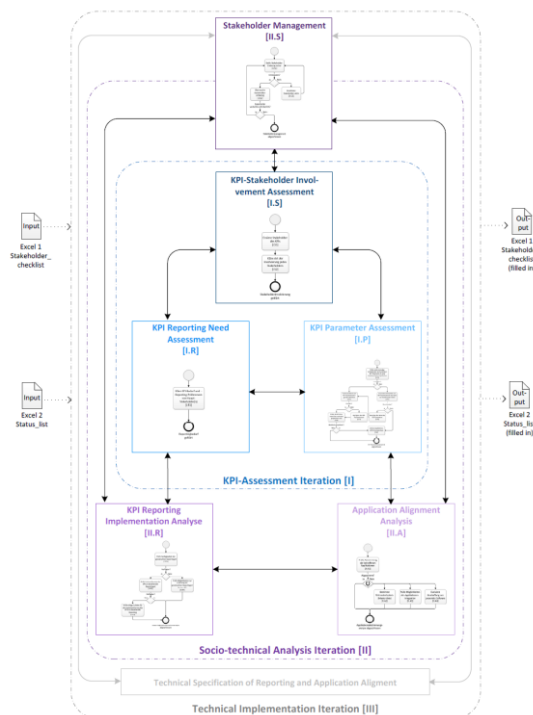


Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals

in the Context of Non-medical Support Services in Hospitals

Documentation for Application



1st part: Introduction / Objectives / Benefit

2nd part: Instructions for the Application in Practice

3rd part: Background Information

October 2019
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Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals

**in the Context of Non-medical Support Services in
Hospitals**

Documentation

1st part: Introduction / Objectives / Benefit

1 Introduction

1.1 Target Group of Documentation

This document was put together for people who deal with key performance indicator and reporting applications in the context of non-medical support services in hospitals (Logistics, Infrastructure, Hygiene, Safety & Security, Hotel Services; for background information see 3rd part of this documentation).

1.2 Objectives of Procedure Reference Model

The goal of the procedure reference model is to

- provide a systematic, holistic and practice oriented basis for target group the mentioned above to enable a subsequent technical implementation of key performance indicator and reporting application alignment
- make the complexity in this context more manageable
- avoid subsequent errors by using a systematic procedure
- offer a basis for a positive dialogue between the responsible ICT managers and the stakeholders involved
- support the hospitals in their endeavour to align and adjust their application and thereby to influence the cost benefit ratio in this context positively in a medium- to long-term perspective

1.3 Recommended Use of Procedure Reference Model

Applying the model is recommended when

- the reporting of a new key performance indicator (KPI) is supposed to be introduced
- the reporting of existing key performance indicators is supposed to be redesigned
- the generation of existing key performance indicators is supposed to be verified in the overall context
- key performance indicators are supposed to be aligned / harmonized overall
- the key performance indicator and reporting applications are supposed to be harmonized or integrated

The scenarios mentioned above are outlined in detail in Table 1.

Table 1: Scenarios for the application of the model

Scenario	Potential procedure	Notes
Generation and reporting of new KPIs (1-n)	<ol style="list-style-type: none"> 1. Determination of desired parameters and reporting form and possibly further stakeholders by the ICT with the initiator (I.P + I.R + I.S) 2. Analysis of reporting implementation and application alignment by ICT (II.R + II.A) 3. Stakeholder management as required by ICT (II.S) 4. Iterations according to the need assessed with the stakeholders per KPI 5. Inclusion of model application in continual service improvement measures of business operations 	<p>Clarification of existing possibilities will probably trigger questions about optimisation of the existing situation and might have a greater impact than initially thought; suggestion: enable low-threshold KPI reporting in the short term and align, plan and initiate a bigger project to optimise the application landscape (cf. scenario 5).</p>
New reporting of existing KPIs	<ol style="list-style-type: none"> 1. Determination of desired form of reporting by ICT with initiator (I.R) 2. Determination of parameters involved by ICT (I.P) 3. Determination of possible additional stakeholders by ICT (I.S) 4. Analysis of reporting implementation and application alignment by ICT in the existing application and reporting landscape (II.R + II.A) 5. Stakeholder management as required by ICT (II.S) 6. Discussion about further steps with stakeholders iterations as required per KPI 7. Inclusion of model application in continual service improvement measures of business operations 	<p>Clarification of existing possibilities will probably trigger questions about optimisation of the existing situation and might have a greater impact than initially thought; suggestion: enable low-threshold KPI reporting in a short term and align and plan and initiate a bigger project to optimize the application landscape (cf. scenario 5).</p>
Specific existing KPIs (for a particular subject area) shall be determined and chosen systematically and subsequently reported	<ol style="list-style-type: none"> 1. Discussion about objectives of KPIs according to strategy/set targets by superordinate, strategic-tactical body 2. Determination of KPI good practices and existing preferences as a basis by a superordinate body or by the project leader 3. Determination of the desired parameters and reporting form by ICT with subject area (I.P + I.R) 4. Determination of possible additional stakeholders by ICT or project leader (I.S) 5. Analysis of reporting implementation and application alignment by ICT (II.R + II.A) 6. Stakeholder management as required by ICT or project leader (II.S) 7. Joint iterative workshops: Clarification of the need, existing situation, possibility of implementation, cost/benefit ratio with regard to the targets. 8. Inclusion of model application in continual service improvement measures of business operations 	<p>For the superordinate assurance of a goal-oriented project procedure, the nomination of a project leader is highly recommended.</p>

Continuation

Scenario	Potential procedure	Notes
Existing KPIs or reporting from different subject areas are to be harmonised	<ol style="list-style-type: none"> 1. Objectives and scope of the harmonisation have to be clarified by a superordinate strategic-tactical body 2. Determination of KPI good practices and existing preferences as basis by superordinate body or project leader 3. Analysis of reporting implementation and application alignment in existing application/reporting landscape by ICT (II.R + II.A) 4. Determination of possible further stakeholders by ICT or project leader (I.S) 5. Critical review of the desired parameters and reporting form by ICT or project leader with subject area (I.P + I.R) 6. Stakeholder management as required by ICT or project leader (II.S) 7. Presentation of the starting position and possible alternatives by ICT and/or project leader 8. Decision about further procedure by superordinate strategic-tactical body 9. Further iterations as required 10. Inclusion of model application in continual service improvement measures of business operations 	<p>For the superordinate assurance of a goal-oriented project procedure, the nomination of a project leader is highly recommended.</p>
Applications shall be aligned or integrated in a better manner	<ol style="list-style-type: none"> 1. Objectives and scope of the harmonization have to be clarified by a superordinate strategic-tactical body 2. Define scope of subject area and prioritisation of individual areas by ICT or superordinate strategic-tactical body 3. Determination of stakeholder by ICT or project leader (I.S) 4. Analysis of reporting implementation and application alignment by ICT in existing application/reporting landscape (II.R + II.A) 5. Stakeholder management as required by ICT or project leader (II.S) 6. Critical review of the requested parameter and reporting form by ICT or project leader with subject area (I.P + I.R) 7. Presentation of the starting position and possible alternatives by ICT and/or project leader 8. Decision about further procedure by superordinate strategic-tactical body 9. Further iterations as required 10. Inclusion of model application in continual service improvement measures of business operations 	<p>For the superordinate assurance of a goal-oriented project procedure, the nomination of a project leader is highly recommended.</p> <p>Instead of tackling all subject areas at once, a procedure along prioritised areas is suggested in order to prevent a project failure due to excessive complexity. After an initial clarification iteration, further iterations can be included in which the focus can be extended.</p>

1.4 Effort-Benefit Ratio of the Procedure Reference Model

It is clear that familiarisation with the model documentation and the first-time application requires an initial effort. In addition, the systematic procedure requires, in the short-term, more time than ad hoc procedures. As the model can be re-used in the same form in different contexts, the effort of using the model decreases with the increasing application, particularly when the tool is repeatedly applied by people versed in taking the role of a super users.

