MULTILATERAL INTEROPERABILITY PROGRAMME (MIP)

MIP4 Information Exchange Specification (MIP4-IES)

Request/Response Exchange Pattern

09 October 2020

DOCUMENT CONTROL

Change Management

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Version History

Version	Author	Date	Reason for Change
1.5.2	IPT4 CM	12 Sep 2017	MIP4.0 official release [ref MSG-DL-26 at MSG20; July 2017]. Details of internal versions removed from Version History.
1.7.0	IPT4 EMT	19 Apr 2018	MIP4.1 official release. Details of internal versions removed from Version History.
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1.14.1	IPT4 CM	09 Oct 2020	MIP4.3 official release. Details of internal versions removed from Version History.

CONTENTS

1 Overview

This document defines the expected usage of the Web Service Messaging Profile (WSMP) Request/Response exchange pattern by the MIP4-IES, according to use cases described in the MIP4-IES Exchange Mechanism Overview [REF-MIP-02]. It has been based heavily on the generic WSMP Request/Response web service specification, and tailored to meet the information exchange needs of the MIP4 Community of Interest (CoI).

2 Scope

The scope of this document includes a technical specification of the MIP4-IES Request/Response exchange pattern, design constraints and implementation details. It is intended for technical users that are developing, consuming or providing such web services. The contents of this document focus solely on the service and not on the information content. The specification of the information content is provided in the *MIP4-IES Information Definition Overview* [REF-MIP-07].

2.1 Note on non-normative examples

The examples in this document are non-normative and they are intended to illustrate the purpose of the concept or the functionality being described. The normative technical details in the document will take precedence over these non-normative examples. The actual implementation shall be based on the normative technical details and technical artifacts.

3 References

For any references in this document to a MIP4-IES source (REF-MIP-##), refer to section 2.3 in the ‘MIP4-IES Overview’ [REF-MIP-01].

For any references in this document to a MIP4-IES Exchange Mechanism external source (REF-EM-##), refer to section 3.1 in the ‘MIP4-IES Exchange Mechanism Overview’ [REF-MIP-02].

For any references in this document to a MIP4-IES Exchange Mechanism XML artifact (ART-EM-##), refer to section 3.3 in the ‘MIP4-IES Exchange Mechanism Overview’ [REF-MIP-02].

4 Technical Artifacts

The following artifacts are required to implement the MIP4-IES Request/Response exchange pattern:

Artifact Reference	Artifact Name
ART-EM-01	Common.xsd
ART-EM-03	Filter.xsd
ART-EM-07	Base.xsd
ART-EM-08	porttypes.wsdl
ART-EM-09	WSMP-FaultMessages.xsd
ART-EM-10	WSMP-ResourceMessages.xsd
ART-EM-11	WSMP-Common.xsd

5 Request/Response Exchange Pattern

Request/Response is a common pattern for inter-computer communication. In this pattern the Consumer sends a request to the Producer and waits for a reply. This pattern is common in both system-to-system and application-to-system communication.

In MIP4-IES, the Request/Response exchange pattern is applied to information sharing between Command and Control (C2) partner systems. Specifically this pattern gives a Consumer the ability to pull information from a Provider as required by the operational context, within the following use cases (described in *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02]): System Initialization and Restart, Situation low-frequency refresh, Per Object Verification, Inspection or Elaboration, and others.

The following design constraints for the implementation of a MIP4-IES Request/Response Web Service have been identified:

a) The web service implementation SHALL be payload agnostic and allow to expand and contract the information to be exchanged without having to redefine the service interface and implementations.
b) The web service SHALL allow for the retrieval of a list of filtering capabilities (e.g supported topics) of the Provider.
c) The web service SHALL allow for the retrieval of a list of identifiable objects given their identifier.

6 Web Service Implementation

6.1 Namespaces

The following namespaces are used in this document:

Prefix	Namespace	Source
mip4-f	https://mip-interop.org/exchange/v4.3/Filter	MIP4-IES Filtering Profile
mip4-c	https://mip-interop.org/exchange/v4.3/Common	MIP4-IES Common
wsmp-s	urn:nato:stanag:5644:wsmp:1:3:soap:services	Web Services Messaging Profile services
wsmp	urn:nato:stanag:5644:wsmp:1:3	Web Services Messaging Profile
wsmp-r	urn:nato:stanag:5644:wsmp:1:3:resources	Web Services Messaging Profile Resources
soap	http://www.w3.org/2003/05/soap-envelope	Web Services Base Notification
wsa	http://www.w3.org/2005/08/addressing	Web Services Addressing
wsam	http://www.w3.org/2007/05/addressing/metadata	Web Services Addressing Metadata

wsaw	http://www.w3.org/2006/05/addressing/wsdl	Web Services Addressing WSDL 1.1 binding
wsn-b	http://docs.oasis-open.org/wsn/b-2	Web Services Base Notification
wsrf-r	http://docs.oasis-open.org/wsrf/r-2	Web Services Resource Framework
wsrf-rp	http://docs.oasis-open.org/wsrf/rp-2	Web Services Resource Framework
wsrf-rpw	http://docs.oasis-open.org/wsrf/rpw-2	Web Services Resource Framework
wstop	http://docs.oasis-open.org/wsn/t-1	Web Services Topics

6.2 Service Metadata

Refer to section 'Cross-pattern Requirements' in *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02].

6.3 Service Rules

Refer to section 'WS-I Profiles and Bindings' in *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02] for service rules that are common to both the Publish/Subscribe and Request/Response exchange patterns.

6.4 Message Container

Refer to section 'Cross-pattern Requirements' in *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02].

6.5 Filtering Data

Refer to section 'Cross-pattern Requirements' in *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02].

