

Cyclone Warning Markup Language (CWML)

A standards-based language for cyclone advices

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Editors: Sai Sun, National ICT Australia (NICTA)
<Sai.Sun@nicta.com.au>
Renato Iannella, National ICT Australia (NICTA)
<renato@nicta.com.au>
Karen Robinson, National ICT Australia (NICTA)
<Karen.Robinson@nicta.com.au>

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1 Introduction

1.1 Background

A Cyclone is a large-scale, atmospheric wind-and-pressure system characterised by low pressure at its centre and by inward spiralling winds that spin counterclockwise in the Northern Hemisphere, and clockwise in the Southern Hemisphere. In meteorology, the term *cyclone* covers a wide variety of meteorological phenomenon such as tropical cyclones, extratropical cyclones and tornadoes. Cyclones are dangerous because they produce destructive winds, heavy rainfall with flooding and damaging storm surges that can cause inundation of low-laying coastal areas. Thus, weather bureaus and cyclone warning centres usually provide cyclone warning service during cyclones threaten coastal and island communities.

Currently, the weather bureaus issue cyclone advices in a textual format. There are some variations in the content and format of the advices issued by different weather bureaus. These pose challenges to effective information sharing and exchange which, however, are critical to the disaster, incident, crisis, and emergency sectors.

The standard-based language for cyclone advices described in this document is being developed as a first attempt to define structured semantic data models for cyclone advices. The benefits of structured semantic data models include:

- Less ambiguity of cyclone advice contents than with purely textual bulletins, as elements of structured documents can have well-defined semantics,
- Improve consistency of advices across the different bureaus of meteorology,

- Improve opportunities for machine processing of advices, allowing advices to be:
 - generated
 - checked/validated
 - disseminated
 - combined/aggregated with other severe weather advices
 - combined/aggregated with related information
 - mapped to visual (or other) presentations suitable for decision makers and the public in a more efficient manner, allowing crucial information to reach the affected public faster.

The language aims to build on relevant standards wherever possible, in order to maximise opportunities for interoperability. For example, it uses selected concepts from the Geography Markup Language (GML), such as GML Points for describing location and GML CompassPoint for describing direction, to facilitate integration with mapping and geospatial systems (so that, for example, the observations and threats contained in a advice can be automatically plotted on a map).

It is also anticipated that the language will be used in conjunction with standards that support the exchange of information in emergency situations, including the Emergency Data Exchange Language (EDXL) Distribution Element and the Common Alerting Protocol (CAP). These can be used to represent metadata about cyclone advices, such as the intended recipients (EDXL) and the category of alert (CAP), which can assist with routing (to the right people and organisations) and prioritization of advices.

1.2 Overview

This document is structured as follows:

- Section 2 describes the model that underpins the language for cyclone advices,
- Section 3 presents the element semantics for the language,
- Section 4 presents an XML schema for the language,
- Section 5 presents some example CWML advices expressed using the language,
- Section 6 presents a CWML example embedded inside an EDXL message, and
- The Appendices present examples of advices issued for Cyclone Larry and Cyclone Ingrid to show the textual advice formats that are currently in use.

2 CWML Model

Cyclone advices are directed at many different kinds of organisations, as well as the public. The main contents of a cyclone advice are:

- General information of the advice, such as the issuer of the advice, the time of issue, the priority of the advice, and the time of future advices.
- A description of how frequently the advice should be broadcasted and the usage of the warning signal.
- Information about watches and warnings that are in effect. In Australia, a watch is issued every six hours when there are indications that gales or stronger winds are expected to affect coastal or island communities within 48 hours but not within 24 hours, while a warning is issued every three hours when such impacts are expected within 24 hours.
- A textual evaluation of the cyclone, possibly including expected impacts.
- The name, the category and the observation time of the cyclone.
- Observations about the cyclone, including the central pressure, the centre of the cyclone, the areas of destructive winds and the wind speed of the cyclone core etc.
- Prediction of threats caused by the cyclone.
- The precautions people are suggested to take for the cyclone.

Not all of these elements may be present in a single advice. For example, advices issued at the beginning period may not include the detailed observation data of the cyclone as it is not so severe.

Figure 1 shows the information model structure of a cyclone advice. The parts that make up the advice are described in detail in the Element Semantics that follows (Section 3).

The model was created from an analysis of example Cyclone advices provided by Australian Government Bureau of Meteorology.

The CWML advice model consists of the above content of the advice and links to applicable areas. These can be for the entire advice or a specific Watch or Warning area(s). The area can be represented as Location, Position, locationDescription or centreLocation.

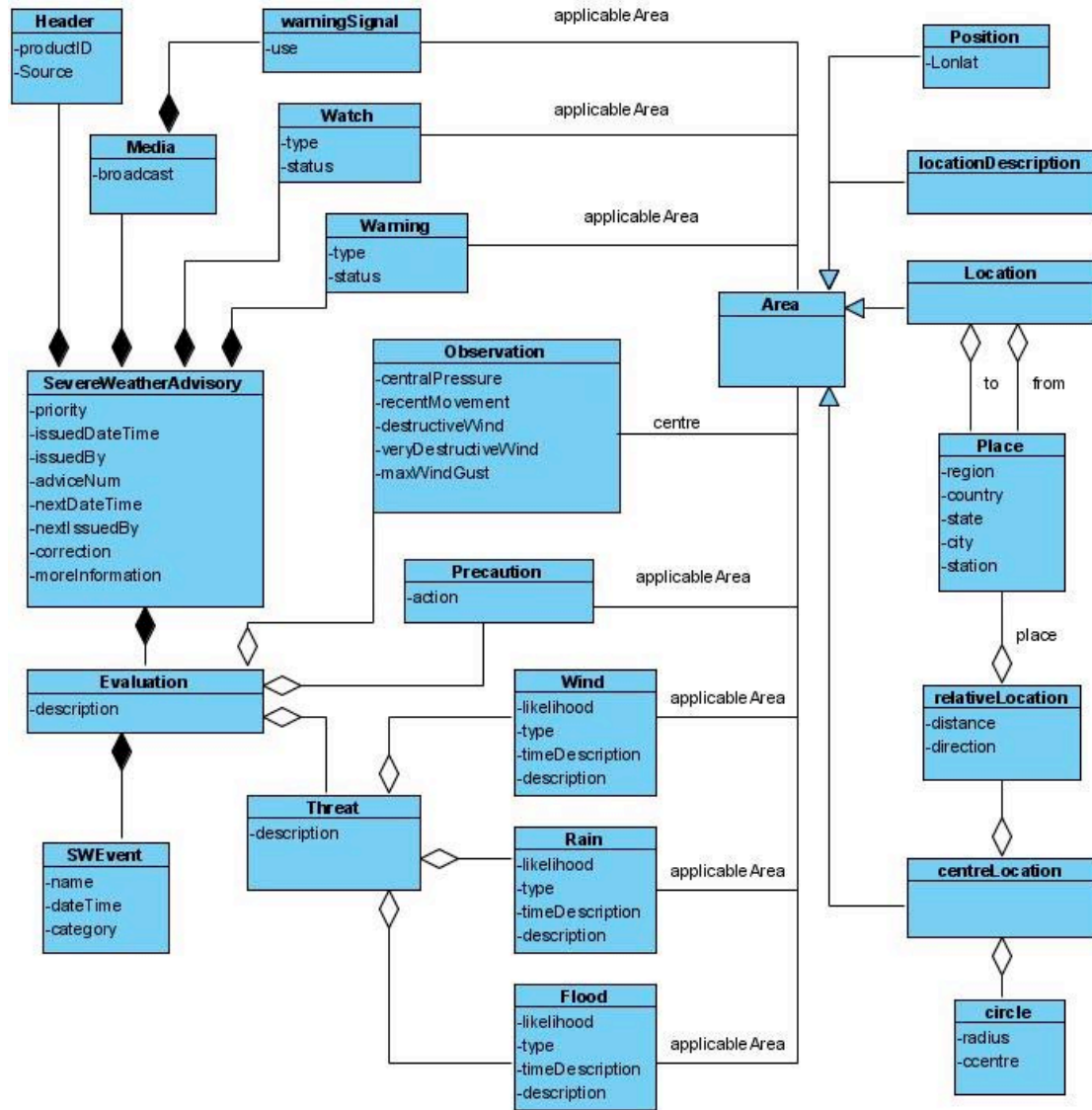


Figure 1. UML model showing the structure of a cyclone advice

3 CWML Element Semantics

3.1 SevereWeatherAdvisory elements

This section defines elements related to the **SevereWeatherAdvisory** class shown in Figure 1.

