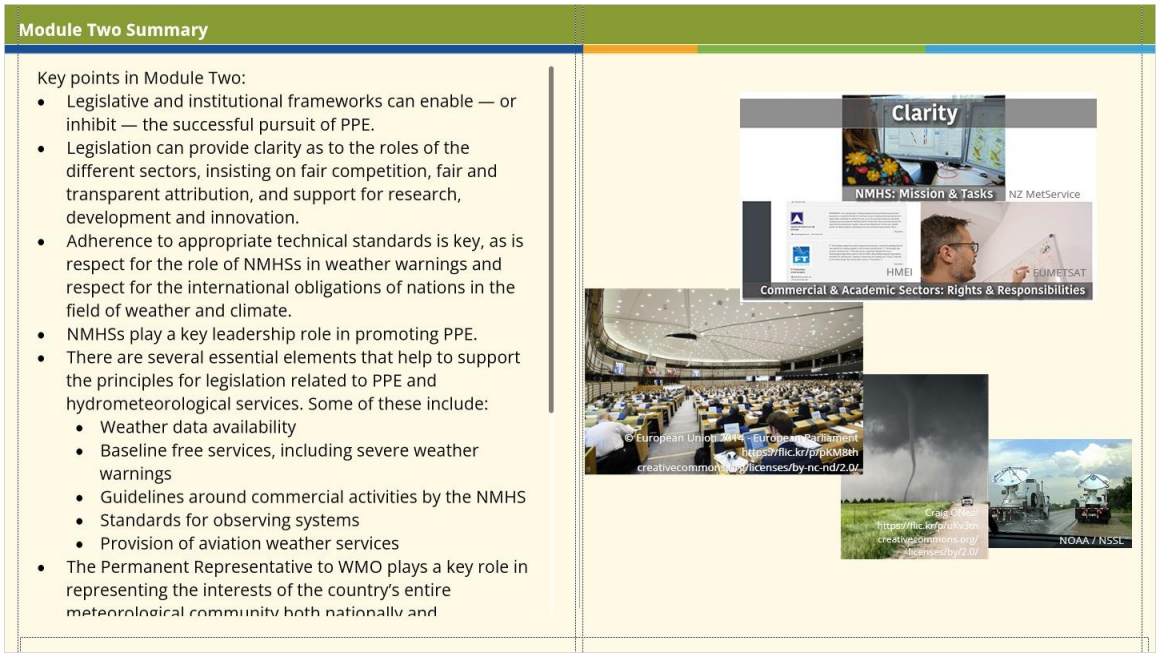
Results for
2.7 Question 1
2.8 Question 2

Result slide properties

Passing	70%
Score	

Notes:

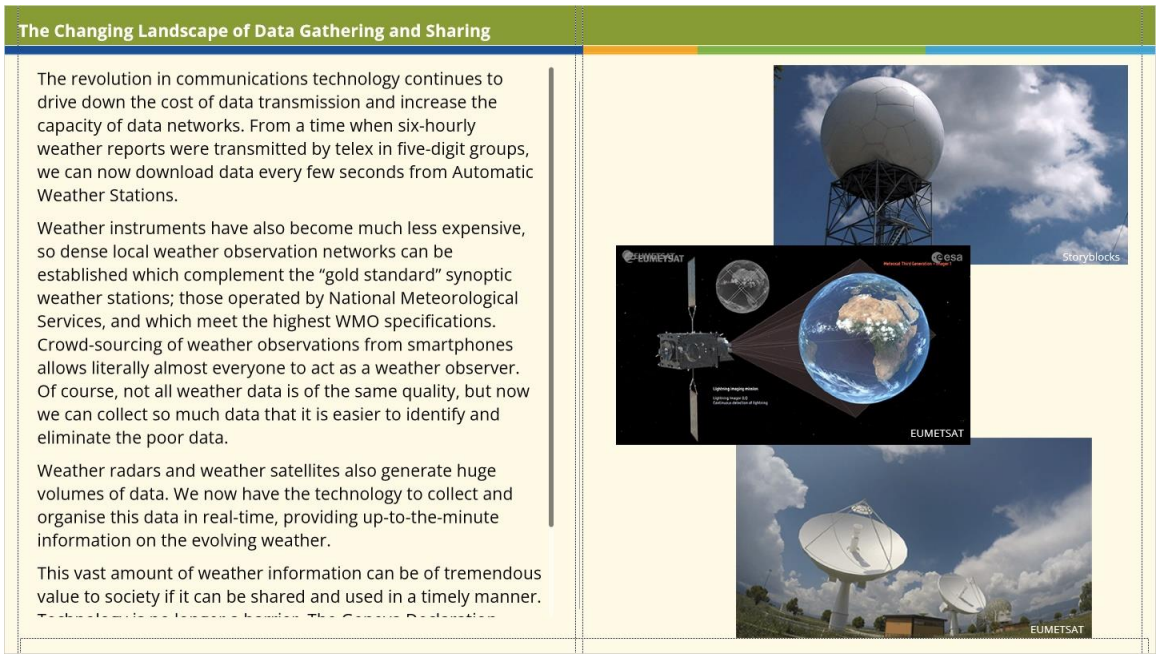
2.10 Module Two Summary



3. Module 3: Data Sharing

3.1 Module Overview: Data Sharing

3.2 The Changing Landscape of Data Gathering and Sharing



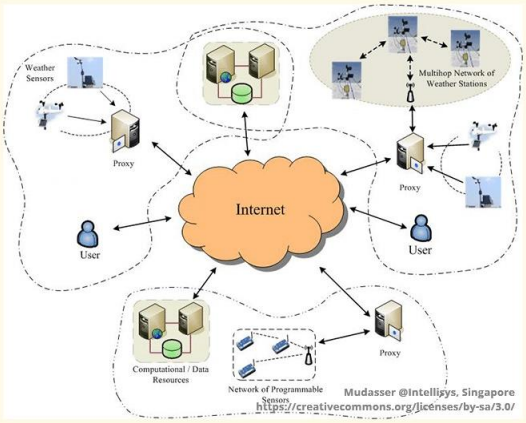
3.3 Sources and Distribution of Weather Data

Sources and Distribution of Weather Data

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.

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.

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.



3.4 Activity: Differing Needs, Concerns and Perspectives

(Pick Many, 10 points, 2 attempts permitted)

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

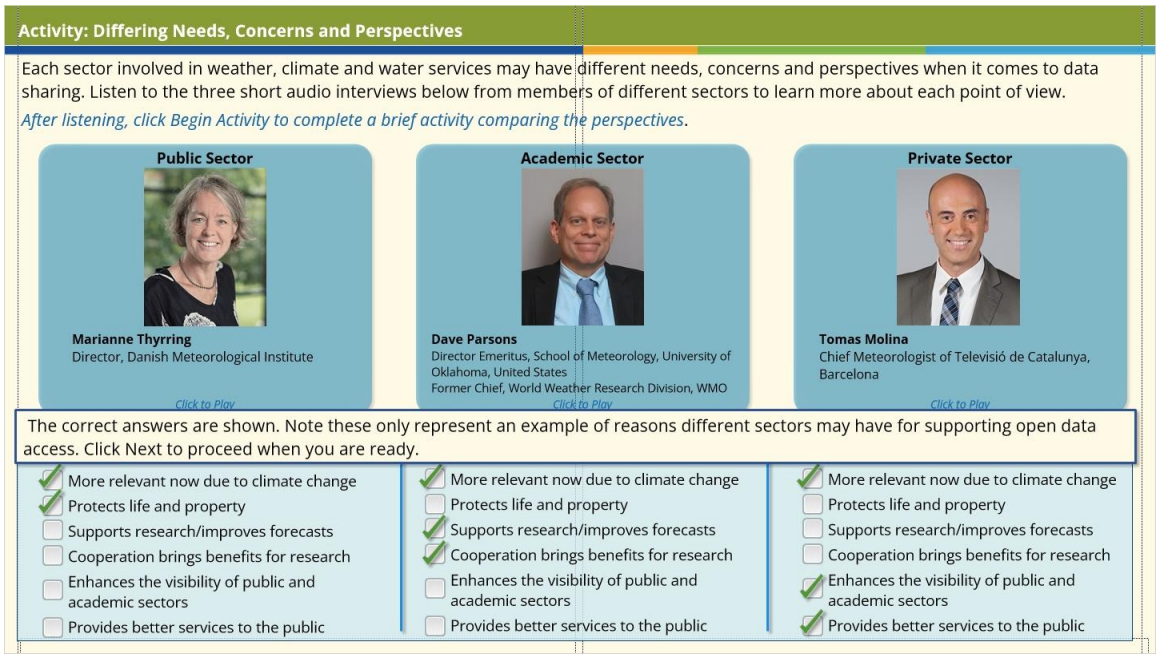
Click to Play

Begin Activity

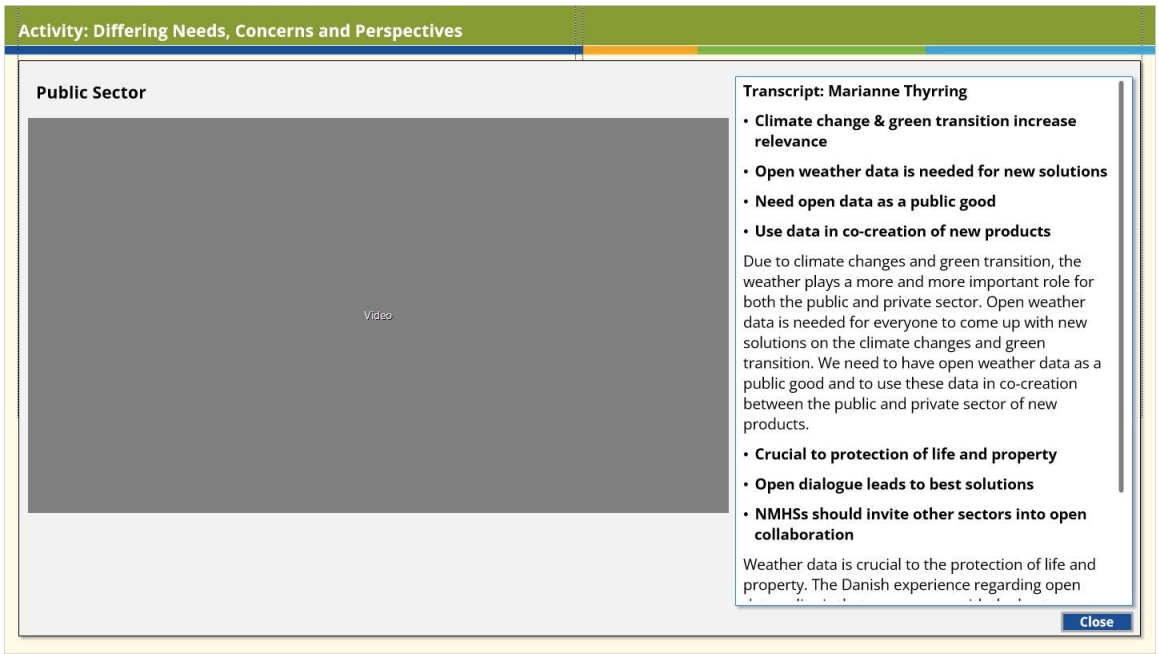
Correct	Choice
X	pub1
X	pub2
	pub3
	pub4
	pub5
	pub6
	aca1
	aca2
X	aca3
X	aca4
	aca5
	aca6
	priv1
	priv2
	priv3
	priv4
X	priv5
X	priv6

Notes:

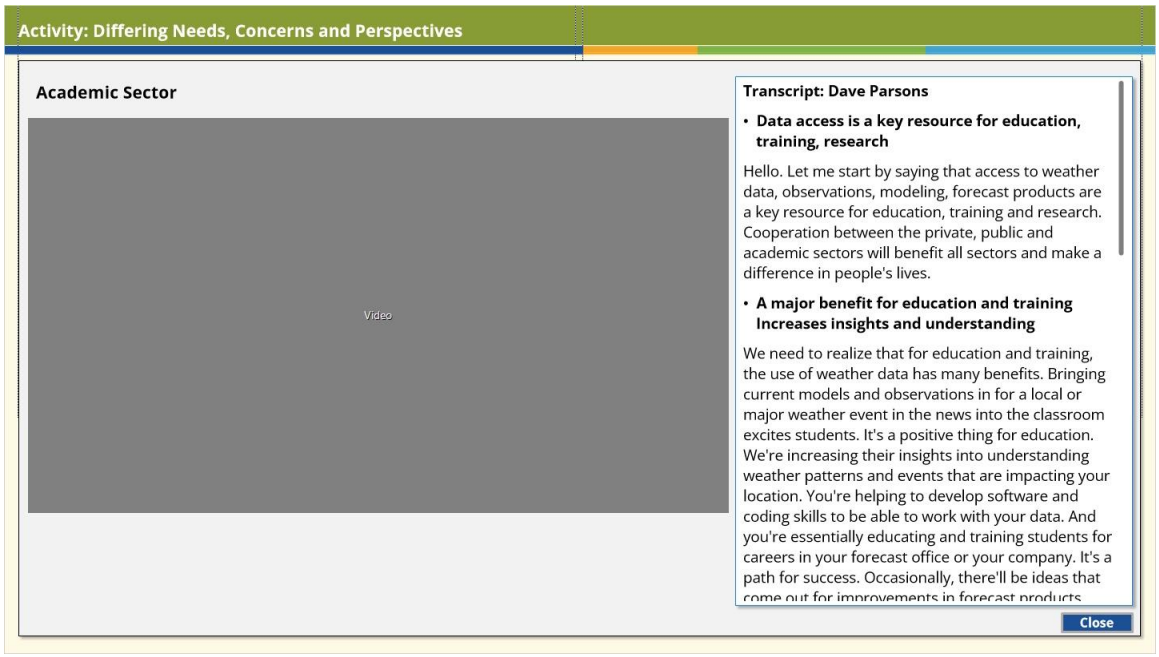
feedback (Slide Layer)



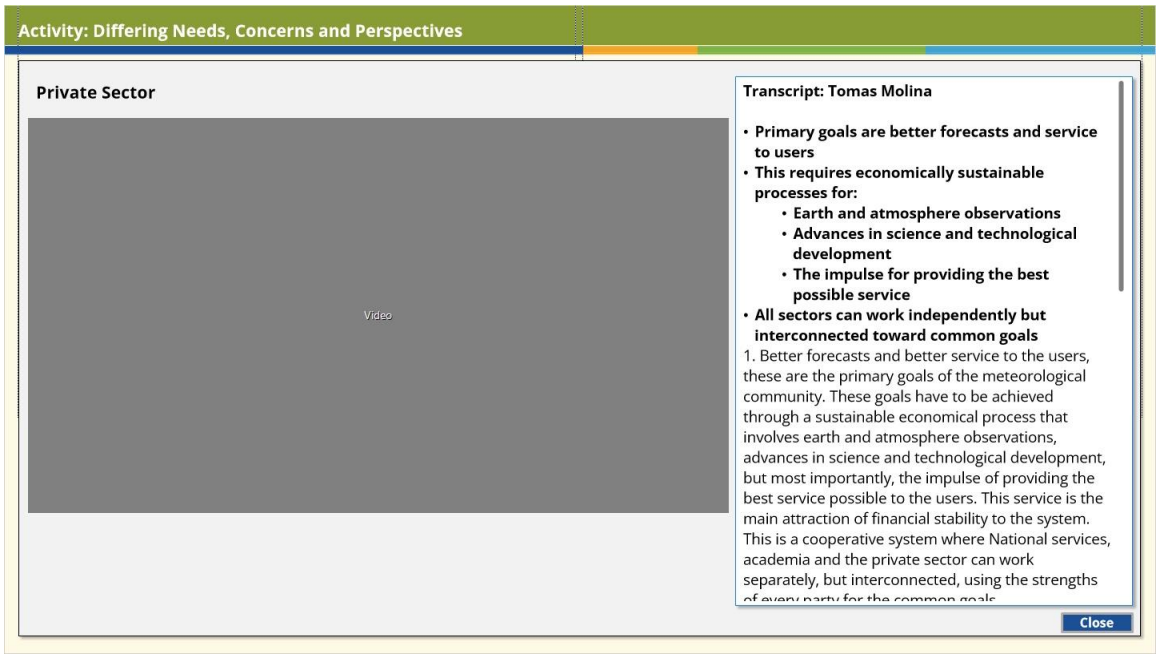
video1 (Slide Layer)



video2 (Slide Layer)

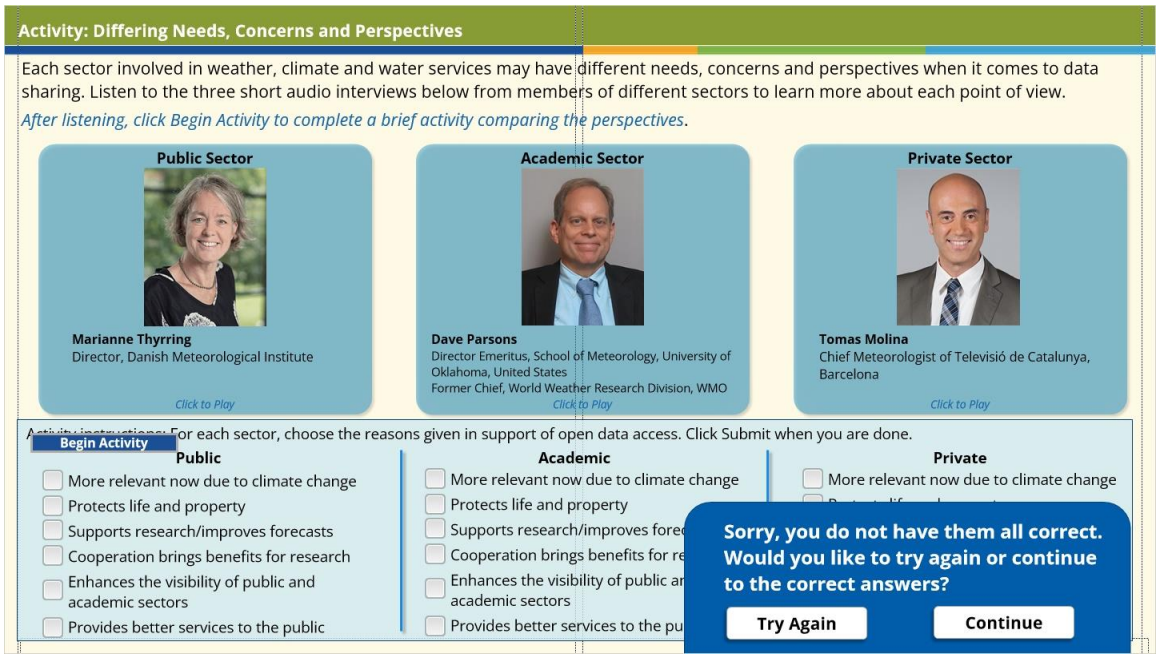


video3 (Slide Layer)



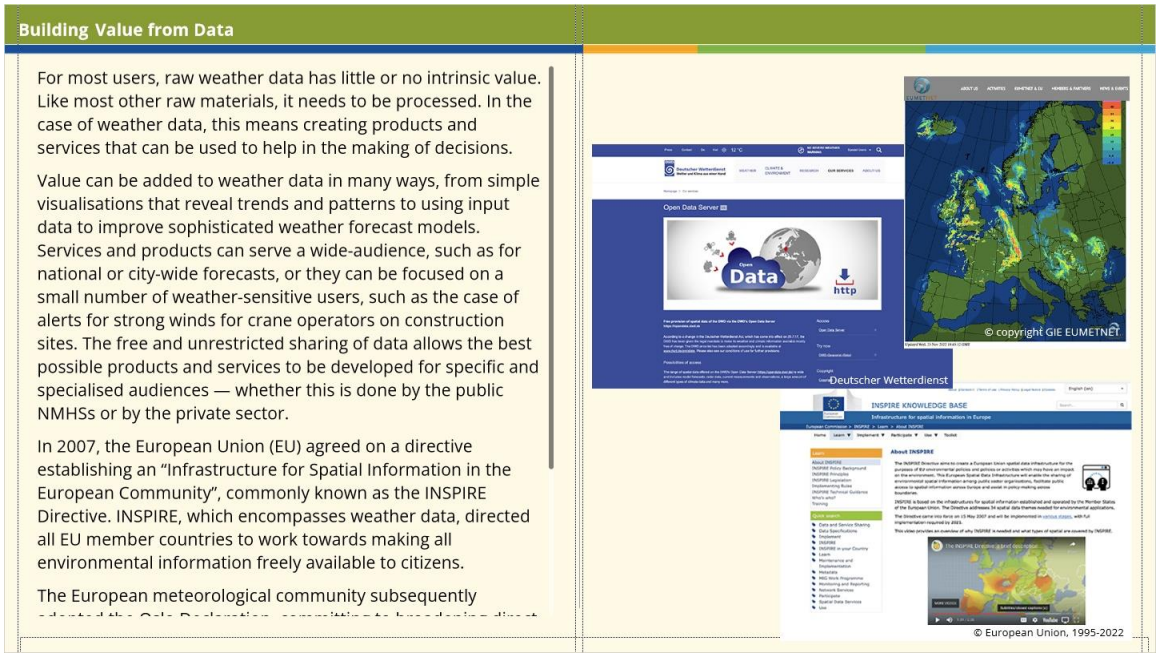
Correct (Slide Layer)

Try Again (Slide Layer)



Incorrect (Slide Layer)

3.5 Building Value from Data



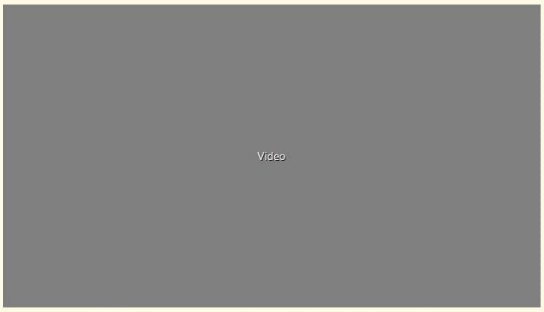
3.6 WMO Unified Data Policy

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?lvl=notice_display&id=22100#

3.7 Data Availability

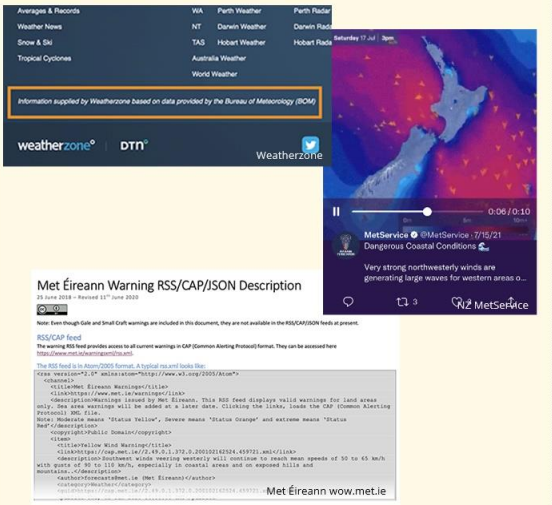
Data Availability

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.

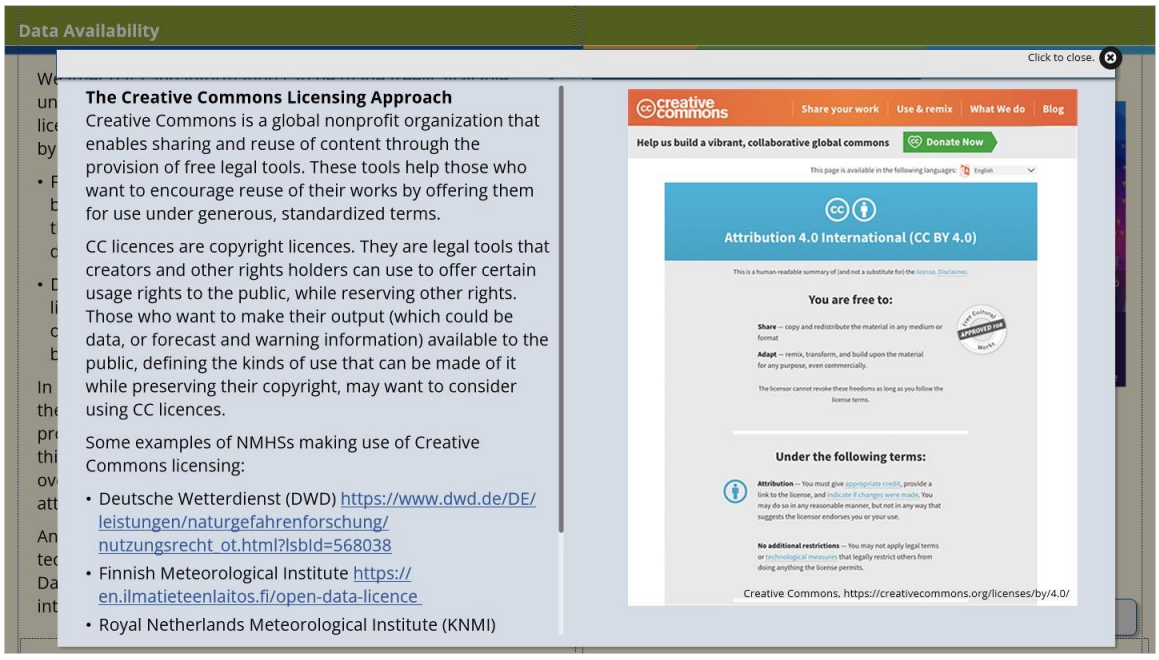
Another very important aspect of data accessibility is the technical means by which it is made discoverable and available. Data must be provided in formats that the user can easily interpret. Establishment of the necessary technical



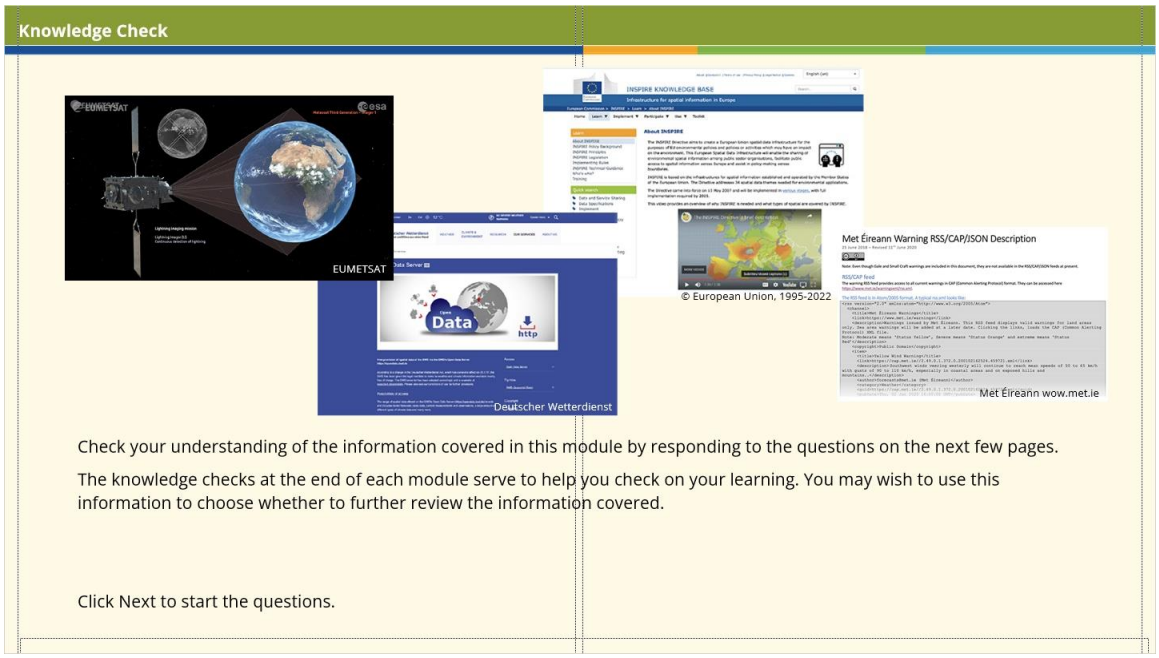
Learn more: The Creative Commons Licensing Approach

Notes:

zoom1 (Slide Layer)

