Standards Implementation Guidelines

Version: **2.17 Final**
Date: **18 04 2019**
Distribution: **Industry**
Document Name: **Criterion_Standards_Implementation_Guidelines.pdf**

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CHANGE HISTORY

DATE	VERSION	STATUS
5th September 2012	1.0	Initial Draft.
31st October 2012	2.0 Draft A	Amendments applied after review by OTG 1. Updated section 7.3 to state that " Criterion recommends that the business logic is a more appropriate place to manage reliable messaging rather than the messaging layer". 2. Removed references to “browser” in section 5.4 because the REST/MTG used with Criterion Standards is B2B - not B2C. 3. Changed the first paragraph in section 5 to note the fact SOAP implementations of Criterion standards should use WS-I profiles whereas REST implementations should use the MTG. 4. Added a paragraph at the end of section 9.2 about code generation for REST web services. 5. Removed references to OpenID and OAuth. Although these are valid federated identity mechanisms for use with REST implementations, they are not used in the Criterion Standards Community and might just cause confusion. 6. Added comments about sample messages - Criterion will aim to provide these for all standards. 7. Added Appendix to include sample signed message which use the SHA256 signing and digest algorithms. 8. Added section 4.4.10 which describes where to find information on schema under development. 9. Added "Some knowledge of XML, XML Schema and the principles of B2B messaging solutions would be helpful in gaining maximum benefit from the content in this document." to the introduction.
		10. Added comment to 4.2 about a SOAP to REST move in the IT industry. 11. Added comment to section 4.4.1 about the discussion document which covers MTG/REST comparison and provided link. Also added a comment about migrating the QNB v3 schemas to a SOAP environment and provided a link. 12. Added section 4.4.9 “Working with Criterion Schema” and listed the most popular schema editors. Documented the reason for the shift from XMLSpy to Oxygen within Criterion. 13. Added section 11.3 to include a description of a few testing tools. 14. Updated section 4.4 to reflect the message exchange patterns supported for each standard. Also included Remote Publishing, Receive External Alert and Retrieve Documentation standards. 15. Updated section 4.3 (release/version control) to include reference to the change request process. 16. Added a comment stating that for information on unsupported versions of any standard, readers should contact Criterion.
15th November 2012	2.0 Draft B	Added Extranet Linking standard to the document.
3rd December 2012	2.0 Final	Added a reference to the Criterion Messaging Security Solution document in Appendix A (sample digital signature).
12th January 2013	2.1 Final	1. Updated FIT Standard version numbers after recent release. 2. Added Auto Enrolment Standards. 3. Updated Contract Enquiry Transaction History after recent release.

4th September 2013	2.2 Final	Updated with latest versions of published Standards.
9th May 2014	2.3 Final	Updated for new versions of Contract Enquiry Single & Multi Wrap Valuation Standards.
26th May 2014	2.4 Final	Updated to record the latest versions of the Auto Enrolment Standards and the Flexible Integration Toolkit patterns.
19th August 2015	2.5 Final	Updated to record the latest versions of the Standards published as Final from the Change Request Consolidation Project – Quotes and New Business for Annuities, Individual Pensions, Group Pensions and Protection.
15th September 2015	2.6 Final	Updated to include new version of FIT, Maintain Generic Data, Maintain Personal Fact Find, Receive External Alert, Retrieve Documentation and Extranet Linking.
11th December 2015	2.7 Final	Added Provide Transaction History Standard to the document.
31st March 2016	2.8 Final	Updated for new versions of Contract Enquiry Single & Multi Pension and Wrap Valuation Standards. Also updated to indicate support for W3C XML Schema Assertions.
4th August 2016	2.9 Final	Correct the MTG versions for CE CIV Standards.
2nd February 2017	2.10 Final	Addition of Provide Investment Switch and Redirect Notification List Standard.
7th June 2017	2.11 Final	Updated for new versions of Flexible Integration Toolkit (FIT), Maintain Generic Data and Maintain Personal Fact Find. • Updated for new versions of Quotes & New Business Protection.
26th July 2017	2.12 Final	Include support for 2017 <tpsdata> structure in Appendix B. Also updated document to include more information, throughout, on <tpsdata>. Removed references to assertions, which are no longer supported as Standard deliverables. A description of Provisional Standards is included too.
30th March 2018	2.13 Final	Added Standards versions introduced since last version of this document. Added more information on the MTG versions available.
19th June 2018	2.14 Final	Added Contract Enquiry Valuation Standards versions introduced since the last version of this document i.e. • Endowment v2.2 • Whole of Life v2.2
21st December 2018	2.15 Final	Added the following • CE Bulk Valuations v1.0 • CE Bonds v2.2 • CE Collective Investments v1.4 • CE Txn Hist Bonds v2.3 • CE Txn Hist Endowment v2.3 • CE Txn Hist Pensions v2.3 • CE Txn Hist WOL Protection v2.3 Maintain Pub/Sub v1.0
11th January 2019	2.16 Final	Added the following • CE Wraps v1.3 • ProvideContractValuation v1.3

18th April 2019	2.17 Final	Added CE Pensions v2.4. Updated to remove versions of Standards that are no longer supported: • CE Pensions v2.1 • CE Pensions v2.0

ACKNOWLEDGEMENTS:

The following organisations are acknowledged for their contribution to this document:

Assureweb (now known as iPipeline Ltd)
Avelo (now known as IRESS)
Aviva
Capita
Friends Life
Intelliflo
Legal & General
Prudential
Royal London
Standard Life

CONTENTS

1.TERMINOLOGY

This section contains some of the terms and acronyms used throughout this document.

Where a term or acronym is referred to in this document, a bracketed reference [n] is supplied to provide more information if required.

TERM / ACRONYM	MEANING
NB	**New Business** The New Business Standard takes the paperwork out of the application process, helping to save time and reduce re-keying as the application form is pre-populated with information contained within the quote, reducing the possibilities for errors, as systems can quickly validate the application form.
NB SIPP	**New Business Self Invested Personal Pension** New Business specifically for SIPP products.
QNB	**Quotes New Business** Enables Advisers to obtain quotes direct from Product Providers, Platforms and via the various Adviser Portals in the marketplace. This term also encompasses the NB (New Business) aspect of the Standards described above.
CE	**Contract Enquiry** Valuations and other information on one or more contracts.
CE TxnHist	**Contract Enquiry Transaction History** Fund Unit Movements information for a contract.
FIT / Pre-pop	**Flexible Integration Toolkit / Pre-population [11]** Data Pattern schemas used as a building block approach to construction of Criterion Standards compliant messages.
SOA	**Service Oriented Architecture [29]** A set of principles and methodologies for designing and developing software in the form of interoperable services.
FBS	**Foundation Business Services [2]** Criterion's approach to building service oriented Standards.
REST	**Representational State Transfer [5]** An approach to Web Service design which uses the basic HTTP protocol.
MTG	**Criterion HTTP Message Transmission Guidelines [3]** A Criterion implementation of the REST approach, created around 2001.
SOAP	**Simple Object Access Protocol [6]** Protocol specification for exchanging structured information in the implementation of Web Services using XML.
HTTP	**Hypertext Transport Protocol** The foundation of data communication for the World Wide Web.
WS-I	**Web Service Interoperability Organisation [17]** Organisation created to address the growing problem of SOAP based web service interoperability issues.
OTG	**Criterion Technical Group [30]** Technical group consisting of representatives from Standard Holders.
CSV	**Comma Separated Values**

TERM / ACRONYM	MEANING
	CSV files store tabular data in plain-text form. CSV data consists of any number of records, separated by line breaks of some kind; each record consists of fields or columns, separated by some character or string (usually a comma). The Criterion Standards community has adopted the use of the "|" as the separation character.

2. INTRODUCTION

2.1 DOCUMENT BACKGROUND

This document provides a technical overview on how best to implement Criterion Standards and best practice for testing Criterion messages, message patterns and implementations.

Some knowledge of XML, XML Schema and the principles of B2B messaging solutions would be helpful in gaining maximum benefit from the content in this document.

When the content of this document is agreed with the CTG (Criterion Technical Group), Criterion will publish it to the wider community via the Criterion website.

This document is split into the sections described below.

2.2 PURPOSE OF THE DOCUMENT

This section describes the reason the document is needed, who it will help and how it will help.

2.3 CRITERION STANDARDS

The Industry currently has access to a large library of Criterion Standards. Depending on when they were produced, these were developed using different approaches.

This section describes:

- the different types of Criterion Standards from traditional (e.g. QNB) to the more modern (e.g. CE and Tracking) up to the latest FBS [2] or SOA [29] style (e.g. Remuneration Statement, NB SIPP);
- the building block approach to creating Criterion Standards using the Flexible Integration Toolkit (FIT or Pre-pop), the Pre-pop Data Patterns and the generic messaging capabilities.

2.4 IMPLEMENTATION APPROACHES

Several implementation approaches are available to the Industry.

This section describes:

- the technical implementation approaches which are available (the REST [5] and SOAP [6] style of messaging). Also includes the hybrid approach where these can be mixed;
- when each is appropriate for use and what are advantages and disadvantages of each;
- which Criterion Standards are designed with SOAP and REST in mind, which are designed only for REST.

2.5 SECURITY

This section describes:

- the ways in which the Industry implements secure messaging using Criterion Standards;
- the different aspects of security including identification, authentication, confidentiality, integrity, non-repudiation and authorisation;
- the Technical Standards provided by other standards bodies which can help with secure messaging and how they compare.

2.6 RELIABILITY

This section describes:

- the ways to guarantee that messaging solutions are reliable;
- the ways messages can be sent and received successfully;
- the ways to prevent duplicate message processing;
- a comparison of the different technical implementation approaches to supporting reliability (SOAP and REST);
- a non-technical approach to reliability.

2.7 SCALABILITY

This section describes:

- things to consider to ensure the ability of a system, network, or process, to handle a growing amount of work in a capable manner;
- the ways in which many of the most popular Internet services manage scalability (e.g. Google, Amazon, Facebook, Twitter etc.)

2.8 INTEROPERABILITY

This section describes:

- the WS-I [17] and its deliverables;
- REST [5] and SOAP [6] interoperability comparisons.

2.9 EXAMPLE IMPLEMENTATIONS

This section describes:

- details of typical implementations which serve as examples of how Criterion Standards are typically implemented (using both SOAP[6] and REST[5]);
- scenarios based on what has been discussed earlier in the document;
- messaging solutions which can be implemented between 2 or more Trading Partners.

2.10TESTING SCENARIOS

This section describes:

- key scenarios to be tested;
- possible approaches for achieving this;
- testing hubs, which could accept and validate messages which are supposed to be Criterion Standard compliant.

3. PURPOSE OF THE DOCUMENT

This document is aimed at both those who are new to Criterion Standards and those who are familiar with the Standards.

One of the most common questions asked of Criterion when an organisation becomes a new Criterion Standards Holder concerns the technical mechanisms available for implementing the Criterion Standards.

For existing Criterion Standards Holders, the questions are commonly around upgrading the technical infrastructure and whether the Criterion Standards will fit with the planned technology changes.

Criterion also receive many questions around securing (Criterion Standards compliant) message content, so this document also addresses this issue.

The testing of messaging interfaces has also been discussed with Criterion on a number of occasions, so this subject is also addressed.

4. CRITERION STANDARDS

4.1 DELIVERABLES

Criterion Standards are used by leading Product Providers, Platforms, Portals, Service Providers and many financial Advisers, promoting efficiency throughout the Industry. They define common processes, data and technical details, helping to significantly cut the costs of linking between systems.

Criterion Standards are developed by representatives from across the Financial Services Industry working together to deliver solutions that respond to their collective needs. Every Standard is commonly agreed before being finalised.

The Criterion Standards are available in the online Standards Library [1].

Most of the Criterion Standards are based on passing information between Trading Partners using XML which is specified and validated using an XML Schema.

Typically, each Criterion Standard will consist of the following deliverables:

DOCUMENT	PURPOSE
Business Requirements Document	A Business Requirements document describes the business needs for the Criterion Standards. These documents provide the business reasons behind the development of the Standard.
Process Design Document	A Process Design document describes the recommended approach to implementing the message exchange mechanisms required.
Service Implementation Guidelines (SIG)	A SIG document provides a service definition which could be used to implement the Criterion Standard. Note that this is mainly relevant to those Standards which support SOAP based web services.
Message Implementation Guidelines (MIG)	A series of MIGs, one for each message/schema, will describe the message structure and the contents of each data item within the message. Business terms, definitions, dependencies and notes are provided for all data items in the message. These documents are produced automatically from the XML Schemas which represent each message.[1]
XML Schema	A series of XML Schemas, one for each message, will provide a machine readable description of the message format and structure. XML Schemas can be used to automate the Criterion Standards compliance checks and also provide a means to auto generate code for the provision of SOAP based web services.
Web Service Description Language (WSDL file)	A WSDL [18] file will provide a machine readable description of the service definition detailed in the SIG. This can be used to auto generate code for the provision of SOAP based web services.
Samples	Sample messages will provide example XML messages which comply with the Criterion Standard. These are designed to give guidance on how messages represent the data required to be exchanged between Trading Partners. Criterion aims to provide sample messages for every version of an Criterion Standard which is published.

[1] Older Standards like QNB have their MIGs produced manually. As a result there can sometimes be discrepancies between the Schema and the MIG, in which case the MIG is taken to be the normative document.

DOCUMENT	PURPOSE
Models	Logical or physical Data Models which have been used during the development of the Standard.

Note that not all of these documents exist for all Criterion Standards. This will largely be dependent on what type of development approach was used to produce the Standard. For a completely new Criterion Standard all documents will be present. For a new version of an existing Criterion Standard then only some of the documents will be relevant.

Criterion are always happy to assist with any enquiries related to the use of the Criterion Standards. Please use the Contact Us form [54] on the Criterion website if you need any assistance.

4.2 IMPLEMENTATION APPROACHES

Of the two different styles of implementation which are available, (REST and SOAP), most current Criterion Standards implementations use the REST approach (via the Criterion MTG [3]). A few years ago, there was a desire within the Criterion Standards Holders' community to move towards SOAP (adhering to the WS-I profiles [17]) however this is no longer the case and the REST approach remains the most popular.

This is reflected across the IT industry where there is a move back to REST (away from SOAP). For example, Amazon now have more than 80% (and increasing) of their web services implemented using REST.

See Section 5 "IMPLEMENTATION APPROACHES" for more information.

4.3 RELEASE & VERSION CONTROL

Versioning support is a key implementation consideration. Criterion support the current release plus two previous versions of each of the Criterion Standards. More information on the Criterion Versioning Policy can be found in the reference section of this document [31].

In summary, a major version change will not be backward compatible e.g. introducing version 4 of the QNB Standards. Whereas minor point releases are backward compatible e.g. introducing version 3.8 of the QNB Standards (see below) would allow those who have implemented version 3.7 to continue trading (without the need for any change) with those who have upgraded to version 3.8.

Criterion will accept requests for changes to existing Standards [31] via the Change Request page [53] on the website. When a Change Request is received Criterion will assess the request and notify the submitter of the decision to progress with the change or otherwise.

In 2017 Criterion introduced the concept of Provisional Standards which allow changes to be applied and delivered more quickly and before they are accepted in their finalised state by the Governance Groups. This allows implementers to get early sight of deliverables with the changes they require but does come with the warning that further changes may follow. More information can be found in the Criterion Versioning Policy document [31]. **Note that as Provisional Standards are introduced much more frequently than Finalised Standards they are not recorded in this document.**

Note also that when you are implementing any Criterion Standards you should, where possible, use the latest release of a particular Criterion Standard. The only exception to this is when you wish to integrate with a Trading Partner where their current implementation adheres to an older version of that particular Criterion Standard. In this case you should agree with the Trading Partner which version they wish you to implement.

4.4 CRITERION STANDARDS USING XML SCHEMA

Criterion XML Schemas are categorised as “Business Process Specific” or “Business Process Agnostic”. The remainder of this section provides details on these schemas and denotes which belong to each category. More information on how Criterion Standards fit with Business Processes can be found in the End-to-End Case Study document [55] available in the reference section of this document.

Criterion use a standardised approach to XML Schema development which is also documented in the reference section of this document. See the Schema and WSDL Design Checklist [32].

Note also that, although Criterion has a policy of namespace qualifying all components in an XML message, ID and IDREF attributes are always defined as namespace unqualified in the Criterion Standards schemas to conform to XML v1.0.

4.5 CRITERION STANDARDS AND EXTENSIBILITY

Since the Criterion Standards have been in existence, the level of support for extensibility has varied as Schema design principles have changed over the years.

From around 2002, the QNB Standards have supported provision of Trading Partner specific data (known as <tpsdata>) and still do. This allows data which is only specific to certain Trading Partners, and not part of the core Criterion Standard, to be exchanged in an Criterion Standards compliant XML message.

From around 2004, with agreement from the Criterion Governance Groups, the non QNB Criterion Standards were designed to be more prescriptive and do not support the <tpsdata> feature.

In 2017 the Criterion Governance Groups agreed that flexibility should be re-introduced into the Criterion Standards going forward. As a result, the use of <tpsdata> is being incorporated into new Criterion Standards and added to existing Criterion Standards as they are being maintained. Small modifications have been made since the original definition of the <tpsdata> structure was added to QNB in 2002:-

- The 2017 <tpsdata> definition now allows for schema validation to be applied to the extension if required;
- Mixed content is no longer supported in the 2017 version of <tpsdata>.

4.6 HTTP MESSAGE TRANSMISSION GUIDELINES

The Criterion HTTP message transmission guidelines (MTG) provide a RESTful framework for implementing the Criterion Standards for XML message exchanges. This is version managed in the same way as all other Criterion Standards.

The MTG defines the envelope that the business data of a Criterion message may be contained within. It describes the information and format of the messages as they are sent from sender to receiver using the HTTP POST and HTTP GET methods that contain data in XML format. This Standard is independent of any specific business process. The business data content of a message is subordinate and wholly contained within the standard XML structure defined by the message transmission guidelines.

The main schema in the MTG is CriterionMessageHeader.xsd which is referred to in all subsequent Criterion Standards defined in this document.

The following MTG information is important for implementers.

HTTP MTG VERSION	NOTES	NAMESPACE
1.3	Must be used by Criterion Quotes New Business (QNB) Standards One namespace used for whole message.	http://www.origoservices.com
2.0	Can be used by all other Criterion Standards (but not QNB) Introduced the use of substitutionGroup in Criterion MessageHeader.xsd to allow the business data definition to be used for the business payload of an XML message. Different namespaces used across message control and business information inside each message.	http://www.origostandards.com/schema/mtg/v2 plus each business specific payload message will have their own namespace.
2.1	<part_save_response_location> added to <m_control>	http://www.origostandards.com/schema/mtg/v2 plus each business specific payload message will have their own namespace.
2.2	Added "Failed XML Signature check" enumeration to <message_status>	http://www.origostandards.com/schema/mtg/v2 plus each business specific payload message will have their own namespace.

4.7 QUOTES NEW BUSINESS

The Quotes New Business schemas are “Business Process Specific”.
The “traditional” style (original Criterion XML Schema design approach) adopted by the Quotes New Business (QNB) Standards was established around 2002 when version 3.0 was first published.

The QNB Standard enables Advisers to obtain quotes direct from Product Providers, Platforms and via the various Adviser Portals in the marketplace. The Standard also takes the paperwork out of the application process, helping to save time and reduce re-keying as the application form is pre-populated with information contained within the quote, reducing the possibilities for errors, as systems can quickly validate the application form.

The QNB Standards were the first XML Messaging Standards published by Criterion. It is worth noting that the QNB SIPP/IDPR Standard was the first Standard developed using a Foundation Business Service [2] approach and thus has a different Schema structure to the “traditional” QNB Standards.

The following information is important for implementers of the QNB Standards (Schemas).

INFORMATION	VALUE
Category	Business Process Specific.

INFORMATION	VALUE
XML Namespaces	One target namespace is used for all "traditional" QNB schemas (http://www.origoservices.com) - this becomes the default namespace in Criterion Standards compliant XML documents.
Element Namespaces	All elements in Criterion QNB Standards compliant XML documents require to be namespace qualified.
Attribute Namespaces	Attribute values in Criterion QNB Standards compliant XML documents **do not** require to be namespace qualified.
Common Data Types	v1.4.1 of the Criterion Data Type Library, where common data structures are defined, is included in all "traditional" QNB schemas. (v1.4.1 of the Criterion Data Type Library has been frozen with respect to traditional QNB schemas. Any changes to data types specified in v1.4.1 or any new data types are embedded locally within the QNB schemas)
Trading Partner Specific Data	Extensibility is supported in all QNB Schemas.
REST Support	The QNB schemas are suitable for REST based web services. See the Criterion MTG [3] for information. Also see the discussion paper comparing the Criterion MTG with REST [24].
SOAP Support	The "traditional" QNB schemas are **unsuitable** for SOAP based web services. This is primarily because SOAP framework toolkits cannot manage the namespace implementations in the "traditional" QNB schemas. See "Migrating QNB to SOAP" document [33] for information about implementing the QNB Standards in a SOAP environment.
Operation / Message Exchange Pattern	**Quotes** Two way (request and response) and can be implemented as either synchronous or asynchronous.
	New Business One-way (request only). NB messages should be followed up later by messages based on the Remote Publishing [35], Receive External Alert Standard [37] or New Business Tracking (see section 4.8) depending on, for example, publication of policy documentation or error handling.
Future Plans	There are no plans to introduce version 4 of the QNB Standards as there is no industry appetite to move to a new major version of the Standard. Change Requests received from the industry, for example to accommodate legislative changes, have been applied and released as backward compatible minor point releases. Introducing version 4 would require a lot of changes for those who have already implemented version 3.x (as a major version change will not be backward compatible).
Existing Versions	The supported versions of the Criterion QNB Standards are fully RDR compliant. See table below for more information.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Criterion QNB Standards are as follows:

PRODUCT	QNB STANDARD VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Quote Annuities	3.7, 3.8 & 3.9	1.4.1	1.3	No
NB Annuities	2.0, 2.1 & 2.2	Not Used	1.3	Yes, but only for the SOAP schemas
Quote Bonds	3.4, 3.6 & 3.7	1.4.1	1.3	No
NB Bonds	3.4, 3.6 & 3.7	1.4.1	1.3	No
NB Collective Investments	3.4, 3.6 & 3.7	1.4.1	1.3	Yes, but only for the SOAP schemas
Quotes Endowments	3.4, 3.6 & 3.7	1.4.1	1.3	No
NB Endowments	3.4, 3.6 & 3.7	1.4.1	1.3	No
Quotes Individual Pensions	3.6, 3.7 & 3.8	1.4.1	1.3	No
NB Individual Pensions	3.6, 3.7 & 3.8	1.4.1	1.3	No
Quotes Group Pensions	3.6, 3.7 & 3.8	1.4.1	1.3	No
NB Group Pensions	3.6, 3.7 & 3.8	1.4.1	1.3	No
Quotes Protection	3.7, 3.8 & 3.9	1.4.1	1.3	No
NB Protection	3.7, 3.8 & 3.9	1.4.1	1.3	No

4.8 NEW BUSINESS TRACKING

The New Business Tracking schemas are “Business Process Specific”.

