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BPM+ Knowledge Package Model and Notation (BKPMN)
Request For Proposal

OMG Document: bmi/2021-03-16

Letters of Intent due: 4 week rule 3Q TC 2021
Submissions due: 4 week rule 3Q TC 2021

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Objective of this RFP

The focus of this Request for Proposal (RFP) is to specify the requirements for the content and structure of a BPM-Plus (BPM+) Knowledge Package. A BPM+ Knowledge Package is considered a “box” or “wrapper” model that contains models developed through the other BPM+ standards (and other artifacts).

What Constitutes a BPM+ Model?

The three OMG standards, Business Process Model and Notation (BPMN); Case Management Model and Notation (CMMN); and Decision Model and Notation (DMN), are often used together to model real-world business situations since they provide a good separation of concerns (for the most part) of Process, Case, and Decision. Thus, the three languages are often spoken about and written about in this context. The origins of the BPM+ acronym was to reduce the burden of referring to all three specifications in speech and in print. A single acronym to refer to the three languages is just simpler.

The idea of BPM+ has since expanded to be a business modeling language stack that will gain new standards as members. The standards that fit into that stack will be languages that address additional areas of concerns and can interact with, in one way or another, with at least one of the other BPM+ languages.

The response to this RFP will be a business modeling standard designed to fit into to the BPM+ stack. The following figure illustrates the relationships between the current and proposed BPM+ standards.

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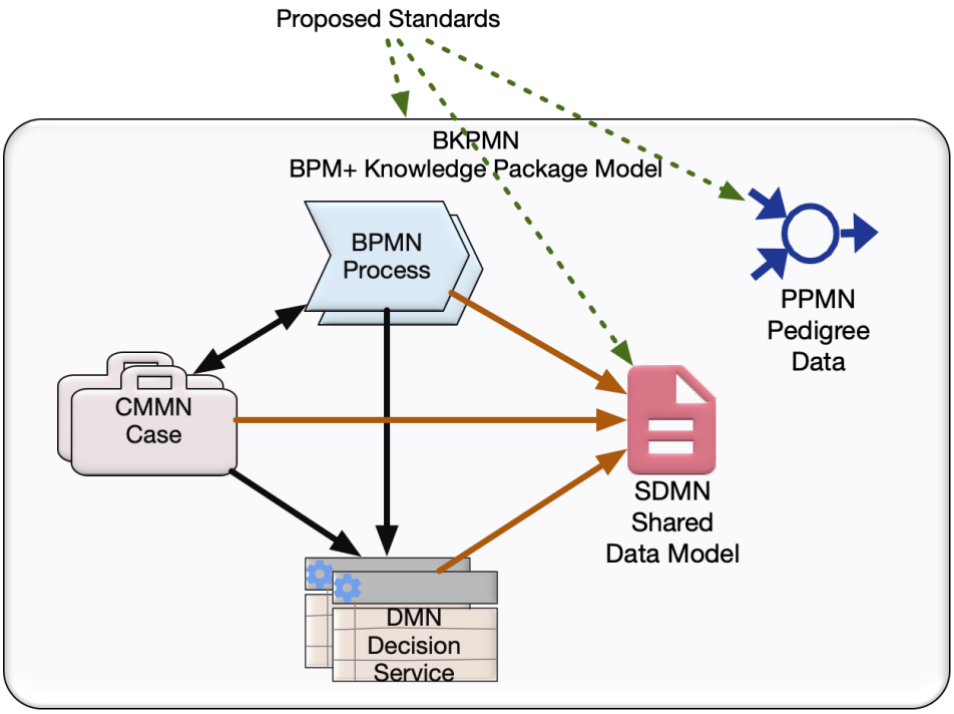

Figure 1. Overview of BKPMN in the Context of BPM+ Standards

Why a BPM+ Knowledge Package?

Based on experience with the current set of BPM+ standards – BPMN, CMMN, and DMN – the need of a packaging mechanism for groups of related BPM+ models was identified (see the use case described in Section 6.1.2 as an illustration of the drivers of this need). For example, using BPM+ models to define a large topic, such as the behaviors of a healthcare clinical guideline (e.g., a hypertension) may result in dozens of individual Process, Case, and Decision models. But there is currently a lack of a mechanism to package the related models with relevant metadata to aid in understanding the content and to aid in the discovery of appropriate BPM+ Knowledge Packages.

A key expectation is that BPM+ Knowledge Packages will be readily distributed to interested parties (i.e., spreading the knowledge). However, unlike a physical package that contains unique physical elements and can be shipped to different locations, a BPM+ Knowledge Package references BPM+ models and other artifacts. These models and artifacts can be re-used by multiple BPM+ Knowledge Packages and, technically, don't exist "inside" the package. Thus, the "shipping" of a BPM+ Knowledge Package consists of the distribution of a set of model files (either XMI or XML). The file for the BPM+ Knowledge Package will include a manifest that identifies the files that contain the BPM+ models or other artifacts. All the files identified in the manifest will be distributed along with the BPM+ Knowledge Package file.

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How this RFP was Designed

Because the main purpose of this RFP was to specify the need for the packaging mechanism for BPM+ models, the details of how the current BPM+ specifications are constructed were studied in detail. As a result of modeling experience and BPM+ specification research, the requirements identified in this RFP define:

- (1) The content of this new business modeling capability, and
- (2) the structural capabilities that ensure that submitted responses will be compatible with the current BPM+ specifications.
  - This will enable tool vendors that already support BPM+ models to implement BKPMN in a manner they are already familiar with.

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1 Introduction

1.1 Goals of OMG

The Object Management Group (OMG) is a software consortium with an international membership of vendors, developers, and end users. Established in 1989, its mission is to help computer users solve enterprise integration problems by supplying open, vendor-neutral portability, interoperability and reusability specifications based on Model Driven Architecture (MDA). MDA defines an approach to IT system specification that separates the specification of system functionality from the specification of the implementation of that functionality on a specific technology platform, and provides a set of guidelines for structuring specifications expressed as models. OMG has published many widely-used specifications such as UML [UML], BPMN [BPMN], MOF [MOF], XMI [XMI], DDS [DDS] and CORBA [CORBA], to name but a few significant ones.

1.2 Organization of this document

The remainder of this document is organized as follows:

Section 2 – *Architectural Context*. Background information on OMG's Model Driven Architecture.

Section 3 – *Adoption Process*. Background information on the OMG specification adoption process.

Section 4 – *Instructions for Submitters*. Explanation of how to make a submission to this RFP.

Section 5 – *General Requirements on Proposals*. Requirements and evaluation criteria that apply to all proposals submitted to OMG.

Section 6 – *Specific Requirements on Proposals*. Problem statement, scope of proposals sought, mandatory requirements, non-mandatory features, issues to be discussed, evaluation criteria, and timetable that apply specifically to this RFP.

Appendix A – References and Glossary Specific to this RFP

Appendix B – General References and Glossary

1.3 Conventions

The key words **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"** and **"need not"** in this document should be interpreted as described in Part 2 of the

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ISO/IEC Directives [ISO2]. These ISO terms are compatible with the same terms in IETF RFC 2119 [RFC2119].

1.4 Contact Information

Questions related to OMG's technology adoption process and any questions about this RFP should be directed to *rfp@omg.org*.

OMG documents and information about the OMG in general can be obtained from the OMG's web site: *https://www.omg.org*. Templates for RFPs (like this document) and other standard OMG documents can be found on the Template Downloads Page: *https://www.omg.org/technology/template_download.htm*

2 Architectural Context

MDA provides a set of guidelines for structuring specifications expressed as models and the mappings between those models. The MDA initiative and the standards that support it allow the same model, specifying business system or application functionality and behavior, to be realized on multiple platforms. MDA enables different applications to be integrated by explicitly relating their models; this facilitates integration and interoperability, and supports system evolution (deployment choices) as platform technologies change. The three primary goals of MDA are portability, interoperability and reusability.

Portability of any subsystem is relative to the subsystems on which it depends. The collection of subsystems that a given subsystem depends upon is often loosely called the *platform*, which supports that subsystem. Portability – and reusability – of such a subsystem is enabled if all the subsystems that it depends upon use standardized interfaces (APIs) and usage patterns.

MDA provides a pattern comprising a portable subsystem that is able to use any one of multiple specific implementations of a platform. This pattern is repeatedly usable in the specification of systems. The five important concepts related to this pattern are:

1. *Model* – A model is a representation of a part of the function, structure and/or behavior of an application or system. A representation is said to be formal when it is based on a language that has a well-defined form ("syntax"), meaning ("semantics"), and possibly rules of analysis, inference, or proof for its constructs. The syntax may be graphical or textual. The semantics might be defined, more or less formally, in terms of things observed in the world being described (e.g. message sends and replies, object states and state changes, etc.), or by translating higher-level language

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constructs into other constructs that have a well-defined meaning. The (non-mandatory) rules of inference define what unstated properties can be deduced from explicit statements in the model. In MDA, a representation that is not formal in this sense is not a model. Thus, a diagram with boxes and lines and arrows that is not supported by a definition of the meaning of a box, and the meaning of a line and of an arrow is not a model – it is just an informal diagram.

2. *Platform* – A set of subsystems/technologies that provide a coherent set of functionality through interfaces and specified usage patterns that any subsystem that depends on the platform can use without concern for the details of how the functionality provided by the platform is implemented.

3. *Platform Independent Model (PIM)* – A model of a subsystem that contains no information specific to the platform, or the technology that is used to realize it.

4. *Platform Specific Model (PSM)* – A model of a subsystem that includes information about the specific technology that is used in the realization of that subsystem on a specific platform, and hence possibly contains elements that are specific to the platform.

5. *Mapping* – Specification of a mechanism for transforming the elements of a model conforming to a particular metamodel into elements of another model that conforms to another (possibly the same) metamodel. A mapping may be expressed as associations, constraints, rules or templates with parameters that to be assigned during the mapping, or other forms yet to be determined.

OMG adopts standard specifications of models that exploit the MDA pattern to facilitate portability, interoperability and reusability, either through *ab initio* development of standards or by reference to existing standards. Some examples of OMG adopted specifications are:

1. *Languages* – e.g. IDL for interface specification [IDL], UML for model specification [UML], BPMN for Business Process specification [BPMN], etc.

2. *Mappings* – e.g. Mapping of OMG IDL to specific implementation languages (CORBA PIM to Implementation Language PSMs), UML Profile for EDOC (PIM) to CCM (CORBA PSM) and EJB (Java PSM), CORBA (PSM) to COM (PSM) etc.

3. *Services* – e.g. Naming Service [NS], Transaction Service [OTS], Security Service [SEC], Trading Object Service [TOS] etc.

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4. *Platforms* – e.g. CORBA [CORBA], DDS [DDS]

5. *Protocols* – e.g. GIOP/IIOP [CORBA] (both structure and exchange protocol), DDS Interoperability Protocol [DDSI].

6. *Domain Specific Standards* – e.g. Model for Performance-Driven Government [MPG], Single Nucleotide Polymorphisms specification [SNP], TACSIT Controller Interface specification [TACSIT].

For an introduction to MDA, see [MDAa]. For a discourse on the details of MDA please refer to [MDAc]. To see an example of the application of MDA see [MDAb]. For general information on MDA, see [MDAd].

Object Management Architecture (OMA) is a distributed object computing platform architecture within MDA that is related to ISO's Reference Model of Open Distributed Processing RM-ODP [RM-ODP]. CORBA and any extensions to it are based on OMA. For information on OMA see [OMA].

3 Adoption Process

3.1 Introduction

OMG decides which specifications to adopt via votes of its Membership. The specifications selected should satisfy the architectural vision of MDA. OMG bases its decisions on both business and technical considerations. Once a specification is adopted by OMG, it is made available for use by both OMG members and non-members alike, at no charge.

This section 3 provides an extended summary of the RFP process. For more detailed information, see the *Policies and Procedures of the OMG Technical Process* [P&P], specifically Section 4.2, and the *OMG Hitchhiker's Guide* [Guide]. In case of any inconsistency between this document or the Hitchhiker's Guide and the Policies and Procedures, the P&P is always authoritative. All IPR-related matters are governed by OMG's *Intellectual Property Rights Policy* [IPR].