6.6 Port Types

The MIP4-IES Request/Response Web Service is defined by the following Port Types:

a) wsrf-rpw:*GetResourceProperty*
b) wsmp-s:*WSMP*

Both Port Types SHALL be implemented by all MIP4-IES Providers implementing the Request/Response exchange pattern.

If the descriptions that follow differ from the MIP4 Information and Exchange mechanism Schemas or WSDLs, the Schemas and WSDLs take precedence.

6.6.1 wsrf-rpw:GetResourceProperty

The wsrf-rpw:*GetResourceProperty* Port Type is implemented by a Request/Response Producer to allow a Consumer to retrieve specific run-time information made available by the Producer.

The WSMP Core Specification [REF-EM-11] is defining multiple properties. Among all of them, a MIP4-IES Request/Response Producer will make at least the resources defined in section 6.6.6 GetResourceProperty Operation of the WSMP Core Specification [REF-EM-11]. The following resource properties related to Create, Update and Delete operations are optional in a MIP4-IES since the Create, Update and Delete operations, which are not supported in IES-MIP4:

- CreateDialects
- UpdateDialects
- DeleteDialects
- CreatePolicies
- UpdatePolicies
- DeletePolicies

No specific faults are added by the MIP4-IES, other than those defined in the WSMP Core Specification [REF-EM-11].

Note: Although the port type wsrf-rpw:*GetResourceProperty* is the same in both the Request/Response and Publish/Subscribe exchange patterns, the meaning and available properties are different. For the Publish/Subscribe exchange pattern, the corresponding documentation also states the supported properties.

Note: In the case of *wsmp-r:WSMPProfiles* a MIP4-IES Request Response Provider must at least respond with the following values:

- MessageTransmissionProfile: *urn:nato:stanag:5644:wsmp:1:3:profiles:mtp:SOAP1.2:1:0*
- *COIProfile:* https://mip-interop.org/data/v4.3

For more details about the usage of the wsmp-r:WSMPProfiles, please refer to the WSMP Core Specification [REF-EM-11].

6.6.1.1 Operation wsrf-rpw:GetResourceProperty.GetResourceProperty

The wsrf-rpw:*GetResourceProperty.GetResourceProperty* operation allows the Consumer to retrieve a typed resource from a Producer. The resource type is identified by a QName. The Producer will return zero or more instances of the type in accordance with its cardinality specified above.

Details about this operation are described in the corresponding specification *WS-ResourceProperties* [REF-EM-08]. Additional constraints applicable to this operation are provided in the *TIDE Transformational Baseline* [REF-EM-03] and the *WSMP Core Specification* [REF-EM-11].

The following are non-normative examples of a [GetResourceProperty] [request|response] message using SOAP.

Sample	Retrieve the wsmp-r:ReadDialect resource from the Producer
Request	<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope" xmlns:a="http://www.w3.org/2005/08/addressing"> <s:Header> <a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourceProperty/GetResourcePropertyRequest</a:Action> <a:MessageID>urn:uuid:7718c60b-fa04-4194-997d-40af3b5f6036</a:MessageID> <a:ReplyTo> <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address> </a:ReplyTo> <a:To s:mustUnderstand="1">http://10.0.99.4:8234/rr-resource</a:To> </s:Header> <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">

	<GetResourceProperty xmlns="http://docs.oasis-open.org/wsrf/rp-2" xmlns:q1="urn:nato:stanag:5644:wsmp:1:3:resources">q1:ReadDialects</GetResourceProperty> </s:Body> </s:Envelope>
Response	<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing" xmlns:s="http://www.w3.org/2003/05/soap-envelope"> <s:Header> <a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourceProperty/GetResourcePropertyResponse</a:Action> <a:RelatesTo>urn:uuid:a3d19efd-edbf-404d-a042-adc50cfa1922</a:RelatesTo> </s:Header> <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema"> <GetResourcePropertyResponse xmlns="http://docs.oasis-open.org/wsrf/rp-2"> <ReadDialects xmlns:obj="https://mip-interop.org/data/v4.3/Objects" xmlns:base="https://mip-interop.org/data/v4.3/Base" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:gen="https://mip-interop.org/data/v4.3/Generics" xmlns:core="https://mip-interop.org/data/v4.3/Core" xmlns:ext="https://mip-interop.org/data/v4.3/Extension" xmlns:met="https://mip-interop.org/data/v4.3/Metadata" xmlns:prim="https://mip-interop.org/data/v4.3/Primitives" xmlns:wsmp="urn:nato:stanag:5644:wsmp:1:3" xmlns:style="https://mip-interop.org/data/v4.3/Style" xmlns="urn:nato:stanag:5644:wsmp:1:3:resources"> <TopicExpressionDialect xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple</TopicExpressionDialect> <TopicExpressionDialect

```
xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/
wsn/t-1/TopicExpression/Concrete</TopicExpressionDialect>
                                                    <TopicExpressionDialect
xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/
wsn/t-1/TopicExpression/Full</TopicExpressionDialect>
        <TopicSet xmlns="http://docs.oasis-open.org/wsn/t-1">
                                                            <tns:LandPicture
xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1"
xmlns:tns="http://mip-interop.org/TopicNamespace" wsnt:topic="true">
                 <Forces xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
                                                        <BattlespaceGeometry
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                                                                <LogisticsCSS
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                   <CBRN xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
                                                    <ElectronicWarfare
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                    <CIS xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
             <FireSupport xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
              <AirDefence xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
                                                <MobilityCounterMobility
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                 <Medical xmlns="http://mip-interop.org/TopicNamespace"
wsnt:Topic="true"/>
                                            <InfrastructureAndEnvironment
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                                                <IntelligenceAssessment
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
                                            <SignificantActivityIncidents
xmlns="http://mip-interop.org/TopicNamespace" wsnt:Topic="true"/>
          </tns:LandPicture>
```

