A Process Model for Project Members Conforming to Enterprise Architecture

Ralph Foorthuis
Sjaak Brinkkemper
Frank Hofman

A PROCESS MODEL FOR PROJECT MEMBERS CONFORMING TO ENTERPRISE ARCHITECTURE

Ralph Foorthuis[1], Sjaak Brinkkemper[2] and Frank Hofman[1]

[1] Statistics Netherlands, Henri Faasdreef 312, 2492 JP The Hague, the Netherlands
R.Foorthuis@cbs.nl

[2] Utrecht University, Information and Computer Sciences, Padualaan 14,
3584 CH Utrecht, the Netherlands
S.Brinkkemper@cs.uu.nl

Abstract. *This paper presents a model for individual project members that carry out projects conforming to Enterprise Architecture. The paper is an appendix of article [1] and [2]. Article [1] "An Artifact Model for Projects Conforming to Enterprise Architecture" presents a high-level model for projects conforming to Enterprise Architecture. This artifact model focuses on creating the artifacts (deliverables or work products such as a Software Architecture Document) at two levels, i.e. the project and the environment, and the interaction between project members inside the project. The process model of the current paper focuses instead at a more detailed level, i.e. the actions of an individual project member. Article [2] "Assessing Business and IT Projects on Compliance with Enterprise Architecture" presents an approach to test projects and their project artifacts on conformance to Enterprise Architecture. As [2] does not contain a detailed description of the testing process, this will be presented in the current paper.*

Status. *version 1.0.p5*

Version history			
Date	**Version**	**Description**	**Authors**
April 25th 2009	1.0.p5	Added: overview diagram, operationalizations of compliance checks. Changed: Apply Boundaries diagram, text of all actions.	Ralph Foorthuis, Sjaak Brinkkemper, Frank Hofman
February 28th 2009	1.0.p4	Update of "Review Baseline" and "Manage EA" actions. Addition of compliance checks appendix.	Ralph Foorthuis, Sjaak Brinkkemper
September 3rd 2008	1.0.p3	Small updates in abstract, introduction and references.	Ralph Foorthuis, Sjaak Brinkkemper
July 8th 2008	1.0.p2	Update of introduction, section 2 and "Define EA boundaries" action.	Ralph Foorthuis, Sjaak Brinkkemper
June 28th 2008	1.0.p1	Initial version.	Ralph Foorthuis, Sjaak Brinkkemper

1 INTRODUCTION

This paper presents a model for individual project members that carry out projects conforming to Enterprise Architecture. The paper is an appendix of article [1] and [2]. Article [1] "An Artifact Model for Projects Conforming to Enterprise Architecture" presents a high-level model for projects conforming to Enterprise Architecture. This artifact model focuses on creating the artifacts (intermediate deliverables or work products such as a Software Architecture Document) at several levels, i.e. the project and the environment, and the interaction between project members. The process model of the current paper focuses instead at a more detailed level, i.e. the actions of an individual project member. Article [2] "Assessing Business and IT Projects on Compliance with Enterprise Architecture" presents an approach to test projects and their project artifacts on conformance to Enterprise Architecture. As [2] does not contain a detailed description of the testing process, this will be presented in the current paper. Note that this paper cannot be fully understood without reading [1].

This paper focuses on the role of project artifacts at the level of the actions of individual project members. An *artifact* is an intermediate work product that is produced and used during a project, and has the function to capture and convey project information [1, 5]. In other words, artifacts are deliverables or work products such as a Software Architecture Document, a Business Analysis Document or a Use Case. Artifacts mediate between project members, and between the project and its environment by communicating through artifacts both explicitly (by its literal text) and implicitly (as boundary objects) [1, 6, 7]. However, the actions of an individual project member or role can also be mediated by an artifact, or rather by its template. A template not only breaks the artifact down in its constituent parts (which imply actions), but can also contain instructions and advice for the author. This guidance is also provided by the methods or approach to which a particular artifact might belong (e.g. UP or RUP). Creating the artifacts by individual project members is central to the model in this paper.

2 THE PROCESS MODEL

In [1] we presented a high-level artifact model for projects conforming to EA. This model features various artifacts and activities that are dedicated to EA (and project conformance to EA in particular). The following subsections will describe the processes (or actions) that create and use these artifacts at a more detailed level. To this end, the notation of the Process-Deliverable Diagram given in [8] will be used. This type of diagram is a combination of a UML class diagram and an activity diagram, extended with symbols to indicate abstraction levels.