3.2 The Adoption Process in detail

3.2.1 Development and Issuance of RFP

RFPs, such as this one, are drafted by OMG Members who are interested in the adoption of an OMG specification in a particular area. The draft RFP is presented to the appropriate TF, discussed and refined, and when ready is

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recommended for issuance. If endorsed by the Architecture Board, the RFP may then be issued as an OMG RFP by a TC vote.

Under the terms of OMG's Intellectual Property Rights Policy [IPR], every RFP shall include a statement of the IPR Mode under which any resulting specification will be published. To achieve this, RFP authors choose one of the three allowable IPR modes specified in [IPR] and include it in the RFP – see section 6.10.

3.2.2 Letter of Intent (LOI)

Each OMG Member organisation that intends to make a Submission in response to any RFP (including this one) shall submit a Letter of Intent (LOI) signed by an officer on or before the deadline specified in the RFP's timetable (see section 6.11). The LOI provides public notice that the organisation may make a submission, but does not oblige it to do so.

3.2.3 Voter Registration

Any interested OMG Members, other than Trial, Press and Analyst members, may participate in Task Force voting related to this RFP. If the RFP timetable includes a date for closing the voting list (see section 6.11), or if the Task Force separately decides to close the voting list, then only OMG Member that have registered by the given date and those that have made an Initial Submission may vote on Task Force motions related to this RFP.

Member organizations that have submitted an LOI are automatically registered to vote in the Task Force. Technical Committee votes are not affected by the Task Force voting list – all Contributing and Domain Members are eligible to vote in DTC polls relating to DTC RFPs, and all Contributing and Platform Members are eligible to vote in PTC polls on PTC RFPs.

3.2.4 Initial Submissions

Initial Submissions shall be made electronically on or before the Initial Submission deadline, which is specified in the RFP timetable (see section 6.11), or may later be adjusted by the Task Force. Submissions shall use the OMG specification template [TMPL], with the structure set out in section 4.9. Initial Submissions shall be written specifications capable of full evaluation, and not just a summary or outline. Submitters normally present their proposals to the Task Force at the first TF meeting after the submission deadline. Making a submission incurs obligations under OMG's IPR policy – see [IPR] for details.

An Initial Submission shall not be altered once the Initial Submission deadline has passed. The Task Force may choose to recommend an Initial Submission, unchanged, for adoption by OMG; however, instead Task Force members

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usually offer comments and feedback on the Initial Submissions, which submitters can address (if they choose) by making a later Revised Submission.

The goals of the Task Force's Submission evaluation are:

- Provide a fair and open process
- Facilitate critical review of the submissions by OMG Members
- Provide feedback to submitters enabling them to address concerns in their revised submissions
- Build consensus on acceptable solutions
- Enable voting members to make an informed selection decision

Submitters are expected to actively contribute to the evaluation process.

3.2.5 Revised Submissions

Revised Submissions are due by the specified deadline. Revised Submissions cannot be altered once their submission deadline has passed. Submitters again normally present their proposals at the next meeting of the TF after the deadline. If necessary, the Task Force may set a succession of Revised Submission deadlines. Submitters choose whether or not to make Revised Submissions - if they decide not to, their most recent Submission is carried forward, unless the Submitter explicitly withdraws from the RFP process.

The evaluation of Revised Submissions has the same goals listed above.

3.2.6 Selection Votes

When the Task Force's voters believe that they sufficiently understand the relative merits of the available Submissions, a vote is taken to recommend a submission to the Task Force's parent Technical Committee. The Architecture Board reviews the recommended Submission for MDA compliance and technical merit. Once the AB has endorsed it, members of the relevant TC vote on the recommended Submission by email. Successful completion of this vote moves the recommendation to OMG's Board of Directors (BoD).

3.2.7 Business Committee Questionnaire

Before the BoD makes its final decision on turning a Technical Committee recommendation into an OMG published specification, it asks its Business Committee to evaluate whether implementations of the specification will be publicly available. To do this, the Business Committee will send a Questionnaire [BCQ] to every OMG Member listed as a Submitter on the recommended Submission. Members that are not Submitters can also complete a Business Committee Questionnaire for the Submission if they choose.

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If no organization commits to make use of the specification, then the BoD will typically not act on the recommendation to adopt it – so it is very important that submitters respond to the BCQ.

Once the Business Committee has received satisfactory BCQ responses, the Board takes the final publication vote. A Submission that has been adopted by the Board is termed an *Alpha Specification*.

At this point the RFP process is complete.

3.2.8 Finalization & Revision

Any specification adopted by OMG by any mechanism, whether RFP or otherwise, is subject to Finalisation. A Finalization Task Force (FTF) is chartered by the TC that recommended the Specification; its task is to correct any problems reported by early users of the published specification. The FTF first collaborates with OMG's Technical Editor to prepare a cleaned-up version of the Alpha Specification with submission-specific material removed. This is the Beta1 specification, and is made publicly available via OMG's web site. The FTF then works through the list of bug reports ("issues") reported by users of the Beta1 specification, to produce a Finalisation Report and another Beta specification (usually Beta2), which is a candidate for Formal publication. Once endorsed by the AB and adopted by the relevant TC and BoD, this is published as the final, Formal Specification.

Long-term maintenance of OMG specifications is handled by a sequence of Revision Task Forces (RTFs), each one chartered to rectify any residual problems in the most-recently published specification version. For full details, see P&P section 4.4 [P&P].

4 Instructions for Submitters

4.1 OMG Membership

To submit to an RFP issued by the Platform Technology Committee an organisation shall maintain either Platform or Contributing OMG Membership from the date of the initial submission deadline, while to submit to a Domain RFP an organisation shall maintain either a Contributing or Domain membership.

4.2 Intellectual Property Rights

By making a Submission, an organisation is deemed to have granted to OMG a perpetual, nonexclusive, irrevocable, royalty-free, paid up, worldwide license to

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copy and distribute the document and to modify the document and distribute copies of the modified version, and to allow others to do the same. Submitter(s) shall be the copyright owners of the text they submit, or have sufficient copyright and patent rights from the copyright owners to make the Submission under the terms of OMG's IPR Policy. Each Submitter shall disclose the identities of all copyright owners in its Submission.

Each OMG Member that makes a written Submission in response to this RFP shall identify patents containing Essential Claims that it believes will be infringed if that Submission is included in an OMG Formal Specification and implemented.

By making a written Submission to this RFP, an OMG Member also agrees to comply with the Patent Licensing terms set out in section 6.10.

This section 4.2 is neither a complete nor an authoritative statement of a submitter's IPR obligations – see [IPR] for the governing document for all OMG's IPR policies.

4.3 Submission Effort

An RFP submission may require significant effort in terms of document preparation, presentations to the issuing TF, and participation in the TF evaluation process. OMG is unable to reimburse submitters for any costs in conjunction with their submissions to this RFP.

4.4 Letter of Intent

Every organisation intending to make a Submission against this RFP shall submit a Letter of Intent (LOI) signed by an officer on or before the deadline listed in section 6.11, or as later varied by the issuing Task Force.

The LOI should designate a single contact point within the submitting organization for receipt of all subsequent information regarding this RFP and the submission. The name of this contact will be made available to all OMG members. LOIs shall be sent by email, fax or paper mail to the “RFP Submissions Desk” at the OMG address shown on the first page of this RFP.

A suggested template for the Letter of Intent is available at https://doc.omg.org/loi [LOI].

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4.5 Business Committee terms

This section contains the text of the Business Committee RFP attachment concerning commercial availability requirements placed on submissions. This attachment is available separately as OMG document omg/12-12-03.

4.5.1 *Introduction*

OMG wishes to encourage rapid commercial adoption of the specifications it publishes. To this end, there must be neither technical, legal nor commercial obstacles to their implementation. Freedom from the first is largely judged through technical review by the relevant OMG Technology Committees; the second two are the responsibility of the OMG Business Committee. The BC also looks for evidence of a commitment by a submitter to the commercial success of products based on the submission.

4.5.2 Business Committee evaluation criteria

4.5.2.1 Viable to implement across platforms

While it is understood that final candidate OMG submissions often combine technologies before they have all been implemented in one system, the Business Committee nevertheless wishes to see evidence that each major feature has been implemented, preferably more than once, and by separate organisations. Pre-product implementations are acceptable. Since use of OMG specifications should not be dependent on any one platform, cross-platform availability and interoperability of implementations should be also be demonstrated.

4.5.2.2 Commercial availability

In addition to demonstrating the existence of implementations of the specification, the submitter must also show that products based on the specification are commercially available, or will be within 12 months of the date when the specification was recommended for adoption by the appropriate Task Force. Proof of intent to ship product within 12 months might include:

- A public product announcement with a shipping date within the time limit.
- Demonstration of a prototype implementation and accompanying draft user documentation.

Alternatively, and at the Business Committee's discretion, submissions may be adopted where the submitter is not a commercial software provider, and therefore will not make implementations commercially available. However, in this case the BC will require concrete evidence of two or more independent

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implementations of the specification being used by end-user organisations as part of their businesses.

Regardless of which requirement is in use, the submitter must inform the OMG of completion of the implementations when commercially available.

4.5.2.3 Access to Intellectual Property Rights

OMG will not adopt a specification if OMG is aware of any submitter, member or third party which holds a patent, copyright or other intellectual property right (collectively referred to in this policy statement as "IPR") which might be infringed by implementation or recommendation of such specification, unless OMG believes that such IPR owner will grant an appropriate license to organizations (whether OMG members or not) which wish to make use of the specification. It is the goal of the OMG to make all of its technology available with as few impediments and disincentives to adoption as possible, and therefore OMG strongly encourages the submission of technology as to which royalty-free licenses will be available.

The governing document for all intellectual property rights (“IPR”) policies of Object Management Group is the Intellectual Property Rights statement, available at: https://doc.omg.org/ipr. It should be consulted for the authoritative statement of the submitter's patent disclosure and licensing obligations.

4.5.2.4 Publication of the specification

Should the submission be adopted, the submitter must grant OMG (and its sublicensees) a worldwide, royalty-free licence to edit, store, duplicate and distribute both the specification and works derived from it (such as revisions and teaching materials). This requirement applies only to the written specification, not to any implementation of it. Please consult the Intellectual Property Rights statement (https://doc.omg.org/ipr) for the authoritative statement of the submitter's copyright licensing obligations.

4.5.2.5 Continuing support

The submitter must show a commitment to continue supporting the technology underlying the specification after OMG adoption, for instance by showing the BC development plans for future revisions, enhancement or maintenance.

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4.6 Responding to RFP items

4.6.1 Complete proposals

Submissions should propose full specifications for all of the relevant requirements detailed in Section 6 of this RFP. Submissions that do not present complete proposals may be at a disadvantage.

Submitters are encouraged to include any non-mandatory features listed in Section 6.

4.6.2 Additional specifications

Submissions may include additional specifications for items not covered by the RFP and which they believe to be necessary. Information on these additional items should be clearly distinguished. Submitters shall give a detailed rationale for why any such additional specifications should also be considered for adoption. Submitters should note that a TF is unlikely to consider additional items that are already on the roadmap of an OMG TF, since this would pre-empt the normal adoption process.

4.6.3 Alternative approaches

Submitters may provide alternative RFP item definitions, categorizations, and groupings so long as the rationale for doing so is clearly stated. Equally, submitters may provide alternative models for how items are provided if there are compelling technological reasons for a different approach.

4.7 Confidential and Proprietary Information

The OMG specification adoption process is an open process. Responses to this RFP become public documents of the OMG and are available to members and non-members alike for perusal. No confidential or proprietary information of any kind will be accepted in a submission to this RFP.

4.8 Proof of Concept

Submissions shall include a “proof of concept” statement, explaining how the submitted specifications have been demonstrated to be technically viable. The technical viability has to do with the state of development and maturity of the technology on which a submission is based. This is not the same as commercial availability. Proof of concept statements can contain any information deemed relevant by the submitter; for example:

> “This specification has completed the design phase and is in the process of being prototyped.”

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> "An implementation of this specification has been in beta-test for 4 months."
>
> "A named product (with a specified customer base) is a realization of this specification."

It is incumbent upon submitters to demonstrate the technical viability of their proposal to the satisfaction of the TF managing the evaluation process. OMG will favor proposals based on technology for which sufficient relevant experience has been gained.