Medium- to long-term, the application of the model can potentially lead to

- reduction of complexity
- increased transparency
- improved stakeholder communication
- better controlling
- resource optimization
- increased safety and security
- cost reduction

in operating and maintaining applications. Thus, the initial effort pays off medium- to long-term in a variety of respects.

1.5 Objective of this Documentation

The documentation provides the basis for the

- general understanding and the interrelations of the model (1st part)
- specific application of the model in practice (2nd part)
- further background information upon requirement and/or interest (3rd part)

1.6 Contact

The development of the model and the documentation was conducted in the context of my dissertation at Liverpool John Moores University. For specific questions or feedback, I can be contacted at:

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Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals

**in the Context of Non-medical Support Services in
Hospitals**

Documentation for Application 2nd part: Instructions for the Application in Practice

2 Instructions for the Application in Practice

2.1 Introduction to the Basic Principles of the Model

2.1.1 Components of the Model

The procedure reference model consists of

- the presentation of the procedure reference model including the notation legend (cf. chapter 2.2)
- six component models, including step by step descriptions in tabular form (cf. chapter 2.3)
- two input documents Excel tables
- this documentation

2.1.2 Iterations Within the Model

The procedure reference model shows **two iterations**:

- the [KPI Assessment Iteration \[I\]](#) and
- the [Socio-technical Analysis Iteration \[II\]](#)

Each iteration consists of three component models:

[KPI Assessment Iteration \[I\]:](#)

- [KPI-Stakeholder Involvement Assessment Sub-Process \[I.S\]](#)
- [KPI-Reporting Need Assessment Sub-Process \[I.R\]](#)
- [KPI-Parameter-Assessment Sub-Process \[I.P\]](#)

[Socio-technical Analysis Iteration \[II\]](#)

- [Stakeholder Management Sub-Process \[II.S\]](#)
- [KPI Reporting Implementation Analysis Sub-Process \[II.R\]](#)
- [Application Alignment Analysis Sub-Process \[II.A\]](#)

The superordinate principle of the procedure is iterative – both within as well as between the two iterations. The iterations can be gone through in varying sequence as often as necessary.

2.1.3 Input Documents

Input documents are two Excel table templates:

- [Excel1_Stakeholder_checklist.xlsx](#)
- [Excel2_Status_list.xlsx](#)

The input documents get continuously filled in in the course of action and thus become output documents.

2.1.4 Free Accessibility

All model parts, input documents, as well as this documentation, are freely accessible (<https://www.zhaw.ch/ifm/fm-healthcare/procedure-reference-model> or <http://www.projektschrittmacherin.ch/publikationen.html>) and can be used and adapted to the needs of the different institutions; this is the reason why widespread Microsoft Office programmes and standardised modelling languages were used.

2.1.5 Importance of Stakeholder Management

A preceding survey had revealed that not the technical application is of primary importance, but the stakeholder management; this aspect was therefore put in the centre of the model, also visually.

2.1.6 Brief Instruction for the Application in Practice

- Check which scenario from Table 1 is applicable for your case.
- Familiarise yourself with the process reference model by reading this documentation.
- Ensure that the hospital top management understands the importance of information management and support services.
- Obtain the official responsibility and the accordingly necessary resources and competences in order to proceed.
- Use Table 1 as a guide for the procedure.
- Execute the sub-processes as described in chapter 2.3 et seq.
- Document the procedure in the two input documents
 - Excel1_Stakeholder_checklist.xlsx
 - Excel2_Status_list.xlsx
- If needed or if you are interested, consult the background information in chapter 3 of this documentation.
- If you need support, cf. chapter 1.5.

2.2 Procedure Reference Model

The procedure reference model was set up in the BPMN 2.0 notation. The corresponding notation is illustrated in Figure 1 and the model itself in Figure 2.

Modelling Notation BPMN 2.0

based on Allweyer (2010), BPMN Offensive Berlin (2011), Freund & Rücker (2017) and OMG (2011)

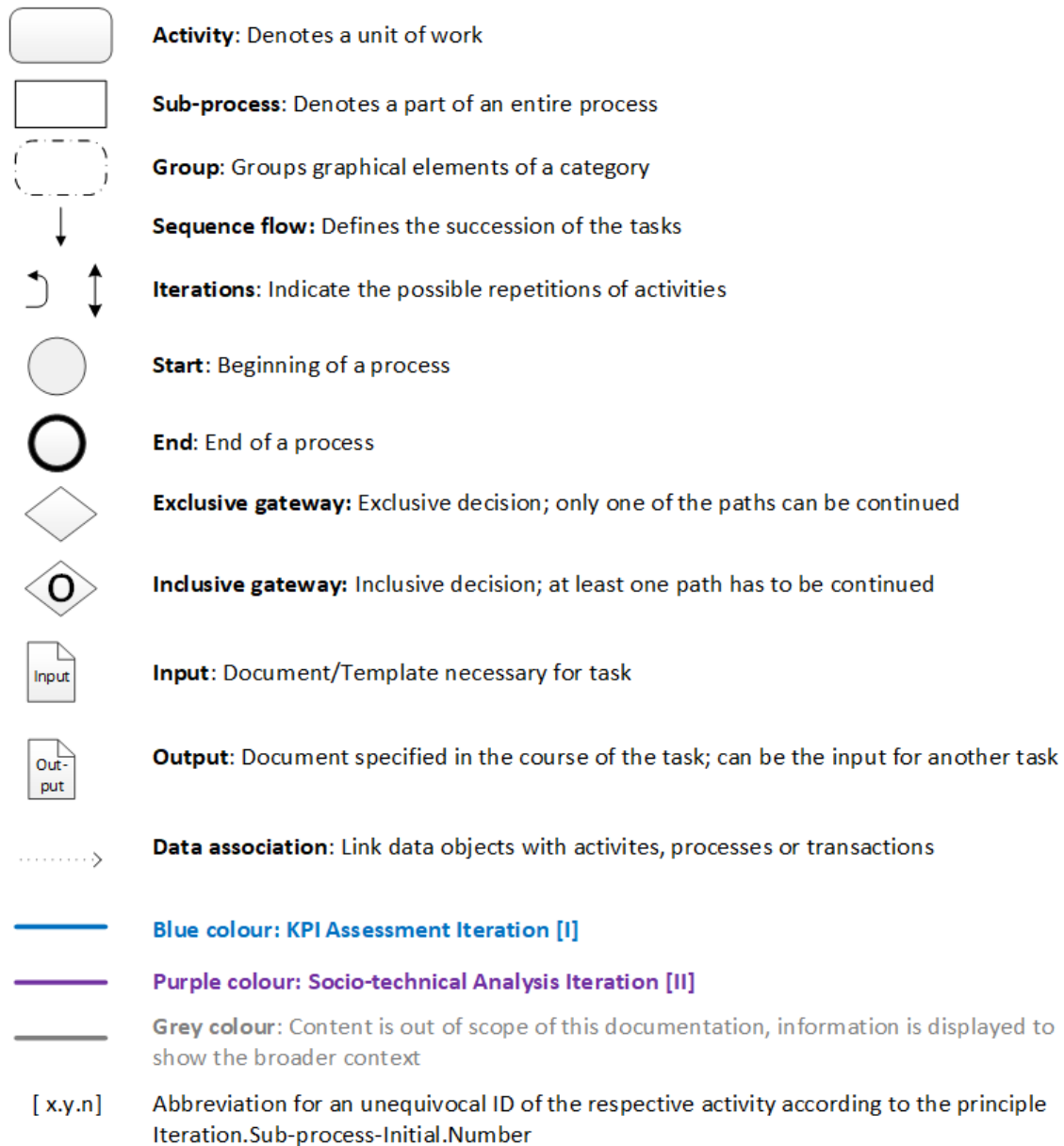


Figure 1: Notation of the Procedure Reference Model

Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals in the Context of Non-medical Support Services in Hospitals

