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FRAMEWORK CONTRACT # TAXUD/2007/CC/088		

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DOCUMENT HISTORY

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1	01-2	08/12/2009	Further updates (RfA76 – FQP Evolutive Maintenance)	I/R	As req.
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(*) Action: I = Insert R = Replace

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1. Introduction

This document is an annex to the Framework Quality Plan, deliverable DLV 0.1.1 requested in Specific Contract 04 [A2] under Framework Contract (IT Service Management for DG TAXUD) [A1], Work Package WP.0.1.

This document presents the Level 1, 2 and 3 of the ITSM process FQP - Annex 18: Capacity Management.

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2. Reference and Applicable Documents

This chapter presents two lists of relevant programme related documents. They are divided into reference and applicable documents.

2.1 Reference Documents

Id	Reference	Title	Date	Version
R1	ITS-IFQP-SC04-Framework Quality Plan	Framework Quality Plan	22/03/2010	1.04
R2	ITS-IFQP-SC04-Annex 9	ITSM Glossary	22/03/2010	1.13
R3	ITS-IPLN-SC04-CAP-COM-TAX-001	Capacity Plan	18/06/2009	1.00

Table 1 – Reference documents

2.2 Applicable Documents

An applicable document is a document which content is binding for a contractor no matter what is mentioned in this FQP.

Id	Reference	Title	Date	Version
A1	TAXUD/2007/CC/088	Framework Contract	04/05/2007	N/A
A2	TAXUD/2007/DE/113	Specific Contract 04	30/06/2008	N/A

Table 2 – Applicable documents

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3. Terminology

3.1 Abbreviations and Acronyms

A list of the abbreviations and acronyms used in the context of the ITSM Programme, and more specifically for this document is provided in Annex 9 ITSM Glossary [R2].

3.2 Interface with DG TAXUD

Where there is a non-specific reference to DG TAXUD, it means that the interface can be with any one of the following business threads of DG TAXUD:

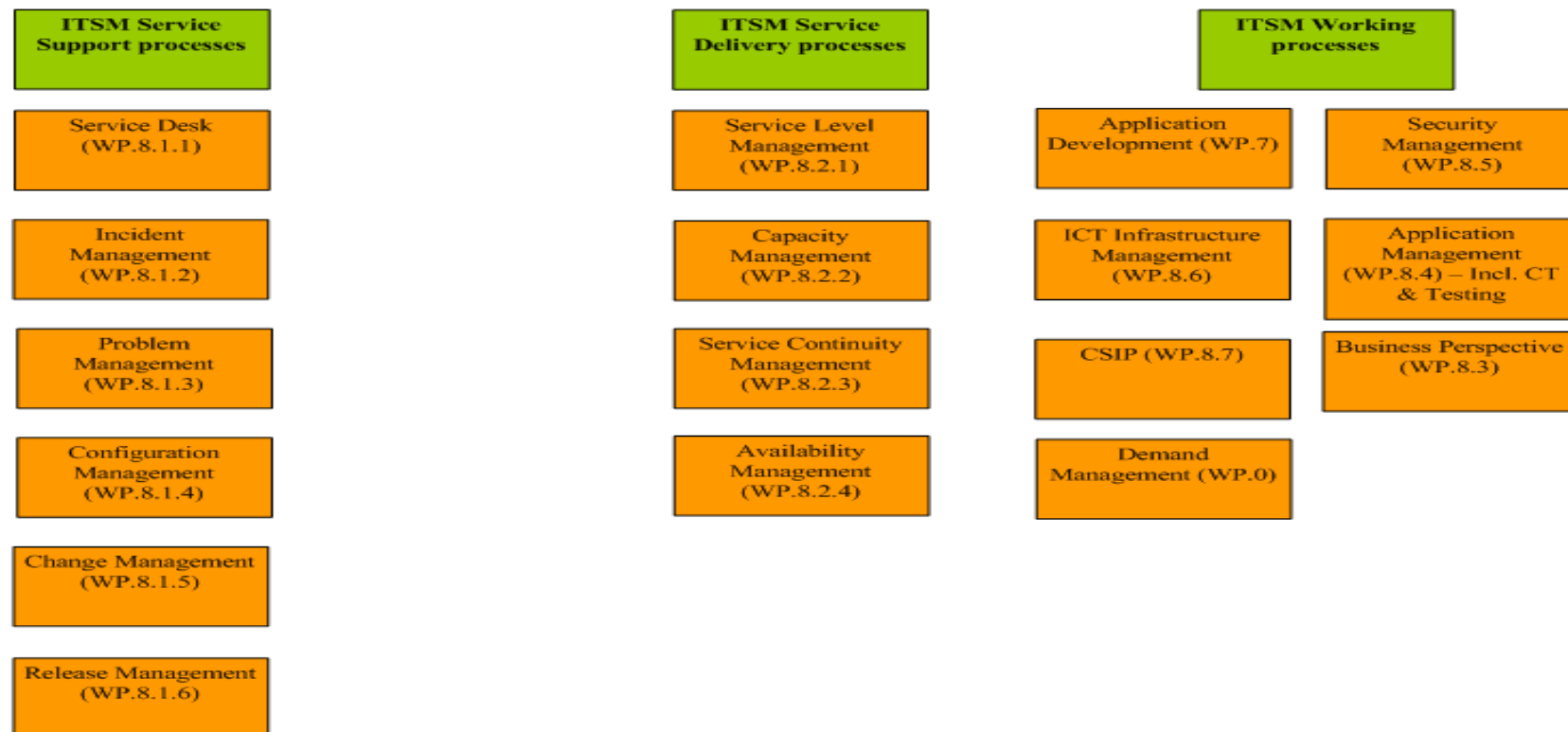
- DG TAXUD A4/CPT;
- DG TAXUD A4/ISD;
- DG TAXUD A4/APM;
- DG TAXUD A3/Tax;
- DG TAXUD A3/Exc;
- DG TAXUD A3/Cust;
- DG TAXUD A3/LISO.