The process model described in this section is not a single diagram, but rather a set of diagrams. Each diagram describes an EA-related process or action identified in [1]. The "Review Baseline" action is also mentioned in [2]. The processes described are:

- Apply EA boundaries
- Provide advice on EA application
- Perform project action conforming to EA
- Add entry to EA Feedback Report
- Review Baseline
- Manage EA

The diagram below, which is a variation of the artifact model presented in [1], shows these processes (rounded rectangles) and the interfacing project artifacts (rectangles). Dotted arrows represent artifact flows. The remainder of section 2 will describe each of the processes in more detail.
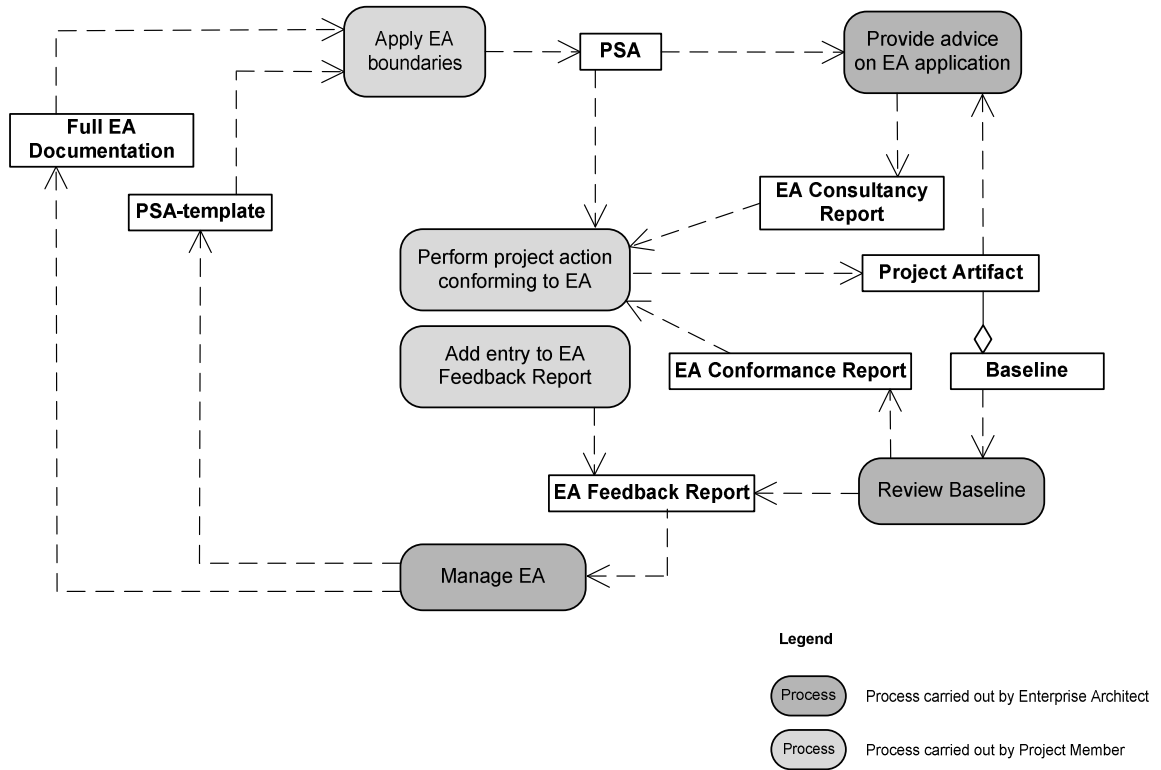

Figure 1. Overview of processes and artifacts in working with EA

2.1 Apply EA boundaries

The *Apply EA boundaries* action identifies EA prescriptions relevant to the project and, if possible, translates them to the specific project situation. During a project, this action is carried out two times. At the beginning of the business analysis phase, this results in the Business PSA artifact. At the beginning of the IT phase, this results in the PSA artifact, which specifies both the business and the IT prescriptions. The Project Member carrying out this action is the Business Analyst for the Business PSA version, and the System Analyst and Software Architect for the IT section of the entire PSA version. Preferably, an Enterprise Architect assists in creating the PSA, as this would guarantee interpreting the EA prescriptions correctly.
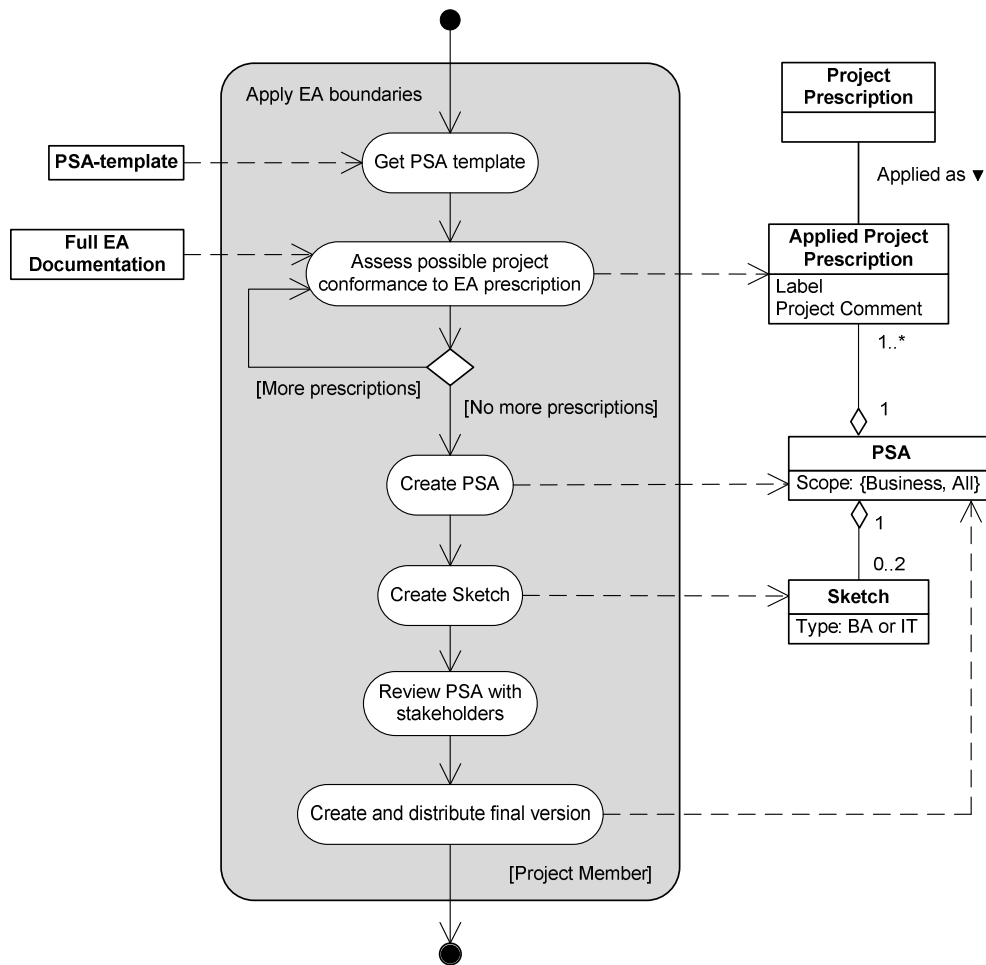