4.9 Submission Format

4.9.1 General

- Submissions that are concise and easy to read will inevitably receive more consideration.
- Submitted documentation should be confined to that directly relevant to the items requested in the RFP.
- To the greatest extent possible, the submission should follow the document structure set out in "ISO/IEC Directives, Part 2 – Rules for the structure and drafting of International Standards" [ISO2]. An OMG specification template is available to make it easier to follow these guidelines.
- The key words **"shall"**, **"shall not"**, **"should"**, **"should not"**, **"may"** and **"need not"** shall be used as described in Part 2 of the ISO/IEC Directives [ISO2]. These ISO terms are compatible with the same terms in IETF RFC 2119 [RFC2119]. However, the RFC 2119 terms **"must"**, **"must not"**, **"optional"**, **"required"**, **"recommended"** and **"not recommended"** shall not be used (even though they are permitted under RFC2119).

4.9.2 Mandatory Outline

All submissions shall use the following structure, based on the OMG Specification template [TEMPL]:

Section 0 of the submission shall be used to provide all non-normative supporting material relevant to the evaluation of the proposed specification, including:

- The full name of the submission
- A complete list of all OMG Member(s) making the submission, with a named contact individual for each
- The acronym proposed for the specification (e.g. UML, CORBA)

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- The name and OMG document number of the RFP to which this is a response
- The OMG document number of the main submission document
- Overview or guide to the material in the submission
- Statement of proof of concept (see 4.8)
- If the proposal does not satisfy any of the general requirements stated in Section 5, a detailed rationale explaining why
- Discussion of each of the “Issues To Be Discussed” identified in Section 6.
- An explanation of how the proposal satisfies the specific requirements and (if applicable) requests stated in Section 6.
- If adopting the submission requires making changes to already-adopted OMG specifications, include a list of those changes in a clearly-labelled subsection in Section 0. Identify exactly which version(s) of which OMG specification(s) shall be amended, and include the list of precise wording changes that shall be made to that specification.

Section 1 and subsequent sections of the submission shall contain the normative specification that the Submitter(s) is/are proposing for adoption by OMG, including:

- Scope of the proposed specification
- Overall design rationale
- Conformance criteria for implementations of the proposed specification, clearly stating the features that all conformant implementations shall support, and any features that implementations may support, but which are not mandatory.
- A list of the normative references that are used by the proposed specification
- A list of terms that are used in the proposed specification, with their definitions
- A list of any special symbols that are used in the proposed specification, together with their significance
- The proposed specification itself

Section 0 will be deleted from any specification that OMG adopts and publishes. Therefore Section 0 of the submission shall contain no normative material (other than any instructions to change existing specifications; ensuring that these are implemented is the responsibility of the FTF that finalises the specification, before it deletes section 0). Any non-normative material outside section 0 shall be explicitly identified.

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The main submission document and any models or other machine-interpretable files accompanying it shall be listed in an inventory file conforming to the inventory template [INVENT].

The submission shall include a copyright waiver in a form acceptable to OMG. One acceptable form is:

> "Each of the entities listed above: (i) grants to the Object Management Group, Inc. (OMG) a nonexclusive, royalty-free, paid up, worldwide license to copy and distribute this document and to modify this document and distribute copies of the modified version, and (ii) grants to each member of the OMG a nonexclusive, royalty-free, paid up, worldwide license to make up to fifty (50) copies of this document for internal review purposes only and not for distribution, and (iii) has agreed that no person shall be deemed to have infringed the copyright in the included material of any such copyright holder by reason of having used any OMG specification that may be based hereon or having conformed any computer software to such specification."

Other forms of copyright waiver may only be used if approved by OMG legal counsel beforehand.

4.10 How to Submit

Submitters should send an electronic version of their submission to the *RFP Submissions Desk (rfp@omg.org)* at OMG Headquarters by 5:00 PM U.S. Eastern Standard Time (22:00 GMT) on the day of the Initial and Revised Submission deadlines. Acceptable formats are Adobe FrameMaker source, ISO/IEC 26300:2006 (OpenDoc 1.1), OASIS DocBook 4.x (or later) and ISO/IEC 29500:2008 (OOXML, .docx).

Submitters should ensure that they receive confirmation of receipt of their submission.

5 General Requirements on Proposals

5.1 Requirements

5.1.1 Use of modeling languages

Submitters are encouraged to express models using OMG modeling languages such as UML, MOF, CWM and SPEM (subject to any further constraints on the types of the models and modeling technologies specified in Section 6 of this RFP). Submissions containing models expressed using OMG modeling languages shall be accompanied by an OMG XMI [XMI] representation of the models (including a machine-readable copy). A best effort should be made to

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provide an OMG XMI representation even in those cases where models are expressed via non-OMG modeling languages.

5.1.2 PIMs & PSMs

Section 6 of this RFP specifies whether PIM(s), PSM(s), or both are being solicited. If proposals specify a PIM and corresponding PSM(s), then the rules specifying the mapping(s) between the PIM and PSM(s) shall either be identified by reference to a standard mapping or specified in the proposal. In order to allow possible inconsistencies in a proposal to be resolved later, proposals shall identify whether it's the mapping technique or the resulting PSM(s) that shall be considered normative.

5.1.3 Complete submissions

Proposals shall be *precise* and *functionally complete*. Any relevant assumptions and context necessary to implement the specification shall be provided.

5.1.4 Reuse

Proposals shall *reuse* existing OMG and other standard specifications in preference to defining new models to specify similar functionality.

5.1.5 Changes to existing specifications

Each proposal shall justify and fully specify any *changes or extensions* to existing OMG specifications necessitated by adopting that proposal. In general, OMG favors proposals that are *upwards compatible* with existing standards and that minimize changes and extensions to existing specifications.

5.1.6 Minimalism

Proposals shall factor out functionality that could be used in different contexts and specify their models, interfaces, etc. separately. Such *minimalism* fosters re-use and avoids functional duplication.

5.1.7 Independence

Proposals shall use or depend on other specifications only where it is actually necessary. While re-use of existing specifications to avoid duplication will be encouraged, proposals should avoid gratuitous use.

5.1.8 Compatibility

Proposals shall be *compatible* with and *usable* with existing specifications from OMG and other standards bodies, as appropriate. Separate specifications offering distinct functionality should be usable together where it makes sense to do so.

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5.1.9 Implementation flexibility

Proposals shall preserve maximum *implementation flexibility*. Implementation descriptions should not be included and proposals shall not constrain implementations any more than is necessary to promote interoperability.

5.1.10 Encapsulation

Proposals shall allow *independent implementations* that are *substitutable* and *interoperable*. An implementation should be replaceable by an alternative implementation without requiring changes to any client.

5.1.11 Security

In order to demonstrate that the specification proposed in response to this RFP can be made secure in environments that require security, answers to the following questions shall be provided:

- What, if any, security-sensitive elements are introduced by the proposal?
- Which accesses to security-sensitive elements should be subject to security policy control?
- Does the proposed service or facility need to be security aware?
- What default policies (e.g., for authentication, audit, authorization, message protection etc.) should be applied to the security sensitive elements introduced by the proposal? Of what security considerations should the implementers of your proposal be aware?

The OMG has adopted several specifications, which cover different aspects of security and provide useful resources in formulating responses. [SEC] [RAD].

5.1.12 Internationalization

Proposals shall specify the degree of internationalization support that they provide. The degrees of support are as follows:

a) Uncategorized: Internationalization has not been considered.

b) Specific to <region name>: The proposal supports the customs of the specified region only, and is not guaranteed to support the customs of any other region. Any fault or error caused by requesting the services outside of a context in which the customs of the specified region are being consistently followed is the responsibility of the requester.

c) Specific to <multiple region names>: The proposal supports the customs of the specified regions only, and is not guaranteed to support the customs of any other regions. Any fault or error caused by requesting the services outside

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of a context in which the customs of at least one of the specified regions are being consistently followed is the responsibility of the requester.

d) Explicitly not specific to <region(s) name>: The proposal does not support the customs of the specified region(s). Any fault or error caused by requesting the services in a context in which the customs of the specified region(s) are being followed is the responsibility of the requester.

5.2 Evaluation criteria

Although the OMG adopts model-based specifications and not implementations of those specifications, the technical viability of implementations will be taken into account during the evaluation process. The following criteria will be used:

5.2.1 Performance

Potential implementation trade-offs for performance will be considered.

5.2.2 Portability

The ease of implementation on a variety of systems and software platforms will be considered.

5.2.3 Securability

The answer to questions in section 5.1.11 shall be taken into consideration to ascertain that an implementation of the proposal is securable in an environment requiring security.

5.2.4 Conformance: Inspectability and Testability

The adequacy of proposed specifications for the purposes of conformance inspection and testing will be considered. Specifications should provide sufficient constraints on interfaces and implementation characteristics to ensure that conformance can be unambiguously assessed through both manual inspection and automated testing.

5.2.5 Standardized Metadata

Where proposals incorporate metadata specifications, OMG standard XMI metadata [XMI] representations should be provided.

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6 Specific Requirements on Proposals

6.1 Problem Statement

The motivation for defining the current RFP for a BPM+ Knowledge Package derived from work being done for the development healthcare clinical guidelines using the current BPM+ standards. The current set of BPM+ standards are: BPMN, CMMN, and DMN. The BPM+ Health organization has published the "Field Guide to Shareable Clinical Pathways". The Field Guide provides the methods and style of modeling with BPMN, CMMN, and DMN for a more formal definition of healthcare clinical guidelines. A Shareable Clinical Pathway is a healthcare domain-specific BPM+ Knowledge Package Model.

During the development of the BPM+ Use Cases that supported the Field Guide, it became apparent that there is no concrete model or structure that is available that would allow developers to create, discover, and distribute a coherent package that is a Shareable Clinical Pathway. Thus, this RFP has been developed to solicit a solution that will allow developers create a BPM+ Knowledge Package consistent with the requirements listed below.

6.1.1 What Constitutes a BPM+ Model

The three OMG standards BPMN, CMMN, and DMN are often used together to model real-world business situations since they provide a good separation of concerns (for the most part) of Process, Case, and Decision. Thus, the three languages are often spoken about and written about in this context. The origins of the BPM+ acronym was to reduce the burden of referring to each of the three specifications in speech and in print. A single acronym to refer to the three languages is just simpler.

The idea of BPM+ has since expanded to be a conceptual modeling language stack that will gain new standards as members. The standards that fit into that stack will be languages that address separate areas of concerns and can interact with, in one way or another, with at least one of the other BPM+ languages.

The response to this RFP will be a modeling standard designed to fit into to the BPM+ stack. The following figure illustrates the relationships between the current and proposed BPM+ standards.

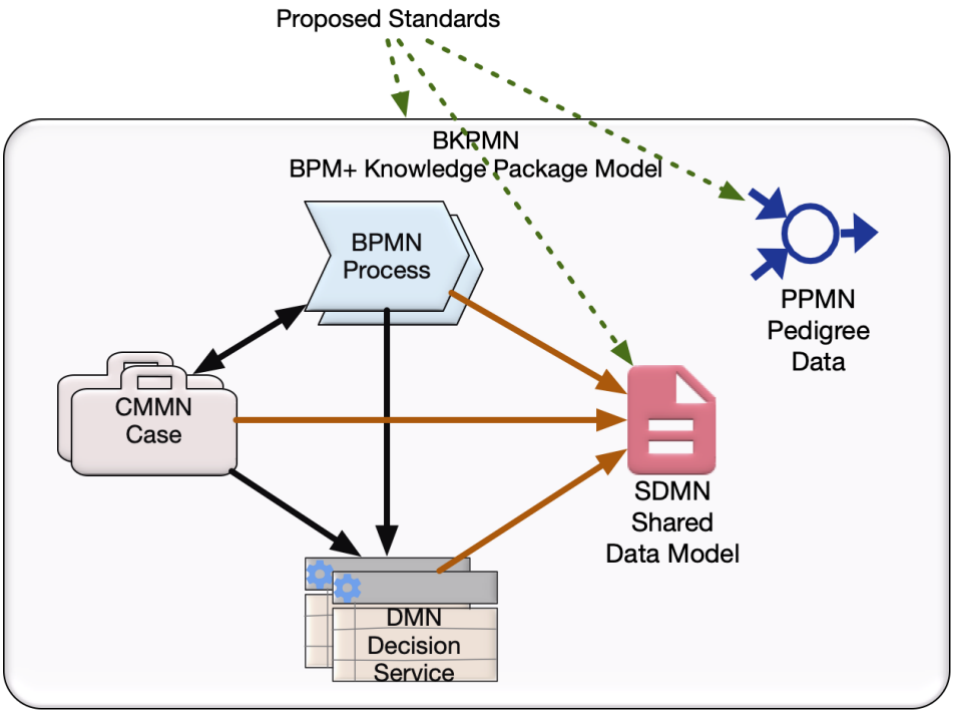

Figure 2. Overview of BKPMN in the Context of BPM+ Standards

6.1.2 Use Case: Hello Patient

This use case is an example of how BKPMN can be used in the context of the other BPM+ standards. It was developed in the context of the healthcare domain, but does not imply that BKPMN is a healthcare domain standard.