Element	SevereWeatherAdvisory
Type	XML structure
Usage	REQUIRED , MUST be used once and only once
Definition	The top-level container element
Comments	
Used in	Top level element

Element	Header
Type	XML structure. Its sub-elements are described in Section 3.2
Usage	OPTIONAL , MAY be used once and only once
Definition	A header that encapsulates the source of this advice and the product code.
Comments	
Used in	SevereWeatherAdvisory

Element	priority
Type	xs:string with restrictions
Usage	REQUIRED , MUST be used once and only once
Definition	The priority of this advice.
Comments	The value must be one of the following: <ul style="list-style-type: none"> - "PRIORITY" - "TOP PRIORITY"
Used in	SevereWeatherAdvisory

Element	issuedDateTime
Type	XML structure containing the TimeInstant element (see Section 3.16)
Usage	REQUIRED , MUST be used once and only once
Definition	The date and time at which the advice was issued
Comments	An example of the contents of this element is as follows: <pre><TimeInstant> <gml:timePosition>2006-05-16T 12:04:00-07:00</gml:timePosition> </ TimeInstant></pre> <p>Here, -07:00 indicates the timezone. Alternatively, "Z" can be used to indicate Coordinated Universal Time (UTC), as in the example below.</p> <pre><TimeInstant> <gml:timePosition>2006-05-16T 19:04:00Z</gml:timePosition></pre>

	</ TimeInstant>
Used in	SevereWeatherAdvisory

Element	issuedBy
Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	The organization that issued the advisory
Comments	
Used in	SevereWeatherAdvisory

Element	adviceNum
Type	xs:nonNegativeInteger
Usage	REQUIRED , MUST be used once and only once
Definition	The advisory number
Comments	The number indicates the position of the advice in a sequence issued by an organization for a particular severe weather event. Numbers start from 1.
Used in	SevereWeatherAdvisory

Element	nextDateTime
Type	XML structure containing the TimeInstant element (see Section 3.16)
Usage	REQUIRED , MUST be used once and only once
Definition	The date and time at which the next advisory will be issued
Comments	The contents of this element are identical to those of the SevereWeatherAdvisory/ issuedDateTime element (see Section 3.1).
Used in	SevereWeatherAdvisory

Element	correction
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A plain language description indicating the correction of a previous advice.
Comments	An example use is shown below: <correction> Removal of incorrect information at bottom of original advice. </correction>
Used in	SevereWeatherAdvisory

Element	moreInformation
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A plain language description of additional information
Comments	An example usage of this element is as follows: <moreInformation> This warning is also available through TV and Radio Broadcasts; the Bureau's website at www.bom.gov.au or call 1300 659 212. The

	Bureau and the State Emergency Service would appreciate this warning being broadcast regularly. </moreInformation >
Used in	SevereWeatherAdvisory

Element	Media
Type	XML structure. Its sub-elements are described in Section 3.3
Usage	OPTIONAL , MAY be used once and only once
Definition	Encapsulates the manner of broadcast and the usage of the warning signal.
Comments	
Used in	SevereWeatherAdvisory

Element	Watch
Type	XML structure. Its sub-elements are described in Section 3.4
Usage	OPTIONAL , MAY use multiple
Definition	Contains a description of the type of the watch, the applicable areas of the watch, and the status of the watch.
Comments	Refer to Section 3.4 for more detailed information about the contents of this element.
Used in	SevereWeatherAdvisory

Element	Warning
Type	XML structure. Its sub-elements are identical to those of the Watch element, and are described in Section 3.4.
Usage	OPTIONAL , MAY use multiple
Definition	Contains a description of the type of the warning, the areas covered by the warning and the status of the warning.
Comments	Refer to Section 3.4 for more detailed information about the contents of this element.
Used in	SevereWeatherAdvisory

Element	Evaluation
Type	XML structure. Its sub-elements are described in Section 3.5
Usage	REQUIRED , MUST be used once and only once
Definition	Provides an analysis of the severe weather event with which the advice is concerned. This analysis will usually include a plain language description of the event, its likely threat, a set of observations, and people precautions.
Comments	Refer to Section 3.5 for more detailed information about the contents of this element.
Used in	SevereWeatherAdvisory

3.2 Header elements

This section defines elements related to the **Header** class shown in Figure 1.

Element	productID
Type	xs:string
Usage	REQUIRED , MUST be used once and only once

Definition	The product identifier for the advice.
Comments	
Used in	Header

Element	Source
Type	xs:string
Usage	REQUIRED, MUST be used once and only once
Definition	The source of the advice.
Comments	
Used in	Header

3.3 Media elements

This section defines elements related to the **Media** class as shown in Figure 1.

Element	broadcast
Type	xs:string
Usage	OPTIONAL, MAY be used once and only once
Definition	The recommended timing for broadcasting the advice.
Comments	Example values: “immediately” “within the hour” “regularly”
Used in	Media

Element	warningSignal
Type	XML structure. Its sub-elements are described in Subsection 3.3.1 (see below).
Usage	REQUIRED, MUST be used once and only once
Definition	The element indicates whether the warning signal should be used with the advice. It may also contain the areas requested to use the warning signal.
Comments	
Used in	Media

3.3.1 warningSignal elements

This subsection defines elements related to **warningSignal** class as shown in Figure 1.

Element	use
Type	xs:Boolean
Usage	REQUIRED, MUST be used once and only once
Definition	A Boolean value indicating whether the warning signal should be used with the advice.
Comments	
Used in	warningSignal

Element	applicableArea
Type	XML structure. Its sub-elements are described in Section 3.11

Usage	Conditional , May be used once and only once
Definition	The area requested to use the warning signal.
Comments	This element should not be used when the value of the use element is “false”. Refer to Section 3.11 for more detailed information about the contents of this XML structure.
Used in	warningSignal

3.4 Watch and Warning elements

This section defines elements related to the **Watch** and **Warning** classes as shown in Figure 1.

Element	type
Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	The type of the watch/warning
Comments	Example Values: “Cyclone” “Tropical Depression” “Subtropical Storm”
Used in	Watch Warning

Element	applicableArea
Type	XML structure with identical content to warningSignal/applicableArea (see Subsection 3.3.1).
Usage	REQUIRED , MUST be used once and only once
Definition	The area for which the watch/warning applies.
Comments	
Used in	Watch Warning

Element	status
Type	xs:string with restrictions
Usage	REQUIRED , MUST be used once and only once
Definition	The current status of a watch or warning
Comments	The value must be one of the following: - “current” - “ended” A watch/warning can be explicitly cancelled by issuing an advice in which the value of the status element is set to “ended”.
Used in	Watch Warning

3.5 Evaluation elements

This section defines elements related to the **Evaluation** class shown in Figure 1.