The New Business (NB) Tracking Standard was introduced in 2005 and provides Advisers with an electronic method of keeping up to date with the progress of New Business Applications. The NB Tracking Standard will inform the Adviser of the Contract Reference enabling onward servicing once the contract is live. Advisers are pro-actively informed of the changes by the Product Provider whenever there is a status change or there is a change in status of any one of the pieces of additional information associated with the proposal.

The following information is important for implementers of the NB Tracking Standards (schemas).

INFORMATION	VALUE
Category	Business Process Specific
XML Namespaces	Different target namespaces were introduced for the business process level schemas. This applied some scope to the Criterion Standards compliant XML document components but didn’t go as far as introducing one unique namespace for every schema. The target namespaces are allocated as follows:

INFORMATION	VALUE
	PTServiceCommissions.xsd: http://www.origostandards.com/schema/cm/v2/ PTServiceStatus.xsd: http://www.origostandards.com/schema/pt/v2/ PTServiceProposals.xsd: http://www.origostandards.com/schema/qnb/v3/ PTServiceTrackedItemIdentity.xsd: http://www.origostandards.com/schema/pt/v2 (same as PTServiceStatus.xsd)
Element Namespaces	All elements in Criterion NB Tracking Standards compliant XML documents require to be namespace qualified.
Attribute Namespaces	Attribute values in Criterion NB Tracking Standards compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	The use of the Criterion Data Type Library was dropped and all data structure definitions are all embedded within the schemas where they are required (derived from the original definitions in the Criterion Data Type Library). This lessens the impact when maintenance is applied to any of these definitions.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	The NB Tracking schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	Not all the NB Tracking schemas are suitable for SOAP based web services framework toolkits (primarily due to the re-use of a namespace across more than one of the NB Tracking schemas). Depending on the range of functionality adopted it may be possible to use SOAP based web services [4] frameworks successfully.
Operation / Message Exchange Pattern	One way (request only). NB Tracking messages may be followed up later by messages based on the Remote Publishing [35] or Receive External Alert Standard [37] depending on for example publication of policy documentation or error handling.
Future Plans	There are no plans to introduce version 3 of the NB Tracking Standards at present. Minor point releases may be used to provide support for required legislative changes, e.g. 2.2 could be introduced if required and will maintain backward compatibility with earlier version 2 releases (2.0 & 2.1).
Existing Versions	The supported versions of the Criterion NB Tracking Standards are fully RDR compliant. See table below for more information.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Criterion NB Tracking Standards are as follows:

PRODUCT	NB TRACKING STANDARD VERSION	STANDARD DATA TYPES	CRITERION MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All products	2.0	Not Used	2.* (version 1 is not compatible)	No (2 of the 4 schemas use the same namespace)
All products	2.1	Not Used	2.* (version 1 is not compatible)	No (2 of the 4 schemas use the same namespace)

PRODUCT	NB TRACKING STANDARD VERSION	STANDARD DATA TYPES	CRITERION MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All products	2.2	Not Used	2.1 & 2.2 (version 1 is not compatible)	No (2 of the 4 schemas use the same namespace)

4.9 CONTRACT ENQUIRY

The Contract Enquiry schemas are “Business Process Specific”.
Criterion’s Contract Enquiry (CE) Standards were introduced around 2003/04 and enable Advisers to obtain valuations and policy information online from a Product Provider or Platform. This helps provide up to the minute valuations and information on a current contract and also reduces the phone calls to Product Providers and Platforms to get this information.

A major change was introduced to the style of Standards delivery with the Contract Enquiry Standards in that separate schemas were delivered to support both REST and SOAP implementations.

The following information is important for implementers of the CE Standards (Schemas).

INFORMATION	VALUE
Category	Business Process Specific.
XML Namespaces	The following Contract Enquiry schemas have unique XML namespaces, so work well with both REST and SOAP based web services frameworks. • Contract Enquiry version 2.0, • Contract Enquiry version 2.1, • Contract Enquiry version 2.2, • Contract Enquiry version 2.3, • Contract Enquiry version 2.4, • Contract Enquiry Wrap Valuation versions 1.1/1.2/1.3 (Single Wrap), • Contract Enquiry Wrap Valuation versions 1.1/1.2/1.3 (Multi Wrap), • Contract Enquiry Collective Investments Version 1.3,1.4. • Contract Enquiry Bulk Valuations version 1.0 All of the other Contract Enquiry versions schemas are only suitable for RESTful web services implemented via the Criterion MTG [3].
Element Namespaces	All elements in Criterion CE Standards compliant XML documents require to be namespace qualified.
Attribute Namespaces	Attribute values in Criterion CE Standards compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	All data structure definitions are embedded within the schemas where they are required (derived from the original definitions in the Criterion Data Type Library).
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	The CE schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	Suitable versions of all schemas exist to allow the use of SOAP based web services [4] framework toolkits. This effectively means there are slightly different versions of these schemas for use with SOAP as opposed to REST (MTG) versions. Note that the data structures are identical – it is only in the area of XML namespaces and top level wrapper elements where the necessary differences occur.
Operation / Message Exchange Pattern	Two way (request and response) and can be implemented as either synchronous or asynchronous.

INFORMATION	VALUE
Future Plans	There are no plans to introduce version 3 of the CE Standards at present. Minor point releases may be used to provide support for required legislative changes, e.g. 2.5 could be introduced if required and will maintain backward compatibility with earlier version 2 releases (2.2, 2.3 & 2.4).
Existing Versions	The supported versions of the CE Standards are described in the table below.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Criterion CE Standards are as follows:

PRODUCT	CE STANDARD VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Bonds, Endowments, Whole of Life, Protection	2.0	Not Used	2.1 & 2.2 (version 1 is not compatible)	No
Bonds, Endowments, Whole of Life, Protection	2.1	Not Used	2.1 & 2.2 (version 1 is not compatible)	Yes
Bonds, Endowments, Whole of Life	2.2	Not Used	2.1 & 2.2 (version 1 is not compatible)	Yes
Collective Investments	1.2.1	1.4.1	1.3	No
Collective Investments	1.3	Not Used	1.3	Yes
Collective Investments	1.4	Not Used	1.3	Yes
Pensions	2.2	Not Used	2.* (version 1 is not compatible)	Yes
Pensions	2.3	Not Used	2.* (version 1 is not compatible)	Yes
Pensions	2.4	Not Used	2.* (version 1 is not compatible)	Yes
Wrap (Single & Multi Wrap)	1.1	Not Used	2.* (version 1 is not compatible)	Yes
Wrap (Single & Multi Wrap)	1.2	Not Used	2.* (version 1 is not compatible)	Yes
Wrap (Single & Multi Wrap)	1.3	Not Used	2.* (version 1 is not compatible)	Yes
Bulk Valuations[2] (all products)	1.0	Not Used	2.* (version 1 is not compatible)	Yes

[2] Bulk Valuations are implemented via the use of the generic Maintain Publish and Subscribe Standard designed to allow management of subscription and delivery of schedule based (periodic) message or data exchanges.

4.10 CONTRACT ENQUIRY TRANSACTION HISTORY

The Contract Enquiry Transaction History schemas are "Business Process Specific".

Criterion's Contract Enquiry Transaction History (CETxnHist) Standards were introduced around 2005 and provide detailed information about Fund Unit Movements within a contract. The products covered are Bonds, Endowments, Whole of Life Protection and Pensions.

More recently, in 2015, the Provide Transaction History (PrvTxnHist) XML Standard was developed using Criterion's Foundation Business Service (FBS) approach (essentially a service-oriented architecture approach to Standards development). For more information on the FBS approach see [2]. This Standard provides the ability to obtain transaction history information (relevant asset transactions, corporate actions, cash account movements and charges) for one or more Wraps. Being an FBS, it can easily be extended at a future date to cover other products.

The following information is important for implementers of the CETxnHist Standards (schemas).

INFORMATION	VALUE
Category	Business Process Specific
XML Namespaces	**CETxnHist** The latest CETxnHist schemas (version 2.1 & 2.2) have unique XML namespaces, so work well with SOAP based web services frameworks. There are no SOAP specific versions of the schemas though. The earlier versions of the schemas (version 2.0) do not have unique XML namespaces and will therefore have issues with SOAP frameworks.
	PrvTxnHist All schemas have unique XML namespaces, so work well with SOAP based web services frameworks and the REST approach.
Element Namespaces	All elements in Criterion CETxnHist & PrvTxnHist Standards compliant XML documents require to be namespace qualified.
Attribute Namespaces	Attribute values in Criterion CETxnHist & PrvTxnHist Standards compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	All data structure definitions are embedded within the schemas where they are required (derived from the original definitions in the Criterion Data Type Library).
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	The CETxnHist & PrvTxnHist schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	**CETxnHist** As stated above, the latest CETxnHist schemas (version 2.1, 2.2 & 2.3) have unique XML namespaces, so work well with SOAP based web services [4] frameworks. There are no SOAP specific versions of the schemas though.
	PrvTxnHist As stated above, the PrvTxnHist schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message	Two way (request and response) and can be implemented as either synchronous or asynchronous.

INFORMATION	VALUE
Exchange Pattern	
Future Plans	**CETxnHist** There are no plans to introduce version 3 of the CETxnHist Standards at present. Minor point releases may be used to provide support for required legislative changes, e.g. 2.4 could be introduced if required and will maintain backward compatibility with earlier version 2 releases (2.1,2.2 & 2.3).
	PrvTxnHist This Standard was published as a 1.0 final version in Dec 2015. Minor point releases may be used to provide support for required legislative changes, e.g. 1.1 could be introduced if required and will maintain backward compatibility with the version 1.0 release.
Existing Versions	The supported versions of the CETxnHist & PrvTxnHist Standards are described in the table below.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Criterion CETxnHist Standards are as follows:

PRODUCT	CETXNHIST STANDARD VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Bonds, Endowments, Whole of Life Protection, Pensions	2.1	Not Used	2.* (version 1 is not compatible)	Yes
Bonds, Endowments, Whole of Life Protection, Pensions	2.2	Not Used	2.* (version 1 is not compatible)	Yes
Bonds, Endowments, Whole of Life Protection, Pensions	2.3	Not Used	2.* (version 1 is not compatible)	Yes

The supported versions of the Criterion PrvTxnHist Standard are as follows:

PRODUCT	PRVTXNHIST STANDARD VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Wraps (Single & Multi)	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.11 COMMISSION / REMUNERATION

The Commission / Remuneration schemas are "Business Process Specific".

In 1999 Criterion introduced Standards for the exchange of commission information in Electronic Data Interchange (EDI) [9] format. These are still widely used in the Criterion Standards Holders' community, although, with the introduction of the XML Criterion Standards for commission in 2004, the EDI Standards are no longer supported by Criterion. There is some useful documentation which may help EDI implementers, see [27] and [28] for Best Practice Guidelines.

The XML version of the Commission Standard, produced in 2004, was not widely implemented.

More recently, in 2012, the Remuneration Statement (XML) Standard was developed using Criterion's Foundation Business Service (FBS) approach. For more information on the FBS approach see [2].

The following information is important for implementers of the Commission/Remuneration Standards. Only the XML versions are commented on here. For information on the EDI version please refer to the Standards Library on the Criterion Standards website [1].

INFORMATION	VALUE
Category	Business Process Specific
XML Namespaces	The latest Remuneration Schemas (version 1.1) have unique XML namespaces, so work well with SOAP based web services frameworks. The Commission Schemas (version 1.0.1) do not have unique XML namespaces and will therefore have issues with SOAP frameworks but work well with the MTG/REST approach.
Element Namespaces	All elements in Commission/Remuneration Schema compliant XML documents require namespace qualification.
Attribute Namespaces	Attribute values in Commission Schema compliant XML documents **do not** require to be namespace qualified. Attribute values in Remuneration Schema compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	V1.4.1 of the Data Type Library, where common data structures are defined, is included in the Commission Schemas. In the Remuneration Schemas all data structure definitions are embedded within the Schemas where they are required (derived from the original definitions in the Data Types Library).
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	Both the Commission and Remuneration Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	As stated above, the Remuneration Schemas (version 1.1) have unique XML namespaces, so work well with SOAP based web services [4] frameworks. The Commission Schemas (version 1.0.1) are **unsuitable** for SOAP based web services. This is primarily because SOAP framework toolkits cannot manage the namespace implementations in these Schemas.

INFORMATION	VALUE
Operation / Message Exchange Pattern	**Remuneration Statement** One way (request only).
	Commission Transfer (XML) Two way (request and response) and can be implemented as either synchronous or asynchronous.
	Commission (EDIFACT) One way (request only).
Future Plans	There are no plans to enhance the Commission Schemas in the future.
Existing Versions	The supported versions of the Commission and Remunerations Schemas are described in the table below.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Criterion Commission/Remuneration Standards are as follows:

4.11.1 REMUNERATION STATEMENT

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All Products	1.1	Not Used	2.* (version 1 is not compatible)	Yes

4.11.2 COMMISSION (XML)

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All Products	1.0.1	1.4.1	1.3	No

4.11.3 COMMISSION (EDIFACT)

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	CRITERION SOAP HEADER (SOAP)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All Products	1.0	n/a	n/a	n/a	n/a
All Products	2.0	n/a	n/a	n/a	n/a

4.12 AUTO ENROLMENT

The Criterion Auto Enrolment Standards were finalised in May 2014. These Standards provide several FBS service definitions which are designed to meet the requirements expressed by domain experts in Criterion 's Automatic Enrolment (AE) Project. For background information please refer to the AE Business Requirements documents [60].

The Auto Enrolment Standards have been developed using the Foundation Business Services (FBS) approach [2].

The following information is important for implementers of the Auto Enrolment Standards.

INFORMATION	VALUE
Category	Business Process Specific.
XML Namespaces	All Schemas have unique XML namespaces, so work well with SOAP based web services frameworks and the REST approach.
Element Namespaces	All elements in Auto Enrolment Schema compliant XML documents require namespace qualification.
Attribute Namespaces	Attribute values in Auto Enrolment Schema compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	In the Auto Enrolment Schemas all data structure definitions are embedded within the Schemas where they are required.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	Auto Enrolment Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	As stated above, the Auto Enrolment Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message Exchange Pattern	11 Auto Enrolment Standards message sets exist: **Receive Group Scheme Contribution Cessation List** **Receive Group Scheme Contribution Refund List** **Receive Group Scheme Contribution List** **Receive AE Assessed Employee List** **Receive AE Assessed Employees For Enrolment List** **Receive AE Assessment List** **Receive AE Expanded New Member Data List** **Receive AE New Member Data List** **Receive AE Opt Out Opt In Joiner List** **Receive AE Postponement Estimation List** **Receive AE Payroll Single Update List** These are all two-way (request and response) and can be implemented as either synchronous or asynchronous.
Future Plans	The Standards Development Working Group completed development of the current v1.0 version of the Auto Enrolment Standards in May 2014, these are with the Industry for a review period.
Existing Versions	All the Auto Enrolment Standards versions which are available are detailed below.
Additional Message Format	In addition to supporting XML for information exchange, the Auto Enrolment Standards allow for the use of CSV format information exchange. Documentation defining the CSV format is also provided.

The supported versions of the Auto Enrolment Standards are as follows:

4.12.1 RECEIVE GROUP SCHEME CONTRIBUTION CESSATION LIST

The GroupSchemeContribution Cessation List Service Definition is an FBS service which provides details to the Scheme administrator of temporary and permanent cessation of contributions, including opt-out information.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.2 RECEIVE GROUP SCHEME CONTRIBUTION REFUND LIST

The ReceiveGroupSchemeContributionRefundList Service Definition is an FBS service which provides details of contribution refunds being paid in respect of either opt-outs or other scheme-valid reasons.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.3 RECEIVE GROUP SCHEME CONTRIBUTION LIST

The ReceiveGroupSchemeContributionList Service Definition is an FBS service which provides contribution collection information (payment schedules and/or remittance advice) to the Scheme.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.4 RECEIVE AE ASSESSED EMPLOYEE LIST

The ReceiveAEAssessedEmployeeList Service Definition is an FBS service which supports the reporting of Auto Enrolment Assessment outcomes.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.5 RECEIVE AE ASSESSED EMPLOYEES FOR ENROLMENT LIST

The ReceiveAEAssessedEmployeesForEnrolmentList Service Definition is an FBS service which provides outcomes of Auto Enrolment Assessment for those who are operating enrolment activity.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.6 RECEIVE AE ASSESSMENT LIST

The ReceiveAEAssessmentList Service Definition is an FBS service which supports the data required for Auto Enrolment Assessment.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.7 RECEIVE AE EXPANDED NEW MEMBER DATA LIST

The ReceiveAEExpandedNewMemberDataList Service Definition is an FBS service which supports the enrolment of new members where scheme defaults for contributions and/or investment choices are not to be applied.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.8 RECEIVE AE NEW MEMBER DATA LIST

The ReceiveAENewMemberDataList Service Definition is an FBS service which supports data required by schemes to enrol new members where scheme default contributions and investment choices are to be applied.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.9 RECEIVE AE OPT OUT OPT IN JOINER LIST

The ReceiveAEOptOutOptInJoinerList Service Definition is an FBS service which allows AE Service Providers to report outcomes to employers.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.10 RECEIVE AE POSTPONEMENT ESTIMATION LIST

The ReceiveAEPostponementEstimationList Service Definition is an FBS service which supports the data required for Auto Enrolment postponement, and the Estimation model of assessment.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.12.11 RECEIVE AE PAYROLL SINGLE UPDATE LIST

The ReceiveAEPayrollSingleUpdateList Service Definition is an FBS service which supports the provision to payroll of contribution changes (new member; increases; decreases; cessations) which may impact payroll deduction.

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Pensions	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.13 FLEXIBLE INTEGRATION TOOLKIT (PRE-POPULATION)

The Flexible Integration Toolkit (Pre-population as it was originally known) Schemas are "Business Process Agnostic" except for *Personal Fact Find* which is "Business Process Specific".

The Flexible Integration Toolkit (FIT) [11] delivers Data Patterns and a structure for assembling them, which can be deployed by Trading Partners according to the business process that they are looking to integrate.

Several Data Pattern Schemas have been developed which can be snapped together to provide larger more complex business process specific Data Pattern Schemas. The *Personal Fact Find* data pattern is the only pattern which is "Business Process Specific" and therefore has an associated Service Definition which is published under the "Maintain Personal Fact Find" Standard.

Alternatively, for those looking to deploy process agnostic services there is a generic Data Pattern and Service Definition which allows all the other patterns to be used as required via a self-defining message structure (like a manifest). This is referred to as the "Maintain Generic Data" Standard.

Each existing Data Pattern is briefly described in the table below. The latest versions can be found on the FIT area of the website [11] where the detailed Patten Description documents can also be found.

DATA PATTERN	DESCRIPTION
Adviser	Details of either an Adviser firm or a regulated individual and the role that they have performed.
BankAccounts	One or more bank accounts including information relating to the bank or building society and account information.
BusinessContacts	A collection of one or more parties who may be communicated with. These parties are either a person (an individual) or a company, and different data is included depending on which of these categories apply. The information relating to the person or company covers a wide range of aspects, including contact details, name and other data required by the relevant business process. This pattern is referred to by many of the other patterns.
CashFlow	Contains data relating to the financial position of one or more Business Contacts. This includes total expenditure, total income, the consumers responsible for the expenditure and the earners responsible for the income.
ContractsSummary	Contains summary information of one or more contracts. This includes information relating to the product as well as some key contract data and information on business contacts involved in the contract.
DocumentSet	Data describing one or more documents, such as the document reference, the type and title. It may also contain location information and who the intended recipient is.
Employment	Contains information relating to the employment of a business contact. This includes information on benefits provided by an employer and also pension related data. Details pertaining to multiple employments may be present.
Illustration	Information used to show possible future values and benefits of a contract, often used to assist the client in product selection. The illustration information includes projections, links to contract(s) summary and KFI documentation relating to the product(s) that are being illustrated.
InvestmentStrategy	Defines the strategy agreed between an Adviser and their Client for dealing with the Client's assets. This includes links to the policyholder(s), product information, investment

DATA PATTERN	DESCRIPTION
	goals, contract information, money in and money out details and instructions to (dis)invest in particular assets.
MoneyLaundering Certificate	Details of an electronic money laundering check carried out on one or more individuals. These details include information relating to the evidence used in the process of completing the money laundering check.
PersonDetails	Contains the personal details for a Client or business contact.
PersonalFactFind	Contains data collected from an individual in order to understand the individual's personal and financial situation, and so give correct advice. The information gathered includes personal details, employment details, financial details, current investments – including existing contracts and properties.
PortfolioSummary	Contains details of investments and assets owned by an individual and held together for financial planning purposes, usually via one or more contracts.
ProcessingState	Contains the processing status associated with the information exchanged for a specific business process when using the "Business Process Agnostic" implementation approach i.e. it informs Trading Partners the state of a business process which is taking place, e.g. an application or a quote.
ProductFeatures*	Contains data which provides key details about a number of different types of products. These details vary according to the product types.
PropertyFeatures	Contains details of a property itself, along with information relating to the ownership of that property.
Remuneration	Details of Adviser remuneration payable for advice given. The remuneration amount may relate to a particular contract, or specific aspects of a contract. The remuneration can be either Adviser charges or commission.
Response	Contains information about the success of a message exchange.
GenericData	Designed to work with one or more of the other Flexible Integration Toolkit patterns. It consists of a header and a main section. The header section defines which patterns appear in the main section, so in effect this is a self-defining structure.