Where it is intended that a reference is to a specific business thread/DG TAXUD department, one of the above naming conventions shall be stated.

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4. ITSM Process model

4.1 Level 0: Process flows



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Figure 4-1: ITSM Process Model

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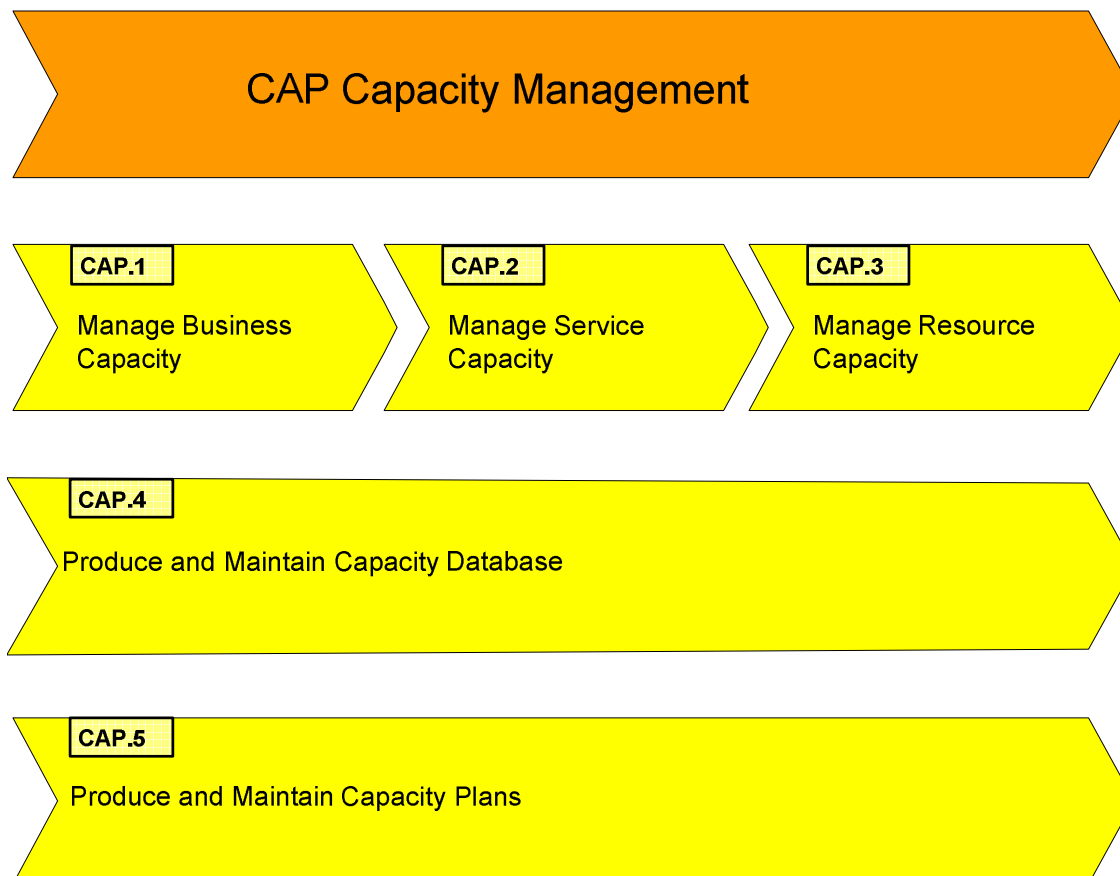
4.2 Level 1: Capacity Management

CAP is responsible for ensuring that the capacity of IT services and the IT infrastructure is able to deliver agreed service level targets in a cost effective and timely manner. The objective of CAP is to ensure that ITSM has, at all times, sufficient capacity to meet the current and future agreed demands of the business needs.

However Capacity Management is also about understanding the potential of new technologies and, if appropriate presented, and whenever agreed upon, used to deliver the services required by the business. Capacity Management needs to recognise that the rate of technological change will probably increase and that new technology should be harnessed to ensure that the IT Services continue to satisfy changing business expectations.

As shown in the picture below CAP consists of five sub-processes:

- CAP.1 Manage Business Capacity;
- CAP.2 Manage Service Capacity;
- CAP.3 Manage Resource Capacity;
- CAP.4 Produce and Maintain Capacity Database;
- CAP.5 Produce and Maintain Capacity Plans.



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Figure 4-2: CAP Capacity Management sub-processes

4.3 Level 2: Capacity Management

CAP is taking place at three levels within an organisation: business capacity, service capacity, and resource capacity. These sub-processes provide the necessary information to create and/or periodically revise the Capacity Plan and the Capacity Database.

CAP.1 Manage Business Capacity

This sub-process is related to the BCM (Business Capacity Management) part of Capacity Management. BCM is responsible for considering current and future business requirements for IT services and ensuring that they are planned and implemented in a timely fashion. The primary objective of the BCM sub-process is to ensure that the future business requirements for IT Services are considered and understood, and that sufficient capacity to support the services is planned and implemented on an appropriate timescale.