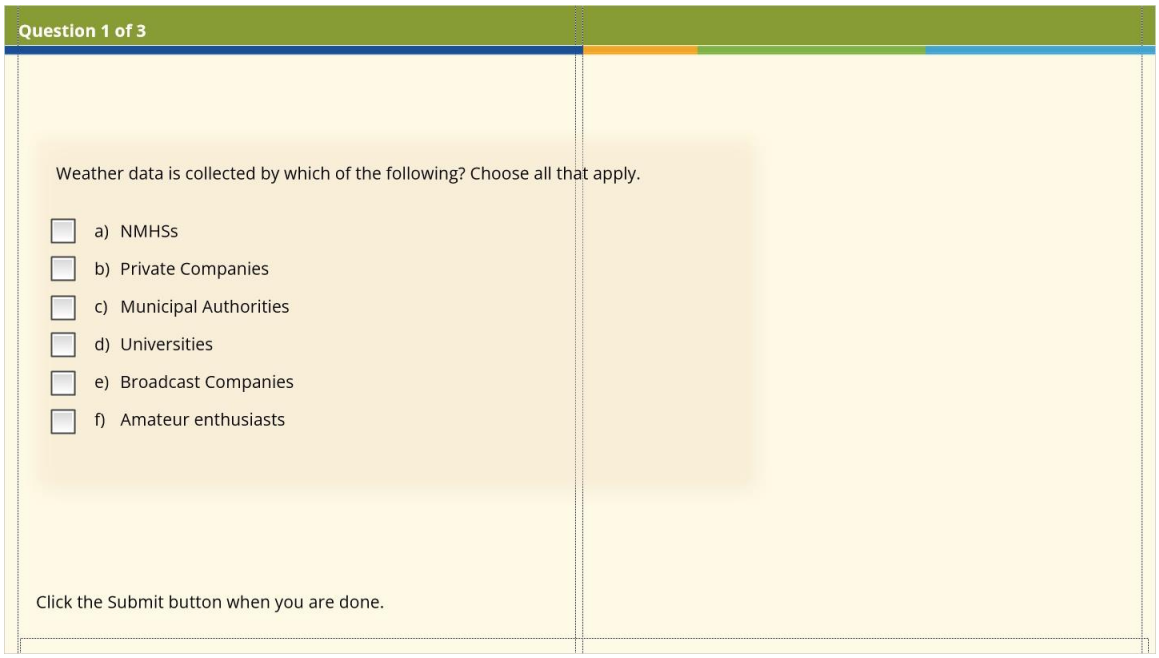


3.8 Knowledge Check



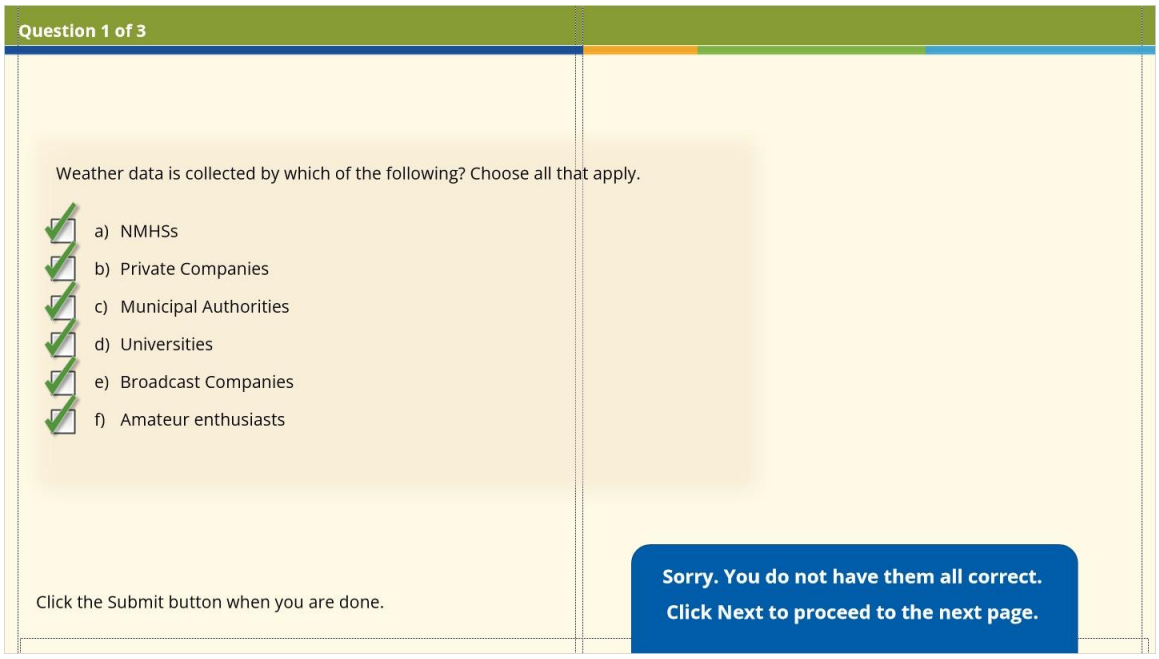
3.9 Question 1

(Pick Many, 10 points, 1 attempt permitted)

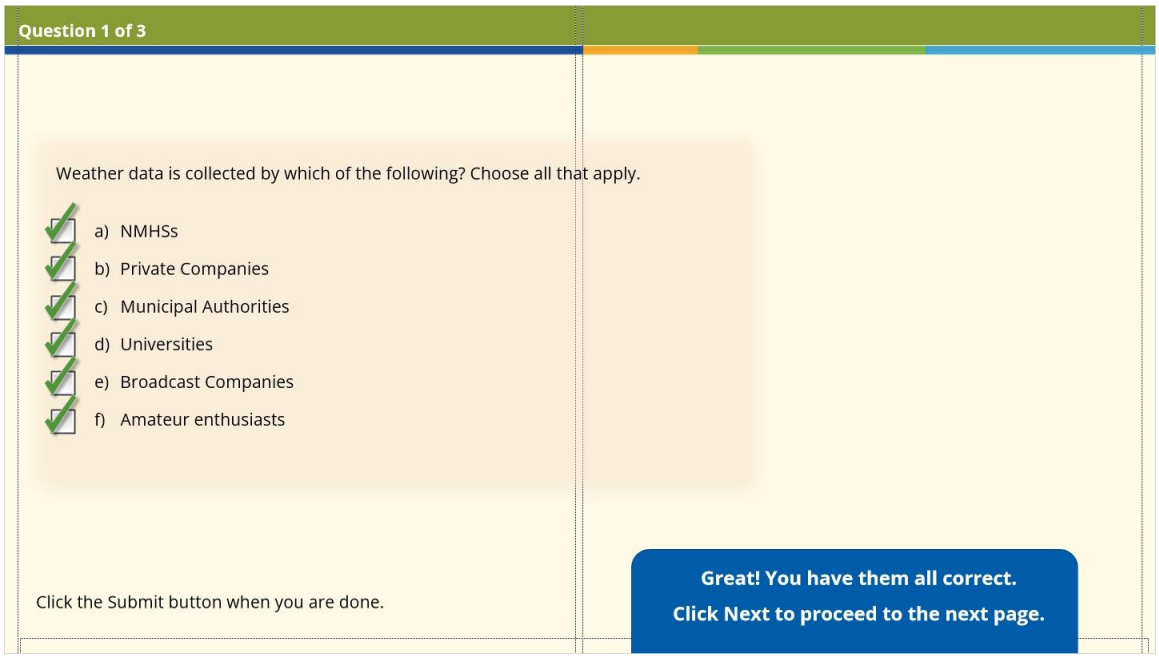


Correct	Choice
X	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
X	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

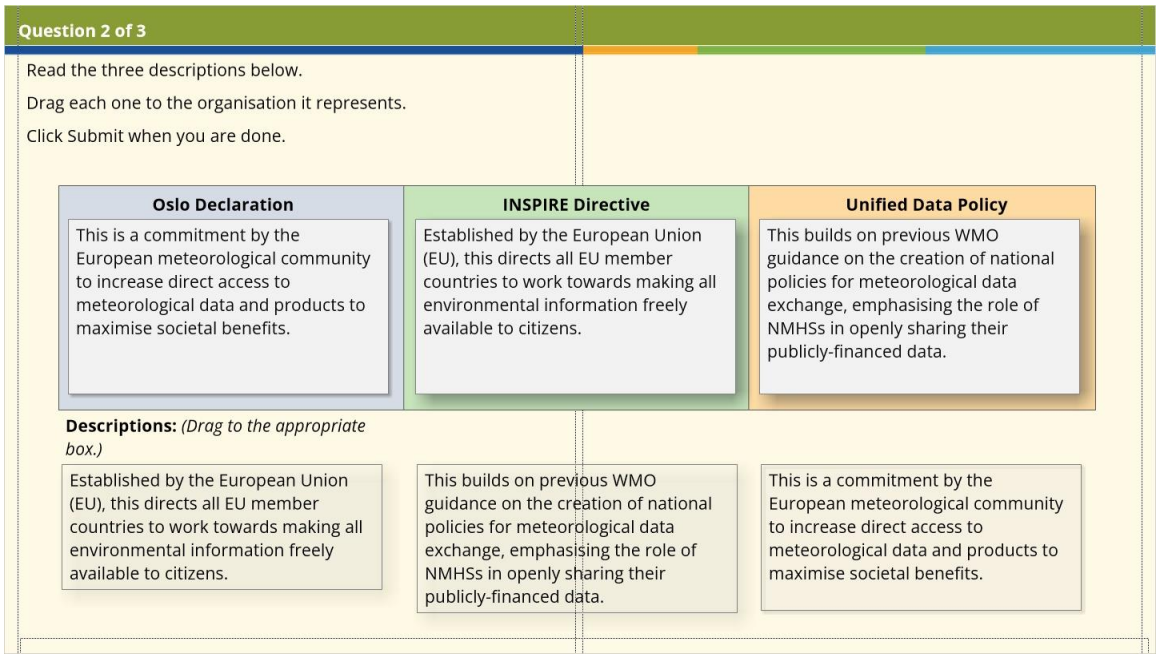


Correct (Slide Layer)



3.10 Question 2

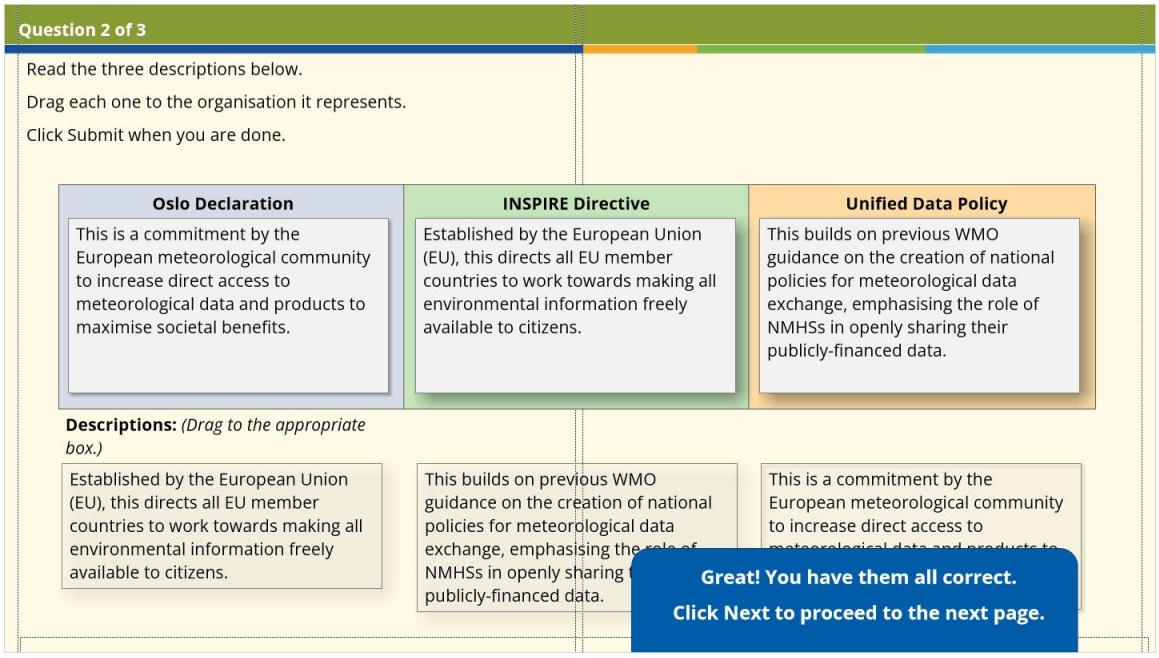
(Drag and Drop, 10 points, 1 attempt permitted)



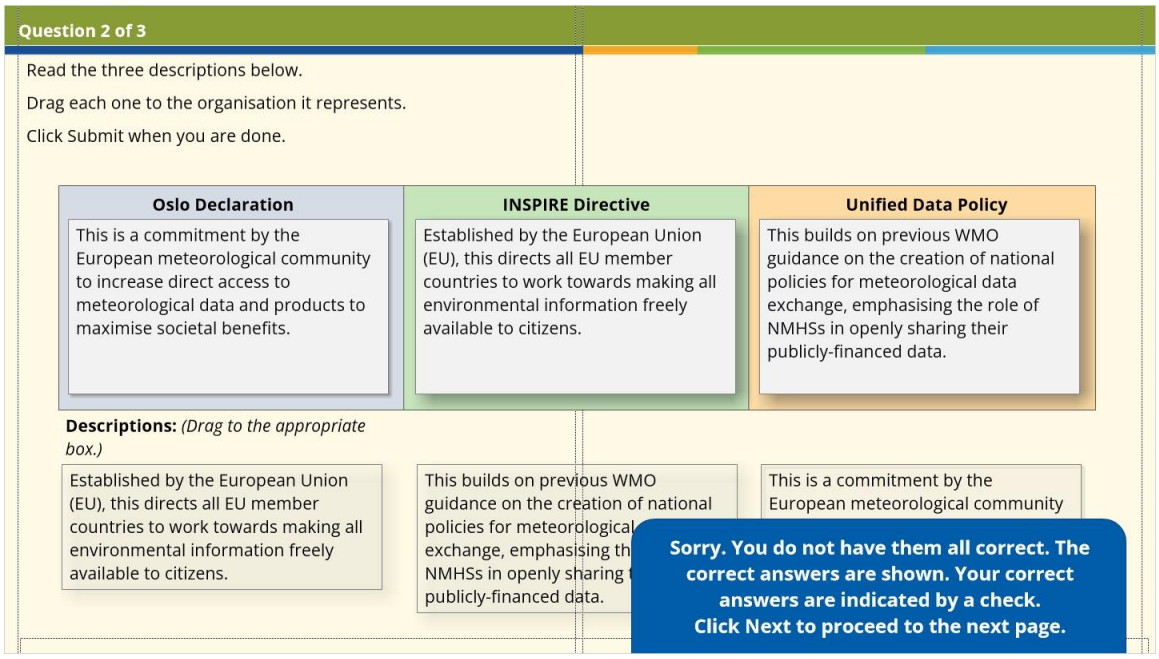
Drag Item	Drop Target
Established by the European Union (EU), this directs all EU member countries to work towards making all environmental information freely available to citizens.	dropzone2
This is a commitment by the European meteorological community to increase direct access to meteorological data 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)

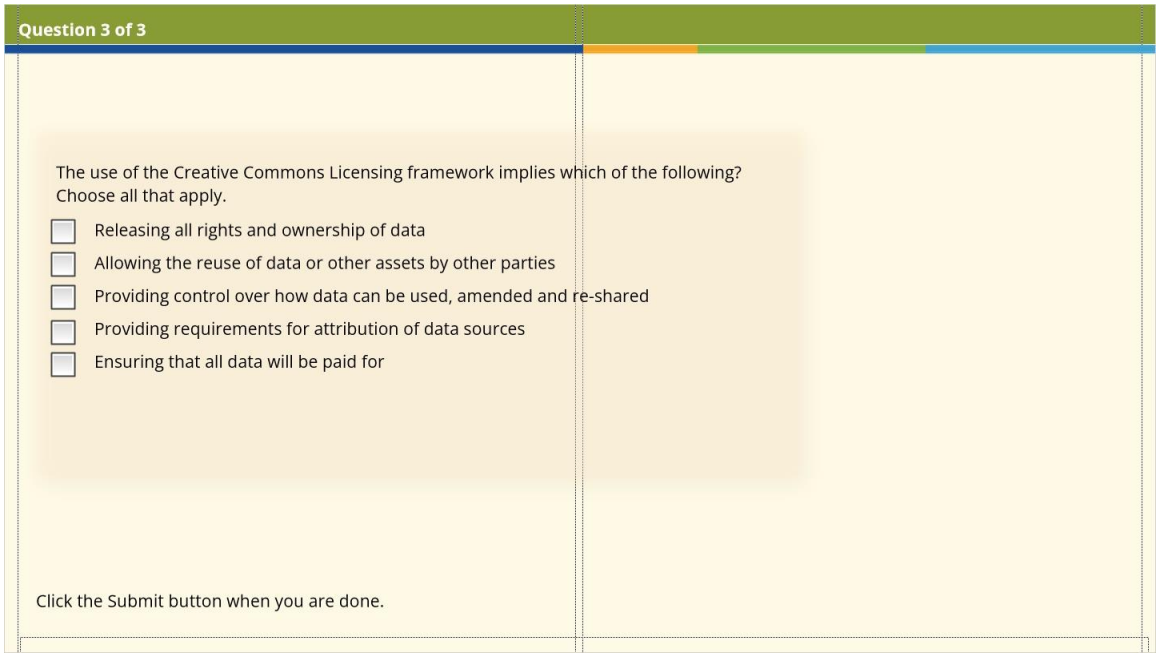


Incorrect (Slide Layer)



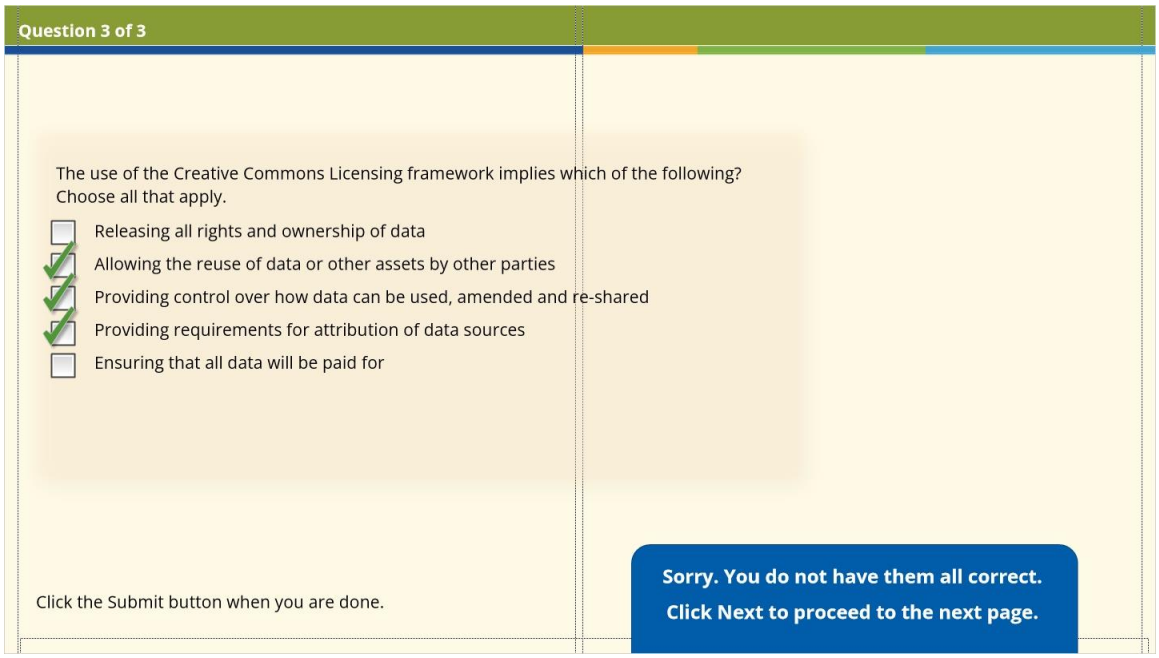
3.11 Question 3

(Pick Many, 10 points, 1 attempt permitted)

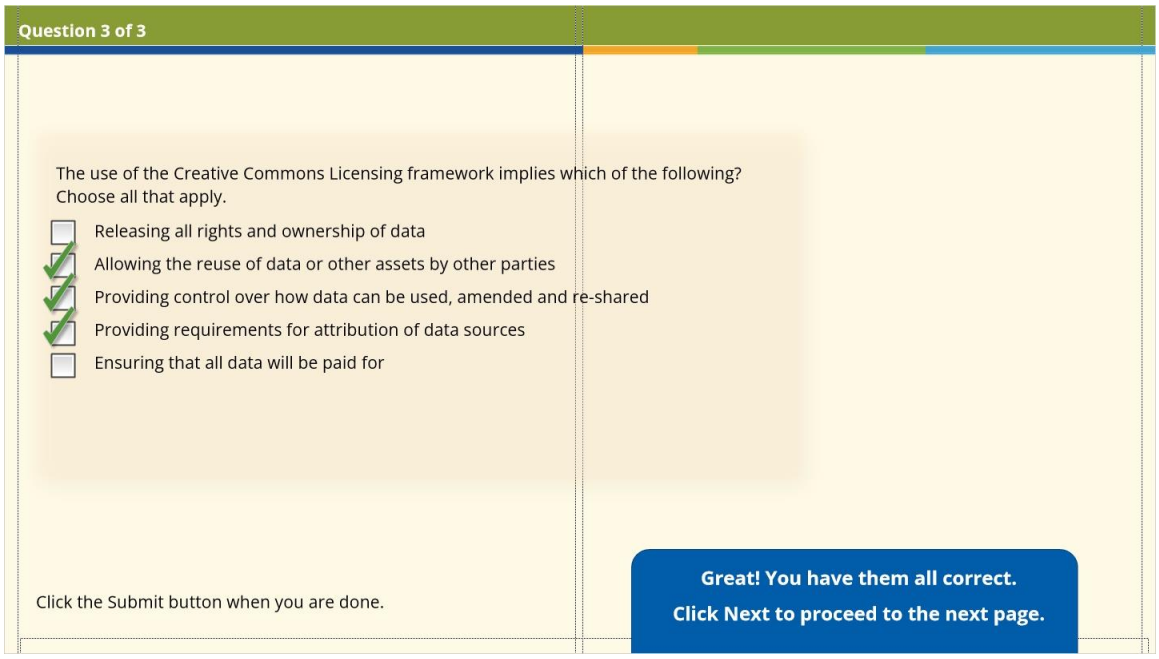


Correct	Choice
	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
	Check Box 5

Incorrect (Slide Layer)

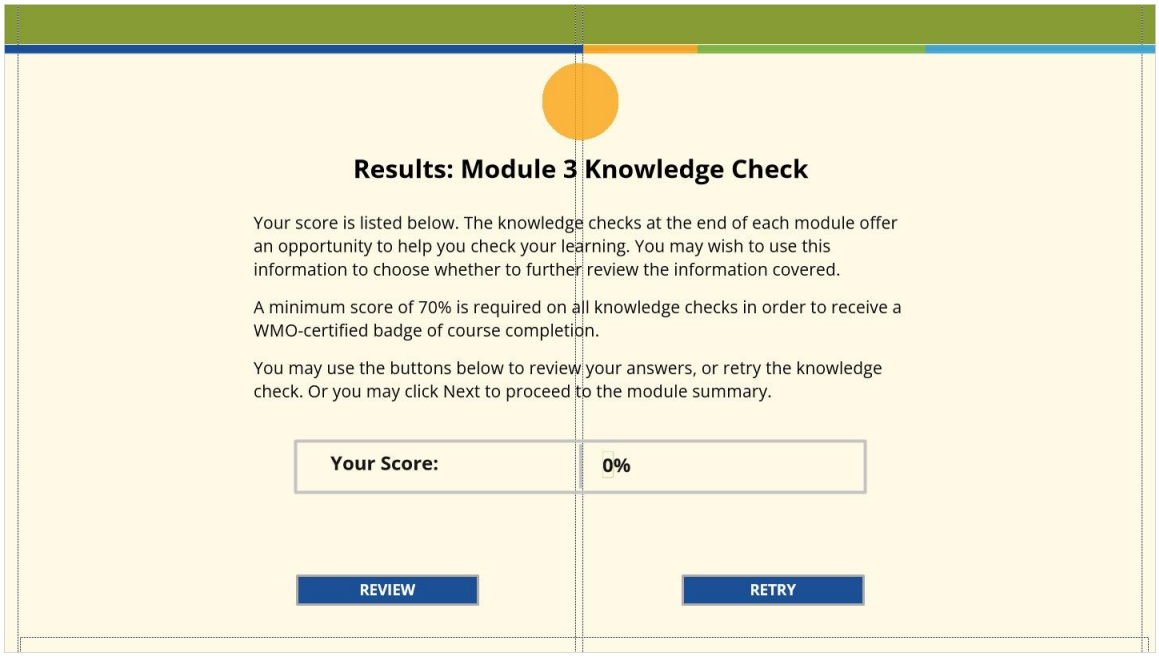


Correct (Slide Layer)



3.12 Results: Module 3 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



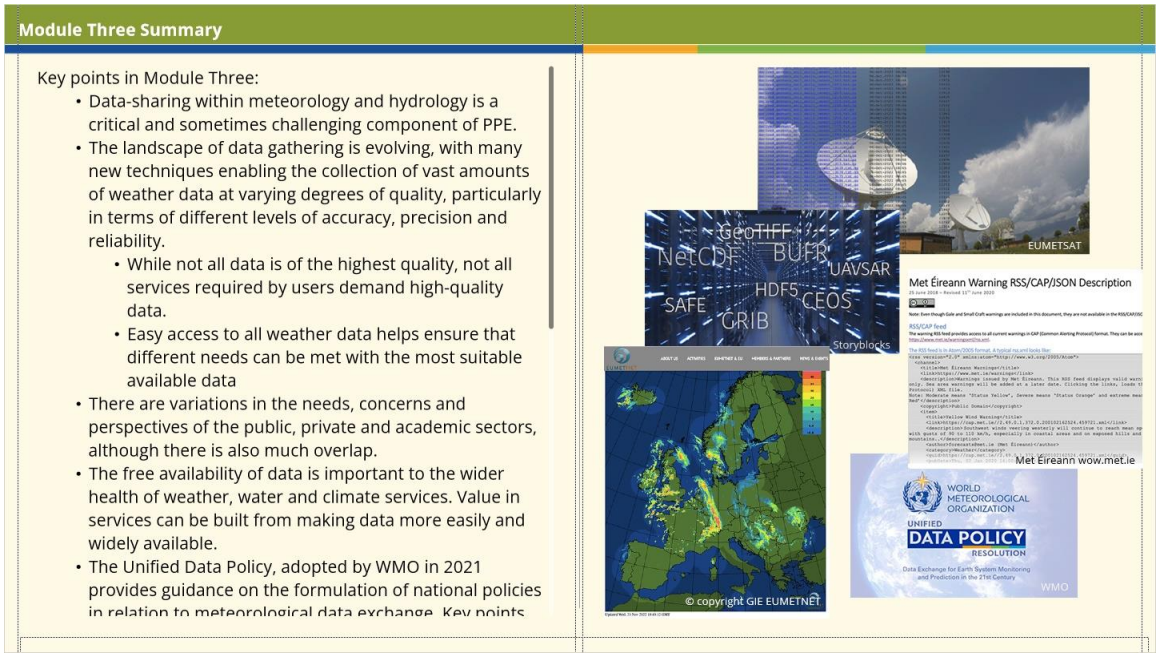
Results for
3.9 Question 1
3.10 Question 2
3.11 Question 3

Result slide properties

Passing	70%
Score	

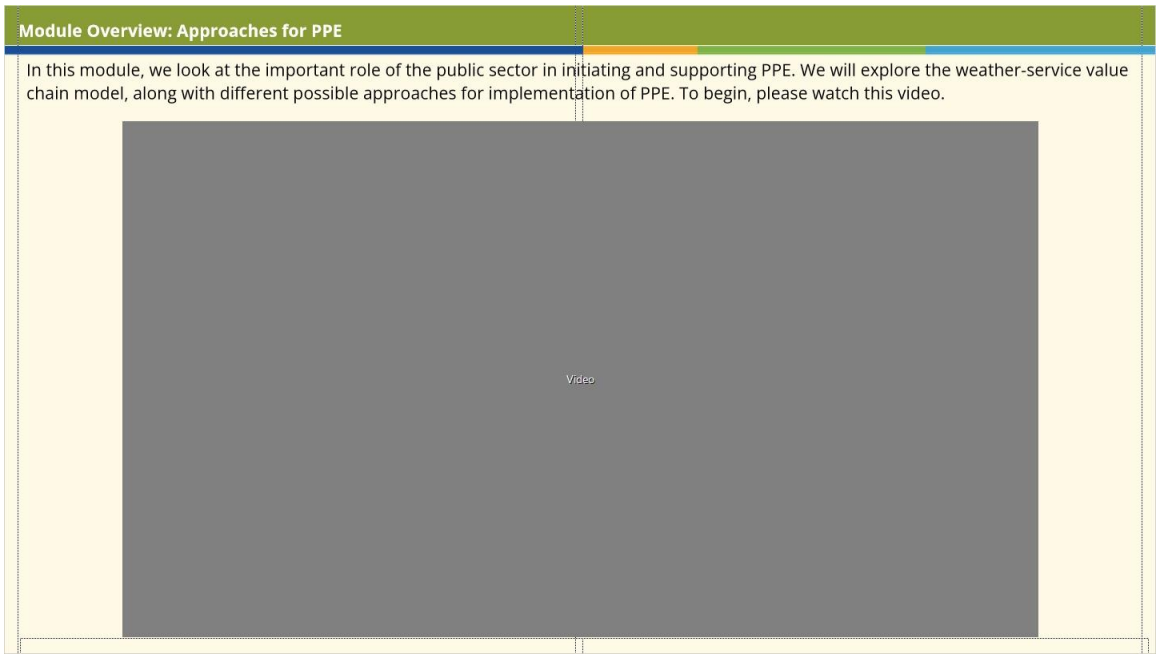
Notes:

3.13 Module Three Summary

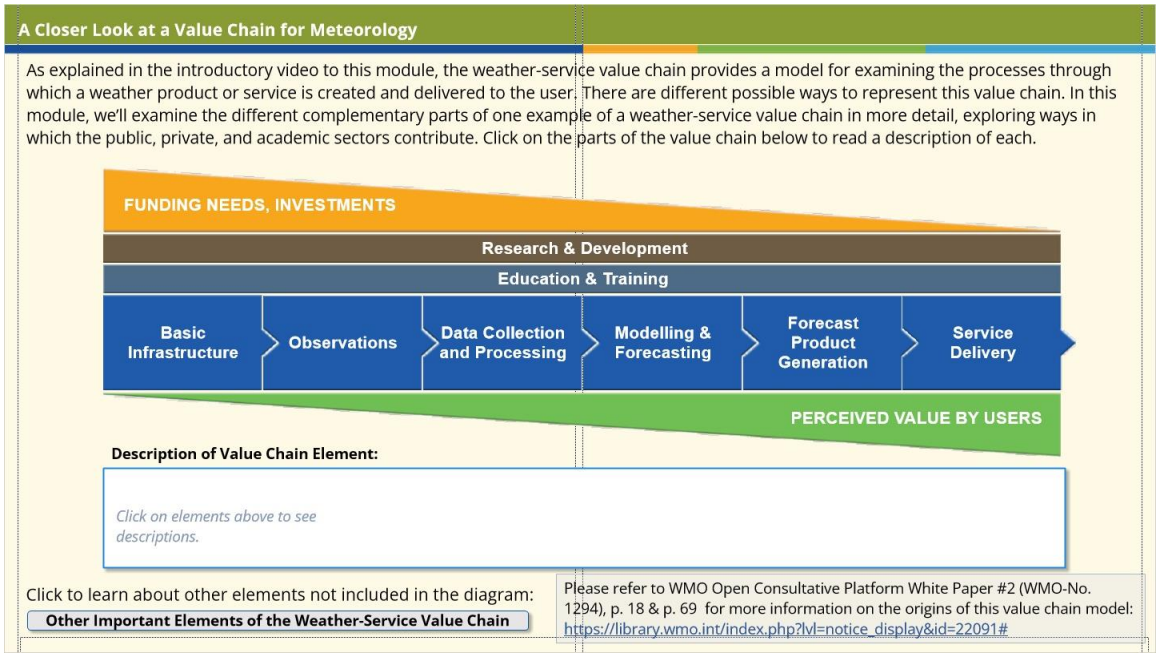


4. Module 4: Approaches for PPE

4.1 Module Overview: Approaches for PPE

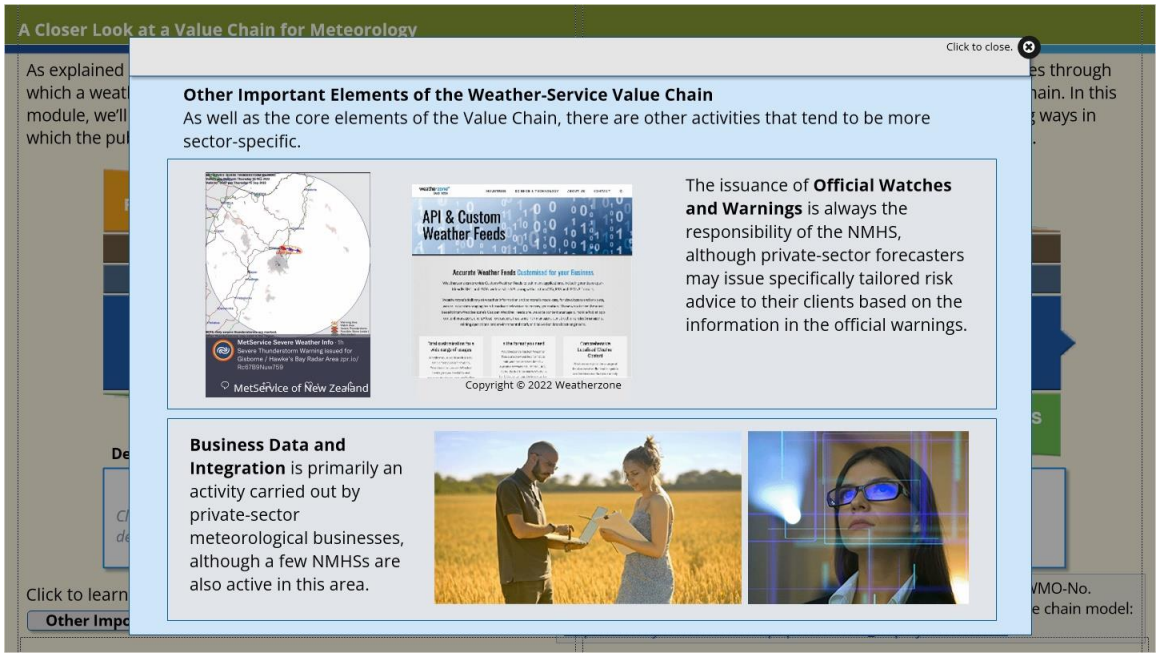


4.2 A Closer Look at a Value Chain for Meteorology

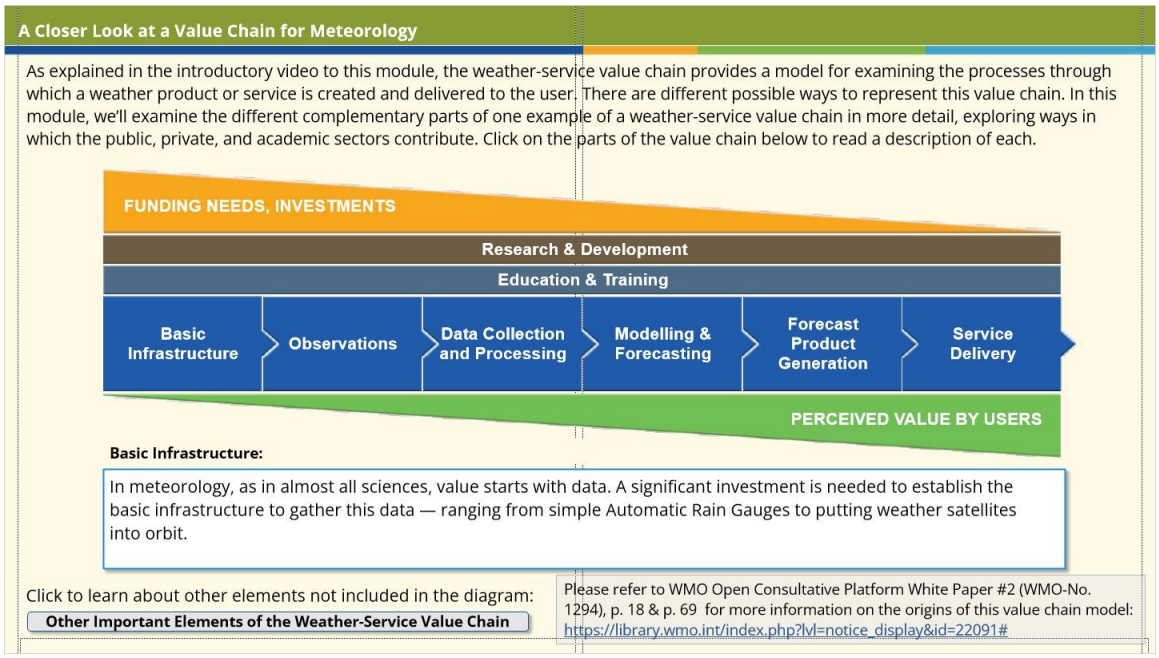


Notes:

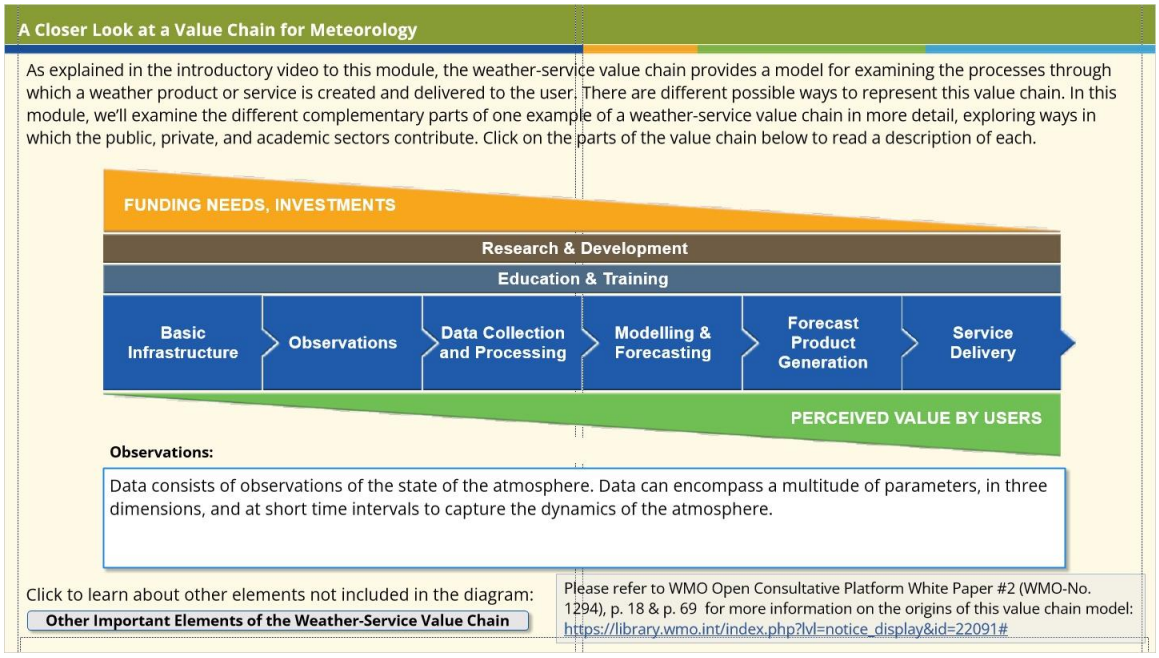
zoom1 (Slide Layer)



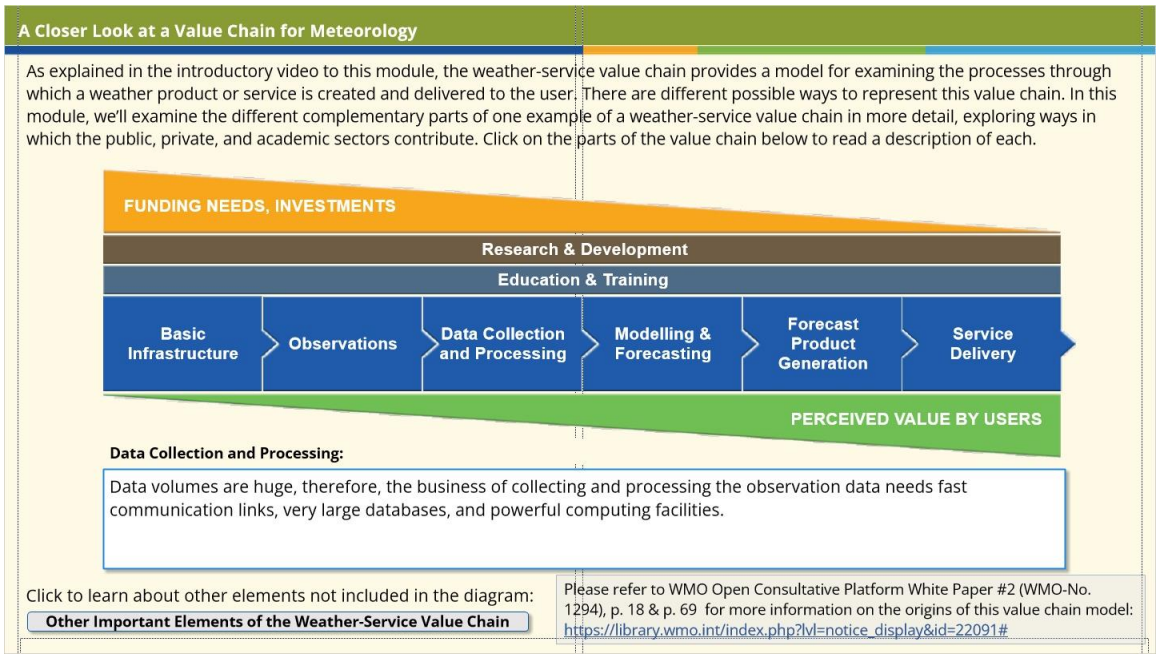
Basic (Slide Layer)



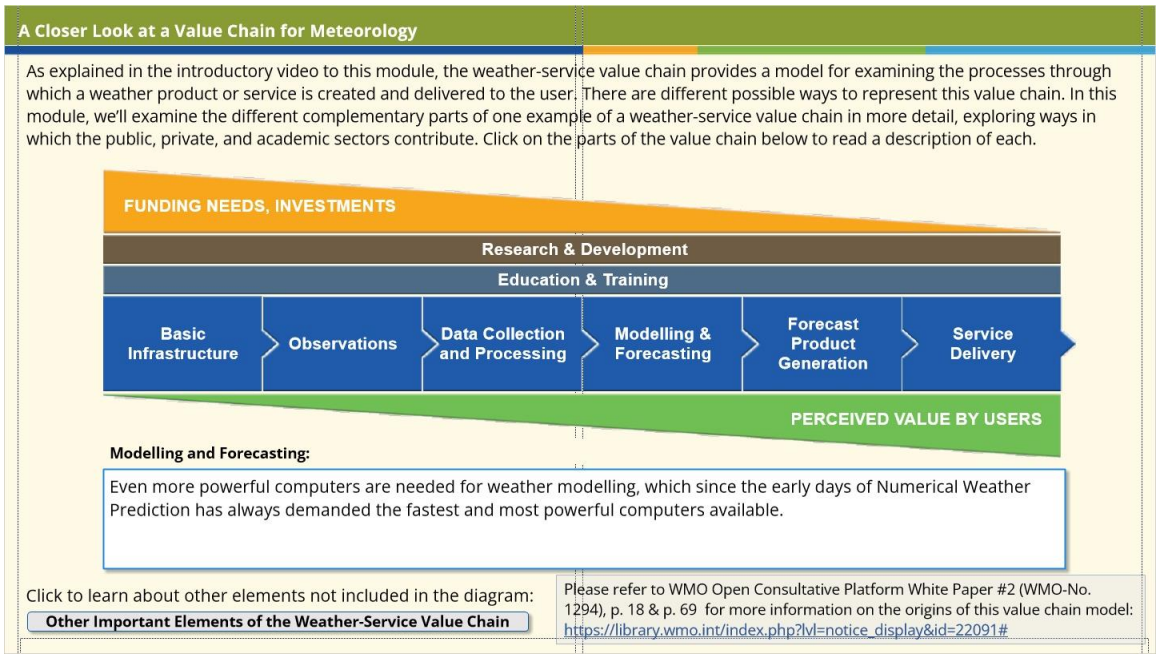
Observations (Slide Layer)



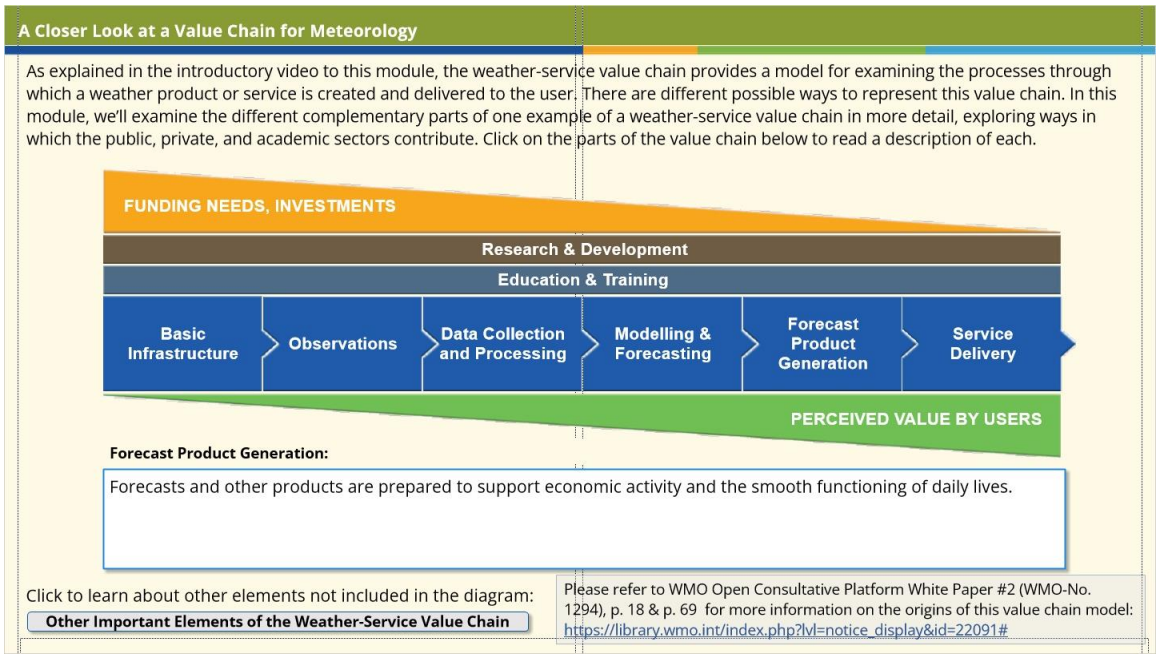
Data (Slide Layer)



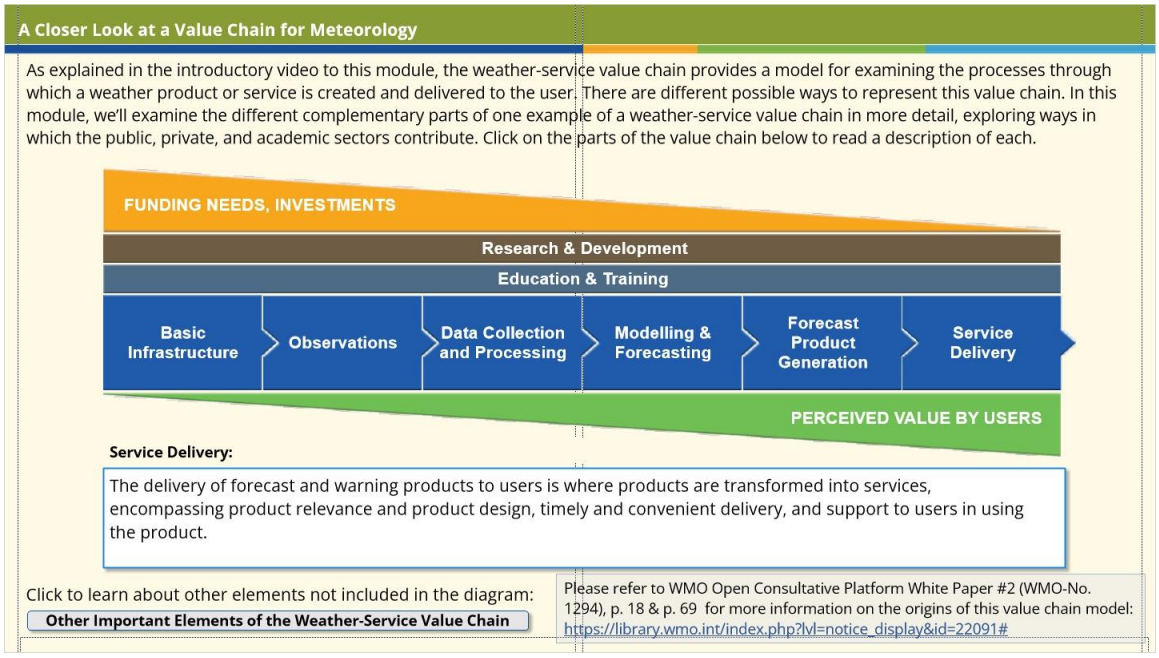
Modelling (Slide Layer)



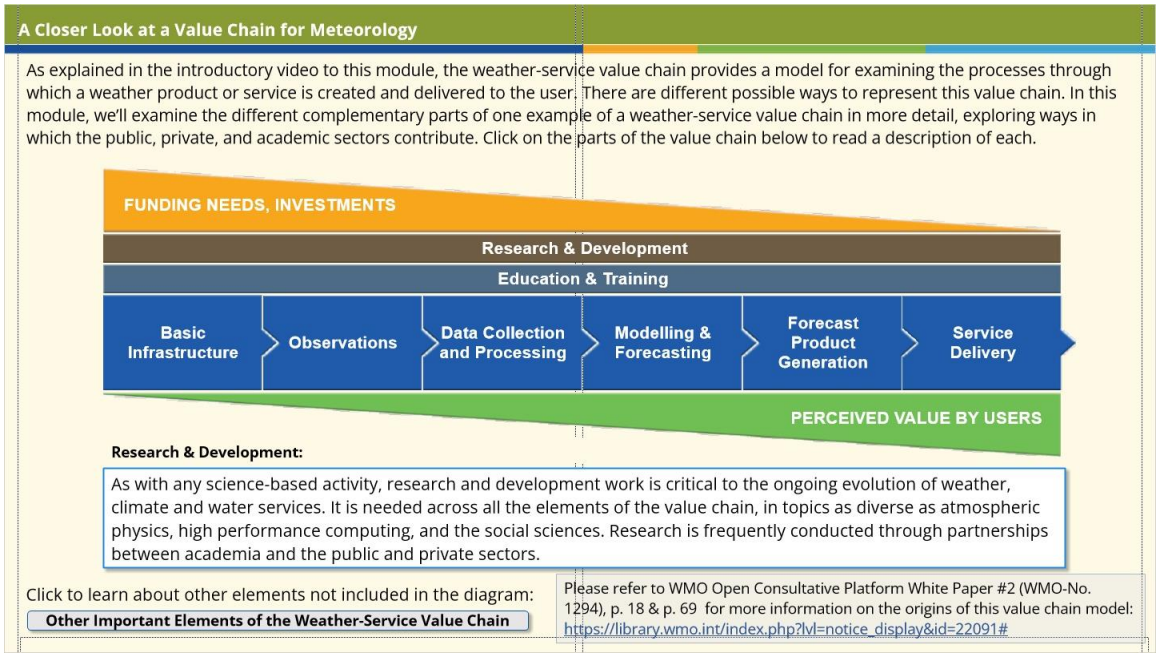
Forecast (Slide Layer)



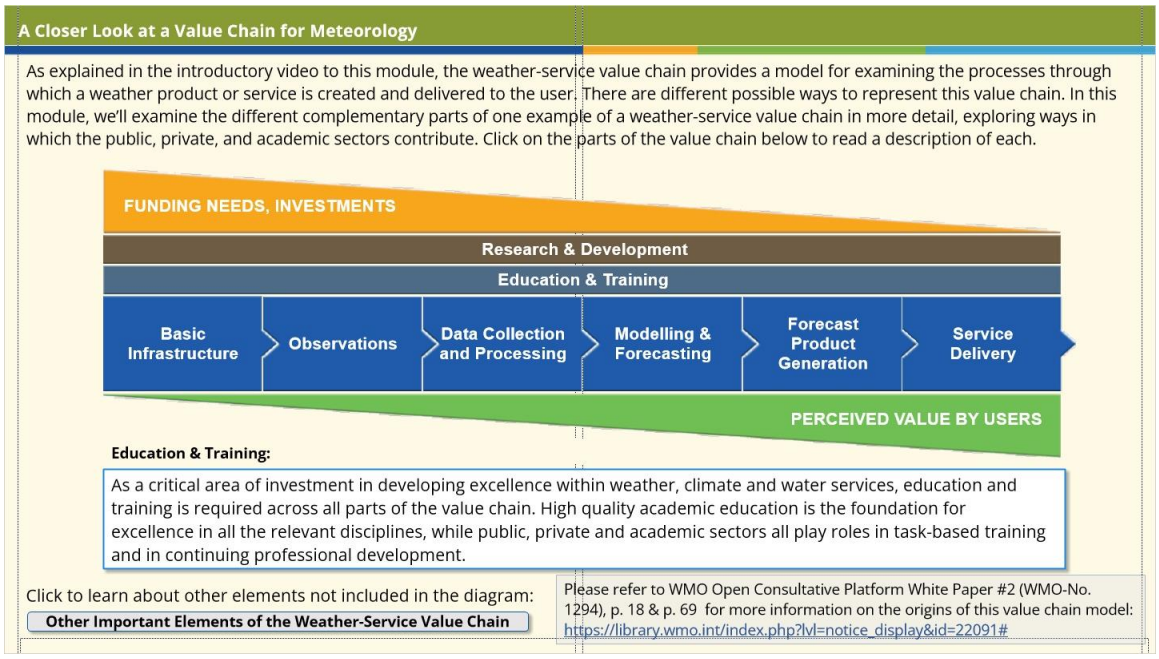
Service (Slide Layer)



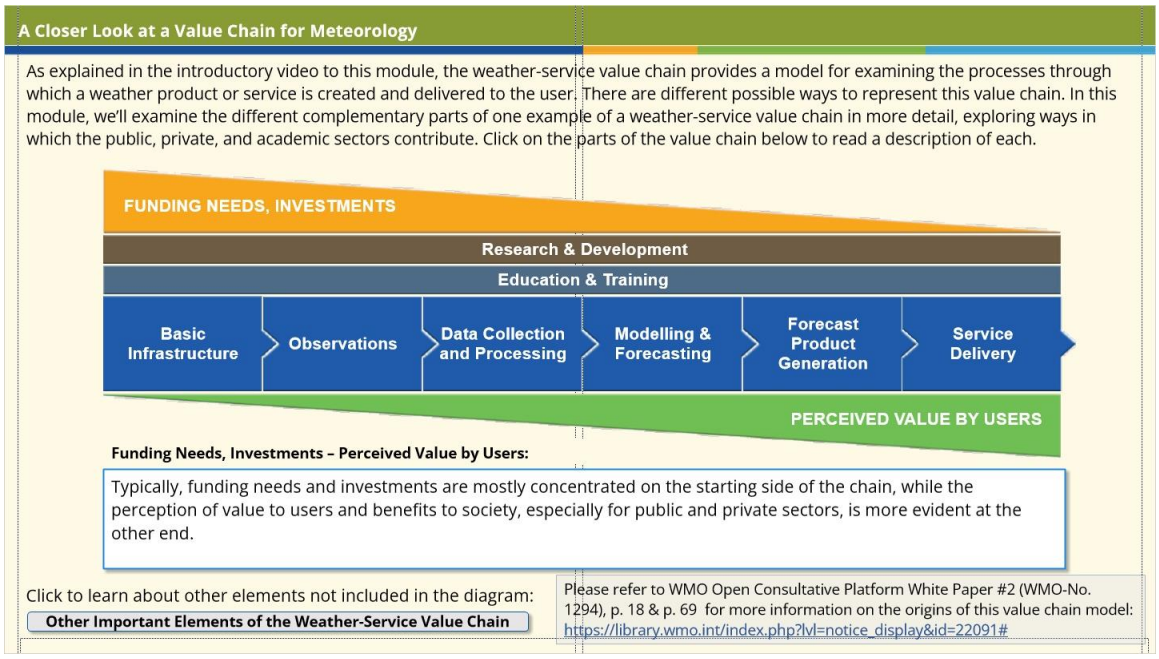
Research (Slide Layer)



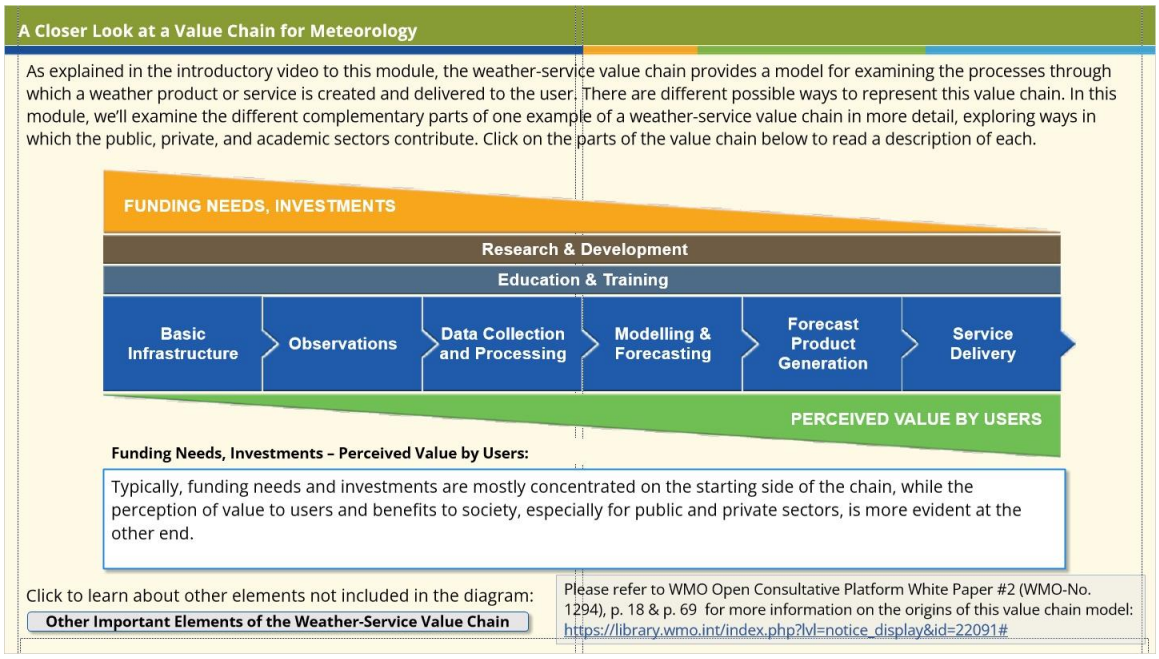
Education (Slide Layer)