*there are individual Data Patterns for each product type, e.g. ProductFeaturesAnnuity.

Two of the Data Patterns have Service Definitions which are briefly described in the table below with a link to the latest version on the website where the Service Implementation Guideline (SIG) and Message Implementation Guideline (MIG) documents can be found.

SERVICE DEFINITION	DESCRIPTION
MaintainPersonalFactFind	Personal Fact find pattern service definition.
MaintainGenericData	Generic Data pattern service definition.

The following information is important for implementers using the Flexible Integration Toolkit.

INFORMATION	VALUE
Category	Business Process Agnostic (except MaintainPersonalFactFind & PersonalFactFind which are Business Process Specific).
XML Namespaces	All the Data Pattern Schemas and Service Definition Schemas have unique XML namespaces, so work well with SOAP based web services frameworks.
Element Namespaces	All elements require namespace qualification.

INFORMATION	VALUE
Attribute Namespaces	All Attribute values require namespace qualification – with the exception of ID/IDREF attributes.
Common Data Types	All data structure definitions are embedded within the Schemas where they are required. A Data Types library for the FIT domain exists for internal use at Criterion.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces or the use of generic messaging, see APPENDIX B – Extending CRITERION Schemas).
REST Support	All FIT Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	All FIT Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message Exchange Pattern	Two way (request and response) and can be implemented as either synchronous or asynchronous.
Future Plans	An Implementation Group is following active implementations; this may initiate future activity.
Existing Versions	The supported versions of the FIT Schemas are described in the table below.
Out of Support Versions	There are no unsupported versions.

The latest versions of the FIT Schemas are as follows:

PATTERN	VERSION	STANDARD DATA TYPES	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Adviser	2.0	Not Used	Yes
BankAccount	1.1	Not Used	Yes
BusinessContacts	2.0	Not Used	Yes
CashFlow	2.1	Not Used	Yes
ContractsSummary	2.1	Not Used	Yes
DocumentSet	1.1	Not Used	Yes
Employment	2.1	Not Used	Yes
Illustration	1.1	Not Used	Yes
InvestmentStrategy	2.2	Not Used	Yes
MoneyLaunderingCertificate	1.0	Not Used	Yes
PersonDetails	1.0	Not Used	Yes
PersonalFactFind	3.1	Not Used	Yes
PortfolioSummary	2.1	Not Used	Yes
ProcessingState	1.0	Not Used	Yes
ProductFeatures	3.0	Not Used	Yes
ProductFeaturesAnnuity	1.1	Not Used	Yes
ProductFeaturesBond	1.1	Not Used	Yes
ProductFeaturesCollectiveInvestment	1.1	Not Used	Yes
ProductFeaturesDefinedBenefitPension	1.1	Not Used	Yes
ProductFeaturesDefinedContributionPension	1.1	Not Used	Yes
ProductFeaturesEndowment	1.1	Not Used	Yes
ProductFeaturesEquityRelease	1.1	Not Used	Yes
ProductFeaturesLoan	1.1	Not Used	Yes
ProductFeaturesMortgage	1.1	Not Used	Yes
ProductFeaturesPrivateMedicalInsurance	1.1	Not Used	Yes
ProductFeaturesProtection	1.1	Not Used	Yes
ProductFeaturesSavingsAndISAs	1.1	Not Used	Yes
ProductFeaturesWholeOfLife	1.1	Not Used	Yes
PropertyFeatures	2.1	Not Used	Yes
Remuneration	1.2	Not Used	Yes
Response	1.0	Not Used	Yes
GenericData	2.1	Not Used	Yes

The latest versions of the Service Definitions are defined below.

FBS	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
MaintainPersonalFactFind	3.1	Not Used	2.*	Yes
MaintainGenericData	2.2	Not Used	2.*	Yes

Grouping all the data patterns together they have been published as the Flexible Integration Toolkit Standard (FIT) as follows.

STANDARD	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
Flexible Integration Toolkit	2.0, 3.0 & 3.1	Not Used	2.*	Yes

4.14 MAINTAIN PUBLISH AND SUBSCRIBE

The Maintain Publish and Subscribe (MaintainPubSub) was introduced in 2018, primarily to facilitate CE Bulk Valuations. This is a generic service definition which can be used in a number of business scenarios to facilitate subscription to the publication of content from a publisher at regular intervals.
The following information is important for implementers of this Standard.

INFORMATION	VALUE
Category	Business Process Specific.
XML Namespaces	All Schemas have unique XML namespaces, so work well with SOAP based web services frameworks and the REST approach.
Element Namespaces	All elements in Maintain Pub/Sub Schema compliant XML documents require namespace qualification.
Attribute Namespaces	Attribute values in Maintain Pub/Sub Schema compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).
Common Data Types	In the Maintain Pub/Sub Schemas no common data types are used, instead all data structure definitions are provided by other Criterion Standard schemas as required. E.g. the Bulk Valuation FIT pattern can be used to exchange bulk valuation data.
Trading Partner Specific Data	Extensibility is supported via tpsdata elements.
REST Support	Maintain Pub/Sub Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	As stated above, the Maintain Pub/Sub Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.

INFORMATION	VALUE
Operation / Message Exchange Pattern	Three Maintain Pub/Sub Standard (MPS) message sets exists: **Subscribe request/response** **Publish push** **Publish pull** There is no need for the asynchronous exchange of MPS data as the publisher is in control of when any MPS data is available to be collected. Hence, from a messaging perspective, the MPS data exchange is assumed to always be a synchronous two-way (request and response) message exchange.
Future Plans	The Standards Development Working Group completed development of the current v1.0 version of the MPS Standards in May 2018. No future plans are known as yet.
Existing Versions	All the MPS Standards versions which are available are detailed below.
Additional Message Format	None.

The supported versions of the Criterion Maintain Publish and Subscribe Standard are as follows:

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All Products	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.15 INVESTMENT SWITCH AND REDIRECT NOTIFICATIONS (ISRN)

The Provide Investment Switch Redirect Notification List Service Definition [63] is an FBS service, introduced in 2017, which supports the provision of Investment Switch and Investment Redirect Notifications from Product Providers to Back Office Systems Suppliers/Trusted Third Parties.

The following information is important for implementers of this Standard.

INFORMATION	VALUE
Category	Business Process Specific.
XML Namespaces	All Schemas have unique XML namespaces, so work well with SOAP based web services frameworks and the REST approach.
Element Namespaces	All elements in Investment Switch and Redirect Notification Schema compliant XML documents require namespace qualification.
Attribute Namespaces	Attribute values in Investment Switch and Redirect Notification Schema compliant XML documents require to be namespace qualified (with the exception of ID/IDREF attributes).

INFORMATION	VALUE
Common Data Types	In the Investment Switch and Redirect Notification Schemas all data structure definitions are embedded within the Schemas where they are required.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	Investment Switch and Redirect Notification Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	As stated above, the Investment Switch and Redirect Notification Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message Exchange Pattern	One Investment Switch and Redirect Notification Standard message set exists: **Provide Investment Switch and Redirect Notification List** There is no need for the asynchronous exchange of ISRN data as the Product Provider is in control of when an ISR Instruction completes and hence when an ISR Notification is available to be collected or picked up from the Provider. Hence, from a messaging perspective, the ISRN data exchange is assumed to always be a synchronous two-way (request and response) message exchange.
Future Plans	The Standards Development Working Group completed development of the current v1.0 version of the Investment Switch and Redirect Notification Standards in Jan 2017. Criterion's Process & Standards Group has been asked if there is sufficient demand to set up an ISRN Standards Implementation Group in 2017.
Existing Versions	All the Investment Switch and Redirect Notification Standards versions which are available are detailed below.
Additional Message Format	None.

The supported versions of the Criterion Provide Investment Switch and Redirect Notification List Standard are as follows:

PRODUCT	VERSION	STANDARD DATA TYPES	MESSAGE HEADER (MTG)	UNIQUE NAMESPACES (FOR EACH SCHEMA)
All Products with an Investment feature	1.0	Not Used	2.* (version 1 is not compatible)	Yes

4.16 TECHNICAL & COMMON XML SCHEMAS

The Criterion Standards' generally exist to cater for business process specific data content but there are a few Schemas which are business process agnostic, as they are related to the technicalities of messaging mechanisms or common data types used across a number of the Criterion Standards XML Schemas. Listed in the tables below are the XML Schemas which fall into this category.

DataTypeLibrary.xsd (Standard Data Types)
Standard Data Types Schema [34].

VERSION	USE
v1.4.1	All of the QNB Business Content Schemas (with the exception of the QNB SIPP/IDPR and NB Annuities Schemas as these use locally defined Data Types).
v2.0.1	Not included in any Criterion Standards Schemas (only used to develop common types to be embedded in other Criterion Schemas).

NOTE: The Criterion Standards Value List document [39] provides a list of all Standard Values that are implemented within the Criterion Standard Data Type Schema. There is ongoing work to bring this list up to date with the Standard Values List actually in use within current Criterion Schemas which no longer make use of the Standard Data Type Schema.

MessageHeader.xsd (MTG/REST Header)
REST style messaging header described in the Criterion HTTP Message Transmission Guidelines [3].

NOTE: Current values that may be used in the **<message_type>** and **<message_version>** elements within the Criterion Message header are documented on the message types page on the website [36].

VERSION	USE
v1.3	All of the QNB Message Header Schemas. Also used in version 1.2 of the Contract Enquiry Collective Investment Message Header Schemas.
v2.0	All of the other Criterion Message Header Schemas with the exception of those mentioned above.
V2.1	All of the other Criterion Message Header Schemas with the exception of those mentioned above.
V2.2	All of the other Criterion Message Header Schemas with the exception of those mentioned above.

SOAPMessageControl.xsd (SOAP Message Control)
SOAP message control described in the Criterion SOAP Based Web Service documentation [4].

VERSION	USE
v1.0	All of the Criterion Message Header Schemas which support the use of SOAP based web services.

xmldsig-core-schema.xsd (W3C XML Digital Signature)
Provides support for digitally signing XML messages [7].

VERSION	USE
v0.1	All of the Criterion Message Header Schemas. This is included for convenience – it is maintained by the W3C under the XML Digital Signature Schemas [7].

money_laundering_certificate.xsd (Money Laundering Checks)
Money Laundering Schema used to confirm that the Adviser has undertaken Money Laundering checks with the Client. [8].

VERSION	USE
v1.0	All of the Criterion NB Business Content Schemas.

4.17 BUSINESS PROCESS AGNOSTIC STANDARDS

4.17.1 REMOTE PUBLISHING

The Remote Publishing Standard was introduced in 2002. It allows information to be exchanged between Trading Partners concerning the availability of documentation relating to a long running business process, for example signifying when policy documents are available during the New Business process.

The following information is important for implementers using the Remote Publishing Standard.

INFORMATION	VALUE
Category	Business Process Agnostic.
XML Namespaces	One target namespace is used for all Remote Publishing Schemas (http://www.origostandards.com/schema/rp/v3).
Element Namespaces	All elements require namespace qualification.
Attribute Namespaces	All Attribute values require namespace qualification (even ID/IDREF attributes).
Common Data Types	All data structure definitions are embedded within the schemas where they are required.
Trading Partner Specific Data	Extensibility is not Supported.
REST Support	All Remote Publishing Schemas are suitable for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	The Remote Publishing Schemas are **unsuitable** for SOAP based web services. This is primarily because SOAP framework toolkits cannot manage the namespace implementations in these Schemas.
Operation / Message Exchange Pattern	One way (request only).
Future Plans	No plans to enhance the Remote Publishing Standard. The functionality provided by the Remote Publishing has been replaced with Criterion's Receive External Alert [37] and Retrieve Documentation [38] FBS Standards.
Existing Versions	The supported versions of the Remote Publishing Standard are described in the table below.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Remote Publishing Standard are defined below.

Remote Publishing Standard Versions

Remote Publishing Schemas. See release notes [35].

VERSION	USE
v3.1	NB and Tracking REST/MTG implementations. Also suitable for any REST/MTG asynchronous messaging exchange.
v3.0	As for v3.1
v2.0	As for v3.1

4.17.2 EXTRANET LINKING

The Extranet Linking Standard was introduced in 2002. It defines a process for linking to Product Provider Extranets by Portals and Third Parties. It came about due to Product Provider requirements to re-use and gain benefits from the use of their Extranet services. The Standard facilitates the use of existing business process specific messaging Standards where appropriate. For example, it can be used to pre-populate Product Provider Extranet screens with information already captured by a Portal.

The latest version (1.2) supports the ability to "suspend and resume" processing carried out via the Extranet by providing a common structure for storing case reference information. The only Schemas specific to the Extranet Linking Standard are for use with "suspend and resume" processing. The Extranet Linking Standard makes use of existing business process specific messaging Standards and provides extensions to support "suspend and resume" processing.

The following information is important for implementers using the Extranet Linking Standard.

INFORMATION	VALUE
Category	Business Process Agnostic.
XML Namespaces	One target namespace is used for both "suspend and resume" Extranet Linking Schemas (http://www.origostandards.com/schema/el/v1.1). Other appropriate namespaces will be used within the context of Extranet Linking with the use of business process specific messaging Standards as required.
Element Namespaces	When using the "suspend and resume" extensions available in Extranet Linking Schemas all elements require namespace qualification. Use of business process specific messaging Standards within the context of Extranet Linking will be driven by the requirements of the specific Criterion Standards in use.
Attribute Namespaces	Extranet Linking extension Schemas do not use attributes. Use of business process specific messaging Standards within the context of Extranet Linking will be driven by the requirements of the specific Criterion Standards in use.
Common Data Types	All data structure definitions are embedded within the extensions Schemas where they are required. Use of business process specific messaging Standards within the context of Extranet Linking will determine the degree to which common Data Types are deployed.
Trading Partner Specific Data	Extensibility is not supported in the Extranet Linking Schemas. Use of business process specific messaging Standards within the context of Extranet Linking will determine the degree to which Trading Partner specific data is supported.
REST Support	Extranet Linking is appropriate for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	Extranet Linking can be used to extend the use of SOAP based web services, but it is primarily facilitated via browser redirects.
Operation / Message Exchange Pattern	Variable dependent on the business process within which the Extranet Linking Standard is implemented.
Future Plans	No plans to enhance the Extranet Linking Standard.

INFORMATION	VALUE
Existing Versions	The supported versions of the Extranet Linking Standard are described in the table below.
Out of Support Versions	Please contact Criterion [54] if you need information on or any assistance with an unsupported version of this Standard.

The supported versions of the Extranet Linking Standard are defined below.

Extranet Linking Standard Versions
See Extranet Linking Standards reference [58].

VERSION	USE
v1.2	As v1.1 but with inclusion of xsd:ID attribute to aid digital signing.
v1.1	Supports passing of information from a Portal/Third Party onto a Product Provider with the intention to use this information to kick-start an Extranet service. In addition, v1.1 provides the ability to support "suspend and resume" processing where this exists in the Extranet service.
v1.0	Supports passing of information from a Portal/Third Party onto a Product Provider with the intention to use this information to kick-start an Extranet service.

4.17.3 RECEIVE EXTERNAL ALERT

Criterion's Receive External Alert Standard (along with the Retrieve Documentation Standard) is designed to provide a REST and a SOAP implementation of the Remote Publishing Standard. The Receive External Alert Standard is a generic Service Definition which is used to inform the recipient of the request message of some action or process which has taken place. See the online documentation for more information [37].

The following information is important for implementers using the Receive External Alert Standard.

INFORMATION	VALUE
Category	Business Process Agnostic.
XML Namespaces	All the Receive External Alert Schemas have unique XML namespaces, so work well with SOAP based web services frameworks.
Element Namespaces	All elements require namespace qualification.
Attribute Namespaces	All Attribute values require namespace qualification – with the exception of ID/IDREF attributes.
Common Data Types	All data structure definitions are embedded within the Schemas where they are required.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	There are MTG enabled Receive External Alert Schemas available for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	The SOAP enabled Receive External Alert Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message Exchange Pattern	Two way (request and response) and can be implemented as either synchronous or asynchronous.
Future Plans	No plans to enhance the Receive External Alert Standard.

INFORMATION	VALUE
Existing Versions	The supported versions of the Receive External Alert Standard are described in the table below.
Out of Support Versions	There are no unsupported versions.

The supported versions of the Receive External Alert Standard are defined below.

Receive External Alert Standard Versions
Receive External Alert request and response Schemas are used to provide alerts. See documentation [37].

VERSION	USE
v1.4	As v1.3 but with inclusion of xsd:ID attribute to aid digital signing.
v1.3	NB and Tracking SOAP/REST implementations. Also suitable for any SOAP/REST asynchronous messaging exchange.
v1.2	NB and Tracking SOAP/REST implementations. Also suitable for any SOAP/REST asynchronous messaging exchange.

4.17.4 RETRIEVE DOCUMENTATION

Criterion's Retrieve Documentation Standard (along with the Receive External Alert Standard) is designed to provide a REST and a SOAP implementation of the Remote Publishing Standard. The Retrieve Documentation Standard is a generic Service Definition which is used to request documentation from a Product Provider. See the online documentation for more information [38].

The following information is important for implementers using the Retrieve Documentation Standard.

INFORMATION	VALUE
Category	Business Process Agnostic.
XML Namespaces	All the Retrieve Documentation Schemas have unique XML namespaces, so work well with SOAP based web services frameworks.
Element Namespaces	All elements require namespace qualification.
Attribute Namespaces	All Attribute values require namespace qualification – with the exception of ID/IDREF attributes.
Common Data Types	All data structure definitions are embedded within the Schemas where they are required.
Trading Partner Specific Data	Extensibility is not supported (although extension is possible using custom wrappers due to unique namespaces, see APPENDIX B – Extending CRITERION Schemas).
REST Support	There are MTG enabled Retrieve Documentation Schemas available for REST based web services. See the Criterion MTG [3] for information.
SOAP Support	The SOAP enabled Retrieve Documentation Schemas have unique XML namespaces, so work well with SOAP based web services [4] frameworks.
Operation / Message Exchange Pattern	Two way (request and response) and can be implemented as either synchronous or asynchronous.
Future Plans	No plans to enhance the Retrieve Documentation Standard.
Existing Versions	The supported versions of the Retrieve Documentation Standard are described in the table below.
Out of Support Versions	There are no unsupported versions.

The supported versions of the Retrieve Documentation Standard are defined below.

Retrieve Documentation Standard Versions

Retrieve Documentation Get request and response Schemas are used to ask the recipient (usually a Product Provider) for documentation. See documentation [38].

VERSION	USE
v1.1	As v1.0 but with inclusion of xsd:ID attribute to aid digital signing.
v1.0	NB and Tracking SOAP implementations. Also suitable for any SOAP asynchronous messaging exchange.

4.18 WORKING WITH CRITERION SCHEMA

There are a number of XML Schema tools available on the market. The most popular tool sets are listed below:-

- Altova XML Spy [40]
- Liquid XML Studio [41]
- Oxygen XML [42]
- Stylus Studio [43]

Criterion currently produce its Schemas using the Oxygen XML Editor.

In the past, Altova XML Spy was used to develop Criterion's Schema, but because of Altova's failure to enforce the "Unique Particle Attribution" constraint [44] in XML Spy this meant a move to the Oxygen XML Editor was required. More details are available on numerous articles on the Internet [45].

4.19 STANDARDS CURRENTLY UNDER DEVELOPMENT

There are always Criterion Standards under development and information on these can be found on the Criterion website [23].

5.IMPLEMENTATION APPROACHES

As mentioned earlier in this document, this section describes:

- the technical implementation approaches which are available (including the REST [5] and SOAP [6] style of messaging). Also included is the hybrid approach where these can be mixed;
- when each is appropriate for use and what the advantages and disadvantages are of each;
- which Criterion Standards are designed with SOAP and REST in mind, which are designed only for REST?

In the main there are two implementation approaches supported by the Criterion Standards. These are:

1. SOAP based web services (using the WS-I profiles [17]);
2. REST web services (using the Criterion MTG [3]).

There is however a third implementation approach which provides a hybrid approach [14] where an existing REST implementation can be wrapped in a SOAP implementation to provide a step towards an SOA implementation approach for those wishing to do so.

