

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Programme
<b>Integrating and Strengthening the European Research Area</b>
Strategic Objective
<b>ICT Research for Innovative Government</b>
Integrated Project / Programme Title
<b>Process Identification and Clustering for Transparency in Reorganising Public Administrations</b>
Acronym
<b>PICTURE</b>
Project No
<b>027717</b>
PICTURE- Work Package Name
<b>WP3 Impact Measurement Methodology</b>

## D3.4

# Impact Measurement Methodology

Leading Partner: PLANET

Security Classification: PUBLIC

December 2007

Final Version

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

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STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

## Table of contents

1	Summary .....	4
2	Introduction .....	5
3	Impact measurement in the context of the overall PICTURE Methodology .....	7
4	Impact Measurement Methodology: Conceptual Model and Steps .....	8
5	References.....	19
Annex I	Weakness Analysis Profiles.....	20
Annex II	Mapping of ICT functionalities to benefits.....	26
Annex III	Measurement of Benefits (Indicators and Measurement units) .....	66

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

## 1 Summary

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Deliverable 3.4 presents the final ICT Impact Measurement Methodology. This methodology serves as a basis for the development of the corresponding ICT Impact Measurement Module of the PICTURE Tool.

The aim of the ICT Impact Measurement methodology is to identify and measure the impact of Information and Communication Technologies (ICTs) on Public Administration (PA) processes. The focus of the methodology is the elimination of weaknesses in processes through the support of ICTs. Specifically, the methodology focuses on the benefits (positive impact) of ICT functionality groups in addressing specific weaknesses (e.g. long process execution time, unnecessary media breaks etc.) in PA processes.

The methodology has been developed based on the findings of the state-of-art study on ICT value concepts (documented in D3.1) as well as the user and technical requirements that have been identified during the course of the PICTURE project (initially documented in D3.2).

The ICT Impact Measurement approach entails the following key steps:

- Step 1 – Identification of process characteristics.
- Step 2 – Identification of weaknesses of processes.
- Step 2 – Mapping of optimal ICT(s) to weaknesses.
- Step 3 – Identification of ICT benefits.
- Step 5 – Measurement of ICT benefits
- Step 6 – Presentation of results

A first version of the ICT Impact Measurement Methodology has been evaluated during November and December 2007 by partner cities in the project i.e. City of Amaroousson, City of Turin, City of Winterthur, City of Muenster and City of Lodz. The methodology was evaluated by conducting five focused workshop sessions in the context of the 2nd PICTURE workshop (collaboration between work packages 3 and 6). The workshops focused on the identification of further weaknesses and the evaluation of initially identified weaknesses. The users' feedback has been incorporated in the final Impact Measurement Methodology.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

## 2 Introduction

The aim of the ICT Impact Measurement methodology is to identify and measure the impact of Information and Communication Technologies (ICTs) on Public Administration (PA) processes. The focus of the methodology is the elimination of key weaknesses in processes through the support of ICTs. Specifically, the methodology focuses on the benefits of ICT Functionality Groups<sup>1</sup> in addressing specific weaknesses (e.g. long process execution time, unnecessary media breaks etc.) in PA processes. ICT benefits are addressed with respect to the following three dimensions:

- quality improvements (including the potential for focused process re-engineering),
- time savings, and
- cost savings.

The rationale of the methodology stems from the following starting point: PA decision makers, when facing a decision to invest for ICTs (e.g. document management), need to be equipped with the right information concerning the impact of a new ICT on the PA's operation. In other words, the key question addressed is: "how will a PA decide in which ICTs to invest?" The PICTURE impact measurement methodology aims to assist the PA to identify the most suitable ICTs for its organisation by identifying the benefits of ICTs on its processes. In a nutshell, it measures the benefits of ICTs by matching appropriate ICTs to processes that require optimization in specific weakness areas. In other words, the methodology is based on a focused (weakness-based) approach rather than a generic mapping of ICTs to processes.

The methodology focuses on infrastructure and integrated ICTs supporting PA processes. "A core element of modernization in public administrations lies in the support of core service delivery processes through ICTs. The current application landscape of administrations is characterised to a large extent by vertical line-of-business applications and respective datasets that are aligned along single functions or organisational units. These applications are increasingly supplemented or replaced by horizontal systems which are provided organisation-wide as modular shared services. Required investments for introduction and operation of such systems can be very well calculated today. The achievable benefits however are hardly quantifiable. Hence, qualitative and quantitative effects of newly introduced ICT are in most cases described quite vague and without measurable foundation. Organisation-wide fields of applications are often not satisfactorily identified due to lack of transparency" (Baacke et al, 2007). These deficits are intended to be addressed and resolved by the Impact Measurement Methodology.

Moreover, the methodology focuses on the impact of ICTs on the entire process landscape (i.e. all modelled processes) of a Public Administration in order to reveal the highest impact of ICTs on the PA. Based on this aggregated user scenario, it is possible to derive also other rational usage scenarios such as:

- Identify and measure the impact of ICTs on a specific cluster of processes (e.g. payment processes etc.).
- Identify and measure the impact of ICTs on one process.
- Identify and measure the impact of one ICT on the entire process landscape.
- Identify and measure the impact of one ICT on one process.

These derived scenarios will be implemented through the filtering options of the impact measurement reports (presented in detail in D5.7 "Specification of ICT Impact Measurement

<sup>1</sup> ICT Functionality Groups (ICT FGs) are specified as ICT (Information and Communication Technology) functional services. Examples are: Object Management Service, Search Service.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Module).

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

### 3 Impact measurement in the context of the overall PICTURE Methodology

The developed conceptual model for the Impact Measurement Methodology builds on the overall context of the PICTURE Methodology<sup>2</sup>, as shown in Figure 1.

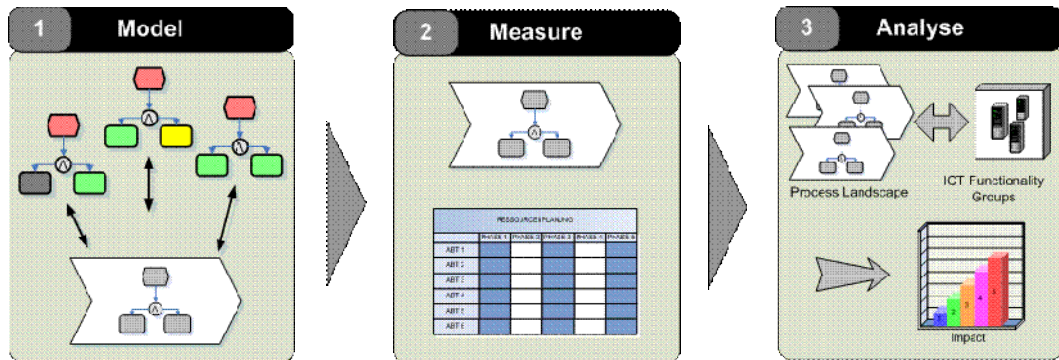


Figure 1 – Overview of PICTURE Methodology

The PICTURE methodology aims to identify potential fields of usage of new ICT as well as the quantitative and qualitative impact of its introduction to an organisation. The methodology is based on three phases:

- **Model:** In this phase, the PA models its processes in the as-as situation. Precisely, the PA models all core administrative processes using pre-defined process building blocks. This phase is supported by the process landscape module of the PICTURE Tool. The key outcome of this phase is the modelled process landscape.
- **Measure:** In the second phase, key process weaknesses as well as potential sources of inefficiency are identified through measurement of specific indicators on the captured process landscape. The PICTURE Tool (impact measurement module) subsequently identifies beneficial ICTs and measures their impact on the processes.
- **Analyse:** In the final phase, PA decision makers analyse the results and derive appropriate ICT investment decisions. Their analysis is supported by the impact measurement reports produced by the PICTURE Tool (impact measurement module).

Work packages 1 and 2 have provided the foundation to formally document the as-is situation of a public administration by modelling its processes on a high level of detail (i.e. in order to support the first phase of the PICTURE methodology “Model”).

The focus of work package 3 and this deliverable is on the Impact Measurement Methodology required to guide the development of the PICTURE Tool with respect to the second (“measure”) and third (“analyse”) phases of the overall PICTURE Methodology.

The conceptual model of the Impact Measurement Methodology is presented in detail in Section 4.1.

<sup>2</sup> The PICTURE methodology (not to be confused with the Impact Measurement Methodology) is the final integrated result of the PICTURE project and consists of the Modeling Methodology and the Impact Measurement Methodology. It is supported by the PICTURE Tool.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

#### 4 Impact Measurement Methodology: Conceptual Model and Steps

This section, presents the conceptual model as well as the specific steps of the Impact Measurement Methodology, supported throughout with examples.

##### 4.1 Conceptual Model for Impact Measurement

In order to develop the Impact Measurement Methodology, a conceptual model has been developed that defines the key conceptual elements employed and their interrelationships.

The foundation of the conceptual model for impact measurement is the documentation of the as-is situation of a public administration by modelling its processes (depicted in process models). Process models consist of different elements such as Process Building Blocks (PBBs), Attributes and Processed Objects. A Process Building Block (PBB) represents an activity that is performed during a process. PBBs are logically related and the combination of a number of PBBs depicts a whole process. PBBs are described in more detail by individual attributes such as duration, sender or communication channel. In many cases, a Processed Object (PO) is related to a PBB. POs represent physical or digital information objects that are used during a process such as messages, documents, records, certificates etc. For example a PBB may produce, send, receive or print a PO depending on the respective kind of activity and the individual PO. A PO can also be described by attributes in more detail (e.g. medium, number of pages, need for signature). Furthermore, each PBB is related to an organisational unit and can be supported by an existing ICT Functionality Group (ICT FG). ICT Functionality Groups are specified as functional ICT services, providing a granularity level to be mapped against the PBBs (specified in work package 2). The elements of a process model and its relations are shown in Figure 2.