The BPM+ Health community has been defining Shareable Clinical Pathways by using the current BPM+ standards to define formal and executable versions of current clinical guidelines (e.g., for hypertension, chronic kidney disease, etc.). Current clinical guidelines are usually found in printed or PDF documents and they contain vague and often confusing semantics leading to a great variability in how the guidelines are understood and performed.

This section describes a simple use case that was developed by the BPM+ Health community. At that time there was no concept of a BPM+ Knowledge Packages or a Shared Data Model. The work on this and other use cases was instrumental in identifying the need and requirements for a BPM+ Knowledge Package and a Shared Data Model (which is not discussed in this RFP).

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Organizing BPM+ Models (A BPM+ Knowledge Package)

The use case defined the Processes, Cases, and Decision Services that are involved in managing a visit to a doctor's office. Note that these models were intended to be illustrative rather than an official, comprehensive healthcare guideline.

The following table lists the major BPM+ model elements that made up the use case.

Table 1. List of BPM+ Models for the Hello Patient Use Case

Cases	Decision Services	Processes
1. Hello Patient 2. Perform Examination 3. Perform Additional Test for Physical	1. What is Treatment Plan? 2. What is Patient's BMI Category? 3. Weight Counseling Suggested? 4. What is Blood Pressure Rating? 5. Physical Required?	1. Manage Hello Patient Triggers… 2. Evaluate Applicability 3. Manage Patient Visit 4. Check In Patient 5. Take Vital Signs 6. Check Out Patient 7. Update Appointment Information 8. Ask Screening Questions 9. Manage Counseling Referral

A larger use case for "Antenatal Care" was developed and contained more models than listed above. For that use case there were 9 Cases, 15 Decision Services, and 28 Processes.

Reviewing one of the models listed in the table above does not provide the overall scope and context of the set of models in the use case. While it may be possible to trace through the connections between the BPM+ models, that tracing still does provide the proper context.

This lack of perspective resulted in a new type of diagram included with the use case. It is referred to as a Knowledge Diagram in this RFP. The diagram provides graphical representations of the BPM+ models and draws connectors to represent how the models can be traced through their connections. The following figure displays the Knowledge Diagram for the Hello Patient use case. Note that all the items listed in Table 1, above, have diagram elements associated with them. There are different notations for Processes, Cases, and Decision Services.

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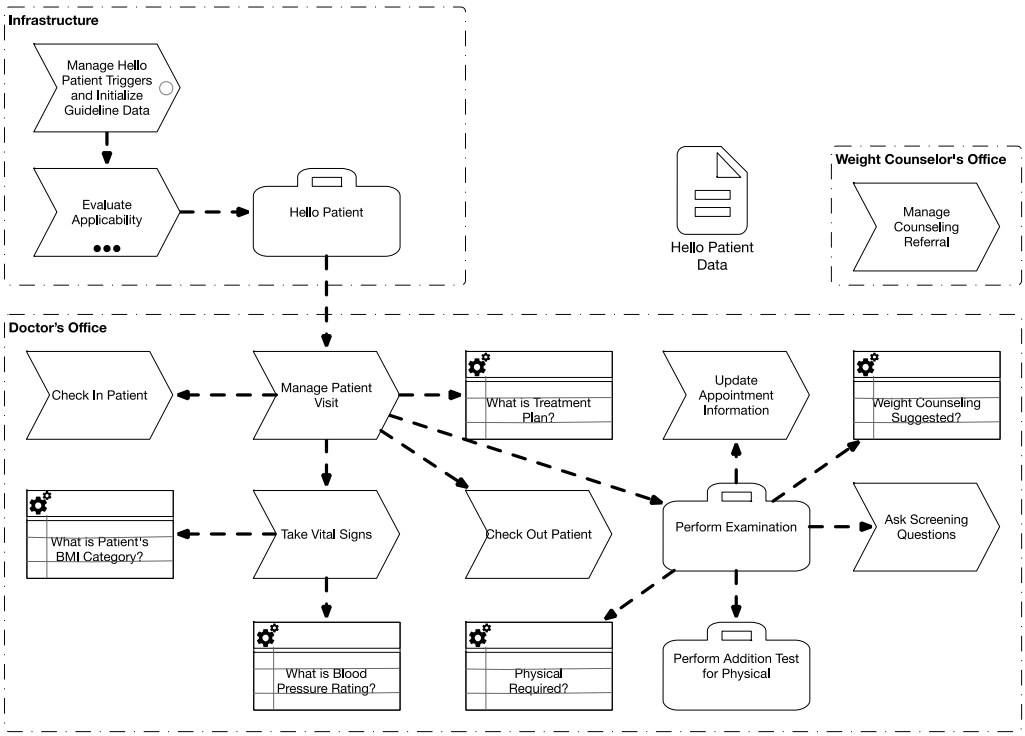

Figure 3. Example of a BPM+ Knowledge Diagram

This diagram is just an example, and the exact notation is not a requirement for this RFP, but there are requirements as to the type of elements, and how they are connected, listed below.

Note that the development of the Knowledge Diagram for the use cases was an indication that something else was needed to fully document the contexts of a set of BPM+ created for a specific topic. This and other factors led to the requirements for a BPM+ Knowledge Package (the subject of this RFP).

Organizing BPM+ Data Elements (A Shared Data Model)

Several elements in BPM+ Models are intended to store or convey data required for the execution of those Models. BPMN has Data Objects, Data Inputs, Data Outputs, Data Stores, and Properties. CMMN has Case File Items. DMN has Information Items that are used for Data Inputs and Decisions. The Hello Patient use case employed many of these types of data elements within its BPM+ models. The following table lists those data elements used within the set of BPM+ models for the Hello Patient use case.

Table 2. List of Data Elements used by the BPM+ Models in the Hello Patient Use Case

Case Data	Decision Service Data	Process Data
1. Blood Pressure	1. Blood Pressure	1. Blood Pressure

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2. Blood Pressure Goal	**2. Blood Pressure Goal**	**2. Blood Pressure Goal**
3. BMI Category	3. Blood Pressure Rating	3. Blood Pressure Rating
4. Encounter	**4. BMI Category**	**4. BMI Category**
5. Exam Data	5. Demographics	5. Demographics
6. Guideline Info	**6. Exam Data**	6. Encounter
7. Health Conditions	**7. Health Conditions**	**7. Exam Data**
8. Medication	**8. Medication**	**8. Health Conditions**
9. Medication Tolerances	**9. Medication Tolerances**	9. Loop Counter
10. Pathway Goals	10. Pathway Goals	**10. Medication**
11. Patient Health Record	11. Patient Complaints	**11. Medication Tolerances**
12. Referral	**12. Patient Health Record**	12. Pathway Goals
13. Treatment Plan	**13. Referral**	13. Patient Complaints
14. Vital Signs and Measurements	**14. Treatment Plan**	**14. Patient Health Record**
15. Weight Counseling Referral	15. Treatment Choice	**15. Referral**
16. Weight Counseling Referral Choice	**16. Vital Signs and Measurements**	**16. Treatment Plan**
	17. Weight Counseling Referral	17. Treatment Choice
	18. Weight Counseling Referral Choice	**18. Vital Signs and Measurements**
		19. Weight Counseling Referral

Note that the data elements listed in **bold** in the table are those that appear in all three types of BPM+ models. The other data elements appear in at least two of the model types.

The set of data elements listed in the above table reflect those data elements that are necessary for only the context of this use case (Hello Patient). They do not represent all the data elements that a doctor's office may require for all of its operations – let alone all the data elements required for the healthcare domain. The use case only specified the data elements that are shared across the models for its particular situation. Hence, we refer to sets of data elements used in this way as "Shared Data".

Since the use case employed all three different types of BPM+ models (Process, Case, and Decision Service), the common data elements of the use case are shared and distributed across the three types of models. While there are some technical differences between how data is structured and used across the BPM+ specifications, at the logical level, they all play the same role within the respective languages. This is evident when a specific conceptual data element

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(e.g., “Vital Signs and Measures”) can be included in all three BPM+ modeling languages (see figure below). That is, the same data element (and its values during runtime) can be passed from a CMMN Case to a BPMN Process and then be used in a DMN Decision.

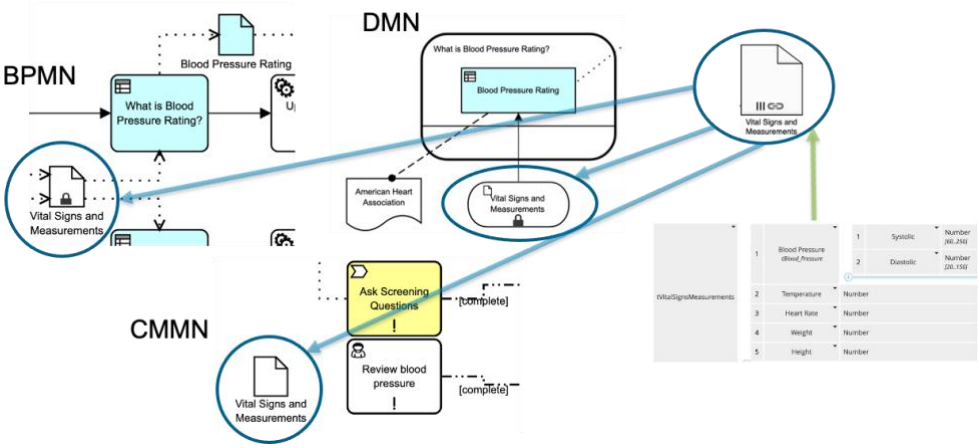

Figure 4. Illustration of How Data Elements are Share Across BPM+ Models

Currently, the same data element has to be defined separately in the tools dedicated to each modeling language. There are no standard mechanisms for sharing data elements across the three types of BPM+ models.

If there are a lot of data elements that are shared between the models of a BPM+ Knowledge Package, the development and maintenance burden for synchronizing the properties of the data elements will be problematic. All of the Hello Patient use date elements were used in at least two types of models. Each time any of the data elements were modified, which can happen multiple times during the BPM+ Knowledge Package development cycle, there would be one or more modifications in the other types of BPM+ models. It would be up to the modeler to ensure that the modifications were made and were consistent.

This maintenance burden was the driver for defining a Shared Data Model, which would be a library of data elements that would readily be available for synchronization with the other BPM+ Models. That is, the Data Items of the Shared Data Model should share the same characteristics as the data elements of the three BPM+ data elements. Further, the modeling experience should be very similar across all four models to ease burdens on the modeler.

The Shared Data Model would provide an environment where data elements can be defined and modified in a single location and the changes could be distributed to the other BPM+ models without additional work and vigilance by the modeler. Modeling tools that implement SDMN should provide a diagramming capability that is consistent with how current BPM+ modeling tools represent their data elements. Specifically, the notation for BPMN and CMMN data

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elements are consistent and should be used as the basis for a SDMN diagram. The following figure provides an example of how a SDMN Data Item Diagram could look.