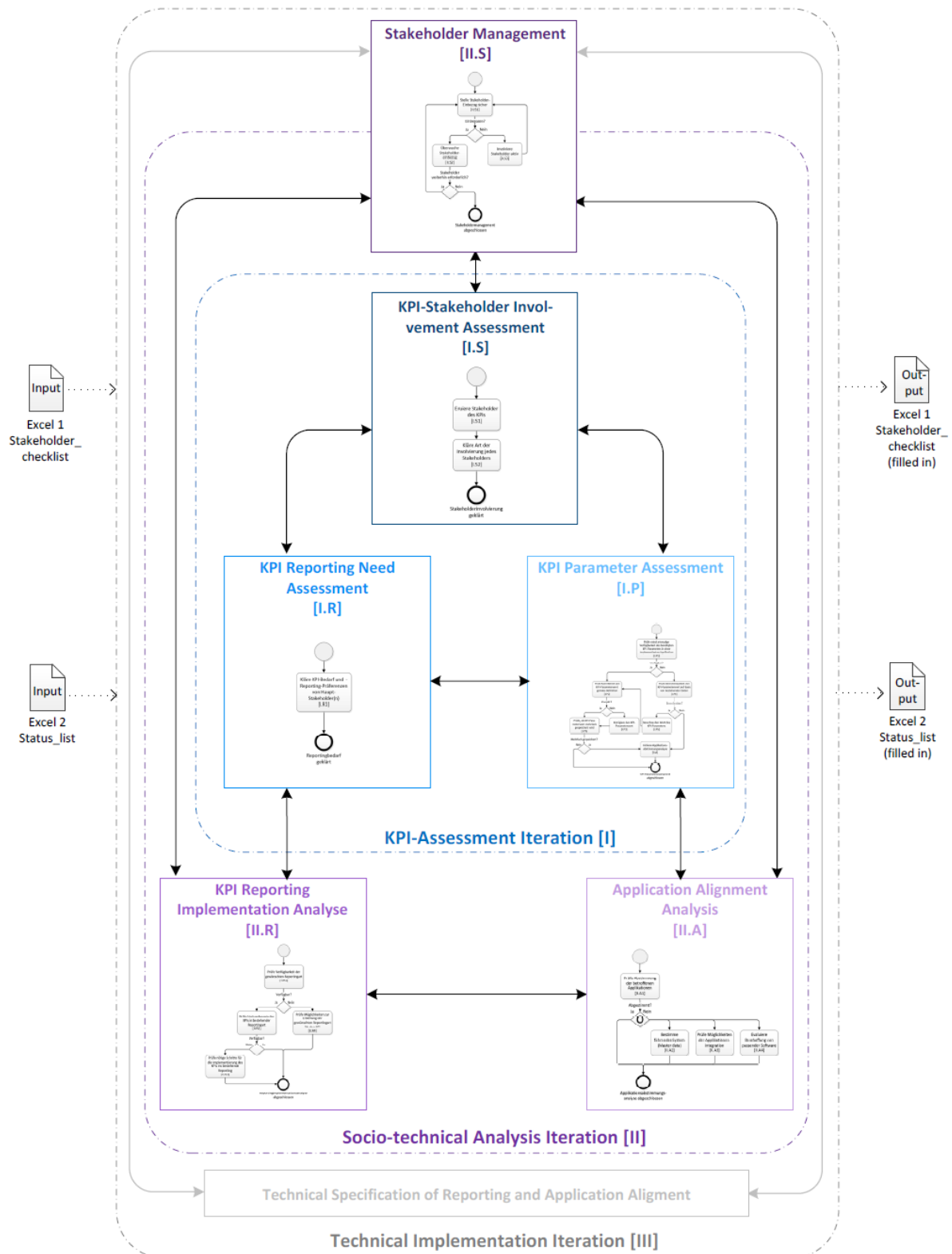


Figure 2: Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals

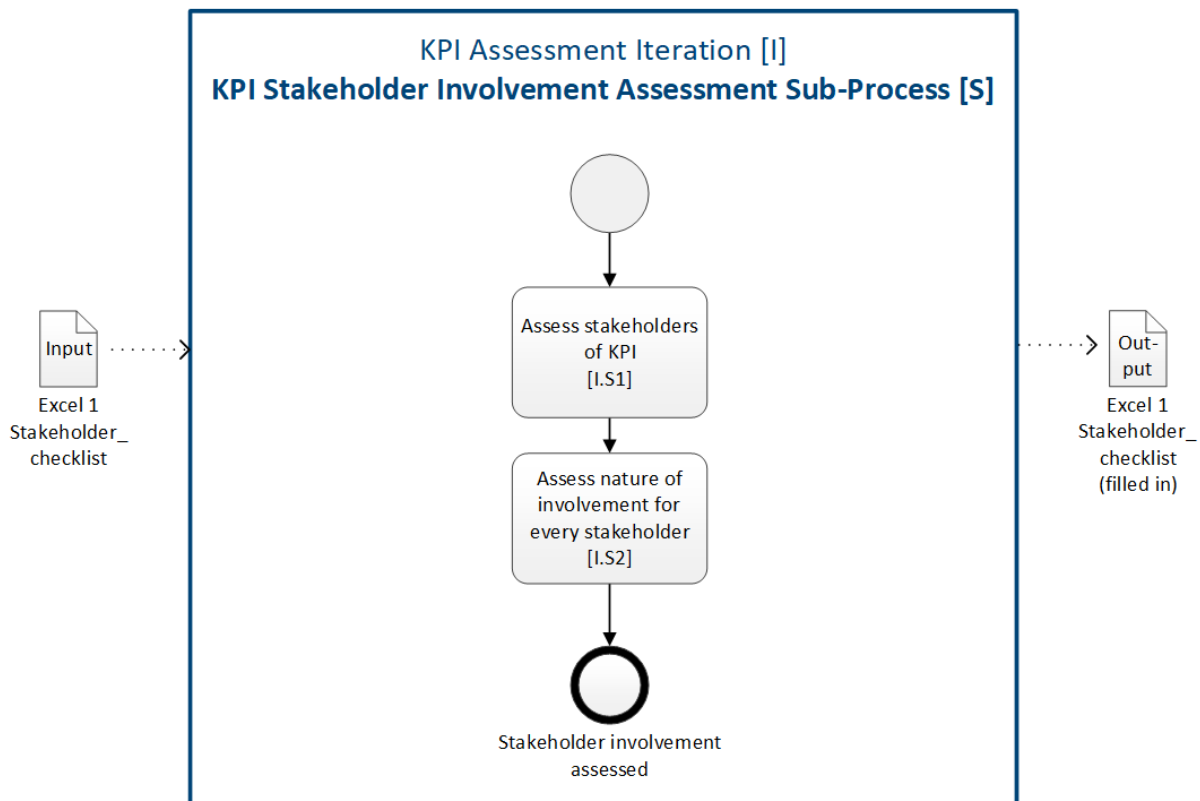
2.3 Component Models

The component models are, as with the procedure reference model, setup with the BPMN 2.0 notation shown in der BPMN 2.0-Notation (cf. Figure 1).

2.3.1 Component Models of KPI Assessment Iteration [I]

The processes are iterative (cf. chapter 2) and can therefore be run through in various orders and in differing intensity, according to the specific needs; therefore, the order of illustrations presented below is not mandatory.