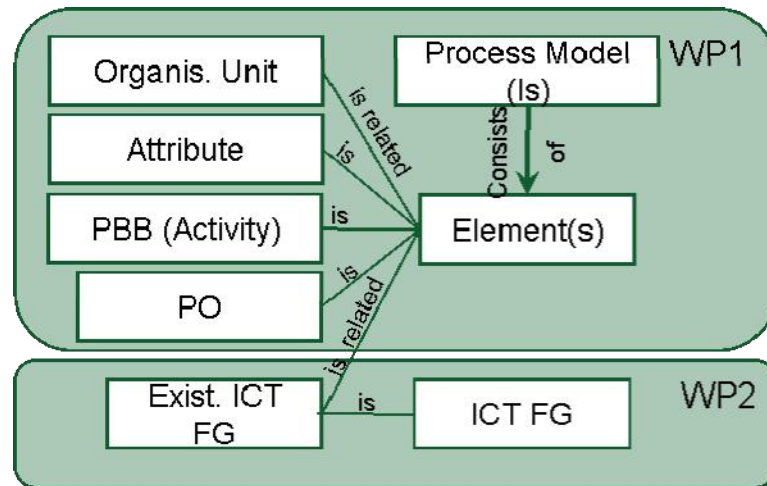


Figure 2 – As-is process model

The Impact Measurement Methodology aims to identify ICT Functionality Group potentials (i.e. new ICT FGs) that can optimise the as-is process models of a Public Administration. In order to do this, it is necessary to define which parts of a process can be supported by new ICT FGs as illustrated in

Figure 3.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

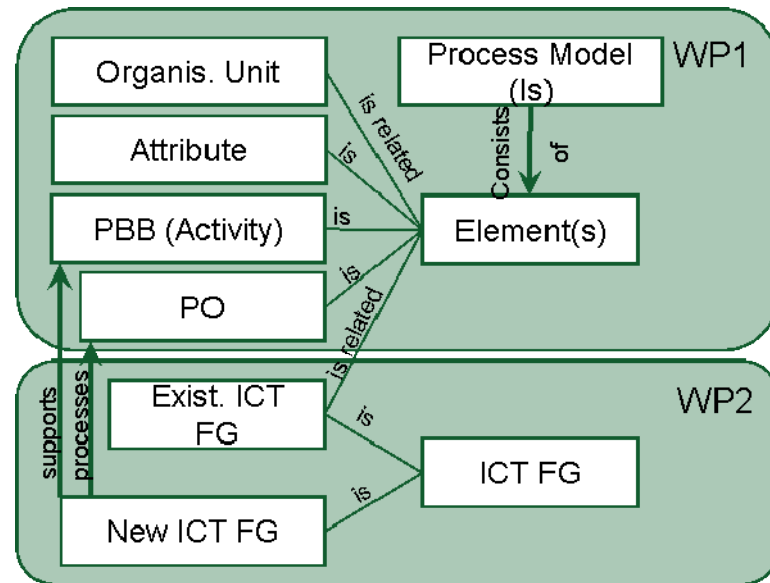


Figure 3 – Relation of New ICT FGs and As-Is Process Model

In order to identify meaningful/context-specific mappings between new ICT FGs and process parts that can be optimised, a weakness-based approach was adopted. In other words, the impact measurement methodology focuses on the identification of weaknesses that can be minimised or removed by new ICT FGs. For this purpose a number of workshops were conducted with PICTURE Public Administration partners in order to gather information on their organisational weaknesses. Weaknesses are inefficiencies in processes such as redundant documents, unnecessary media breaks, long execution times etc.

In order to identify and formalise weaknesses, the concept of a (weakness) pattern<sup>3</sup> is developed and employed. A pattern consists of a combination of elements such as PBBs, POs, Attributes, related Organisational Units and existing ICT FG (cf. Figure 4). For example, the weakness “redundant document” can be identified with a pattern consisting of PBB “copy”, with the attribute “number of copies” larger than a specified threshold.

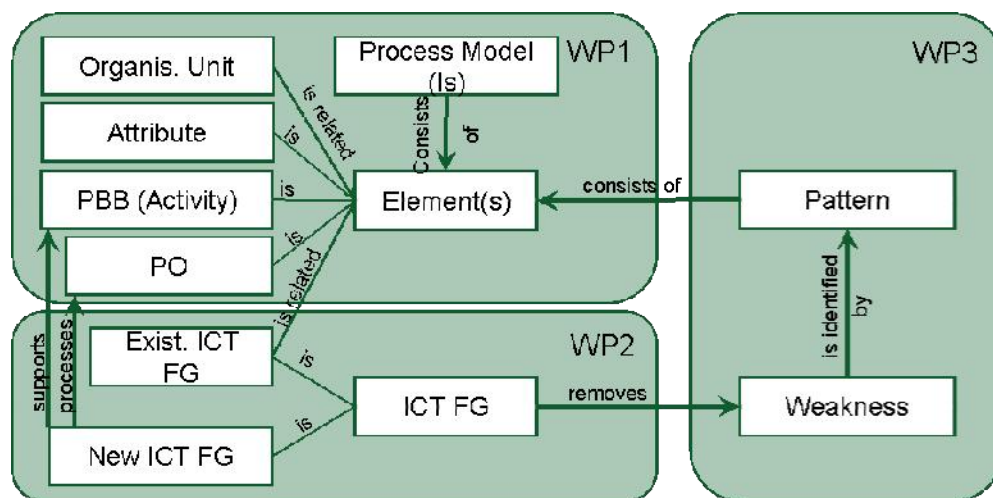


Figure 4 – Weaknesses and Patterns

<sup>3</sup> The concept of patterns is analysed in detail and described in D5.7 “Specification of ICT Impact Measurement Module”.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Once a weakness has been captured, it is possible to identify relevant ICT FGs that remove or reduce the specific weakness. The logic is that ICT-based removal or reduction of a weakness has certain impacts (benefits) on the processes affected (Figure 5). The introduction of a new ICT FG can also realise more than one benefit.

For example, the weakness “redundant documents” can be effectively minimized by a combination of Object Management Service and Library Service, rendering the following benefits among others: reduced storage/space, data integrity, reduced processing time and availability / information retrieval.

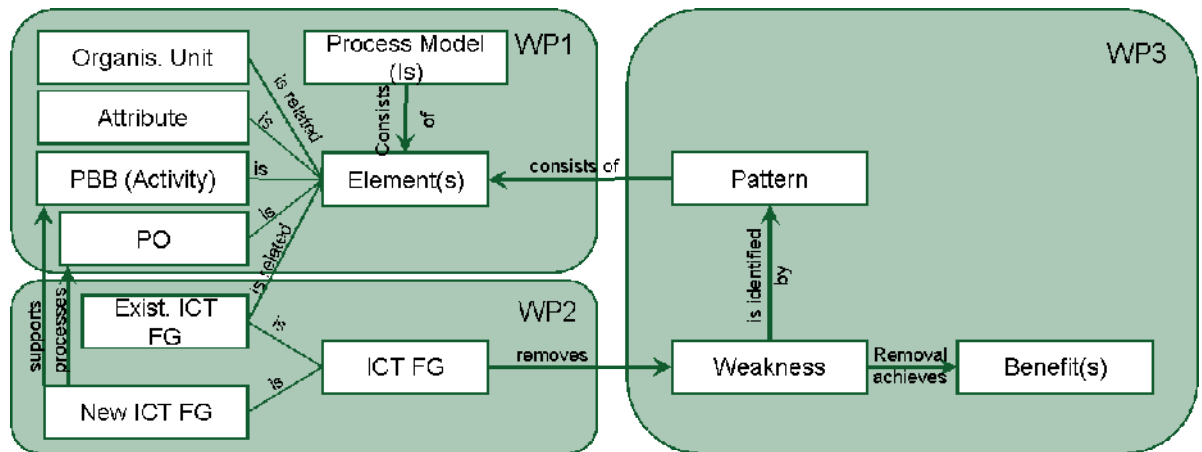


Figure 5 – Weaknesses- Patterns - Benefits

Finally, in order to be able to quantify benefits, characteristics (cf. Figure 6) of processes have to be considered. Characteristics are for example the complexity of processes (i.e. number of PBBs), the number of cases per period or the number of involved POs in a process. Such characteristics enable prioritisation of weaknesses. For the example weakness of “redundant documents”, processes can be sorted depending on the number of affected POs (which is a characteristic).

Moreover, process characteristics may point to potential weaknesses. For example, the characteristic “usage of different communication channels” can point to the existence of the weakness “high manual effort required to integrate different external communication channels”.

Figure 6 reveals the complete set of concepts and their relationships within the conceptual model for Impact Measurement.

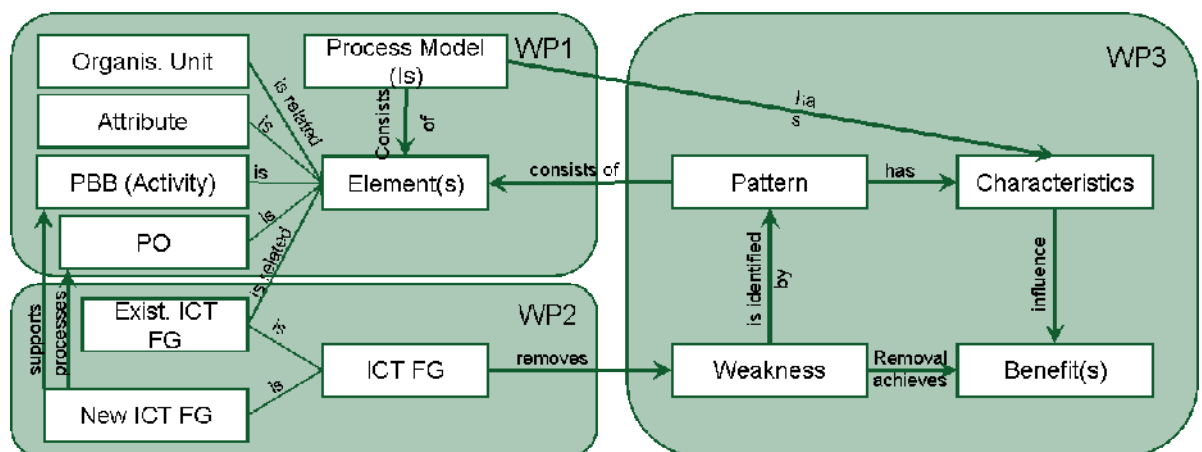


Figure 6 – Impact Measurement Conceptual Model

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

The identified conceptual elements are depicted by the key steps of the measurement methodology which are presented in the subsequent Section 4.2.

## 4.2 Impact Measurement Methodology: Key Steps

In order to support the development of the PICTURE Tool (specifically, the Tool's Impact Measurement Module), a step-wise approach has been developed which is based on the conceptual model presented in section 4.1. The approach aims to fulfil the realization of the objective of the Impact Measurement Methodology, which is to identify and measure the impact of Information and Communication Technologies (ICTs) on Public Administration (PA) processes.

The specific usage context is the following: identification and measurement of the impact of "N" ICT functionalities on the entire process landscape (consisting of "X" modelled PA processes).

A key pre-requisite in order to perform impact measurement is the availability of modelled PA processes. Specifically, the PA should have modelled all its key processes in the PICTURE Tool (with the support of the process landscaping methodology).

Subsequently, a set of six steps need to be performed for impact measurement, summarised in Figure 7.



Figure 7 – Steps of the Impact Measurement Methodology

Each step of the Impact Measurement Methodology is presented in detail as follows.