Element	SWEvent
Type	XML structure. Its sub-elements are described in Section 3.6
Usage	REQUIRED , MUST be used once and only once
Definition	Contains the name, the category and the observation time of the severe weather event.
Comments	Refer to Section 3.6 for more detailed information about the contents of this element.
Used in	Evaluation

Element	description
Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	A plain language analysis of the severe weather event, typically explaining what has been observed and what is predicated for this event.
Comments	
Used in	Evaluation

Element	Observation
Type	XML structure. Its sub-elements are described in Section 3.7
Usage	OPTIONAL , MAY be used once and only once
Definition	A collection of observations that characterise the severe weather event.
Comments	Refer to Section 3.7 for more detailed information about the contents of this element.
Used in	Evaluation

Element	Threat
Type	XML structure. Its sub-elements are described in Section 3.8
Usage	OPTIONAL , MAY be used once and only once
Definition	Provides an analysis of the threat caused by the severe weather event. This analysis will usually include a plain language description and a set of detailed predictions based on different threat factors.
Comments	Refer to Section 3.8 for more detailed information about the contents of this element.
Used in	Evaluation

Element	Precaution
Type	XML structure. Its sub-elements are described in Section 3.9
Usage	OPTIONAL , MAY be used multiple.
Definition	Indicates the precautions should be taken for the severe weather event.
Comments	<p>An example of the contents of this element is as follows:</p> <pre><Precaution> <applicableArea> <Location> <from> <city>Cape Tribulation</city> </from></pre>

	<pre> <to> <city>Proserpine</city> </to> </Location> </applicableArea> <action> People in this area should consider actions they will need to take if the cyclone threat increases and listen to the next advice. </action> </Precaution> </pre> <p>This example states that people in the area between Cape Trbulation and Proserpine should consider actions they will need to take if the cyclone threat increase and listen to the next advice.</p> <p>It may be necessary to include multiple “Precaution”s in an Evaluation element as people in different areas may need to take different actions.</p> <p>Refer to Section 3.9 for more detailed information about the contents of this element.</p>
Used in	Evaluation

3.6 SWEvent elements

This section defines elements related to the **SWEvent** class shown in Figure 1.

Element	name
Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	The name of the severe weather event
Comments	Example values: “Tropical Cyclone Larry” “Tropical Cyclone Ingrid”
Used in	SWEvent

Element	dateTime
Type	XML structure containing the TimeInstant element (see Section 3.16)
Usage	REQUIRED , MUST be used once and only once
Definition	The date and time at which the observation was made.
Comments	The contents of this element are identical to those of the SevereWeatherAdvisory/ issuedDateTime element (see Section 3.1).
Used in	SWEvent

Element	category
Type	XML structure. Its sub-elements are described in Section 3.17
Usage	REQUIRED , MUST be used once and only once

Definition	The category of the severe weather event.
Comments	<p>As the categorization of severe weather events is not uniform internationally, the category class is designed as a choice.</p> <p>At present, only the Australian cyclone categories are defined as part of this choice.</p>
Used in	SWEvent

3.7 Observation elements

This section defines elements related to the **Observation** class shown in Figure 1.

Element	centralPressure
Type	XML structure containing the measure element (Section 3.16).
Usage	REQUIRED , MUST be used once and only once
Definition	The central pressure of the cyclone.
Comments	<p>An example usage of this element is as follows:</p> <pre><centralPressure> <measure uom="urn:x-ogc:def:uom:OGC:1.0:hector-Pa"> 925</measure> </centralPressure></pre> <p>Here the unit of measure is Hectopascal, a conventional unit for central pressure of the cyclone.</p>
Used in	Observation

Element	centre
Type	XML structure. Its sub-elements are described in Section 3.11
Usage	REQUIRED , MUST be used once and only once
Definition	The centre of the cyclone.
Comments	<p>The centre of the cyclone usually chooses the centreLocation type to represent enough details.</p> <p>Refer to Section 3.11 for more detailed information about the contents of this element.</p>
Used in	Observation

Element	recentMovement
Type	XML structure containing the speed element and the direction element (see Section 3.15).
Usage	REQUIRED , MUST be used once and only once
Definition	The recent movement of the cyclone, represented by the speed and the direction.
Comments	<p>An example usage of this element is as follows:</p> <pre><recentMovement> <speed> <measure uom="urn:x-ogc:def:uom:OGC:1.0:kmh">8</measure></pre>

	<pre> </speed> <direction> <CompassPoint>W</CompassPoint> </direction> </recentMovement> </pre> <p>This example states that the cyclone is moving towards the west at 8 km/hr.</p>
Used in	Observation

Element	destructiveWind
Type	XML structure containing the measure element (Section 3.16)
Usage	OPTIONAL , MAY be used once and only once
Definition	The range impacted by destructive winds.
Comments	<p>An example usage of this element is as follows:</p> <pre> <destructiveWind> <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">90</measure> </destructiveWind> </pre> <p>This example states that destructive winds are expected out to 90 kilometres from the centre of the cyclone.</p>
Used in	Observation

Element	veryDestructiveWind
Type	XML structure containing the measure element (Section 3.16)
Usage	OPTIONAL , MAY be used once and only once
Definition	The range impacted by very destructive winds.
Comments	Note that the range impacted by very destructive winds is always smaller than the range impacted by destructive winds.
Used in	Observation

Element	maxWindGust
Type	XML structure containing the measure element (Section 3.16)
Usage	OPTIONAL , MAY be used once and only once
Definition	The wind speed of the cyclone core.
Comments	<p>An example usage of this element is as follows:</p> <pre> <maxWindGust> <measure uom="urn:x-ogc:def:uom:OGC:1.0:kmh">290</measure> </maxWindGust> </pre> <p>This example states that the wind gusts are 290 km/hr near the centre of the cyclone.</p>
Used in	Observation

3.8 Threat elements

This section defines elements related to the **Threat** class as shown in Figure 1.

Element	Description
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Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	A plain-language summary indicating the threats that should be expected from the severe weather event.
Comments	
Used in	Threat

Element	Wind
Type	XML structure. Its sub-elements are described in Section 3.10
Usage	OPTIONAL , MAY use multiple
Definition	A description that characterises expected destructive winds. The possible values include “likelihood”, “type”, “applicableArea”, “timeDescription” and “description”.
Comments	<p>An example usage of this element is as follows:</p> <pre> <Wind> <possibility>expected</possibility> <type>the very destructive core of the cyclone</type> <applicableArea> <locationDescription>near the coast between Cape Melville and Cooktown</locationDescription> </applicableArea> <timeDescription> late Wednesday afternoon </timeDescription> </Wind> </pre> <p>This example states that The very destructive core of the cyclone is expected near the coast between Cape Melville and Cooktown late Wednesday afternoon.</p> <p>As there may be different types of winds impacting different area, it may be necessary to include multiple watches in a single advice.</p> <p>Refer to Section 3.10 for more detailed information about the contents of this element.</p>
Used in	Threat

Element	Rain
Type	XML structure. Its sub-elements are identical to those of Wind , and are described in Section 3.10.
Usage	OPTIONAL , MAY use multiple
Definition	A description that characterises expected destructive rains. The possible values include “likelihood”, “type”, “applicableArea”, “timeDescription” and “description”.
Comments	Refer to Section 3.10 for more detailed information about the contents of this element.
Used in	Threat

Element	Flood
Type	XML structure. Its sub-elements are identical to those of Wind , and are described in Section 3.10.
Usage	OPTIONAL , MAY use multiple
Definition	A description that characterises expected flooding. The possible

	values include “likelihood”, “type”, “applicableArea”, “timeDescription” and “description”.
Comments	As the status of the possible flood is usually more complex than the wind and the rain, “description” is commonly given to make it clearer. Refer to Section 3.10 for more detailed information about the contents of this element.
Used in	Threat

3.9 Precaution elements

This section defines elements related to the **Precaution** class as shown in Figure 1.