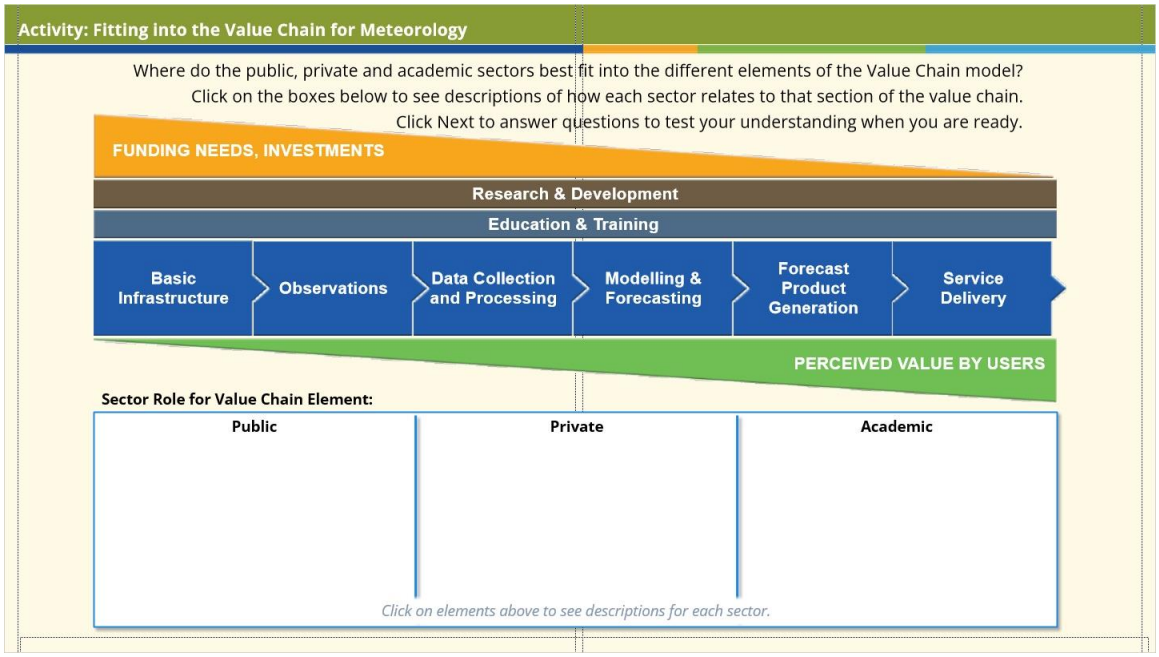
Funding (Slide Layer)



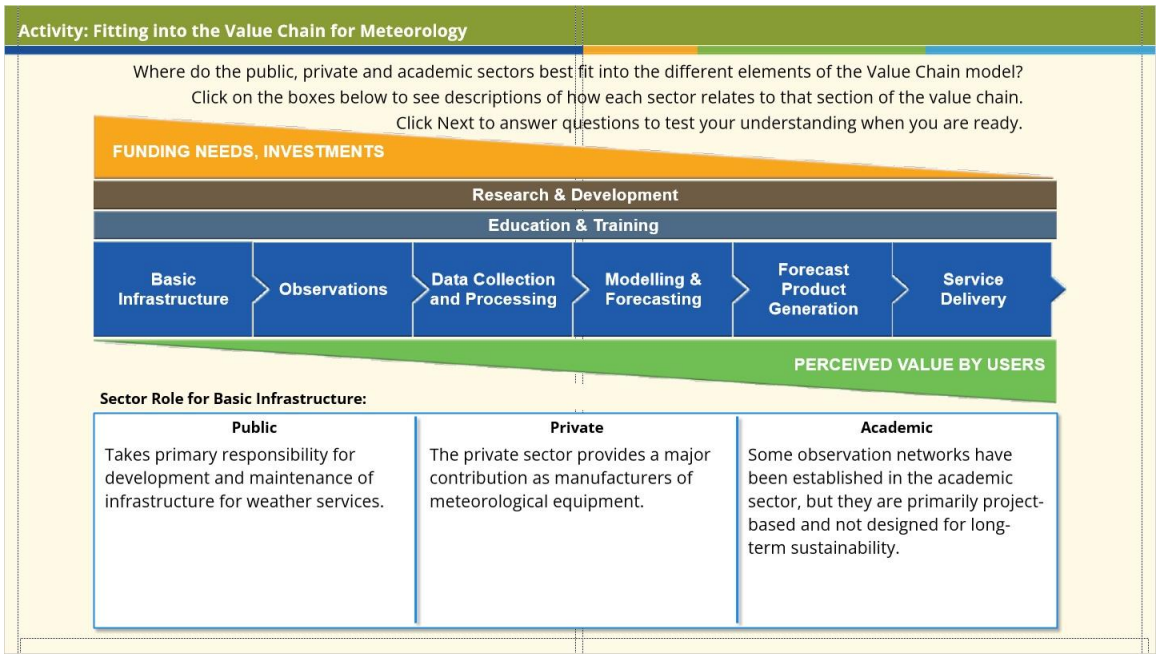
Perceived (Slide Layer)



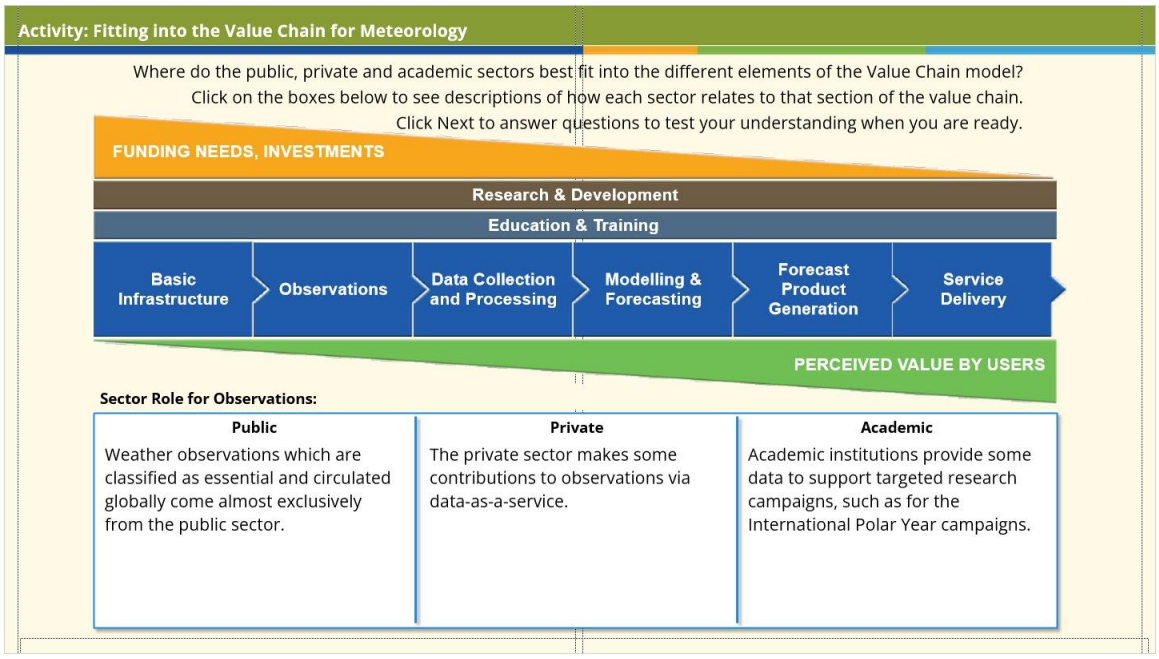
4.3 Activity: Fitting into the Value Chain for Meteorology



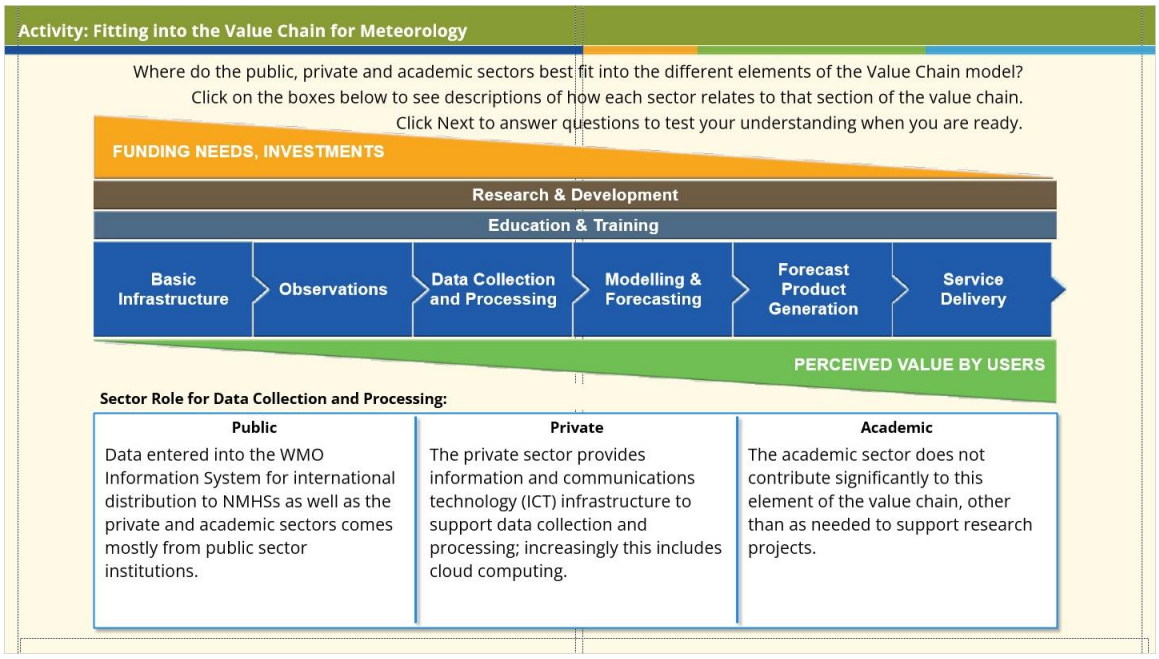
Basic (Slide Layer)



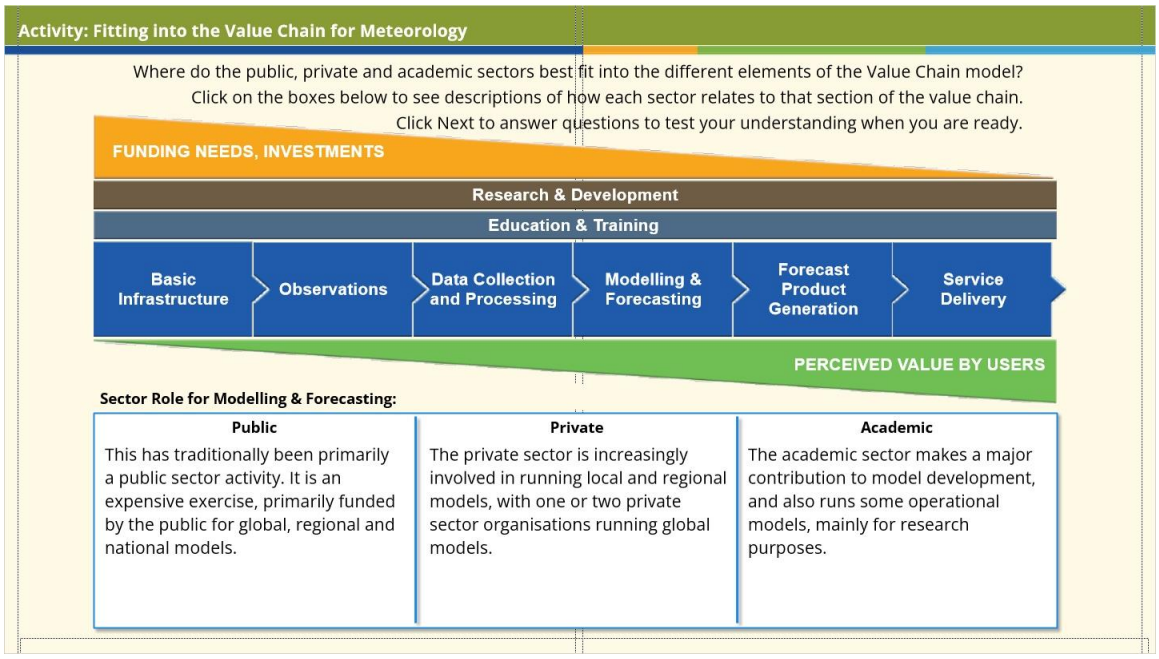
Observations (Slide Layer)



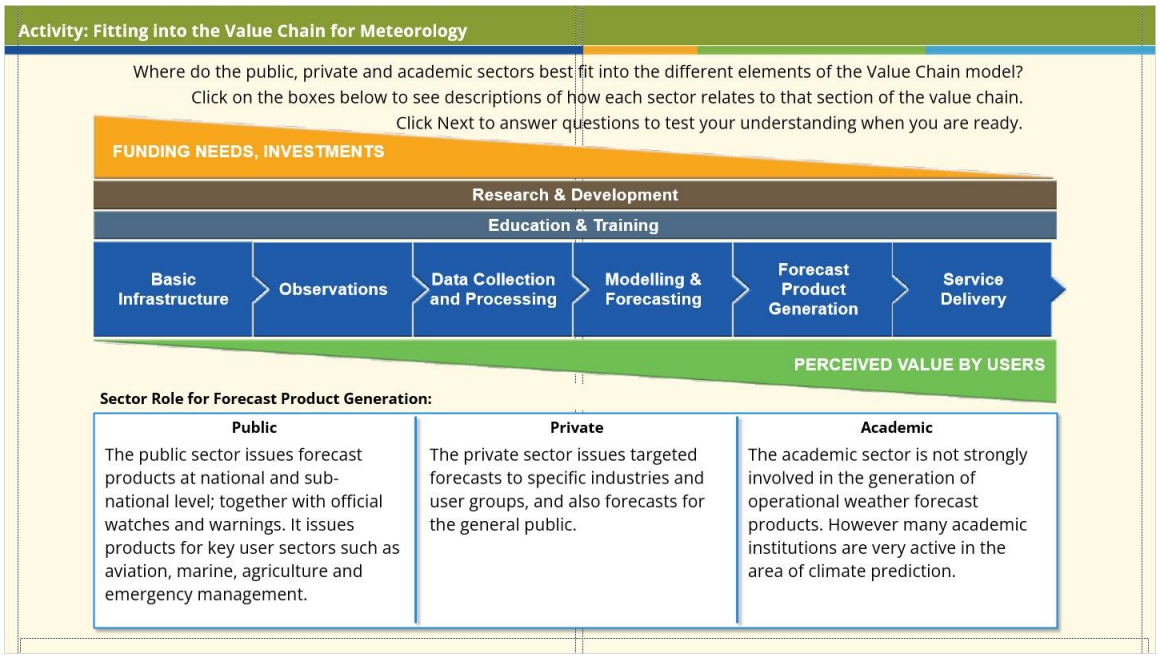
Data (Slide Layer)



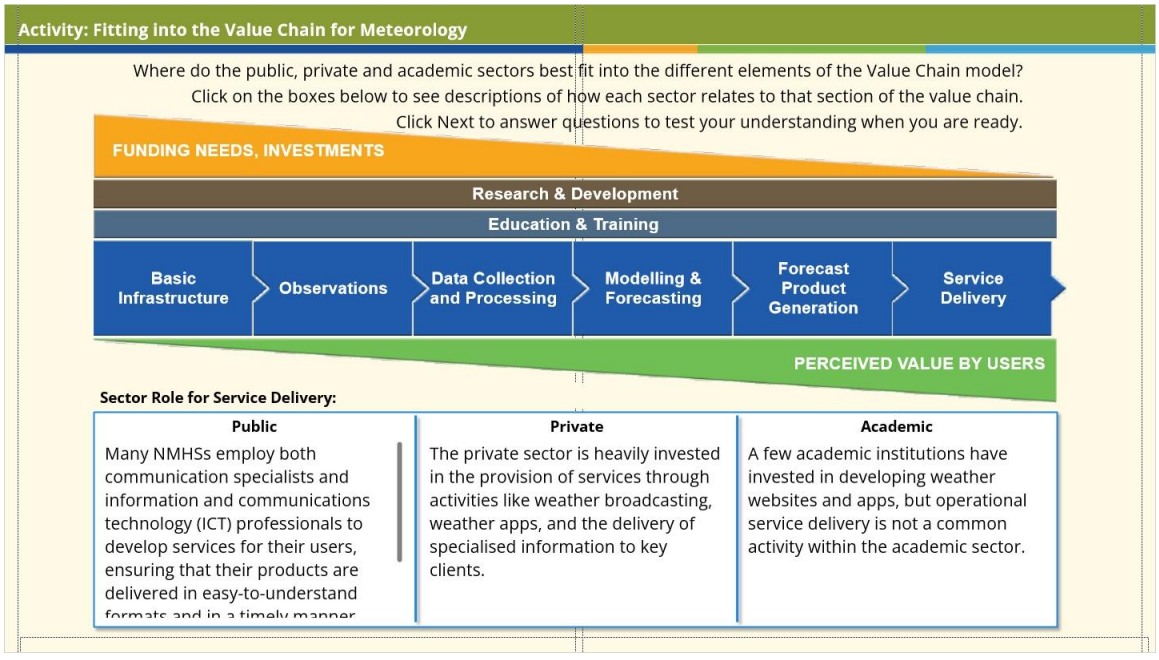
Modelling (Slide Layer)



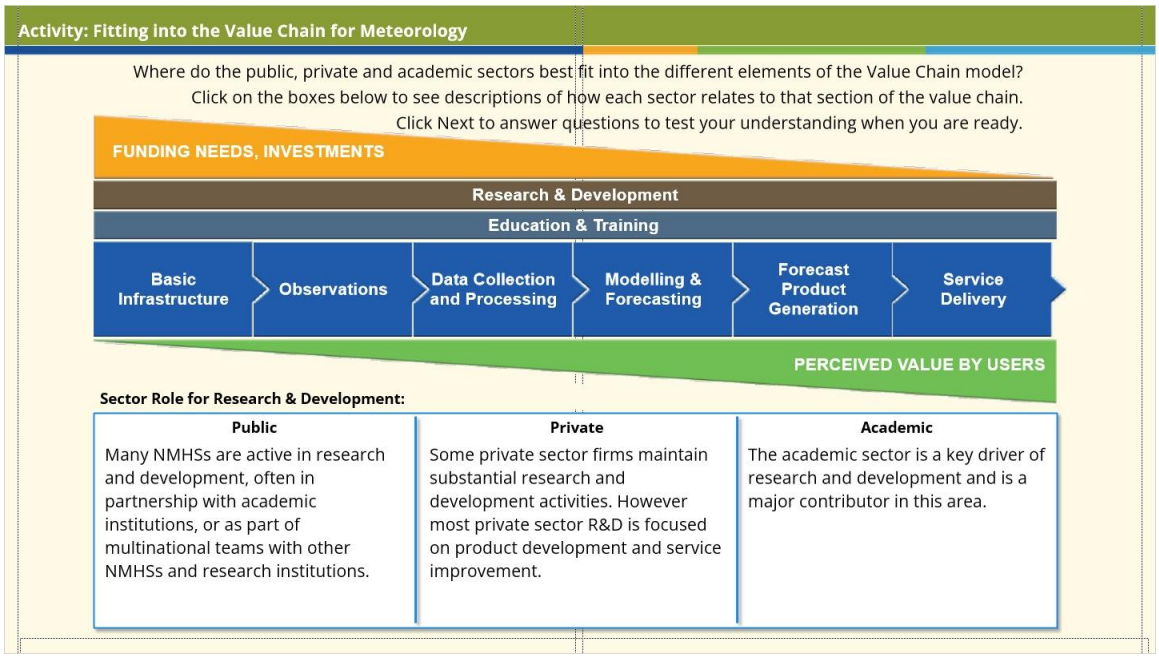
Forecast (Slide Layer)



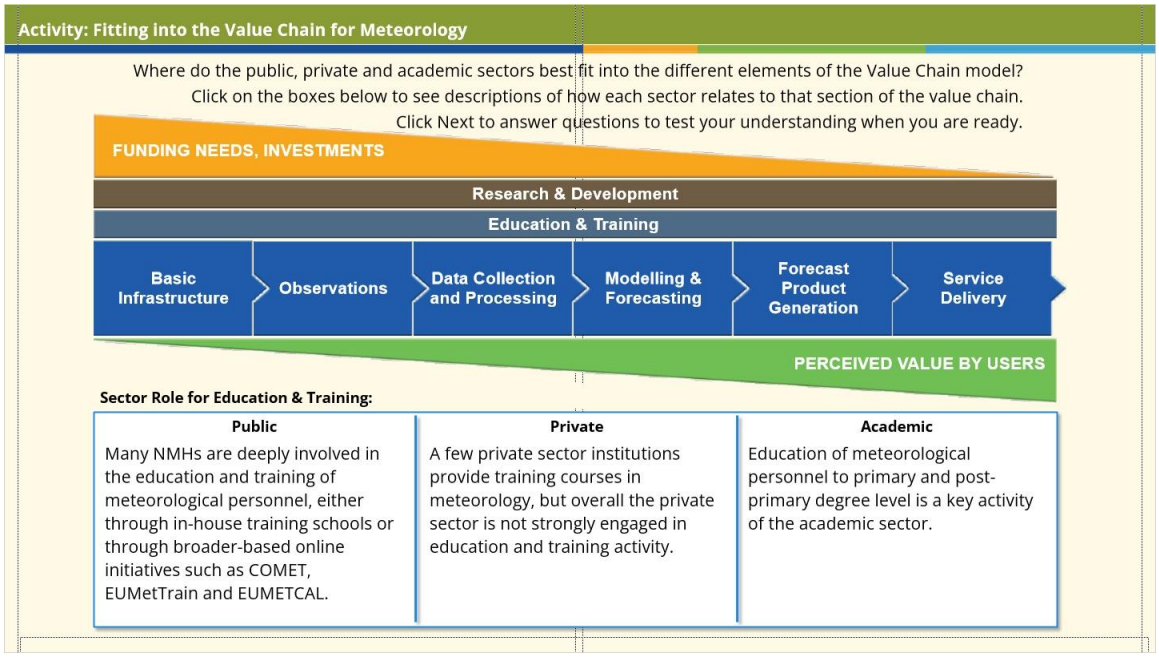
Service (Slide Layer)



Research (Slide Layer)

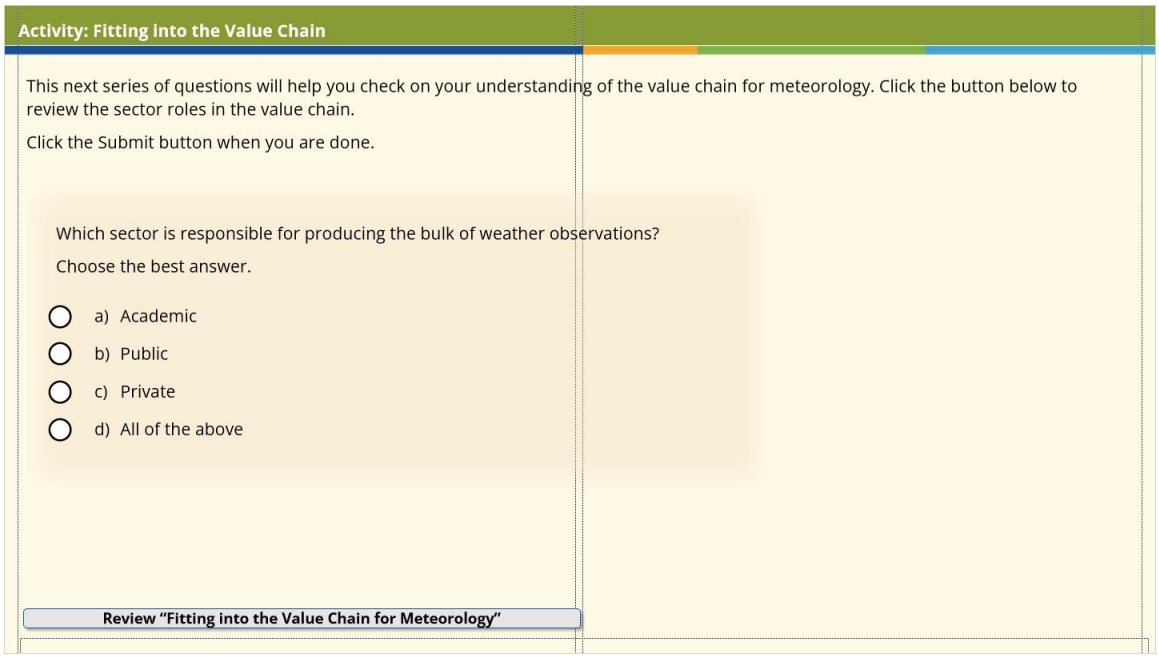


Education (Slide Layer)



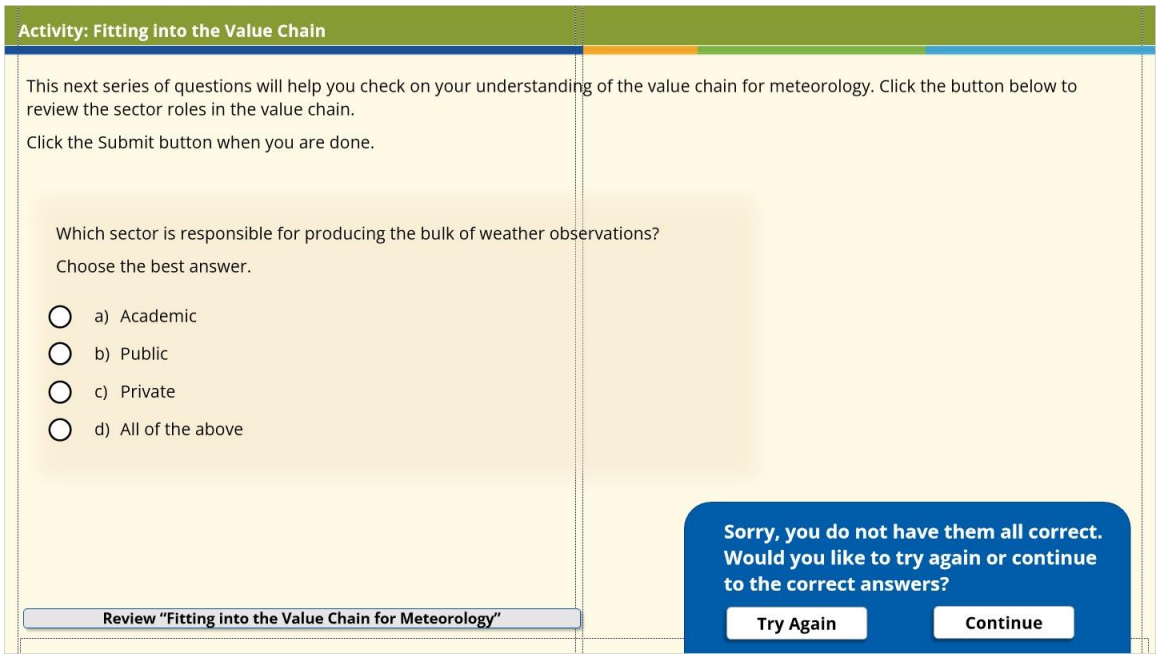
4.4 Value Chain Roles Question 1

(Pick One, 10 points, 2 attempts permitted)

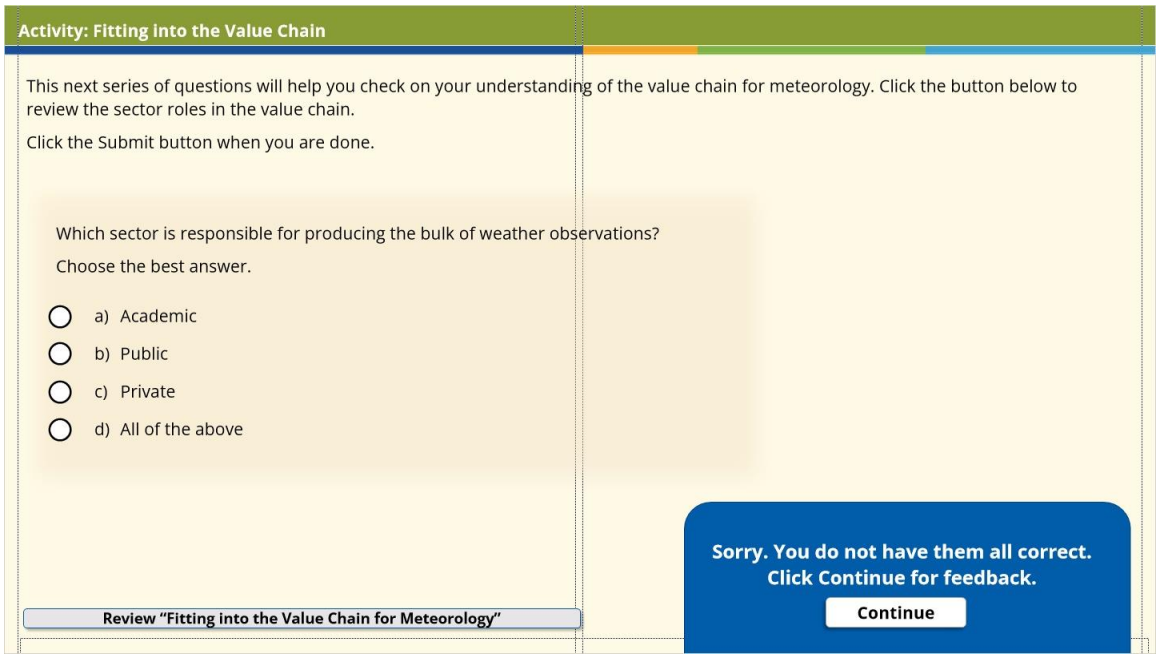


Correct	Choice
	a1
X	a2
	a3
	a4

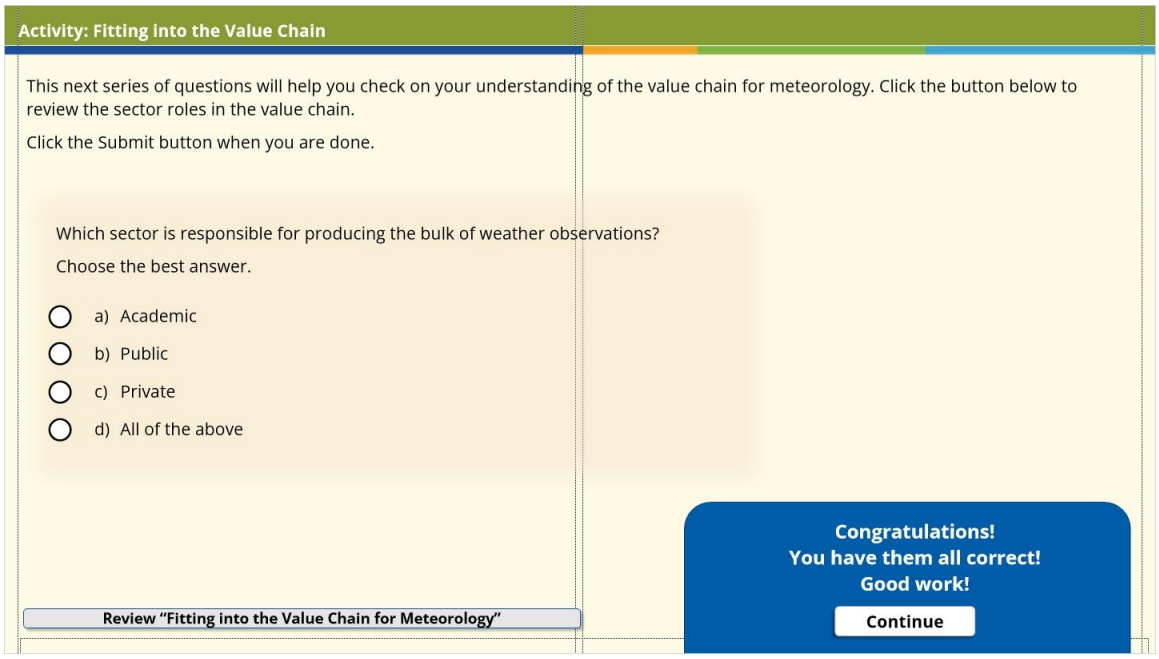
Try Again (Slide Layer)