	<tns:MaritimePicture xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1" xmlns:tns="http://mip-interop.org/TopicNamespace" wsnt:topic="true"/> <tns:AirPicture xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1" xmlns:tns="http://mip-interop.org/TopicNamespace" wsnt:topic="true"/> </TopicSet> <MetadataBindingDialects> <Dialect>https://mip-interop.org/data/v4.3/Dialect</Dialect> </MetadataBindingDialects> <DataDialects> <Dialect>https://mip-interop.org/data/v4.3</Dialect> </DataDialects> <FilterMetadataBindingDialects> <Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple</Dialect> <Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Concrete</Dialect> <Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Full</Dialect> </FilterMetadataBindingDialects> </ReadDialects> </GetResourcePropertyResponse> </s:Body> </s:Envelope>

Sample	Retrieve the wsmp-r:WSMPProfiles resource from the Producer
Request	<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope" xmlns:a="http://www.w3.org/2005/08/addressing"> <s:Header>

<table>
<tr><td></td><td>
<a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourceProperty/GetResourcePropertyRequest</a:Action>

<a:MessageID>urn:uuid:44b8346f-0f87-456e-8cb1-0d450c8ae65a</a:MessageID>
<a:ReplyTo>

<a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address>
</a:ReplyTo>
<VsDebuggerCausalityData xmlns="http://schemas.microsoft.com/vstudio/diagnostics/servicemodelsink">uIDPozAVbuj9xSRLgZdoNvSA4aUBAAAATpQT5iloSUSW3S8b+1ZAzZtt2LFKufVMn1fZX7tDUvUACQAA</VsDebuggerCausalityData>
<a:To s:mustUnderstand="1">http://10.0.99.4:8234/rr-resource</a:To>
</s:Header>
<s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<GetResourceProperty xmlns="http://docs.oasis-open.org/wsrf/rp-2" xmlns:q1="urn:nato:stanag:5644:wsmp:1:3:resources">q1:WSMPProfiles</GetResourceProperty>
</s:Body>
</s:Envelope>
</td></tr>
<tr><td>Response</td><td>
<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing" xmlns:s="http://www.w3.org/2003/05/soap-envelope">
<s:Header>
<a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourceProperty/GetResourcePropertyResponse</a:Action>

<a:RelatesTo>urn:uuid:04dc3c57-fd20-4967-bda4-83ed8e40daea</a:RelatesTo>
</td></tr>
</table>

```
  </s:Header>
      <s:Body    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
                                          <GetResourcePropertyResponse
xmlns="http://docs.oasis-open.org/wsrf/rp-2">
                                                    <WSMPProfiles
xmlns:obj="https://mip-interop.org/data/v4.3/Objects"
xmlns:base="https://mip-interop.org/data/v4.3/Base"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:gen="https://mip-interop.org/data/v4.3/Generics"
xmlns:core="https://mip-interop.org/data/v4.3/Core"
xmlns:ext="https://mip-interop.org/data/v4.3/Extension"
xmlns:met="https://mip-interop.org/data/v4.3/Metadata"
xmlns:prim="https://mip-interop.org/data/v4.3/Primitives"
xmlns:wsmp="urn:nato:stanag:5644:wsmp:1:3"
xmlns:style="https://mip-interop.org/data/v4.3/Style"
xmlns="urn:nato:stanag:5644:wsmp:1:3:resources">

<MessageTransmissionProfile>urn:nato:stanag:5644:wsmp:1:3:profiles:mtp
:SOAP1.2:1:0</MessageTransmissionProfile>
        <COIProfile>https://mip-interop.org/data/v4.3</COIProfile>
      </WSMPProfiles>
    </GetResourcePropertyResponse>
  </s:Body>
</s:Envelope>
```

6.6.2 wsmp-s:WSMP

The wsmp-s:*WSMP* port type is implemented by a MIP4-IES Provider to allow a Consumer to synchronously retrieve data. It consists of multiple operations made available by the *WSMP Core specification* [REF-EM-11]. In the MIP4-IES, only the following operations are mandatory:

6.6.2.1 Operation wsmp-s: WSMP.Read

The Read operation allows the Consumer to retrieve one or more data objects from the Provider based on one or more given filtering criteria. The request message contains the wsmp:*Filter* element that is used to provide one or more filters. Refer to the *WSMP Core Specification* [REF-EM-11] for more details about this operation.

In the MIP4-IES context, the filtering criteria MUST exclusively be expressed using the wsmp:*Filter* element. The Consumer SHOULD fill the Dialect attribute of the Data element with the following value:

https://mip-interop.org/data/v4.3/Dialect

The Any element of the Data element SHOULD not be filled. Upon reception of a Read operation, any content in the Any element MUST be ignored.

In addition to the core WSMP requirements, it is expected for MIP4-IES that the Consumer MUST provide at least one filter criteria in order to use the Read operation. In particular, the wsmp:*Filter* and its child TopicExpression are mandatory in the MIP4-IES specification.

All the details about the filters are described in the *WSMP Core specification* [REF-EM-11], *WS-BaseNotification specification* [REF-EM-02] and the *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02]. Additional constraints applicable to this operation are provided in the *TIDE Transformational Baseline* [REF-EM-03].

Requesting items by their identifiers:

The Filter element provides multiple filtering capabilities. MIP4-IES defines its own specific filter (see §9). It is expected that, in order to filter on Identifiers, a MIP4-IES consumer requests a wsmp-s:Read operation with a filter *wsmp:MessageContent* filled with the MIP4-IES specific filter (passing a list of *base;Identifier*)..