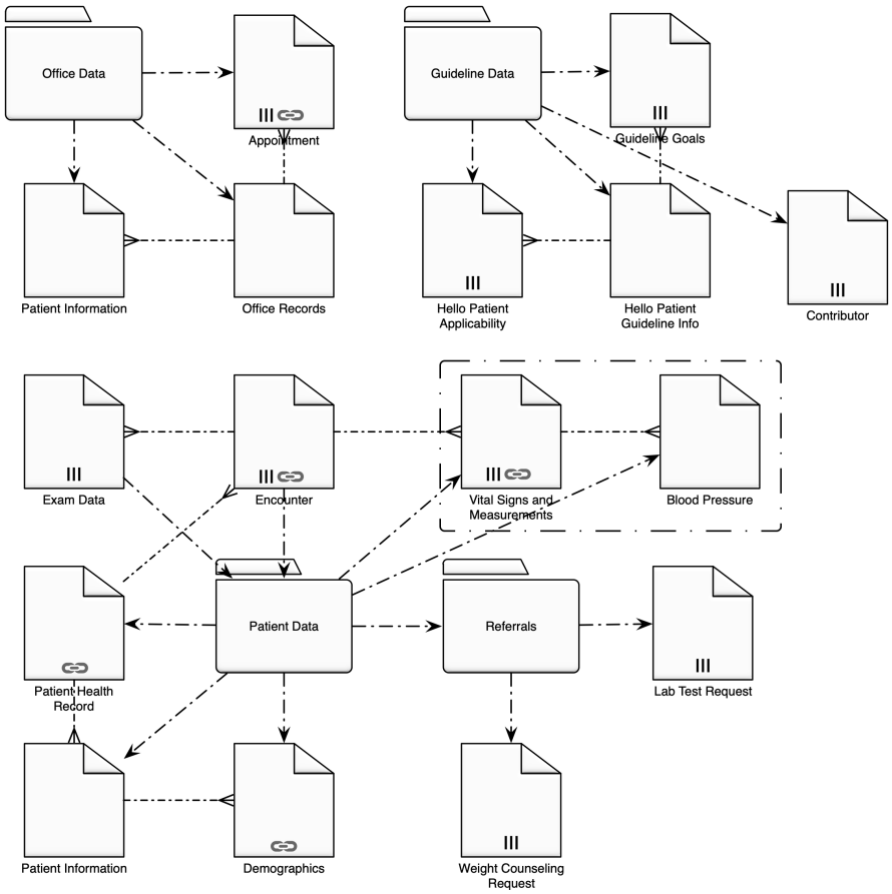

Figure 5. An Example of How a SDMN Could Look

It is true DMN's data element notation is slightly different (as can be seen in Figure 4, above) and there is no way to reconcile this at this time. The logical data concepts are the same across the three BPM+ models (as also illustrated in Figure 4, above) and basing the SDMN notation on BPMN and CMMN would provide the best solution for modelers using all the BPM+ standards.

Note that the figure above has not been standardized – it is illustrative.

A Shared Data Model would then become another component of a BPM+ Knowledge Package (as shown in Figure 2 above).

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6.2 Scope of Proposals Sought

The scope of proposals for this RFP is for response submissions to define a specification, metamodel, and XSD that, at a minimum, satisfy all the mandatory requirements listed in Section 6.5 below.

6.3 Relationship to other OMG Specifications and activities

6.3.1 Relationship to OMG specifications

Proposals may reference and build upon any of the OMG specifications identified in this section. In each case, the most recent version is applicable, unless the most recent version was adopted less than six months before the final submission to this specification, in which case the previous version may be used.

Proposals should identify the specific dependencies they have on any of these specifications including their specific version.

Proposals are recommended to leverage the most up-to-date versions of the following OMG specifications as applicable. See Appendix A.1.2 for complete references (including URLs) of these OMG specifications.

- [API4KB] Application Programming Interfaces (API) to Knowledge Bases (KB) RFP
- [BMM] Business Motivation Model (BMM ™)
- [BPMN] OMG Business Process and Model Notation (BPMN™)
- [CMMN] OMG Case Management Model and Model Notation (CMMN™)
- [CWM]: Common Warehouse Metamodel
- [DD] Diagram Definition (DD™)
- [DMN] OMG Decision Model and Model Notation (DMN™)
- [DOL] Distributed Ontology, Model, and Specification Language:
- [MDMI] OMG Model Driven Message Interoperability (MDMI), Version 1.0
- [MOF] Meta Object Facility (MOF™)
- [MOFVD] Versioning and Development Lifecycle (MOFVD™)
- [PLMS] Product Lifecycle Management Services (PLM)
- [RAS] Resource Asset Specification
- [RMS] Records Management Services
- [SMOF] MOF Support for Semantic Structures (SMOF™)
- [SysML] OMG Systems Modeling Language (SysML®)
- [UAF] Unified Architecture Framework (UAF)

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- [UML] Unified Modeling Language [UML®]
- [XMI] XML Metadata Interchange (XMI®)

6.3.2 Relationship to other OMG Documents and work in progress

Submissions for the following related OMG RFPs are currently in progress at the time of issuance of this RFP:

- [KerML] Kernel Modeling Language
- [IMM] Metamodel for Information Management
- [MVF] Multiple Vocabulary Facility
- [PPMN] Provenance and Pedigree Model and Notation RFP
- [SDMN] Shared Data Model and Notation RFP

6.4 Related non-OMG Activities, Documents and Standards

Proposals are recommended to leverage the most up-to-date versions of the following non-OMG specifications as applicable:

- [ADL] openEHR Archetype Definition Language: ADL 2, Revision
- [AOM] openEHR Archetype Object Model (AOM), Revision 2.1.14
- [CEM] Standards for detailed clinical models as the basis for medical data exchange and decision support. Int J Med Inf, 69(2-3), 157-74.
- [CDA] Clinical Document Architecture (CDA®) Release 2
- [CIMI] Clinical Information Modeling Initiative (CIMI)
- [CIMIRMR] CIMI Reference Model Requirements
- [CKM] openEHR Clinical Knowledge Manager
- [CTS2] OMG Common Terminology Service 2 (CTS2)
- [FHIR] Fast Health Interop Resource (FHIR)
- [HLV7v3] HL7 Version 3 Standard: Core Principles and Properties of Version 3 Models
- [ISO 8601] Data and time format
- [ISO 11179] Information technology — Metadata registries (MDR)
- [ISO 13606-2] Health informatics — Electronic health record communication Part 2: Archetype interchange specification, 2008-12-01
- [ISO-TC184] Interoperability, integration, and architectures for enterprise systems and automation applications
- [KAI] openEHR Knowledge Artefact Identification, Revision 0.7.5
- [KNART] Knowledge Artifact (KNART)
- [OSLC] Open Services for Lifecycle Collaboration (OSLC)
- [NIEM-UML] UML Profile for NIEM
- [RIM] Reference Information Model (RIM)

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- [STEP] ISO 10303-233:2012 (STEP)
- [XML] Extensible Markup Language (XML ™)

6.5 Submission Requirements

The optional requirements are listed along with the mandatory requirements, in this section instead of the next section, to maintain their logical grouping. The Mandatory/Optional classification is indicated in parentheses for each requirement.

6.5.1 BPM+ Knowledge Package metamodel

MM.1 BKPMN Metamodel (Mandatory)

Proposals SHALL provide an SMOF-compliant metamodel that supports the development of a BPM+ Knowledge Package. The requirements contained in this section provide further details that submissions must meet.

MM.2 UML Profile (Optional)

Proposals May provide a UML Profile for BKPMN.

6.5.1.1 Model Interchange

This section identifies a group of mandatory and/or optional requirements. These interchange schemas must be consistent with current BPM+ interchange schemas.

MM.3 XMI Schema for BKPMN Metamodel (Mandatory)

Proposals SHALL deliver the BKPMN metamodel in the form of an an XMI-compliant [XMI] schema to enable import/export of BKPMN compliant models by tools that support the BPM+ standards.

MM.4 XMI Schema for BKPMN Diagram Interchange (Mandatory)

Proposals SHALL provide an XMI Schema for importing and exporting BKPMN diagrams. The schema must utilize the current OMG Diagram Definition (DD), which provides for basic diagram elements.

MM.5 XML Schema for BKPMN Metamodel (Mandatory)

Proposals SHALL provide an XML Schema (XSD) for importing and exporting BKPMN models.

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MM.6 XML Schema for BKPMN Diagram Interchange (Mandatory)

Proposals SHALL provide an XML Schema (XSD) for importing and exporting BKPMN diagrams. The schema must utilize the current OMG Diagram Definition (DD), which provides for basic diagram elements.

6.5.2 Core Capability Requirements

This group of requirements was influenced by the way that the current BPM+ standards were constructed. Since the accepted submissions to this RFP is intended to fit with the stack of BPM+ standards, we reviewed the metamodels and XSDs of those standards. Based on this review, we identified a number of capabilities that will position an eventual BKPMN standard such that it is consistent with the other BPM+ standards.

Many of these capabilities are available in MOF plus SMOF (which extends MOF to support multiple classification) and the work-in-progress KerML. The current BPM+ standards provided their own version of these capabilities. Responders have a choice of:

- Defining updates to the BPM+ standards to utilize existing OMG capabilities (in lieu of their own solutions) and design BKPMN in the same way, or
- Replicate the core capability elements in the current BPM+ standards.

Whichever approach is taken, BKPMN must be compatible, in modeling style and tool implementation style, with current BPM+ standards. Further, submitters should also review section 6.7.1.4 in the Issues to be Discussed section. This issue expresses that submitters for BKPMN should work closely with the SDMN RFP (bmi-21-01-04) submitters and plan for BKPMN to reuse SDMN core capabilities.

C.1 Core Capabilities (Mandatory)

Proposals SHALL provide the core capabilities required for an OMG modeling language that are compatible with current BPM+ specifications.

C.1.1 Basic Elements and Properties (Mandatory)

Proposals SHALL provide support for basic element capabilities that include identifiers, names, and documentation.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

As a business modeling language, the submissions to this RFP must include some basic capabilities for the elements of that language.

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Base or Root Element with the following characteristics:

- Identifier
  - This is a read-only property that is filled by the modeling environment and can't be changed after creation.
- Name
  - This capability could be implemented with a specific element or with a property added to modeling elements as appropriate.
- Documentation
  - This capability could be implemented with a specific element or with a property added to the base or root element.
- Categorization
  - This capability, which has user-defined semantics, can be used for documentation or analysis purposes. It could be implemented with a specific element or with a property added to the base or root element.

The following figure is for illustrative purposes and is an example metamodel. This is not meant to imply a specific solution. Responders are responsible for determining their response to this requirement.

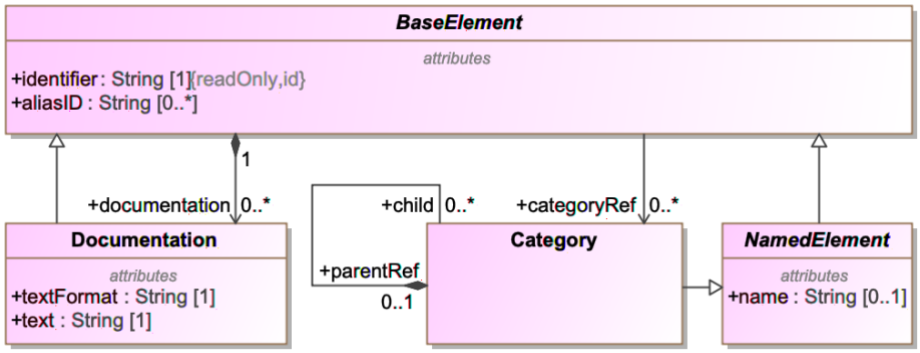

Figure 6. Example of the Structure of Core Elements and Properties

C.2 External Relationships (Mandatory)

Proposals SHALL provide support for defining relationships between any model element to and/or from potentially different models.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

BPM+ Knowledge Packages are part of a complex development of a set of related BPM+ models and other artifacts. In this context, responses to this RFP SHALL to enable BKPMN Artifacts to be integrated within these other models

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via the specification of a non-intrusive identity/relationship capability. This will enable BKPMN Artifacts and elements to be related to any other addressable domain model.

For BKPMN models, there could be external relationships to larger domain data models. These data models would not be a part of the working components of the over BPM+ Knowledge Package and the relationships would not define any semantic content, but they can provide information about the source and larger context of the BKPMN artifacts.

C.2.1 Semantic Reference (Mandatory)

Proposals SHALL provide a specialized external relationship capability that focuses on linking BKPMN elements to external sources of meaning (that is, an ontology).

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The purpose of this RFP is not to provide a specification for the development of ontologies. However, the elements that will be defined by responses to this RFP may be representative of elements defined by ontologies.

The specific context of a BPM+ Knowledge Package may result in terminology that differs with respect to normative ontology models. To reduce any confusion due to terminology, the elements of a BPM+ Knowledge Package will need the capability of linking to the appropriate external sources of definitions and meaning (i.e., an ontology) for their domain. Thus, any ambiguity that results due to a specific name of a Data Item may be alleviated. One possible way of implementing this is through the addition of a Semantic Reference, providing a mechanism to provide that capability. Another implementation strategy is to use the forthcoming Multiple Vocabulary Facility [MVF] specification and metamodel which facilitates the use of multiple, context-specific vocabularies to with any UML-compliant model, including BPM+ models.