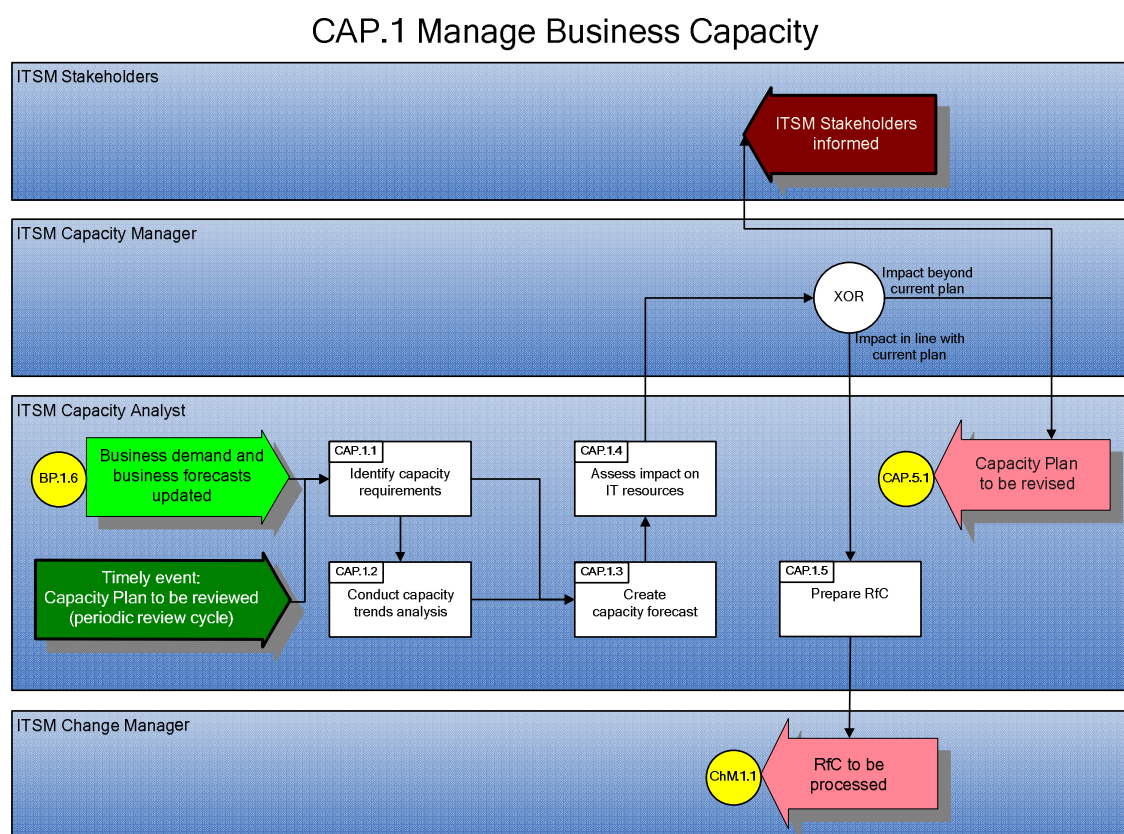


Figure 4-3: CAP.1 Manage Business Capacity

The above schema is the final goal for efficient and effective business capacity management. This process will be put in place progressively.

The current situation is as follows: There is no clear view on business demand and business forecasts yet. Communication with the business thread managers is ongoing in

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order to achieve the necessary information. Once all information is received and complete, the next steps of the business capacity management process will be performed.

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CAP.2 Manage Service Capacity

This sub-process is related to the SCM (Service Capacity Management) part of Capacity Management. The focus of SCM is the management of the performance of the live, operational IT services. SCM is responsible for ensuring that the performance of all services, as detailed in the SLAs, are monitored and measured. The collected data is recorded, analysed and reported. As necessary, actions are initiated to ensure that the performance of the services meets the business requirements.

CAP.2 Manage Service Capacity

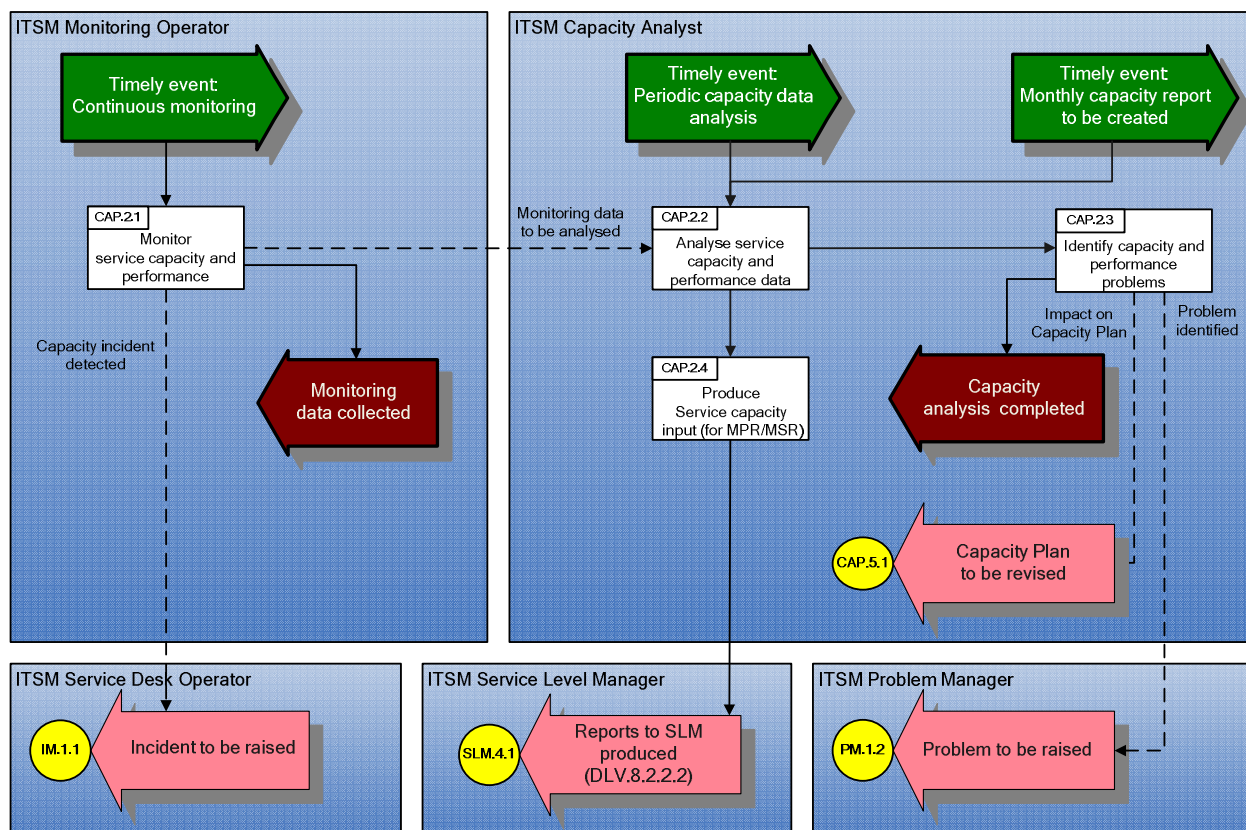


Figure 4-4: CAP.2 Manage Service Capacity

The above schema is the final goal for efficient and effective service capacity management. This process will be put in place progressively.