6.6.2.2 Operation wsmp-s: WSMP.Create

The MIP4-IES does not expect a specific usage of the Create operation of WSMP. Any implementation of it is thus out of the scope of this specification.

6.6.2.3 Operation wsmp-s: WSMP.Update

The MIP4-IES does not expect a specific usage of the Update operation of WSMP. Any implementation of it is thus out of the scope of this specification.

6.6.2.4 Operation wsmp-s: WSMP.Delete

The MIP4-IES does not expect a specific usage of the Delete operation of WSMP. Any implementation of it is thus out of the scope of this specification.

6.6.2.5 Faults

No specific faults are added by the MIP4-IES, other than those defined in the *WSMP Core Specification* [REF-EM-11].

If an item in the request cannot be handled, the Provider will return an mip4-c:UnhandledItem element inside the Context (which is nested data element of the wsmp:CRUDCommandType) with the ContextIdentifier and ID elements [ART-EM-02] of the specific item, instead of the individual data object for that item. This mip4-c:UnhandledItem informs the Consumer about the requested item and the reason why the item could not be handled. As a result, the response list will contain the same number of elements as identifiers requested. However, the order of the requested elements is not necessarily maintained.

Depending on the reason for the failure, the mip4-c:*UnhandledItem* will contain the following information items:

a) The Consumer requests a MIP4 Identifier not known to the Provider. Reason: unknownIdentifier (mip4-c:*ItemRequestFailureReason*).
b) An error occurred at the Provider side while handling the request. Reason: processingError (mip4-c:*ItemRequestFailureReason*).

The following is non-normative example of a [Read] [request|response] message using SOAP.

	Sample - Read request
Request	<soap:Envelope xmlns:soap="http://www.w3.org/2003/05/soap-envelope"> <soap:Header> <Action xmlns="http://www.w3.org/2005/08/addressing">urn:nato:stanag:5644:wsmp:1:3:reqres:operation:read:request</Action> <MessageID xmlns="http://www.w3.org/2005/08/addressing">urn:uuid:5969f0a5-bd63-4441-8d67-7375aa837352</MessageID> <To xmlns="http://www.w3.org/2005/08/addressing">http://10.81.0.14:8234/rr</To> <ReplyTo xmlns="http://www.w3.org/2005/08/addressing"> <Address>http://www.w3.org/2005/08/addressing/anonymous</Address> </ReplyTo> </soap:Header> <soap:Body> <ns1:Read xmlns:ns1="urn:nato:stanag:5644:wsmp:1:3" xmlns:ns2="http://www.w3.org/2005/08/addressing" xmlns:ns3="http://docs.oasis-open.org/wsn/b-2" xmlns:ns4="http://docs.oasis-open.org/wsn/t-1" xmlns:ns5="http://docs.oasis-open.org/wsrf/bf-2" xmlns:ns6="urn:nato:stanag:5644:wsmp:1:3:resources" xmlns:ns7="urn:nato:stanag:5644:wsmp:1:3:fault" xmlns:ns8="http://docs.oasis-open.org/wsrf/r-2" xmlns:ns9="http://docs.oasis-open.org/wsrf/rp-2"> <ns1:Filter> <ns1:TopicExpression