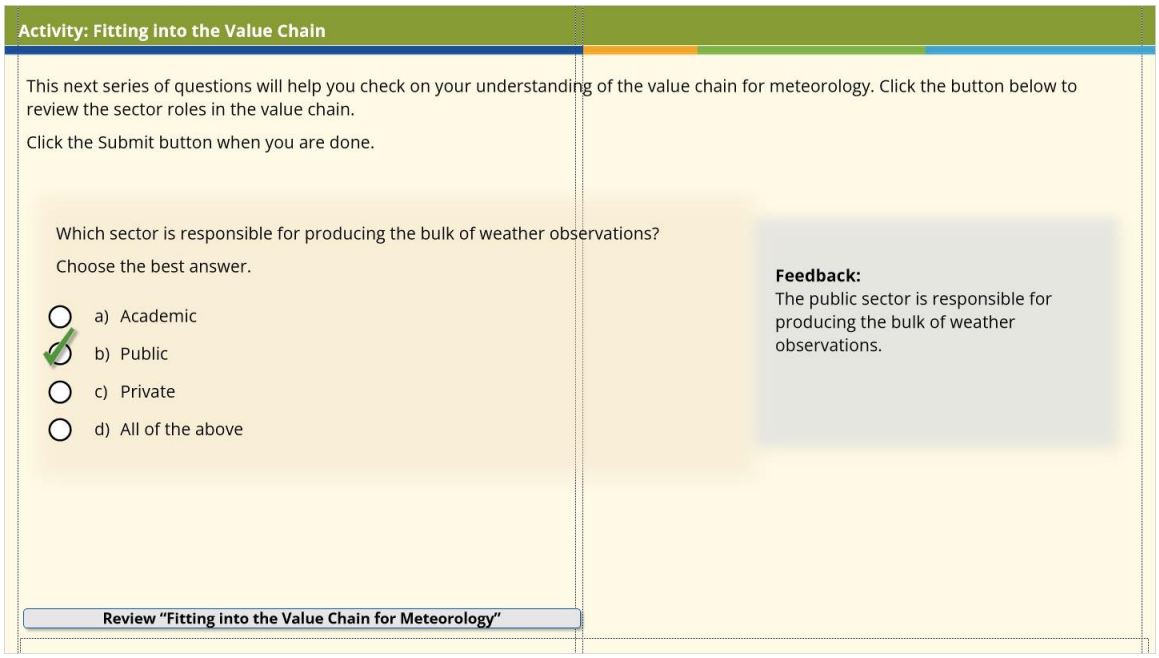
Incorrect (Slide Layer)



Correct (Slide Layer)

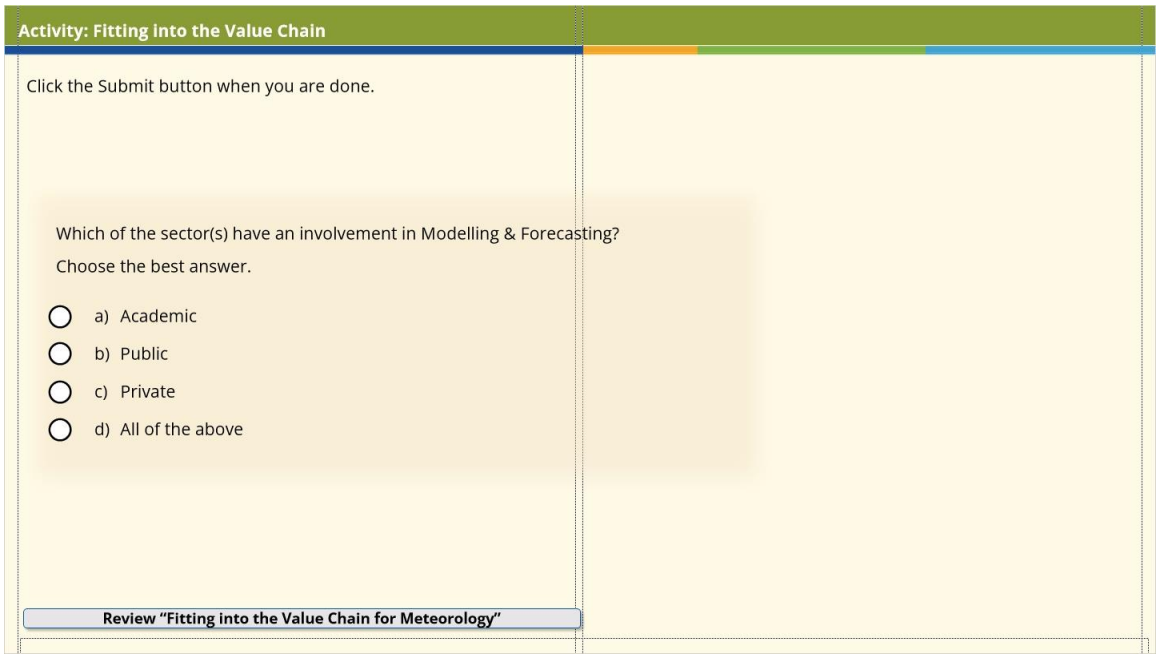


feedback (Slide Layer)



4.5 Value Chain Roles Question 2

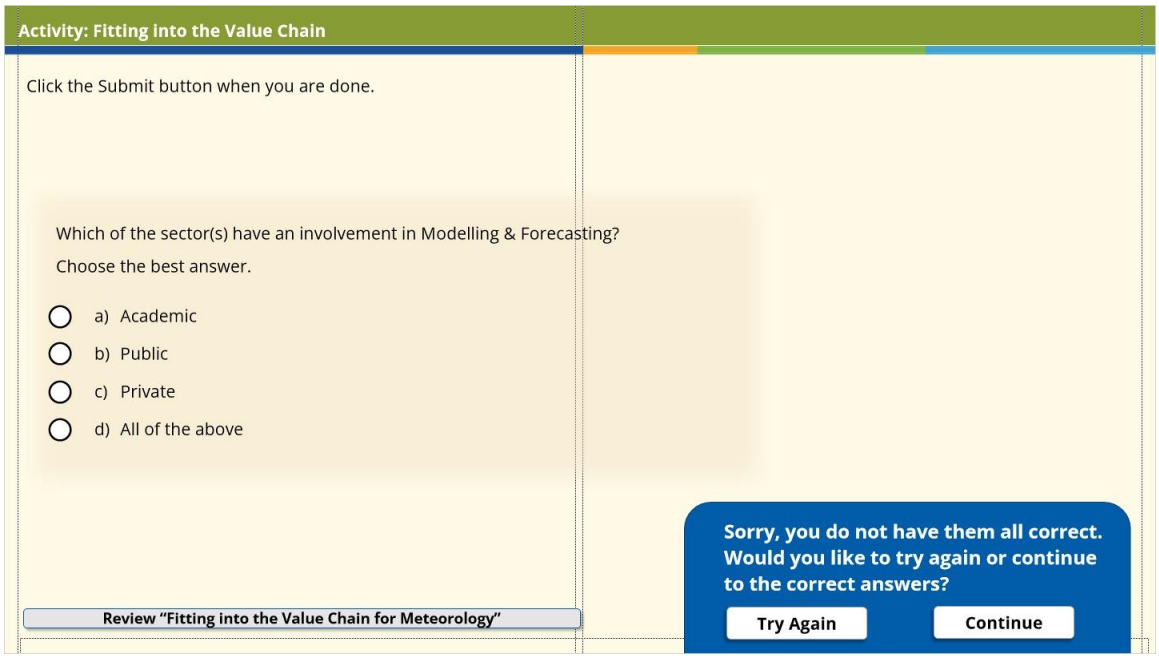
(Pick One, 10 points, 2 attempts permitted)



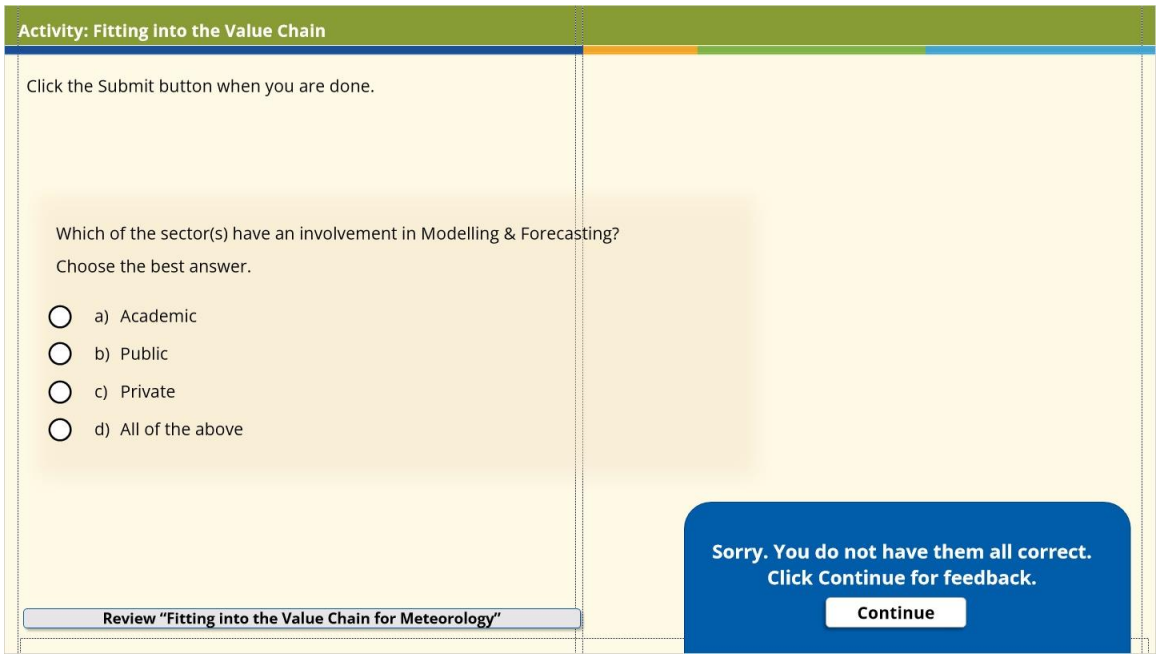
Correct	Choice
	a1
	a2
	a3
X	a4

Notes:

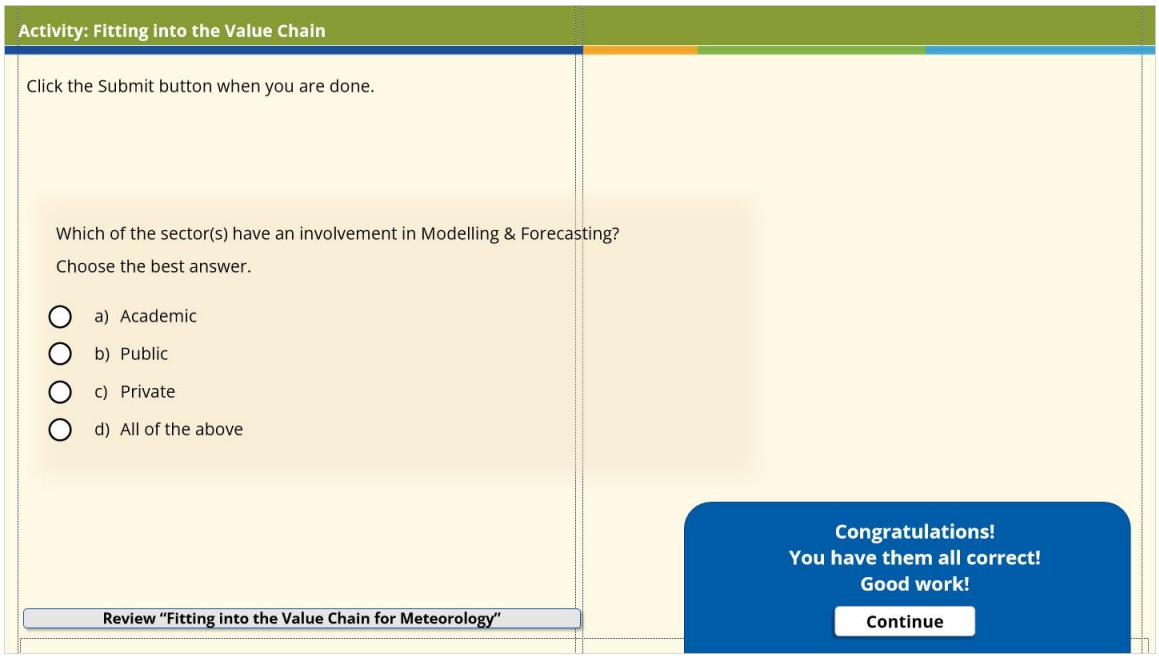
Try Again (Slide Layer)



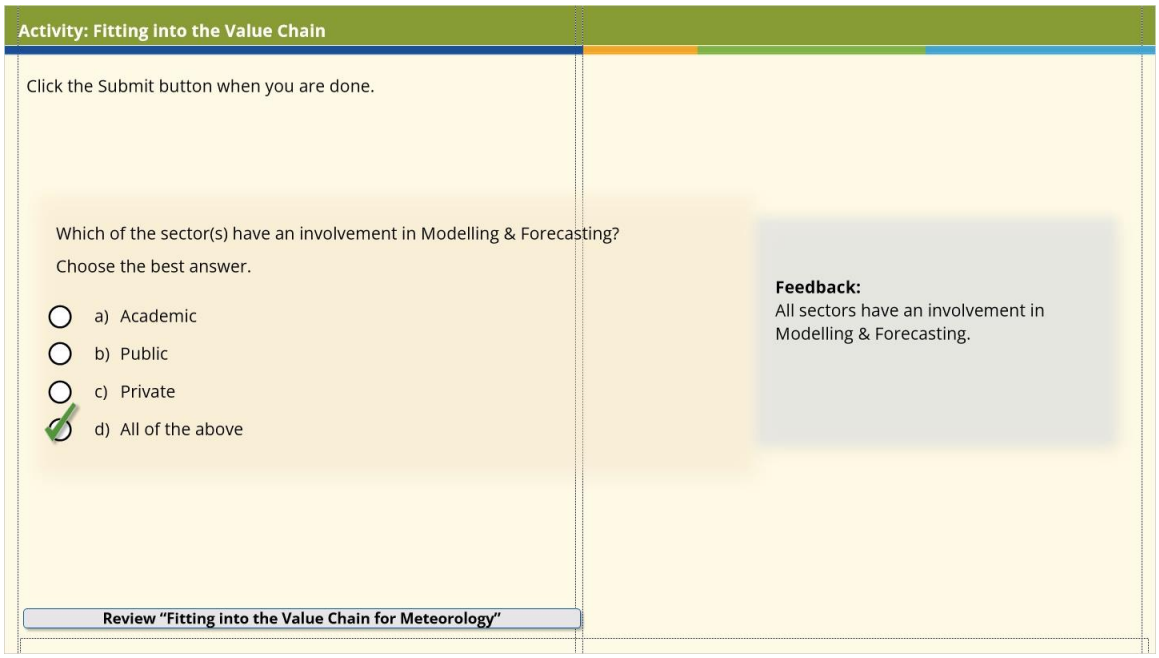
Incorrect (Slide Layer)



Correct (Slide Layer)

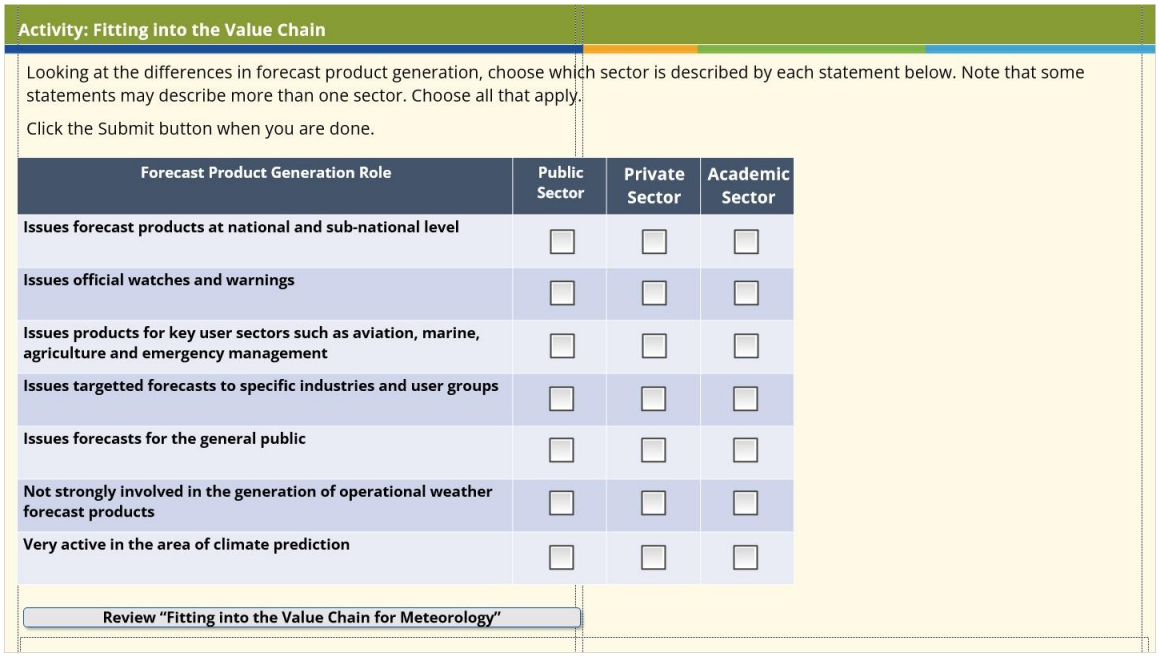


feedback (Slide Layer)



4.6 Value Chain Roles Question 3

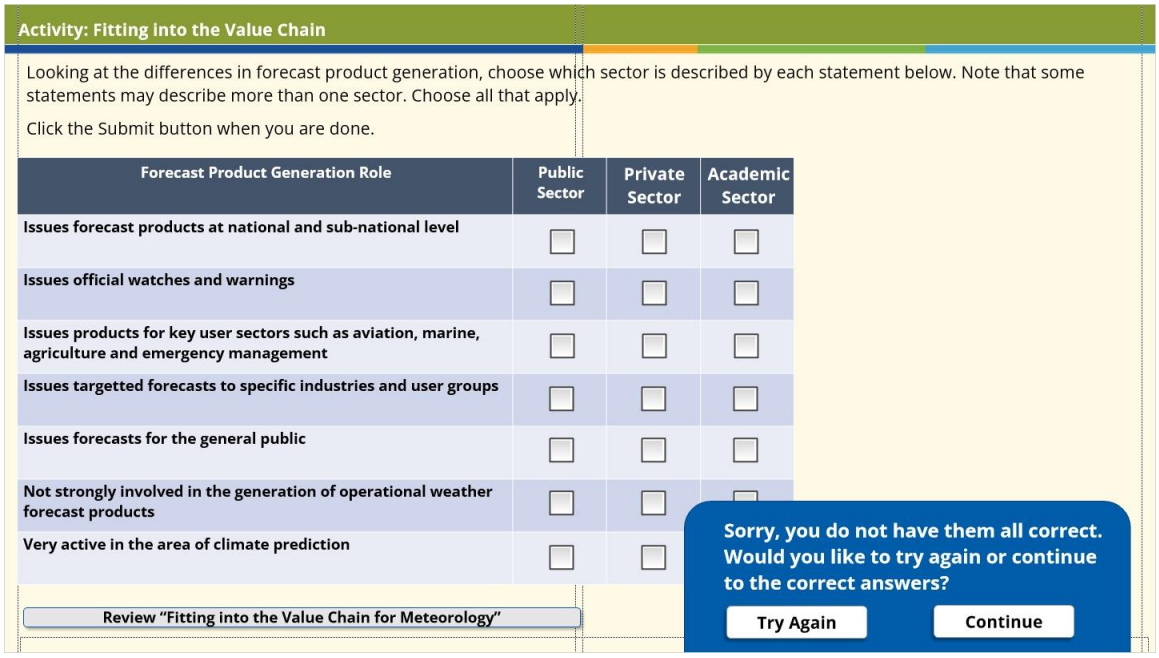
(Pick Many, 10 points, 2 attempts permitted)



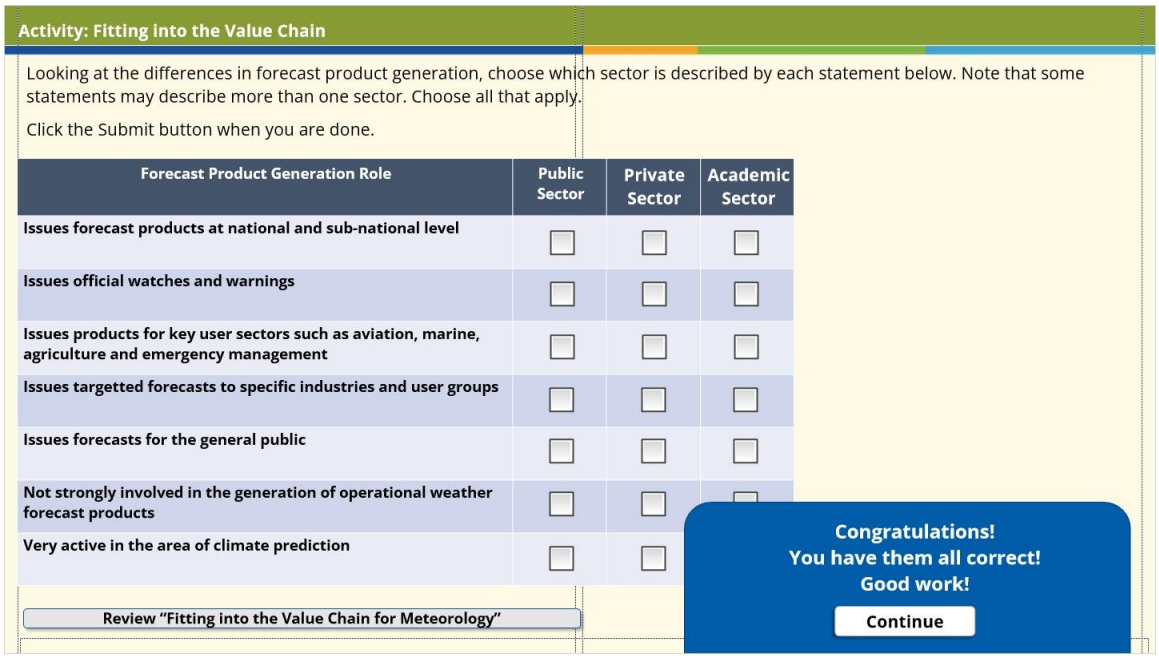
Correct	Choice
X	a1a
	a1b
	a1c
X	a2a
	a2b
	a2c
X	a3a
	a3b
	a3c
	a4a

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

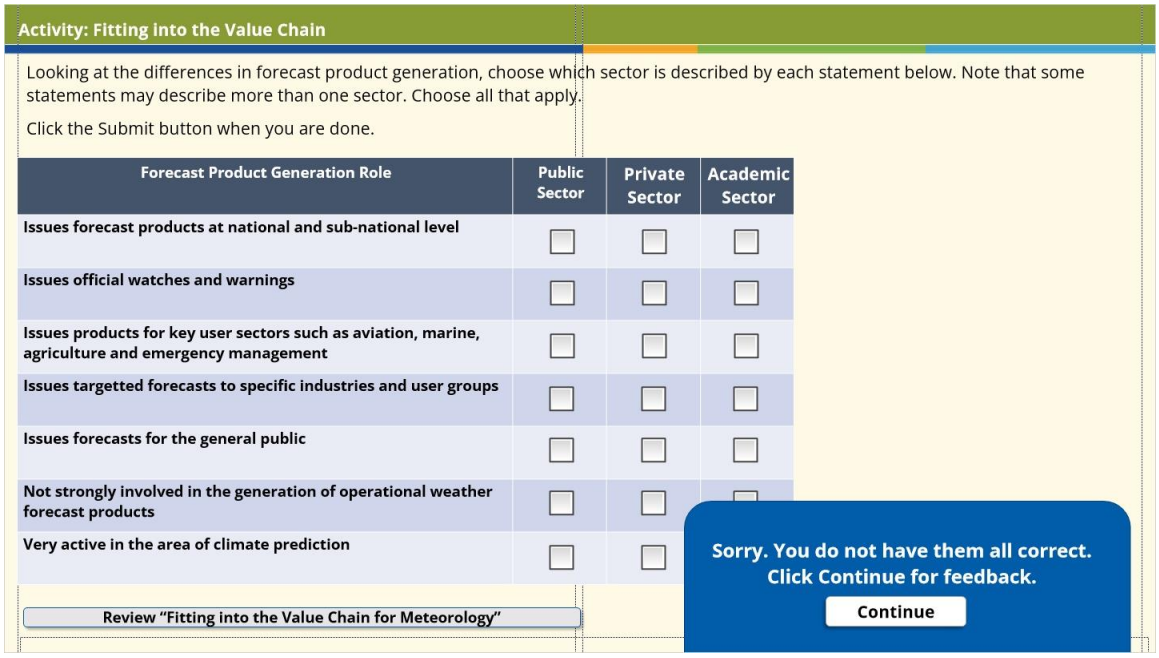
Try Again (Slide Layer)



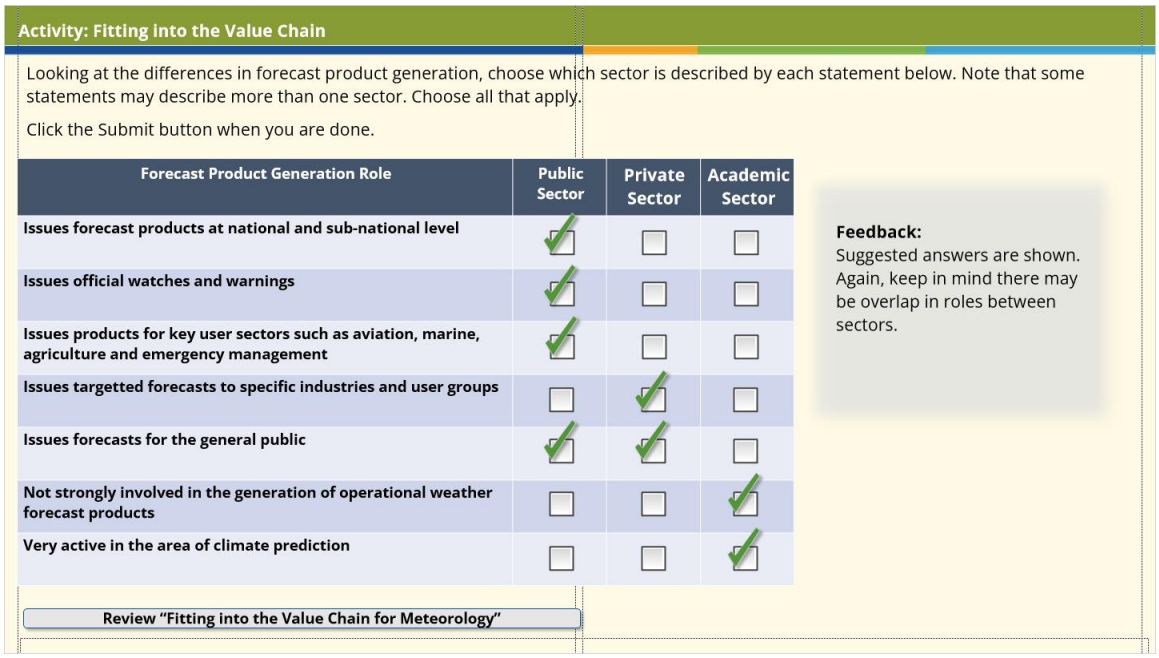
Correct (Slide Layer)