Element	applicableArea
Type	XML structure with identical content to warningSignal/applicableArea (see Subsection 3.3.1).
Usage	OPTIONAL , MAY be used once and only once
Definition	The area where the precaution should be taken.
Comments	
Used in	Precaution

Element	action
Type	xs:string
Usage	REQUIRED , MUST be used once and only once
Definition	The action that people should take for the severe weather event
Comments	An example of the contents of this element is as follows: <action> Stay calm and remain in a secure shelter. </action>
Used in	Precaution

3.10 Wind, Rain and Flood elements

This section defines elements related to the **Wind, Rain, and Flood** classes as shown in Figure 1.

Element	likelihood
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	The possibility of this predicted threaten.
Comments	
Used in	Threat/Wind Threat/Rain Threat/Flood

Element	type
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	The type or degree of this threatening factor
Comments	Example values: “Gales” “Heavy rain” “the dangerous storm tide”
Used in	Threat/Wind Threat/Rain Threat/Flood

Element	applicableArea
Type	XML structure with identical content to warningSignal/applicableArea (see Subsection 3.3.1).
Usage	REQUIRED , MUST be used once and only once
Definition	The applicable area of this threat
Comments	
Used in	Threat/Wind Threat/Rain Threat/Flood

Element	timeDescription
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A textual description of the time of this expected threat.
Comments	As this element is used in the prediction of threats, it can not be as precise as the TimeInstant type adopted in SevereWeatherAdvisory/issuedDateTime . The following are example values of this element: “later in the day” “Wednesday morning” “within the next few hours”
Used in	Threat/Wind Threat/Rain Threat/Flood

Element	description
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A plain language description providing more information besides the contents of the above sub-elements
Comments	
Used in	Threat/Wind Threat/Rain Threat/Flood

3.11 Area elements

The **Area** class is an important class in CWML as it is used by many other classes to represent:

- An applicable area of a watch or a warning
- An area the warning signal should be used to broadcast the advice
- The centre of the cyclone
- The area in which people should take precautions for the severe weather event

To provide flexible and comprehensive expressions, CWML defines an **Area** with a choice of the following values: **Position**, **Location**, **locationDescription**, and **centreLocation**.

Element	Position
Type	XML structure containing the Point element (see Section 3.16)
Usage	OPTIONAL , MAY be used once and only once
Definition	The coordinates of a location. The coordinates are typically a pair consisting of a latitude and longitude – however, they can potentially be coordinates from any spatial reference system.
Comments	<p>An example usage of this element is as follows:</p> <pre><position> <Point srsName="urn:ogc:def:crs:OGC:1.3:CRS84"> <gml:pos>-17.5 148.3</gml:pos> </Point> </position></pre> <p>This example describes a location latitude 17.5 degrees south and longitude 148.3 degrees east in the WGS 84 spatial reference system.</p>
Used in	warningSignal/applicableArea Watch/applicableArea Warning/applicableArea Wind/applicableArea Rain/applicableArea Flood/applicableArea Observation/centre

Element	Location
Type	XML structure. Its sub-elements are described in Section 3.12
Usage	OPTIONAL , MAY be used once and only once
Definition	Indicates the area delimited by places (where places may be fine-grained, such as cities, stations, or coarse-grained, such as countries or regions).
Comments	<p>An example usage of this element is as follows:</p> <pre><Location> <from> <city>Cape Melville</city> </from> <to> <city>Cape Tribulation</city></pre>

	<pre></to> </Location></pre> <p>This example states the area between Cape Melville and Cape Tribulation.</p>
Used in	warningSignal/applicableArea Watch/applicableArea Warning/applicableArea Wind/applicableArea Rain/applicableArea Flood/applicableArea Observation/centre

Element	locationDescription
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A short textual description of a location
Comments	<p>This class is frequently used when the Location class is not enough to represent some complex areas. An example usage of this element is as follows:</p> <pre><locationDescription> across Cape York Peninsula to the eastern Gulf of Carpentaria between the mouth of the Gilbert River and Aurukun </locationDescription></pre>
Used in	warningSignal/applicableArea Watch/applicableArea Warning/applicableArea Wind/applicableArea Rain/applicableArea Flood/applicableArea Observation/centre

Element	centreLocation
Type	XML structure which contains a required circle element and may contain one or more relativeLocation element(s) (see Section 3.13).
Usage	OPTIONAL , MAY be used once and only once
Definition	Includes a circle to represent the centre and the relative distance from the centre to some symbolic place (e.g. city, town).
Comments	<p>An example use is as follows:</p> <pre><centreLocation> <circle> <radius> <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">20</measure> </radius> <centre> <Point srsName="urn:ogc:def:crs:OGC:1.3:CRS84"> <gml:pos>-13.8 146.3</gml:pos> </Point> </centre></pre>

	<pre> </circle> <relativeLocation> <distance> <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">200</measure> </distance> <direction> <CompassPoint>ENE</CompassPoint> </direction> <place> <city>Cape Melville</city> </place> </relativeLocation> <relativeLocation> <distance> <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">220</measure> </distance> <direction> <CompassPoint>NNE</CompassPoint> </direction> <place> <city>Cooktown</city> </place> </relativeLocation> </ centreLocation > </pre> <p>This example means that the centre of the cyclone is within 20 kilometres of latitude 13.8 degrees south longitude 146.3 degrees east about 200 kilometres east northeast of Cape Melville and 220 km north northeast of Cooktown.</p> <p>This element is commonly used in the Observation/Centre class.</p> <p>Refer to Subsection 3.13.1 for more detailed information about the circle element and refer to Subsection 3.13.2 for more detailed information about the relativeLocation element.</p>
Used in	<p>warningSignal/applicableArea Watch/applicableArea Warning/applicableArea Wind/applicableArea Rain/applicableArea Flood/applicableArea Observation/centre</p>

3.12 Location elements

This section defines elements related to the **Location** class as shown in Figure 1.

Element	from
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Type	XML structure containing a combination of the following elements: region, country, state, city, station (see Section 3.14).
Usage	REQUIRED, MUST be used once and only once
Definition	The symbolic place used to delimit the Location class. It can be anything from an observation station to a large-scale region (e.g., “the Pacific Basin”). The description of the symbolic place is made up of a hierarchy of: region name, country name, state name, city name and station name. However, not all of these are required – for example, a city name by itself forms a valid place description if it is sufficiently unambiguous.
Comments	When this element is used itself, the area is the symbolic place. When this element is used together with to , the area is the location surrounded by these places.
Used in	Location

Element	to
Type	XML structure with identical content to from (see the above).
Usage	OPTIONAL, MAY use multiply
Definition	The place used to delimit the Location class
Comments	Its sub-elements are identical to that of the from element. However, the usage is OPTIONAL .
Used in	Location

3.13 centreLocation elements

This section defines elements related to the **centreLocation** class as shown in Figure 1.

Element	circle
Type	XML structure. Its sub-elements are described in Subsection 3.13.1 (see below)
Usage	REQUIRED, MUST be used once and only once
Definition	The circle used to represent the centre of the cyclone.
Comments	
Used in	centreLocation

Element	relativeLocation
Type	XML structure. Its sub-elements are described in Subsection 3.13.2 (see below)
Usage	OPTIONAL, MAY be used multiply
Definition	The relative distance from the centre to some symbolic place
Comments	
Used in	centreLocation

3.13.1 circle elements

This subsection defines elements related to the **circle** class as shown in Figure 1.