The following figure is for illustrative purposes only and is not meant to imply a specific solution. The figure shows the concept of linking a Knowledge Diagram element to external reference that provides an agreed upon definition of the concept represented by the Data Item. In this example, a “Take Vital Signs and Measurements” Process is linked to an item named “Taking patient vital signs assessment (procedure)” in SnoMed, which is a health care domain site that provides accepted definitions of health care concepts.

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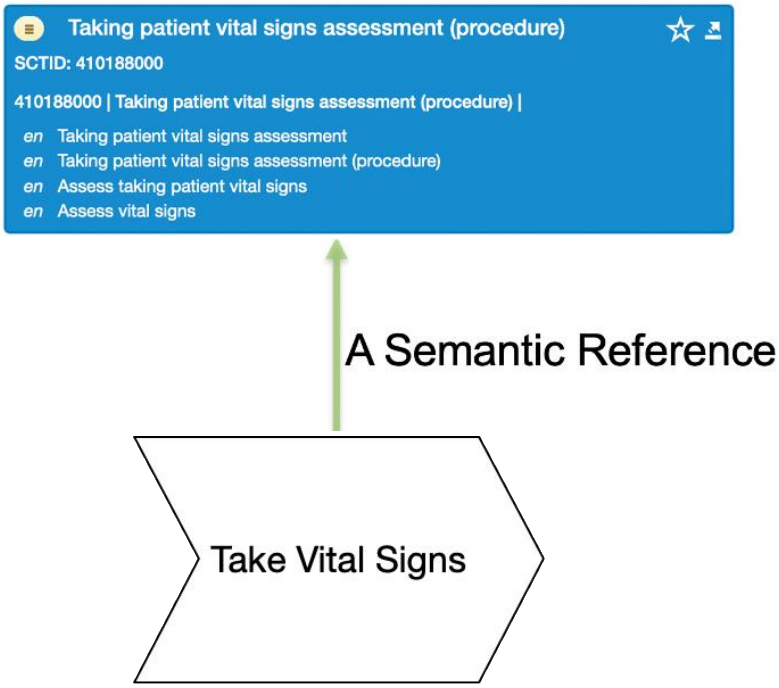

Figure 7. An Example of a Semantic Reference within a BPKMN Model

Note that this type of figure or diagram is not expected in a BPM+ Knowledge Package. It has been constructed for demonstration purposes.

C.3 Import (Mandatory)

Proposals SHALL provide the capability to import elements from another namespace.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The main purpose of import would be to import another BKPMN package to utilize the elements within the package. However, it should also be possible to import non-BKPMN elements, such as an XML Schema. It will be the responsibility of the implementation of a BKPMN tool to understand how to deal with non-BKPMN-standard types of files. It will be the responsibility of the implementation of an BKPMN tool to understand how to deal with non-BKPMN-standard types of files. This requirement topic is also listed in the "Issues to be Discussed" section, below.

C.4 Packaging (Mandatory)

Proposals SHALL provide a packaging mechanism for BKPMN elements.

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Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The idea of a "package" is that the package will contain all the elements of a model that is based on that specification. When the content of that model is serialized, the model elements will be contained within the package. Some previous BMI specifications have named this packaging element "Definitions."

For example, the BPMN *Definitions* element is the main package that contains all the Collaborations, Processes, and other elements that make up the BPMN model.

The responses to this RFP are required to provide a packaging element that contains BKPMN elements as well as the key attributes and associations that most BMI modeling specifications will need as part of their packaging element (see requirement on Basic Metadata, below).

C.4.1 Basic Metadata (Mandatory)

Proposals SHALL provide basic package metadata such as namespace, versioning, significant dates, etc. The metadata must be immutable per version of the model.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The basic metadata defined for submissions to this RFP may include elements such as language, version (of the model), author, etc. Responders will determine the basic metadata elements that are appropriate for BPM+ business models. Metadata provided by core OMG standards, such as MOF, should be considered as well as those provided by current BPM+ standards.

C.4.2 BPM+ Knowledge Package-Specific Metadata

Proposals SHALL provide additional metadata that aids in the discoverability, understandability, etc. of the package. The metadata must be immutable per version of the model.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The extended metadata defined for submissions to this RFP may include elements such as effective period, jurisdiction, etc. Responders will determine the additional metadata elements that are appropriate for BPM+ Knowledge Packages. Additional metadata elements that may be appropriate for consideration include those specified in the Architecture Board's Specification

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Metadata guidelines (see https://www.omg.org/techprocess/ab/SpecificationMetadata.rdf), Dublin Core Metadata Terms (https://www.dublincore.org), and ISO 11179.

C.5 Synchronization of BPM+ Modeling Languages Core Capabilities (Optional)

Proposals MAY provide extensions or updates to current BPM+ modeling languages (BPMN, CMMN, and DMN) to synchronize their core capabilities with BKPMN and other BPM+ standards work-in-progress (PPMN, SDMN).

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Because the standards that are in the current BPM+ stack were developed at different times and semi-independently, their core capabilities are not consistent. Further, the BPM+ metamodels could have better utilized the existing OMG capabilities that are available in MOF, for example.

Since BKPMN will require these same core capabilities, responders to this RFP can take this opportunity to refactor the existing BPM+ standards to be more architecturally sound.

The application of this requirement, or not, will determine the overall solution for BKPMN, since BKPMN must be architecturally consistent with the current as-is or updated BPM+ specifications.

6.5.3 BPM+ Knowledge Package Content

This set of requirements extends the basic packaging requirement above. The difference for this requirement is that packaging characteristics of a BPM+ Knowledge Package are overlayed on top of the basic packaging characteristics and meta data defined in the requirements above.

Some of this content will be a reflection of the content that is contained within the referenced documents, in particular, the behavioral models. Further, some of this content will be an addition to the behavioral model content and provided by the package authors. The requirements of both types are identified below.

KP.1 Manifest (Mandatory)

Proposals SHALL provide a manifest that identifies (references) the location of the behavioral model files (both BPM+ and non-BPM+), including domain-specific models, and supporting information of the package. These files will be included with the BPM+ Knowledge Package file when the package is distributed.

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Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Since there is an expectation that BPM+ Knowledge Packages will be readily distributed to interested parties, the Manifest will be a key component of the BPM+ Knowledge Package. It will provide a list of all the files that contain the content – the models and supporting information – that make up the Knowledge Package. BPM+ model files, non-BPM+ model files, and other types of files may be included in the Manifest. The contents of the Knowledge Package are maintained in separate files because they may be used in multiple Knowledge Packages. Thus, they are not specifically "owned" by a single Knowledge Package.

KP.1.1 Profile (Mandatory)

Proposals SHALL provide a list (a profile) of the specific modeling languages and their versions that are included in the package.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The BPM+ (and other) behavioral models (e.g., a BPMN Process) are defined by standards that have been developed over the years and a given model will be developed using the characteristics for specific version of its base standard. For example, a DMN model could have been developed with DMN version 1.0, 1.1, 1.2, and 1.3.

Thus, it is important to document the versions of the standards that were used for the BPM+ models that are the content of the Knowledge Package. With this information, potential organizations that might consume the package will be able to know whether their tool suite can support the models.

KP.1.2 General Model Connectivity (Optional)

Proposals MAY provide a means to define a contract (interface definition) of integration that consuming / dependent models specified within the scope of the Knowledge Package instance may reference. Elements within a Knowledge Package instance may require use or integration with other knowledge elements that are not directly specified, known or within the scope of the knowledge package definition instance. This is essentially providing a decoupling or proxy to an external or to-be determined resources from that Knowledge Package definition instance. This external resource must honor the contract (interface definition). The external resource location and implementation is not known at time of authorship. The external resource is not required by Knowledge Package definition at time of authorship but is required at runtime by

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constituents within the scope of the knowledge package instance. These external models may or may not be delivered together with the BPM+ Knowledge Package definition instance. Such contracts are used to expose required interfaces to complex, and composite models to be delivered at runtime. This contract could be inferred from the internal connections between the models in the package. If it is asserted, it must be consistent with the internal connections between the models of the package. The contract itself must be included as a model in the package and should be expressed in a BPM+ language or is MOF compliant.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

This will provide a late-binding capability where models can be connected at runtime if the target model satisfies the defined contract.

6.5.3.1 Content Reflective of the Manifest Content

This section identifies a group of requirements intended to define content to be exposed on the surface of the BPM+ Knowledge Package. This content exists within the models that are included in the Manifest (i.e., the contents of the Knowledge Package).

Like a physical package, a BPM+ Knowledge Package should have information on its surface that informs potential customers of that package about the contents of the package (i.e., an ingredients list). The requirements listed in this group of requirements that expose specific types of information that are within the models of the BPM+ files in the Manifest. The result will be specific metamodel elements that reflect the required information. These metamodel elements will provide mechanisms to link the element to an appropriate model element that exists in one of the BPM+ files listed in the Manifest.

Note: there are no requirements for information contained in non-BPM+ models. However, responders could provide such elements for BKPMN as appropriate.

KP.2 Inputs and Outputs (Mandatory)

Proposals SHALL provide the capability of identifying (naming) the required inputs and required outputs of a BPM+ Knowledge Package. The identified inputs or outputs SHALL have the capability of referencing an appropriate data element in one of the Knowledge Package's BPM+ models.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

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An example of an Input to a BPM+ Knowledge Package would be a particular lab result in a healthcare scenario. The lab result would be a particular data element in the initiating Process or Case that is part of the Knowledge Package and it would be required at the start of the Process or Case.

Thus, the intent of this requirement is to expose, to the "surface" of the package, the existence of the key data elements that are required or are produced by the BPM+ Knowledge Package behaviors. The definition (e.g., data structures) of those data elements will be found in the BPMN and CMMN models contained in the Manifest documents. Thus, the BPM+ Knowledge Package will not define these elements, but it will identify them on the surface of the package. Note that not all data elements that exist in those BPM+ models will be seen at the package level, but only those that are Inputs or Outputs of the package.

KP.3 Participants (Mandatory)

Proposals SHALL provide the capability of defining the Participants of a BPM+ Knowledge Package.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

This will be a list of the key performers within the behavioral models of the BPM+ Knowledge Package. For example, a healthcare BPM+ Knowledge Package might include physicians, pharmacists, etc., as participants. Each individual participant will be defined in the context of a BPMN Process or Collaboration or a CMMN Case. Thus, the participant listed for the package will be a reflection of the participant defined in one of these behavioral models.

KP.4 Starting Trigger/Event (Mandatory)

Proposals SHALL provide the capability of defining the Event(s) that start the behaviors of a BPM+ Knowledge Package.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The enactment of the behaviors of a BPM+ Knowledge Package will often be triggered by specific events. For example, a plane crash would be the trigger for the handling of a crash investigation defined by a Knowledge Package. Thus, responses to this RFP will provide the ability to identify the which events will trigger the package.

These events should be related to specific events within at least one BPMN Process that is part of the BPM+ Knowledge Package. Note that not all Start Events in all the BPMN Processes will be listed as the package trigger, but only

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the Start Event(s) that signify that the BPM+ Knowledge Package should be enacted.

6.5.3.2 Content Outside the Manifest Content

This section identifies a group of mandatory and/or optional requirements. For this group the responses to this RFP will define content exposed on the surface of the BPM+ Knowledge Package that does not exist within the models that are the contents of the package. The authors of the BPM+ Knowledge Package, through the direction of the subject matter experts, will provide this content.

There are elements required for some BPM+ Knowledge Packages that don't explicitly exist in the current BPM+ modeling languages. For example, there may be activities in a BPMN Process that can be used to satisfy a goal, but BPMN does not have a mechanism to define or link to a goal. Since the goal(s) of a BPM+ Knowledge Package is important for organizations interested in the package, this type of information should be made available on the surface of the package.

As the stack of BPM+ modeling languages is expanded, some of the requirements list here may become information reflective of those languages, rather than being extended information.

KP.5 Applicability (Mandatory)

Proposals SHALL provide the capability to identify the preconditions that must exist before the behaviors in the package are applied (i.e., when should you use this package).