Figure 2. The Apply EA boundaries action

Apply EA boundaries	
Get PSA template	The Project Member obtains the PSA template. This template can already include the EA prescriptions that are relevant for projects. However, they still need to be tuned to the current project.
Assess possible project conformance to EA prescription	The Project Member picks a prescription in order to assess whether the project is expected to be able to conform to it. In this context, the prescription can be given a label. For example, APL if it is considered directly applicable, or ALT if it needs to be altered to project circumstances. See [3] for the full set of labels. In addition to the label, the Project Member adds a comment indicating how the project expects to comply with the prescription. The result is an Applied Project Prescription, although this concerns merely the first step of a Prescription's application. At a later stage, Prescriptions will be applied in Project Artifacts, such as the Software Architecture Document. See 2.3 for more on this. Prescriptions can be applied in Project Artifacts explicitly (citing and/or referring to prescriptions) or implicitly (being consistent with prescriptions without explicitly citing or referring to them).
Create PSA	After all the prescriptions have been assessed, the PSA can be created. Its Type indicates whether it concerns the Business PSA or the entire PSA (which also includes IT prescriptions).
Create Sketch	Optionally, a Sketch can be created, giving a preliminary vision of the envisioned business situation or a first high-level overview of the system's functional and technical requirements. This Sketch can be used to communicate fundamental ideas in an early stage with stakeholders, including the Enterprise Architect. As the Business PSA and the PSA are created early on in the Business Analysis phase and IT-phase respectively, it might not be possible to create a useful Sketch at this time if the project is complex. Therefore, a Sketch can be included in the PSA or it can be a separate artifact.
Review PSA with stakeholders	The (Business) PSA needs to be reviewed with stakeholders. This has several functions. First, the Project Member can check and communicate whether he or she has understood the business and the Enterprise Architecture. Second, reviewing the (Business) PSA creates architectural awareness amongst the people inside and outside the project. Reviewing and updating the artifact may take several iterations. In order to keep the diagram simple, however, we have abstracted from this.
Create and distribute final version	The Project Member creates the final version of the (Business) PSA and distributes it to the relevant stakeholders.