Element	radius
----------------	---------------

Type	XML structure containing the measure element (Section 3.16)
Usage	REQUIRED , MUST be used once and only once
Definition	The radius of the circle
Comments	
Used in	circle

Element	ccentre
Type	XML structure containing the Point element (Section 3.16)
Usage	REQUIRED , MUST be used once and only once
Definition	The centre of the circle
Comments	
Used in	circle

3.13.2 relativeLocation elements

This subsection defines elements related to the **relativeLocation** class as shown in Figure 1.

Element	distance
Type	XML structure containing the measure element (Section 3.16).
Usage	REQUIRED , MUST be used once and only once
Definition	The distance from the symbolic place.
Comments	
Used in	relativeLocation

Element	direction
Type	XML structure containing the CompassPoint element (Section 3.16).
Usage	REQUIRED , MUST be used once and only once
Definition	The direction of the cyclone centre to the symbol place
Comments	<p>An example use is as follows:</p> <pre><direction> <CompassPoint>W</CompassPoint> </direction></pre> <p>This example states that the cyclone centre is located WEST of the symbolic place.</p>
Used in	relativeLocation

Element	place
Type	XML structure with identical content to Location/from (see Section 3.12).
Usage	REQUIRED , MUST be used once and only once
Definition	The relative symbolic place
Comments	
Used in	relativeLocation

3.14 from, to and place elements

This section defines elements related to the **from**, **to** and **place** classes as shown in Figure 1.

Element	region
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A region name.
Comments	Example values: “Pacific Basin” “East Coasts of Kamchatka Peninsula” “Kuril Islands”
Used in	Location/from Location/to relativeLocation/place

Element	country
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A country name.
Comments	
Used in	Location/from Location/to relativeLocation/place

Element	state
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A state (or province) name.
Comments	
Used in	Location/from Location/to relativeLocation/place

Element	city
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	A city (or town) name.
Comments	
Used in	Location/from Location/to relativeLocation/place

Element	station
Type	xs:string
Usage	OPTIONAL , MAY be used once and only once
Definition	The name of an observation station.
Comments	
Used in	Location/from

	Location/to relativeLocation/place
--	---

Note that the values for the elements in this section are free text strings. This is not ideal, but reflects the current practice for Cyclone advices. The use of a structured vocabulary for place names (e.g. Getty Thesaurus of Geographic Names or UN Location Codes) would enable more precise semantics and aid in interoperability.

3.15 recentMovement elements

This subsection defines elements related to the **recentMovement** class.

Element	Speed
Type	XML structure containing the measure element (Section 3.16).
Usage	REQUIRED , MUST be used once and only once
Definition	The speed of the movement
Comments	
Used in	recentMovement

Element	direction
Type	XML structure with identical content to relevantLocation/direction (see Subsection 3.13.2).
Usage	REQUIRED , MUST be used once and only once
Definition	The direction of the movement
Comments	
Used in	recentMovement

3.16 GML-based element types

This section describes four additional elements used for describing times, places, directions and measurements in CWML. All are based on types from the Geography Markup Language (GML).

Element	TimeInstant
Type	XML structure defines as per GML TimeInstantType (see the GML temporal schema)
Usage	REQUIRED , MUST be used once and only once
Definition	A date and time, described using the gml:timePosition element.
Comments	<p>An example of the contents of this element is as follows:</p> <pre><gml:timePosition>2006-05-16T 12:04:00-07:00</gml:timePosition></pre> <p>Here, -07:00 indicates the timezone. Alternatively, “Z” can be used to indicate Coordinated Universal Time (UTC), as in the example below.</p>

	<gml:timePosition>2006-05-16T 19:04:00Z</gml:timePosition>
Used in	SevereWeatherAdvisory/issuedDateTime SevereWeatherAdvisory/nextDateTime SWEvent/dateTime

Element	Point
Type	XML structure defined as per GML PointType (see the GML geometryBasic schema)
Usage	REQUIRED , MUST be used once and only once
Definition	A point in space representing the location of an observation or prediction. This is represented by a set of coordinates, as per the GML definition of PointType .
Comments	For an example usage, see the position element in Section 3.11.
Used in	Position centreLocation /circle/centre

Element	CompassPoint
Type	XML structure defined as per GML CompassPointEnumeration (see the GML direction schema)
Usage	REQUIRED , MUST be used once and only once
Definition	A direction, described using the gml:CompassPointEnumeration element.
Comments	Example values: “N” “SE” Here, “N” represents north and “SE” represents “southeast”.
Used in	Observation/recentMovement/direction centreLocation /relevantLocation/direction

Element	measure
Type	XML structure defined as per GML MeasureType (see the GML basicTypes schema)
Usage	REQUIRED , MUST be used once and only once
Definition	The value of a numerical observation or prediction. The units of measure for the observation are specified by the mandatory uom attribute.
Comments	
Used in	Observation/centralPressure Observation/recentMovement/speed Observation/destructiveWind Observation/veryDestructiveWind Observation/maxWindGust centreLocation /circle/radius centreLocation/ relevantLocation/distance

3.17 category elements

The **category** class is used to describe the degree of the severe weather event. Different countries/regions may have different categorisations. Consequently, CWML

defines **category** with a choice element. **AUCategory** is one choice which must be an integer between 1 and 5. More choices may be added when necessary.

Element	AUCategory
Type	xs:integer with restrictions
Usage	OPTIONAL , MAY be used once and only once.
Definition	Australia cyclone category
Comments	The integer must be one of 1-5. The larger the integer, the more severe the event.
Used in	SWEvent/category

4 XML Schema

This section presents a formal XML schema for the CWML. Example advisories formulated using the language follow in Section 5.

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:gml="http://www.opengis.net/gml"
  xmlns="urn:x-swevent:cyclone:1.0"
  targetNamespace="urn:x-swevent:cyclone:1.0"
  elementFormDefault="unqualified" attributeFormDefault="unqualified">
  <xs:import namespace="http://www.opengis.net/gml"
    schemaLocation="http://schemas.opengis.net/gml/3.1.1/base/gml.xsd"></xs:import>

  <xs:element name="SevereWeatherAdvisory" type="SWAdvisoryType"/>

  <xs:complexType name="SWAdvisoryType">
    <xs:sequence>
      <xs:element name="Header" type="HeaderType" minOccurs="0" maxOccurs="1"/>
      <xs:element name="priority" type="priorityType" minOccurs="1" maxOccurs="1"/>
      <xs:element name="issuedDateTime" type="DateTimeType" minOccurs="1"
maxOccurs="1"/>
      <xs:element name="issuedBy" type="xs:string" minOccurs="1" maxOccurs="1"/>
      <xs:element name="adviceNum" type="xs:nonNegativeInteger" minOccurs="1"
maxOccurs="1"/>
      <xs:element name="nextDateTime" type="DateTimeType" minOccurs="1" maxOccurs="1"/>
      <xs:element name="correction" type="xs:string" minOccurs="0" maxOccurs="1"/>
      <xs:element name="moreInformation" type="xs:string" minOccurs="0" maxOccurs="1"/>
      <xs:element name="Media" type="MediaType" minOccurs="0" maxOccurs="1"/>
      <xs:element name="Watch" type="AdviceType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Warning" type="AdviceType" minOccurs="0" maxOccurs="unbounded"/>
      <xs:element name="Evaluation" type="EvaluationType" minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="HeaderType">
    <xs:sequence>
      <xs:element name="productID" type="xs:string" minOccurs="1" maxOccurs="1"/>
      <xs:element name="Source" type="xs:string" minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="MediaType">
    <xs:sequence>
      <xs:element name="broadcast" type="xs:string" minOccurs="0" maxOccurs="1"/>
      <xs:element name="warningSignal" type="warningSignalType" minOccurs="1"
maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="warningSignalType">
    <xs:sequence>
      <xs:element name="use" type="xs:boolean" minOccurs="1" maxOccurs="1"/>
      <xs:element name="applicableArea" type="AreaType" minOccurs="0" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

```