NOTE: *When choosing the REST web services implementation option, it is recommended that the* Criterion *HTTP Message Transmission Guidelines are followed. Similarly, when choosing the SOAP based web services implementation approach it is recommended that the WS-I profiles are followed.*

5.1 SOAP BASED WEB SERVICES

Many players in the Criterion Standards Holders' community have, over the last few years, been investing in SOAP Based Web Services and the associated (WS-*) technologies. Several Trading Partners have successfully implemented solutions based on these technologies. The success of this work has led to strong Standards Holders' community demand to ensure that the Criterion Standards are capable of operating with these technologies for XML messaging between organisations. There is also a growing need to interoperate within a wider e-Commerce environment which has already adopted SOAP Based Web Service technologies as the norm.

A few years ago, the OTG [30] agreed the policy that any Criterion Standard development must provide support for SOAP based web services as the preferred method of deployment.

At the same time as agreeing this policy, Criterion was involved with the WS-I (Web Services Interoperability organisation) and the W3C to ensure that Criterion deliverables would provide the best support for SOAP based web servicing toolsets. Criterion believe that they are now developing Standards which provide optimum support in this area.

5.2 REST WEB SERVICES

Around 2001, Criterion produced its first XML based Standards for the Life & Pensions Industry. At that time there was no concept of REST or SOAP, so Criterion, with the help of the OTG, produced a bespoke approach to provide web services based on the use of XML messaging technologies. This approach is described in the Criterion HTTP Message Transmission Guidelines (MTG) [3] documentation and effectively became the Criterion Standards Holders' community adoption of the REST [5] approach (which became a common term many years later).

Many organisations have successfully implemented solutions based on the MTG and have been operating in this way for a number of years, specifically in the area of Quotes New Business and Contract Enquiry (where there is not the full support for the SOAP approach). The existence of these implementations, using older Criterion Standards

which do not support SOAP based web services, has meant that there is ongoing strong Criterion Standards Holders' community demand to ensure that the Criterion Standards are capable of operating with REST/MTG as well as SOAP.

Criterion has endeavoured to ensure that any Criterion Standard development provides support for REST based web services as well as SOAP based web services.

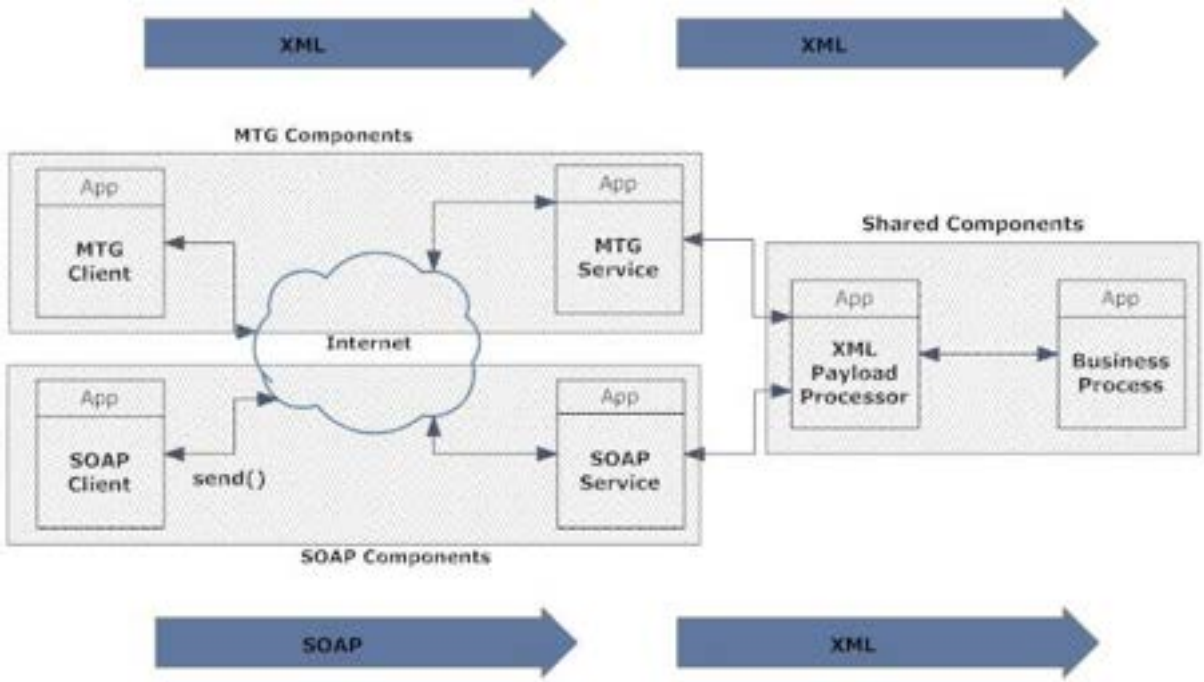
5.3 HYBRID APPROACH

The hybrid approach is documented in the "Wrapping REST within SOAP using Criterion Standards" document [14]. This approach is targeted at those wishing to migrate existing MTG Criterion Standard implementations across to SOAP based web services to gain some of the benefits of SOAP based web services technologies. The document [14] details how to allow SOAP to be used as the message transfer mechanism during gradual migration away from MTG compliant message implementations by:

1. wrapping an existing MTG implementation;
2. allowing more use of SOAP headers for service control information.

In the diagram below the "Shared components" represent the business process and the XML payload processor which were originally fronted by some "MTG components" to provide a RESTful implementation.

The "SOAP components" can be added later to provide a SOAP based web services implementation to front the "Shared components". This provides the ability to exchange the original MTG compliant messages across a SOAP transport layer giving the benefits of a SOAP framework[3], but the reuse of the original "Shared components".



[3] The benefits of SOAP frameworks include the provision of security, reliability, co-ordination and transactions via a set of standardised specifications e.g. WS-Security and WS-ReliableMessaging.

5.4 WHICH TO USE, SOAP OR REST?

REST is very easy to understand but does lack standards for use in development tooling and is, therefore, considered an architectural approach. The Criterion HTTP Message Transmission Guidelines are an implementation of this REST approach.

In comparison, SOAP is an IT Industry standard with a well-defined protocol and a set of well-established specifications. The WS-I profiles provide a template to follow when implementing a SOAP based web services solution.

Areas that REST works really well are:

- **Limited bandwidth and resources**
  - The REST/MTG approach uses the standard *GET* and *POST* verbs.
- **Totally stateless operations**
  - If an operation needs to be continued, then REST is not the best approach and SOAP may be a better fit. However, if you need stateless CRUD (Create, Read, Update, and Delete) operations, then REST is appropriate.
- **Caching situations**
  - If the information can be cached (because of the totally stateless operation of the REST approach) then REST is ideal.

The REST approach is just that, an approach, whereas SOAP consists of a number of technical standards and protocols.

The three areas above cover a lot of solutions. So why even consider SOAP? SOAP is fairly mature and well-defined and does come with a standard specification.
Areas that SOAP works really well include:

- **Asynchronous processing and invocation**
  - If your application needs a guaranteed level of reliability and security then SOAP offers standards to ensure this type of operation. For example: WS-Reliable Messaging and WS-Security.
- **Formal contracts**
  - If both the Provider and the consumer of a service have to agree on the message exchange format, then SOAP provides rigid specifications for this type of interaction by using XML Schema and the Web Services Description Language (WSDL) to electronically define the web service definition in terms of operations and the supported message formats for each operation. There is more detail on REST and SOAP support for formal contracts in Section 9 “INTEROPERABILITY”.
- **Stateful operations**
  - If the application needs contextual information and conversational state management then SOAP has the support of the standard specifications in the WS-* stack to support those requirements (Security, Transactions, Coordination, etc.). Comparatively, the REST approach would mean developers having to build this custom plumbing.

5.5 ADVANTAGES/DISADVANTAGES OF THE BASIC SOAP AND REST IMPLEMENTATION APPROACHES

APPROACH	ADVANTAGES	DISADVANTAGES
SOAP Based Web Services	Faster/cheaper development with the use of auto code generation for end to processing. Easier to find resources to support as it requires a more common skill set which is more widely available in the IT industry. SOA capabilities built in. Support for Transactions, Security, Addressing, Trust, Coordination, Reliability etc. Not just limited to HTTP transport. Plenty of Standards (WS-* specifications). Provides end to end security, not just at the transport level.	Interoperability issues with different vendor WS-* implementations. Heavyweight and more complex solution requiring tooling to generate code. More complex to support than REST. Verbose messages using SOAP. Complex security rules through the implementation of WS-Security and XML digital signature/encryption.
REST Based Web Services	Simple and easy to understand as it is based on the use of HTTP. More scalable with its lightweight approach. Messages are smaller. More reliable because of its simplicity.	Support for Transactions, Security, Addressing, Trust, Coordination, Reliability etc. must be developed by the implementer Little in the way of technical standards as it's based on HTTP protocol alone.
Hybrid	Provides the best of both SOAP and REST.	Two approaches to support.

5.6 WHICH IMPLEMENTATION APPROACHES ARE SUPPORTED BY THE CRITERION STANDARDS?

See Section 4 "CRITERIONCriterion STANDARDS" for a list of all Standards and information relating to which implementation approaches they support[4].

[4] Support is always within the context of either 1) the Criterion HTTP Message Transmission Guidelines (MTG) using REST or 2) the Web Services Interoperability Organisation's Profiles (WS-I) using SOAP.

6. SECURITY

Secure web services can be created using both SOAP based web services and the REST approach. SOAP based web services use a more complex but standardised approach, whereas REST uses the basics of HTTP.
Security can be broken down into six different aspects, each of which will be described in terms of how REST and SOAP can manage these.

6.1 ASPECTS OF SECURITY

6.1.1 IDENTIFICATION

Identification is the means of recognising who the Client of a specific service actually is. It may be something as straightforward as a user-id or more complex such as an x.509 certificate. Either way it is simply the mechanism used to recognise the user who is attempting to use an available service.

6.1.2 AUTHENTICATION

Authentication is the means of ensuring that the identity you have established for a particular user is actually valid. In other words, is the user who they say they are? This can be verified, for example, by using a password or an x.509 certificate. There are a number of other mechanisms available, but passwords and certificates are the primary techniques used in the Criterion Standards Holders' community.

6.1.3 DATA PRIVACY/CONFIDENTIALITY

Keeping the payload of a messaging implementation (a call to a web service) private and confidential is usually done via some form of encryption which secures the message content whilst in transmission between the web Service Client and the web Service Provider. Encryption is in most cases provided at the transport level (e.g. HTTPS/TLS [56]). It can alternatively be provided at the application level (e.g. using XML Encryption [16]) when using SOAP based web services to encrypt message parts as required).

6.1.4 DATA INTEGRITY

Data integrity ensures that messages have not been tampered with during transmission. This is achieved by digitally signing messages. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, and that it was not altered in transit. Digital signing of XML payloads is typically carried out using software which implements the XML Digital Signature [7] process.

6.1.5 NON-REPUDIATION

Non-repudiation provides proof of the integrity and origin of data along with authentication that with high assurance can be asserted to be genuine. Integrity is confirmed (as described above) by verification of digitally signed message content. Asserting the origin of the payload is typically provided by use of digital certificates (e.g. Unipass) to sign messages. The digital origin only means that the certified/signed data can be, with reasonable certainty, trusted to be from somebody who possesses the private key corresponding to the signing certificate.

6.1.6 AUTHORISATION

Authorisation is granted based on the identity and authentication of the client making the request for a service offered by the Service Provider. This is not something than can be covered by "Standards" as it tends to be dependent

on agreements between the Service Provider and the Service Consumer. As such, authorisation tends to be managed in a bespoke manner within the service applications provided.

6.2 SECURITY IN SOAP BASED WEB SERVICES

Secure SOAP based web services are provided by implementations of a number of different WS-* standards and use a WS-I compliant SOAP framework.

6.3 SECURITY IN THE REST APPROACH

Unlike SOAP based web services, secure REST web services do not have web service standards to follow. REST is based on the use of HTTP and the most common approach to security is to use HTTP Basic Authentication [19] over HTTPS/TLS. In many cases this has been extended to use x.509 certificates instead of username and passwords and becomes an integral part of the web service core application rather than being provided by a compliant messaging framework (as it would in a SOAP based web service implementation).
A simple analogy describing the difference between SOAP and REST security can be found in the references section – see "Explaining the difference between REST and SOAP security" [24]. SOAP based web services can provide end to end security, whilst REST only provides transport level security.

6.4 SECURITY MATRIX

The matrix below shows the relationship between the various aspects of security (data privacy, data integrity, authentication, identification and non-repudiation) and the technologies available in providing them.
The first column lists the technology which could be used to secure an appropriate web service implemented using SOAP or REST.

SOAP	Data Privacy	Data Integrity	Authentication	Identification	Non Repudiation
Transport Layer Security (HTTPS/TLS)	Y	N	N	N	N
User-id/Password (using HTTPS/TLS)	Y	N	Y	Y	N
X.509 certificates (using HTTPS/TLS)	Y	N	Y	Y	Y
XML Encryption/Signature	Y	Y	N	N	Y

REST	Data Privacy	Data Integrity	Authentication	Identification	Non Repudiation
Transport Layer Security (HTTPS/TLS)	Y	N	N	N	N
User-id/Password (using HTTPS/TLS with basic authentication)	Y	N	Y	Y	N
X.509 certificates (using HTTPS/TLS)	Y	N	Y	Y	Y

6.5 SUMMARY

By using a combination of technologies an implementer can secure all aspects of a SOAP based web service. However, it is not possible to provide data integrity for REST implementations unless this is applied within the application logic itself. All other aspects of a REST implementation can be secured using HTTPS/TLS and X.509 certificates.

See “APPENDIX A – Sample Signed Messages” for an example of a signed message used in a RESTful implementation of Contract Enquiry.

7. RELIABILITY

Reliable messaging is the guarantee that a message sent by a client application is indeed received at the Service Provider end, received only once and, if multiple messages are involved, received in the correct order.

7.1 SOAP BASED WEB SERVICES

SOAP based web services have the WS-I Reliable Secure profile [20] to help in this area. This document defines the WS-I Reliable Secure Profile 1.0, consisting of a set of non-proprietary web services specifications, along with clarifications, refinements, interpretations and amplifications of those specifications which promote interoperability. It also contains a set of executable test assertions for assessing the conformance to the profile. See Section 9 “INTEROPERABILITY” for more information on this.

7.2 REST APPROACH TO WEB SERVICES

Nothing like the WS-I profiles exist for the REST approach. Reliability has to be designed and built into a REST solution as there are no standards or specifications to help. This is one of the most common objections against REST i.e. that it doesn't offer reliable messaging. There is no equivalent to WS-ReliableMessaging [21] for the RESTful approach, and many conclude that because of this REST can’t be applied where reliability is an issue (which translates to pretty much every system that has any relevance in business scenarios).

For many REST supporters the preference is for a solution at the application level. Many believe that for business purposes there is no need for reliable messaging [22]. If there are well-defined business semantics and business logic, separate reliable messaging is redundant. For example, if requirements such as “in-order processing” and “send only once” are important then they will be catered for in the business logic of applications NOT in the messaging layer.

7.3 SUMMARY

There is considerable complexity involved in implementing reliable messaging at the messaging layer, both with the use of WS-I profiles for SOAP and on your own with REST. For this reason, Criterion recommends that the business logic is a more appropriate place to manage reliable messaging.

8.SCALABILITY

Scalability is the ability of a system, network, or process, to handle a growing amount of work in a capable manner or its ability to be enlarged to accommodate that growth. For example, it can refer to the capability of a system to increase total throughput under an increased load.

8.1 SOAP BASED WEB SERVICES

SOAP based web services don't lend themselves to caching, they have to maintain session state and they use verbose payloads. As a result, scalability does suffer in comparison to REST based web services.

8.2 REST APPROACH TO WEB SERVICES

The REST approach is more scalable because it is stateless (with clients being responsible for transitioning to new states), messages are smaller (no SOAP envelope) and caching can be implemented helping to reduce bandwidth usage.

8.3 SUMMARY

Most popular Internet facing services use the REST approach – largely due to scalability issues. For example: Google no longer use SOAP based web services and Amazon only use SOAP for about 20% of their needs. Facebook and Twitter are implemented using the REST approach.

For enterprise applications, speed and scalability are probably the most important requirements. SOAP based web services are much harder to scale than RESTful services, which is one of the reasons that REST is often chosen as the architecture for popular Internet facing services (like Facebook and Twitter). Using REST means that you can take advantage of HTTP caching and other features, like Conditional GET, that aid the scaling of services. Many of these techniques can't be used with SOAP because SOAP only uses POST over HTTP.

There has been a marked increase in the take up of the REST approach over the last few years as can be seen in IT industry reports [26].

9.INTEROPERABILITY

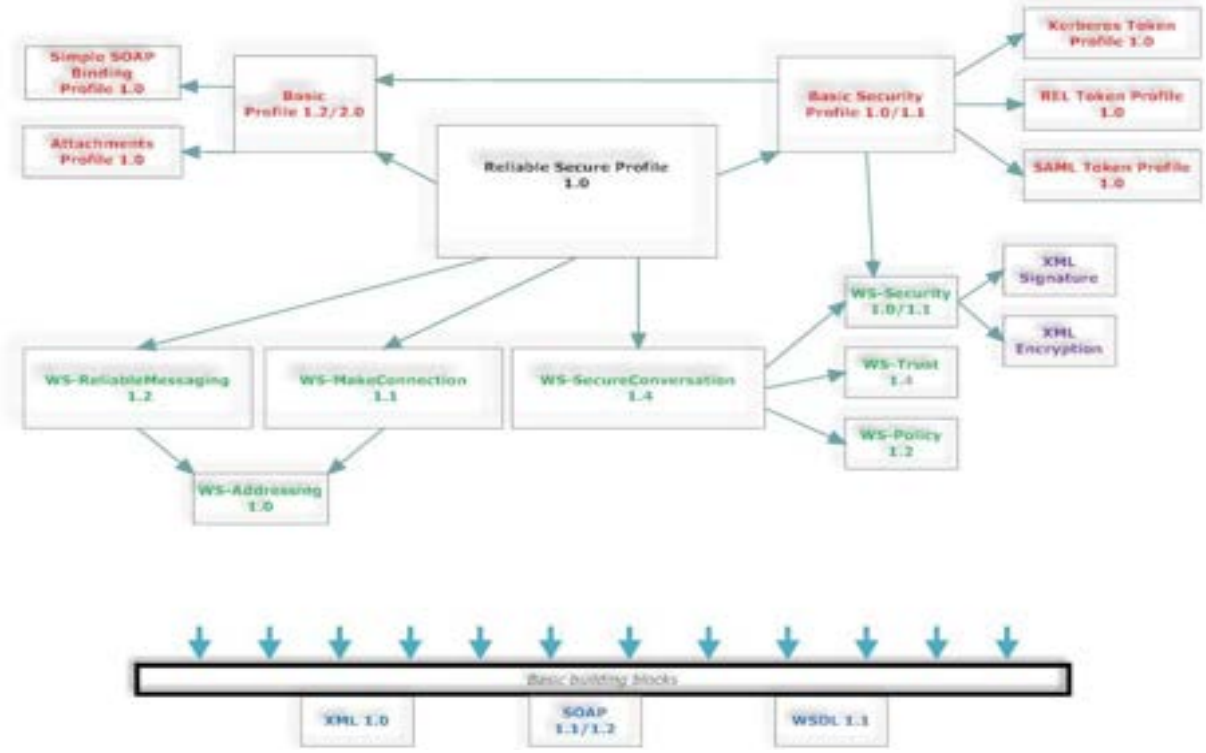
The term Interoperability is used to describe the capability of different programmes to exchange data via a common set of exchange formats and to use the same protocols. The lack of interoperability can be a consequence of a lack of attention to standardisation during the design of a programme.

9.1 SOAP BASED WEB SERVICES

In web services development and operational frameworks, the lack of interoperability may actually be caused by differing interpretations of WS-* Standards by different vendors. This is where the Web Services Interoperability Organisation (WS-I) [17] profiles become invaluable.

The WS-I have provided web service profiles which offer interoperability guidance for core WS-* specifications. WS-I profile compliant web services development and operational frameworks are used to ensure interoperability exists between Web Service Clients and Web Service Providers.

Security and reliability feature heavily in the WS-I profiles. The diagram below shows the relationship between the WS-I profiles and the WS-* Standards. The first profiles delivered were the Basic Profile and the Basic Security Profile (in red). The Reliable Secure Profile (in black) was built from these and some additional WS-* Standards (in green).



9.2 REST APPROACH TO WEB SERVICES

In the REST approach there is no direct support for generating code from a Service Definition, so interoperability has never been much of an issue. With SOAP development tools and the use of the Web Service Description Language (WSDL 1.1) [18] the ability to auto-generate code from a Service Definition is a very powerful and useful feature – although you still need to learn how to use the SOAP based web service's operations before using the generated code. A couple of efforts are being made to get such support into REST, one being a parallel specification, known as

WADL (Web Application Description Language) [26]. The other is a push to use WSDL 2.0 [18] to describe REST web service endpoints. Some support for these approaches to generate code for RESTful web services are now available but they are not as popular as the tools used for generating SOAP based web services.
With RESTful web services, it is possible to auto-generate code from XML Schema to produce native programming structures capable of storing the information from XML messages which conform to the Schema. SOAP tools tend to generate code to manage the “plumbing” of marshalling data to/from the SOAP XML messages whereas this has to be done separately in REST.