2.2   Provide advice on EA application

The *Provide advice on EA application* action features several steps for an Enterprise Architect to take when giving advice to a project conforming to EA. The initiative for this action can come from the project or from the Enterprise Architect. This action results in an EA Consultancy Report. Although a review can result in this type of report, this is not a review action (this action type is described in section 2.5).
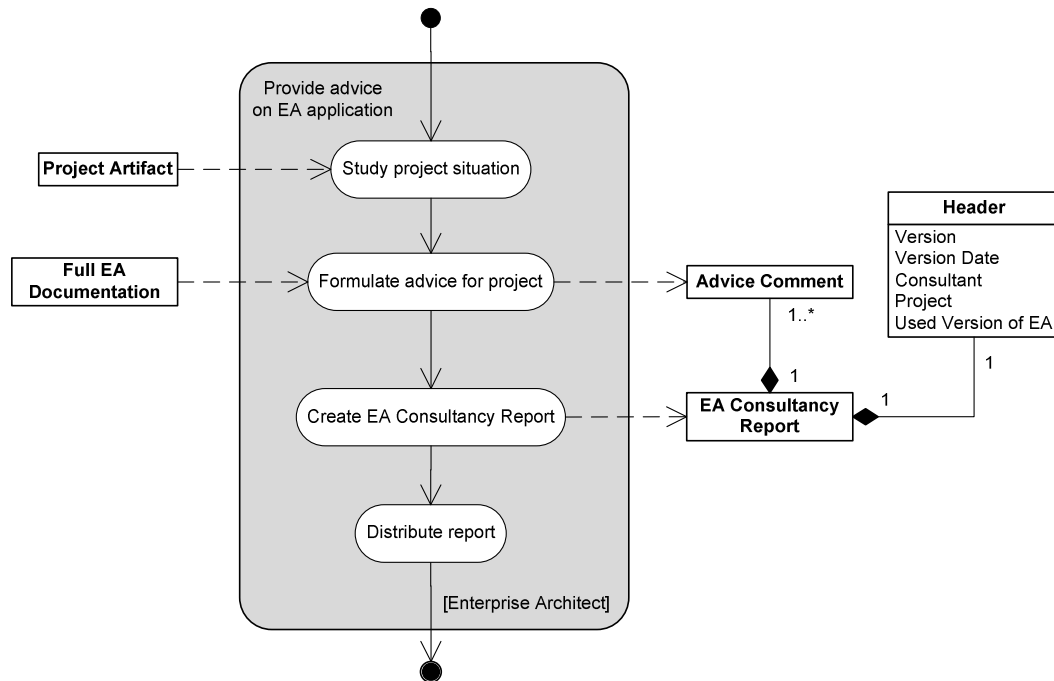

Figure 3. The Provide advice on EA application action

Provide advice on EA application	
Study project situation	The Enterprise Architect studies the project situation, using Project Artifacts (if present) and possibly face-to-face interviews or workshops. The Project Artifact can also be a PSA here.
Formulate advice for project	The Enterprise Architect writes down his advice in an Advice Comment, using the Full EA Documentation as a reference.
Create EA Consultancy Report	The Enterprise Architect creates the final EA Consultancy Report, including its meta information in the Header.
Distribute report	The Enterprise Architect distributes the EA Consultancy Report to the relevant stakeholders.

2.3 Perform project action conforming to EA

The *Perform project action conforming to EA* action represents a generic process for carrying out a project action that needs to be consistent with the prescriptions of the EA.
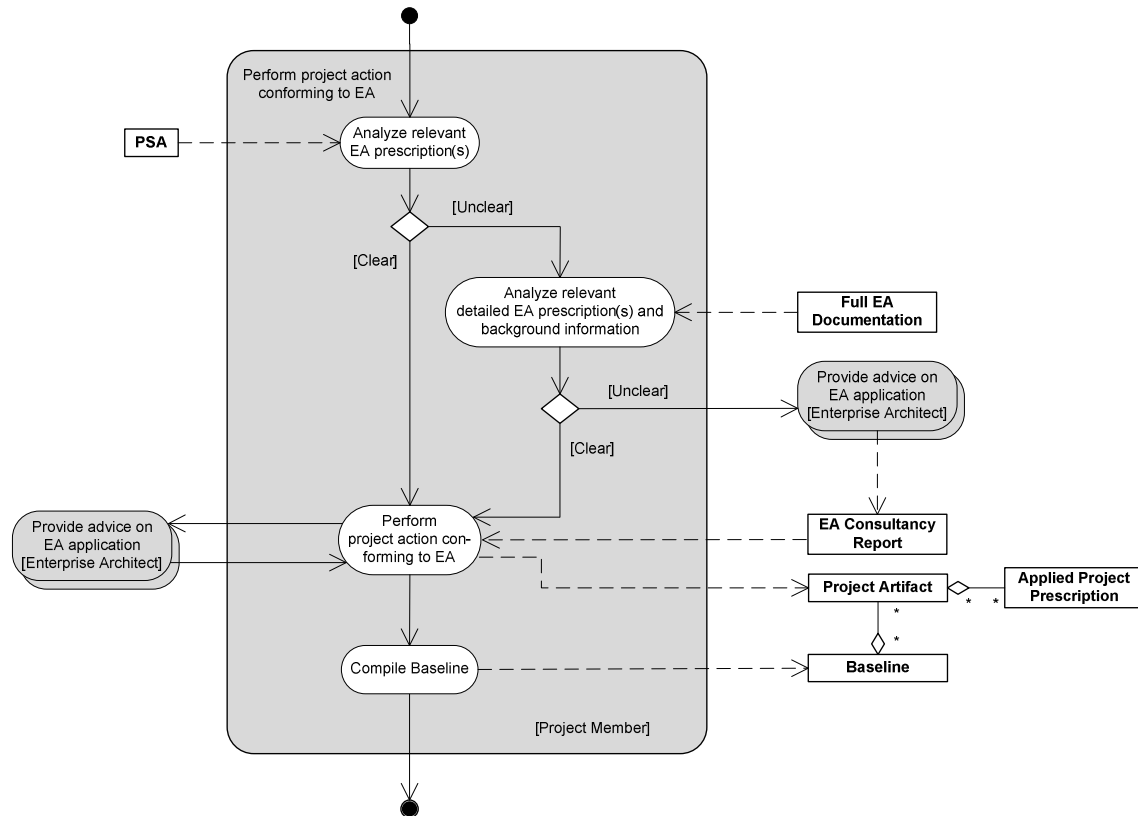