	xmlns:tns="http://mip-interop.org/TopicNamespace" Dialect="http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple">tns:LandPicture</ns1:TopicExpression> </ns1:Filter> </ns1:Read> </soap:Body> </soap:Envelope>
Response	<?xml version="1.0" encoding="UTF-8"?> <env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope"> <env:Header xmlns:wsa="http://www.w3.org/2005/08/addressing"> <wsa:To env:mustUnderstand="true">http://www.w3.org/2005/08/addressing/anonymous</wsa:To> <wsa:Action>urn:nato:stanag:5644:wsmp:1:3:reqres:operation:read:response</wsa:Action> <wsa:MessageID>urn:uuid:cf3e0dfc-17fe-487d-80e9-e43fc99cfc1d</wsa:MessageID> <wsa:RelatesTo>urn:uuid:93808228-559d-4b9d-a81f-e1cb06d52a0e</wsa:RelatesTo> </env:Header> <env:Body> <ns2:WSMPMsg xmlns:ns2="urn:nato:stanag:5644:wsmp:1:3" xmlns:ns3="http://docs.oasis-open.org/wsn/b-2"> <ns2:Update> ´´<ns2:Data ns2:Dialect="https://mip-interop.org/data/v4.3/Dialect"> <base:Context xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns:affiliation="https://mip-interop.org/data/v4.3/BattlespaceConcept/Affiliation" xmlns:base="https://mip-interop.org/data/v4.3/Base" xmlns:battlespaceconcept="https://mip-interop.org/data/v4.3/BattlespaceConcept" xmlns:battlespaceconceptmetadata="https://mip-interop.org/data/v4.3/BattlespaceConcept/Metadata" xmlns:concept="https://mip-interop.org/data/v4.3/Concept" xmlns:conceptmetadata="https://mip-interop.org/data/v4.3/Concept/Metadata" xmlns:location="https://mip-interop.org/data/v4.3/BattlespaceConcept/Location" xmlns:object="https://mip-interop.org/data/v4.3/BattlespaceConcept/Object" xmlns:organisation="https://mip-interop.org/data/v4.3/BattlespaceConcept/Object/Actor/Organisation" xmlns:staffconcept="https://mip-interop.org/data/v4.3/StaffConcept" xmlns:staffconceptmetadata="https://mip-interop.org/data/v4.3/StaffConcep

```
t/Metadata"
xmlns:staffconceptoverlay="https://mip-interop.org/data/v4.3/StaffConcept
/Overlay"
xmlns:unit="https://mip-interop.org/data/v4.3/BattlespaceConcept/Object/A
ctor/Organisation/Unit">
<base:ContextIdentifier>/Overlay</base:ContextIdentifier>
 <base:Data xsi:type="staffconceptoverlay:OverlayType">

<base:ID>3a9b275a-07d2-42df-a6c0-92394e46b19b</base:ID>
<concept:ConceptName>Sample Overlay</concept:ConceptName>
                    <staffconcept:StaffConceptMetadata>

<staffconceptmetadata:StaffConceptMetadataOriginator>
      <conceptmetadata:OriginatorName>a</conceptmetadata:OriginatorName>
            </staffconceptmetadata:StaffConceptMetadataOriginator>
                                  </staffconcept:StaffConceptMetadata>
   <staffconceptoverlay:OverlayContent xsi:type="unit:InfantryUnitType">
            <base:ID>4f213be7-58fd-4c7b-90dd-b46d62e4f237</base:ID>
                                                    <concept:ConceptName>12
BN Artillery4</concept:ConceptName>
             <battlespaceconcept:BattlespaceConceptGeographicLocation>
                                                 <location:LocationGeometry
xsi:type="location:AbsolutePointType">
<location:AbsolutePointLatitudeCoordinate>
<location:LatitudeCoordinateCoordinate>52.79</location:LatitudeCoordinate
Coordinate>
</location:AbsolutePointLatitudeCoordinate>
             <location:AbsolutePointLongitudeCoordinate>
<location:LongitudeCoordinateCoordinate>15.60</location:LongitudeCoordina
teCoordinate>
                           </location:AbsolutePointLongitudeCoordinate>
                                       </location:LocationGeometry>
             </battlespaceconcept:BattlespaceConceptGeographicLocation>
                    <battlespaceconcept:BattlespaceConceptMetadata>
                    <conceptmetadata:ConceptMetadataReportingData>
<conceptmetadata:ReportingDataCategoryCode>Reported</conceptmetadata:Repo
rtingDataCategoryCode>

<conceptmetadata:ReportingDataObservationDateTime>2020-09-28T10:16:53.878
Z</conceptmetadata:ReportingDataObservationDateTime>

<conceptmetadata:ReportingDataReportingDateTime>2020-09-28T10:16:53.878Z<
/conceptmetadata:ReportingDataReportingDateTime>
                                  <conceptmetadata:ReportingDataReporter>

<conceptmetadata:ReporterName>Reporter</conceptmetadata:ReporterName>
                           </conceptmetadata:ReportingDataReporter>
                    </conceptmetadata:ConceptMetadataReportingData>
```

	</battlespaceconcept:BattlespaceConceptMetadata> <organisation:OrganisationHasCommandFunctionIndicator>false</organisation:OrganisationHasCommandFunctionIndicator> <organisation:MilitaryOrganisationServiceCode>Army</organisation:MilitaryOrganisationServiceCode> <unit:UnitEchelon xsi:type="object:ArmyEchelonType"> <object:ArmyEchelonCode>Battalion</object:ArmyEchelonCode> </unit:UnitEchelon> </staffconceptoverlay:OverlayContent> </base:Data> <base:ContextLastModificationDateTime>2020-09-28T10:16:53.878Z </base:ContextLastModificationDateTime> </base:Context> </ns2:Data> <ns3:TopicExpression xmlns:xxxxx="https://insane.fkie.fraunhofer.de/models/datapool" Dialect="http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple">xxxxx:SAD </ns3:TopicExpression> </ns2:Update> </ns2:WSMPMsg> </env:Body> </env:Envelope>

	Sample - Read request for an Identifier that raises UnhandledItem error
Request	<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope"> <env:Header xmlns:wsa="http://www.w3.org/2005/08/addressing"> <wsa:To env:mustUnderstand="true">http://localhost:59556/services/Request</wsa:To> <wsa:Action>urn:nato:stanag:5644:wsmp:1:3:reqres:operation:read:request</wsa:Action> <wsa:MessageID>urn:uuid:fe88ea79-55c1-482c-b1ba-1c556eeff2e3</wsa:MessageID> </env:Header> <env:Body> <ns8:Read xmlns:ns12="https://mip-interop.org/data/v4.3/Base"

<table>
<tr><td></td><td>

```
                xmlns:ns4="http://docs.oasis-open.org/wsn/b-2"
             xmlns:ns55="https://mip-interop.org/exchange/v4.3/Filter"
                xmlns:ns8="urn:nato:stanag:5644:wsmp:1:3">
          <ns8:Filter>
<ns4:TopicExpression
xmlns:xxxxx="https://insane.fkie.fraunhofer.de/models/datapool"
Dialect="http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple">xxxxx
:SAD </ns4:TopicExpression>
<ns8:MessageContent
ns8:Dialect="https://mip-interop.org/data/v4.3/Dialect">
<ns55:MIP4Filter>
<ns12:ID>4f213be7-58fd-4c7b-90dd-b46d62e4f237</ns12:ID>
<ns12:ContextIdentifier>/Overlay/3a9b275a-07d2-42df-a6c0-92394e46b19b/Con
tent
                      </ns12:ContextIdentifier>
                  </ns55:MIP4Filter>
              </ns8:MessageContent>
          </ns8:Filter>
       </ns8:Read>
   </env:Body>
</env:Envelope>
```