9.3 SUMMARY

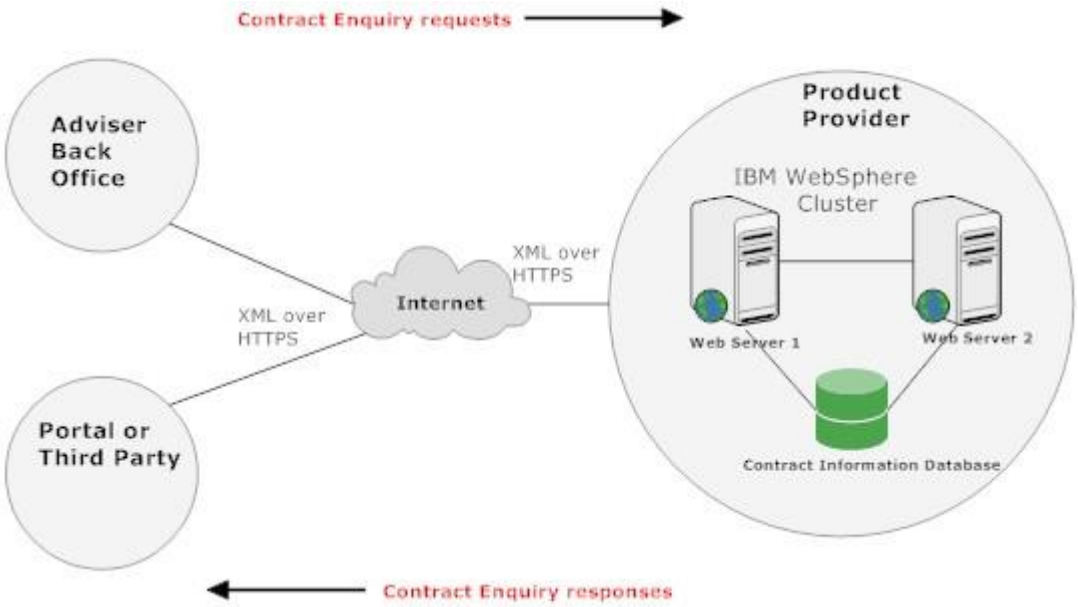
Interoperability should not be a major issue with the REST approach. However, with SOAP based web services this could quite easily become a major issue, depending on the compatibility of development tools used by the web service Client and the web Service Provider. For this reason, it is always advisable to select development tools which offer WS-I profile compliant code generation and SOAP message construction.

10. EXAMPLE IMPLEMENTATIONS

This section documents some example implementations.

10.1 REST EXAMPLE IMPLEMENTATION 1

This is an example of a Contract Enquiry Bonds service using a REST implementation.



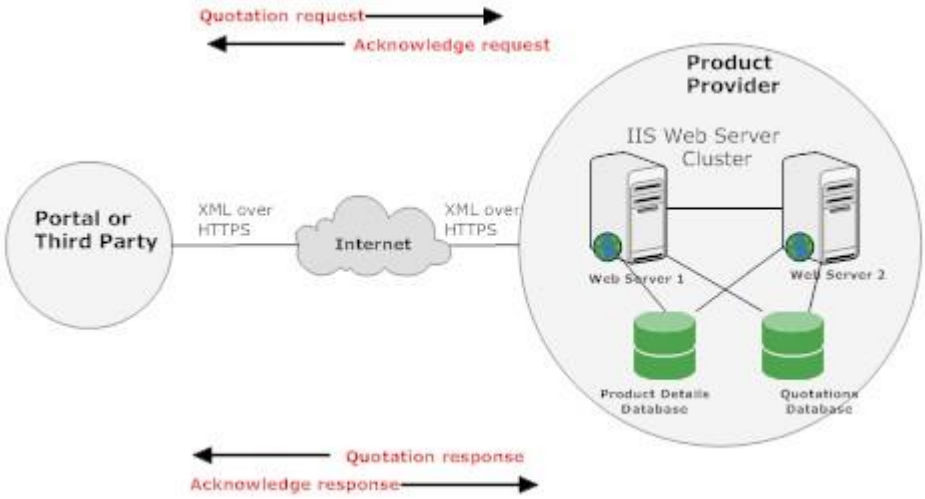
Implementation Details:

Service Provider	Product Provider managing contracts on behalf of an Adviser.
Service Consumer	Adviser, Portal or Third Party managing a Client's portfolio.
Technology used to host the service	IBM Tivoli Access Manager (security). Java on an IBM WebSphere Application Server cluster. Synchronous request/response message exchange pattern.
Security	XML over HTTPS (data privacy). Basic HTTP authentication (identification and authentication). XML payload header contains the Adviser's username and password (authorisation).
Scalability	Infrastructure is clustered and load balanced.
Reliability	No specific reliability issues to be managed. Maximum number of retries is configurable.

Interoperability	Not an issue (simple XML over HTTP message exchanges).

10.2 REST EXAMPLE IMPLEMENTATION 2

This is an example of a Quotation service using a REST implementation.



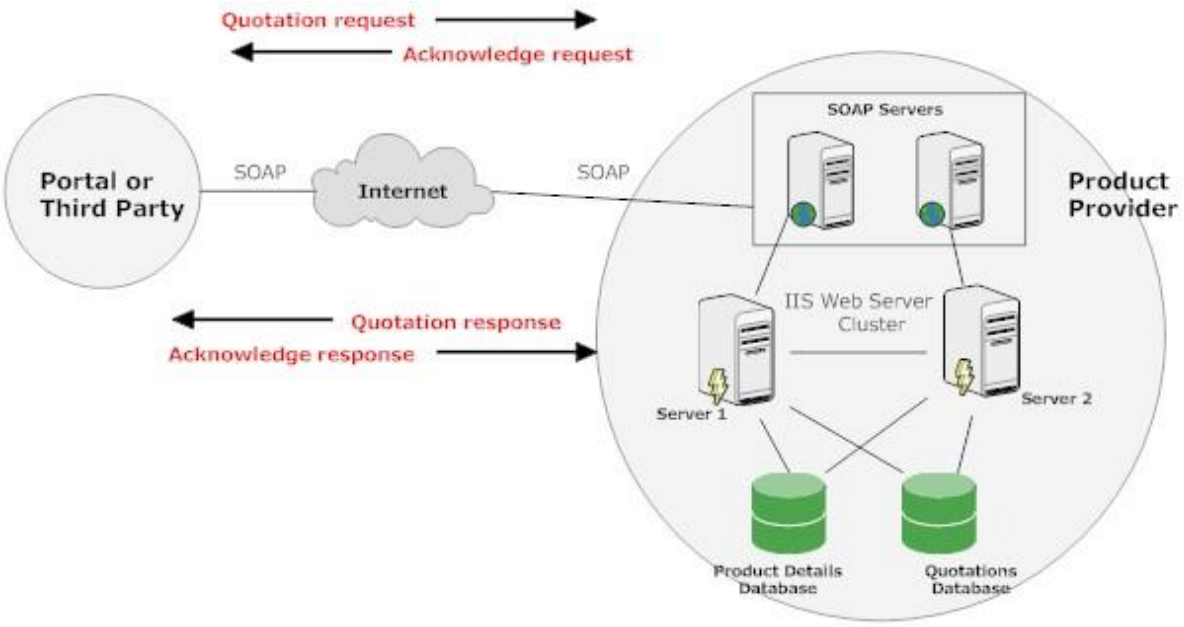
Implementation details:

Service Provider	Product Provider providing a quotation service on behalf of a Portal or Third Party.
Service Consumer	Portal or Third Party managing a quotation comparison service.
Technology used to host the service	Infrastructure is clustered and load balanced. .NET on IIS servers. Asynchronous request/response message exchange pattern.
Security	Access restricted by IP address. XML over HTTPS (data privacy). XML payload header contains the Adviser's username and password (authorisation).
Scalability	Infrastructure is clustered and load balanced. Asynchronous message exchange.
Reliability	No specific reliability issues to be managed. Maximum number of retries is configurable.

Interoperability	Not an issue (simple XML over HTTP message exchanges)

10.3 SOAP EXAMPLE IMPLEMENTATION 1

This is an example of a Quotation service using a SOAP implementation.



Implementation details:

Service Provider	Product Provider providing a quotation service on behalf of a Portal or Third Party.
Service Consumer	Portal or Third Party managing a quotation comparison service.
Technology used to host the service	Infrastructure is clustered and load balanced. SOAP servers manage security (identification, authentication, data integrity and non-repudiation). .NET on IIS servers provides business logic. Asynchronous request/response message exchange pattern.
Security	SOAP header contains x.509 certificate (identification and authentication). SOAP body is signed using x.509 certificate (data integrity and non-repudiation). SOAP envelope is encrypted using x.509 certificate (data privacy). SOAP body contains the Adviser's identity in the form of x.509 certificate key information (authorisation).
Scalability	Infrastructure is clustered and load balanced. Asynchronous message exchange.
Reliability	No specific reliability issues to be managed. Maximum number of retries is configurable. WS-I Reliable Secure Profile is available if reliability is required at the messaging level.
Interoperability	May be an issue (depending on tools used for developing the service). Becomes more of an issue the more WS-* components that are involved.

11. TESTING SCENARIOS

11.1 REQUIREMENTS

The basic requirement here is to enable service consumers to test the web services they plan to use, as hosted by Service Providers. These may be new web services being introduced as part of the introduction of some new functionality (e.g. a new product launch) or changes/enhancements to existing web services.

Testing scenarios are totally dependent on the availability of suitable testing environments. Many Product Providers, Portals and Third Party Services will provide Internet accessible test environments, usually referred to as UAT (User Acceptance Testing) environments.

UAT environments prove to your Trading Partners that the web services you provide work according to their understanding of their own business requirements. Service consumers test the business functions they expect to be provided and look at the business results to make sure they are correct. UAT is the only chance your Trading Partners usually have to test your web services to their satisfaction before they commit to using them in a live environment.

It is important that UAT systems exist in order to provide:

- testing of web services without impact on the live environment;
- testing within a distinct system/infrastructure which mirrors the setup on the live environment in every way;
- testing coverage for all test cases including all documented exceptions;
- testing of security features protecting the service.

11.2 TESTING HUBS

There has been some discussion within the Criterion Standards Holders' community about the value of a Testing Hub which could be used to:

- check messages for compliance with a particular Criterion Standard;
- provide sample Criterion Standard compliant response messages for a particular business process;
- simulate the long running transactions for a particular business process using Criterion Standard messages.

At the moment Testing Hubs are still at the discussion stage, with future plans to be arranged via the Criterion Governance Groups.

11.3 TESTING TOOLS

A number of testing tools are available to developers to aid the testing of web services. In some cases, one toolset will support all testing requirements, in other cases developers may need to use more than one.

A few toolsets are listed below with information about their support for SOAP and REST.

TOOLSET	FREE	DESCRIPTION	SOAP	REST
SoapUI	Yes	SoapUI [46] is a free open source cross-platform Java based functional testing solution from Eviware which is specifically designed for SOAP based web service testing. With an easy-to-use graphical interface SoapUI allows quick and easy creation and execution of	Yes	No

		automated functional, regression, compliance, and load testing. SoapUI executes within its own stand-alone user interface or via plug-ins for the NetBeans, IntelliJ, and Eclipse IDEs.		
TestMaker	Yes	TestMaker [47] is a free open source cross-platform Java based testing application from PushToTest. TestMaker works with SoapUI [46] to provide support for testing SOAP based web services and natively supports testing of REST web services.	Yes (with SoapUI)	Yes
WebInject	Yes	WebInject [48] is a free tool for automated testing of web applications and web services. It can be used to test both SOAP based web services and REST web services. It can also be used as a test harness to create a suite of automated functional, acceptance, and regression tests.	Yes	Yes
SOAPbox	Yes	SOAPbox [49] is a free tool provided by Vordel which allows testing of **secure** SOAP based web services. SOAPbox allows digital signing and encryption of test XML messages. It can be used to simulate client usage of the secure service, so that performance and security problems are identified and resolved early.	Yes	No
Visual Studio Test	No	Visual Studio Test [50] is an integrated testing toolset developed by Microsoft to facilitate all forms of testing for web services. Familiar to most .NET developers.	Yes	Yes
Rational Tester	No	IBM Rational Tester [51] is an automated web services testing tool. It is a functional and regression testing tool that enables testing of web services. Supports SOAP (including WS-Security) and REST.	Yes	Yes

NOTES:

1. SOAPbox specialises in the testing of applying digital signatures and encryption to SOAP messages.
2. SoapUI is probably the most popular SOAP based web services toolkit.
3. TestMaker relies on some other tools to provide overall testing support, e.g. it makes use of SoapUI.

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13. APPENDIX A – SAMPLE SIGNED MESSAGES

This section describes the components of a digital signature by using a Contract Enquiry request message by way of an example. This is not intended to represent the standard approach to signing message content, but more of an indication what is possible. For more information on Criterion's recommended approach to managing signatures please see [59] the "Criterion Messaging Security Solution" document.

In the example below:

- SHA256 is specified as the digest and signature algorithms;
- the <m_control> and <m_content> elements are signed individually;
- a Unipass x.509 certificate provides the private key for use in signing the message and the public key for verifying the signed content.

Contract Enquiry Request Message – before signing

```
<?xml version="1.0" encoding="UTF-8"?>
<mtg:message xmlns:mtg="http://www.origostandards.com/schema/mtg/v2"
 xmlns:ce="http://www.origostandards.com/schema/ce/v2.1/CEBondSingleContractRequest"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.origostandards.com/schema/mtg/v2 CEBondSingleContractRequest.xsd">
   <mtg:m_control id="mcontrol">
```

```
      <mtg:control_timestamp>2012-09-06T14:13:51.0Z</mtg:control_timestamp>
      <mtg:message_id>msg_id11111111111111111111111111111111</mtg:message_id>
      <mtg:message_type>Contract Enquiry Request</mtg:message_type>
      <mtg:message_version>2.1</mtg:message_version>
      <mtg:expected_response_type>synchronous</mtg:expected_response_type>
      <mtg:initiator_id>Origo</mtg:initiator_id>
      <mtg:responder_id>Life Company</mtg:responder_id>
    </mtg:m_control>
    <ce:m_content id="mcontent">
      <ce:b_control>
        <ce:contract_enquiry_reference>CE123456</ce:contract_enquiry_reference>
      </ce:b_control>
      <ce:intermediary>
        <ce:company_name>IFA Company Ltd</ce:company_name>
        <ce:contact_details>
          <ce:name>Mr John Smith</ce:name>
          <ce:telephone_number>0131 523 4480</ce:telephone_number>
        </ce:contact_details>
      </ce:intermediary>
      <ce:request_scope>
        <ce:contract_details_required_ind>No</ce:contract_details_required_ind>
        <ce:valuation_currency>GBP</ce:valuation_currency>
        <ce:fund_code_type_required>SEDOL</ce:fund_code_type_required>
        <ce:valuation_request ce:type="Current"/>
      </ce:request_scope>
      <ce:contract>
        <ce:contract_reference_number>A-284762-01</ce:contract_reference_number>
      </ce:contract>
    </ce:m_content>
  </mtg:message>
```

The signed message consists of two parts:

1. The data payload which contains the message control block and the business content block of the message. These are the <m_control> and the <m_content> elements.
2. The signature itself.

The signature itself is split into three parts:

1. The <ds:SignedInfo> element contains signing information which describes which components of the message are actually signed, which algorithms were used to carry out the signing and what type of signature has been created.
2. The <ds:SignatureValue> element contains the signature value after the signing information is applied to the parts of the message being signed.
3. Optionally the <ds:KeyInfo> element will contain the public key information that can be supplied in the message. This is used to verify that the signature is valid. If this is not present in the message, then the recipient must already know which private key to use to verify the content – this would most likely have been agreed as part of the service level agreement (SLA). In the example below there is no public key information supplied, which implies an agreement has been made over which public key to use for verification of the signature as part of the SLA.

Contract Enquiry Request Message – after signing

```
<?xml version="1.0" encoding="UTF-8"?>
<mtg:message xmlns:mtg="http://www.origostandards.com/schema/mtg/v2"
xmlns:ce="http://www.origostandards.com/schema/ce/v2.1/CEBondSingleContractRequest"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.origostandards.com/schema/mtg/v2
CEBondSingleContractRequest.xsd">
  <mtg:m_control id="mcontrol">
    <mtg:control_timestamp>2012-09-06T14:13:51.0Z</mtg:control_timestamp>
    <mtg:message_id>msg_id11111111111111111111111111111111</mtg:message_id>
    <mtg:message_type>Contract Enquiry Request</mtg:message_type>
    <mtg:message_version>2.1</mtg:message_version>
    <mtg:expected_response_type>synchronous</mtg:expected_response_type>
    <mtg:initiator_id>Origo</mtg:initiator_id>
    <mtg:responder_id>Life Company</mtg:responder_id>
  </mtg:m_control>
  <ce:m_content id="mcontent">
    <ce:b_control>
      <ce:contract_enquiry_reference>CE123456</ce:contract_enquiry_reference>
    </ce:b_control>
    <ce:intermediary>
      <ce:company_name>IFA Company Ltd</ce:company_name>
      <ce:contact_details>
        <ce:name>Mr John Smith</ce:name>
        <ce:telephone_number>0131 523 4480</ce:telephone_number>
      </ce:contact_details>
    </ce:intermediary>
    <ce:request_scope>
      <ce:contract_details_required_ind>No</ce:contract_details_required_ind>
      <ce:valuation_currency>GBP</ce:valuation_currency>
      <ce:fund_code_type_required>SEDOL</ce:fund_code_type_required>
      <ce:valuation_request ce:type="Current"/>
    </ce:request_scope>
    <ce:contract>
      <ce:contract_reference_number>A-284762-01</ce:contract_reference_number>
    </ce:contract>
  </ce:m_content>
```

```
<ds:Signature xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
  <ds:SignedInfo>
    <ds:CanonicalizationMethod Algorithm="http://www.w3.org/TR/2001/REC-xml-c14n-20010315#WithComments"/>
    <ds:SignatureMethod Algorithm="http://www.w3.org/2001/04/xmldsig-more#rsa-sha256"/>
    <ds:Reference URI="#mcontent">
      <ds:Transforms>
        <ds:Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature"/>
      </ds:Transforms>
      <ds:DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256"/>
      <ds:DigestValue>WGCxZq3zRh1qjqfx2TnQo8mCZvehE0926sQTHxPpgCM=</ds:DigestValue>
    </ds:Reference>
    <ds:Reference URI="#mcontrol">
      <ds:Transforms>
        <ds:Transform Algorithm="http://www.w3.org/2000/09/xmldsig#enveloped-signature"/>
      </ds:Transforms>
      <ds:DigestMethod Algorithm="http://www.w3.org/2001/04/xmlenc#sha256"/>
      <ds:DigestValue>46ddZBjN1yvyopDrN4Bw8t3N1V9Kvtz4xnfB5i91aIM=</ds:DigestValue>
    </ds:Reference>
  </ds:SignedInfo>
  <ds:SignatureValue>EX6Dv/9eH/yib4RDtzPMwB3SVEccRxWkuT2sDIm/3f8sqAMhjTsPgVXlhf4S4z703QCiCT4P3h5CA4EVL69AJ65CJF3lz
kVuKD8fHoN1Gj0JqoXcynSmGu6pPn0htUGDDGQ6Zm8148xWtPAOn/yOiUbORWWibKkfvtoz1n3YOrsAfD6cDGDxq909IERllwjJhFGAx1wO1DZJ
pg/vH0pDd+ZvQsMYTzM4g7RW2aPLnkGsAbe87LJkPGv8nGhdhvZXRr8dWuDjdsnj/qZifsmHWYpANOqq1bRXiFLgV2rszz1GR3PE9z0xFzyFxpmX
aJlEXxgZJ/pw6nkCFn0SNwzklg==
  </ds:SignatureValue>
</ds:Signature>
</mtg:message>
```

NOTES:

1. The digest algorithm in the example above is the recommended value of SHA256 (which is represented by the value http://www.w3.org/2001/04/xmlenc#sha256 in any programming interface specifying the digest algorithm).
2. The signature algorithm in the example above is also the recommended value of RSA SHA256 (which is represented by the value http://www.w3.org/2001/04/xmldsig-more#rsa-sha256 in any programming interface specifying the signature algorithm).

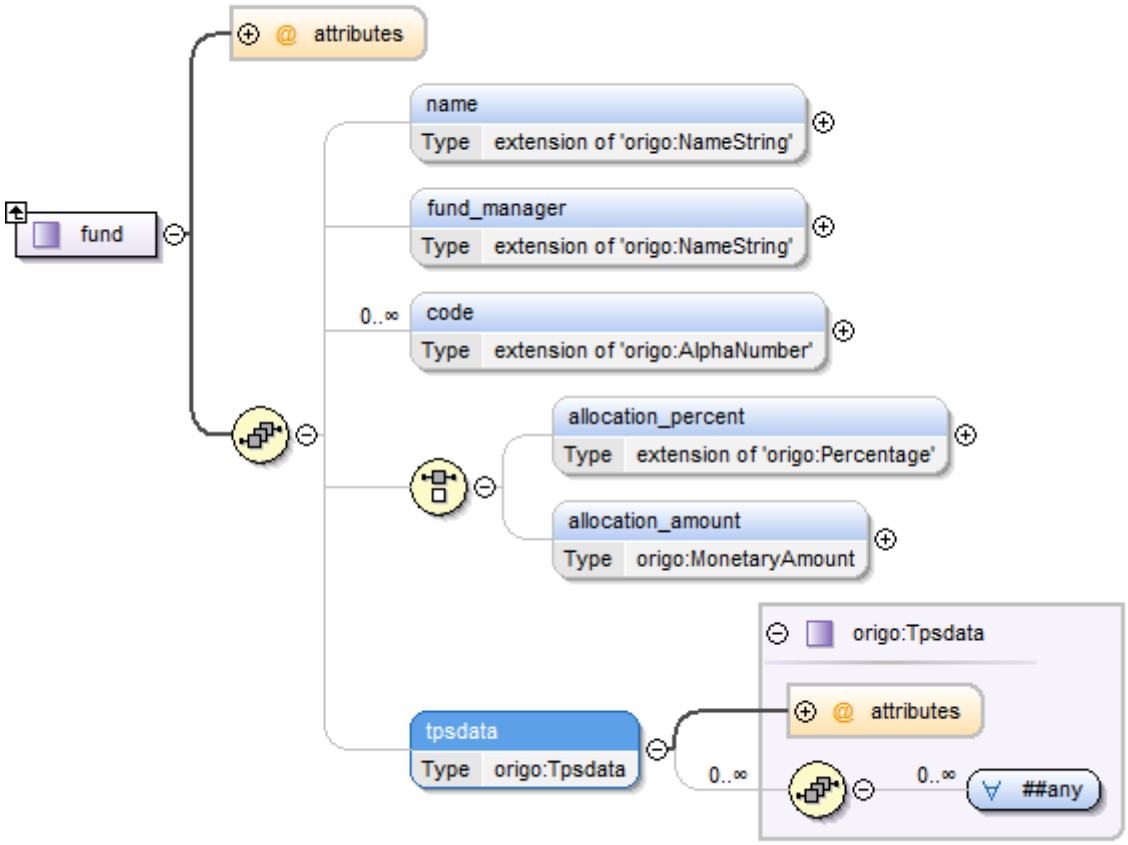
14. APPENDIX B – EXTENDING CRITERION SCHEMAS

There are currently numerous mechanisms which can be used to extend Criterion Schemas with Trading Partner specific data, some of which are explained in this section.