Figure 4. Perform project action conforming to EA

Perform project action conforming to EA	
Analyze relevant EA prescription(s)	The Project Member studies the relevant prescription(s) in the PSA in order to know in what way he or she is bounded when performing his planned action.
Analyze relevant detailed EA prescription(s) and background information	If the PSA does not provide sufficient information about how to apply the prescriptions to the project situation, the Full EA Documentation might be consulted. This documentation is expected to contain more background information and comments than the PSA.
Provide advice on EA application	If the Full EA Documentation also does not provide the required information, an Enterprise Architect can be consulted. Formally, this action is not part of the *Perform project action conforming to EA* action, but it is included here to provide context. This action is described in more detail in section 2.2. It results in an EA Consultancy Report, the advice of which can be used to perform the project action. Note that this report can also be a simple e-mail.
Perform project action conforming to EA	The Project Member performs the action (e.g. designing a business process), resulting in one or more Project Artifacts conforming to EA. During this action, relevant experiences can be entered into the EA Feedback Report (see 2.4).

2.4   Add entry to EA Feedback Report

The *Add entry to EA Feedback Report* action evaluates the applicability of the Enterprise Architecture from a project perspective. The action can be carried out by any project member that is bounded by architectural prescriptions.
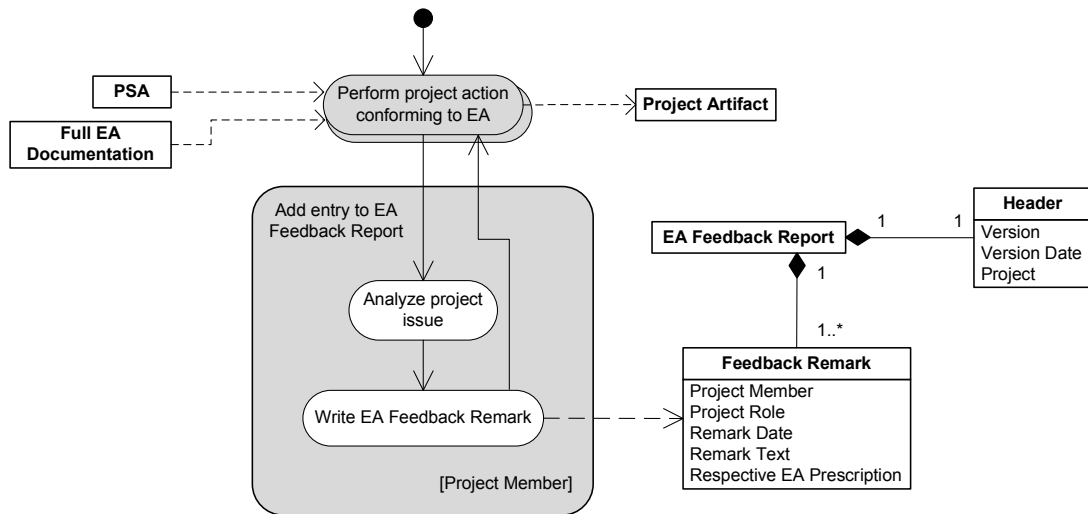

Figure 5. The Add entry to EA Feedback Report action

Add entry to EA Feedback Report	
Perform project action conforming to EA	The Project Member carries out his action while trying to adhere to architectural prescriptions (included in the PSA and EA documentation). Formally, this action is not part of the *Add entry to EA Feedback Report* action, but it is included here to provide context. This action is described in more detail in section 2.3. The *Add entry to EA Feedback Report* action can also be initiated from the *Apply EA boundaries* action described in section 2.1, as this also applies EA prescriptions.
Analyze project issue	If the Project Member experiences an issue in applying the architectural prescription, he or she analyzes it. An issue need not be negative per se, it can also be a positive experience.
Write Feedback Remark	The Project Member adds a Feedback Remark – and its meta information – to the EA Feedback Report.