2.3.1.1 KPI Stakeholder Involvement Assessment Sub-process [S]

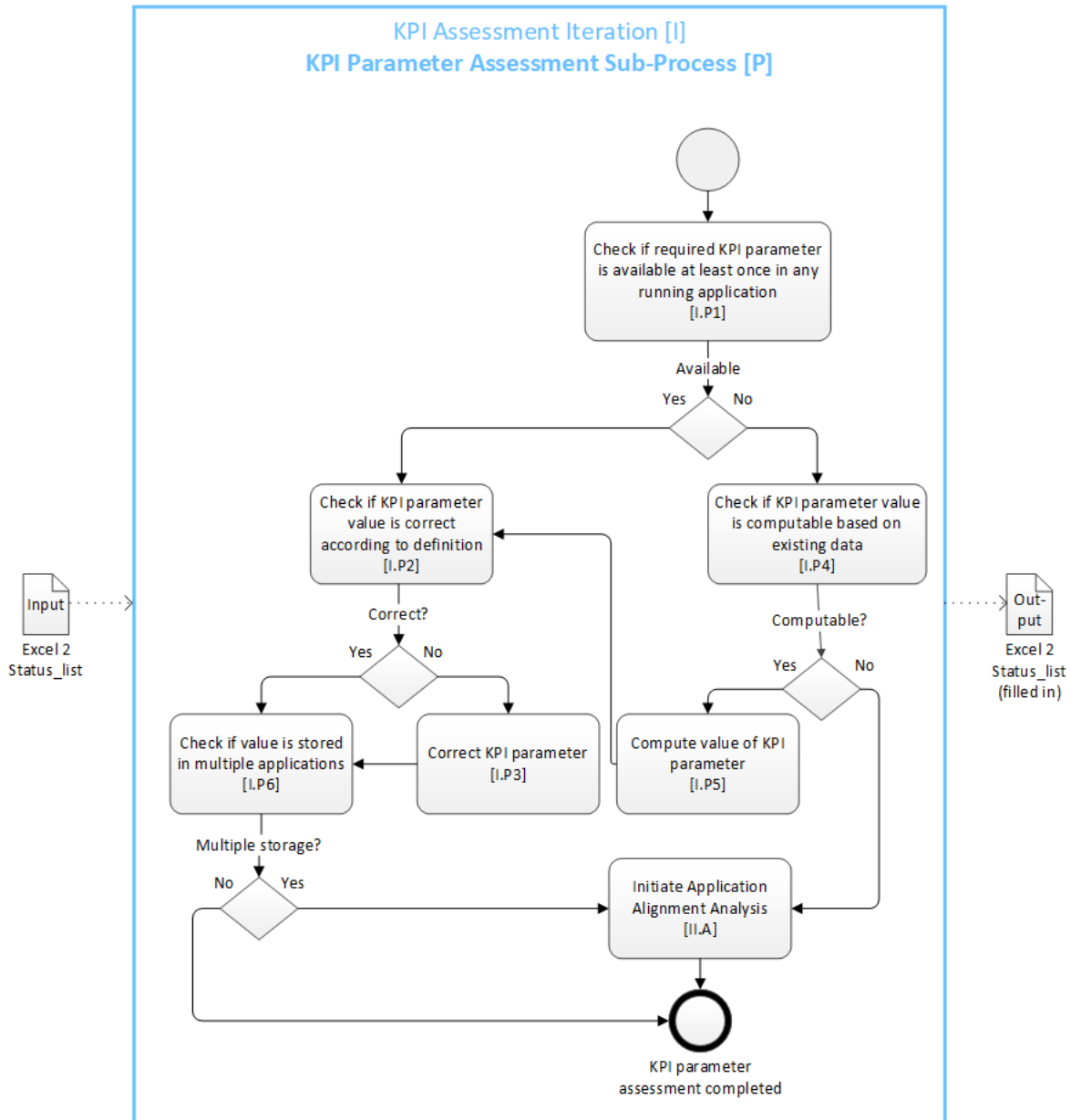


ID	Activity	Explanation
I.S1	Assess Stakeholder of KPIs	The input document serves as a checklist for identifying the stakeholders of the desired/required KPI. The goal is that all the essential stakeholders from the different areas are known in order to facilitate stakeholder management The input document has to be filled in accordingly.
I.S2	Assess nature of involvement for every stakeholder	In order to derive the stakeholder management measures, it is important to clarify in what form and to what extent a stakeholder is involved in the further process. The input document has to be filled in accordingly.

Input document: Excel1_Stakeholder_checklist.xlsx (URL cf. chapter 2.5)

2.3.1.2 KPI Parameter Assessment Sub-Process [P]

As a KPI consists of at least two parameters (cf. chapter 3.2.2), for every KPI the corresponding parameters have to be assessed separately, which means at least two iterations for every KPI.



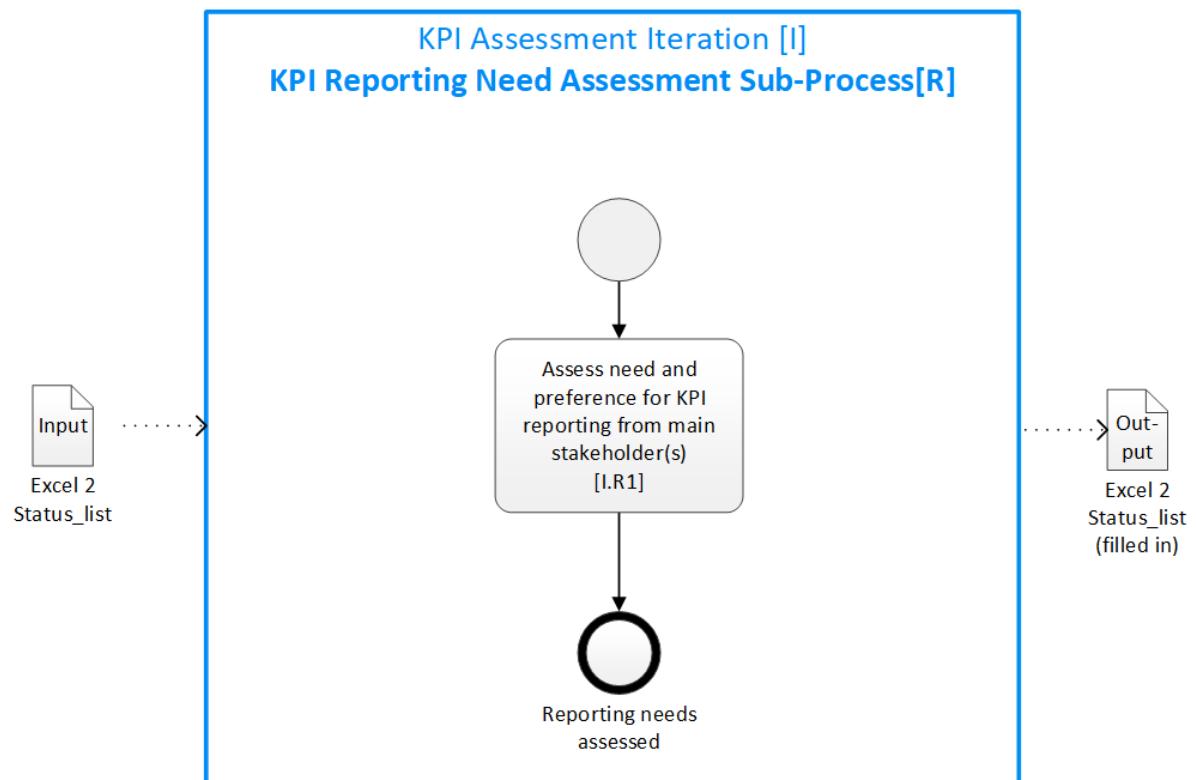
ID	Activity	Explanation
I.P1	Check if required KPI parameter is available at least once in any implemented application	Is the desired/necessary KPI and its parameters available at least once in any application? The input document has to be filled in accordingly.