Incorrect (Slide Layer)

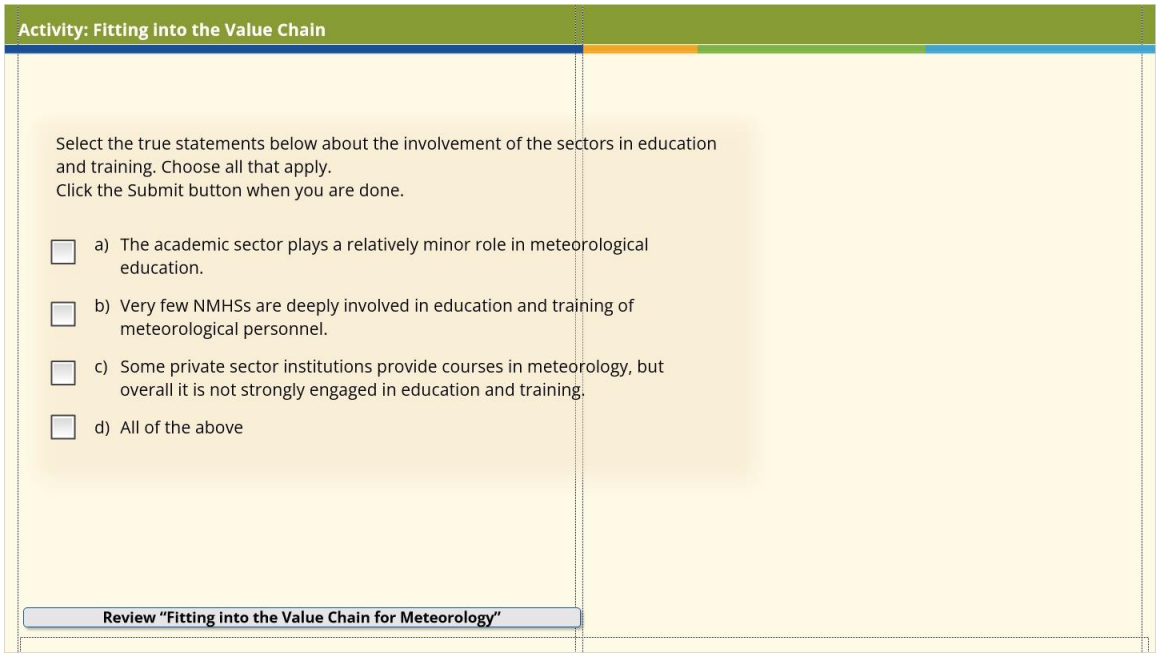


feedback (Slide Layer)



4.7 Value Chain Roles Question 4

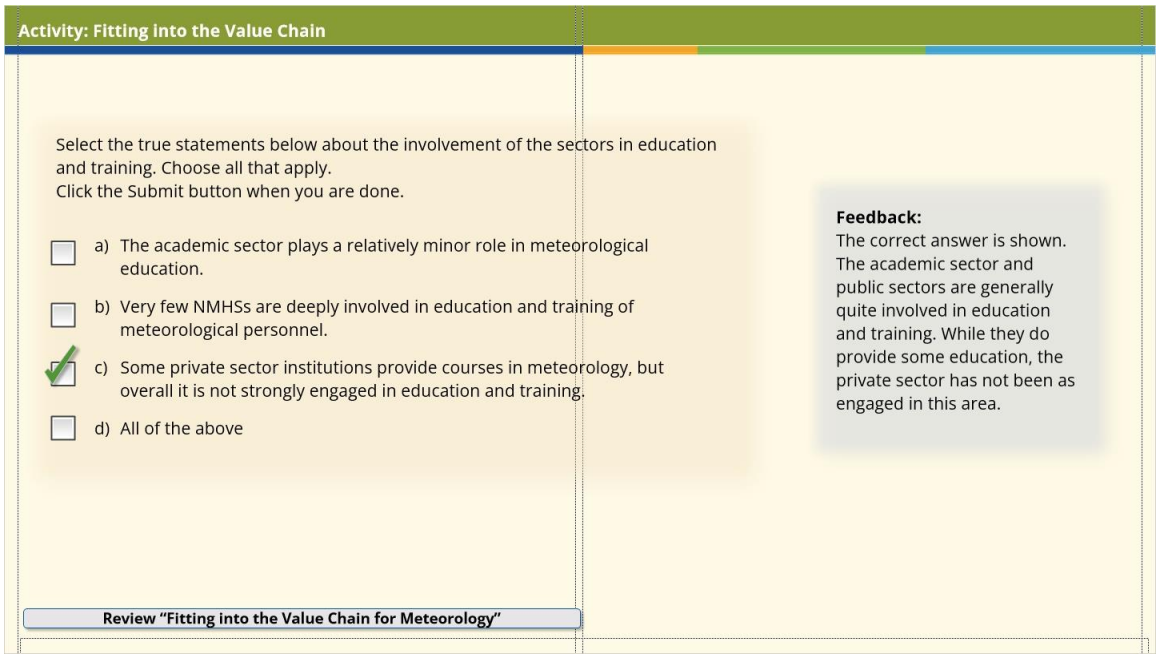
(Pick Many, 10 points, 2 attempts permitted)



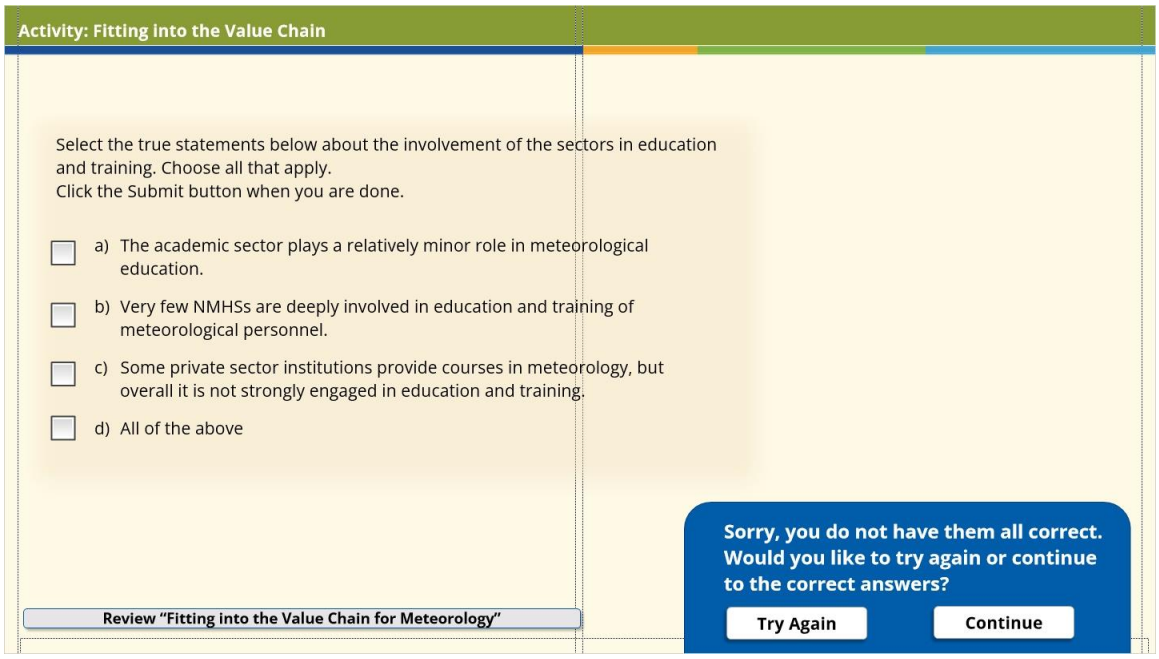
Correct	Choice
	a4
X	a3
	a2
	a1

Notes:

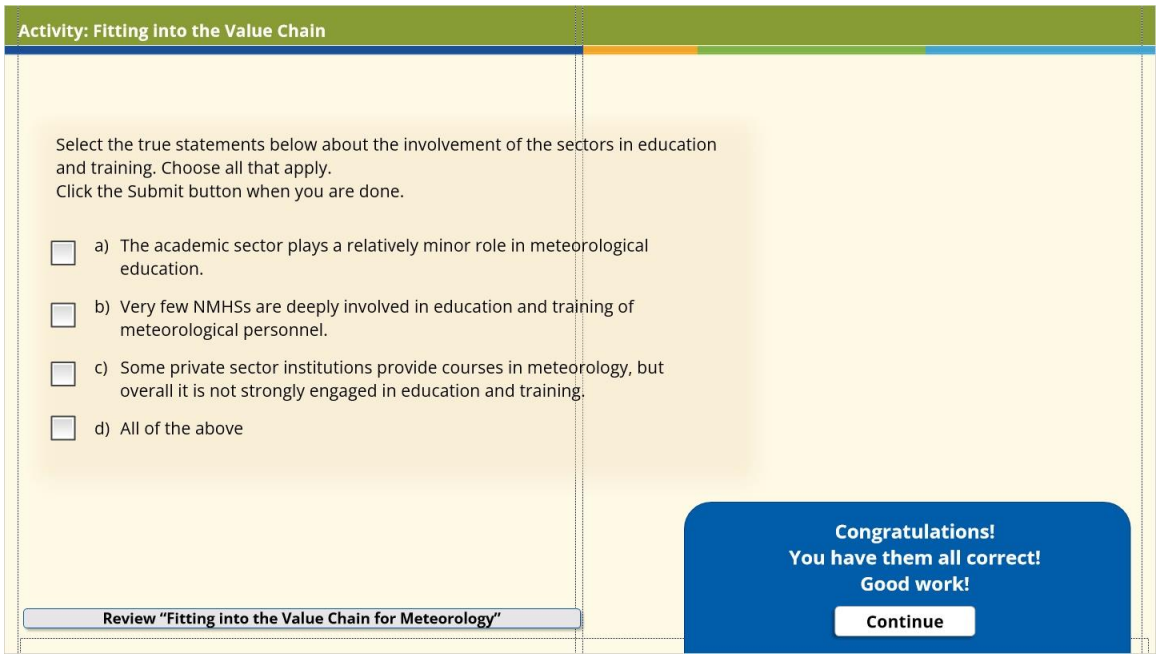
feedback (Slide Layer)



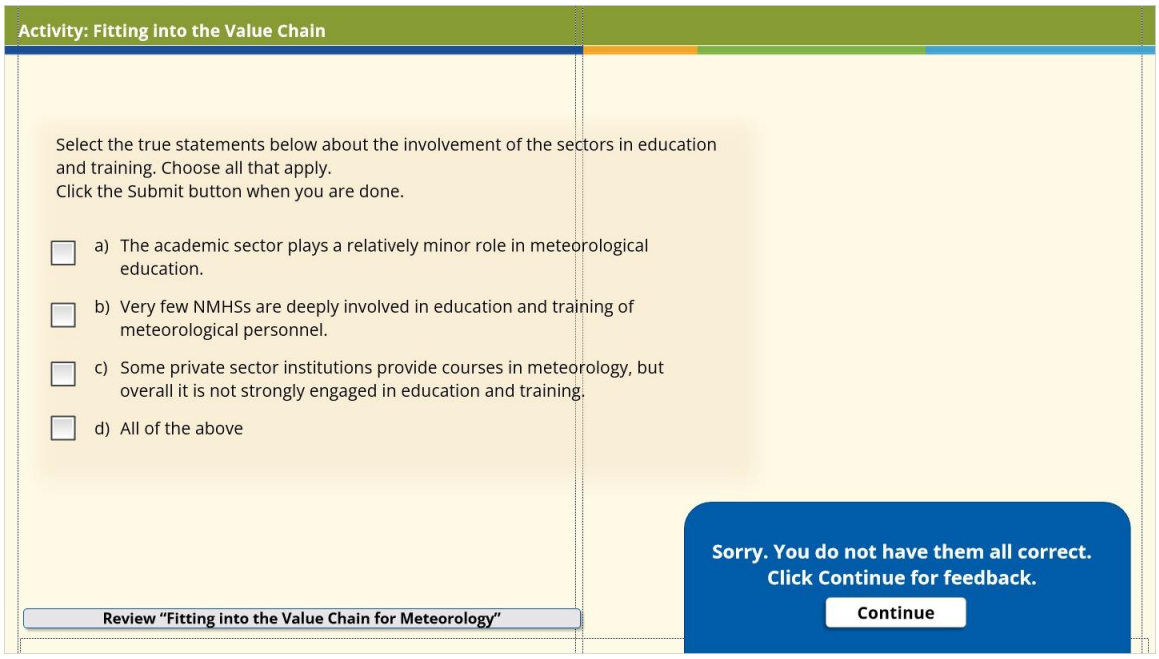
Try Again (Slide Layer)



Correct (Slide Layer)



Incorrect (Slide Layer)



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.

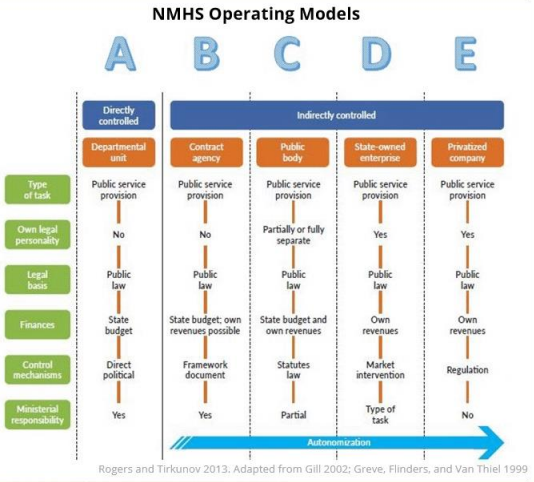
The position of an NMHS on this spectrum will help to inform its capacity to engage in PPE, and the shape of that engagement. The political and administrative philosophy of the relevant government will also be an important consideration.

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

Model A: Ireland

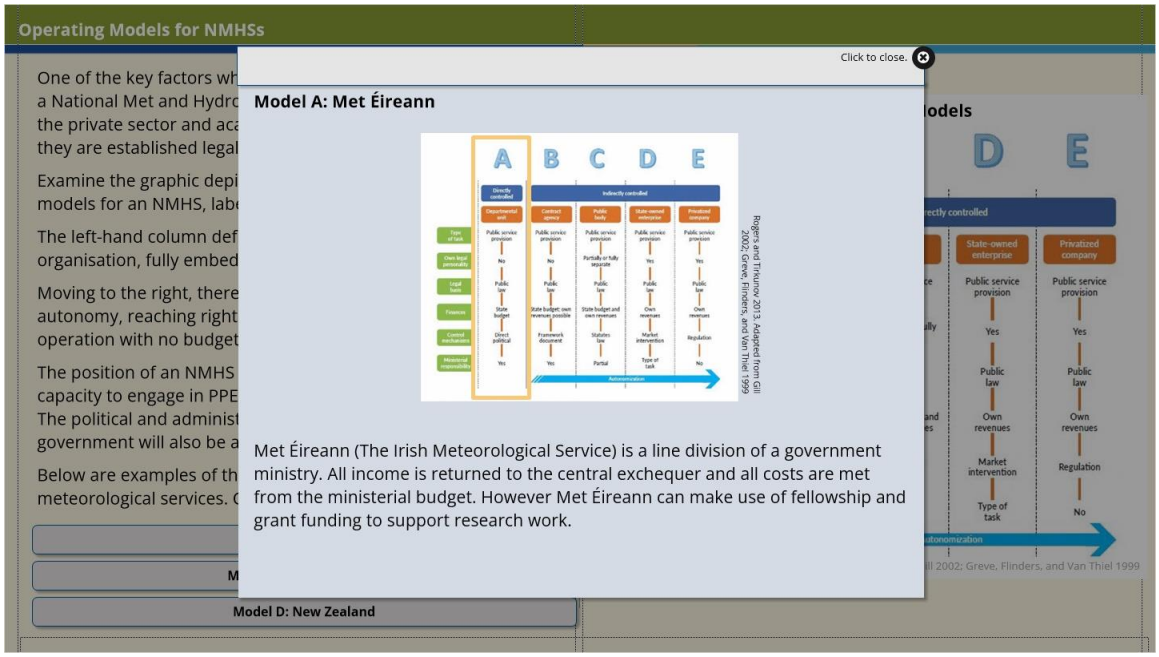
Model C: Czech Republic

Model D: New Zealand

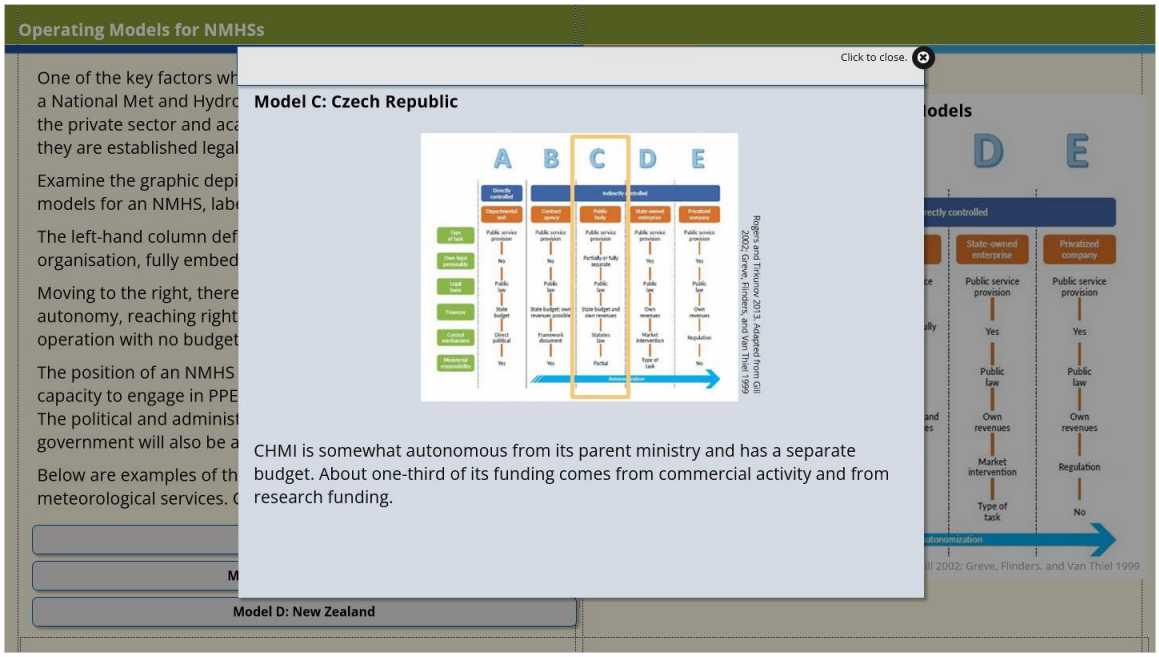


Notes:

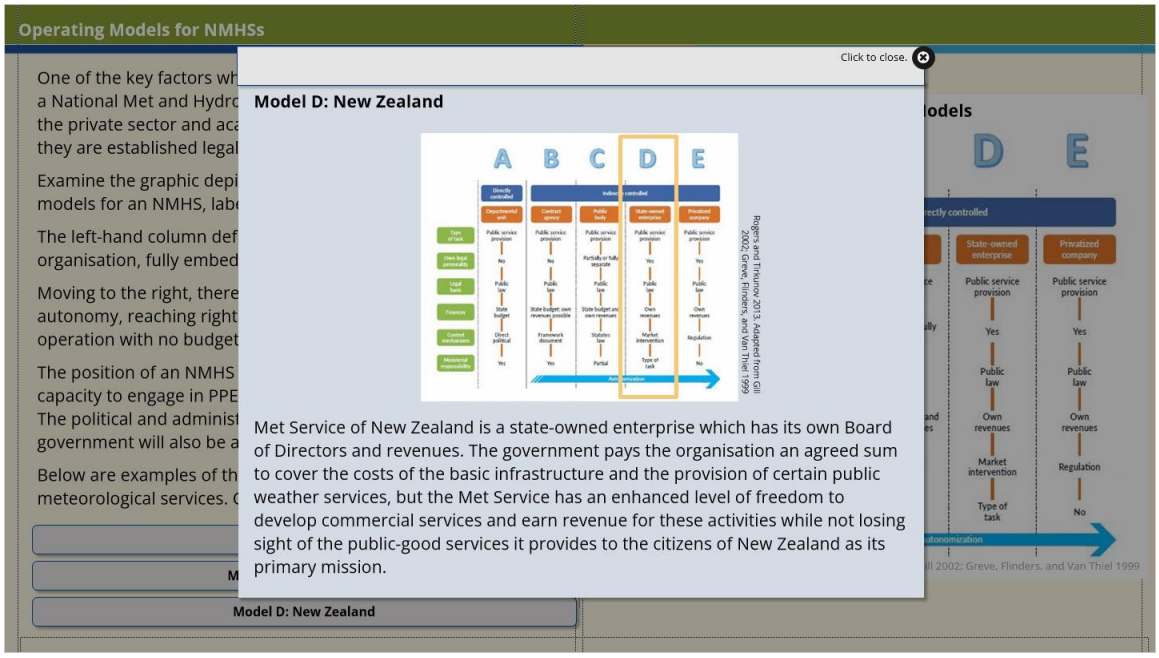
zoom1 (Slide Layer)



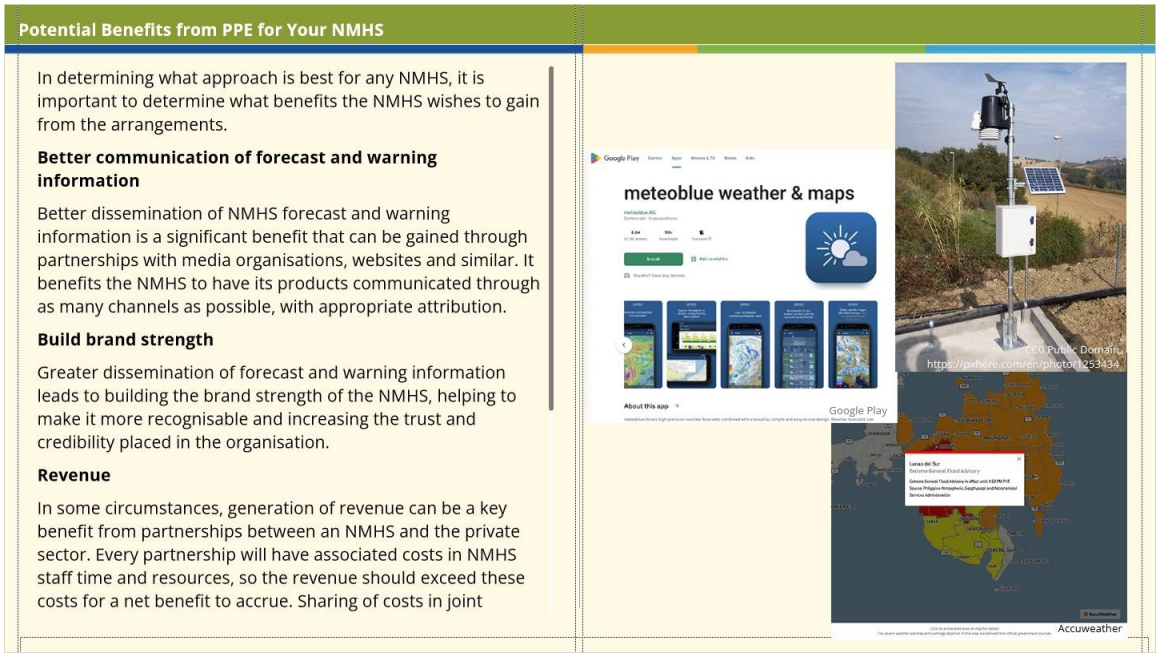
zoom2 (Slide Layer)



zoom3 (Slide Layer)



4.9 Potential Benefits from PPE for Your NMHS



Notes:

4.10 Ensuring Sustainability of Critical Meteorological Services

Ensuring Sustainability of Critical Meteorological Services

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.

Critical NMHS services that should be maintained and strengthened:

Observation infrastructure

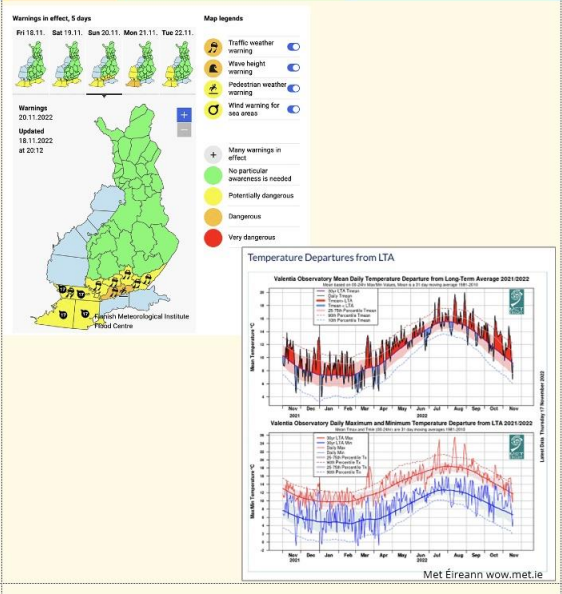
Chief among these is to sustain – and if possible improve – the data observation infrastructure. It is a key NMHS responsibility to gather high quality information about the weather and climate in its own country.

Quality-control & archiving of data

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.

Watches and warnings

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



4.11 Building on Complementary Strengths

Building on Complementary Strengths

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?

NMHSs

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.

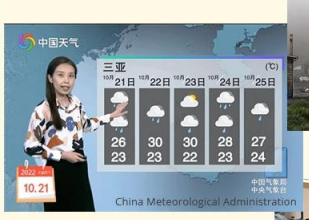
Among the strengths that an NMHS may lack are presentation of information, and marketing and promotion. These are often strengths to be found in private sector organisations.

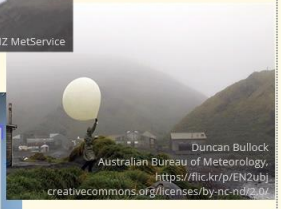
Media

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.