If the extension being applied could be considered useful to the Criterion Standards Holders' community then it is important that a Change Request is raised (see [53]) to make Criterion aware of the potential to incorporate it in future versions of the relevant Criterion Standard.

14.1 USE OF THE <TPSDATA> ELEMENT DEFINED WITHIN THE CRITERION QNB STANDARD SCHEMAS

The first mechanism makes use of the **<tpsdata>** element which is provided as an optional element at the end of all Criterion defined structures in the QNB schemas for the purpose of extension for non-Standard use. For example, below is the Schema definition for the <fund> element as it appears in the Quotes Bond request schema (QNBINVESTMENTBONDQUOTEREQUESTMCONTENT.XSD).



Information related to the use of this mechanism for providing Trading Partner specific data.

Where and when to use	**Where:** This mechanism is only supported in the **QNB Schemas**. **When:** When additional information related to a specific element defined in the Criterion schema needs to be provided. The inclusion of **<tpsdata>** element on all schema types should support all requirements in this area.
Structure supported	Any structure can be included within a **<tpsdata>** element. There is no limitation on the amount of data or the number of elements which can be specified when using <tpsdata> elements. Mixed content [62], which is not supported in Criterion schemas, is also allowed in <tpsdata> elements.
<tpsdata> validation	It is not possible to validate the structure of the trading partner specific data due to the use of **xsd:any** with **processContents="skip"** and **namespace="##any"** in the Criterion schema definitions. See reference [57] for more details on the XML Schema **any** element.
Trading Partner agreements	Trading Partners need to agree the structure of the extension before exchanging messages.
Advantages	Supported by the Criterion QNB Standards.
Disadvantages	Schema validation against the **<tpsdata>** element is not provided due to the definition of <tpsdata> in the QNB Criterion Schemas.

Below is an example of a Quote Bond request message where the sender has included Trading Partner specific data added to the **<fund>** element.

```
<?xml version="1.0" encoding="UTF-8"?>
<message xmlns="http://www.origoservices.com"
        xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
        xsi:schemaLocation="http://www.origoservices.com QNBINVESTMENTBONDQUOTEREQUEST.XSD">
        <m_control>
                <control_timestamp>2012-10-31T18:13:51.0Z</control_timestamp>
                <message_id>Msg-11111111111111111111111111111111</message_id>
                <message_type>Quotation Request</message_type>
                <message_version>/origo/3.7/QNBBondQuoteRequest.xsd</message_version>
                <expected_response_type>synchronous</expected_response_type>
                <initiator_id>Test Adviser</initiator_id>
                <responder_id>Test Provider</responder_id>
        </m_control>
        <m_content>
                <b_control>
                        <service_provider_reference_number>S123</service_provider_reference_number>
                        <intermediary_case_reference_number>I123</intermediary_case_reference_number>
                        <quote_type>Single Company</quote_type>
                        <quote_or_print>Quote Only</quote_or_print>
                        <generic_quote_ind>No</generic_quote_ind>
                        <message_version_number>3.7</message_version_number>
                        <submission_date>2012-10-31</submission_date>
```

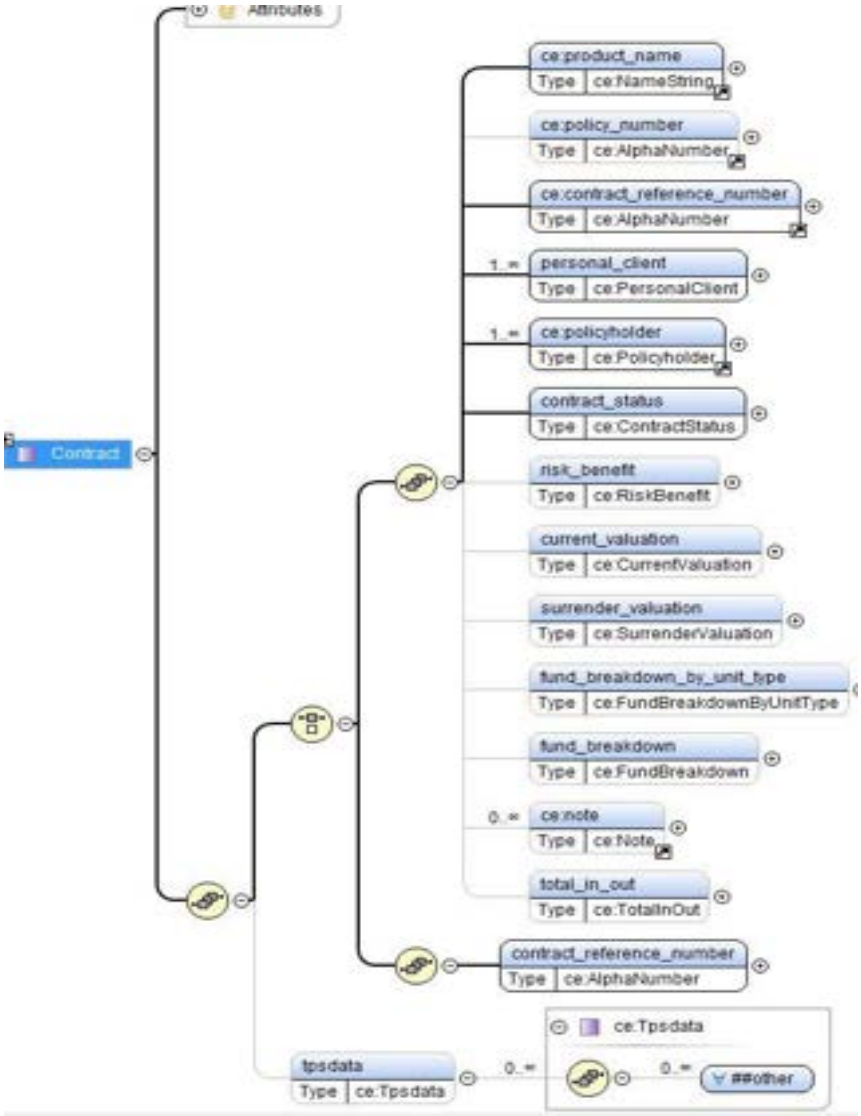
```
</b_control>
<intermediary type="IFA" id="i1">
	<role>Seller</role>
	<network>The Network</network>
	<sib_number>999999</sib_number>
	<pia_number>98765</pia_number>
	<FirmFSARef>123456</FirmFSARef>
	<PrincipalOrNetworkFSARef>999999</PrincipalOrNetworkFSARef>
	<basis_of_sale>
		<panel.identifier>PI1</panel.identifier>
	</basis_of_sale>
	<company_name>The IFA Company</company_name>
	<branch_name>First Branch</branch_name>
	<branch_number>IF1234</branch_number>
	<agency_number>IF1234</agency_number>
	<agency_address>
		<line_1>IFA House</line_1>
		<line_2>IFA Street</line_2>
		<line_3>IFA Town</line_3>
		<line_4>IFA County</line_4>
		<postcode>AB1 2CD</postcode>
	</agency_address>
	<provider_branch/>
	<registered_individual>
		<FSARef>FSA12345</FSARef>
	</registered_individual>
	<contact_details>
		<name>John Smith</name>
		<telephone_number>01234 567890</telephone_number>
		<fax_number>01234 678901</fax_number>
		<e_mail_address>jsmith@theifacompany.co.uk</e_mail_address>
	</contact_details>
</intermediary>
<application>
	<personal_client id="pc1">
		<title>Mr</title>
		<forenames>John</forenames>
		<surname>Smith</surname>
		<sex>Male</sex>
		<marital_status>Married</marital_status>
		<date_of_birth>1970-10-05</date_of_birth>
		<smoker_ind>No</smoker_ind>
	</personal_client>
	<personal_client id="pc2">
		<title>Mrs</title>
		<forenames>Jane</forenames>
		<surname>Smith</surname>
		<sex>Female</sex>
		<marital_status>Married</marital_status>
		<date_of_birth>1970-05-17</date_of_birth>
		<smoker_ind>No</smoker_ind>
	</personal_client>
	<product type="Investment Bond" sub_type="Distribution Bond" product_code="B3">
		<increment_ind>Yes</increment_ind>
		<distributions_ind>Yes</distributions_ind>
		<investment_strategy>
			<investment_contribution>
				<contribution>
					<amount currency="GBP">400</amount>
				</contribution>
				<main_commission commission_entitlement_id="ce1"/>
			</investment_contribution>
```

```
                                        <fund type="Unit Linked">
                                                <name>Distribution Fund</name>
                                                <allocation_percent>100</allocation_percent>
                                                <tpsdata>
                                                        <risk_factor>5</risk_factor>
                                                        <sector>North American Equities</sector>
                                                </tpsdata>
                                        </fund>
                                </investment_strategy>
                                <distribution>
                                        <payment>
                                                <payment_basis>Full Distribution</payment_basis>
                                                <first_payment_basis>Normal</first_payment_basis>
                                        </payment>
                                </distribution>
                                <risk_benefit type="Return Of Fund">
                                        <cover_basis>First Event</cover_basis>
                                        <risk_cover>
                                                <risk_event>Death</risk_event>
                                                <life_assured personal_client_id="pc1" sequence_number="1"/>
                                                <life_assured personal_client_id="pc2" sequence_number="2"/>
                                        </risk_cover>
                                </risk_benefit>
                                <policy_term>
                                        <start_date>2012-12-01</start_date>
                                </policy_term>
                                <commission_entitlement id="ce1" type="Nil Commission"/>
                                <illustration_basis>
                                        <contribution_or_benefit_led>Contribution</contribution_or_benefit_led>
                                        <required_year_value>10</required_year_value>
                                        <waive_policy_charge_ind>Yes</waive_policy_charge_ind>
                                </illustration_basis>
                        </product>
                </application>
        </m_content>
</message>
```

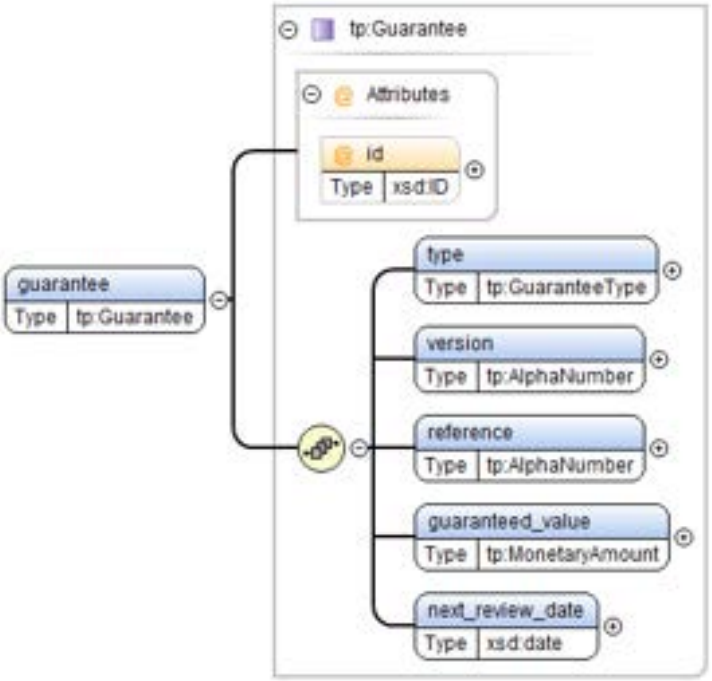
14.2 USE OF THE <TPSDATA> ELEMENT DEFINED WITHIN THE CRITERION 2017+ STANDARD SCHEMAS

The QNB schema design has provided <tpsdata> elements for a number of years, however schema design principles have changed over the years, driven by the Criterion Governance groups. For a while Criterion schema were prescriptive with no support for <tpsdata>, but as of 2017 it has been agreed that schema design should incorporate flexibility. This has led to the re-introduction of <tpsdata> in schema design. Small modifications have been made since the original <tpsdata> structure was added to QNB - the 2017 <tpsdata> definition now allows for schema validation to be applied to the extension if required.

By way of example, the diagram below is the Schema definition for the <contract> element as it appears/will appear in the CE Endowment Reference Response v2.2 schema (CEEndowmentSingleContractReferenceResponse.xsd) which includes support for <tpsdata>:-



In this example a trading partner wishes to include Guarantee information in the response message via the included support for **<tpsdata>** and has supplied a schema (tpsGuarantee.xsd) which is to be used to validate the content of the <tpsdata> element. This schema contains the following structure:-



Information related to the use of this mechanism for providing Trading Partner specific data.

Where and when to use	**Where:** This mechanism is supported in schemas which include **<tpsdata>** elements AND are not **QNB Schemas**. E.g. it is used where extensibility has been added since 2017. **When:** When additional information related to a specific element defined in the Criterion schema needs to be provided. The inclusion of **<tpsdata>** element on all schema complex types will support all requirements in this area.
Structure supported	Any structure can be included within a **<tpsdata>** element. There is no limitation on the amount of data or the number of elements which can be specified when using **<tpsdata>** elements. Mixed content [62] is not supported in the 2017 introduction of **<tpsdata>** in Criterion schemas.
Message validation	It **is** possible to validate the structure of the trading partner specific data due to the use of **xsd:any** with **processContents="lax"** and **namespace="##other"** in the Criterion schema definition of tpsdata. See reference [57] for more details on the XML Schema **any** element. It is recommended that implementers use namespaces specific to the use of <tpsdata> to clearly show this is not part of the Criterion Standard.
Trading Partner agreements	Trading Partners should agree the structure of the extension before exchanging messages. They should also agree whether or not schema validation will apply to the extension. If schema validation is required, then a schema should be defined and exchanged to allow validation to occur. If schema validation is not required, then there is no need to supply a schema defining the structure of the extension.

Advantages	Supported by Criterion Standards upgraded since 2017.
Disadvantages	None.

Below is an example of a Contract Enquiry Endowment Reference Response v2.2 message where the sender has included Trading Partner specific extension data added to the **<contract>** element to allow Guarantee information to be exchanged. To allow this message and the extension to be schema validated the trading partners have agreed to use the extension schema (**tpsGuarantee.xsd)**.

All Trading Partner specific extension data is name-space prefixed accordingly (**tp:**).

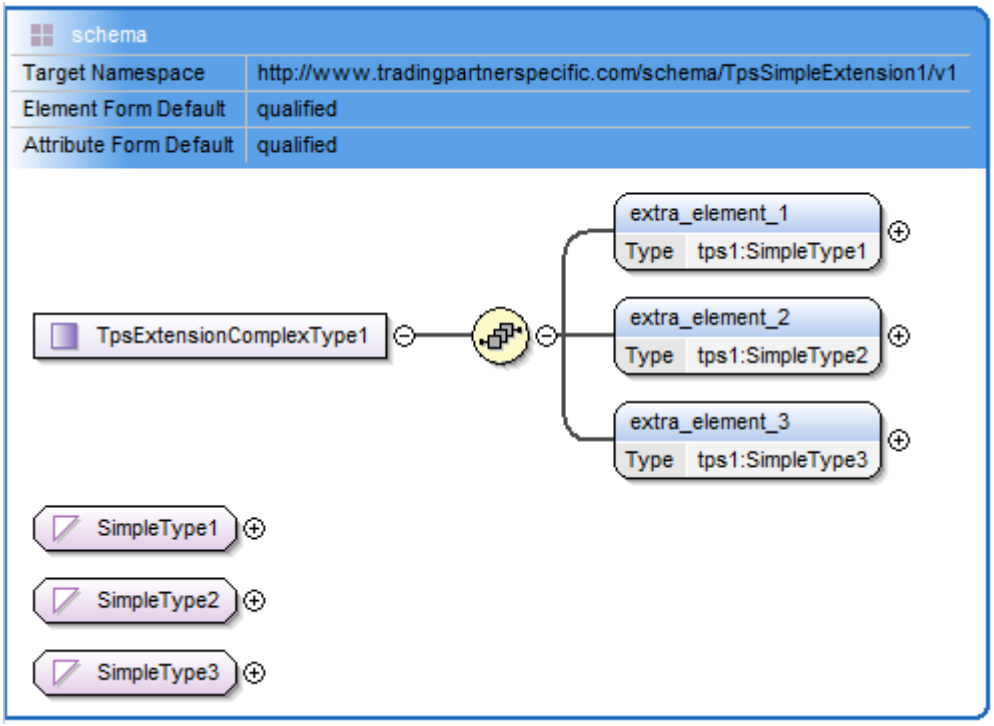
```
<?xml version="1.0" encoding="UTF-8"?>
<mtg:message xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
 xmlns:mtg="http://www.origostandards.com/schema/mtg/v2"
 xmlns:ce="http://www.origostandards.com/schema/ce/v2.1/CEEndowmentSingleContractReferenceResponse"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.origostandards.com/schema/mtg/v2 CEEndowmentSingleContractReferenceResponse.xsd">
  <mtg:m_control id="m_control1">
    <mtg:control_timestamp>2017-07-14T11:32:22.192</mtg:control_timestamp>
    <mtg:message_id>23efe69d-2ae6-4a8a-912c-da00697d27ea</mtg:message_id>
    <mtg:message_type>Contract Enquiry Response</mtg:message_type>
    <mtg:message_version>/origo/2.2/CEEndowmentSingleContractReferenceResponse.xsd</mtg:message_version>
    <mtg:message_status>Success</mtg:message_status>
    <mtg:expected_response_type>synchronous</mtg:expected_response_type>
    <mtg:initiator_id>Initiator</mtg:initiator_id>
    <mtg:initiator_orchestration_id/>
    <mtg:user_id>userid</mtg:user_id>
    <mtg:responder_id>Product Provider</mtg:responder_id>
  </mtg:m_control>
  <ce:m_content>
    <ce:b_control>
      <ce:enquiry_response_status>Success</ce:enquiry_response_status>
    </ce:b_control>
    <ce:intermediary>
      <ce:FirmFSARef>123456</ce:FirmFSARef>
    </ce:intermediary>
    <ce:request_scope>
      <ce:contract_details_required_ind>No</ce:contract_details_required_ind>
      <ce:fund_code_type_required>SEDOL</ce:fund_code_type_required>
      <ce:valuation_request ce:type="Current"/>
    </ce:request_scope>
    <ce:contract ce:type="Endowment" ce:sub_type="Low Cost Endowment">
      <ce:product_name>Product Name</ce:product_name>
      <ce:policy_number>654321</ce:policy_number>
      <ce:contract_reference_number>CE78901234</ce:contract_reference_number>
      <ce:personal_client id="pc1">
        <ce:title>Mr</ce:title>
        <ce:forenames>Test</ce:forenames>
        <ce:surname>Case</ce:surname>
        <ce:sex>Male</ce:sex>
        <ce:date_of_birth>1978-06-27</ce:date_of_birth>
        <ce:correspondence_address>
          <ce:postcode>EH12 5DH</ce:postcode>
        </ce:correspondence_address>
        <ce:national_insurance_number>WL123456B</ce:national_insurance_number>
      </ce:personal_client>
      <ce:policyholder>
        <ce:customer_reference_number></ce:customer_reference_number>
```

```
        </ce:policyholder>
        <ce:contract_status>
          <ce:status>In Force</ce:status>
        </ce:contract_status>
        <ce:current_valuation>
          <ce:timestamp>2017-07-14T11:32:22.192</ce:timestamp>
          <ce:expiry_date>2017-08-14</ce:expiry_date>
          <ce:product_provider_reference>PP453456</ce:product_provider_reference>
          <ce:amount>2500.00</ce:amount>
        </ce:current_valuation>
        <ce:fund_breakdown_by_unit_type>
          <ce:fund_unit_holding ce:unit_type="Accumulation">
            <ce:fund_name>Fund Name</ce:fund_name>
            <ce:number_of_units>50</ce:number_of_units>
            <ce:fund_code ce:type="SEDOL">code1</ce:fund_code>
            <ce:value_of_units>2500.00</ce:value_of_units>
            <ce:fund_unit_valuation_price>
              <ce:date>2017-07-14</ce:date>
              <ce:price>50.00</ce:price>
            </ce:fund_unit_valuation_price>
          </ce:fund_unit_holding>
        </ce:fund_breakdown_by_unit_type>
        <ce:total_in_out>
          <ce:total_paid_in_to_date>2000.00</ce:total_paid_in_to_date>
          <ce:total_paid_out_to_date>0.00</ce:total_paid_out_to_date>
        </ce:total_in_out>
        <ce:tpsdata>
          <tp:guarantee id="G1" xmlns:tp="tp-structure-definition/schema/guarantee"
            xsi:schemaLocation="tp-structure-definition/schema/guarantee tpsGuarantee.xsd">
            <tp:type>Capital</tp:type>
            <tp:version>Freedom</tp:version>
            <tp:reference>G1</tp:reference>
            <tp:guaranteed_value>2500.00</tp:guaranteed_value>
            <tp:next_review_date>2017-08-14</tp:next_review_date>
          </tp:guarantee>
        </ce:tpsdata>
      </ce:contract>
    </ce:m_content>
</mtg:message>
```