</td></tr>
<tr><td>Response</td><td>

```
<env:Envelope xmlns:env="http://www.w3.org/2003/05/soap-envelope">
<env:Header xmlns:wsa="http://www.w3.org/2005/08/addressing">
<wsa:To
env:mustUnderstand="true">http://www.w3.org/2005/08/addressing/anonymous<
/wsa:To>
<wsa:Action>urn:nato:stanag:5644:wsmp:1:3:reqres:operation:read:response<
/wsa:Action>
<wsa:MessageID>urn:uuid:eb3b7187-b8cd-40c2-8b18-bb06be28df7c</wsa:Message
ID>
<wsa:RelatesTo>urn:uuid:fe88ea79-55c1-482c-b1ba-1c556eeff2e3</wsa:Relates
To>
</env:Header>
<env:Body>
<ns2:WSMPMsg                    xmlns:ns2="urn:nato:stanag:5644:wsmp:1:3"
xmlns:ns3="http://docs.oasis-open.org/wsn/b-2">
       <ns2:Update>
                                                                <ns2:Data
ns2:Dialect="https://mip-interop.org/data/v4.3/Dialect">
<ns11:Context         xmlns:ns11="https://mip-interop.org/data/v4.3/Base"
xmlns:ns2="http://www.w3.org/2005/08/addressing"

xmlns:ns55="https://mip-interop.org/exchange/v4.3/Common">
```

</td></tr>
</table>

```
<ns11:ContextIdentifier>/Overlay/3a9b275a-07d2-42df-a6c0-92394e46b19b/Con
tent
                    </ns11:ContextIdentifier>

<ns11:Data
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
Reason="unknownIdentifier" xsi:type="ns55:UnhandledItemType">
                  <ns11:ID>4f213be7-58fd-4c7b-90dd-b46d62e4f237</ns11:ID>
                    </ns11:Data>

<ns11:ContextLastModificationDateTime>2020-09-28T10:57:04.293Z
                    </ns11:ContextLastModificationDateTime>
                </ns11:Context>
            </ns2:Data>
<ns3:TopicExpression
xmlns:xxxxx="https://insane.fkie.fraunhofer.de/models/datapool"
Dialect="http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple">xxxxx
:SAD
            </ns3:TopicExpression>
        </ns2:Update>
    </ns2:WSMPMsg>
</env:Body>
</env:Envelope>
```

6.6.3 wsrf-rpw:GetResourcePropertyDocument

The wsrf-rpw:GetResourcePropertyDocument Port Type is implemented by a Producer to allow a Consumer to retrieve all run-time resources made available by the Producer. No input parameter is required. The producer shall return a message including the resources. (Please refer to WSMP Core Specification for detailed information [REF-EM-11]).

The following is a non-normative example of a [GetResourcePropertyDocument] [request|response]

message using SOAP.

Sample	Retrieve supported resources from the Producer
Request	<s:Envelope xmlns:a="http://www.w3.org/2005/08/addressing" xmlns:s="http://www.w3.org/2003/05/soap-envelope"> <s:Header> <a:Action s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourcePropertyDocument/GetResourcePropertyDocumentRequest</a:Action> <a:MessageID>urn:uuid:27b065fe-15d8-4e79-934b-b3a4ae7f4020</a:MessageID> <a:ReplyTo> <a:Address>http://www.w3.org/2005/08/addressing/anonymous</a:Address> </a:ReplyTo> </s:Header> <s:Body> <GetResourcePropertyDocument xmlns="http://docs.oasis-open.org/wsrf/rp-2"/> </s:Body> </s:Envelope>