2.5 Review Baseline

The *Review Baseline* action formally reviews project artifacts on EA compliance, resulting in an EA Conformance Report. This action description could also be applied to an informal review, but note that it could then have any project artifact as its input and would result in an EA Consultancy Report. For reasons of visual clarity, the diagram does not show the multiplicity of the relationship between Baselines and project artifacts (which is: one (version of an) artifact can belong to multiple Baseline versions, and one Baseline version can comprise multiple artifacts).
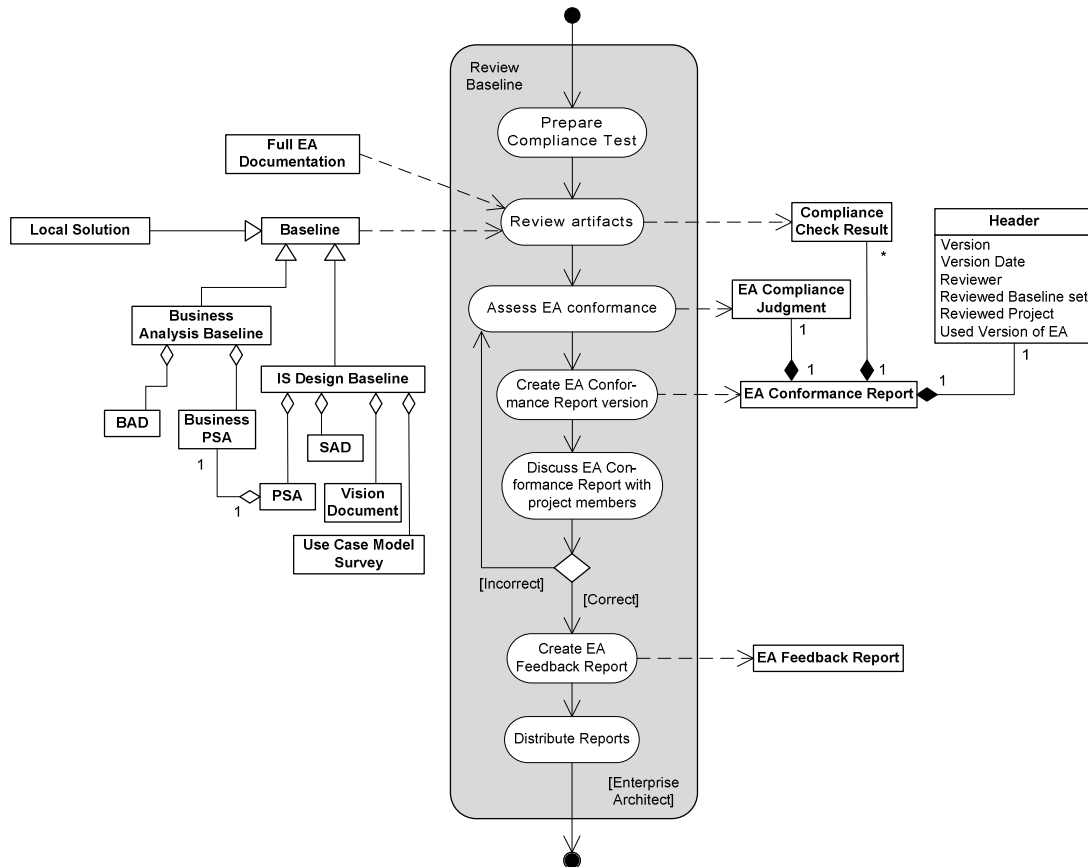

Figure 6. The Review Baseline action

Review Baseline	
Prepare Compliance Test	The Enterprise Architect prepares the Compliance Test for use in the specific situation. This includes collecting the Baseline and obtaining the most recent versions of the EA prescriptions. See [2] for more on the Compliance Test.
Review artifacts	The Enterprise Architect reviews the project artifacts from the Baseline. Reviewing the artifacts means using Compliance Checks for assessing the EA Prescriptions that have been implicitly or explicitly applied in the Baseline's project artifacts. The four types of Compliance Checks are Correctness Check, Justification Check, Consistency Check and Completeness Check. Using them yields Compliance Check Results that (possibly only in the case of non-compliance) will be included in the EA Conformance Report. See [2] and the appendix for more on the Compliance Checks.

Assess EA conformance	After reviewing the artifacts, the Enterprise Architect makes an EA Compliance Judgment regarding the degree in which the project complies to the EA.
Create EA Conformance Report version	The Enterprise Architect creates a version of the EA Conformance Report, including its meta information in the Header.
Discuss EA Conformance Report with project members	The Enterprise Architect discusses the draft version of the EA Conformance Report with the authors of the assessed Baseline. The goal of this step is twofold. First, to clarify the report, if needed. Second, to avoid Compliance Check Results (review comments) and an EA Compliance Judgment that are invalid due to an incorrect understanding of the Baseline and its knowledge domain. If changes in the EA Conformance Report are required, the Enterprise Architect goes back to the "Review artifacts" step.
Create EA Feedback Report	During the review process and the discussions with the project members, the Enterprise Architect may have discovered weak aspects of the EA. These can be stated in an EA Feedback Report.
Distribute Reports	The Enterprise Architect distributes the EA Conformance Report to the relevant stakeholders. The EA Feedback Report is sent to the lead Enterprise Architect.