### 4.2.1 Step 1 – Identification of process characteristics

<u>Step overview:</u>	The PICTURE Tool collects information on characteristics of processes that may indicate potential weaknesses.
<u>Input/ pre-requisite:</u>	Modelled processes with sufficient information on PBB and PO attributes.
<u>Output:</u>	List of process characteristics (in the process landscape).

#### Detailed step description:

Process characteristics are identified and analysed within the process models as useful indicators that point to potential weaknesses in processes. For example, as noted earlier also, the characteristic "usage of different communication channels" may point to the existence of the weakness "manual effort required to integrate different external communication channels".

The identification of characteristics is performed via specific parameters which are often documented in the attributes of the processes. Examples of characteristics and their investigated parameters are provided in the following table.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

ID	Process characteristic title	Detailed parameters
C1	Process complexity	Number of sub-processes and number of PBBs per process.
C2	Recurrent Process Building Blocks (PBBs)	PBBs occurring most times in a process / in the process landscape (such PBBs have most impact on the whole landscape if they are improved or supported by ICT).
C3	Usage of resources	The sum of all specified needs of consumables per process / in the process landscape
C4	Number of Processed Objects (POs)	The sum of processed objects in a process / in the process landscape.
C5	Number of Processed Object Transfers	The sum of transfers of a processed object in a process/ in the process landscape.
C6	Number of organisational interface breaks	Transition of a processed object from one unit to another.
C7	Number of Processed Objects that have potential for digitization	Per process / process landscape.
C8	Number of input documents required to accompany application forms etc.	Per process / process landscape.
C9	Number of involved organisational units	The sum of organisational units involved in a process / in the process landscape. Ratio of message exchanges to number of organisational units involved.
C10	Number of external parties involved	The sum of external parties (e.g. other PAs, business partners) involved in a process / process landscape. Ratio of message exchanges to number of external parties involved.
C11	Usage of different communication channels	Types of communication channels (e.g. email, fax, in person, telephone, mail etc.) used and usage statistics per process / in the process landscape.
C12	Cycle times	Time from process start to end.
C13	Idle times	Time in between PBBs within a process (especially applicable for PBBs: wait until).

Table 1 – Key process characteristics

Characteristics also facilitate the analysis and prioritisation of identified weaknesses (supporting Step 5 “Measurement of ICT Benefits” of the methodology). In most cases, the weight of a weakness cannot be analysed until it is normalised i.e. relating to the process complexity (e.g. media breaks) or the number of cases (e.g. number of successful objections

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

against the PA).

#### 4.2.2 Step 2 - Identification of weaknesses

<u>Step overview:</u>	The PICTURE Tool identifies the key weaknesses of the modelled processes (through weakness patterns).
<u>Input/ pre-requisite:</u>	<ul style="list-style-type: none"> <li>• Modelled Processes</li> <li>• List of Process characteristics</li> </ul>
<u>Output:</u>	List of weaknesses (in the process landscape).

#### Detailed step description:

In the second step, the PICTURE Tool<sup>4</sup> identifies the key weaknesses of the modelled processes. As mentioned earlier, weaknesses are defined as inefficiencies in processes such as unnecessary media breaks, long execution times etc. Key examples of weaknesses are presented in the following table.

An extended list of weaknesses and their analysis profiles (that map the weakness to relevant ICTs, benefits and measurement of the benefits in detail) is presented in Annex I.

The specific weakness patterns (combinations combination of process elements such as PBBs, POs, Attributes, related Organisational Units and existing ICT FG) employed for the identification of weaknesses are documented in D5.7 "Specification of ICT Impact Measurement Module".

ID	Weakness name	Definition / Description
W1	Unclear storage location of documents	It is not clear where the original document is stored. As a result, civil servants spend much time searching for an appropriate document.
W2	Redundant documents	Many printed / electronic copies of documents are created that are unnecessary (not required by legislation); redundant use of paper.
W3	Different templates for same document / activity (lack of standardization)	Different templates are available for the same document or activity performed by civil servants.
W4	Manual effort to integrate different input / external communication channels	Data / information from external sources is received via different channels (e.g. in municipalities' office, mail, email, internal mail, internet, fax). As a result, high manual effort is required to integrate and process the input channels. Also, the use of multiple external communication channels (e.g. fax, telephone, internet etc.) causes delays and possible errors (especially in unstructured communication channels such as telephone).
W5	Manual effort to integrate different input channels for	Applications and requests can be triggered via a vast amount of different channels (in municipalities' office,

<sup>4</sup> Hereinafter, referred to also as "the Tool"

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

ID	Weakness name	Definition / Description
	internal data	mail, email, internal mail, internet, fax) for internal PA data.
W6	Different systems are used for the same process / activity	Different IT systems are used to perform the same process or activity in different departments/ by different people.
W7	Lack of integration between systems	Many different applications are used in one process in the Public Administration that often are not well integrated.
W8	Tracking of processes is not possible	No systems are available that can be used to track the progress of a process and to find out who is currently working on a particular request. Also, the hand-over of tasks between civil servants is not ensured / cannot be tracked. This means that there is a time frame in which a task is not assigned to a particular person.
W9	Redundant data sets	It is not clear who maintains the master data set and what data sets are replications within the PA.
W10	Multiple format of data	The same data is stored in multiple formats e.g. printed paper, floppy disks etc.
W11	Multiple redundant signatures required	Many signatures (not required by official legislation) are requested by many PA personnel causing time bottlenecks.
W12	Unnecessary media break	Unnecessary change in medium or channel of processed object e.g. from electronic format to paper.

Table 2 – Key process weaknesses

It should be noted that the weaknesses identified serve as an initial set for the development of the PICTURE Tool and as a “proof of concept”. The PICTURE tool will be flexible and adaptive enough so as to enable Public Administrations to identify further weaknesses (or modify existing ones) according to their organisations’ specific characteristics and situation.

#### 4.2.3 Step 3 – Mapping of optimal ICTs to weaknesses

<u>Step overview:</u>	The PICTURE Tool identifies which ICT (s) can most optimally remove or minimize the identified weaknesses (from Step 1).
<u>Input/ pre-requisite:</u>	<ul style="list-style-type: none"> <li>List of weaknesses in the process landscape</li> <li>Weakness analysis profiles</li> </ul>
<u>Output:</u>	Optimal ICTs mapped to weaknesses

#### Detailed step description:

For each weakness (one at a time), the Tool identifies which ICT (s) can most optimally remove or minimize the weakness. This is performed via the mapping of weaknesses to ICTs (cf. weakness analysis profiles in Annex I).

For example, the weakness “redundant documents” can be eliminated with the combination of the following ICTs: Object Management Service (specifically, a Document Management

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

System) and Library Service.

Moreover, within this step, environmental checks are performed in order to ensure the ICT(s) can validly remove each weakness (e.g. are there legal constraints that perhaps require a media break?). Such checks are performed with the support of the process attributes (e.g. need for authenticity etc).

#### 4.2.4 Step 4 – Identification of ICT benefits

<u>Step overview:</u>	The PICTURE Tool identifies the associated benefits of the ICT(s) for each weakness.
<u>Input/ pre-requisite:</u>	<ul style="list-style-type: none"> <li>List of weaknesses in the process landscape</li> <li>Optimal ICTs mapped to weaknesses</li> <li>Weakness analysis profiles</li> </ul>
<u>Output:</u>	Benefits per ICT

#### Detailed step description:

In this step, the PICTURE Tool presents the associated benefits of the mapped ICTs per weakness (the mapping of ICTs to weakness has been performed in Step 3).

The logic of the methodology lies on the principle that ICT functionalities remove (or minimise) weaknesses and as a result (i.e. through the removal of a weakness) concrete benefits are obtained.

In the example of the weakness “redundant documents”, the combination of ICTs “Object Management Service” and “Library Service” renders the following benefits: reduced processing time, legal compliance, data integrity, availability – information retrieval, data protection, reduced consumable costs, and reduced storage / space.

Benefits are grouped according to the following three dimensions: time, quality and resources/cost. The following table presents the key benefit dimensions and benefits employed in the methodology.

ID	Benefit Dimension	Benefit
B1	Time Savings	Processing Time Reduction
B2	Time Saving & Quality	Error Reduction
B3	Time Saving & Quality	Idle Time Reduction
B4	Time Saving & Quality	Transport Time Reduction
B5	Quality	Legal Compliance
B6	Quality	Audit Trail / Traceability
B7	Quality	Quality of Calculation Results
B8	Quality	(Data) Integrity
B9	Quality	Availability of Service
B10	Quality	Information Retrieval / Availability
B14	Quality	Privacy
B15	Quality	Data Protection
B18	Quality	Effectiveness
B19	Quality	Accessibility
B11	Resources	Reduced Consumables cost

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

ID	Benefit Dimension	Benefit
B12	Resources	Reduced Storage/Space
B13	Resources	System Redundancy Reduction (incl. Licences)

Table 3 – Benefit dimensions and specific benefits

In order to determine the benefits related to specific ICTs Functionality Groups, a mapping of ICTs to their key associated benefits has been developed (cf. Annex II).

#### 4.2.5 Step 5 – Measurement of ICT benefits

<u>Step overview:</u>	The PICTURE Tool measures the benefit of each ICT in terms of quality, time and resource dimensions.
<u>Input/ pre-requisite:</u>	<ul style="list-style-type: none"> <li>List of process characteristics</li> <li>List of weaknesses in the process landscape</li> <li>Optimal ICTs mapped to weaknesses</li> <li>Weakness analysis profiles</li> </ul>
<u>Output:</u>	Measurement data

#### Detailed step description:

In the fifth step of the methodology, the Tool measures the benefit of each ICT in terms of quality, time and resource dimensions, taking into account also the process characteristics.

Benefits are measured with the help of indicators and specified measurement units. In the example provided below, the Benefit B1 “Processing Time Reduction” can be measured among others with the indicator IC1.1 “Individual processing time (per PBB)”, which is measured in “minutes”.

ID	Dimension	Benefit	Indicator	Unit of measurement
B1	Time Saving	Processing Time Reduction	IC1.1 Individual processing time (per PBB, duration between start and end of PBB)	Minutes
			IC1.2 Total processing time (Sum of all individual processing times of active PBBs per process)	Minutes = sum of all B1.1s in process
			IC1.3 Cycle time (Total time from process start till process end - sum of processing time, transport time and idle time)	Minutes (average, max, min. variance).

Figure 8 – Indicators and Units of Measurement for Benefit “Processing Time Reduction”

A detailed list of all identified benefits (in Table 2), corresponding indicators and units of measurement is presented in Annex III.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

#### 4.2.6 Step 6 – Presentation of results

<u>Step overview:</u>	The PICTURE Tool develops a set of reports that present the results of impact measurement.
<u>Input/ pre-requisite:</u>	<ul style="list-style-type: none"> <li>• Measurement data</li> <li>• Optimal ICTs mapped to weaknesses</li> <li>• Benefits per ICT</li> <li>• List of weaknesses</li> <li>• List of process characteristics</li> </ul>
<u>Output:</u>	Reports

#### Detailed step description:

The final step of the methodology is the presentation of the impact measurement results. A set of reports are produced according to the user's preferences (e.g. whole process landscape view, report on specific processes or problems).