Academia

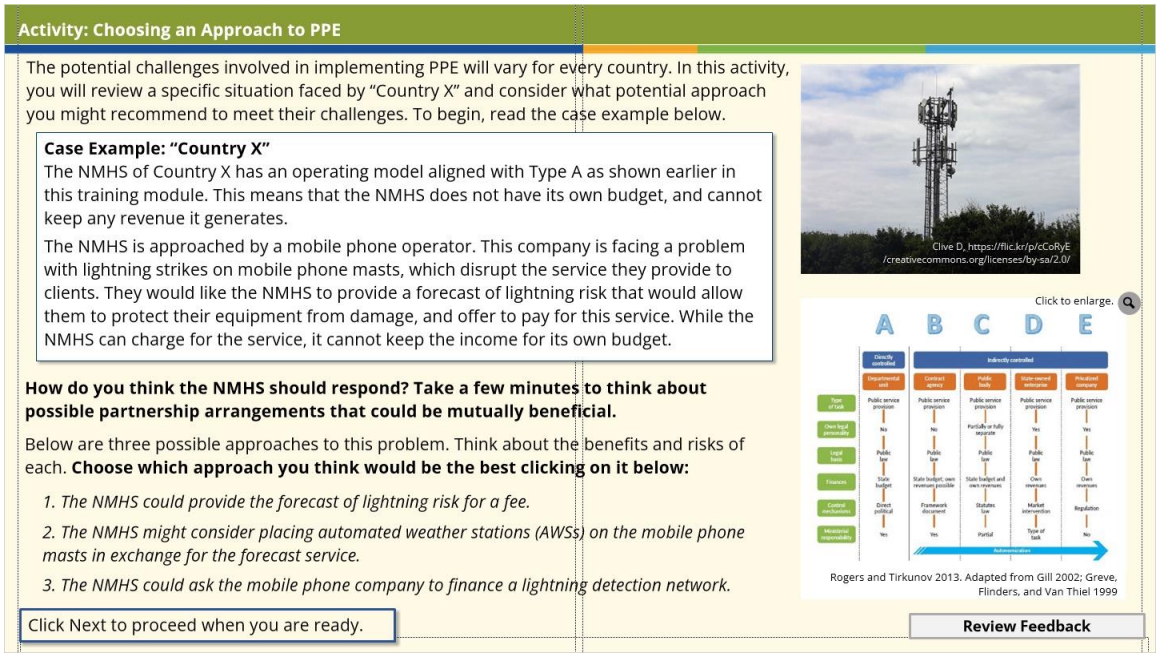
For smaller NMHSs the capacity to maintain an active research group may be challenging. Partnering with a research group in academia can lead to the development of new and improved





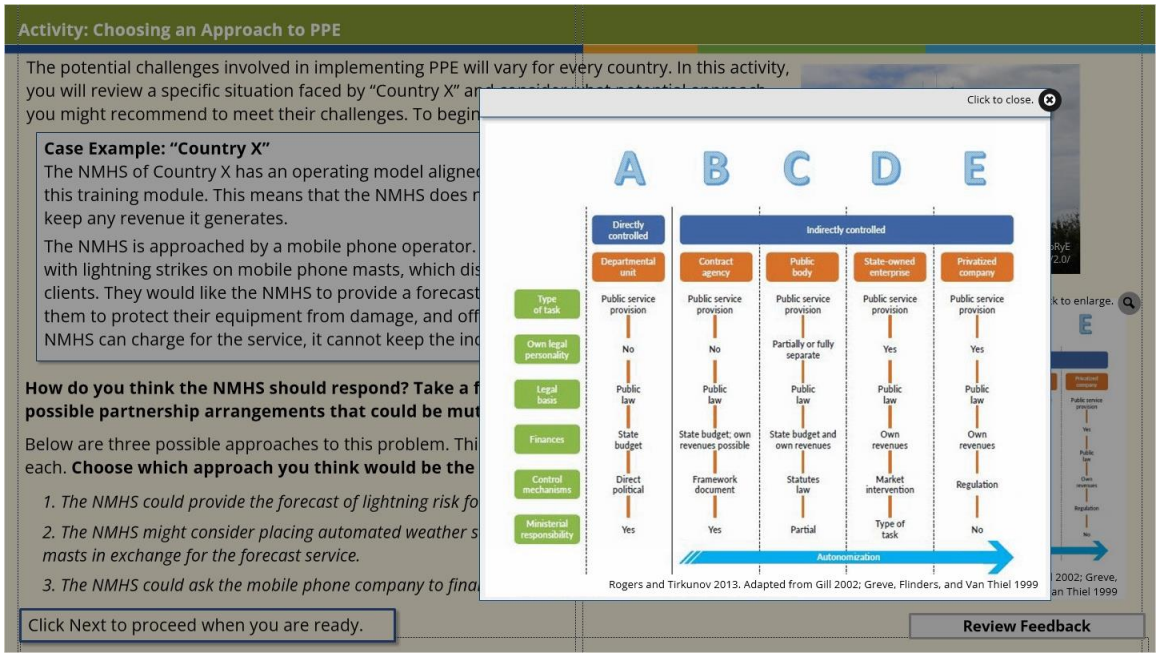
4.12 Activity: Choosing an Approach to PPE

(Pick One, 10 points, 1 attempt permitted)

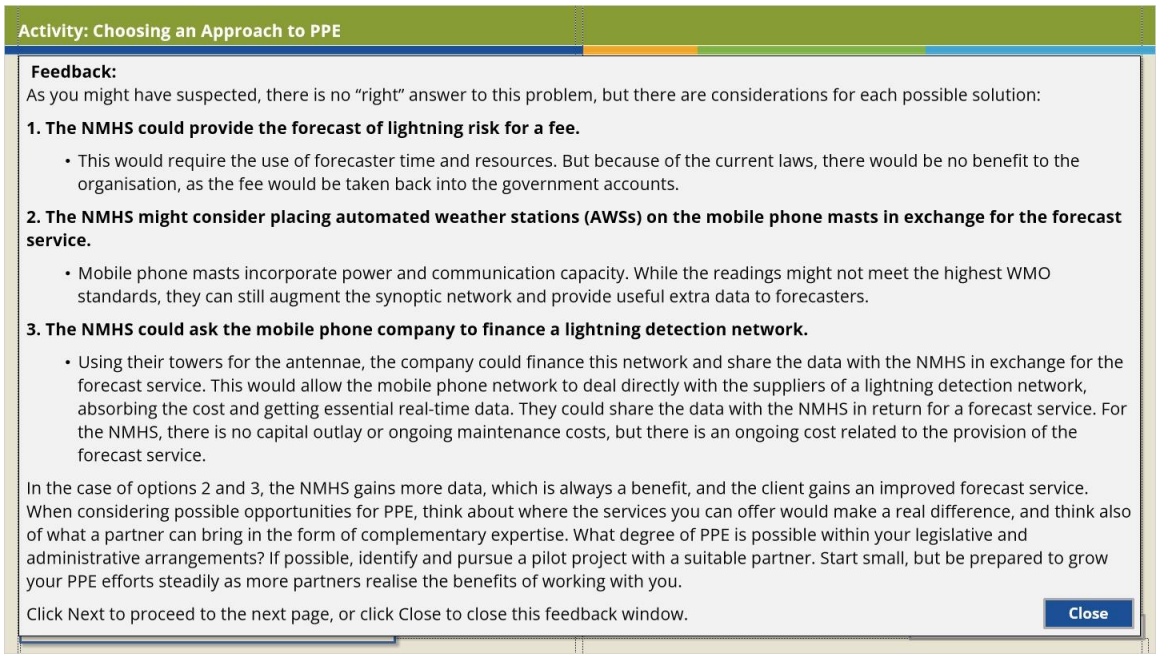


Correct	Choice
	1. The NMHS could provide the forecast of lightning risk for a fee.
	2. The NMHS might consider placing automated weather stations (AWSs) on the mobile phone masts in exchange for the forecast service.
	3. The NMHS could ask the mobile phone company to finance a lightning detection network.

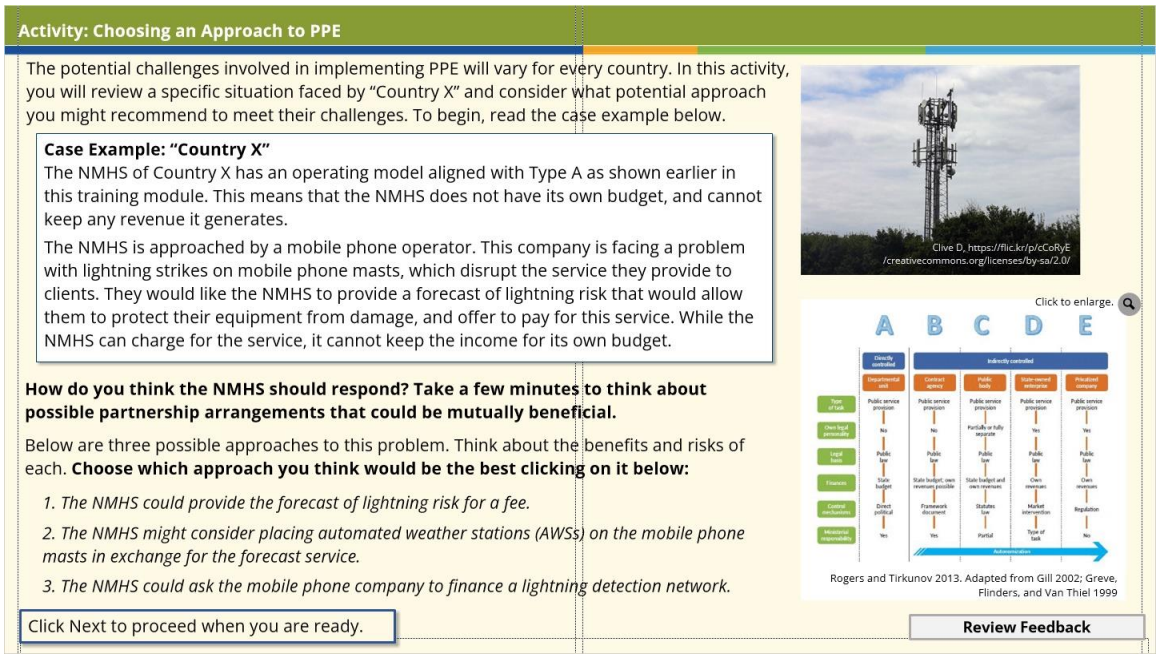
zoom1 (Slide Layer)



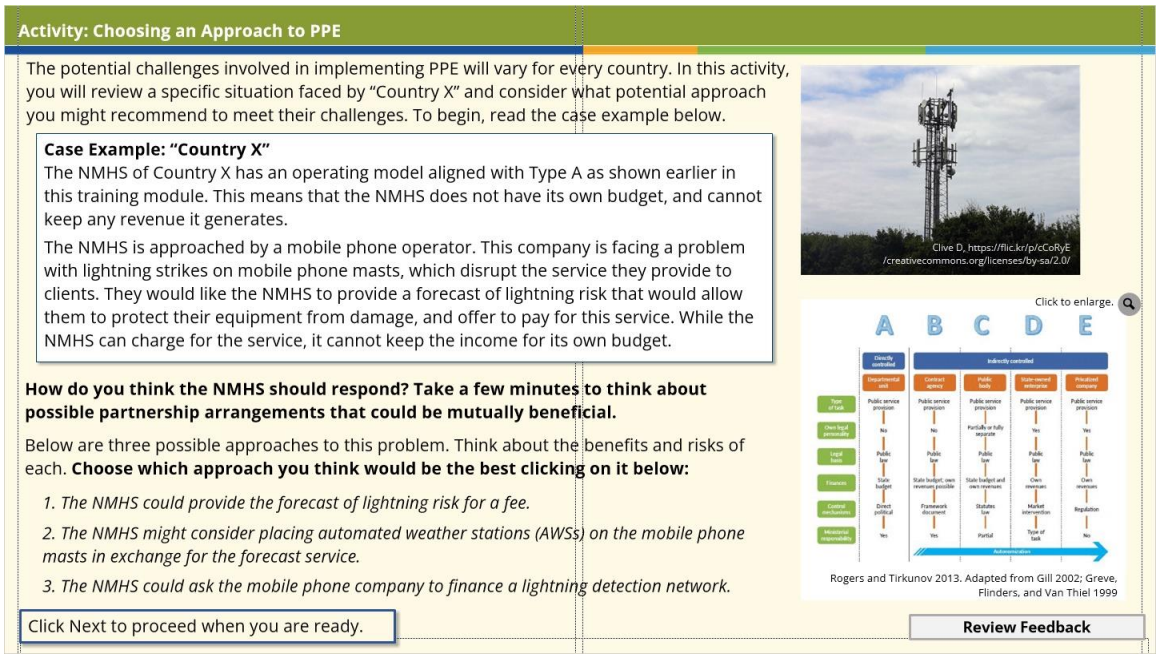
feedback (Slide Layer)



Incorrect (Slide Layer)



Correct (Slide Layer)



4.13 Activity: Your Roadmap to PPE

Activity: Your Roadmap to PPE

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.

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.

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.

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?

type your text here

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?

type your text here

Print

4.14 Knowledge Check

Knowledge Check

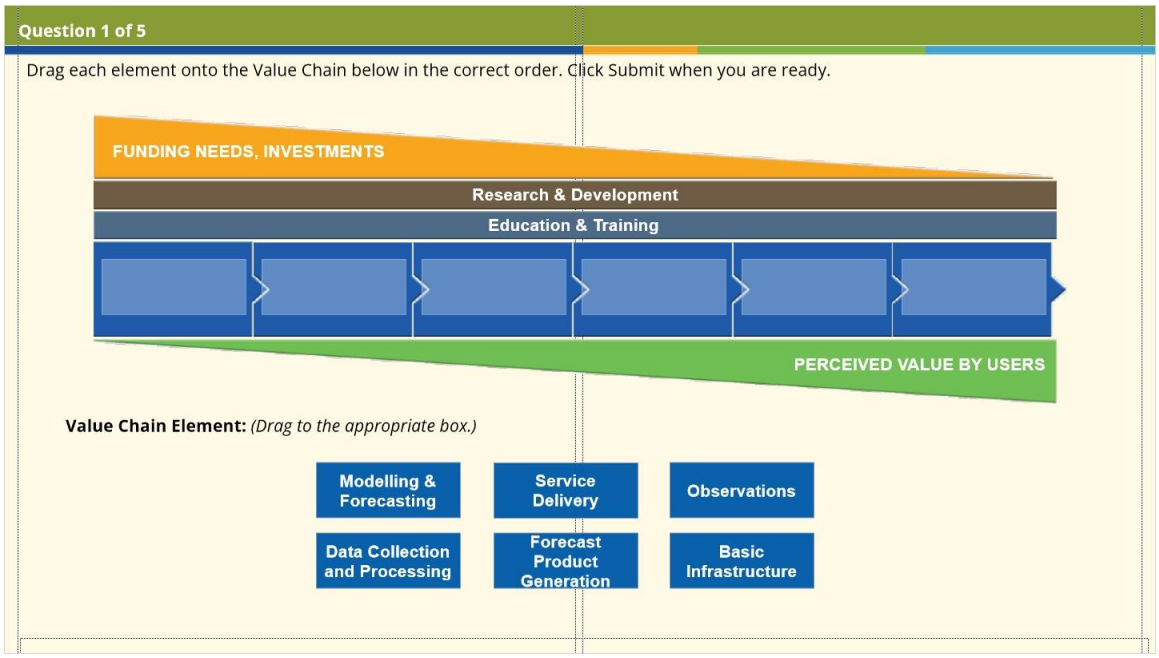
Check your understanding of the information covered in this module by responding to the questions on the next few pages.

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.

4.15 Question 1

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

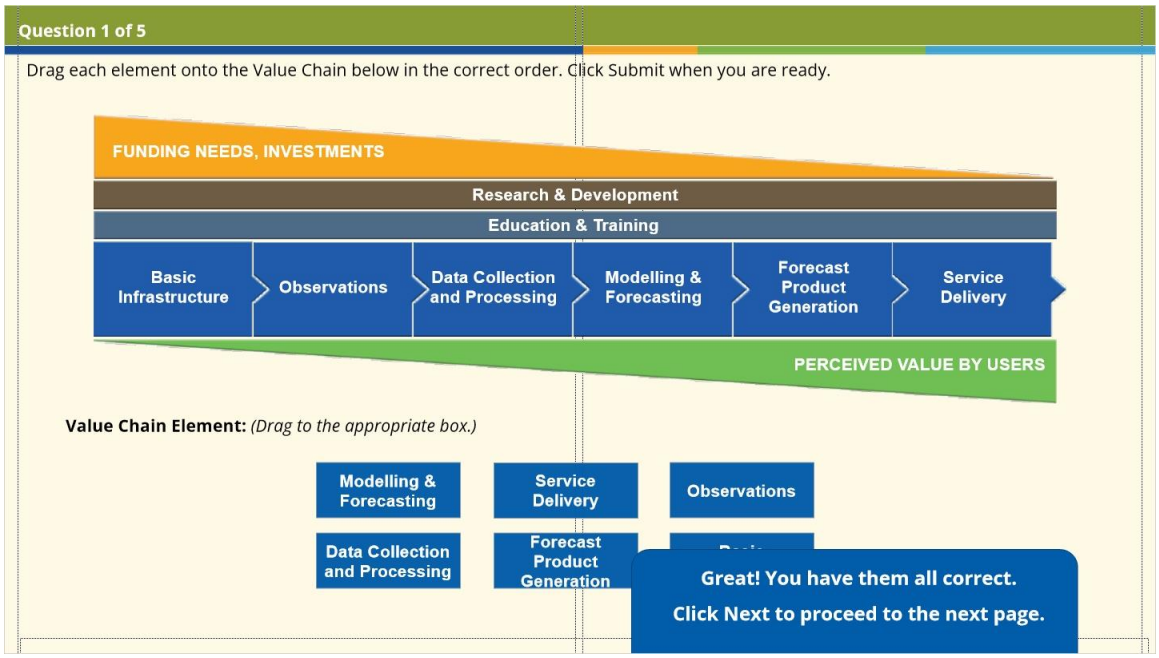


Drag Item	Drop Target
Basic Infrastructure	
Observations	
Data Collection and Processing	
Modelling & Forecasting	
Forecast Product Generation	
Service Delivery	

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)



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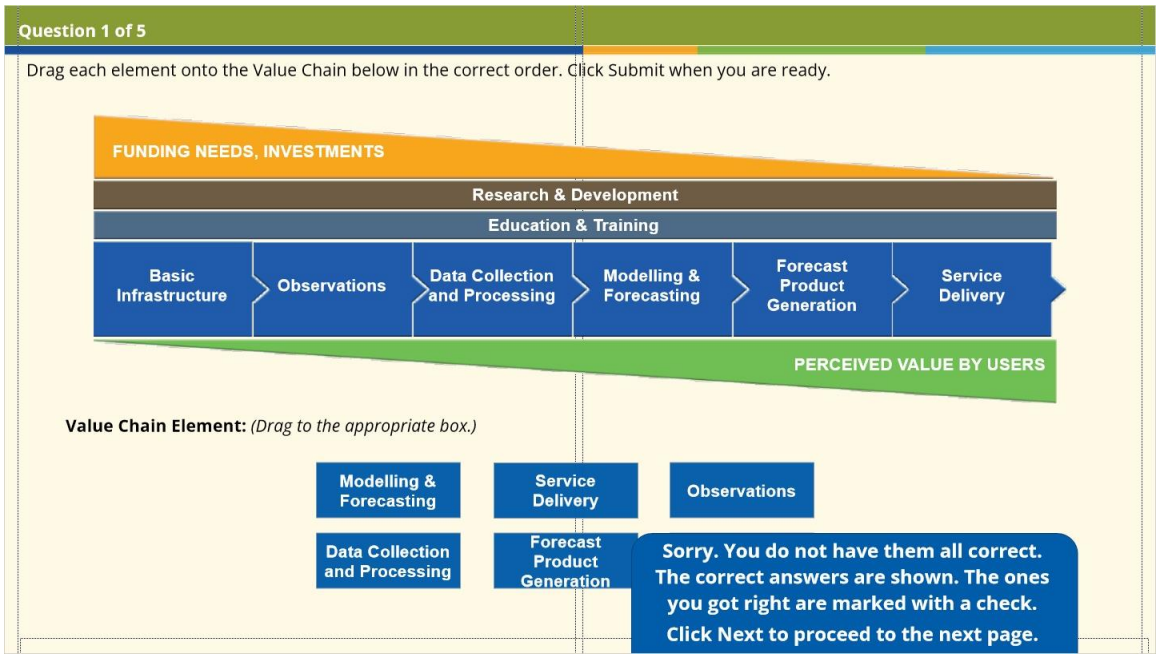
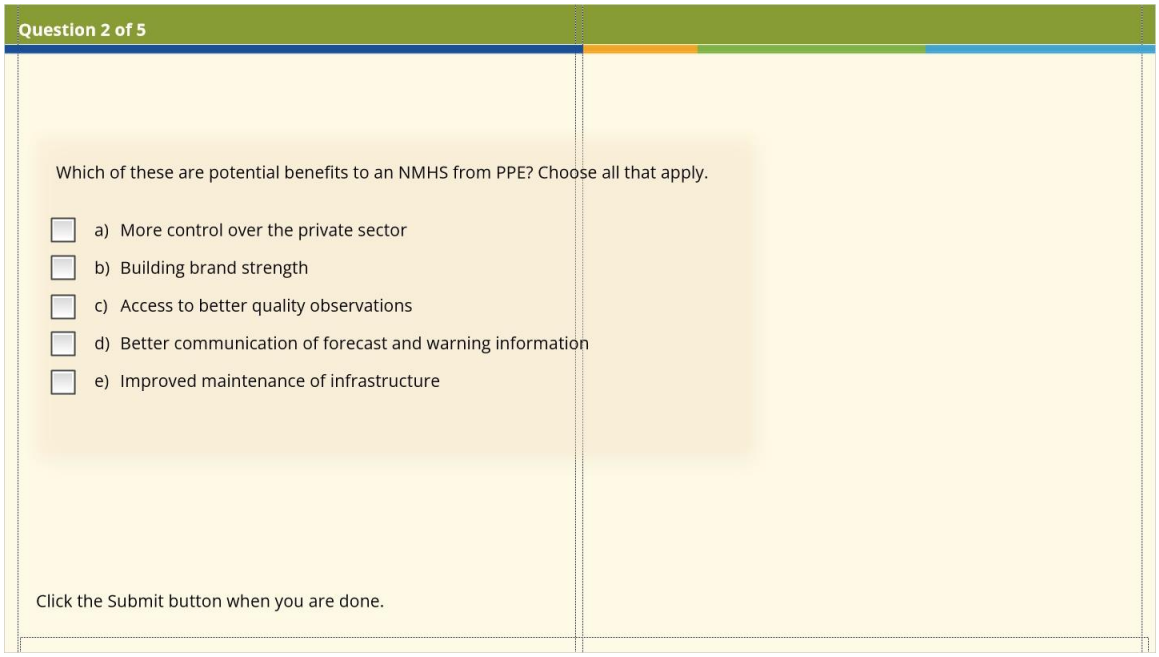


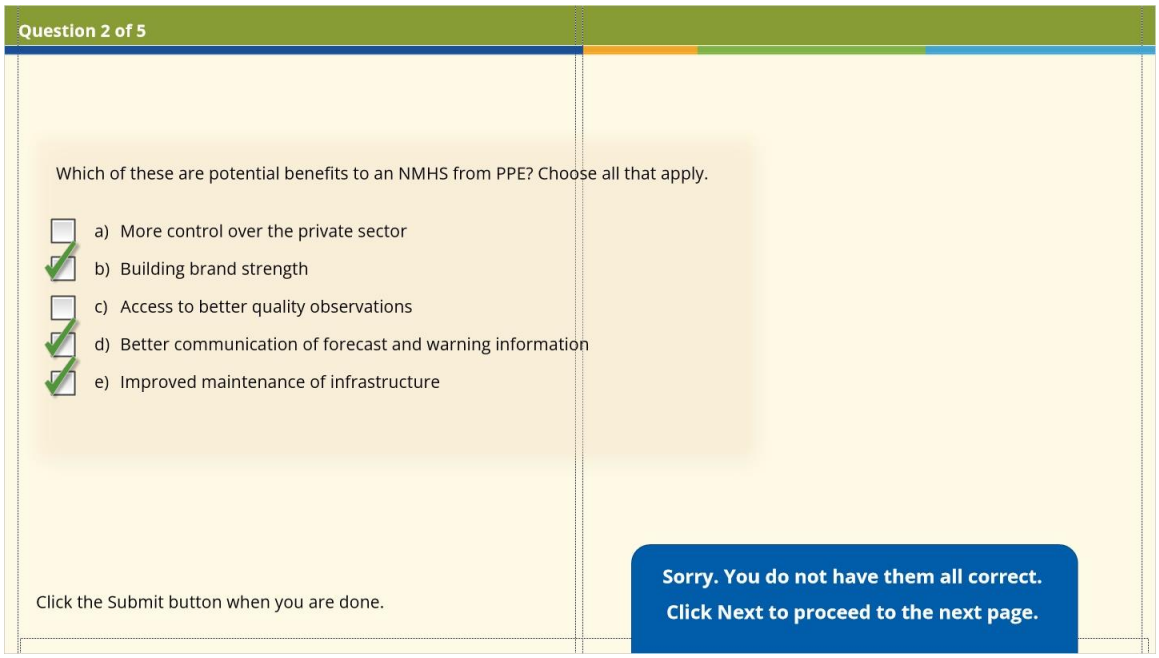
4.16 Question 2

(Pick Many, 10 points, 1 attempt permitted)



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

Incorrect (Slide Layer)



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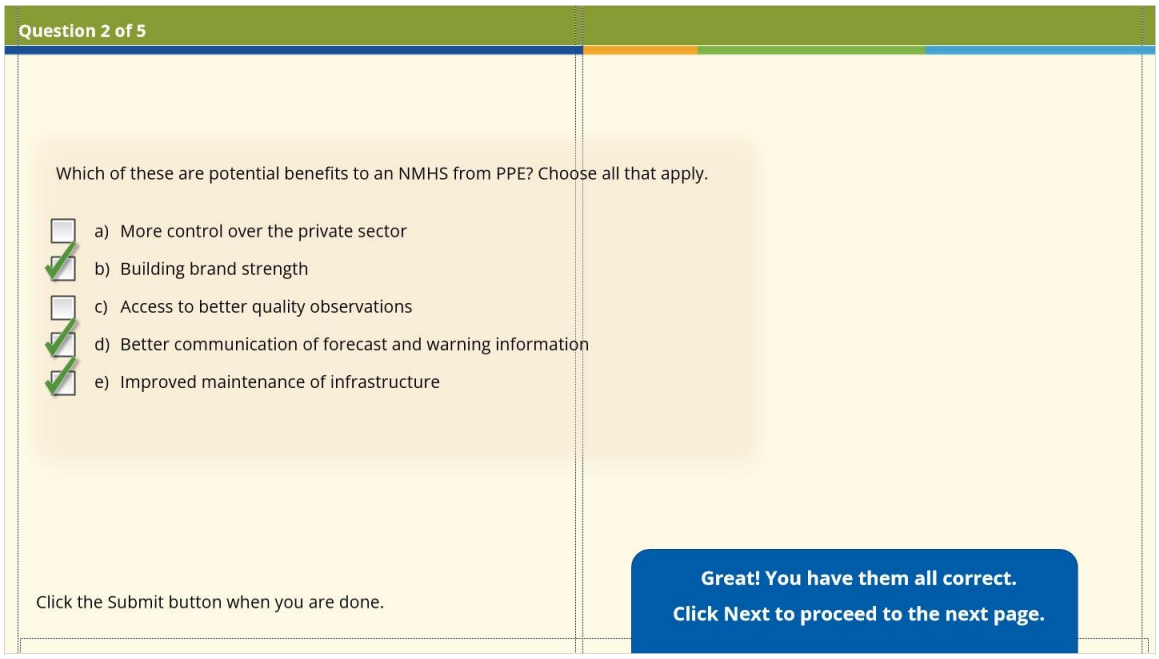
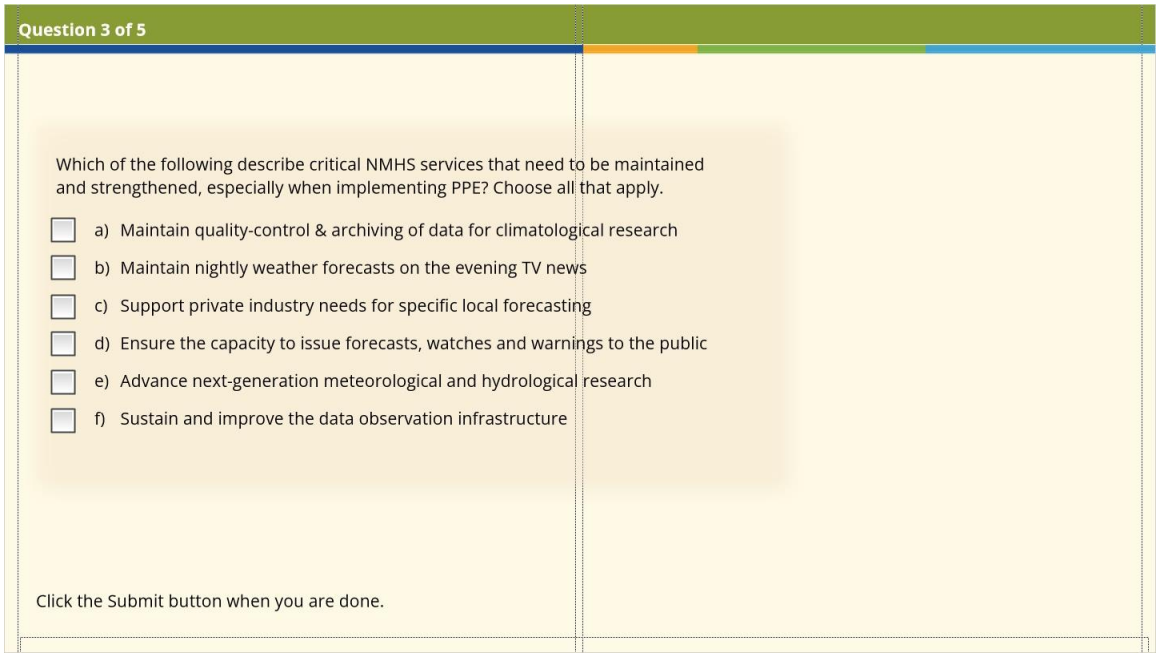


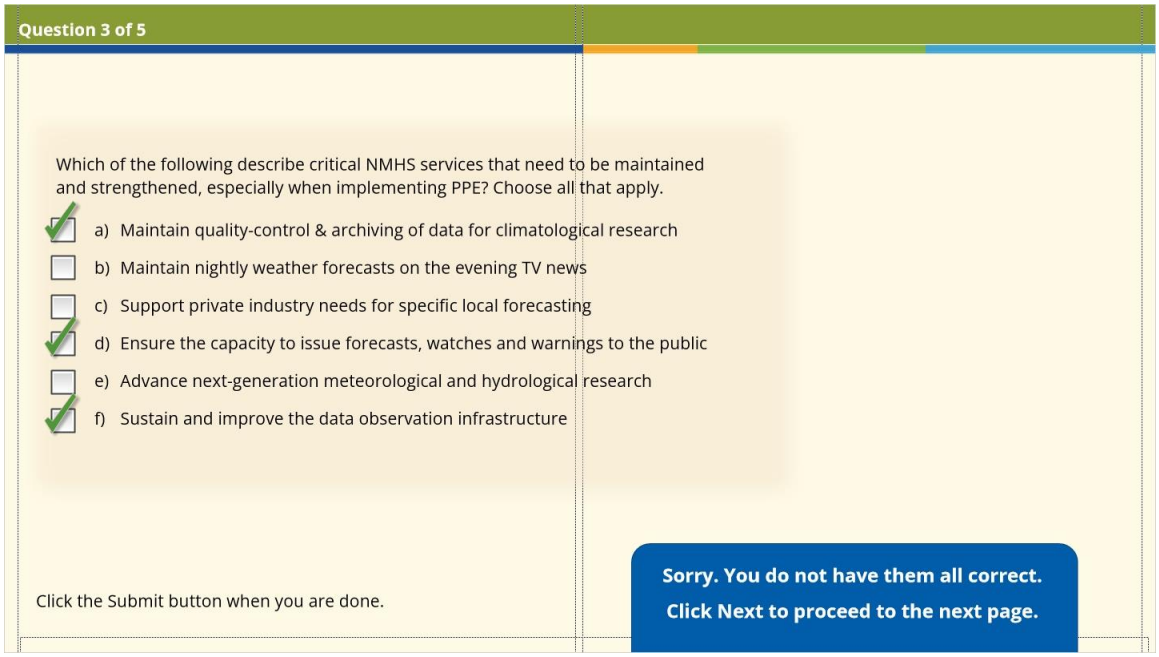
4.17 Question 3

(Pick Many, 10 points, 1 attempt permitted)