Response

```
<s:Envelope xmlns:s="http://www.w3.org/2003/05/soap-envelope"
xmlns:a="http://www.w3.org/2005/08/addressing">
  <s:Header>
    <a:Action
s:mustUnderstand="1">http://docs.oasis-open.org/wsrf/rpw-2/GetResourcePropertyDo
cument/GetResourcePropertyDocumentResponse</a:Action>
    <a:RelatesTo>urn:uuid:e8ee6fd9-c6c5-4342-8779-bf9f0cbfb560</a:RelatesTo>
  </s:Header>
  <s:Body xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
    <GetResourcePropertyDocumentResponse
xmlns="http://docs.oasis-open.org/wsrf/rp-2">
      <WSMPRequestResponseRP xmlns="urn:nato:stanag:5644:wsmp:1:3:resources"
xmlns:obj="https://mip-interop.org/data/v4.3/Objects"
xmlns:base="https://mip-interop.org/data/v4.3/Base"
xmlns:gen="https://mip-interop.org/data/v4.3/Generics"
xmlns:core="https://mip-interop.org/data/v4.3/Core"
xmlns:ext="https://mip-interop.org/data/v4.3/Extension"
xmlns:met="https://mip-interop.org/data/v4.3/Metadata"
xmlns:prim="https://mip-interop.org/data/v4.3/Primitives"
xmlns:wsmp="urn:nato:stanag:5644:wsmp:1:3"
xmlns:style="https://mip-interop.org/data/v4.3/Style">
        <ReadDialects xsi:type="ReadDialects">
        <TopicExpressionDialect
xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/wsn/t-1/To
picExpression/Simple</TopicExpressionDialect>
        <TopicExpressionDialect
xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/wsn/t-1/To
picExpression/Concrete</TopicExpressionDialect>
        <TopicExpressionDialect
xmlns="http://docs.oasis-open.org/wsn/b-2">http://docs.oasis-open.org/wsn/t-1/To
picExpression/Full</TopicExpressionDialect>
        <TopicSet xmlns="http://docs.oasis-open.org/wsn/t-1">
                <tns:LandPicture wsnt:topic="true"
xmlns:tns="http://mip-interop.org/TopicNamespace"
xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1">
                <Forces wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <BattlespaceGeometry wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <LogisticsCSS wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <CBRN wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <ElectronicWarfare wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <CIS wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
                <FireSupport wsnt:Topic="true"
```

```
xmlns="http://mip-interop.org/TopicNamespace" />
               <AirDefence wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
               <MobilityCounterMobility wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
               <Medical wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
              <InfrastructureAndEnvironment wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
               <IntelligenceAssessment wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
              <SignificantActivityIncidents wsnt:Topic="true"
xmlns="http://mip-interop.org/TopicNamespace" />
               </tns:LandPicture>
               <tns:MaritimePicture wsnt:topic="true"
xmlns:tns="http://mip-interop.org/TopicNamespace"
xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1" />
               <tns:AirPicture wsnt:topic="true"
xmlns:tns="http://mip-interop.org/TopicNamespace"
xmlns:wsnt="http://docs.oasis-open.org/wsn/t-1" />
       </TopicSet>
       <MetadataBindingDialects>
            <Dialect>https://mip-interop.org/data/v4.3/Dialect</Dialect>
       </MetadataBindingDialects>
       <DataDialects>
              <Dialect>https://mip-interop.org/data/v4.3</Dialect>
       </DataDialects>
         <FilterMetadataBindingDialects>

<Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Simple</Dialect>

<Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Concrete</Dialect>

<Dialect>http://docs.oasis-open.org/wsn/t-1/TopicExpression/Full</Dialect>
          </FilterMetadataBindingDialects>
        </ReadDialects>
        <ReadPolicies>
       <wsmp:Policy>
              <wsmp:DataCompression>
             <wsmp:CompressionAlgorithm>None</wsmp:CompressionAlgorithm>
             <wsmp:Encoding>None</wsmp:Encoding>
              </wsmp:DataCompression>
              <wsmp:Binding extension="string">InLine</wsmp:Binding>
       </wsmp:Policy>
        </ReadPolicies>
        <TopicNamespaces>
       <TopicNamespace targetNamespace="http://mip-interop.org/TopicNamespace"
name="http://mip-interop.org/TopicNamespace"
xmlns="http://docs.oasis-open.org/wsn/t-1">
```

```
                <Topic final="true" name="LandPicture" />
                <Topic final="true" name="MaritimePicture" />
                <Topic final="true" name="AirPicture" />
        </TopicNamespace>
         </TopicNamespaces>
         <WSMPProfiles>

<MessageTransmissionProfile>urn:nato:stanag:5644:wsmp:1:3:profiles:mtp:SOAP1.2:1
:0</MessageTransmissionProfile>
           <COIProfile>https://mip-interop.org/data/v4.3</COIProfile>
         </WSMPProfiles>
       </WSMPRequestResponseRP>
    </GetResourcePropertyDocumentResponse>
  </s:Body>
</s:Envelope>
```

7 Use Cases

The following section describes how the MIP4-IES Request/Response Web Service is used, in terms of preconditions and interactions between Consumer and Provider, to accomplish Use Cases/Scenarios described in the MIP 4.0 Exchange Overview document [REF-MIP-02]. It is anticipated that additional use cases may be identified according to specific needs.

Currently, the Use Cases relevant for the MIP4-IES Request/Response Web Service exchange pattern are:

a) System Initialization;
b) Situation Recovery;
c) System Restart;
d) Per-object Verification, Inspection or Elaboration; and
e) Situation Low Frequency Refresh.

7.1 System Initialization

7.1.1 Problem

During system initialization on the Consumer side, it is required to obtain the Situation as known by one or more third-party systems acting as Provider.

7.1.2 Solution

The system being initialized obtains the Situation by using the MIP4 Request/Response exchange pattern (playing the Consumer role) interacting with one/more third systems (playing the Provider role) capable to provide the Situation as known by them. The MIP4-IES Request/Response exchange pattern specification does not specify how the discovery (who is able to provide required information and its endpoint reference) of such Providers is governed.

7.1.3 Required Operations

In order to accomplish the use case using MIP4-IES Request/Response exchange pattern following operations are required and used in the provided order:

Required Operations: System Initialization	
Port Type	**Operation**
wsrf-rpw:*GetResourceProperty*	wsrf-rpw:*GetResourceProperty*
wsmp-s:*WSMP*	wsmp-s:*Read*

In order to properly use the Read operation, the Consumer needs to know which topics and additional filters the Provider is able to handle. The topics and additional filters are retrieved using wsrf-rpw:*GetResourceProperty* operation.

7.1.4 Consumer-Provider Interactions

The following table provides the preconditions and steps required to accomplish the target use case.

Consumer-Provider Interactions: System Initialization	
Prec.	**Description**
1	Both Consumer and Provider systems are conformant to MIP4-IES Request/Response exchange pattern Specification.
2	Both Consumer and Provider systems are able to process and exchange information represented according to MIP4-IES Information Schemas. [REF-MIP-07]
3	Consumer has successfully discovered the target Provider. The system on Consumer side has been properly configured and is ready to interact with Provider system.
Step	**Description**
1	The Consumer retrieves the topics exposed by the Provider using the wsmp:GetResourceProperty operation with wsmp-r:ReadDialect as parameters (please refer to WSMP Core Specification for detailed information [REF-EM-11]).
2	The Consumer requests all data objects of interest using the Read operation. The provided filters are in accordance with what is returned by the Providerin the previous step.
3	Depending on specific needs (e.g. object referenced by another object), the Consumer may need to retrieve specific objects for which it already knows the identifier. The Consumer retrieves the objects of interest using the Read operation: in this request the filter also contains a list of identifiers as parameter of the wsmp:*MessageContent (see 9.1 Filtering)*.