The reports should satisfy the following three usage scenarios as shown in Error! Reference source not found. :

- Scenario 1: the user wants to see the overall situation in the process landscape (e.g. to see the impact of all ICTs on all modelled processes).
- Scenario 2: User has a special information need (e.g. wants to see the analysis for a particular weakness/problem or for specific ICTs etc.).
- Scenario 3: User wants to analyse the impact for a specific process.

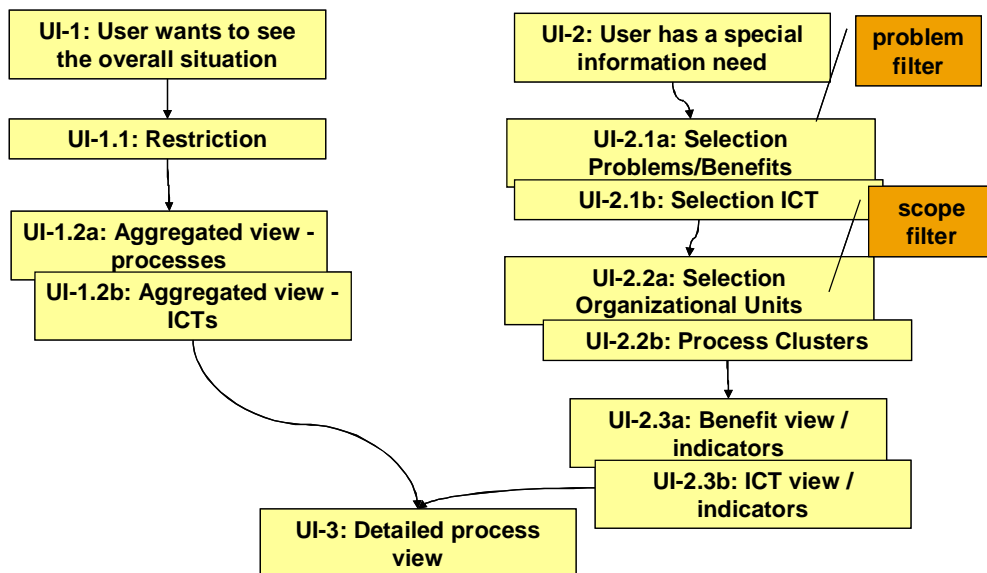


Figure 9 – Scenarios for Impact Measurement Reports

Finally, in order to enable comparisons of measurement reports at different points of time, the tool will enable the storage of reports.

The specification of the user interfaces per scenario is presented in detail in D5.7

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

“Specification of Impact Measurement Module”.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

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STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

## Annex I Weakness Analysis Profiles

The following tables analyse in detail the key weaknesses in Public Administration Processes, providing information on the matching ICT functionality group, benefits obtained, quantification of benefits and possible re-organisation proposal.

These profiles are the integrated outcome of the "impact measurement" sessions in the 2<sup>nd</sup> PICTURE workshops with each of the PICTURE partner cities held between October and December 2007.

ID	W1
Weakness name	Unclear storage location of documents
Description (verbal)	It is not clear where the original document is stored. Civil servants spend much time searching for the appropriate document.
ICT Functionality Group(s)	Search Services Catalogue Services (prerequisite: documents and records are handled electronically and Object Management Services are in place)
Achievable benefits (from benefit mapping)	reduced processing time error reduction idle time reduction transport time reduction
Quantification	reduced processing time: reduce search time below threshold (searching carried out by civil servant himself) error reduction: reduce chance that you make decisions on outdated information idle time reduction: reduced response time when asking others for the document transport time reduction: reduced if you switch to electronic document handling (indirect)
Re-organisation proposal	ICT implementation has to be combined with clear guidelines that only system based information is authorized to prevent the uncontrolled growth of "private" repositories.
Comments	

ID	W2
Weakness name	Redundant documents
Description (verbal)	Many printed / electronic copies of documents are created that are unnecessary (not required by legislation); redundant use of paper
ICT Functionality Group(s)	Combination of Object Management Service and Library Service (which make up the core elements of Doc. Mgmt. System (see D2.6, chapt. 5.1) → Case Mgmt. would be an aggregation of several functionalities from different functionality groups, (at a minimum Object Management, Library, Search and Workflow Services)
Achievable benefits (from benefit mapping)	reduced processing time legal compliance data integrity availability – information retrieval data protection reduced consumable costs storage / space
Quantification	reduced processing time: duration of PBB Copy

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

	<p>legal compliance: ensures that documents are deleted as requested by law</p> <p>data integrity: notes are captured electronically → reduce errors when typing in</p> <p>availability – information retrieval: see 3.1</p> <p>data protection: access and change rights are handled centrally, unauthorized changes are prohibited, changes are tracked</p> <p>reduced consumable costs: #PBB Copy * PO.pages</p> <p>storage / space: accumulate it across process landscape (indirect)</p>
Re-organisation proposal	drop PBB copy, handle records and documents electronically
Comments	This is related to weaknesses #9 and #1

ID	W3
Weakness name	Different templates for same document / activity (lack of standardization)
Description (verbal)	Different templates are available for the same document or the same activity performed by a civil servant
ICT Functionality Group(s)	combination of Object Management Services Library Services Publishing Services
Achievable benefits (from benefit mapping)	error reduction legal compliance availability – information retrieval
Quantification	error reduction: errors (calculations, etc.) are avoided by using the correct template legal compliance: ensure that documents follow all legal requirements availability – information retrieval: management and retrieval of templates will be easier
Re-organisation proposal	Implement the respective ICTs while defining clear ownership on templates
Comments	

ID	W4
Weakness name	Manual effort to integrate different input/ external communication channels
Description (verbal)	<p>Data / information from external sources is received via different channels (e.g. in municipalities' office, mail, email, internal mail, internet, fax). As a result, high manual effort is required to integrate and process the input channels.</p> <p>Also, the use of multiple external communication channels (e.g. fax, telephone, internet etc.) causes delays and possible errors (especially in unstructured communication channels such as telephone).</p>
ICT Functionality Group	Capture Service works best if you also have: Object Management and Library Services
Achievable benefits (from benefit mapping)	reduced processing time transport time reduction error reduction
Quantification	reduced processing time: reduction in duration of PBB Capture / Enter transport time reduction: can be realized by using a capture service that has an automatic recipient recognition error reduction: fewer errors can occur when capturing automatically
Re-organisation	establishing a common process agnostic of entry channels

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

proposal	
Comments	Many triggering channels have to be provided (requested by law) in most PAs. At the entry of the organisation any incoming data should be transformed into electronic (if possible to a single format) to ease following processing

ID	W5
Weakness / Characteristic name	Manual effort to integrate different input channels for internal data
Description (verbal)	Applications and requests can be triggered via a vast amount of different channels (in municipalities office, mail, email, internal mail, internet, fax) for internal PA data
ICT Functionality Group	Object Management Service Library Service
Achievable benefits (from benefit mapping)	reduced processing time transport time reduction error reduction
Quantification	reduced processing time: reduction in duration of PBB Capture / Enter transport time reduction: can be realized by using a capture service that has an automatic recipient recognition error reduction: fewer errors can occur when capturing automatically
Re-organisation proposal	integrate it into one channel (if it is not prohibited by legal requirements)
Comments	Internally PAs have more possibilities to integrate the channels.

ID	W6
Weakness name	Different systems are used for the same process / activity
Description (verbal)	Different technical / IT systems are used to perform the same process or activity (e.g. to manage addresses) in different departments / by different people.
ICT Functionality Group	not applicable
Achievable benefits (from benefit mapping)	ICT Functionality Group redundancy reduction IT maintenance cost
Quantification	not applicable
Re-organisation proposal	consolidate to one ICT
Comments	Further analysis is required

ID	W7
Weakness name	Lack of integration between systems
Description (verbal)	Often many different applications are used in one process. The applications are often not very well integrated.
ICT Functionality Group	integration services (under surrounding services: infrastructure application, collaboration, business application) workflow management services
Achievable benefits (from benefit mapping)	Reduced Processing Time audit trail / traceability
Quantification	Reduced Processing Time: time saved by dropping PBB Capture / Enter audit trail / traceability: is provided through workflow system
Re-organisation	drop Capture / Enter step

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

proposal	
Comments	

ID	W8
Weakness name	Tracking of processes is not possible
Description (verbal)	No systems are available that can be used to track the progress of a process and to find out who is currently working on a particular request. Also: Hand-over of tasks between civil servants is not ensured / guaranteed, can not be tracked. That means there is a time frame in which a task is not assigned to a particular person.
ICT Functionality Group	workflow management Object Management and Library Services (at least for all process that involve documents)
Achievable benefits (from benefit mapping)	Audit Trail / Traceability Idle Time Reduction Processing Time Reduction
Quantification	Audit Trail / Traceability: visibility of process steps Idle Time Reduction: Individual idle time between PBBs (the waiting time between two sequential PBBs), Idle time total (sum of individual idle time per process); Number of idles per process Processing Time Reduction: individual processing time, total processing time, cycle time
Re-organisation proposal	Certain PBBs can be eliminated (on a case-by-case basis)
Comments	

ID	W9
Weakness name	Redundant data sets
Description (verbal)	Redundant data sets are used in public administrations. It is not clearly identified who maintains the master data and what data sets are replications.
ICT Functionality Group	combination of Object Management services catalogue services
Achievable benefits (from benefit mapping)	reduced processing time data integrity
Quantification	reduced processing time: avoid multiple entries of data data integrity: qualitative
Re-organisation proposal	consolidate ICT components
Comments	

ID	W10
Weakness / Characteristic name	Multiple format of data
Description (verbal)	The same data is stored in multiple formats e.g. printed paper, floppy disks etc.
ICT Functionality Group	combination of Object Management services

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

	Library Services Publishing Services (for renditioning purposes)
Achievable benefits (from benefit mapping)	reduced processing time Reduced Consumables reduced storage/space
Quantification	Reduced Processing Time: time saved by faster execution of PBB "Retrieve" Reduced Consumables: reduced consumable costs: #PBB Copy * PO.pages Reduced Storage Space: reduced storage costs: #PBB Copy * PO.pages * avg.volume
Re-organisation proposal	ICT implementation has to be combined with clear guidelines that only system based information is authorized to prevent the uncontrolled growth of "private" repositories.
Comments	