```

<xs:complexType name="AdviceType">
  <xs:sequence>
    <xs:element name="type" type="xs:string" minOccurs="1" maxOccurs="1"/>
    <xs:element name="applicableArea" type="AreaType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="status" type="AdviceStatusType" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="EvaluationType">
  <xs:sequence>
    <xs:element name="SWEEvent" type="SWEEventType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="description" type="xs:string" minOccurs="1" maxOccurs="1"/>
    <xs:element name="Observation" type="ObservationType" minOccurs="0" maxOccurs="1"/>
    <xs:element name="Threat" type="ThreatType" minOccurs="0" maxOccurs="1"/>
    <xs:element name="Precaution" type="precautionType" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="SWEEventType">
  <xs:sequence>
    <xs:element name="name" type="xs:string" minOccurs="1" maxOccurs="1"/>
    <xs:element name="dateTime" type="DateTimeType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="category" type="categoryType" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="ObservationType">
  <xs:sequence>
    <xs:element name="centralPressure" type="MeasurementType" minOccurs="1"
maxOccurs="1"/>
    <xs:element name="centre" type="AreaType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="recentMovement" type="MovementType" minOccurs="1"
maxOccurs="1"/>
    <xs:element name="destructiveWind" type="MeasurementType" minOccurs="0"
maxOccurs="1"/>
    <xs:element name="veryDestructiveWind" type="MeasurementType" minOccurs="0"
maxOccurs="1"/>
    <xs:element name="maxWindGust" type="MeasurementType" minOccurs="0"
maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="ThreatType">
  <xs:sequence>
    <xs:element name="description" type="xs:string" minOccurs="1" maxOccurs="1"/>
    <xs:element name="Wind" type="threatElementType" minOccurs="0"
maxOccurs="unbounded"/>
    <xs:element name="Rain" type="threatElementType" minOccurs="0"
maxOccurs="unbounded"/>
    <xs:element name="Flood" type="threatElementType" minOccurs="0"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="threatElementType">
  <xs:sequence>
    <xs:element name="likelihood" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element name="type" type="xs:string" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

```

```

    <xs:element name="applicableArea" type="AreaType" minOccurs="0" maxOccurs="1"/>
    <xs:element name="timeDescription" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element name="description" type="xs:string" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="precautionType">
  <xs:sequence>
    <xs:element name="applicableArea" type="AreaType" minOccurs="0" maxOccurs="1"/>
    <xs:element name="action" type="xs:string" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="AreaType">
  <xs:choice>
    <xs:element name="Position" type="PositionType"/>
    <xs:element name="locationDescription" type="xs:string"/>
    <xs:element name="Location" type="locationType"/>
    <xs:element name="centreLocation" type="centreLocationType"/>
  </xs:choice>
</xs:complexType>

<xs:complexType name="locationType">
  <xs:sequence>
    <xs:element name="from" type="PlaceType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="to" type="PlaceType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="centreLocationType">
  <xs:sequence>
    <xs:element name="circle" type="circleType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="relativeLocation" type="relativeLocationType" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="circleType">
  <xs:sequence>
    <xs:element name="radius" type="MeasurementType" minOccurs="1" maxOccurs="1"/>
    <xs:element name="ccentre" type="PositionType" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="PositionType">
  <xs:sequence>
    <xs:element name="Point" type="gml:PointType"/>
  </xs:sequence>
</xs:complexType>

<xs:complexType name="PlaceType">
  <xs:sequence>
    <xs:element name="region" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element name="country" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element type="xs:string" name="state" minOccurs="0" maxOccurs="1"/>
    <xs:element name="city" type="xs:string" minOccurs="0" maxOccurs="1"/>
    <xs:element name="station" type="xs:string" minOccurs="0" maxOccurs="1"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MeasurementType">

```

```

    <xs:sequence>
      <xs:element name="measure" type="gml:MeasureType" minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="directionType">
    <xs:sequence>
      <xs:element name="CompassPoint" type="gml:CompassPointEnumeration" minOccurs="1"
maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="MovementType">
    <xs:sequence>
      <xs:element name="speed" type="MeasurementType" minOccurs="1" maxOccurs="1"/>
      <xs:element name="direction" type="directionType" minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="relativeLocationType">
    <xs:sequence>
      <xs:element name="distance" type="MeasurementType" minOccurs="1" maxOccurs="1"/>
      <xs:element name="direction" type="directionType" minOccurs="1" maxOccurs="1"/>
      <xs:element name="place" type="PlaceType" minOccurs="1" maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="DateTimeType">
    <xs:sequence>
      <xs:element name="TimeInstant" type="gml:TimeInstantType" minOccurs="1"
maxOccurs="1"/>
    </xs:sequence>
  </xs:complexType>

  <xs:simpleType name="priorityType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Priority"/>
      <xs:enumeration value="Top Priority"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="AdviceStatusType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="current"/>
      <xs:enumeration value="ended"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="categoryType">
    <xs:choice>
      <xs:element name="AUCategory" type="AUCategoryType"/>
    </xs:choice>
  </xs:complexType>

  <xs:simpleType name="AUCategoryType">
    <xs:restriction base="xs:integer">
      <xs:enumeration value="1"/>
      <xs:enumeration value="2"/>
      <xs:enumeration value="3"/>
      <xs:enumeration value="4"/>
    </xs:restriction>
  </xs:simpleType>

```

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```
<xs:enumeration value="5"/>
</xs:restriction>
</xs:simpleType>
</xs:schema>
```

5 CWML Examples

This section shows two example Severe Weather Advises expressed using the CWML. These are based on the example cyclone advises that are shown in the appendices.

5.1 Example of the Advice of Cyclone Larry

This example is based on the BOM advice of Cyclone Larry shown in Appendix A.

```
<?xml version="1.0" encoding="UTF-8"?>
<cwml:SevereWeatherAdvisory xmlns:gml="http://www.opengis.net/gml"
  xmlns:cwml="urn:x-swevent:cyclone:1.0"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="urn:x-swevent:cyclone:1.0 cwml.xsd">
  <Header>
    <productID>IDQP0005</productID>
    <Source>Australian Government Bureau of Meteorology
      Queensland Tropical
      Cyclone Warning Centre
    </Source>
  </Header>
  <priority>Priority</priority>
  <issuedDateTime>
    <TimeInstant>
      <gml:timePosition>2006-03-18T10:32:00-05:00</gml:timePosition>
    </TimeInstant>
  </issuedDateTime>
  <issuedBy>
    the Bureau of Meteorology, Brisbane
  </issuedBy>
  <adviceNum>
    2
  </adviceNum>
  <nextDateTime>
    <TimeInstant>
      <gml:timePosition>2006-03-18T17:00:00-05:00</gml:timePosition>
    </TimeInstant>
  </nextDateTime>
  <moreInformation>
    This warning is also available through TV and Radio Broadcasts; the Bureau's website at
    www.bom.gov.au or call 1300 659 212. The Bureau and the State Emergency Service would appreciate
    this warning being broadcast regularly.
  </moreInformation>
  <Media>
    <warningSignal>
      <use>>false</use>
    </warningSignal>
  </Media>
  <Watch>
    <type>Cyclone</type>
    <applicableArea>
      <Location>
        <from>
          <city>Cape Tribulation</city>
        </from>
      </Location>
    </applicableArea>
  </Watch>
</cwml:SevereWeatherAdvisory>
```

```

    <to>
      <city>Proserpine</city>
    </to>
  </Location>
</applicableArea>
<status>current</status>
</Watch>
<Evaluation>
  <SWEvent>
    <name>Tropical Cyclone Larry</name>
    <dateTime>
      <TimeInstant>
        <gml:timePosition>2006-03-18T10:00:00-05:00</gml:timePosition>
      </TimeInstant>
    </dateTime>
    <category>
      <AUCategory>2</AUCategory>
    </category>
  </SWEvent>
  <description>
    At 10am, Tropical Cyclone Larry, Category 2, was centred near latitude 17.2 south longitude
    156.6 east, which is 1150 kilometres east of Cairns.
    Tropical Cyclone Larry is expected to intensify further and move in a westerly direction over
    the weekend at about 25 km/h.
    Tropical Cyclone Larry is expected to affect coastal and island areas between Cape Tribulation and
    Proserpine early Monday morning.
  </description>
  <Precaution>
    <applicableArea>
      <Location>
        <from>
          <city>Cape Tribulation</city>
        </from>
        <to>
          <city>Proserpine</city>
        </to>
      </Location>
    </applicableArea>
    <action>People in this area should consider actions they will need to take if the cyclone
    threat increases and listen to the next advice.</action>
  </Precaution>
  <Precaution>
    <action>
      If you are unsure about actions to be taken, information is available from your local
      government or local State Emergency Service.
    </action>
  </Precaution>
</Evaluation>
</cwml:SevereWeatherAdvisory>