Continuation

ID	Activity	Explanation
I.P2	Check if KPI parameter value is correct according to the definition	Is the desired/necessary KPI and its parameters correct according to the KPI definition (either defined in-house or under https://www.zhaw.ch/en/lisfm/institutes-centres/ifm/about-us/hospitality-management/fm-in-healthcare/remos/kenkas/ . The input document has to be filled in accordingly.
I.P3	Correct KPI parameter value	If the value is not correct according to the definition, it has to be corrected with the appropriate measures. The input document has to be filled in accordingly.
I.P4	Check if KPI parameter value is computable based on existing data	If the desired/necessary KPI parameter value is not yet available, check if the value can be calculated according to the definition on the basis of the available partial values. The input document has to be filled in accordingly.
I.P5	Compute value of KPI parameter	If the desired/necessary KPI parameter values can be calculated on the basis of available partial values, the calculation has to be executed. The input document has to be filled in accordingly.
I.P6	Check if value is stored in multiple applications	In order to avoid redundancies, check if the KPI parameter is stored in multiple applications. The input document has to be filled in accordingly.
IIA	Initiate Application Alignment Analysis (II.A)	cf. chapter 2.3.2.3

Input document: Excel2_Status_list.xlsx (URL cf. chapter 2.5)

2.3.1.3 KPI Reporting Need Assessment Sub-Process [R]

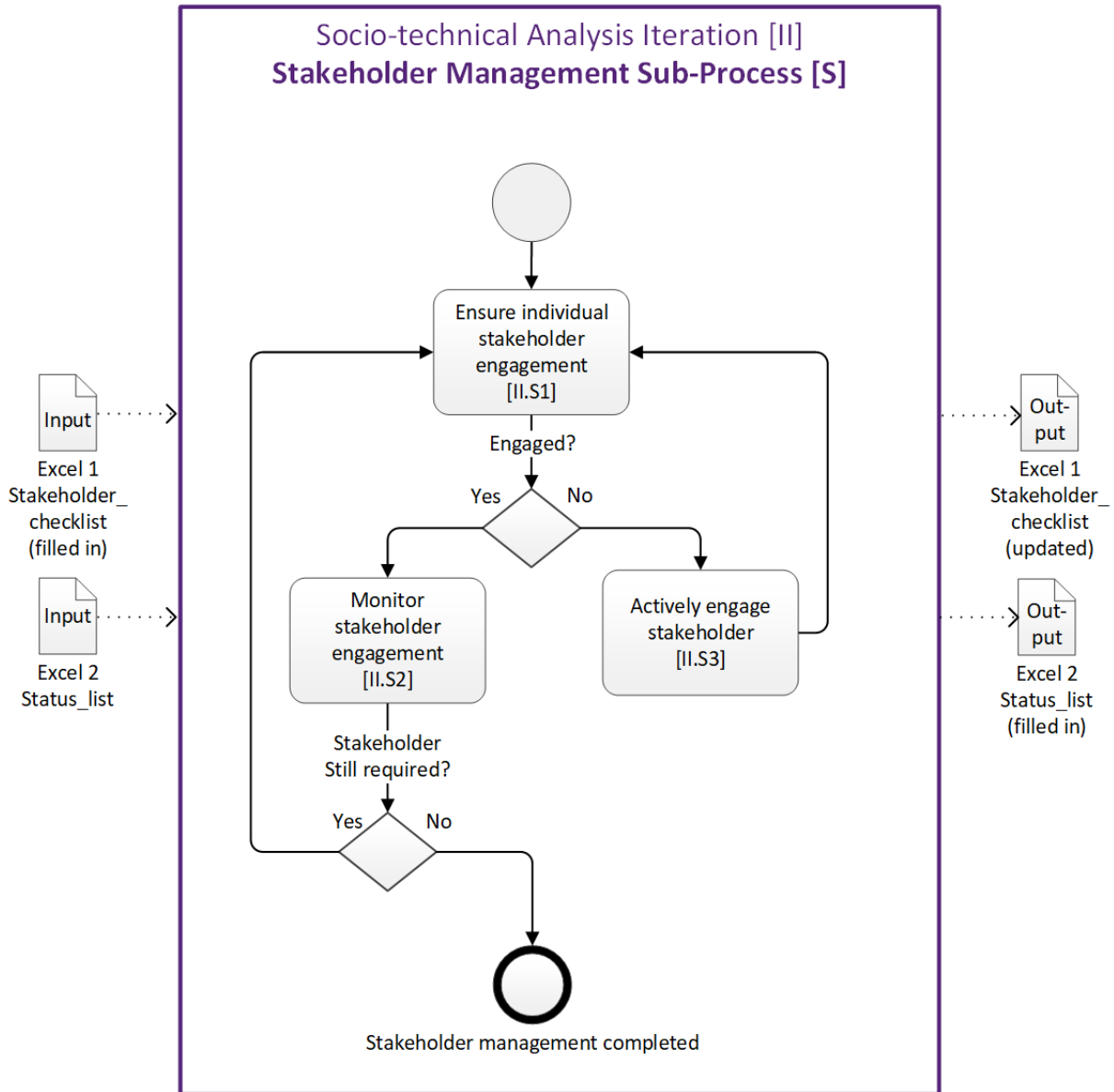


ID	Activity	Explanation
I.R1	Assess need and preference for KPI reporting from main stakeholder(s)	The input document supports the assessment of the KPI need and the reporting preferences. The goal is to carry out the KPI reporting as optimally as possible with respect to the cost-benefit relationship. The input document has to be filled in accordingly.

Input document: Excel2_Status_list.xlsx (URL cf. chapter 2.5)

2.3.2 Socio-technical Analysis Iteration [II]

2.3.2.1 Stakeholder Management Sub-Process [S]



ID	Activity	Explanation
II.S1	Ensure individual stakeholder engagement	In addition to the content and technological related aspects, it is important, to pursue sensible stakeholder management. It is important that the engagement of stakeholders is continuously secured. The input document has to be filled in accordingly.
II.S2	Monitor stakeholder engagement	The assurance of stakeholder engagement has to be consciously monitored regularly. The input document has to be filled in accordingly.