ID	11
Weakness / Characteristic name	Multiple redundant signatures required
Description (verbal)	Many signatures (not required by legislations) are required by too many PA personnel, causing time bottlenecks.
ICT Functionality Group	potentially Security Services Workflow Management Services
Achievable benefits (from benefit mapping)	reduced processing time
Quantification	Reduced Processing Time: time saved by dropping PBB Sign
Re-organisation proposal	Change management clearly outranks the implementation of ICT. At first place change management should eliminate the practice of non required multiple signatures To do so one may examine where this practise derives from. In many cases it was established to secure the information of potential stakeholders. With Object Management, Library, and Workflow Services in place this original want can be supplied without interfering agile government
Comments	

ID	12
Weakness name	Unnecessary media break
Description (verbal)	Unnecessary (i.e. not required by legislation) change in medium or channel of processed object e.g. electronic to paper
ICT Functionality Group	combination of Object Management services Library Services Workflow Services
Achievable benefits (from benefit mapping)	Reduced Processing Time Error Reduction Reduced Consumables Reduced Storage Space
Quantification	Reduced Processing Time: time saved by dropping PBB Capture / Enter Error reduction: qualitative analysis, estimation of # errors reduced

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

	Reduced Consumables: reduced consumable costs: #PBB Copy * PO.pages Reduced Storage Space: reduced storage costs: #PBB Copy * PO.pages * avg.volume
Re-organisation proposal	with the mentioned ICT in place core functionalities are provided to ease the daily work of the civil servants.. Thus policies and change management that prevent unnecessary media breaks can be implemented with a higher success rate.
Comments	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

## Annex II Mapping of ICT functionalities to benefits

The following table maps specific benefits to the ICT functionalities employed in PICTURE. The functionality (group) – benefit – mappings has been developed based on an incremental approach conducting interviews with IT experts among relevant partners (e.g. SAP and FILENET/IBM)<sup>5</sup>.

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
Catalog Services	Provides services for having an enterprise/master catalogue of all the documents, content of all types, metadata and process definitions in the enterprise across all repositories.	Content	Ability to index a variety of content types – document, image, pdf, Web content, email, electronic and paper records and their associated metadata	B04: index allows faster search for electronic documents B01/B03: if catalogue service replaces paper-based archiving and manual search for documents in archive B12: if catalogue service is combined with electronic storage it leads to reduced storage space	B01 B03 B04 B06 B12
		Process Definitions	Ability to index the process definitions and their associated metadata	B01/B03: index allows for faster identifying the appropriate process / the next responsible person in the process	
		Custom (Objects)	Ability to index custom objects and their associated metadata – customer records, for example	B04: index allows faster search for electronic objects B01/B03: if catalogue service replaces paper-based archiving and manual search for objects in archive B12: if catalogue service is combined with electronic storage it leads to reduced storage space for paper-based records	

<sup>5</sup> Note that the mappings are not hard coded in the PICTURE tool (current state of development) and can be modified at any time.

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
Classification	Provides services to assist in classifying or categorizing new and existing information and to add relevant metadata to content for efficient organisation and delivery of content to portals and desktops. It involves the development of taxonomy structures,	Automatic	Automatically classify documents of specific content types to a document class without user intervention. This technology commonly leverages parsing, filters and related technology to optimize the results.	B01: reduced manual effort in classifying the documents, ideally zero if the automatic classification works well; has to be combined with a digitalization functionality or a channel over which electronic documents are received	B01 B02 B09
		Rule-based	A means to efficiently and accurately organize content. Business rules allow an organisation to leverage their domain expertise to construct a hierarchy of categories. The characteristics of each category can be specified using rules.	B01: reduced manual effort in classifying the documents B02: through unambiguous classification following the rules	
		Thesaurus	Access to word stemming and synonym data to assist in the process of content categorization to group items using similar words.	B01: reduced manual effort in classifying the documents B02: through unambiguous classification following the guidance given by the Thesaurus	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Categorization	Another word for classification. Individual documents or content components are analyzed for subject matter and meaning and then assigned to the "best fit" category in the taxonomy. For example, in the library, this is analogous to assigning Dewey Decimal	B01: reduced effort for searching a document by using the categorization B09: Improved availability of documents	
		Taxonomy	Defines a set of categories that documents are classified against. A taxonomy is often industry specific.	B01: reduced manual effort in classifying the documents B02: through unambiguous classification following the taxonomy	
		Ontology	An explicit formal specification of how to represent the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that exist among them.	B01: reduced manual effort in classifying the documents B02: through unambiguous classification following the guidance given by the ontology	
Search	Provides services oriented around the search functions in an enterprise, such as indexed search, full-text search, and federated search.	Relevancy Ranking	Rank search results using algorithms that check for highest correlation with the initial search query.	B01: users find the result more quickly B07: results are more relevant for the work of the user B18: if employee is faster in finding something he can be more effective in working on his tasks	B01 B02 B06 B07 B09 B18

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Result Summarization	Present document summary in the search results to help end-users quickly identify the most relevant hits in a results list without downloading and reading an entire file. Intelligent summaries can be created to show the context in which the query terms	B01: users find the result more quickly B18: if employee is faster in finding something he can be more effective in working on his tasks	
		Federated	Provides searching capability across multiple disparate sources of unstructured data, leveraging the federated repository services as necessary. Correlates multiple answer sets into one answer set for the end user.	B01: user does not have to search multiple sources manually B07: results are more relevant for the work of the user B18: if employee is faster in finding something he can be more effective in working on his tasks	
		Hit Highlighting	Allows users to immediately find the first instance of a word in the document they are searching for, no matter if that word is on the first page, last page, or somewhere in between.	B01: users find the result more quickly B18: if employee is faster in finding something he can be more effective in working on his tasks	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Templates	A Search Template can be defined for common searches done by many end users to save time and increase productivity.	B01: users find the result more quickly B02: reduced error probability in generating the search term B06: it is possible to guide / monitor what the users are searching for B07: results are more relevant for the work of the user B09: the user can access the necessary data faster B18: if employee is faster in finding something he can be more effective in working on his tasks	
		Stored Searches	A complete search that is ready to be used for searching the repository. It can include criteria based upon contents and/or property values.	B01: users find the result more quickly B02: reduced error probability in generating the search term B06: it is possible to guide / monitor what the users are searching for B07: results are more relevant for the work of the user B09: the user can access the necessary data faster B18: if employee is faster in finding something he can be more effective in working on his tasks	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Metadata	Ability to search for documents and content based on metadata or properties associated with the document.	B02: reduced probability that the search does not deliver relevant results B07: results are more relevant for the work of the user B18: if employee is faster in finding something he can be more effective in working on his tasks	
		Fulltext	Ability to search for documents based on a keyword or text phrase within the document itself.	B01: users find the result more quickly B02: reduced probability that the search does not deliver relevant results B07: results are more relevant for the work of the user B18: if employee is faster in finding something he can be more effective in working on his tasks	
		Persistent/ Long Running	Ability to perform a single search across multiple content repositories / databases that could take many hours or days to complete. These searches are persisted in the repository for access at a later point. This is important for e-discovery.	B01: user does not have to search all sources on his own B07: results are more relevant for the work of the user B09: the user can access the necessary data in a aggregated and optimized way B18: if employee is faster in finding something he can be more effective in working on his tasks	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
Forms	Provides services to manage electronic and print forms including both the form itself and the data that it can contain.	Thin Presentation	Form templates and their associated logic are converted to pure HTML and client-side JavaScript for display in an end user's Web browser. Upon completion, form data is delivered back to the server for storage and processing.	B01: reduced efforts for digitizing information (if subsequent handling is electronic) B02: as potential errors in misinterpreting hand-writings can be removed B04: if electronic form replaces paper-based forms B08: form can guide user entry and thus increase data integrity B13: if web form replaces paper-based form than systems for scanning and archiving can be removed B19: customers have a further channel to access the necessary forms	B01 B02 B04 B05 B06 B08 B09 B13 B12 B19
		Rendering	Form templates and data can be programmatically rendered into various static image formats such as PDF and TIFF for archival purposes.		