2.6   Manage EA

The *Manage EA* action creates the enterprise architecture and related artifacts, resulting in the Full EA Documentation and the PSA template. These artifacts are distributed to projects conforming to EA. The feedback that these projects send to the Enterprise Architect as a result of applying EA prescriptions can be used to update the enterprise architecture and PSA template.
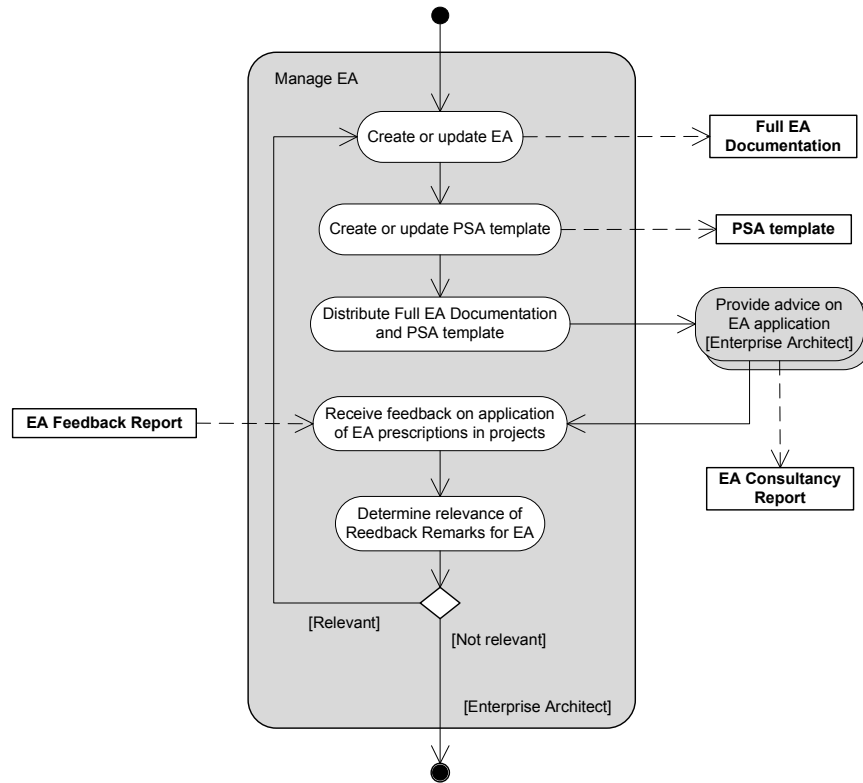

Figure 7. The Manage EA action

Manage EA	
Create or update EA	The Enterprise Architect creates the EA (if non-existent) or updates the EA (if relevant Feedback Remarks are received).
Create or update PSA template	The Enterprise Architect creates or updates the PSA template if the new EA demands so.
Distribute Full EA Documen-tation and PSA template	The Full EA Documentation and PSA template are distributed to projects that need to conform to EA.
Provide advice on EA application	The Enterprise Architect provides projects with advice on how to apply the EA prescriptions. Formally, this action is not part of the *Manage EA* action, but it is included here to show the relationship between these actions.
Receive feedback on application of EA prescriptions in projects	As projects carry out their actions conforming to EA, they collect their evaluation remarks in an EA Feedback Report. This report is sent to the Enterprise Architect.
Determine relevance of Feedback Remarks for EA	The Enterprise Architect then determines whether one or more Feedback Remarks are relevant for the current version of the EA. If so, the Full EA Documentation and/or the PSA template are revised.

3   APPENDIX: OPERATIONALIZED COMPLIANCE CHECKS

The *Review Baseline* action of section 2.5 uses four types of compliance checks. These checks for testing projects on compliance with Enterprise Architecture are discussed in [2]. The four types are:

- Correctness Check
- Justification Check
- Consistency Check
- Completeness Check

The research described in [2] yielded in the following operational definitions of these checks:

1. The three values of the checks are ordinal. From low to high, the order is "Failed", "Needs attention" and "Passed". The "Not applicable" value is not considered as being an intrinsic part of this order.
2. The assessment is limited to testing the desired or future situation – be it short, medium or long term – since the objective is to test the compliance of the (design of the) new business and/or IT system that is to be delivered. The current situation is therefore not assessed when testing a project on conformance.
3. If a prescription is relevant (regardless of whether it is mandatory) and has indeed been applied (regardless of whether it has been applied correctly), the Justification Check results in "Passed". If a prescription is relevant (and mandatory) but has not been applied, the Justification Check results in "Failed". If a prescription has been applied while it is not relevant in the specific local situation (regardless of whether it is mandatory), the Justification Check again results in "Failed". If a prescription has not been applied in a situation in which it is not relevant (regardless of whether it is mandatory), the Justification Check results in "Passed", even though it is present in the Enterprise Architecture. See statement 4 for more information about the values of the Justification Check.
4. The instruction in statement 3 focuses on the role of relevancy. For prescriptions that have been determined relevant and mandatory, the values for the Justification Check will be described in more detail below. Given a relevant and mandatory prescription:
   - The "Passed" value indicates that the project has applied (all of the mandatory elements of) the prescription, regardless of whether this has been done accurately or not.
   - The "Needs attention" value indicates:
     - Partial conformance: the project has applied the prescription partially (e.g. only one or several of the mandatory elements, or one mandatory element only to a certain degree), regardless of whether this has been done accurately or not.
     - Insufficient information: there are indications that the project has applied the prescription (e.g. because it is claimed or implied in the Baseline), regardless whether this has been done accurately or not. However, it is not possible to test this (e.g. because references have been made or implied to additional documents, which are not included in the tested Baseline and are therefore not available for assessment).
   - The "Failed" value indicates that no information whatsoever is available about the application of the prescription, i.e. the prescription seems to be totally ignored. A "Failed" value could also indicate that the project has stated that this (relevant) prescription is not considered relevant.
5. The value of the Correctness Check is dependent on the value of the Justification Check for the prescription in question. The value of the Correctness Check cannot be higher than that of

the Justification Check. For the Correctness Check, no distinction is made between mandatory and recommended prescription elements; all elements are considered equal. In other words, if one applies a prescription, whether it is mandatory or not, it should be applied correctly. Below, the value of the Correctness Check is discussed in relation to the Justification Check.