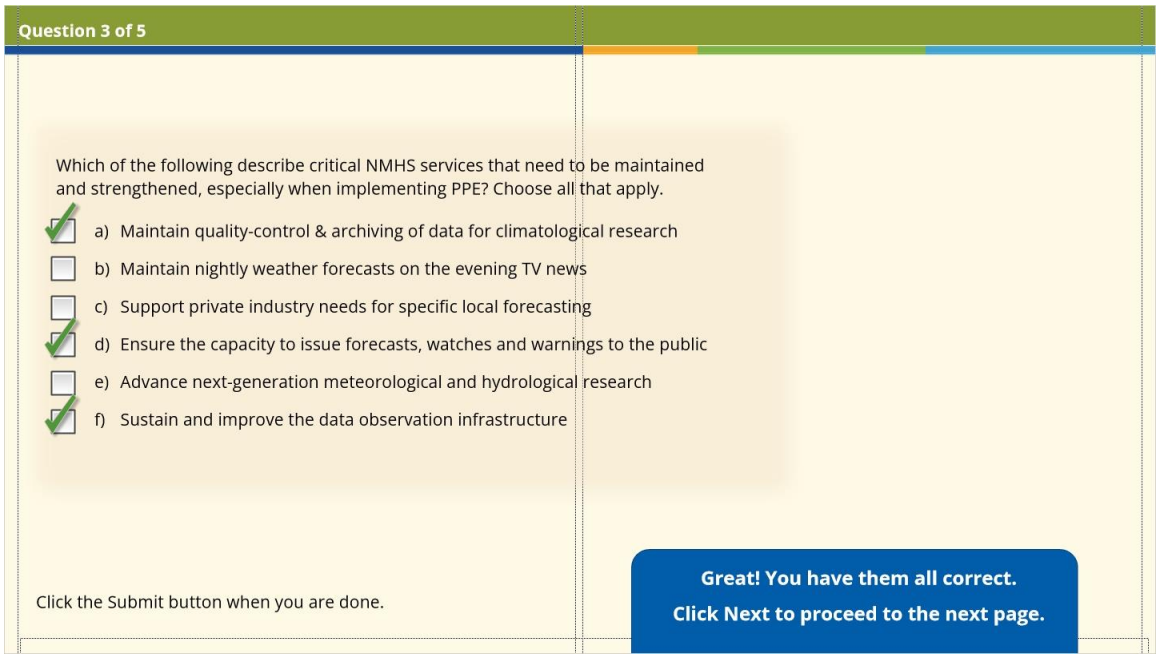


Correct	Choice
X	Check Box 1
	Check Box 2
	Check Box 3
X	Check Box 4
	Check Box 5
X	Check Box 6

Incorrect (Slide Layer)

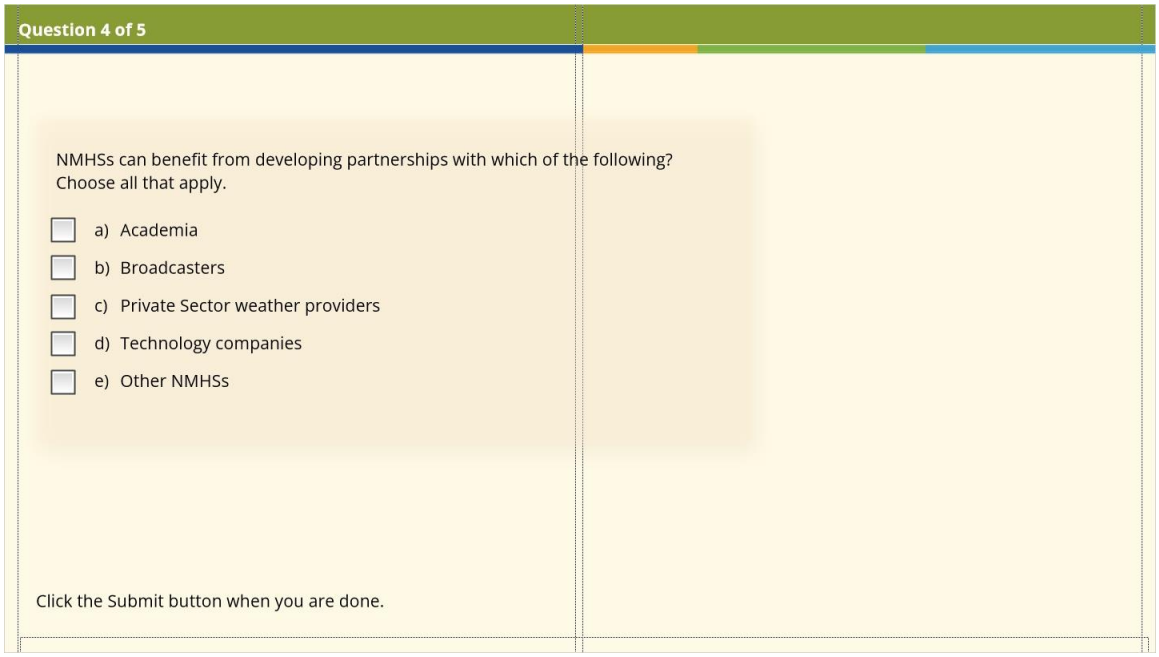


Correct (Slide Layer)



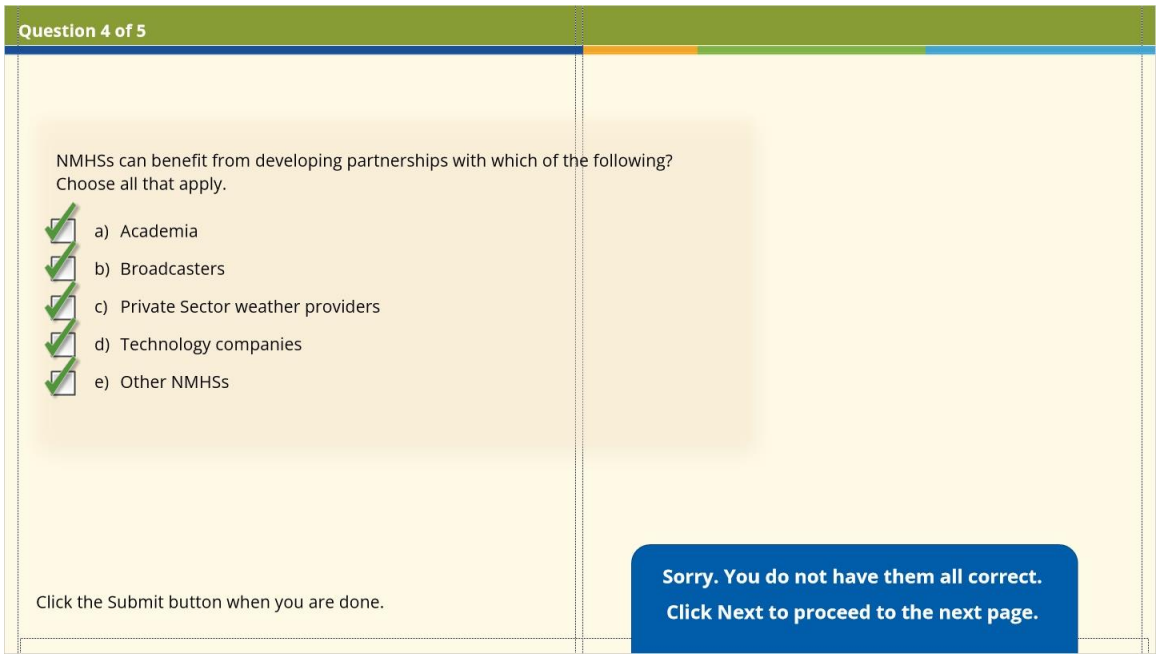
4.18 Question 4

(Pick Many, 10 points, 1 attempt permitted)

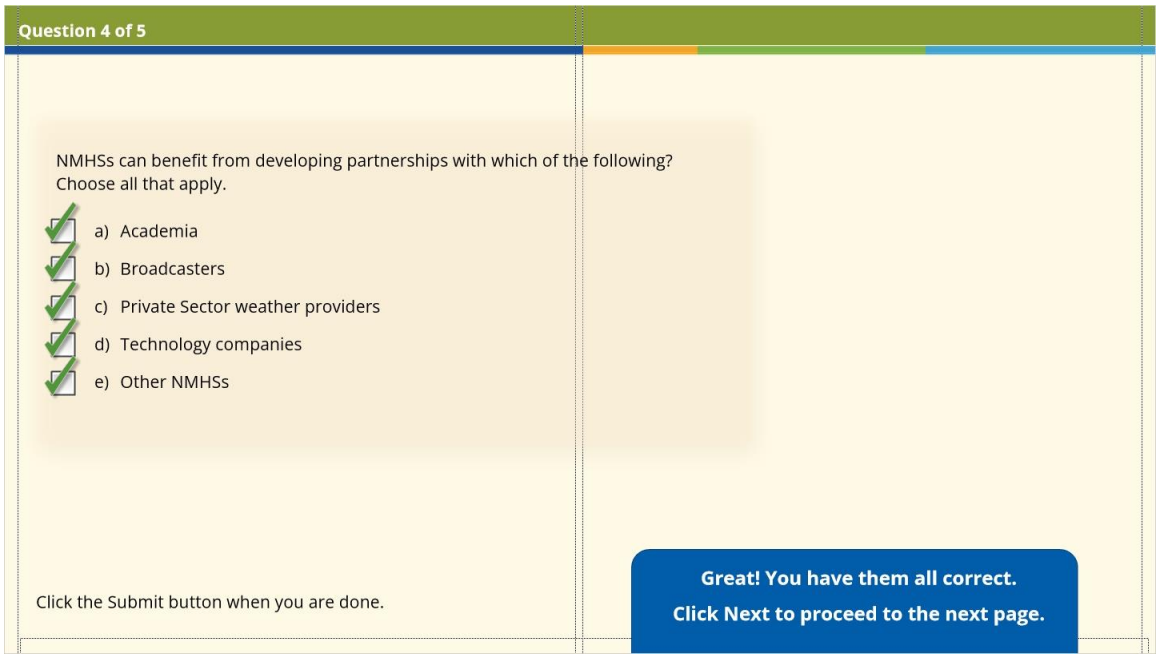


Correct	Choice
X	Check Box 1
X	Check Box 2
X	Check Box 3
X	Check Box 4
X	Check Box 5

Incorrect (Slide Layer)

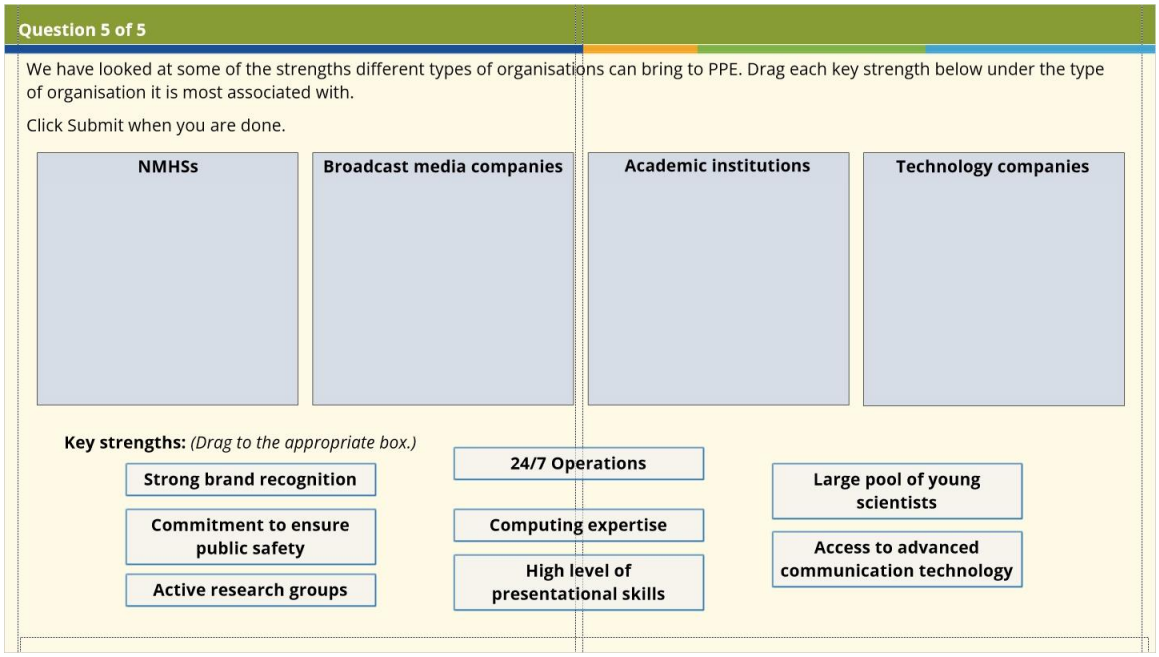


Correct (Slide Layer)



4.19 Question 5

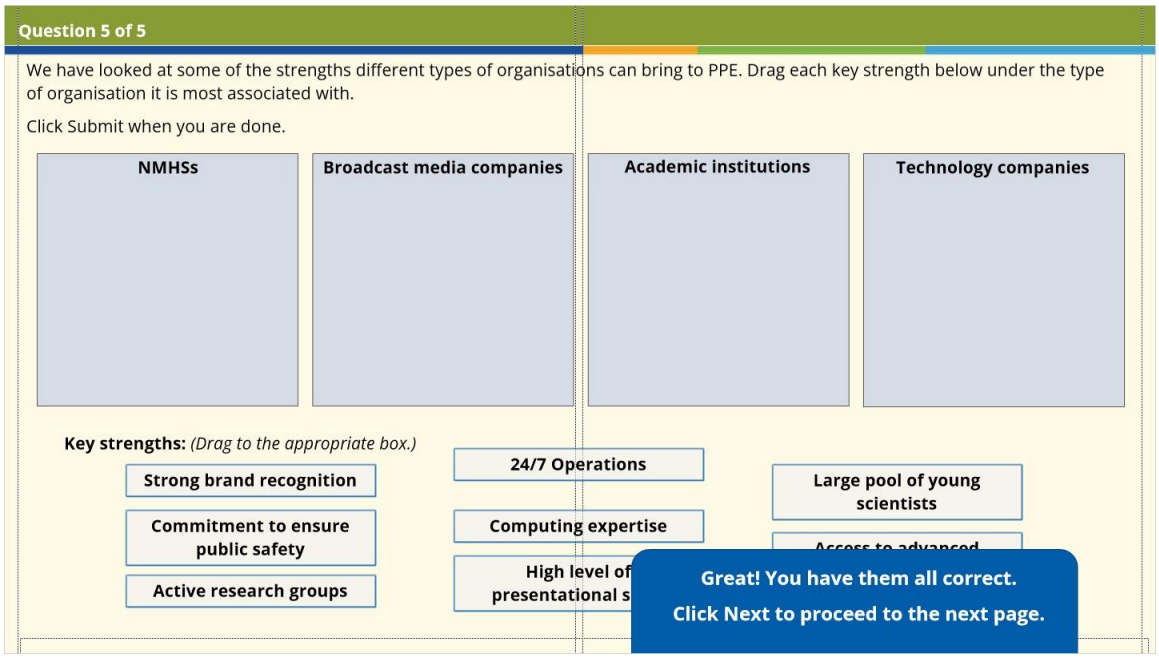
(Drag and Drop, 10 points, 1 attempt permitted)



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)



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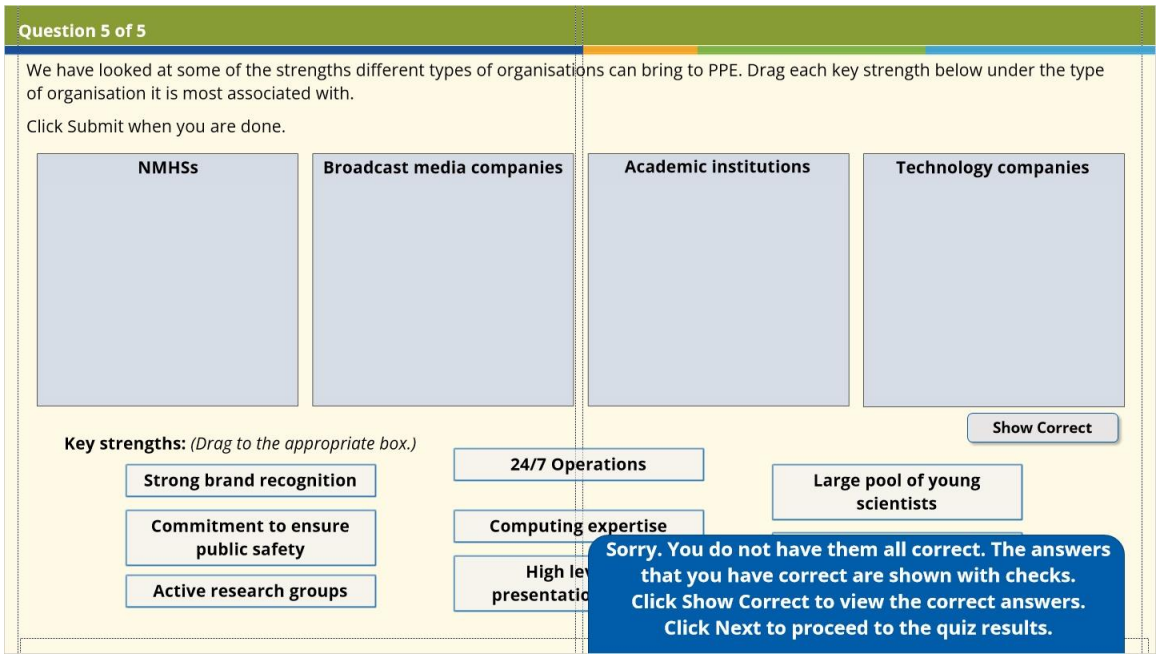
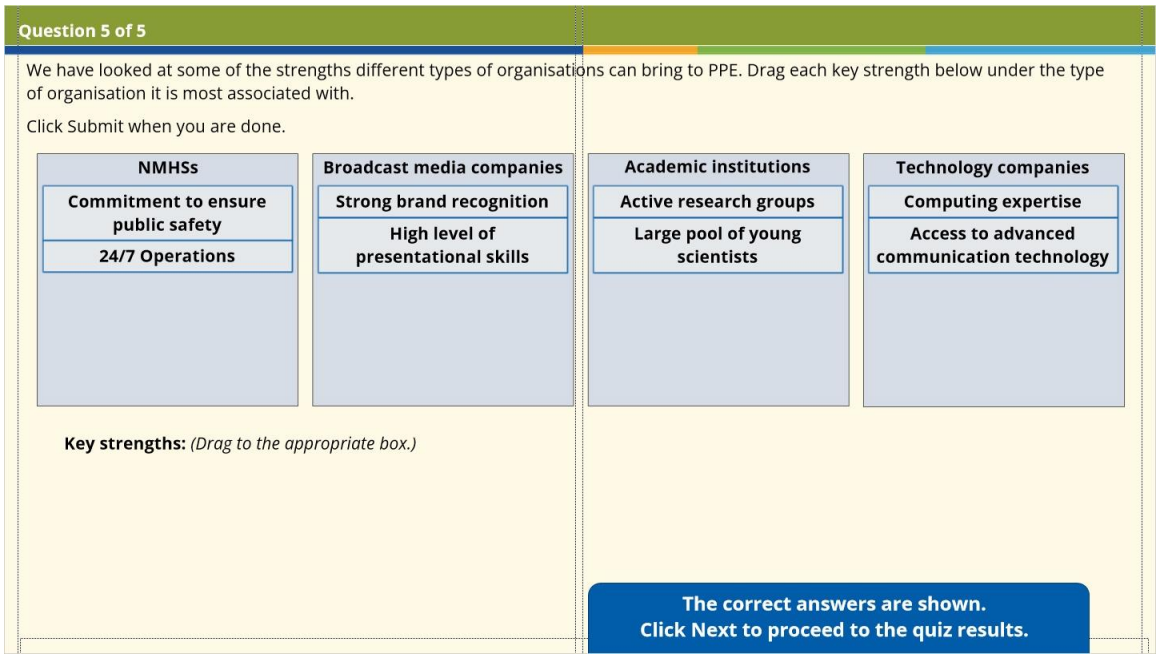
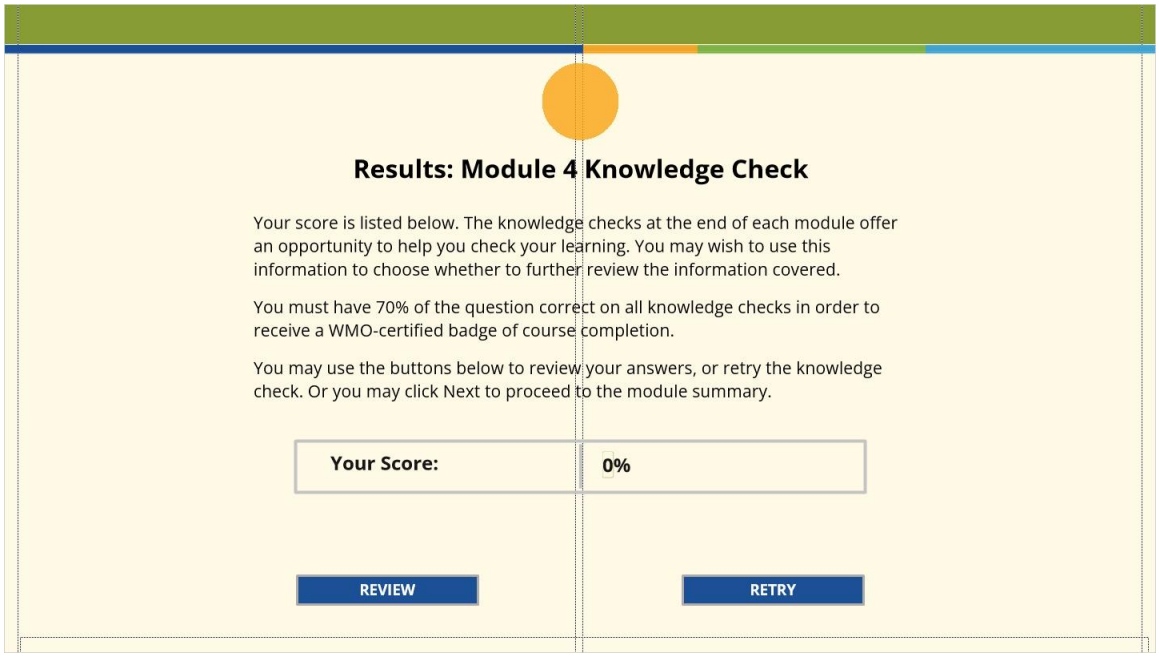


final correct (Slide Layer)



4.20 Results: Module 4 Knowledge Check

(Results Slide, 0 points, 1 attempt permitted)



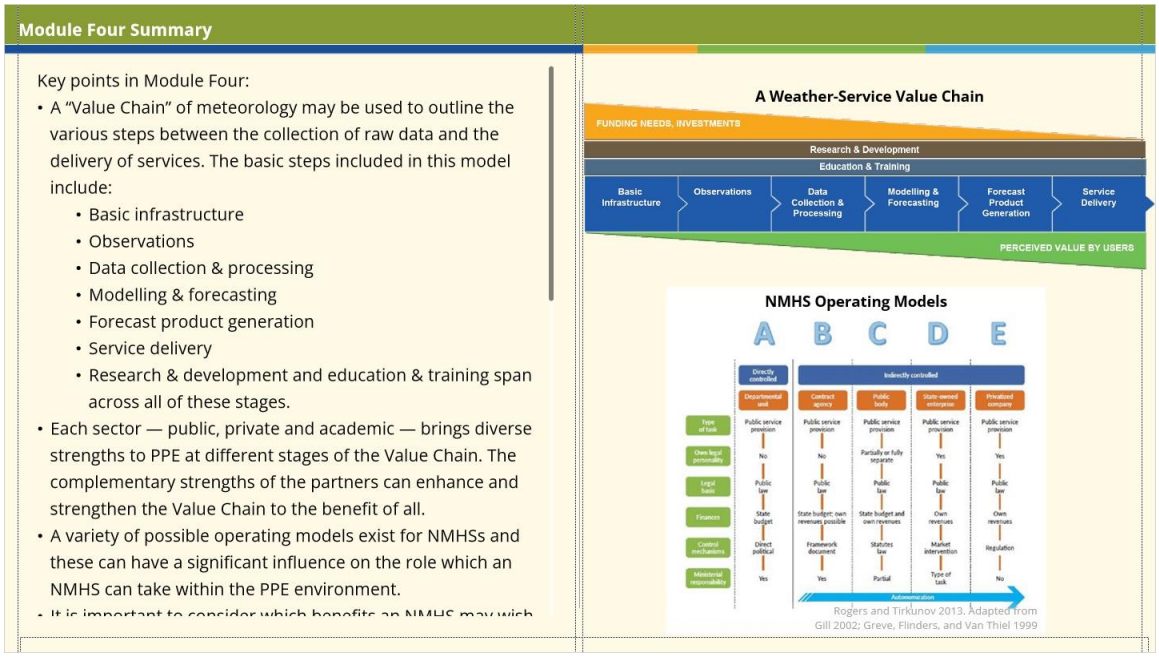
Results for
4.15 Question 1
4.16 Question 2
4.17 Question 3
4.18 Question 4
4.19 Question 5

Result slide properties

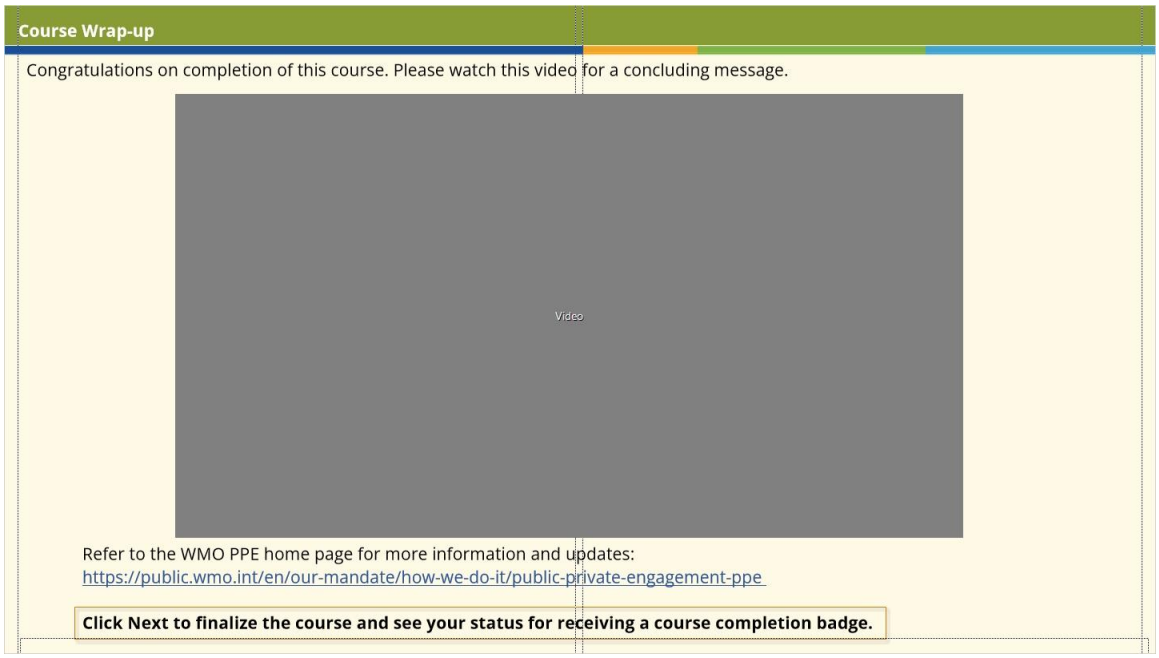
Passing	70%
Score	

Notes:

4.21 Module Four Summary



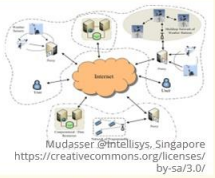
4.22 Course Wrap-up



Notes:

4.23 Course Completion

Course Completion



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

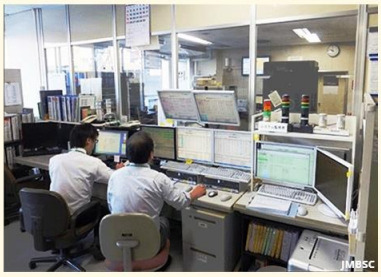
Case Example 1: Strong Wind Alerting System for a High Speed Train in the Netherlands

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

Japan Meteorological Agency, Tokyo



Japanese Meteorological Business Support Center

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.

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.

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.

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)

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.

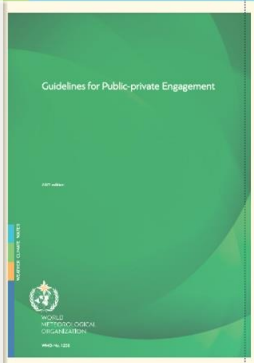
4. Create shared values between partners
Recognise opportunities for innovation and growth, based on science, to meet societal needs.

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.



Refer to the full document for more information:
- Guidelines for Public-Private Engagement (WMO-No. 1258), https://library.wmo.int/?lvl=notice_display&id=21858