The current situation is as follows: Business monitoring of services is being performed (number of messages, number of registered users ...). This data is being filled in progressively into the CDB. Once there is enough data available, the next steps of the service capacity management process will be put in place.

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CAP.3 Manage Resource Capacity

This sub-process is related to the RCM (Resource Capacity Management) part of Capacity Management. RCM focuses on the monitoring and management of the individual components of the IT infrastructure. The primary objective of RCM is to identify and understand the capacity, performance and utilisation of each of the components in the IT infrastructure.

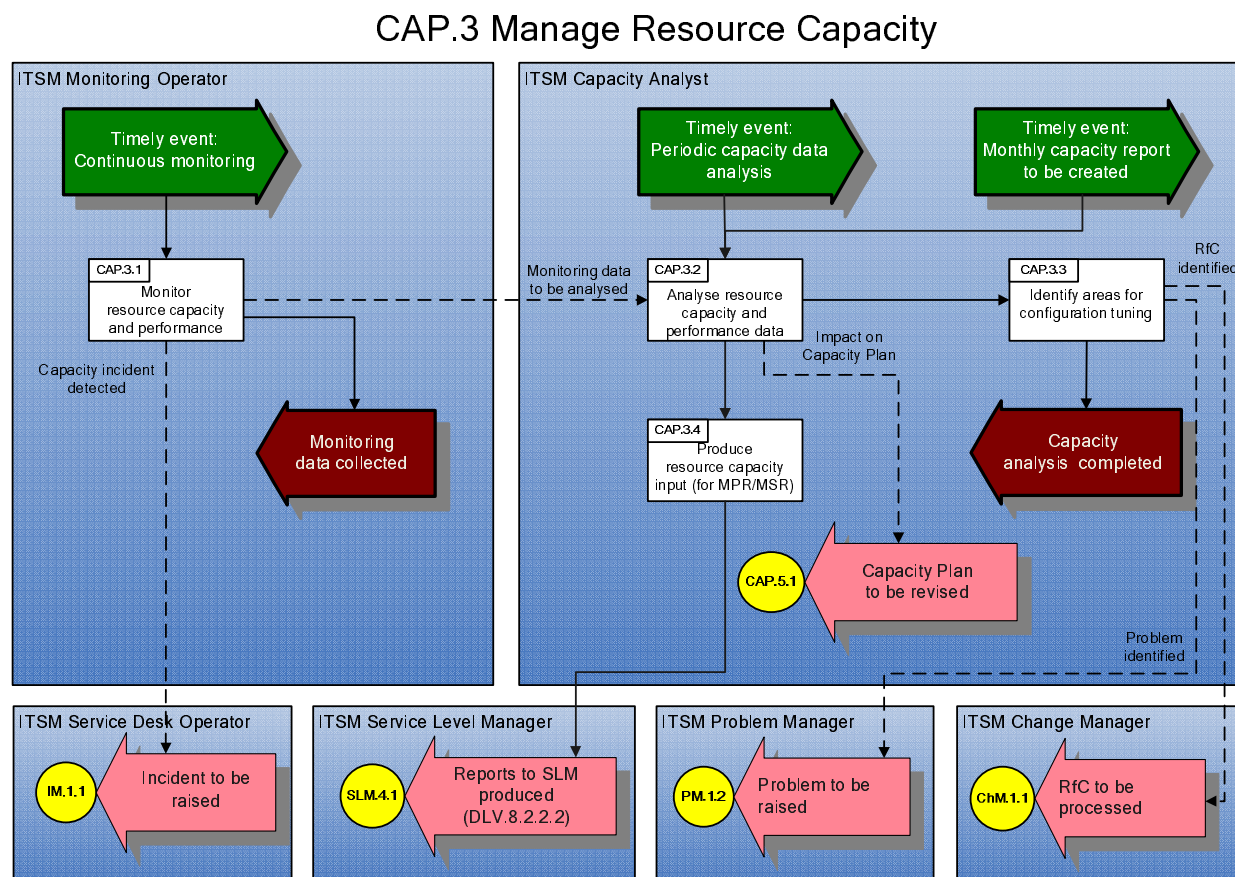


Figure 4-5: CAP.3 Manage Resource Capacity

The above schema is the final goal for efficient and effective resource capacity management.

The current situation is as follows: The process is in place. Resource monitoring is being performed with different tools and customized scripts Consolidation is currently being performed.. Standardizations on the collection of the monitored data is being agreed, and filled progressively into the CDB. Incidents, Problems and Changes are raised when necessary.

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CAP.4 Produce and Maintain Capacity Database

This sub-process ensures that the Capacity Database is produced, approved, maintained and improved. The Capacity Database contains metrics, measurements and statistics used to match existing and future capacity needs. The primary objective of the Capacity Database is to support the prediction and forecasting of capacity needs on the long term. It stores all required data and provides valuable input to other Capacity Management sub-processes.

Note: the previously called “Cap2013” and “Cap2013 Database”, is in fact now replaced and referred to as “Capacity Database”. Therefore “Cap2013” is no longer referenced to as such, this is due to the fact that a forecast for 5 years continually evolves and is not limited to the year 2013.