```

5.2 Example of the Advice of Cyclone Ingrid

This example is based on the BOM advice of Cyclone Ingrid shown in Appendix B.

```

<?xml version="1.0" encoding="UTF-8"?>
<cwml:SevereWeatherAdvisory xmlns:gml="http://www.opengis.net/gml"
  xmlns:cwml="urn:x-swevent:cyclone:1.0"

```



```

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="urn:x-swevent:cyclone:1.0 cwml.xsd">
<Header>
  <productID>IDQP0005</productID>
  <Source>Bureau of Meterology
    Queensland Region
    Tropical Cyclone Warning Centre
  </Source>
</Header>
<priority>Top Priority</priority>
<issuedDate Time>
  <TimeInstant>
    <gml:timePosition>2005-03-09T01:47:00-05:00</gml:timePosition>
  </TimeInstant>
</issuedDate Time>
<issuedBy>the Bureau of Meteorology, Brisbane</issuedBy>
<adviceNum>11</adviceNum>
<nextDate Time>
  <TimeInstant>
    <gml:timePosition>2005-03-09T05:00:00-05:00</gml:timePosition>
  </TimeInstant>
</nextDate Time>
<Media>
  <broadcast>immediately</broadcast>
  <warningSignal>
    <use>true</use>
    <applicableArea>
      <Location>
        <from>
          <city>Lockhart River</city>
        </from>
        <to>
          <city>
            Port Douglas
          </city>
        </to>
      </Location>
    </applicableArea>
  </warningSignal>
</Media>
<Watch>
  <type>Cyclone</type>
  <applicableArea>
    <locationDescription>across Cape York Peninsula to the eastern Gulf of Carpentaria between the
    mouth of the Gilbert River and Aurukun</locationDescription>
  </applicableArea>
  <status>current</status>
</Watch>
<Warning>
  <type>Cyclone</type>
  <applicableArea>
    <Location>
      <from>
        <city>Lockhart River</city>
      </from>
      <to>
        <city>Port Douglas</city>
      </to>
    </Location>
  </applicableArea>

```

```

    <status>current</status>
  </Warning>
<Evaluation>
<SWEvent>
  <name>Severe Tropical Cyclone Ingrid</name>
  <dateTime>
    <TimeInstant>
      <gml:timePosition>2005-03-09T01:00:00-05:00</gml:timePosition>
    </TimeInstant>
  </dateTime>
  <category>
    <AUCategory>5</AUCategory>
  </category>
</SWEvent>
<description>
  At 1:00 am EST Severe Tropical Cyclone Ingrid, Category 5, with central pressure 930 hPa, was
  relocated by satellite near latitude 13.8 south longitude 146.3 east, which is about 220 km north
  northeast of Cooktown and 200 kilometres east northeast of Cape Melville. The cyclone was moving
  westward at 8k/h but is expected to move in a west southwest direction during the day.
</description>
<Observation>
  <centralPressure>
    <measure uom="urn:x-ogc:def:uom:OGC:1.0:hecto-Pa">930</measure>
  </centralPressure>
  <centre>
    <centreLocation>
      <circle>
        <radius>
          <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">20</measure>
        </radius>
        <ccentre>
          <Point srsName="urn:ogc:def:crs:OGC:1.3:CRS84">
            <gml:pos>-13.8 146.3</gml:pos>
          </Point>
        </ccentre>
      </circle>
      <relativeLocation>
        <distance>
          <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">200</measure>
        </distance>
        <direction>
          <CompassPoint>ENE</CompassPoint>
        </direction>
        <place>
          <city>Cape Melville</city>
        </place>
      </relativeLocation>
      <relativeLocation>
        <distance>
          <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">220</measure>
        </distance>
        <direction>
          <CompassPoint>NNE</CompassPoint>
        </direction>
        <place>
          <city>Cooktown</city>
        </place>
      </relativeLocation>
    </centreLocation>
  </centre>

```

```

<recentMovement>
  <speed>
    <measure uom="urn:x-ogc:def:uom:OGC:1.0:kmh">8</measure>
  </speed>
  <direction>
    <CompassPoint>W</CompassPoint>
  </direction>
</recentMovement>
<destructiveWind>
  <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">90</measure>
</destructiveWind>
<veryDestructiveWind>
  <measure uom="urn:x-ogc:def:uom:OGC:1.0:km">35</measure>
</veryDestructiveWind>
<maxWindGust>
  <measure uom="urn:x-ogc:def:uom:OGC:1.0:kmh">290</measure>
</maxWindGust>
</Observation>
<Threat>
  <description>Severe Tropical Cyclone Ingrid poses a serious threat to the far north Queensland
  coast with very destructive wind gusts to 290 km/hr near the centre.</description>
  <Wind>
    <likelihood>expected</likelihood>
    <type>Gales</type>
    <applicableArea>
      <Location>
        <from>
          <city>Cape Melville</city>
        </from>
        <to>
          <city>Port Douglas</city>
        </to>
      </Location>
    </applicableArea>
    <timeDescription>
      early Wednesday morning
    </timeDescription>
  </Wind>
  <Wind>
    <likelihood>likely</likelihood>
    <type>Destructive winds</type>
    <applicableArea>
      <Location>
        <from>
          <city>Cape Melvilla</city>
        </from>
        <to>
          <city>Cape Tribulation</city>
        </to>
      </Location>
    </applicableArea>
    <timeDescription>
      later in this morning
    </timeDescription>
  </Wind>
  <Wind>
    <likelihood>expected</likelihood>
    <type>the very destructive core of the cyclone</type>
    <applicableArea>

```

```

    <locationDescription>near the coast between Cape Melville and
Cooktown</locationDescription>
  </applicableArea>
  <timeDescription>
    late Wednesday afternoon
  </timeDescription>
</Wind>
<Rain>
  <likelihood>expected</likelihood>
  <type>Heavy rain</type>
  <applicableArea>
    <locationDescription>on the coast and ranges north of Port Douglas</locationDescription>
  </applicableArea>
  <timeDescription>
    on Wednesday
  </timeDescription>
</Rain>
<Flood>
  <likelihood>likely</likelihood>
  <type>the dangerous storm tide</type>
  <applicableArea>
    <Location>
      <from>
        <city>
          Cape Melville
        </city>
      </from>
      <to>
        <city>
          Cape Tribulation
        </city>
      </to>
    </Location>
  </applicableArea>
  <timeDescription>late Wednesday afternoon</timeDescription>
  <description>
    Coastal residents between Cape Melville and Cape Tribulation are specifically warned of the
    dangerous storm tide as the cyclone crosses the coast late Wednesday afternoon. The sea is likely to
    rise steadily to a level significantly above the highest tides of the year with damaging waves, strong
    currents and flooding of low-lying areas extending some way inland.
  </description>
</Flood>
</Threat>
<Precaution>
  <action>People living in areas likely to be affected by this flooding should be prepared to
  evacuate if advised to do so</action>
</Precaution>
<Precaution>
  <applicableArea>
    <Location>
      <from>
        <city>
          Lockhart River
        </city>
      </from>
      <to>
        <city>
          Port Douglas
        </city>
      </to>
    </Location>
  </applicableArea>