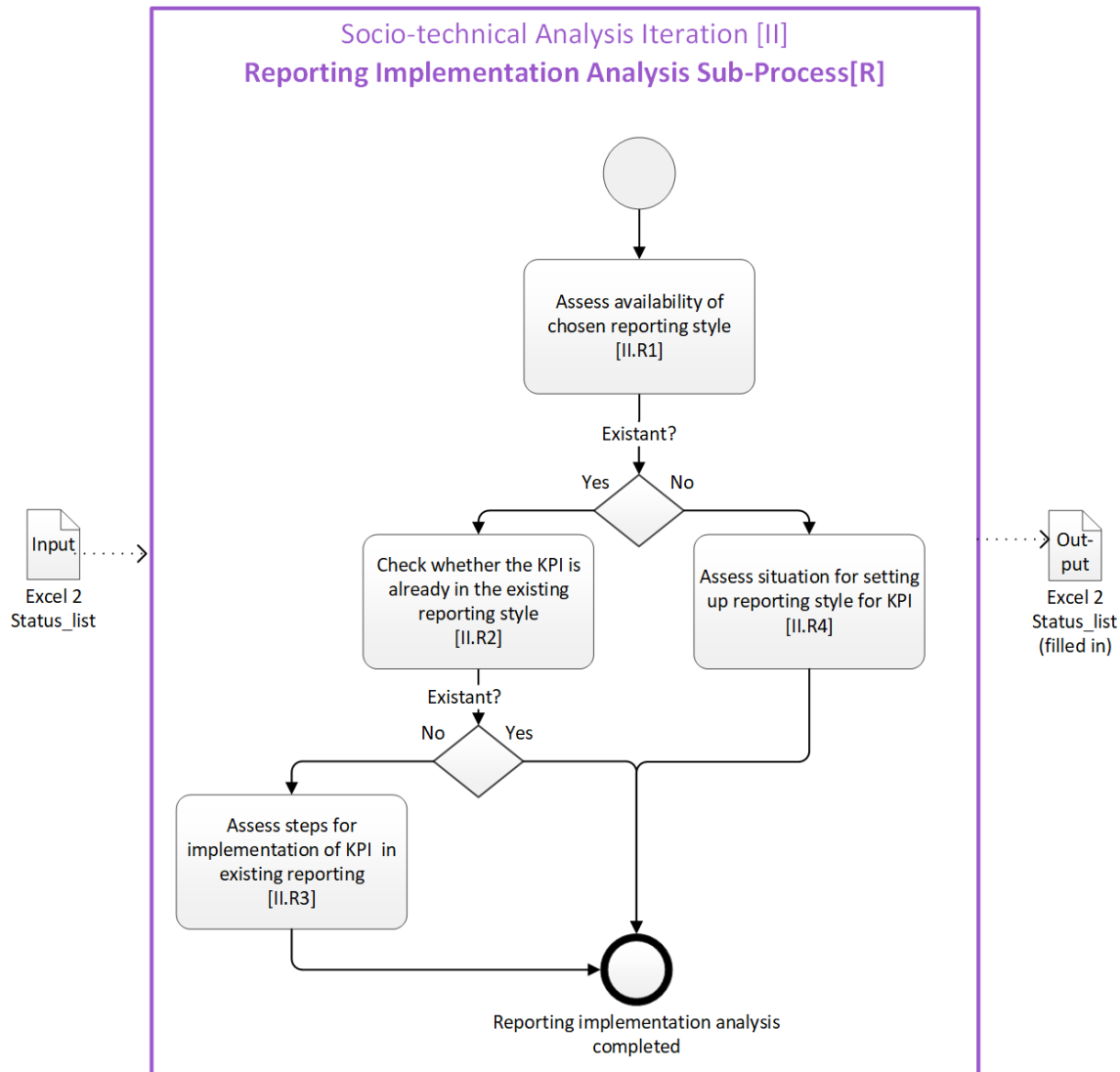
Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals in the Context of Non-medical Support Services in Hospitals

Continuation

ID	Activity	Explanation
II.S3)	Actively engage stakeholder	If the engagement of stakeholders is not secured, the engagement has to be actively induced. The input document has to be filled in accordingly.

Input documents: Excel1_Stakeholder_Checklist.xlsx and Excel2_Status_list.xlsx (URLs cf. chapter 2.5)

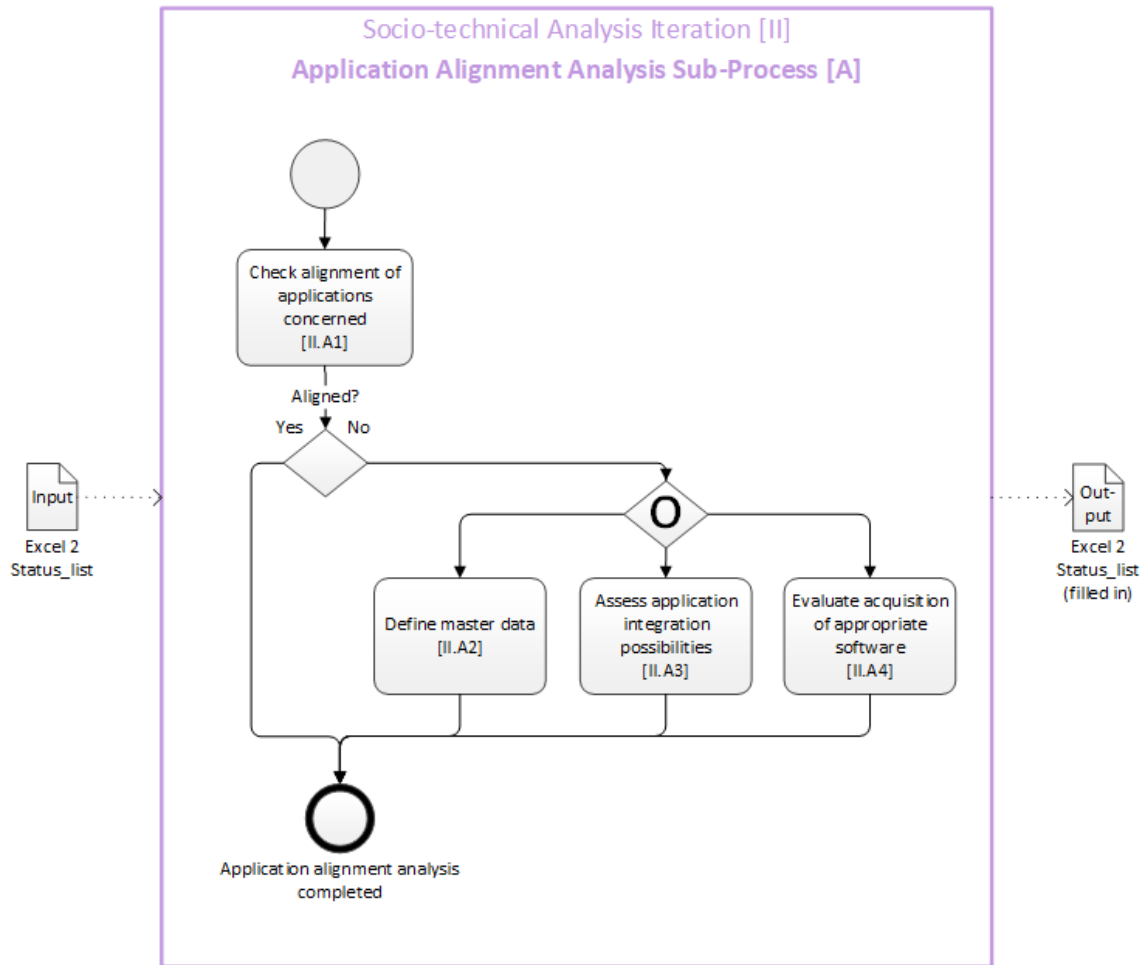
2.3.2.2 Reporting Implementation Analysis Sub-Process [R]



ID	Activity	Explanation
II.R1	Assess availability of chosen reporting style	It must be clarified whether the desired reporting style of the main stakeholder is already being applied. The input document has to be filled in accordingly.
II.R2	Check whether the KPI is already in existing reporting style	If the reporting style is available, clarify if the concerned KPI is already or could be configured. The input document has to be filled in accordingly.
II.R3	Assess steps for implementation of KPI in existing reporting	If the concerned KPI is not yet configured in the desired reporting style, check if the KPI can be implemented. The input document has to be filled in accordingly.
II.R4	Assess situation for setting up reporting style for KPI	If the reporting style is not available, check if the desired reporting style can be set up and implemented. The input document has to be filled in accordingly.

Input-Document: Excel2_Status_list.xlsx (URL cf. chapter 2.5)

2.3.2.3 Application Alignment Analysis Sub-Process [A]



ID	Activity	Explanation
II.A1	Check alignment of applications concerned	The goal is to reach a compatible, redundancy-free application alignment. Therefore, it must be clarified whether the applications involved in the KPI reporting are aligned. The input document has to be filled in accordingly.
II.A2	Define master data	If the applications involved in the KPI reporting are not aligned, it has to be clarified which of the existing systems is the leading one. The input document has to be filled in accordingly.
II.A3	Assess application integration possibilities	If the applications involved in the KPI reporting are not aligned, the possibilities for an application integration should be assessed. The input document has to be filled in accordingly.