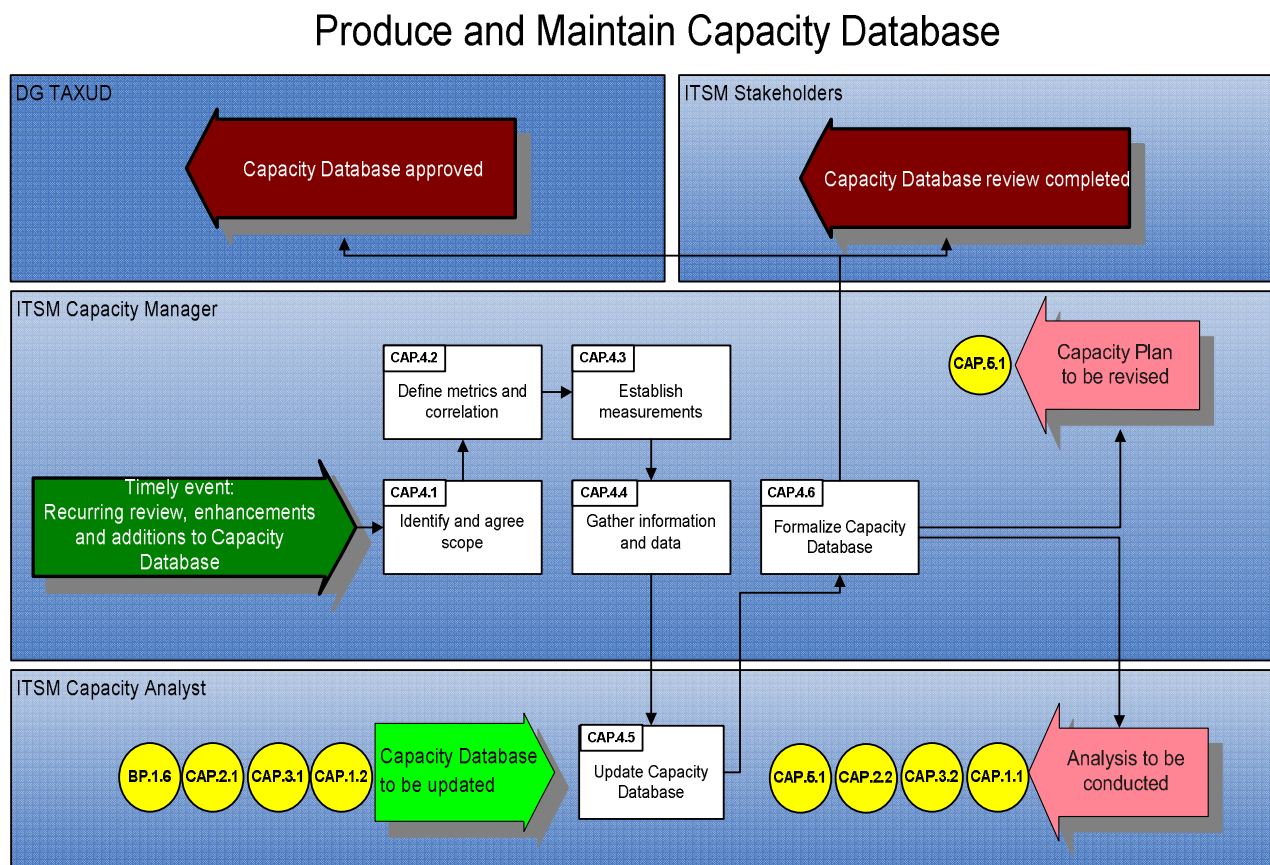


Figure 4-6: CAP.4 Produce and Maintain Capacity Database

The above schema is the final goal for the efficient and effective production and maintenance of the Capacity Database. This sub-process is iterative and will be put in place progressively. Currently the Capacity Database contains an Excel sheet that categorises all data sources used in the Capacity Plan. It also contains a prototype calculation Excel sheet, which forecasts Service Capacity. The Capacity Database will gradually be populated with required data and metrics. It should contain the key business and application metrics as well as service and resource statistics aggregated at

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a higher level. Forecasts will be calculated based on this aggregated information and the defined correlations

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CAP.5 Produce and Maintain Capacity Plans

This sub-process ensures that the Capacity Plan is produced, approved and kept up to date. The Capacity Plan contains advice on how much IT capacity is needed to match existing and future service needs, with a line of sight of at least 3 years.