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Applicability describes the population or conditions to which the BPM+ Knowledge Package is intended. There may be many BPM+ Knowledge Packages that cover the same or similar topics (e.g., Diabetes in healthcare). The differences between the packages are usually centered around the conditions or populations that the package is optimized for. A Diabetes Knowledge Package, for example, may be focus for a certain age group, such as children, elderly, etc. Thus, a physician looking to apply a BPM +Knowledge Package for Diabetes should pick the appropriate package based on the specific patient characteristics as compared to the applicability definitions of the candidate packages.

KP.6 Expected Results (Effects) (Mandatory)

Proposals SHALL provide the capability of defining its Expected Results or Effects (of the identified behaviors) of a BPM+ Knowledge Package.

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Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

A BPM+ Knowledge Package is enacted in order to achieve specific results (as a response to a set of circumstances or events). Thus, it is a requirement to list all the potential results of the package. Of course, not all of the results may actually occur during a specific enactment. The results will often be related to the goals of the package, although there may be results that may occur independent or contrary to a goal.

KP.7 Goals (Mandatory)

Proposals SHALL provide the capability of defining the Goals of a BPM+ Knowledge Package.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

As with Expected Results, a BPM+ Knowledge Package is developed for a specific purpose. Thus, there are naturally specific goals that would be related to that purpose. In general, a goal would be related to one or more specified results.

KP.8 Recommendations (Mandatory)

Proposals SHALL provide the capability to define observation or assessment behaviors in the form of Recommendations.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

In a general sense, a BPM+ Knowledge Package is a recommendation of specific behaviors that should be performed given a set of circumstances or conditions.

For example, a physician may recommend that a patient begin a diet regime as part of the overall treatment (the core Recommendation) for hypertension.

Responders should look at the requirements for the BPM+ Knowledge Package as a basis for defining the properties of a Recommendation.

6.5.4 BPM+ Knowledge Package Diagrams

The topics addressed by a BPM+ Knowledge Package may be complex and may involve a large number of Process, Cases, and Decisions. These models also interact with each. A simple Manifest that lists the files that contain all the behavioral models does not provide an adequate view of the scope and nature of the Knowledge Package.

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Early work on prototype BPM+ Knowledge Packages found that a diagram of the behavioral model elements (the Processes, Cases, and Decisions) and how they interact provided a good representation of the content and scope of the Knowledge Package. Thus, responses to this RFP are required to provide such a diagram as outlined in the requirements below.

BD.1 Knowledge Diagram (Mandatory)

Summary: The responses to this RFP SHALL provide a graphical representation of the behavioral scope and contents of the component BPM+ Models.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Section 6.1.2 shows an example of what a Knowledge Diagram may look like. Responders are not required to use the exact notation shown in the diagram, but the types of elements depicted are required (and listed in the next requirement).

BD.2 Diagram Elements (Mandatory)

Proposals SHALL provide a diagram that will display, at a minimum, the following model elements:

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The diagram elements defined for submissions to this RFP should include, at a minimum, graphical representations of the following elements:

- Process Models
- Collaboration Models
- Choreography Models
- Case Models
- Decision Models
- Undefined Behaviors
  - These are behaviors that have been identified but their specific nature has not yet been decided. That is, they will eventually be modeled through a Process or Case.
- BPM+ Knowledge Packages
  - These are other BPM+ Knowledge Packages that are related to the package that is the subject of the diagram.
- Diagram Artifacts (see requirement below)

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The diagram elements, except for diagram artifacts, represent the content of the models that are contained within the BPM+ files listed in the Manifest.

BD.3 Notation Style (Mandatory)

Proposals SHALL ensure that diagram elements will be consistent and not conflict with current and planned BPM+ Modeling notations where possible.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Since the BKPMN standard and its diagram are planned to be part of the BPM+ stack of standards, the notational elements of this standard should seamless fit in with this stack. Thus, any diagram elements for BKPMN must be consistent with and should not conflict with the other BPM+ standards. For example, if one of the standards in the stack defines a “star” shape for a specific concept, then BKPMN must use the same “star” shape if it graphical represents that same concept.

This consistency also applies to the Graphical Adornment requirement and the Diagram Element Relationships requirement below.

BD.3.1 Graphical Adornment Style (Mandatory)

Proposals SHALL define adornments of key diagram element properties and ensure that they are consistent with the current and planned BPM+ Model diagram adornments.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Responders will determine the specific adornments/markers that are appropriate for Knowledge Diagrams.

BD.4 Diagram Element Relationship Connectors (Mandatory)

Proposals SHALL provide graphical connectors that define the relationships between the model elements and ensure that the connector notation is consistent with the current and planned BPM+ Model diagram connectors.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

The diagram element connectors for a package defined for submissions to this RFP should include, at a minimum, the following relationships:

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- The calling relationship between models.
  - That is, if one model (e.g., a Process) call another model (e.g., a Decision Service), then the relationship connector can be attached to those two model elements.

Note that if the relationship is planned, but not yet specified in the behavioral models, the relationship connector can still be connected subject to eventual verification with the models.

BD.4.1 BPM+ Model Connectivity Extensions (Optional)

Proposals MAY provide extensions to BPMN and CMMN that specify how the relationships between each of these standards and their relationship with DMN are defined.

Supporting Information (Illustrative purposes only - Not meant to imply a specific solution):

Because the standards that are in the current BPM+ stack were developed at different times and semi-independently, the relationships between the model elements of the standards have not been fully defined.

For example, a BPMN Business Rule Task is the activity that can be used to connect to a DMN Decision Service. However, BPMN does not specify how a task can be connected to a specific DMN element. Each implementation of the specifications would handle that in its own way. This means that when a Knowledge Package with such a connection is distributed to another environment, the connection between the BPMN Task and the DMN Decision Service is likely lost.

The establishment of standard connection mechanisms (e.g., between a BPMN Task and a DMN Decision Service) will facilitate the distribution of BPM+ Knowledge Packages as well as the validation of all the relationships in the Knowledge Diagram.

BD.5 Diagram Artifacts (Mandatory)

Proposals SHALL provide the capability to display the following generic diagram artifacts: Group, Text Annotation, and an Association Connector.

6.6 Optional Requirements

Optional requirements are listed along with mandatory requirements in the “Submission Requirements” section, above, to maintain their logical grouping.

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The Mandatory/Optional classification is indicated in parentheses for each requirement.

6.7 Issues to be discussed

These issues will be considered during submission evaluation. They should not be part of the proposed normative specification.

6.7.1.1 Extensibility

There are many issues about extending modeling elements and how the models are then exported and imported across compliant tools.

Responders are encouraged to review the consequences of extending the elements of a BPM+ Knowledge Package.

6.7.1.2 Import

Responders are encouraged to review the types of documents that may be imported into a BPM+ Knowledge Package and what the potential consequences may be. This includes importing other BPM+ Knowledge Packages as well as other types of relevant models as identified by responders.

6.7.1.3 Lifecyle

There are many issues about extending modeling elements and how the models are then exported and imported across compliant tools.

Responders are encouraged to review how the lifecycle of a BPM+ Knowledge Package relates to the event elements in BPM+ Models. Specifically, how do CMMN Milestones and BPMN Start, Intermediate, and End Events relate to the overall lifecycle of the package. Further, should a state diagram, in some form, be used to define the lifecycle?

6.7.1.4 Core Capabilities

The Core Capabilities requirements identified and listed in Section 6.5.2 are capabilities that are common to all BPM+ standards (and to many OMG standards). Further, there is work-in-progress for new BPM+ that also will contain these core capabilities. In particular, the RFP for SDMN is requiring that the SDMN specification provide a separate and reusable package of these core capabilities. The intent of this separate package is for new BPM+ specifications to reuse these capabilities rather than creating another version of the same capabilities.

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Since SDMN has not been approved at the time of this RFP, a requirement cannot be written for BKPMN to reuse the SDMN core capabilities. However, it is expected that the submitters for BKPMN should work closely with the SDMN submitters and plan for BKPMN to reuse SDMN core capabilities. If the BKPMN submitters choose a different approach, they will have to provide adequate justification.

6.8 Evaluation Criteria

The following criteria will also be used in the evaluation of the RFP responses:

- The solution must be easy to understand.
- The solution must have a smooth integration with existing BPM+ standards and be well suited to work with parallel, related RFP solutions.
- The solution should utilize pre-existing specifications as appropriate (including the reusable core capabilities provided by SDMN when they are available).
- The quality of the solutions to the mandatory and optional requirements.
  - If major features are included that have not identified by a requirement listed above, then those features should be adequately justified.

6.9 Other information unique to this RFP

No other information has been identified as being unique to this RFP.

6.10 IPR Mode

Every OMG Member that makes any written Submission in response to this RFP shall provide the **Non-Assertion Covenant** found in Appendix A of the OMG IPR Policy [IPR].

6.11 RFP Timetable

The timetable for this RFP is given below. Note that the TF or its parent TC may, in certain circumstances, extend deadlines while the RFP is running, or may elect to have more than one Revised Submission step. The latest timetable can always be found at the OMG *Work In Progress* page at https://www.omg.org/schedules under the item identified by the name of this RFP.

Event or Activity	Date
Letter of Intent (LOI) deadline	*4 week rule 3Q TC (30 August 2021)*

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Initial Submission deadline	*4 week rule 3Q TC (30 August 2021)*
Voter registration closes	*4 week rule 3Q TC (30 August 2021)*
Initial Submission presentations	*3Q TC (27 September 2021)*
Revised Submission deadline	*4 week rule 4Q TC (8 November 2021)*
Revised Submission presentations	*4Q TC (6 December 2021)*

Appendix A References & Glossary Specific to this RFP

A.1 References Specific to this RFP

A.1.1 Bibliographic Citation List

The following documents are referenced or are potentially relevant to this RFP or its responeses:

- [1] Wikipedia. Main Page. Mar 31, 2015. http://en.wikipedia.org
- [2] Merriam-Webster on-line dictionary
- [3] OMG Unified Modeling Language (OMG UML), Version 2.5, March 2015, OMG Document Number - formal/2015-03-01
- [4] Friedenthal, Sanford, Moore, Alan, Steiner, Rick. A Practical Guide to SysML: the systems modeling language. New York, NY: Elsevier, 2015. Third Edition
- [5] Friedenthal, S. 2016. "Evolving SysML and the System Modeling Environment to Support MBSE, Part 2" *INSIGHT* (*December Volume 19 Issue 4, Pg. 76-80*)
- [6] ISO 9241-210:2010. Ergonomics of human-system interaction - Part 210: Human-centered design for interactive systems. Geneva, Switzerland: International Organization for Standardization.
- [7] OMG Systems Modeling Language (OMG SysML), Version 1.5, May 2017, OMG Document Number: formal/2017-05-01
- [8] Matthews, P.H. (2014). The Concise Oxford Dictionary of Linguistics: Oxford University Press. Retrieved at: http://www.oxfordreference.com/

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- [9] Object Management Group. RFP Template, June 2015, OMG Document Number ab/15-06-01
- [10] Friedenthal, S., Burkhart, R. 2015. "Evolving SysML and the System Modeling Environment to Support MBSE" *INSIGHT* (*August 2015 Volume 18 Issue 2, Pg. 39-42*)

A.1.2 OMG Standards List

Proposals may reference and build upon any of the OMG specifications identified in this section. The follow list provides the identified specifications and a link to their most recent version:

- [AML] OMG Archetype Modeling Language (AML): https://www.omg.org/spec/AML/1.0/PDF
- [API4KB] Application Programming Interfaces (API) to Knowledge Bases (KB) RFP: http://www.omg.org/cgi-bin/doc.cgi?ad/2010-06-09
- [BMM] Business Motivation Model (BMM ™): https://www.omg.org/spec/BMM/
- [BPMN] OMG Business Process and Model Notation (BPMN™): https://www.omg.org/bpmn/
- [CMMN] OMG Case Management Model and Model Notation (CMMN™): https://www.omg.org/spec/CMMN/
- [DD] Diagram Definition (DD™): http://www.omg.org/spec/DD
- [DMN] OMG Decision Model and Model Notation (DMN™): https://www.omg.org/spec/DMN/
- [DOL] Distributed Ontology, Model, and Specification Language: https://www.omg.org/spec/DOL/
- [MDMI] OMG Model Driven Message Interoperability (MDMI), Version 1.0: http://www.omg.org/spec/MDMI/1.0/
- [MOF] Meta Object Facility (MOF™): http://www.omg.org/spec/MOF
- [MOFVD] Versioning and Development Lifecycle (MOFVD™): http://www.omg.org/spec/MOFVD
- [PLMS] Product Lifecycle Management Services (PLM): https://www.omg.org/spec/PLM/2.1/
- [PSCS] Precise Semantics of UML Composite Structures (PSCS™): https://www.omg.org/spec/PSCS/
- [PSSM] Precise Semantics of UML State Machines (PSSM): https://www.omg.org/spec/PSSM/
- [QVT] Query View Transformation (QVT™): http://www.omg.org/spec/QVT
- [RAS] Resource Asset Specification: http://www.omg.org/spec/RAS