14.3 MODIFICATION OF THE CRITERIONMESSAGEHEADER.XSD WRAPPER SCHEMA

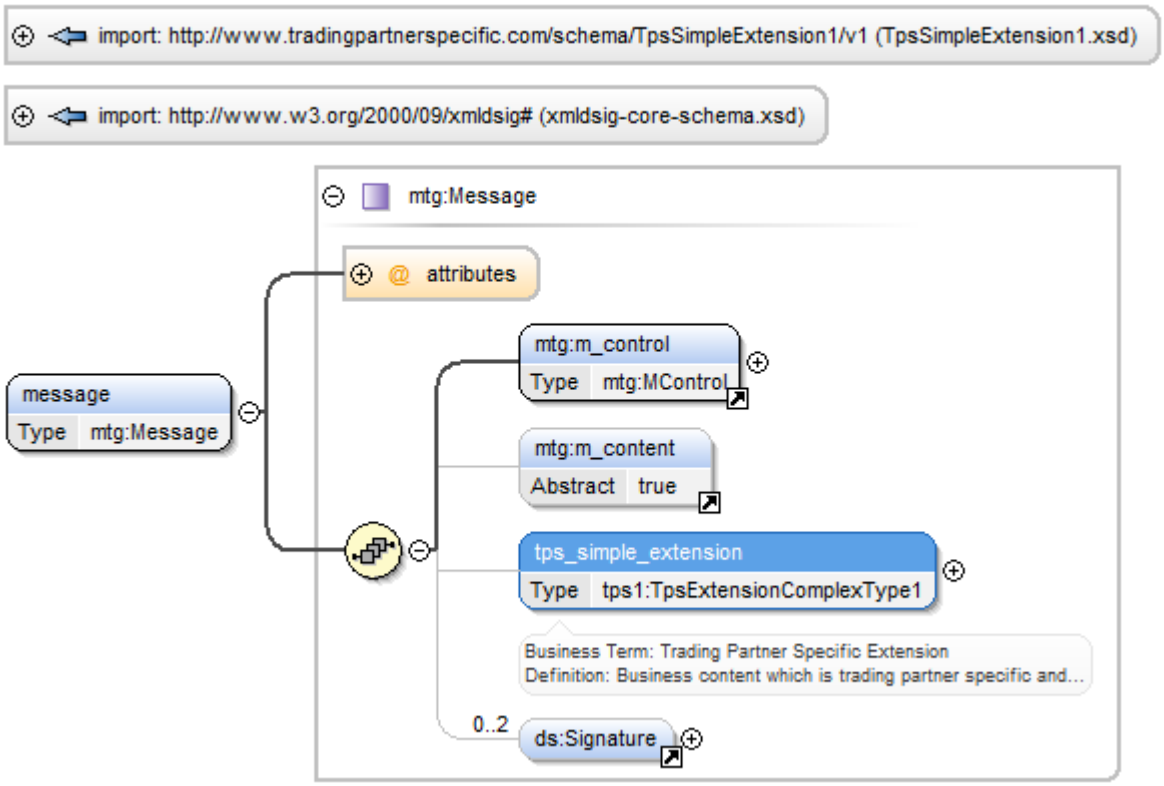
This mechanism requires a minor amendment to the top level wrapper Schema (**CriterionMessageHeader.xsd**) used by the relevant Criterion Standard and then the use of a Trading Partner specific extension schema (**TpsSimpleExtension1.xsd**) to represent the data associated with the extension. In this example the **TpsSimpleExtension1.xsd** schema contains three mandatory elements purely for the purpose of demonstration.

TpsSimpleExtension1.xsd



A small modification to the **CriterionMessageHeader.xsd** Schema will provide the ability to use an optional **<tps_simple_extension>** element which includes the Trading Partner specific data. The additional element is shown in the diagram below.

Modification applied to CriterionMessageHeader.xsd



Information related to the use of this mechanism for providing Trading Partner specific data.

Where and when to use	**Where:** All Criterion Standards, excluding QNB Standards (where this functionality already exists as demonstrated in example 14.1 above) and Standards changed to include flexibility introduced in 2017 (demonstrated in Section 14.2). **When:** 1. the information which requires to be exchanged **does not** relate to a specific element already defined within the message, OR, 2. the information which requires to be exchanged **does** relate to a specific element already defined within the Criterion Schema **and** there is only one occurrence of that element (so there is no doubt which element the relationship between the standard message data and the Trading Partner specific data refers to), OR, 3. the information which requires to be exchanged **does** relate to a specific element already defined within the Criterion Schema **and** can be expressed in such a way to allow the relationship between the standard message data and the trading partner specific data to be specified – i.e. by using an IDREF attribute to refer to an existing ID attribute in the message.
Structure supported	Any structure can be included within the separately defined **<tps_simple_extension>** (or similarly named) element within a Trading Partner specific schema – defined externally to the relevant Criterion Standard.

Message validation	Validation of the Trading Partner specific structure is provided by the use of the externally defined Trading Partner specific Schema.
Trading Partner agreements	Trading Partners need to agree the structure of the extension before exchanging messages and ensure that they share the externally defined Trading Partner specific Schema.
Advantages	Schema validation for the extension is possible with the use of the extension Schema.
Disadvantages	Deviation from the relevant Criterion Standard.

Below is an example of a Remuneration Statement message where the sender has included Trading Partner specific extension data added to the **<message>** element. To create this message the sender has modified the **CriterionMessageHeader.xsd** schema to include an optional **<tps_simple_extension>** element. The XML Schema type for this element is defined in a separately provided non- Criterion schema arbitrarily called **TpsSimpleExtension1.xsd**.

All Trading Partner specific extension data is name-space prefixed accordingly (**tps1:**).

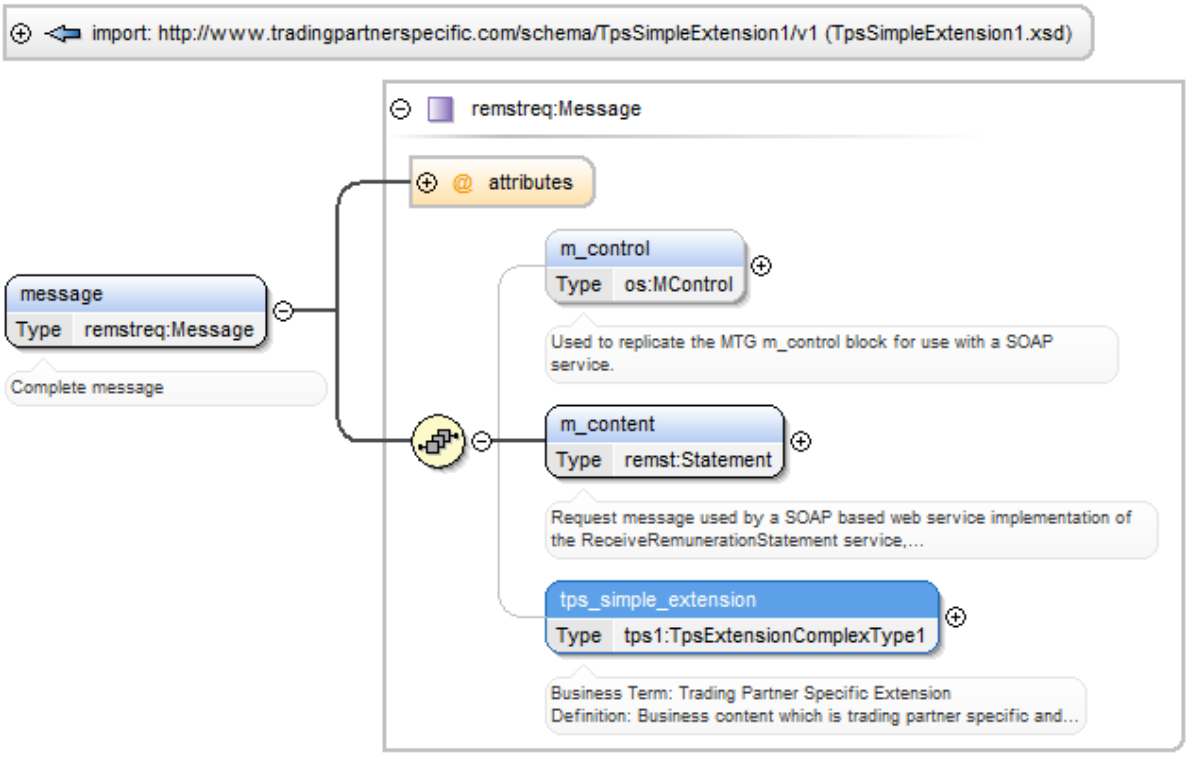
```
<?xml version="1.0" encoding="UTF-8"?>
<mtg:message xmlns:remstreq="http://www.origostandards.com/schema/ReceiveRemunerationStatement/v1/LoadStatementRequest"
 xmlns:mtg="http://www.origostandards.com/schema/mtg/v2"
 xmlns:remst="http://www.origostandards.com/schema/RemunerationStatement/v1"
 xmlns:tps1="http://www.tradingpartnerspecific.com/schema/TpsSimpleExtension1/v1"
 xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.origostandards.com/schema/mtg/v2 LoadRemunerationStatementRequestMTG.xsd">
   <mtg:m_control>
      <mtg:control_timestamp>2012-10-31T18:13:51.0Z</mtg:control_timestamp>
      <mtg:message_id>Msg-22222222222222222222222222222222</mtg:message_id>
      <mtg:message_type>Remuneration Statement</mtg:message_type>
      <mtg:message_version>/origo/1.1/RemunerationStatement.xsd</mtg:message_version>
      <mtg:expected_response_type>synchronous</mtg:expected_response_type>
      <mtg:initiator_id>Test Provider</mtg:initiator_id>
      <mtg:responder_id>Test Adviser</mtg:responder_id>
   </mtg:m_control>
   <remstreq:m_content>
      <remst:reference>Ref</remst:reference>
      <remst:product_provider_name>Provider Name</remst:product_provider_name>
      <remst:date>2012-10-31</remst:date>
      <remst:currency>GBP</remst:currency>
      <remst:adviser_charge_total>20000</remst:adviser_charge_total>
      <remst:amount_released>20000</remst:amount_released>
      <remst:commission_total>20000</remst:commission_total>
      <remst:consultancy_charge_total>20000</remst:consultancy_charge_total>
      <remst:remuneration_total>20000</remst:remuneration_total>
      <remst:payee_firm>
         <remst:company_name>IFA Company</remst:company_name>
         <remst:reference>
            <remst:type>FSA</remst:type>
            <remst:reference_number>99999999</remst:reference_number>
         </remst:reference>
      </remst:payee_firm>
   </remstreq:m_content>
```

```
   <mtg:tps_simple_extension>
      <tps1:extra_element_1>Extra data 1</tps1:extra_element_1>
      <tps1:extra_element_2>Extra data 2</tps1:extra_element_2>
      <tps1:extra_element_3>Extra data 3</tps1:extra_element_3>
   </mtg:tps_simple_extension>
</mtg:message>
```

NOTE: Defining the Trading Partner specific data separately in another Schema allows a convenient way to share the definition with Trading Partners. It also ensures that the modifications are kept separate from the relevant Criterion Standard and clarifies where the message format differs from the relevant Criterion Standard.

NOTE: Similar modifications can be applied to a SOAP implementation by modifying the **LoadRemunerationStatementRequestSOAP.xsd** Schema in the Criterion Remuneration Statement Standard.

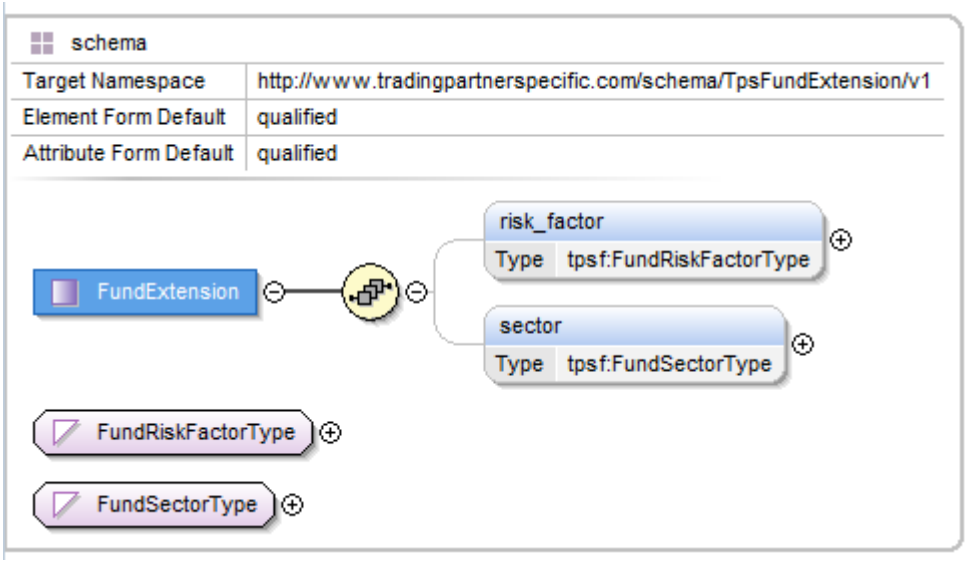
For example:-



14.4 MODIFICATION OF LOWER LEVEL MESSAGE CONTENT SCHEMAS

This mechanism requires a minor amendment to the lower level message content schemas for a particular Criterion Standard. A Trading Partner specific extension schema, for example **TpsFundExtension.xsd**, can be used to represent the data associated with the extension.

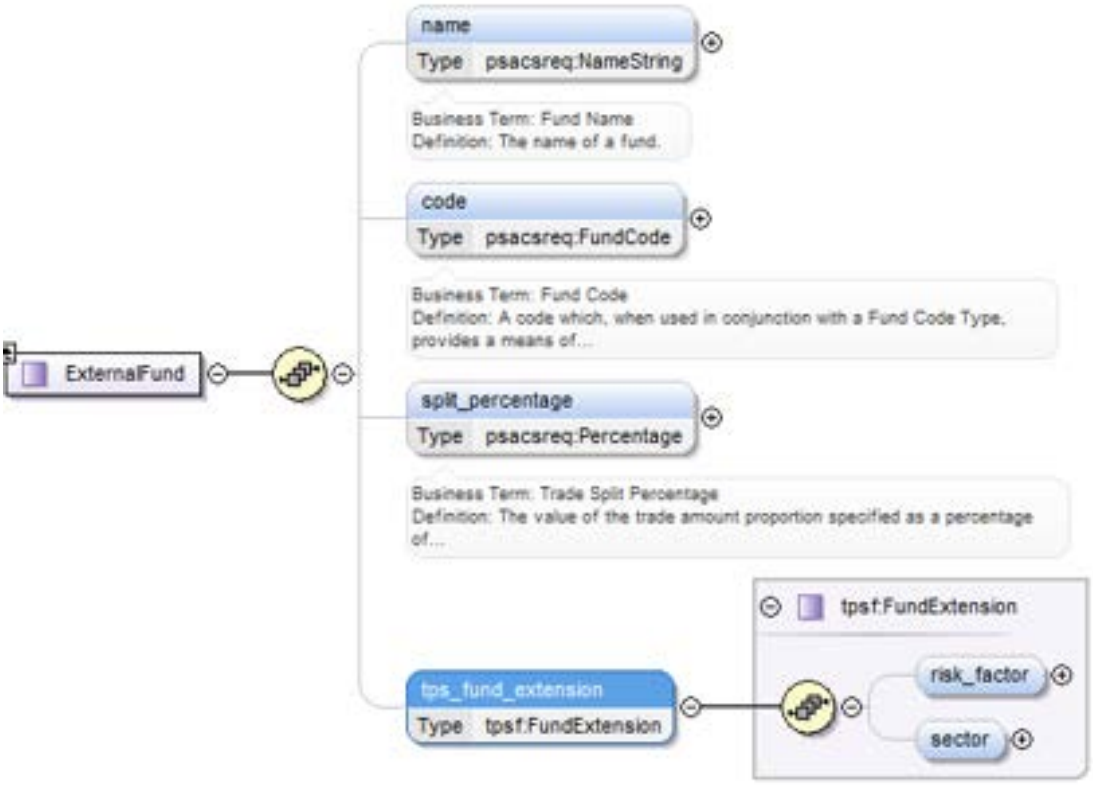
TpsFundExtension.xsd



In the following example a small modification to the NB SIPP create request message content Schema (**ProcessSIPPIDPRApplicationCommonStartRequest.xsd**) will provide the ability to use an optional **<tps_fund_extension>** element which includes the Trading Partner specific data related to a fund.

The additional Trading Partner specific element added to the **ProcessSIPPIDPRApplicationCommonStartRequest.xsd** Schema is shown below.

Change applied to ProcessSIPPIDPRApplicationCommonStartRequest.xsd



Information related to the use of this mechanism for providing Trading Partner specific data.

Where and when to use	**Where:** All Criterion Standards, excluding QNB Standards (where this functionality already exists as demonstrated in Section 14.1) and Standards changed to include flexibility introduced in 2017 (as demonstrated in Section 14.2). **When:** 1. The information which requires to be exchanged relates to a specific element already defined within the message which cannot be referenced by means of the ID/IDREF approach (and therefore cannot be referenced by using the mechanism described in section 14.3).
Structure supported	Any structure can be included within a separately defined **<tps_fund_extension>** (or similarly named) element within a Trading Partner specific Schema – defined separately to the relevant Criterion Standard.
Message validation	Validation of the structure is provided by the use of the externally defined Trading Partner specific Schema.
Trading Partner agreements	Trading Partners need to agree the structure of the extension before exchanging messages and ensure that they share the externally defined Trading Partner specific Schema.

Advantages	Schema validation for the extension is possible with the use of the extension Schema.
Disadvantages	Deviation from the relevant Criterion Standard.

Below is an example of the NB SIPP Start request message where the sender has included a Trading Partner specific extension to fund information in the **<fund>** element.

To create this message the sender has modified the **ProcessSIPPIDPRApplicationCommonStartRequest.xsd** Schema to include an optional **<tps_fund_extension>** element as part of the fund definition. The extension is defined in a separately provided non- Criterion schema called **TpsFundExtension.xsd** – see the diagram at the start of this section.