CAP.5 Produce and Maintain Capacity Plans

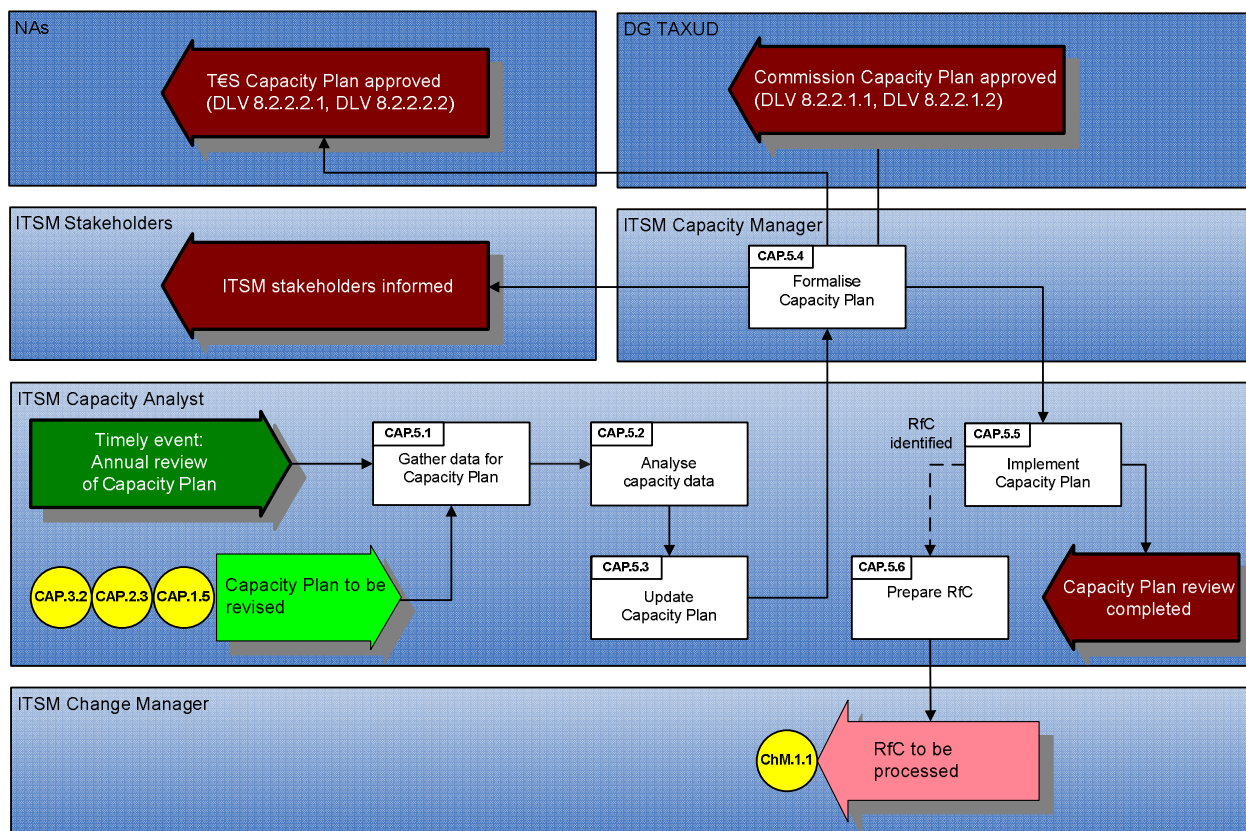


Figure 4-7: CAP.5 Produce and Maintain Capacity Plans

The above schema is the final goal for the efficient and effective production and maintenance of the capacity plans.

The current situation is as follows: The production of the Commission Capacity Plan is ongoing (based on the data available at this moment). The production of the Trans-European Systems Capacity Plan is started (based on the data available at this moment). As the initial plans production is ongoing, no review is done yet.

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RACI Table for CAP

Activity	DG TAXUD A4/ISD	NAs	ITSM Capacity Analyst	ITSM Capacity Manager	ITSM Monitoring Operator	ITSM Service Desk Operator	ITSM Business Perspective Manager	ITSM Service Level Manager	ITSM Problem Manager	ITSM Change Manager
CAP.1.1 Identify capacity requirements			R	A			C			
CAP.1.2 Conduct capacity trends analysis			R	A						
CAP.1.3 Create capacity forecast			R	A			C			
CAP.1.4 Assess impact on IT resources			R	A						
CAP.1.5 Prepare RfC			R	A						I
CAP.2.1 Monitor service capacity and performance				A	R	I				
CAP.2.2 Analyse service capacity and performance data			R	A					I	
CAP.2.3 Identify capacity and performance problems			R	A						I
CAP.2.4 Produce service capacity input (for MPR/MSR)			R	A			I	I		
CAP.3.1 Monitor resource capacity and performance				A	R	I				
CAP.3.2 Analyse resource capacity and performance data			R	A					I	
CAP.3.3 Identify areas for configuration tuning			R	A					I	I
CAP.3.4 Produce resource capacity input (for MPR/MSR)			R	A				I		
CAP.4.1 Identify and agree scope	C		C	R/A	C		C	C		
CAP.4.2 Define metrics and correlation	R/C			R/A			C	C		
CAP.4.3 Establish measurements	R/C		C	R/A	C		R/C	C		

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CAP.4.4 Gather information and data	R/C		C	R/A	C		R/A			
CAP.4.5 Update Capacity database	I		R	A	I		I			
CAP.4.6 Formalise Capacity database	C			R/A			I			
CAP.5.1 Gather data for Capacity Plan			R	A	C		C	C		
CAP.5.2 Analyse capacity data			R	A	C		C	C		
CAP.5.3 Update Capacity Plan	C	C	R	A	C		C	C		
CAP.5.4 Formalise Capacity Plan	C	C		R/A			A/R			
CAP.5.5 Implement Capacity Plan			R	A			I			
CAP.5.6 Prepare RfC			R	A						I

Table 4-1: CAP
RACI Table

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Communication interfaces with DG TAXUD A4/ISD

Interface description communication with DG TAXUD A4/ISD	Direction	Format	Source Process	Destination Process
CAP.1.1 Identify capacity requirement				
Business forecasts and demands provided by DG TAXUD A4/ISD	Incoming	E-mail	Business Perspective	Cap.1.1
Capacity planning and review invitation	Outgoing	E-mail, Phone	Cap.1.1	Business Perspective
Business capacity planning and review meeting (periodic capacity review)	Incoming	Meeting room	Business Perspective	Cap. 1.1
CAP.2.4 Produce Service capacity input (for MPR/MSR)			Cap.2.4	SFI
CAP.3.4 Produce resource capacity input (for MPR/MSR)			Cap.3.4	SFI
Capacity input (part of monthly service reports)	Outgoing	E-mail, Printed		
CAP.4.3 Establish measurement				
Produce a gap report on the required data	Outgoing	E-mail	Cap.4.3	ITSM Monitoring
CAP.4.6 Formalise Capacity Database				
Gather updates for the forecast model	Incoming	E-mail	ITSM Infra Meeting	Cap.4.6
Produce an updated forecast model	Outgoing	E-mail		
CAP.5.4 Formalise Capacity Plan				
Capacity Plan of Commission IT services (DLV.8.2.2.1.1, DLV.8.2.2.1.2)	Outgoing	CIRCA publication	Cap.5.4	SFI
Capacity Plan of trans-European IT services (DLV.8.2.2.2.1, DLV.8.2.2.2.2)	Outgoing	CIRCA publication	Cap.5.4	SFI
Capacity Plan reviewed and approved	Incoming	Formal approval confirmation via e-mail and/or mail	SFA	Cap.5.4

Table 4-2: CAP Communication interfaces with DG TAXUD A4/ISD

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4.4 Level 3: Capacity Management