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- [RMS] Records Management Services: https://www.omg.org/spec/RMS/
- [SMOF] MOF Support for Semantic Structures (SMOF™): https://www.omg.org/spec/SMOF/
- [SysML] OMG Systems Modeling Language (SysML®): http://www.omg.org/spec/SysML/
- [UAF] Unified Architecture Framework (UAF): https://www.omg.org/spec/UAF
- [UML] Unified Modeling Language™ (UML®): http://www.omg.org/spec/UML
- [XMI] XML Metadata Interchange (XMI®) http://www.omg.org/spec/XMI

A.1.3 Other Standards List

The following documents are referenced or are potentially relevant to this RFP or its responses:

- [ADL] openEHR Archetype Definition Language: ADL 2, Revision 2.0.5, http://www.openehr.org/releases/trunk/architecture/am/adl2.pdf
- [AOM] openEHR Archetype Object Model (AOM), Revision 2.1.14, http://www.openehr.org/releases/trunk/architecture/am/aom2.pdf
- [CEM] Standards for detailed clinical models as the basis for medical data exchange and decision support. Int J Med Inf, 69(2-3), 157-74.
- [CDA] Clinical Document Architecture (CDA®) Release 2: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=7
- [CIMI] Clinical Information Modeling Initiative (CIMI): http://www.hl7.org/Special/Committees/cimi/index.cfm
- [CIMIRMR] CIMI Reference Model Requirements: http://informatics.mayo.edu/CIMI/index.php/CIMI_Reference_Model_Requirements
- [CKM] openEHR Clinical Knowledge Manager: http://openehr.org/ckm
- [CTS2] OMG Common Terminology Service 2 (CTS2), http://www.omg.org/spec/CTS2/1.1/
- [FHIR] Fast Health Interop Resource (FHIR) : http://www.hl7.org/implement/standards/product_section.cfm?section=12
- [HLV7v3] HL7 Version 3 Standard: Core Principles and Properties of Version 3 Models: http://www.hl7.org/implement/standards/product_brief.cfm?product_id=58
- [ISO 8601] Data and time format: https://www.iso.org/iso-8601-date-and-time-format.html

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- [ISO 11179] Information technology — Metadata registries (MDR): https://www.iso.org/standard/61932.html
- [ISO 13606-2] Health informatics — Electronic health record communication Part 2:Archetype interchange specification, 2008-12-01
- [KAI] openEHR Knowledge Artefact Identification, Revision 0.7.5: http://www.openehr.org/releases/trunk/architecture/am/knowledge_id_system.pdf [OpenAPI] OpenAPI Specification: https://www.openapis.org/
- [KNART] Knowledge Artifact (KNART): http://www.hl7.org/special/Committees/projman/searchableProjectIndex.cfm?action=edit&ProjectNumber=1374
- [OSLC] Open Services for Lifecycle Collaboration (OSLC): http://open-services.net/
- [NIEM-UML] UML Profile for NIEM : https://www.omg.org/spec/NIEM-UML/3.0/PDF
- [RIM] Reference Information Model (RIM): http://www.hl7.org/implement/standards/rim.cfm
- [XML] Extensible Markup Language (XML™): https://w3c.org/XML

A.2 Glossary Specific to this RFP

Applicability - Applicability describes the conditions for which the Knowledge Package is intended.

Association - A type of Artifact that is a connecting object that is used to indicate there is some relationship between two KPMN graphical elements. There is no semantics defined by the connector.

Case - A CMMN element that involves actions taken regarding a subject in a particular situation to achieve a desired outcome.

Choreography - A BPMN Element that is an ordered sequence of message exchanges between two or more Participants. In a Choreography there is no central controller, responsible entity, or observer of the Process.

Collaboration - A BPMN Element that is a collection of Participants shown as Pools, their interactions as shown by Message Flows, and MAY include Processes within the Pools and/or Choreographies between the Pools.

Decision - A DMN element that is the act of determining an output value (the chosen option), from a number of input values, using logic defining how the output is determined from the inputs.

Decision Service - A DMN element that defines reusable logic within a decision model. A decision service exposes one or more decisions from a decision model as a reusable element, a service, which might be consumed (for example) internally by another decision in the decision

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model, or externally by a task in a BPMN process model. When the service is called with the necessary input data and decision results, it returns the outputs of the exposed decisions.

Definitions **-** This the main element that is used by standards such as BPMN and CMMN to contain the elements of those languages. A BPM+ Knowledge Package specification must have an equivalent element.

Diagram Artifact **-** A graphical object that provides supporting information about any BPM+ Knowledge Package diagram. However, it does not have any behavioral semantics.

Effect **-** An expected response to the application of a Knowledge Package element. In Medicine, for example, a reduction in blood pressure would be an expected effect after the application of a medication.

Goal **-** A goal is a statement about a desired state or condition to be brought about or sustained during the performance of the Knowledge Package.

Group **-** A type of Diagram Artifact that are a mechanism for a modeler to encircle a group of diagram elements to highlight that group for user-defined purposes. Groups do not provide any specific semantic definitions.

Input **-** An Input represents a key data element that is necessary to be present at the start of a performance of a Knowledge Package.

Knowledge Model Diagram **-** A diagram that provides a visual representation of the breadth and scope of a Knowledge Package in terms of the BPM+ models it contains.

Knowledge Package **-** A Knowledge Package is mechanism for packaging and distributing a set of BPM+ models (i.e., the knowledge).

Lifecycle Event **-** A Lifecycle Event is a significant circumstance or event that occurs during the performance of the behaviors of a BPM+ Knowledge Package.

Manifest **-** The Manifest is a list of files that contain the components of the Knowledge Package. This will usually include multiple BPM+ documents (e.g., BPMN files). Other files, such as narratives, will also be in the Manifest.

Milestone **-** Represents an achievable target, defined to enable evaluation of progress of the Case.

Output **-** An Output represents a key data element that is is produced through the performance of a Knowledge Package.

Process **-** A BPMN element that describes a sequence or flow of Activities in an organization with the objective of carrying out work.

Recommendation **-** A sub-element of a BPM+ Knowledge Package that defines, under specific circumstances, a set of behaviors that can have a goal and expected results. A BPM+

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Knowledge Package can be considered a large-scale Recommendation and can contain many internal Recommendations that may or may not occur.

Semantic Reference **-** The Semantic Reference element is a type of External Relationship that allows Knowledge Package elements to be Linked to External Sources of Truth, such as ontologies.

Start Trigger **-** An event that triggers the start of the behaviors of a BPM+ Knowledge Package.

Text Annotation **-** A type of DiagramArtifact that are a mechanism for a modeler to provide additional information for the reader of a BKPMN Diagram. The TextAnnotation object can be connected to a specific object on the Diagram with an Association.

Appendix B General Reference and Glossary

B.1 General References

The following documents are referenced in this document:

- [BCQ] OMG Board of Directors Business Committee Questionnaire, *https://doc.omg.org/bcq*
- [Guide] The OMG Hitchhiker's Guide, *https://doc.omg.org/hh*
- [IDL] Interface Definition Language Specification, *https://www.omg.org/spec/IDL35*
- [INVENT] Inventory of Files for a Submission/Revision/Finalization, *https://doc.omg.org/inventory*
- [IPR] IPR Policy, *https://doc.omg.org/ipr*
- [ISO2] ISO/IEC Directives, Part 2 – Rules for the structure and drafting of International Standards, *https://isotc.iso.org/livelink/livelink?func=ll&objId=4230456*
- [LOI] OMG RFP Letter of Intent template, *https://doc.omg.org/loi*
- [MDAa] OMG Architecture Board, "Model Driven Architecture - A Technical Perspective", *https://www.omg.org/mda/papers.htm*
- [MDAb] Developing in OMG's Model Driven Architecture (MDA), *https://www.omg.org/mda/papers.htm*
- [MDAc] MDA Guide, *https://www.omg.org/docs/omg/03-06-01.pdf*
- [MDAd] MDA "The Architecture of Choice for a Changing World, *https://www.omg.org/mda*
- [MOF] Meta Object Facility Specification, *https://www.omg.org/spec/MOF/*

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- [P&P] Policies and Procedures of the OMG Technical Process, *https://doc.omg.org/pp*
- [ISO2] ISO/IEC Directives, Part 2 – Rules for the structure and drafting of International Standards, *https://isotc.iso.org/livelink/livelink?func=ll&objId=4230456*
- [TEMPL] Specification Template, *https://doc.omg.org/submission-template*
- [UML] Unified Modeling Language Specification, *https://www.omg.org/spec/UML*
- [XMI] XML Metadata Interchange Specification, *https://www.omg.org/spec/XMI*

B.2 General Glossary

Architecture Board (AB) - The OMG plenary that is responsible for ensuring the technical merit and MDA-compliance of RFPs and their submissions.

Board of Directors (BoD) - The OMG body that is responsible for adopting technology.

Common Object Request Broker Architecture (CORBA) - An OMG distributed computing platform specification that is independent of implementation languages.

Common Warehouse Metamodel (CWM) - An OMG specification for data repository integration.

CORBA Component Model (CCM) - An OMG specification for an implementation language independent distributed component model.

Interface Definition Language (IDL) - An OMG and ISO standard language for specifying interfaces and associated data structures.

Letter of Intent (LOI) - A letter submitted to the OMG BoD's Business Committee signed by an officer of an organization signifying its intent to respond to the RFP and confirming the organization's willingness to comply with OMG's terms and conditions, and commercial availability requirements.

Mapping - Specification of a mechanism for transforming the elements of a model conforming to a particular metamodel into elements of another model that conforms to another (possibly the same) metamodel.

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Metadata - Data that represents models. For example, a UML model; a CORBA object model expressed in IDL; and a relational database schema expressed using CWM.

Metamodel - A model of models.

Meta Object Facility (MOF) - An OMG standard, closely related to UML, that enables metadata management and language definition.

Model - A formal specification of the function, structure and/or behavior of an application or system.

Model Driven Architecture (MDA) - An approach to IT system specification that separates the specification of functionality from the specification of the implementation of that functionality on a specific technology platform.

Normative – Provisions to which an implementation shall conform to in order to claim compliance with the standard (as opposed to non-normative or informative material, included only to assist in understanding the standard).

Normative Reference – References to documents that contain provisions to which an implementation shall conform to in order to claim compliance with the standard.

Platform - A set of subsystems/technologies that provide a coherent set of functionality through interfaces and specified usage patterns that any subsystem that depends on the platform can use without concern for the details of how the functionality provided by the platform is implemented.

Platform Independent Model (PIM) - A model of a subsystem that contains no information specific to the platform, or the technology that is used to realize it.

Platform Specific Model (PSM) - A model of a subsystem that includes information about the specific technology that is used in the realization of it on a specific platform, and hence possibly contains elements that are specific to the platform.

Request for Information (RFI) - A general request to industry, academia, and any other interested parties to submit information about a particular technology area to one of the OMG's Technology Committee subgroups.

Request for Proposal (RFP) - A document requesting OMG members to submit proposals to an OMG Technology Committee.

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Task Force (TF) - The OMG Technology Committee subgroup responsible for issuing a RFP and evaluating submission(s).

Technology Committee (TC) - The body responsible for recommending technologies for adoption to the BoD. There are two TCs in OMG – the *Platform TC* (PTC) focuses on IT and modeling infrastructure related standards; while the *Domain TC* (DTC) focuses on domain specific standards.

Unified Modeling Language (UML) - An OMG standard language for specifying the structure and behavior of systems. The standard defines an abstract syntax and a graphical concrete syntax.

UML Profile - A standardized set of extensions and constraints that tailors UML to particular use.

XML Metadata Interchange (XMI) - An OMG standard that facilitates interchange of models via XML documents.