- If the value of the Justification Check is "Passed" because the prescription is relevant and has been applied, the value of the Correctness Check can result in "Passed", "Needs attention" or "Failed". A value of "Not applicable" is not allowed.
- If the value of the Justification Check is "Needs attention" because the prescription is relevant, but has been applied partially or there is insufficient information to test it, the value of the Correctness Check can only result in either "Failed" (if all elements are "Failed") or "Needs attention" (e.g. if one element is "Passed", one is "Failed" and one is "Needs attention"). The values "Passed" and "Not applicable" are not allowed.
- If the value of the Justification Check is "Failed" because the prescription in question has not been applied and it was relevant to do so, the value of the Correctness Check per definition also results in "Failed".
- If the value of the Justification Check is "Failed", "Passed", "Needs attention" or "Not applicable" and the prescription in question is not relevant, the value of the Correctness Check per definition results in "Not applicable" (regardless of whether the prescription in question has been applied accurately or not).

Summing up, the table below shows the combinations that are allowed and not allowed.

Justification / Correctness		Passed	Needs attention	Failed	N.A.
Relevant?	Value				
Yes	Passed	Allowed	Allowed	Allowed	Not allowed
	Needs attention	Not allowed	Allowed	Allowed	Not allowed
	Failed	Not allowed	Not allowed	Allowed	Not allowed
No	All	Not allowed	Not allowed	Not allowed	Allowed

Legend

Allowed (green)	Allowed
Not allowed (red)	Not allowed

6. The value of the Consistency Check results in "Failed" if specific inconsistencies or off-balances can be found or expected. Therefore, the value does not automatically result in "Failed" if one or more of the underlying Correctness or Justification Checks is "Failed" (which would basically be identical to a Completeness Check on a subset of the prescriptions). However, one or several "Needs attention" values for underlying Correctness or Justification Checks do automatically result in a value "Needs attention" for the Consistency Check, since it cannot be known whether consistency is maintained.
7. The Completeness Check only results in a "Passed" value if all prescriptions have a "Passed" value for the Justification Check. The Completeness Check assesses whether all relevant pre-scriptions have been taken into account, regardless of whether the application is correct. Therefore, the results of the Correctness Check and Consistency Check are not relevant here; these will be taken into account in the final judgment.
8. The final judgment takes all of the compliance check results in account. A "Passed" value for the final judgment indicates complete conformance, and thus a "Passed" value for all underlying checks.

References

1. Foorthuis, R.M., Brinkkemper, S., Bos, R. (2008). An Artifact Model for Projects Conforming to Enterprise Architecture. In: Stirna, J., Persson, A. (Eds.). The Practice of Enterprise Modeling. Proceedings of PoEM 2008, IFIP WG 8.1 Working Conference, LNBIP 15, pp. 30-46. Berlin: Springer.

2. Foorthuis, R.M., Hofman, F., Brinkkemper, S., Bos, R. (To appear). Assessing Business and IT Projects on Compliance with Enterprise Architecture. In: Proceedings of GRCIS 2009, CAISE Workshop on Governance, Risk and Compliance of Information Systems.

3. Foorthuis, R.M., Brinkkemper, S. (2007). A Framework for Local Project Architecture in the Context of Enterprise Architecture. Journal of Enterprise Architecture, Vol. 3, No. 4, pp. 51-63.

4. Foorthuis, R.M., Brinkkemper, S. (2008). Best Practices for Business and Systems Analysis in Projects Conforming to Enterprise Architecture. Enterprise Modelling and Information Systems Architectures, Vol. 3, No.1, pp. 36-47

5. Rational. (2003). Rational Unified Process. Version 2003.06.00.65. RSC.

6. Bertelsen, O.W. (2000). Design artefacts: Towards a design-oriented epistemology. Scandinavian Journal of Information Systems, Vol. 12, No. 1, pp. 15-28.

7. Star, S.L., Griesemer, J.R. (1989). Institutional Ecology, 'Translations' and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. Social Studies of Science, Vol. 19, No. 3, pp. 387-420.

8. Weerd, I. van de, Brinkkemper, S. (2008). Meta-modeling for situational analysis and design methods. In M.R. Syed and S.N. Syed (Eds.). Handbook of Research on Modern Systems Analysis and Design Technologies and Applications, pp. 38-58. Idea Group Publishing, Hershey.