Procedure	
<div> <div>CAP.1.1</div> <div>Identify capacity requirements</div> </div>	<p><u>CAP.1: Manage Business Capacity</u></p> <p>Currently this sub-process is being put in place. The processes and stakeholders are identified. The data of Business Perspective must be clarified yet (elaborated for one application, then extended to all applications).</p> <p>CAP.1.1 Identify capacity requirements</p> <p>Current and future capacity requirements are collected, documented and verified by the ITSM Capacity Analyst. This currently includes the required service levels such as performance availability and continuity requirements.</p> <p>It is important to note that the actual capturing of capacity requirements is primarily covered in design and development related activities as defined in ICT Infrastructure Management and Application Management.</p> <p>This procedure covers the periodic review and validation of these identified requirements triggered by the following events:</p> <ul style="list-style-type: none"> • Business demands and Business forecasts, updated, received from BP (Business Perspective) • ITOP, received from AM (Application Management); • MCP, received from BP (Business Perspective); • Periodic review of the Capacity Plan (yearly trigger to revise the Capacity Plan). • Timely event Capacity Database. <p>The capacity requirements are captured from a broad range of sources including¹:</p> <ul style="list-style-type: none"> • Business demands according to the current and future business requirements and capacity forecasts; • Availability requirements (and plans) which have to be taken into account in all capacity planning and sizing activities; • Capacity, performance and continuity requirements captured

¹ Different methods will be used to collect the data:

- Access to reports and documents (via the ITSM Publishing Platform, CIRCA, etc.)
- Conduct meetings with stakeholders
- Conduct interviews (e.g. via phone, e-mail, etc.).

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	<p>through Service Level Management or the described Service Level Requirements as stated in the specifications of the Business Plans.</p> <ul style="list-style-type: none"> • Continuity requirements (and plans) which have to be taken into account in all capacity planning activities; • ICT Infrastructure and application designs covering capacity and performance related aspects; • Business Plans, projects and other changes that have an impact on the capacity usage of the current ICT Infrastructure. <p>CAP requirements are defined per business thread and per application in terms of:</p> <ul style="list-style-type: none"> • Business volumes (e.g. number of transactions per category/type); • Storage requirements (for business data); • Expected throughput; • Patterns of usage (how the load is spread during working hours, ...); • Number of connected users (e.g. per location and usage pattern). <p>Different methods will be used to collect the data, such as:</p> <ul style="list-style-type: none"> • Reports and documents analysis (from the ITSM Publishing Platform, CIRCA, etc.); • Meetings/interviews with stakeholders. <p>The capacity requirement data gathering is a time consuming and difficult exercise which is still ongoing (collection of current and future business volumes, business specifications, number of messages, new functionalities ... per business thread and per application). An empty capacity requirements document has been created.</p> <p>These requirements will be consolidated into a capacity requirements document, which is an ITSM internal deliverable distributed for information to the different CAP activities.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> CAP.1.2 Conduct capacity trends analysis </div>	<p>CAP.1.2 Conduct capacity trends analysis</p> <p>Periodically (yearly, or more frequently, depending on demands/forecasts requirements updates), the ITSM Capacity Analyst evaluates actual capacity consumption and utilisation (based on the collected service and resource capacity data) against the capacity forecast resulting from the previous process iteration. (*)</p> <p>This activity consists of reviewing the historical and current data on capacity and performance (provided by SCM and RCM) and matching these with the expected capacity usage, as mentioned in the capacity forecast.</p> <p>The data is held in spreadsheets and graphical, trending and forecasting</p>

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	<p>facilities are used to show the utilisation of a particular resource over a previous period of time, and how it can be expected to change in the future.</p> <p>The historical service usage and IT resource utilisation statistics in the Capacity database are analysed to identify trends and usage patterns. These trends are the basis to predict the future workload. The Capacity Database is updated with the identified and agreed average growth factors.</p> <p>(*) The above description of 1.2 is the final goal of this sub-process. Due to missing information concerning business capacity data, business capacity trends analysis is not done yet. However, since the process is defined, this step can be implemented as soon as more relevant data becomes available.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> CAP.1.3 Create capacity forecast </div>	<h3>CAP.1.3 Create capacity forecast</h3> <p>CAP must predict the demand for capacity considering the business plans, business demand and volumes (from BP), capacity requirements (from CAP.1.1), capacity trends (CAP.1.2), projects and FSCs.</p> <p>To achieve this, the ITSM Capacity Analyst first collects all necessary information to create the capacity forecast:</p> <ul style="list-style-type: none"> • Business plans, business demands and volumes (from BP). This includes: <ul style="list-style-type: none"> ○ Business metric: current and forecasted number of concurrent users, number of transactions per period, storage requirements, response time requirements... ○ To what extent will the announced business changes influence the present trends? ○ What are the changes in the legal constraints in availability and storage of new messages/data? • Anticipated and planned projects, releases and changes (from ChM); • Capacity requirements identified (from CAP.1.1 and CAP.4.5); • Capacity trends identified • FSCs from ChM; • Anticipated or running projects (portfolio and project initiatives) from project portfolio management; • Release plans and schedules (e.g. maintenance, upgrades ...) from Release Management. <p>Based on the business forecasts and capacity trends, the capacity forecast is created, which defines the expected load on IT services (high-level metrics) required to determine the required capacity for the underlying IT resources.</p> <p>The forecast is created per business thread and used to derive forecasts</p>