Continuation

II.A4	Evaluate acquisition of appropriate software	If the applications involved in the KPI reporting are not aligned, the acquisition of a suitable software can be evaluated. The input document has to be filled in accordingly.
-------	--	--

Input document: Excel2_Status_list.xlsx (URL cf. chapter 2.5)

2.4 Input Documents

2.4.1 Input Document – Excel 1 Stakeholder Checklist (Template)

As the title and the format imply, the input document Excel1_Stakeholder_checklist.xlsx is a Microsoft Excel document.

The purpose of the input documents is to support the process.

The document consists of four areas displayed in four different colours as illustrated in Figure 3:

- **Grey:** Space for key performance indicators/-parameters, e.g. from "Excel1_Stakeholder_checklist.xlsx " or from own collection
- **Dark pink:** Within the different subject areas, typical stakeholders are listed. The list can be modified according to individual needs by inserting or deleting rows. The specific names can be recorded by the individual subject areas per KPI.
- **Light pink:** Nature of stakeholder involvement; in the top left legend, there are different suggestions which can be selected from the drop-down list within the correspondingly coloured section. If needed, further/other differentiations can be used.
- **Pink:** Stakeholder management measures; in the top right legend, there are different suggestions which can be selected from the drop-down list within the correspondingly coloured section. If needed, further/other differentiations can be used.

Input Document/Excel 1: Stakeholder Checklist (neutral template)

Type of stakeholder involvement to be identified for every KPI:
 OT = KPI ownership tactical (owns the KPI for tactical controlling of subject area, power influence presumably medium to high)
 OS = KPI ownership strategic (wants the KPI for strategic controlling of the enterprise, power influence presumably high)
 OO = KPI generator operational (contributes to generation of KPI by operational activities/data entering, power influence presumably low)
 OF = KPI generator on financial side (contributes to generation of KPI on financial side, power influence presumably medium to high)
 IA = KPI IT impl. of application (enables the generation of the KPI by management of application, power influence presumably medium to high)
 IR = KPI IT impl. of reporting (enables the display of the KPI by implementing the reporting, power influence presumably medium)
 XY = Others involvement to define individually
 * = Main stakeholder

Stakeholder management measures for every stakeholder:
 I = (very) high need for communication, close cooperation, joint decisions
 II = High need for information, regular communication
 III = Need for information only when affected
 IV = only official, formal information / communication
 V = to be defined individually

Fill in names if more than one person, insert rows

	Non-medical support services					Strategic Mgmt Services	IT Services	Legal, Finance, HRH, admin, Marketing	Medical staff	Hospital overall	Software providers	External divers															
	Logistic	Infrastructure	Hygiene, Safety & Security	Hotel/Service																							
	Procurement	Inventory Management	Transport & Distribution	Disposal & Recycling	Maintenance	Space Management	Energy	Safety	Cleaning	Sterilisation	Catering	Textiles	Accommodation Admin.	Hotel Var.													
KPIs from "KPI_Parameter_Excel1":																											
KPIs for specific subject area from "KPI_Parameter_Excel1":																											
see following tabs:																											
<table border="1"> <tr> <td>neutral</td> <td>Procurement</td> <td>Inventory</td> <td>Transport</td> <td>Disp_Recyc.</td> <td>Maintenance</td> <td>Space Mgm</td> <td>Energy</td> <td>Safety&Security</td> <td>Cleaning</td> <td>Steri</td> <td>Catering</td> <td>Textiles</td> <td>Accomm. Admin.</td> <td>Hotel Var.</td> </tr> </table>													neutral	Procurement	Inventory	Transport	Disp_Recyc.	Maintenance	Space Mgm	Energy	Safety&Security	Cleaning	Steri	Catering	Textiles	Accomm. Admin.	Hotel Var.
neutral	Procurement	Inventory	Transport	Disp_Recyc.	Maintenance	Space Mgm	Energy	Safety&Security	Cleaning	Steri	Catering	Textiles	Accomm. Admin.	Hotel Var.													
Stakeholder measures																											

Figure 3: Input Document „ Excel1_Stakeholder_checklist “

In addition to a neutral template, a corresponding tab is also prepared for each subject area as illustrated in Figure 4.

neutral	Procurement	Inventory	Transport	Disp_Recyc.	Maintenance	Space Mgm	Energy	Safety&Security	Cleaning	Steri	Catering	Textiles	Accomm. Admin.	Hotel Var.
---------	-------------	-----------	-----------	-------------	-------------	-----------	--------	-----------------	----------	-------	----------	----------	----------------	------------

Figure 4: Tabs in the input document

Access to input document cf. chapter 2.5.

2.4.2 Input Document/Excel 2: Status List (Template)

As the title and the format imply, the input document Excel2_Status_list.xlsx is a Microsoft Excel document.

The purpose of the input document is to support the whole procedure by making it possible to document the different process steps.

As illustrated in Figure 5, the document consists of

- the area with the listed key performance indicators (analogous to the input document „Excel1_Stakeholder_checklist.xlsx“)
- the individual activities according to the component models (explicitly identifiable by the ID)

Input Document/Excel 2: Status List for the Analysis and Specification of the Alignment of Applications of Non-Medical Support Services in Hospitals (Template)

1. Enter the desired KPIs in column 4.
2. Fill the list (please use the comment field in the template document).

ID	KPI Parameter Assessment [I.P.]				KPI Reporting Area (cf. comment field)	KPI Reporting Information Source [I.S.]				Application Alignment Measure [I.M.]				Knowledge Management [I.K.]		
	ID	Parameter Name (cf. comment field)	Parameter Description (cf. comment field)	Parameter Unit (cf. comment field)		ID	Reporting Area (cf. comment field)	ID	Reporting Area (cf. comment field)	ID	Reporting Area (cf. comment field)	ID	Reporting Area (cf. comment field)	ID	Reporting Area (cf. comment field)	ID

Figure 5: Input Document “Excel2_Status_list.xlsx”

Where appropriate, a comment was added, recognizable by a red triangle in the upper right cell corner. By placing the cursor on the red triangle, the comment appears as exemplarily shown in Figure 6.

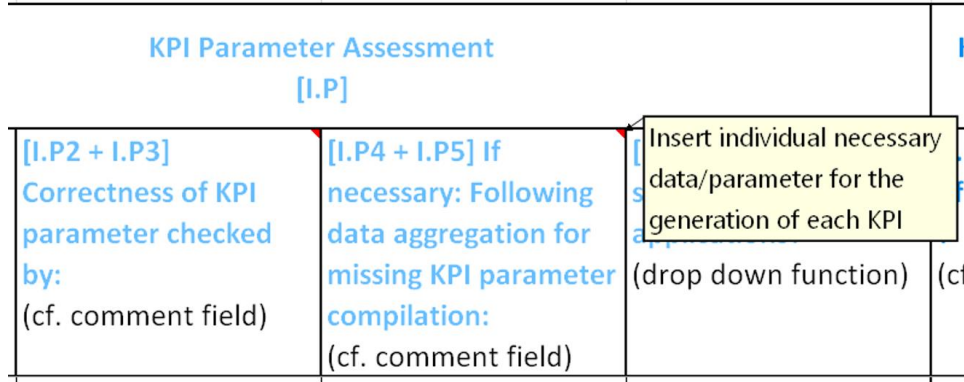
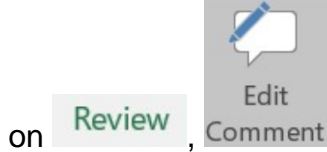


Figure 6: Show comments in input document

Should the comment field not be displayed correctly: adjust the field by clicking



Yes/No answers can be chosen via dropdown lists, all other cells can be filled in with free text (cf. Figure 7).

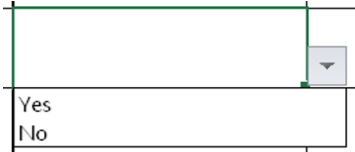


Figure 7: Example of dropdown functionality

In addition to a neutral template, here too there is a corresponding tab every subject (cf. Figure 4: Tabs in the input document

For the access to the input document cf. chapter 2.5.