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
				rendering programs (e.g. pdf creators) have been used before these can be reduced B19 enable accessibility through ability to render different output depending on the consumers requirements	
		Process Integration	Forms and form data can be integrated with workflow steps providing direct display of form content and automatic mapping of form data with workflow data fields.	B01: users can directly access the relevant forms B02: user does not have to search and open irrelevant forms B04: documents are directly delivered to user and do not have to be delivered paper-based B06: with process log it can be traced which documents have been delivered to which user B09: data is directly available when needed B13: additional file storage and search system can potentially be removed	
		Step Processor	Out-of-the-box eForms step processor displays form content directly to the user, simplifying the interface and the steps required to complete or approve forms. No custom programming is required since the	B01 Form is directly integrated into process: improvement for back-office B18: Effectiveness is increased as user is guided through process of filling forms (B19: accessibility is improved through a further channel for electronic forms)	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
			eForms step processor can display multi-page form templates created with the easy to use eForms Designer application.		
		Data Mapping	Data entered into a form can be automatically mapped into form data document properties and workflow data fields for further use. Users do not need to manually re-enter information.	<p>B01: users can directly access the relevant data</p> <p>B02: user does not have to re-enter data, thus reducing typing errors</p> <p>B04: data is directly delivered to user and does not have to be delivered paper-based</p> <p>B06: with process log it can be traced which data has been delivered to which user</p> <p>B09: data is directly available when needed</p> <p>B13: additional file storage and search system can potentially be removed</p>	
		Data/Logic Engine	Form templates can be designed with extensive data logic similar to that provided by spreadsheet applications. This logic is converted to client-side JavaScript and executes within the user's browser, providing real-time results.	<p>B18: Effectiveness is increased for user as does not have to calculate everything on his own</p> <p>B19: accessibility is improved through a further channel for sending data</p>	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
Decision Mgmt.	Provides services to manage and leverage rules throughout content- and process-driven applications.	Business Rules	The definition and implementation of rules within the content and process lifecycles. Typically, the rules are leveraged by services within document events and enterprise workflows to make automated decisions to streamline the flow of information.	B01: automatic decision can fasten the process execution and reduce the workload on people B02: automatic decision reduce the error probability B06: automatic rule execution can be logged and thus make decisions traceable B07 negative: if rule set is not maintained correctly, wrong decisions can be made	B01 B02 B05 B06 B07
		Rules Management	Maintain, update, and manage rules used by the rules engine runtime.	B01 negative: additional effort to maintain the rules instead of having users decide B02 negative: rule sets might be incomplete or contradictory B05: rule maintenance can help to ensure legal compliance	
Object Mgmt.	Provides services for managing enterprise content and a broad range of unstructured and structured data known as business objects including electronic documents, Web content, records, folders, workflow definitions, stored searches, templates, reports, and	Metadata	Collection of properties that describe the content / object.	B01 negative: increased effort for setting up the repository B08: metadata reduces ambiguity B10: improved availability of documents while using metadata	B01 B05 B08 B09 B10 B15
		Inheritance	A subclass / child that gains the attributes of its parent / master class including properties and security attributes.	B05, B15: inheritance of attributes and security regulations ensure compliance	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Custom Object	Predefined base class for managing and storing data that does not have content or a lifecycle. For example, a customer might be represented in the repository as a custom object	B08: improved data quality / consistency through capturing all relevant information via the base class B09: information about e.g. customer is better available during the process	
		Document Object	Predefined base class for managing and storing documents and their associated metadata. Documents are managed throughout their lifecycle and can participate in compound document structures.	B08: improved data quality / consistency through capturing all relevant information via the base class B10: information about e.g. document is better available during the process	
		Folder Object	Predefined base class for managing and storing folders and their associated metadata. A folder is a container that is used to group other objects (e.g. documents or other folders).	B08: improved data quality / consistency through capturing all relevant information via the base class B10: information about e.g. the folder or documents of the folder is better available during the process	
		Annotation Object	Predefined base class for representing incidental information that is attached to an object for the purpose of annotating or footnoting that	B08: improved data quality / consistency through capturing all relevant information via the base class B10: enhanced information about documents captured by annotations is better available	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
			object.		
		Proxy Object	A content object that references content that resides in another repository.	B08: improved data quality / consistency through references	
		Document Marking Sets	A feature that offers the ability to secure content based on the value of one of its properties. Markings offer additional security on an object based on selected values. Markings do not override the normal security on the object.	B05, B14, B15: provides additional means to restrain access to objects in addition to standard role-management	
		Relationship Mgmt.	Relationship management is the ability to create, manage, traverse and remove relationships between two objects in the repository. Additional behavior such as prevent deletion of child, and delete child when parent is deleted can be expressed	B08: Avoid "information orphans" that make no sense when context information is removed B10: Enable identification of document relations	
		Security	Defines the default access rights for the object and security policies that may be applied to the object.	B14: Allow access only to authorized users B15: Prevent unauthorized access	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
		Hierarchical Classes	Classes define the types of objects stored in the repository. Classes define the metadata, default security, audit configuration and business logic associated with objects. Predefined base classes can be sub-classed to define new object types, where behaviour	.B05, B15: inheritance of attributes and security regulations ensure compliance	
Publishing	Provides services to convert documents from a variety of formats, such as Microsoft Word, Excel, and PowerPoint formats to PDF and HTML formats.	Dynamic Documents	Document that is automatically rendered into another format. These documents contain more than one document, often of more than one file format. The dynamic document can be XML and consist of hundreds, if not thousands, of documents.	B10: Enable to build large scale documents of related content	B01 B02 B05 B06 B08 B10 B11 B12 B19
		Thumbnail	A miniature graphic of a page.	B01 reduced search efforts by generating an overview of. e.g. current documents via thumbnails B10 enhanced search usability by generating an overview of. e.g. current documents via thumbnails	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
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		Renditioning	Transformation of a source document's format to a target format (e.g. Word to PDF) where the content stays the same, but the format is changed.	B01 through reduction of manual need to transform documents B02 through reduction of potential for manual errors B08 enable loss-free transformation of information to required format B19 enable accessibility through ability to render different output depending on the consumers requirements	
		Electronic	Documents managed as electronic files as opposed to a physical format.	B02 through less possibilities to loose/misplace documents B06 electronically managed documents enable traceability, e.g. of accesses B11 electronic transport/exchange reduces need for consumables B12 reduction of resources needed for e.g. archiving	
		Print	Electronic document that is printed in real-time or in batch.	B05 if print-outs are legally required B19 enable accessibility for non internet-enabled consumers	
		Transformation	Ability to change the style/format of a document from one format (e.g. Word) to another (e.g. PDF) while retaining the	B02 through reduction of potential for manual errors B08 enable loss-free transformation of information to required format	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
			content of the document.		
XML Mgmt.	Provides services to manipulate and work with XML data including the ability to parse through the data, burst a large XML file into smaller components, and to use XML to represent any data.	Parsing	Provides services to analyze and/or separate XML data into more easily processed components.	B02 through ability to easier connect with other organisations	B02 B08 B09 B12 B15
		Bursting	Provides high performance services to take an XML file and break it down into several to many atomic XML files. During this process, metadata can be extracted from the XML and relationships established between the atomic elements.	B02 through automated break down of complex documents into smaller entities that are easier to handle and to be used for multiple purposes while maintaining the original relationship. B09 by allowing a more focused access to information B15 by limiting access to particular elements of a document while making it general available.	
		DataMgmt. / Data Representation	Use of XML to represent data, including workflow definitions, templates, publishing assemblies, import/export formats, and site/user preferences, etc.	B08 improved data integrity through transparent and automatically accessible exchange files B12 Storage reduction	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
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		Schema Mgmt.	Data model and style sheet definitions (XSL) that are represented using XML. XML can be validated against the specified schema on import.	B08: validate information against predefined data definitions	
		Assembly	An XML document that defines the assembly or list of source documents and the order in which the documents would be combined into a single document. This is based on the compound document framework and turns a compound document into a single XML document	see „Publishing: Dynamic Documents“ see also „Bursting“ since „Assembly“ is the counterpart of “Bursting”	
		Import	XML is used to import and export objects and metadata definitions.	B02 through ability to easier connect with other organisations	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
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Workflow	Provides services to enable and manipulate human driven process flows.	Work Package	Provides services for the management of the work packages that flow through the BPM system, as noted in the subcategories.	B01 through ability to coordinate related tasks B03 Inform participant of open tasks "push vs. pull" B04 reduce manual effort for transport of information "travelling" through the process. B05 ensure compliance with for example maximum durations of a certain process B06 of the information processed and decision made B14 data only accessible to people involved in the workflow (Role-based) B15 more efficiency results in better service to citizens and businesses	B01 B03 B04 B05 B06 B13 B14 B15
		Routing	Provides services for the management of routing components, data, and other content through the workflow, using defined process maps and definitions to execute the process engine.		

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
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		Escalation	Provides services for initiating an escalation path during a process execution.	B01 enable inclusion of escalation into the coordination through the work flow system B03 reduce idle time for decision/ further actions on escalated issues. through workflow push mechanism	
		Ressource Mgmt.	Provides services for assignment of resources to a process step based on rules that act upon the process execution at run time.	B01 more efficient use of ressources available to execute a task B13 through more efficient use of ressources, also: human ressources	
		Load Balancing	Provides services for workload balancing among executing tasks in the process engine.	B01 reduced process time by optimizing work loads of employees B02 reduced error time by optimizing work loads of employees (avoid individual overloads) B16 improved quality of service	
		Queue Mgmt.	Provides workload balancing services for work queues across individuals or groups.	see Load Balancing	
Auditing	Provides services to log data pertinent in order to later examine activity for either regulatory or management reasons.	Regulatory	Log and access audit data for the purposes of regulatory compliance.	B05 improved legal compliance support B06 more transparent traceability	B05 B06
		System	Log and access audit data related to system activity and performance for the purposes of system management and	B01 System-side performance optimization B13 reduction of license cost through more efficient use of	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

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Layer 1		Layer 2			
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			performance improvement.	applications	
		Transaction Logging	Monitor content and process management activities such as object creation, update, deletion, date/time of activity, and user of activity that are logged and can be provided as management reports.	B01, B03, B04 through analysis and traceability of processes, comparison to-be vs. actual processes B05 analyze compliance with for example maximum durations of a certain process B06 of the information processed and decisions made B16 more efficiency results	
Library Services	Provides services that support check-in, check-out, and other multi-user management functions critical to content and process management.	Retrieval	Retrieve documents from the content repository. The documents may be verified for integrity before retrieval.	B01 reduced time for document search through central retrieval point B8 through provided integrity check B10	B01 B03 B04 B06 B08 B10 B15
		Archive	Move documents from near-term content repositories to longer-term information archives.	B06 through adaption of retention periods B15 through limited access to archive	
		Store	Save documents to the content repository.	General function of a content repository	
		Indexing	Provides a service for full-text indexing of content and metadata for enabling users to easily search the	B01 through improved search functionality B10 enables information retrieval in documents with	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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			repository.	continuous text	
		Approval	Pre-defined approval workflows for enabling users to easily enter new or modified content into the repository and have that content reviewed. New approval workflows can be created as desired.	B01,B03, B04 through optimization of authorization procedures	
		Multi-level Versioning	Provides two-level version management, where interim versions can be created and managed prior to check-in and distribution of major versions. Different security policies are often associated with s and published versions.	B08 through ability to recover false changes of documents	
Content Federation Services	Provides services to access content from numerous heterogeneous repositories within the enterprise and federate the information to provide a single enterprise source for critical business content. Federation	Catalog	Ability to create and manage a master index of content and documents that reside in a number of heterogeneous repositories (similar to a card catalog in a library). The index data would include document properties.	B01: Faster search for documents by employees B02: Proper service better accepted and therefore more often used by employees	B01 B02 B08 B09 B10 B14 B15

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
	Services allows enterprises to search, catalog,	Events	Enables active content capabilities on documents that have been federated from disparate repositories.	B09: Consolidation of data increases availability of data B10: IR results can be improved	
		Content Integration	Providing access, security and search capabilities for documents and content that reside in a mix of content repositories, including documents and content that resides in one or more repositories.	B08: Data is correct aggregated from different sources B14: increased privacy B15: high data protection	
		Classify	Ability to assign a metadata to a document regardless of where the document resides.	B01: Contributes to a more precise electronic search > time savings B09: better availability of data B10: better IR results	
		Update	Ability to modify the metadata (document properties), document content, and/or location of the document regardless of where the document resides.	B01: Contributes to a more precise electronic search > time savings B09: better availability of data B10: better IR results	
		Search	Provides integrated index- or full text-based search results against multiple content stores including documents and content that resides in one or more repositories.	B01: Contributes to a more precise electronic search > time savings B02: employees better informed > less errors B09: higher data availability B10: better IR results (see B01/B02)	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
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		Delete	Ability to delete the document and its associated metadata regardless of where the document resides.	B02: old irrelevant docs can be removed > less errors B10: better IR results (see B01/B02)	
		Security	Ability to set and/or modify the security permissions and policies on the document and its metadata regardless of where the document resides.	B14: increased privacy B15: increased data protection	
Event Services	Allowing all components to react to stimuli from systems, applications, and people, whether by pre-determined or ad-hoc events. Assuming each component has some mechanism to create events, this layer provides access to publish and subscribe to events; rea	Aggregation	Aggregate events over the course of time (could be within milliseconds or over the course of years). These services should address the problem with high efficiency (e.g. don't keep events that may occur over the course of months in memory, store them to disk).	B01 & B06 by freeing up memory while maintaining capability of tracing even rarely occurring events	B01 B02 B03 B04 B06 B14
		Sequencing	Take messages that arrive out of order and re-order them as needed prior to further processing.	B02: well informed employees B03: less idle time	
		Publish and Subscribe	Publish and Subscribe is an effective way of disseminating information to multiple users. It provides a source of information that users select from and then receive on a regular basis or	B03: less idle time B04: improves transport time	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
			when certain events occur.		
		Asynchronous	Behavior encoded in the event subscription occurs after the action that triggered the event.	B03: less idle time B04: improves transport time	
		Synchronous	Behavior encoded in the event subscription must occur in conjunction with the action that triggered the event. These events are capable of affecting transactions and prohibiting actions that violate business policies.	B01: performance optimization B03: less idle time B04: improves transport time B14: data protection	
IDARS	Integrated Document Archive and Retrieval System (Gartner Inc. specific term). IDARS covers a broader range of archiving to distribution capabilities to multiple devices for static data thus subsuming COLD and Distributed Output	COLD / Report Mgmt.	Computer Output to Laser Disc: An archive-centric model for managing static data directly for storage purposes to laser disc. Products solely focused here lack capabilities for broader output management.	B01: employee has not to care about B02: automatic way ensures high quality B12: efficient usage of consumables	B1 B2 B11 B12