```

```

    </Location>
  </applicableArea>
  <action>
    People in this area should have almost completed preparations and should be ready to take
    shelter tomorrow before conditions become dangerous
  </action>
</Precaution>
<Precaution>
  <applicableArea>
    <locationDescription>inland areas across Cape York Peninsula to the eastern Gulf of
    Carpentaria Coast</locationDescription>
  </applicableArea>
  <action>
    People in this area should also consider actions they will need to take
  </action>
</Precaution>
</Evaluation>
</cwml:SevereWeatherAdvisory>

```

6 CWML & EDXL Example

In many cases, the CWML advice may be distributed as the payload to an EDXL Distribution Element message as EDXL is fast becoming the framework for all-hazard early warning notifications. The advantage of using EDXL is that the recipients can be specified, as well as other critical emergency information and routing information.

In the example below, the EDXL message indicates routing options with <recipientRole>, <keyword> and <targetArea>. EDXL systems will distribute the embedded CWML advice (and other embedded payloads) based on established rules pertinent to the emergency operations and governance procedures of the applicable jurisdictions.

```

<?xml version="1.0" encoding="UTF-8"?>
<EDXLDistribution xmlns="urn:oasis:names:tc:emergency:EDXL:DE:1.0"
  xmlns:cap="urn:oasis:names:tc:emergency:cap:1.1"
  xmlns:cwml="urn:x-swevent:cyclone:1.0">
  <distributionID>urn:cairns:au:dist:1234567890</distributionID>
  <senderID>emergency@hazard.gov.zz</senderID>
  <dateTimeSent>2006-05-31T16:00:00-05:00</dateTimeSent>
  <distributionStatus>Exercise</distributionStatus>
  <distributionType>Report</distributionType>
  <combinedConfidentiality>UNCLASSIFIED</combinedConfidentiality>
  <recipientRole>
    <valueListUrn>urn:x-swevent:vocab:roles</valueListUrn>
    <value>emergency-manager</value>
  </recipientRole>
  <keyword>
    <valueListUrn>urn:x-swevent:vocal:incidents</valueListUrn>
    <value>cyclone</value>
  </keyword>
  <targetArea>
    <country>AU</country>
    <locCodeUN>AUCNS </locCodeUN>
  </targetArea>
  <contentObject>
    <contentDescription>CWML message about the Cylone</contentDescription>
    <xmlContent>
      <embeddedXMLContent>
        <cwml:SevereWeatherAdvisory>
          .....see examples in Section 5.....
        </cwml:SevereWeatherAdvisory>
      </embeddedXMLContent>
    </xmlContent>
  </contentObject>
</EDXLDistribution>

```

Appendix A. Example of the Advice of Cyclone Larry

This advice is taken from the BOM advice of Cyclone Larry, page 2.

IDQP0005

Australian Government Bureau of Meteorology
Queensland
Tropical Cyclone Warning Centre

Media: The Standard Emergency Warning Signal should NOT be used with this message.

PRIORITY

TROPICAL CYCLONE ADVICE NUMBER 2

Issued by the Bureau of Meteorology, Brisbane

Issued at 10:32am on Saturday the 18th of March 2006

A Cyclone WATCH has been issued for coastal and island communities between Cape Tribulation and Proserpine.

At 10am, Tropical Cyclone Larry, Category 2, was centred near latitude 17.2 south longitude 156.6 east, which is 1150 kilometres east of Cairns.

Tropical Cyclone Larry is expected to intensify further and move in a westerly direction over the weekend at about 25 km/h.

Tropical Cyclone Larry is expected to affect coastal and island areas between Cape Tribulation and Proserpine early Monday morning.

People living between Cape Tribulation and Proserpine should consider actions they will need to take if the cyclone threat increases and listen to the next advice. If you are unsure about actions to be taken, information is available from your local government or local State Emergency Service.

The next advice will be issued at 5pm EST Saturday.

This warning is also available through TV and Radio Broadcasts; the Bureau's website at www.bom.gov.au or call 1300 659 212. The Bureau and the State Emergency Service would appreciate this warning being broadcast regularly.

Appendix B. Example of the Advice of Cyclone Ingrid

This advice is taken from the BOM advice of Cyclone Ingrid, pages 14-15.

IDQP0005
BUREAU OF METEOROLOGY
Queensland Region
Tropical Cyclone Warning Centre

Media: For immediate broadcast. Transmitters in the area Lockhart River to Port Douglas are requested to use the Standard Emergency Warning Signal.

TOP PRIORITY
TROPICAL CYCLONE ADVICE NUMBER 11
Issued by the Bureau of Meteorology, Brisbane
Issued at 1:47am on Wednesday the 9th of March 2005

A Cyclone WARNING is current for coastal and island communities between Lockhart River and Port Douglas.

A Cyclone WATCH extends across Cape York Peninsula to the eastern Gulf of Carpentaria between the mouth of the Gilbert River and Aurukun.

At 1:00 am EST SEVERE TROPICAL CYCLONE Ingrid, Category 5, with central pressure 930 hPa, was relocated by satellite near latitude 13.8 south longitude 146.3 east, which is about 220 km north northeast of Cooktown and 200 kilometres east northeast of Cape Melville. The cyclone was moving westward at 8 km/h but is expected to move in a west southwest direction during the day.

Severe Tropical Cyclone Ingrid poses a serious threat to the far north Queensland coast with very destructive wind gusts to 290 km/hr near the centre.

Gales are expected to develop between Cape Melville and Port Douglas early Wednesday morning. Destructive winds are likely between Cape Melville and Cape Tribulation later in the morning. The very destructive core of the cyclone is expected near the coast between Cape Melville and Cooktown late Wednesday afternoon.

Coastal residents between Cape Melville and Cape Tribulation are specifically warned of the dangerous storm tide as the cyclone crosses the coast late Wednesday afternoon. The sea is likely to rise steadily to a level significantly above the highest tides of the year with damaging waves, strong currents and flooding of low-lying areas extending some way inland. People living in areas likely to be affected by this flooding should be prepared to evacuate if advised to do so.

Heavy rain can be expected to develop on the coast and ranges north of Port Douglas on Wednesday.

Details of SEVERE TROPICAL CYCLONE Ingrid, Category 5, for 1:00 am EST
Central Pressure : 930 Hectopascals
Location of Centre : within 20 kilometres of
latitude 13.8 degrees south
longitude 146.3 degrees east
about 200 kilometres east northeast of Cape Melville
and 220 km north northeast of Cooktown.

Recent Movement : towards the west at 8 km/hr.
Destructive winds : out to 90 kilometres from the centre

Very destructive winds: out to 35 kilometres from the centre.
Maximum wind gusts : 290 kilometres per hour near the centre.

People in near coastal areas between Lockhart River and Port Douglas should have almost completed preparations and should be ready to take shelter tomorrow before conditions become dangerous.

People over inland areas across Cape York Peninsula to the eastern Gulf of Carpentaria coast should also consider actions they will need to take.

The next advice will be issued at 5 am EST Wednesday morning.