2.5 Templates

The documents are all freely downloadable under <https://www.zhaw.ch/ifm/fm-healthcare/procedure-reference-model> or <http://www.projektschrittmacherin.ch/publikationen.html>

Procedure Reference Model for the Alignment of Non-medical Support Service Applications in Hospitals

**In the Context of Non-medical Support Services in
Hospitals**

**Documentation for Application
3rd part: Background Information**

3 Background Information

3.1 Starting Position

Projects conducted have revealed that many Swiss hospitals currently have not only implemented many different non-aligned applications in the context of non-medical support services, but also that the managers responsible in the non-medical areas do not have all the necessary KPIs and reporting available. The first fact presents a high risk of errors, and is inefficient and expensive; the second one means that services and resources cannot be verified and controlled systematically. To respond to this problem, a procedure reference model for the alignment of non-medical support services applications in hospitals was developed in the context of a dissertation with the goal to ensure the correct reporting and configuration of relevant KPIs.

3.2 Definition of Terms

3.2.1 Definition of the Term Non-medical Support Services

Non-medical Support Services in Hospitals are defined based on Gerber (2016) as illustrated in Figure 8:

<u>Area</u>	<u>Subject Area</u>
Logistics	Procurement, Inventory Management, Transport & Distribution, Disposal & Recycling
Infrastructure	Maintenance, Space Management, Energy
Facility Services	Safety, Security, Cleaning, Sterilization
Hotel Services	Catering, Textiles, Accommodation Administration & Operation of Properties, Hotel Various



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Figure 8: Extract from Service Allocation Model for Non-medical Support Services in Hospitals (Gerber, 2016, p. 6)

3.2.2 Definition of the Term KPIs (Key Performance Indicators) per Subject Area

The necessary key performance indicators in the subject areas mentioned above were developed in a previous project together with industry and hospital partners. The development and documentation of the corresponding KPIs are available on <https://www.zhaw.ch/en/lsvm/institutes-centres/ifm/about-us/hospitality-management/fm-in-healthcare/remos/kenkas/>. A KPI always has at least two parameters (example. cost per m2 or value of goods of medical procurement in relation to value of goods of non-medical procurement).

3.2.3 Definition of the Term “Stakeholder”

In this context, stakeholders are all people who are affected or involved in one form or another.

3.2.4 Definition of the Term “Assessment”

The term assessment has the character of assessing, judging, evaluating or determining.

3.2.5 Definition of the Term “Analysis”

Analysis as distinct from assessment is understood as in-depth examination or verification.

3.3 Delimitation

The model – and thus also the documentation – deals with the analysis, but not with the technical implementation of the application alignment.

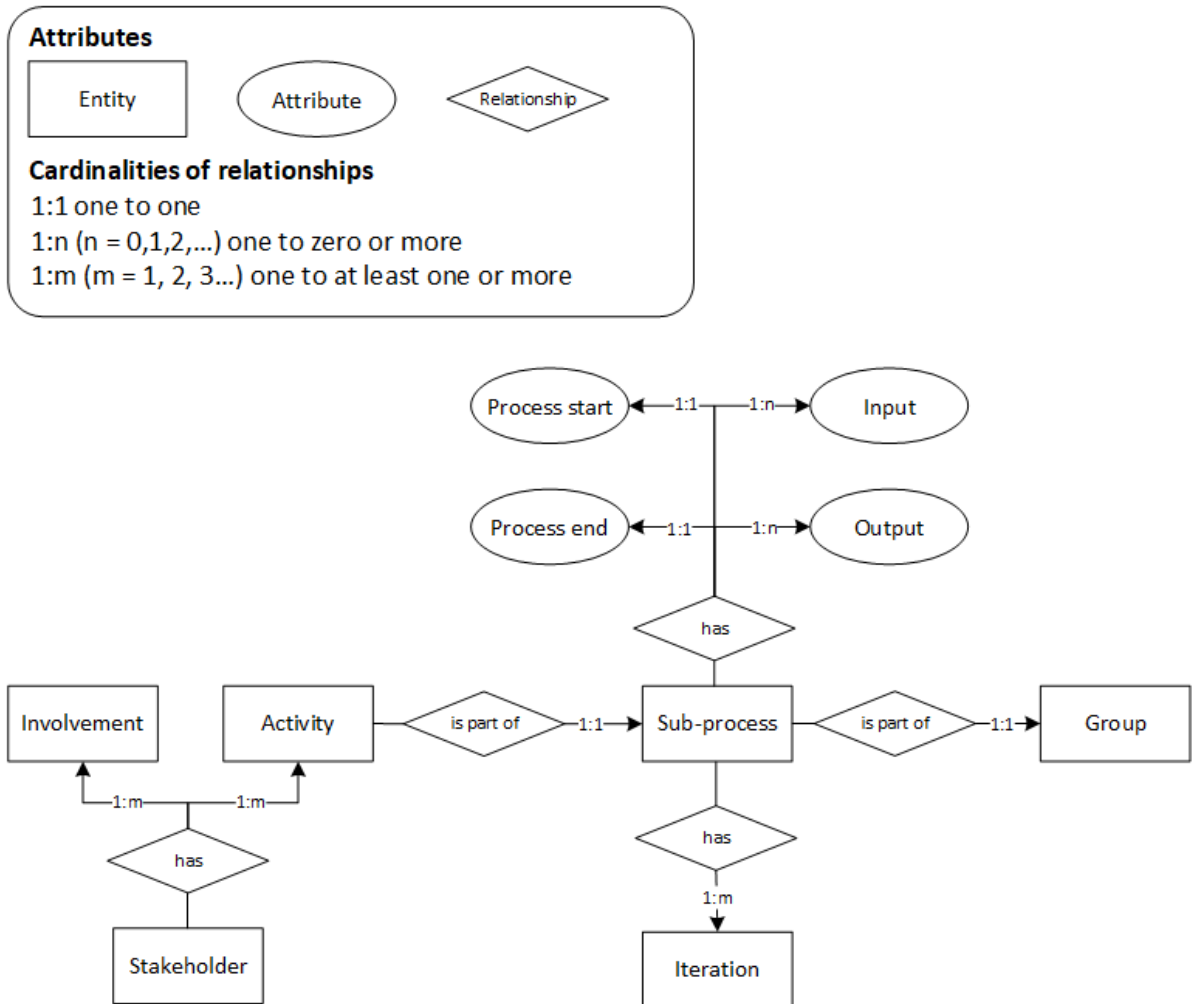
Medical applications are not dealt with either.

3.4 Metamodel

The metamodel is the conceptual basis for the procedure reference model and its component models. The metamodel is set up in the Modified Entity Relationship Model Notation (Modified Chen-Notation) based on Academic dictionaries and encyclopedias (no date), Chen (1976), Chen (1981), Chen (1991) and Chen (2002) and is illustrated in Figure 9.

Metamodel of the Reference Procedure Model for the alignment of non-medical support service applications in hospitals

Modified Entity Relationship Model notation (Modified Chen-Notation) based on Academic dictionaries and encyclopedias (n.d.); Chen (1976); Chen (1981); Chen (1991); Chen (2002)



Explication:
 A stakeholder has at least one involvement, can have different involvements (1:m)
 A stakeholder can have no, one or many specific tasks (1:m)
 A task is part of exactly one sub-process (1:1)
 A sub-process can have no, one or many inputs (1:n)
 A sub-process can have no, one or many outputs (1:n)
 A sub-process has exactly one process start (1:1)
 A sub-process has exactly one process end (1:1)
 A sub-process can have one or many iterations (1:m)
 A sub-process can be part of one or many group (1:1)

Figure 9: Metamodel of Procedure Reference Model for the Alignment of Non-medical Support Service Application in Hospitals

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