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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	Mgmt (DOM).	Print Stream	Aka output management for managing a variety of printer output formats and streamlining the delivery of documents. These documents can be generated in batch or on-demand based on some user or process event.	B01: employee has not to care about B02: automatic way ensures high quality B11: efficient usage of consumables	
		Multi-channel Delivery	A common term used to describe pushing information of all types to various output devices including, paper, Web, pda, fax machines, printers, etc. (Think of channel in this respect as a communication path. This is often critical for bill presentment and p	B01: employee has not to care about B02: automatic way ensures high quality B11: efficient usage of consumables	
Retention Mgmt.	Provides services for the management of retention and disposition schedules as they relate to the management of records. Physical storage is managed in the Data Services layer.	Policy Engine	Provides runtime services to manage retention policy rules and to take appropriate action and/or generate events based on these rules.	B01: supports fast decisions B02: wrong decisions can be avoided	B01 B02 B03 B04
		Events	Ability to manage common retention-related tasks based on scheduled events.	B03: less idle time B04: improves transport time	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

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		Scheduler	Schedule common retention-related tasks based on events or dates.	B03: less idle time B04: improves transport time	
Distribution	Provides services to manage the process of data and content distribution to improve performance, service levels, redundancy, and offline usage.	Metadata	Synchronize and/or replicate content properties across geographic locations so it's available to users globally for optimal performance.	B09: high availability of data B10: better IR results for all distributed employees	B02 B09 .B10
		Content	Provides services to allow content to be synchronized between a server and client in order to allow the client to operate in an offline mode.	B02: working with current data B09: high availability of data	
		Synchronisation	Synchronize and/or replicate content across geographic locations so it's available to users globally for optimal performance.	B02: working with current data B09: high availability of data	
		Replication	Provides services to manage more than one repository that houses replicated content. These services help synchronize content, metadata, and state between these repositories and keep them	See CFS for benefits.	

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Layer 1		Layer 2			
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of Functionality)		
			synchronized.		
Lifecycle Mgmt.	Provides services for the full content lifecycle from creation to expungement.	Content Lifecycle	A graph of states that a document will go through over its lifetime as well as actions that are triggered when it transitions from one state to another.	B01: redundant steps can be identified B06: traceability: trace of a document can be investigated	B01 B05 B06 B12
		Storage Lifecycle	Ability for fixed and dynamic content to be stored on a storage system based on its retention schedule.	B05 Improved fulfilment of Legal & Compliance requirements through transparent storage procedure B06 Increased traceability: trace of a document can be investigated B12 Reduced storage space	
		Process-Lifecycle Correlation	Ability for a document at a particular state to launch or participate in a workflow.	B01: redundant steps can be identified B06: tracability: trace of a document can be investigated	
		Declaration	Indicating that a document transitions into a record at some point in its lifecycle.	B05 Improved fulfilment of Legal & Compliance requirements through transparent procedure B06 Increased traceability: trace of a document can be investigated	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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Interoperability	Provide services to make inter- or intra-system communication seamless with other systems of record in the enterprise. This includes interaction with systems outside of the enterprise as well.	Transmission Protocoll	Provide abstraction from underlying transmission protocols for information exchange.	B01/B02: better communication B03: better communication B04: time reduction through proper communication concepts B11: less consumables through electronic communication	B01 B02 B03 B04 B08 B09 B11
		Email/SMTP Server	Simple Mail Transfer Protocol (SMTP), a protocol for sending email messages between servers.	B01/B02: better communication B03: better communication B04: time reduction through proper communication concepts B11: less consumables through electronic communication	
		Data Transformation	Mapping of one data format to another.	B01/B02: better communication B03: better communication B04: time reduction through proper communication concepts B08: data integrity B09: availability of data B11: less consumables through electronic communication	
		Interface Mgmt.	Ability to transform or manage data between different protocols or APIs.	B01/B02: better communication B03: better communication B04: time reduction through proper communication concepts B08: data integrity B09: availability of	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Core ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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				data B11: less consumables through electronic communication	
		Data Transmission & Packaging	A network of computer systems linked together for communication across LAN, WAN, and other types of networks.	B01/B02: better communication B03: better communication B04: time reduction through proper communication concepts B08: data integrity B09: availability of data B11: less consumables through electronic communication	
		Information Mapping	Mapping of one data format to another.	see above	
Optimization Services	Provides functionality required to ensure the optimal alignment between deployed processes and the current business environment.	Analytics	Multi-dimensional performance data, including custom business data fields, facilitating detailed real-time and historical analysis of process performance.	B01: identify optimization potentials B02: error/time reduction through process monitoring (B06: traceability of current status of documents)	B01 B02 B06
		Real-Time Monitoring & Escalation	The continuous tracking of work flowing through the processes under management coupled with autonomous escalation as, and when, exceptions arise.	B01: identify optimization potentials B02: error/time reduction through process monitoring B06: traceability of current status of documents	

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Layer 1		Layer 2			
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		Simulation	The simulation of the performance of processes prior to their deployment, providing quantitative information regarding the performance improvements.	.B01: time reduction through optimization by simulation of specific processes	
		Historical reporting	Comprehensive historical data, providing both a micro and macroscopic view into the performance of the tasks making up the processes under management.	B01: time reduction through optimization by analyzing historical data from processes	

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
Capture Services	Provides services around the acquisition, image enhancement, indexing, Optical Character Recognition (OCR), and distribution of content such as paper documents, faxes, word processing files, spreadsheets and CAD files.	Imaging	Bring in content via an image scanning mechanism	B10: increases information availability by making paper based information electronically available B12: reduces storage space for paper document archive	.B1 .B2 .B3 .B4 .B8 .B10 .B12
		OCR	Recognize characters in scanned documents. The services must provide both whole document and zoned document recognition services, including integration with index field value	B1/B2: speeds up processing since eliminating manual information capturing; reduces error prone manual data capture B10: increases information availability by making paper based content electronically	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
			domains (a zip code will be 5 + 4, for example).	available	
		Fax	Direct capture of electronic facsimile transmissions. The capture should include the parsing and capture of fax related metadata that is sent during transmission.	B1/B2/B3/B4: eliminates unnecessary media breaks (fax transmission = electronic - fax = paper output - scan = digitize formerly digital information) and allows direct allocation	
		Barcode	Encoding of characters that are machine readable. Rectangular black bars and the white space between the bars form characters as defined for specific bar code types. Bar code types include 3 of 9, Interleaved 2 of 5, UPC and others. Bar codes are typically used to encode index data and/or separate documents.	B1/B2/B3/B4/B8: allows immediate and direct association with the respective file or case	
		Form Identification	Recognition of pre-defined forms when re-scanned into the system. Provides a way to identify the images that correspond to one or more specific forms for automatic matching and processing.	B1/B2/B3/B4/B8/B10: provides the same benefits as Imaging and OCR, enhanced by the fact that content of a form is structured content and therefore useful for multiple automated purposes	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
		Form Processing	Provides capabilities for the capture and recognition of fixed format forms, using a template to identify, extract and validate data from scanned images for input to business process applications	B1/B2/B3/B4/B8/B10: enhances Forms Identification and makes use of the structured content for business processing	
		COLD	Provides a system for indexing, sorting, storing, mining and analysis of computer generated reports and forms such as customer statements, claims, billing statements, and payroll histories in a compressed but easily retrievable format. This system makes it unnecessary to archive reports in printed form and is easier to work with than microfiche, an earlier solution.	B10/B12 see above	
		EDI	Electronic Data Interchange-the transfer of data between different companies using a standard format. ANSI has approved a set of EDI standards known as the X12 standards. The service should provide a way to output Captured information in EDI format for use with other business systems.	B2/B8/B10	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
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		Entry Templates	Provide end users with a fast, customizable and easy way to add documents, custom objects, and folders repositories. Entry templates allows the individual to create object wizards to be customized to a particular purpose such as 'Create Application' and only the relevant data for an application will be entered.	B1/B2	
Content Publishing Service	Provides services to assist in the assembly, preparation, renditioning, formatting and delivery of content in a number of common output formats both analog and digital.	Dynamic Documents	Create documents that have variable content. This content can be hidden or surfaced based on variables, events, or data. This allows the documents to adapt to a particular context and act intelligently. For example, in a building permit application, creating a building permit document based on a complex set of rules for a particular customer that consists of many separate documents authored throughout the organisation. Another example of a dynamic document is a compound document.	B1: creation of (complex) documents can be (semi) automated. B5: by making use of predefined text building blocks and the usage of rules legal compliance gets enhanced B15: helps to ensure that only the respective content gets provided to the respective addressee	.B1 .B5 .B10 .B15

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
		Electronic Distribution	Delivery of content to external sites; for example, content created within the administration intended for syndication, as well as privacy-controlled items requiring restricted access. For example, this can be based on events, processes, or express actions.	B1 / B10	
		Print	Print production of content and documents. These services should provide the ability to print to a number of standard print standards and to dynamically insert content during print runs. The print job can also be created on demand based on user events such as joining a mutual fund, which prints a prospectus for the customer.	B1 / B5	
Desktop Applications	Provides services around the creation and modification of content in third-party desktop applications such as Microsoft Office, Sun StarOffice, OpenOffice , but also other widespread used applications and storing them in a central repository. Content includes email, spreadsheets, rich text documents, CAD files, presentations, video, and images	Word Processing	Provide integration into e.g. Microsoft Word and other popular word processing applications to enable users to easily manage documents within a central repository. Users can easily store, search, and retrieve documents directly from the word processing application, e.g. thru the Microsoft Word menus	B1/B2: reduces manual activities on managing content	.B1 .B2 .B5