7.2 Situation Recovery

7.2.1 Problem

The Consumer has determined, or suspected, that it has lost the Situation as known by the Provider. Given that a Partial Situation is known by the Consumer, efficiently re-establish the Situation.

7.2.2 Solution

The system being recovering obtains the Situation by using the MIP4 Request/Response exchange pattern (playing the Consumer role) interacting with one/more third systems (playing the Provider role) capable to provide the Situation as known by them. MIP4-IES Request/Response exchange pattern specification does not specify how the discovery (who is able to provide required information and its endpoint reference) of such providers is governed.

This use case can be accomplished in a similar way of System initialization one. In particular by properly using the wmsp-s:*WSMP* Port Type.

7.3 System Restart

7.3.1 Problem

Due to a number of reasons, the system on Consumer side is restarting. The need is to retrieve the situation as quick as possible.

7.3.2 Solution

Depending on the restarting system data persistency features, the system restart may be covered in the same way foreseen for System Initialization or Situation recovery or by mixing both use cases.

7.4Per-Object Verification, Inspection or Elaboration

7.4.1 Problem

The Consumer is interested only in verifying/inspecting/elaborating “small” subsets or specific data objects.

7.4.2 Solution

The system interested in that subset obtains the required information by using the MIP4 Request/Response exchange pattern (playing the Consumer role) and interacting with one/more third systems (playing the Provider role) capable to provide the Situation as known by them. MIP4 specifications do not specify how the discovery (who is able to provide required information and its endpoint reference) of such providers is governed.

Consumer-Provider interactions are similar to the ones described in §5.1.4 except that the consumer just selects the subset of interest from the available references returned by the Read operation with a list of Identifiers passed as a filter to retrieve the subset of objects.

In order to perform a filter on Identifiers list, a MIP4-IES Consumer MUST include a mip4-f:*MIP4Filter* element (containing the list of Identifiers) as a child of the wsmp:*MessageContent* of wsmp:*Filter*. The wsmp:MessageContent.Dialect MUST be set to (see §9 MIP4-IES Profile for more details):

https://mip-interop.org/data/v4.3/Dialect/Filter

7.5 Situation Low Frequency Refresh

7.5.1 Problem

This Use Case happens when only Request/Response is implemented or available between Consumer and Producer (e.g:no Publish/Subscribe implementation or the Consumer decides to update the situation at his convenience).

7.5.2 Solution

The system interested in consuming the Situation retrieves updates by using the MIP4 Request/Response exchange pattern (playing the Base Consumer role) pulling them periodically from one or more third systems (playing the Provider role) capable to provide the Situation as known by them. MIP4-IES Request/Response exchange pattern specification does not specify how the discovery (who is able to provide required information and its endpoint reference) of such providers is governed.

The realization of this use case is similar to the ‘System Initialization’ use case. In particular, by properly using the wsmp-s:*WSMP* Port Type.

8 Glossary

Refer to the *MIP4-IES Exchange Mechanism Overview* [REF-MIP-02] for the definition of any acronyms/terms used in this document.

9 MIP4-IES Profile

MIP4-IES defines a COI-specific profile to implement on top of the *WSMP Core Specification* [REF-EM-11]. In terms of the Request-Response exchange pattern, this profile is structured for one usage:

a) Filtering

In order to detect that the Filters are defined according to the MIP4-IES profiles, the Consumer MUST use the MIP4-IES dialects:

https://mip-interop.org/data/v4.3/Dialect/Filter

Also, in order to detect that the payload corresponds to MIP4-IES, the Provider SHALL fill the Dialect attribute of the Data element with the following value:

https://mip-interop.org/data/v4.3/Dialect

Be aware that the ResourceProperty COIProfile URL is (see 6.6.1):

https://mip-interop.org/data/v4.3

9.1 Filtering

For the purpose of filtering, the *WSMP Core Specification* [REF-EM-11] proposes multiple generic filters, among them **wsmp:*TopicExpression***, wsmp:*MetadataExpression*, and **wsmp:*MessageContent***. The MIP4-IES uses these generic filters (e.g to filter on Topic) using the mechanism of XML Extension of these elements. It also needs specific filtering.

In the ‘Per Object Verification, Inspection or Elaboration’ use case, the Consumer calls a Read operation, with a single mip4-f:*MIP4Filter* element as a direct child of the wsmp:*MessageContent*.

mip4-f:*MIP4Filter* allows the Consumer to define a contextIdentifier and one or more identifiers within this context. The provider shall provide the requested IdentifiableTypes (each in its own Context) and a mip4-c:UnhandledItem for every IdentifiableType he cannot resolve.

These structures are defined in *Filter.xsd* [ART-EM-03].

9.2 Topic expression usage in Responses

The WSMP specification provides the ability to send a wsmp:TopicExpression along with data in a response to a request.

In the MIP4-IES context, this TopicExpression is to be handled in the same manner as the TopicExpression of a wsn:NotificationMessage (See [REF-EM-02], WS-BaseNotification). That means that this TopicExpression shall identify a single topic, that matches the data that is sent. If the data matches multiple single topics at the same time, then the Provider must send it as many times as there are matching single topics.

9.3 Operations in Response

WSMP allows a provider to respond with a Create, Update and Delete operations using wsmp:*WSMPMsg*.

In the MIP4-IES context, a Consumer shall support all of the three operations.

In the case of the reception of a Create or an Update, it is up to the Consumer to determine which behavior is to be adopted, depending on its own internal state.

When creating the response, it is up to the Provider to determine whether the operation is a Creation or an Update.

When a Provider locally removes an Identifiable from a Topic, only when the Consumer requests from the Topic, it will be implicitly informed about the removed Identifiable, which is no longer part of the Response.