All Trading Partner specific extension data is name-space prefixed accordingly using the prefix **tpsf:** which enables Schema validation for the extension data.

```
<?xml version="1.0" encoding="UTF-8"?>
<mtg:message xmlns:ds="http://www.w3.org/2000/09/xmldsig#"
 xmlns:mtg="http://www.origostandards.com/schema/mtg/v2"
 xmlns:psacsreq="http://www.origostandards.com/schema/ProcessSIPPIDPRApplication/v1.0/Common/StartRequest"
xmlns:tpsf="http://www.tradingpartnerspecific.com/schema/TpsFundExtension/v1"
xmlns:st="http://www.origostandards.com/schema/ProcessSIPPIDPRApplication/v1.0/StartRequest"
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xsi:schemaLocation="http://www.origostandards.com/schema/mtg/v2 ProcessSIPPIDPRApplicationStartMTGRequest.xsd">
  <mtg:m_control>
    <mtg:control_timestamp>2012-10-31T18:13:51.0Z</mtg:control_timestamp>
    <mtg:message_id>msg-11111111111111111111111111111111</mtg:message_id>
    <mtg:message_type>Proposal</mtg:message_type>
    <mtg:message_version>/origo/1.2/ProcessSIPPIDPRApplicationStartMTGRequest.xsd</mtg:message_version>
    <mtg:expected_response_type>synchronous</mtg:expected_response_type>
    <mtg:initiator_id>Test Adviser</mtg:initiator_id>
    <mtg:responder_id>Test Product Provider</mtg:responder_id>
  </mtg:m_control>
  <st:m_content>
    <psacsreq:intermediary_case_reference_number>I123</psacsreq:intermediary_case_reference_number>
    <psacsreq:application_reference_number>APP123</psacsreq:application_reference_number>
    <psacsreq:advice_given_ind>false</psacsreq:advice_given_ind>
    <psacsreq:basis_of_sale>Other</psacsreq:basis_of_sale>
    <psacsreq:other_basis_of_sale_description>Basis of sale description</psacsreq:other_basis_of_sale_description>
    <psacsreq:panel_identifier>Panel identifier</psacsreq:panel_identifier>
    <psacsreq:applicant>
      <psacsreq:pr_retirement>
        <psacsreq:pr_retirement_age>60</psacsreq:pr_retirement_age>
      </psacsreq:pr_retirement>
      <psacsreq:personal_client>
        <psacsreq:name>
          <psacsreq:given_name>Fernando</psacsreq:given_name>
          <psacsreq:family_name>Alonso</psacsreq:family_name>
        </psacsreq:name>
        <psacsreq:national_insurance_number>WB123456B</psacsreq:national_insurance_number>
        <psacsreq:date_of_birth>1986-05-04</psacsreq:date_of_birth>
      </psacsreq:personal_client>
    </psacsreq:applicant>
    <psacsreq:money_in>
      <psacsreq:regular_contribution>
        <psacsreq:amount>907773.00</psacsreq:amount>
```

```
        <psacsreq:frequency>Every 4 months</psacsreq:frequency>
        <psacsreq:indexation_type>Fixed</psacsreq:indexation_type>
        <psacsreq:indexation_value>3.00</psacsreq:indexation_value>
        <psacsreq:preferred_payment_day>14</psacsreq:preferred_payment_day>
        <psacsreq:start_date>2012-12-04</psacsreq:start_date>
        <psacsreq:employer_pays_personal_contribution_ind>false</psacsreq:employer_pays_personal_contribution_ind>
        <psacsreq:net_gross>Net</psacsreq:net_gross>
        <psacsreq:payment_method>Bankers Draft</psacsreq:payment_method>
        <psacsreq:payer>
          <psacsreq:payer_type>Applicant</psacsreq:payer_type>
        </psacsreq:payer>
      </psacsreq:regular_contribution>
    </psacsreq:money_in>
    <psacsreq:product_provider>
      <psacsreq:name>Product Provider</psacsreq:name>
    </psacsreq:product_provider>
    <psacsreq:product>
      <psacsreq:name>Product Name</psacsreq:name>
      <psacsreq:product_type>Corporate Bond</psacsreq:product_type>
    </psacsreq:product>
    <psacsreq:trading_instruction id="ID017">
      <psacsreq:external_asset_instruction>
        <psacsreq:total_external_percentage>40.000</psacsreq:total_external_percentage>
        <psacsreq:external_asset>
          <psacsreq:fund>
            <psacsreq:code psacsreq:code_type="ISIN">AB1111111111</psacsreq:code>
            <psacsreq:split_percentage>75.000</psacsreq:split_percentage>
            <psacsreq:tps_fund_extension>
              <tpsf:risk_factor>5</tpsf:risk_factor>
              <tpsf:sector>North American Equities</tpsf:sector>
            </psacsreq:tps_fund_extension>
          </psacsreq:fund>
        </psacsreq:external_asset>
        <psacsreq:external_asset>
          <psacsreq:fund>
            <psacsreq:code psacsreq:code_type="ISIN">AB2222222222</psacsreq:code>
            <psacsreq:split_percentage>25.000</psacsreq:split_percentage>
            <psacsreq:tps_fund_extension>
              <tpsf:risk_factor>2</tpsf:risk_factor>
              <tpsf:sector>UK All Companies</tpsf:sector>
            </psacsreq:tps_fund_extension>
          </psacsreq:fund>
        </psacsreq:external_asset>
      </psacsreq:external_asset_instruction>
      <psacsreq:plan_bank_account>
        <psacsreq:percentage>0.000</psacsreq:percentage>
      </psacsreq:plan_bank_account>
    </psacsreq:trading_instruction>
    <psacsreq:trading_instruction id="ID018">
      <psacsreq:external_asset_instruction>
        <psacsreq:total_external_percentage>60.000</psacsreq:total_external_percentage>
        <psacsreq:external_asset>
          <psacsreq:fund>
            <psacsreq:code psacsreq:code_type="ISIN">GB1111111111</psacsreq:code>
            <psacsreq:split_percentage>10.000</psacsreq:split_percentage>
            <psacsreq:tps_fund_extension>
              <tpsf:risk_factor>3</tpsf:risk_factor>
              <tpsf:sector>Specialist</tpsf:sector>
            </psacsreq:tps_fund_extension>
          </psacsreq:fund>
        </psacsreq:external_asset>
        <psacsreq:external_asset>
```

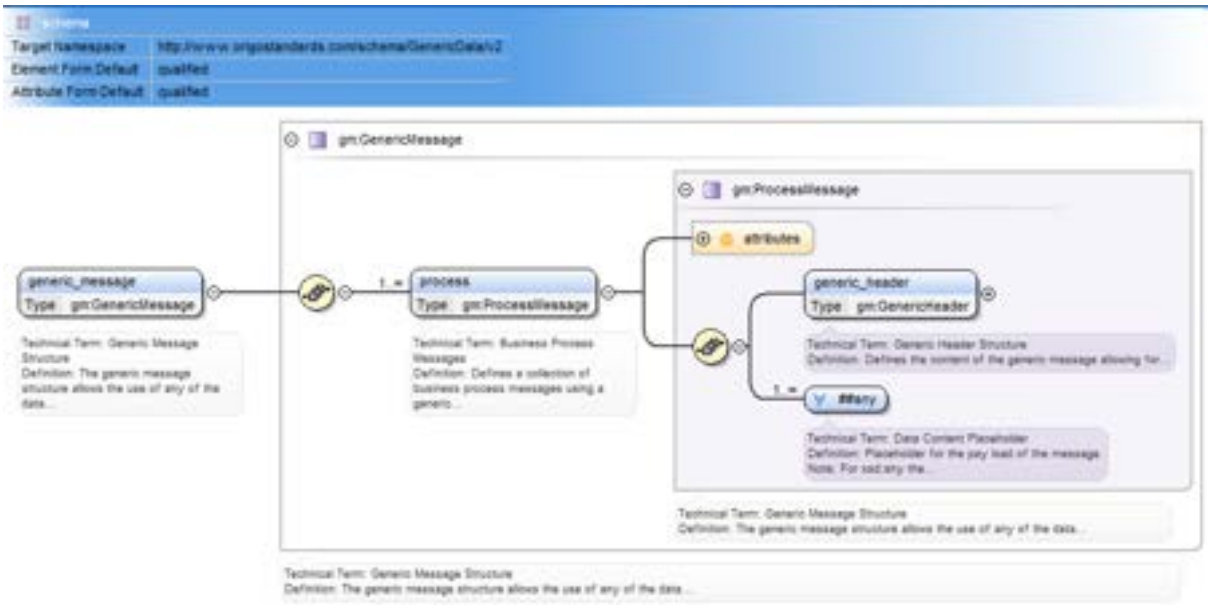
```
            <psacsreq:fund>
              <psacsreq:code psacsreq:code_type="ISIN">GB2222222222</psacsreq:code>
              <psacsreq:split_percentage>90.000</psacsreq:split_percentage>
              <psacsreq:tps_fund_extension>
                <tpsf:risk_factor>8</tpsf:risk_factor>
                <tpsf:sector>Property</tpsf:sector>
              </psacsreq:tps_fund_extension>
            </psacsreq:fund>
          </psacsreq:external_asset>
        </psacsreq:external_asset_instruction>
        <psacsreq:plan_bank_account>
          <psacsreq:percentage>99.000</psacsreq:percentage>
        </psacsreq:plan_bank_account>
      </psacsreq:trading_instruction>
      <psacsreq:group_detail>
        <psacsreq:scheme_reference_number>SCH000001</psacsreq:scheme_reference_number>
        <psacsreq:scheme_name>Test Scheme Name</psacsreq:scheme_name>
        <psacsreq:scheme_company>
          <psacsreq:name>Company Name</psacsreq:name>
          <psacsreq:registered_company_number>123456789</psacsreq:registered_company_number>
        </psacsreq:scheme_company>
        <psacsreq:part_of_group_arrangement_ind>false</psacsreq:part_of_group_arrangement_ind>
      </psacsreq:group_detail>
    </st:m_content>
</mtg:message>
```

14.5 USE OF GENERIC MESSAGING

This mechanism uses the Flexible Integration Toolkit (Pre-population) Generic Data Schema to define the Trading Partner specific extensions to the message structure. Generic messaging can include both Criterion and non-Criterion Schemas as the example in this section will show.

The Generic Data Schema provides the ability to define the contents of an XML message at the point the message is exchanged. This is enabled by the use of a header (or manifest) element which details the content of the message - described in terms of Patterns or Schemas used in the construction of the rest of the message. See the diagrams which follow for more information.

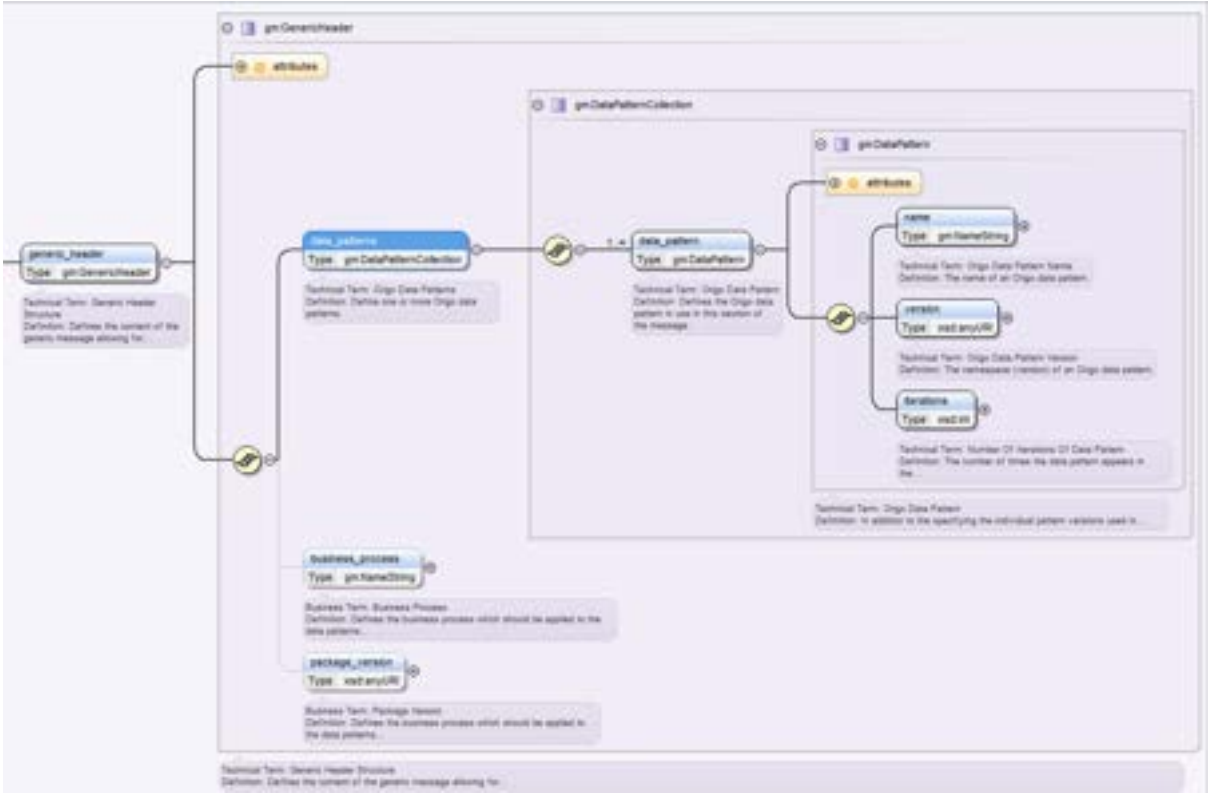
Top Level Structure of a Generic Message



The **<generic_message>** consists of one or more **<process>** elements, each of which represents a business process. In most cases only one **<process>** element will be present.

Each **<process>** element will consist of one **<generic_header>** and a number of other elements which are described in the **<generic_header>** element. The **xsd:any** XML Schema element [57] is used in the **GenericData.xsd** Schema to allow any (i.e. generic) message structure to be used.

Header/Manifest Structure



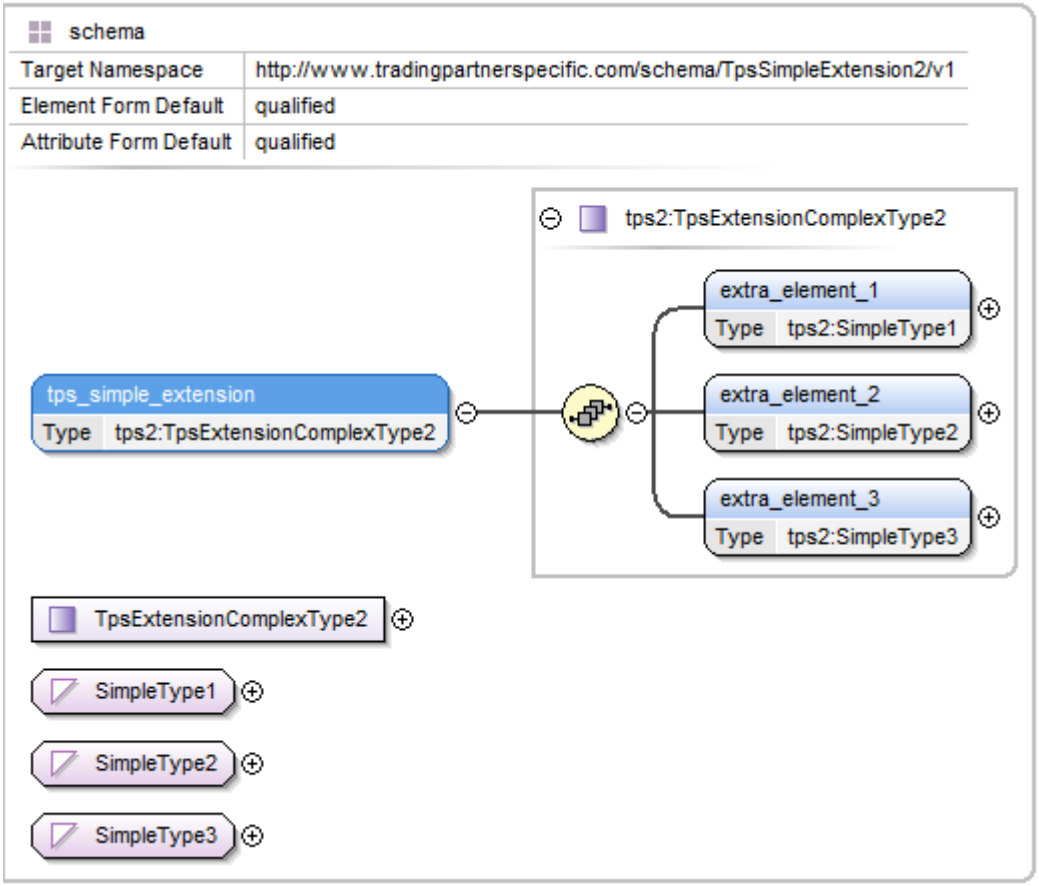
Information related to the use of this mechanism for providing Trading Partner specific data.

Where and when to use	**Where:** Intended for use with Flexible Integration Toolkit (Pre-population), however this can be used with any Criterion Standard. **When:** The most appropriate use of this mechanism is when there is a large amount of Trading Partner specific related data which can be treated in the same way as the FIT Patterns.
Structure supported	Any structure can be included within a separately defined Trading Partner specific Schema.
Message validation	Validation of the structure is provided by the use of the externally defined Trading Partner specific Schema.
Trading Partner agreements	Trading Partners need to agree the structure of the extension before exchanging messages and ensure that they share the externally defined Trading Partner specific Schema.
Advantages	Schema validation for the Trading Partner specific extension is possible with the use of the extension Schema.
Disadvantages	Because of the generic nature of this approach there is effectively no “contract” defining the exact message format. This in turn means that this approach is not

	suitable to be used with code generation tools which generate template web service code from the contract definition provided in the XML Schema and WSDL files.

Below is an example of a message sent in response to a request for Cash Flow and Investment Strategy information for a client where the sender has included Trading Partner specific data by using the separately provided non-Criterion schema called **TpsSimpleExtension2.xsd**.

TpsSimpleExtension2.xsd



To create this message the sender has included:

1. a reference to one iteration of the **TpsSimpleExtension2.xsd** schema (or pattern) in the **<generic_header>** element;
2. the **<tps_simple_extension>** element in the message body holding the Trading Partner specific data.

All Trading Partner specific extension data is name-space prefixed accordingly using the prefix **tps2:**

Example Response Message

```
<?xml version="1.0" encoding="UTF-8"?>
<mgmgresp:message xmlns:gm="http://www.origostandards.com/schema/GenericData/v2"
 xmlns:mgmgresp="http://www.origostandards.com/schema/MaintainGenericData/v2/GetResponse"
 xmlns:resp="http://www.origostandards.com/schema/Response/v1"
```

```
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.origostandards.com/schema/MaintainGenericData/v2/GetResponse GetGenericDataResponseSOAP.xsd">
  <mgmgresp:m_content>
    <mgmgresp:success_ind>true</mgmgresp:success_ind>
    <mgmgresp:generic_data>
      <gm:process>
        <gm:generic_header>
          <gm:data_patterns>
            <gm:data_pattern>
              <gm:name>CashFlow</gm:name>
              <gm:version>http://www.origostandards.com/schema/CashFlow/v1</gm:version>
              <gm:iterations>1</gm:iterations>
            </gm:data_pattern>
            <gm:data_pattern>
              <gm:name>InvestmentStrategy</gm:name>
              <gm:version>http://www.origostandards.com/schema/InvestmentStrategy/v1</gm:version>
              <gm:iterations>1</gm:iterations>
            </gm:data_pattern>
            <gm:data_pattern>
              <gm:name>TpsExtension</gm:name>
              <gm:version>http://www.tradingpartnerspecific.com/schema/TpsSimpleExtension2/v1</gm:version>
              <gm:iterations>1</gm:iterations>
            </gm:data_pattern>
          </gm:data_patterns>
          <gm:business_process>Cash Flow &amp;amp; Investment Strategy</gm:business_process>
        </gm:generic_header>
        <cf:cash_flow xmlns:cf="http://www.origostandards.com/schema/CashFlow/v1"
          xmlns:bc="http://www.origostandards.com/schema/BusinessContacts/v1"
          xsi:schemaLocation="http://www.origostandards.com/schema/CashFlow/v1 CashFlow.xsd">
          <cf:business_contacts>
            <bc:business_contact id="ID000">
              <bc:person>
                <bc:name>
                  <bc:title>Mr</bc:title>
                  <bc:family_name>Smith</bc:family_name>
                </bc:name>
                <bc:gender>Male</bc:gender>
              </bc:person>
            </bc:business_contact>
          </cf:business_contacts>
          <cf:total_expenditure>
            <cf:single_contact business_contact_id="ID000"/>
            <cf:amount cf:currency="GBP">23000.00</cf:amount>
            <cf:frequency>Annually</cf:frequency>
          </cf:total_expenditure>
          <cf:total_income>
            <cf:single_contact business_contact_id="ID000"/>
            <cf:amount cf:currency="GBP">24000.00</cf:amount>
            <cf:frequency>Annually</cf:frequency>
            <cf:net_or_gross>Net</cf:net_or_gross>
          </cf:total_income>
          <cf:consumers>
            <cf:consumer>
              <cf:single_contact business_contact_id="ID000"/>
              <cf:expenditures>
                <cf:expenditure>
                  <cf:expenditure_basis>Essential</cf:expenditure_basis>
                  <cf:expenditure_type>Clothing</cf:expenditure_type>
                  <cf:expenditure_payment>
                    <cf:amount>250.00</cf:amount>
                  </cf:expenditure_payment>
                </cf:expenditure>
```

```
            </cf:expenditures>
          </cf:consumer>
        </cf:consumers>
        <cf:earners>
          <cf:earner>
            <cf:single_contact business_contact_id="ID000"/>
            <cf:employment_incomes>
              <cf:employment_income>
                <cf:income_type>Profit Related Pay</cf:income_type>
                <cf:income_payment>
                  <cf:amount cf:currency="GBP">250.00</cf:amount>
                  <cf:frequency>Weekly</cf:frequency>
                </cf:income_payment>
                <cf:guaranteed_ind>false</cf:guaranteed_ind>
                <cf:pensionable_ind>false</cf:pensionable_ind>
              </cf:employment_income>
            </cf:employment_incomes>
          </cf:earner>
        </cf:earners>
      </cf:cash_flow>
      <is:investment_strategy xmlns:is="http://www.origostandards.com/schema/InvestmentStrategy/v1"
        xsi:schemaLocation="http://www.origostandards.com/schema/InvestmentStrategy/v1 InvestmentStrategy.xsd">
        <is:policyholders>
          <is:policyholder business_contact_id="ID000"/>
        </is:policyholders>
        <is:products>
          <is:product>
            <is:name>Cash ISA</is:name>
            <is:type>ISA</is:type>
          </is:product>
        </is:products>
        <is:contract_reference_number>IS1223123</is:contract_reference_number>
        <is:money_in>
          <is:transfers_in>
            <is:transfer_in trading_instruction_id="ID006"/>
            <is:transfer_in trading_instruction_id="ID007"/>
          </is:transfers_in>
        </is:money_in>
        <is:money_out>
          <is:regular_withdrawals>
            <is:regular_withdrawal trading_instruction_id="ID008">
              <is:payment_basis>Fixed Amount Per Frequency</is:payment_basis>
            </is:regular_withdrawal>
          </is:regular_withdrawals>
          <is:tax_free_cash_payments>
            <is:tax_free_cash trading_instruction_id="ID009">
              <is:max_allowed_ind>true</is:max_allowed_ind>
            </is:tax_free_cash>
          </is:tax_free_cash_payments>
        </is:money_out>
        <is:trading_instructions>
          <is:trading_instruction id="ID006"/>
          <is:trading_instruction id="ID007"/>
          <is:trading_instruction id="ID008"/>
          <is:trading_instruction id="ID009"/>
        </is:trading_instructions>
      </is:investment_strategy>
      <tps2:tps_simple_extension xmlns:tps2="http://www.tradingpartnerspecific.com/schema/TpsSimpleExtension2/v1"
        xsi:schemaLocation="http://www.tradingpartnerspecific.com/schema/TpsSimpleExtension2/v1
TpsSimpleExtension2.xsd">
        <tps2:extra_element_1>Extra data 1</tps2:extra_element_1>
        <tps2:extra_element_2>Extra data 2</tps2:extra_element_2>
```

```
            <tps2:extra_element_3>Extra data 3</tps2:extra_element_3>
          </tps2:tps_simple_extension>
        </gm:process>
      </mgmgresp:generic_data>
    </mgmgresp:m_content>
</mgmgresp:message>
```

NOTE: The **<tps_simple_extension>** element name is arbitrary and only used for demonstration purposes.