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
		Spreadsheet	Provide integration into e.g. Microsoft Excel and other popular spreadsheet applications to enable users to easily manage spreadsheets within a central repository. Users can easily store, search, and retrieve spreadsheets directly from the spreadsheet application, e.g. thru the Microsoft Excel menus	B1/B2: reduces manual activities on managing content	
		Presentation	Provide integration into e.g. Microsoft PowerPoint and other popular presentation software to enable users to easily manage presentations within a central repository. Users can easily store, search, and retrieve presentations directly from the presentation software e.g. thru Microsoft PowerPoint menus.	B1/B2: reduces manual activities on managing content	
		Desktop Publishing	Provide integration into popular desktop publishing applications.	B1/B2: reduces manual activities on managing content	
		CAD/CAM	Provide integration into popular computer aided design and modeling applications.	B1/B2: reduces manual activities on managing content	
		Email	Provide integration into widespread eMail applications such as Microsoft Outlook or Lotus Notes to enable users to easily manage, track and	B1/B2: reduces manual activities on managing content. B5: allows to integrate another communication channel (email) with the file / case	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
			retain their email messages and attachments within a central repository.		
		WSRP	Provides services that adhere to the Web Services for Remote Portal, a standard for interactive, presentation oriented Web services.		
Content Security Services		Digital Signature	Electronic signatures for the purpose of identification and authentication. There are different levels of electronic signatures whose applicability is subject to national laws.	B5	.B5 .B14 .B15
		Object-Level Security	Authorize access to repository objects. Should allow to define default access rights on a object's class level.	B14 / B15	
		Digital Rights Management	Digital Rights Management (DRM) is an umbrella term referring to any of several technical methods used to control or restrict the use of digital media content on electronic devices with such technologies installed. The media most often restricted by DRM techniques include music, visual artwork, and movies.	B5	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
		Timestamp	A digital or electronic notary that provides digital evidence that data has not been altered. There are different levels of timestamp whose applicability is subject to national laws.	B5/B15	
Identity Management	Provides services that deal with identifying individuals in a system and controlling their access to resources within that system by associating user rights and restrictions with the established identity	Encryption	Computer encryption is based on the science of cryptography to securely transmit data over networks in real-time or store data and documents in databases and/or file systems.	B15	.B5 .B14 .B15
		Authentication / Single Sign-On	Authentication is any process by which you verify that someone is who he or she claims they are. This usually involves a username and a password, but can include any other method of demonstrating identity, such as a smart card, retina scan, voice recognition, or fingerprints. Authentication is equivalent to showing your ID card at the ticket counter at the airport. Single sign on (SSO) enables users to authenticate themselves once, after which they can directly access any application on the network for which	B5 / B14	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
			they have permission.		
		Authorization	User, group, or role-based authorization to provide access to resources. Authorization is finding out if the person, once identified, is permitted to have the resource. This is usually determined by finding out if that person is a part of a particular group, if that person has paid admission, or has a particular level of security clearance. Authorization is equivalent to checking the boarding pass before entering an aircraft.	B14 / B15	
		Policy Management	Create, update, and delete security policies.	B16 Quality of Service, B1 Time Savings	
		LDAP / Directory Services	Authenticate users and groups using corporate Directory Servers/Services. Lightweight Directory Access Protocol (LDAP) is a standard commonly	B1 / B16 Quality of Service, B1 Time Savings	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
			used by commercial Directory Servers for storing and managing users and groups		
Collaboration	Provides services to integrate collaboration solutions (e.g. unifying instant messaging engines).	Synchronous	Provide integration framework for e.g. leading Web conferencing technologies such as WebEx. The integration framework should allow creation of the online meeting object with properties such as: subject, agenda, start time and date, attendees, and duration. It further could be more extended to allow for aggregation of instant messaging technologies.	B1: integration of systems potentially speeds up processes B6: integration of systems enhances traceability of cases	.B1 .B6
		Asynchronous	E.g. an SMTP server laying the foundation for integration to desktop applications such as Microsoft Outlook and IBM Lotus Notes. Extended integrations may include: using an email client to complete tasks, replying to discussion postings, and responding to polls.	B1: integration of systems potentially speeds up processes B6: integration of systems enhances traceability of cases	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
Business Applications	Provides services to integrate with enterprise applications including packaged and legacy applications.	CRM	Ability to integrate and access content residing in a customer relationship management application and to interact with its internal processes.	B1/B2/B10: integration of systems potentially speeds up processes, reduces error prone manual steps, and enhances information availability B9: integration of systems allows increased service	.B1 .B2 .B7 .B9 .B10
		ERP for Government	Ability to integrate and access content residing in an enterprise resource planning application and to interact with its internal processes.	B1/B2/B10: integration of systems potentially speeds up processes, reduces error prone manual steps, and enhances information availability B7: capabilities of the system can be used instead of manual calculations B9: integration of systems allows increased service	
		eProcurement	Ability to integrate and access content residing in a eProcurement application and to interact with its internal processes.	B1/B2/B10: integration of systems potentially speeds up processes, reduces error prone manual steps, and enhances information availability	
		HR System	Ability to integrate and access content residing in a human resources management system and to interact with its internal processes.	B2: integration of systems reduces error prone manual steps B10	
		GIS	Ability to integrate and access content residing in a geo information system or a location aware application and to interact with its internal processes.	B10: provides additional dimensions of information	
		Legacy	Ability to integrate and access content residing in a	B1/B2/B10: integration of systems potentially speeds up	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

Peripheral ICT Functionality Groups				Benefits per functionality	Overall benefits per functionality group
Functionality Group / Service Name	Definition (of Functionality Group)	Functionality Name	Definition (of functionality)		
			homegrown application.	processes, reduces error prone manual steps, and enhances information availability	
Infrastructure Applications	Provides services to access reporting and system management tools as well as other infrastructure applications.	Reports	Ability for an organisation to utilize a best-of-breed reporting / business intelligence tool for generating and distributing statistical data and reports.	B6 / B10	B6 B9 B10
		System Management	Ability for the system administrator / operator to proactively monitor the health of systems and applications utilizing enterprise system management software/tools.	B16 Quality of Service	
		Electronic Calendar	Ability to make use of a central calendar providing all date / time relevant information, including national holidays, an organisations specific schedules, covering potentially different time zones	B9	

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

### Annex III Measurement of Benefits (Indicators and Measurement units)

The following table presents how the benefits are measured through specific indicators and relevant units of measurement.

ID	Dimension	Benefit	Indicator	Unit of measurement
B1	Time Saving	Processing Time Reduction	IC1.1 Individual processing time (per PBB, duration between start and end of PBB)	Minutes
			IC1.2 Total processing time (Sum of all individual processing times of active PBBs per process)	Minutes = sum of all B1.1s in process
			IC1.3 Cycle time (Total time from process start till process end - sum of processing time, transport time and idle time)	Minutes (average, max, min. variance).
B2	Time Saving & Quality	Error Reduction	IC2.1 Number of data Inputs/Outputs missing	numeric e.g. 10 (based on estimation of modeller) - Sources of information (for modeller) e.g. rate of non completeness in initial checks of completeness (for inputs missing), objections to PA by end-user (for outputs missing).
			IC2.2 Number of data inputs/outputs incomplete	numeric
			IC2.3 Number of data inputs/outputs wrong	numeric
			IC2.4 Number of data inputs/outputs too late	numeric
B3	Time Saving	Idle Time Reduction	IC3.1 Individual idle time between PBBs (the waiting time between two sequential PBBs)	Minutes
			IC3.2 Idle time total (sum of individual idle time per process);	Minutes = sum of all B3.1 per process
			IC3.3. Number of idles per process	Numeric
B4	Time Saving	Transport Time Reduction	IC4.1 Individual PO transport time (the time required for a processed object to be transported/delivered between two PBBs) ;	Minutes
			IC4.2 Total PO transport time (sum of all individual PO transport times)	Minutes=sum of all B4.1 per process
			IC4.3 number of transports of one PO in process	Numeric

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

ID	Dimension	Benefit	Indicator	Unit of measurement
			IC4.4 total number of PO transports per process	Numeric= sum of all B4.3 per process
B11	Resources	Reduced Consumables Costs	IC11.1 Average number of paper pages (required for prints or copies per PBB)	numeric
			IC11.2 Total number of paper pages (per process)	
			IC11.3 Total cost of paper pages (per process)	Euro --> based on average cost of 5 Euro for 250 pages)
			IC11.4 Average number of toners (per PBB)	Numeric (based on the average capacity of a large toner to print 10,000 pages, and medium-size toner to print 3,000 pages)
			IC11.5 Total number of toner & ink cartridges (per process)	Numeric
			IC11.6 Total cost of toners per process	Euro based on --> Cost of 1 toner at approx. 60 Euro
			IC11.7 Total cost of consumables per process	Euro = sum of all B11.3 and B11.6
B12	Resources	Reduced Storage/Space costs	Storage space	square Meters
			Storage costs (folders, boxes etc.)	Euro
B13	Resources	ICT Functionality Groups Redundancy reduction	numeric and qualitative difference between current ICTs and proposed ICTs	qualitative analysis
B20	Resources	Reduced labour costs (measured in conjunction with B1.1 and B1.3)	IC20.1 Labour cost per PBB	Euro = hourly person rate divided by 60 x B1.1
			IC20.2 Labour cost of PBB	Euro =(hourly person rate divided by 60 x B1.3
B5	Quality	Legal Compliance	compliance of process with legal regulations	Qualitative
B6	Quality	Audit Trail / Tracability	visibility of process steps	Qualitative
			visibility of process (including processed object) status	Qualitative
			availability of statistics on process monitoring	Qualitative

STREP- Project	PICTURE	Project - No	027717
PICTURE	D3.4	Work package	WP3
Document	Impact Measurement Methodology	Date	Dec. 2007

ID	Dimension	Benefit	Indicator	Unit of measurement
B7	Quality	Quality of Calculation Results	partly addressed by B2 – to be combined with error reduction	Qualitative
B8	Quality	(Data) Integrity	partly addressed by B2 - - cannot be quantified - link this to error reduction	Qualitative - yes/no linked to channel of processed object.
B9	Quality	Availability of Data & Service	Making information and service available online to externals (business & citizens)	Qualitative - yes/no
B10	Quality	Information Retrieval	Making information retrieval and document access for internal purposes (e.g. lookup of documents) faster and easier available through (e.g. object management & library services)	Qualitative - yes/no
B14	Quality	Privacy	compliance with privacy regulations	Qualitative
B15	Quality	Data Protection	compliance with data protection regulations	Qualitative
B19	Quality	Accessibility	number of external access points (and channels) available for process	Numeric