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	<p>per application and/or IT service. The forecast also defines by which date the infrastructure should be compliant with the forecasted capacity.</p> <p>Depending upon the characteristics of an IT Service, different capacity metrics are used. Capacity contains the defined and approved metrics. Examples of the metrics in the forecast:</p> <ul style="list-style-type: none"> • Number of messages per channel; • Number of transactions (per period, per type); • Number of concurrent users (including peak values, ...); • Number of messages or data to be stored (for storage requirements); • Average size of messages or business data. <p>The load forecast is created with a line of sight of 5 years – containing more accurate figures for the coming periods. All increase of required capacity is captured at least 12 months in advance in order to allow DG TAXUD A4/ISD, their contractors (DIGIT, ITSM, ...) and NAs to undertake the necessary action (e.g. update and formalise the Capacity Plan, acquire resources and implement the required capacity changes).</p> <p>Due to few or no comprehensive information of business specifications availability; the business capacity forecast based on business plan demands cannot be created at this moment. However, since the process is defined, this can be implemented as soon as all required info is collected (info gathering is ongoing).</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> CAP.1.4 Assess impact on IT resources </div>	<p>CAP.1.4 Assess impact on IT resources</p> <p>To support the capacity requirements and forecasts established, the ITSM Capacity Analyst identifies the needed ICT Infrastructure resource capacity (e.g. storage capacity, network capacity, server capacity ...). The required resources for IT components are compared with the current and planned resources to identify gaps.</p> <p>Currently the following information is available:</p> <ul style="list-style-type: none"> • Data collected on resources by monitoring tools and shell scripts (e.g. current disk space usage/Database space usage); • Overview of capacity related incidents. <p>Based upon theses resource utilisation and current business volumes, the impact of changes in volumes is determined in terms of IT resources such as:</p> <ul style="list-style-type: none"> • Storage capacity needed; • Database sizing; • System capacity (sizing and number of servers). <p>To conduct this exercise, the technical infrastructure and its current and</p>

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	<p>projected capabilities has to be well understood (what throughput and performance can be achieved with the available CIs). CMDB information is used for this purpose.</p> <p>The estimated impact on resource requirements for planned changes (e.g. new applications, new services, new releases, upgrades/migrations, retirements, projects) taken into account. In addition, the cumulative effect of changes over a given period of time is evaluated by reviewing all changes and associated impact assessments. The cumulative effects of single changes can often cause degraded response times, file storage problems, and excess demand for processing capacity.</p> <p>The next step is to match the required capacity for ICT Infrastructure resources with the currently available capacity (taking into account any planned upgrades and/or changes). Based upon this analysis the gap in ICT Infrastructure resources can be identified, which results in an overview of additional resources required and/or overcapacity available.</p> <p>It may be necessary to initiate change requests to ensure adequate capacity is acquired and installed.</p> <p>To reach the final goal of this sub-process, translation between business specification volumes and IT resources utilisation should be mastered.</p>
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; padding: 2px;">CAP.1.5</div> <div>Prepare RfC</div> </div>	<p>CAP.1.5 Prepare RfC</p> <p>For the impact to be in line with the current capacity plan, the ITSM Capacity Analyst prepares an RfC, to be handled further by the ITSM Change Manager.</p>
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; padding: 2px;">CAP.2.1</div> <div>Monitor service capacity and performance</div> </div>	<p><u>CAP.2: Manage Service Capacity</u></p> <p>CAP.2.1 Monitor service capacity and performance</p> <p>Certain monitoring is applicable as to collect data on certain metrics, in order to produce MPR/MSR reports.</p> <p>Examples are :</p> <ul style="list-style-type: none"> • Number of weblogic requests; • Number of successful connections; • Number of XML messages.

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<div>CAP.2.2</div> <div>Analyse service capacity and performance data</div>	CAP.2.2 Analyse service capacity and performance data The data collected from monitoring is analysed by the ITSM Capacity Analyst, on a periodic basis and at least monthly to prepare the data which serves as input for the MPR/MSR.
<div>CAP.2.3</div> <div>Identify capacity and performance problems</div>	CAP.2.3 Identify capacity and performance problems Capacity incidents and problems (provided by Service Desk) resolution are currently performed, some of these were mentioned in the document DLV.8.2.2.1.1. – Capacity Plan [R3]
<div>CAP.2.4</div> <div>Produce Service capacity input (for MPR/MSR)</div>	CAP.2.4 Produce Service capacity input (for MPR/MSR) All MPR and MSR capacity input produced and used in the document DLV 8.2.2.1.1. – Capacity Plan [R3] are available on CIRCA.
<div>CAP.3.1</div> <div>Monitor resource capacity and performance</div>	<u>CAP.3: Manage Resource Capacity</u> CAP.3.1 Monitor resource capacity and performance The ITSM Monitoring Operator organises and supervises the continuous monitoring of capacity utilisation and performance of the individual infrastructure components (IT resources) that support the IT services. This monitoring is mainly automated using different tools but also includes manual verifications and data collection activities. The input for the monitoring activities are: <ul style="list-style-type: none"> • Monitor definitions and thresholds; • Capacity baselines or profiles (normal patterns of usage); • Planned changes and maintenance plans (planned unavailability or outages of IT resources). Based upon the data collected and exceptions detected, the following output is created: <ul style="list-style-type: none"> • Collected capacity and performance data (stored in the capacity management Database); • Exceptions detected resulting in capacity and performance events; • Incidents raised to be investigated and managed by IM. The activities involved in this elementary process include: <ul style="list-style-type: none"> • Monitor performance and capacity of IT resources; • Collect capacity and performance data (for analysis); • Store and timestamp collected data in CDB; • Evaluate performance against predefined thresholds; • Generate and log events in case of detected exceptions;

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	<ul style="list-style-type: none"> • Initiate incidents in case of exceptions which need to be investigated in more detail. <p>Whenever monitored thresholds are breached or threatened, alarms are raised and breaches, warnings or exception reports are produced. Each event is analysed in more detail and it is determined whether additional actions need to be undertaken. In this case, an incident is raised and the Service Desk is informed about the situation. Analysis of the situation will then be completed and remedial action taken under control of IM.</p> <p>The standard and central monitoring systems are Microsoft SCOM and BMC Patrol. However, to monitor the diversity of IT resources (e.g. Databases, network components, firewalls, servers ...) additional tools are required to cover all monitoring requirements.</p> <p>In addition, most IT resources have built-in performance and capacity management tools, which are used to monitor and analyse performance (such as Database management systems, operating systems ...).</p> <p>Example of IT resources to be monitored by SCOM:</p> <ul style="list-style-type: none"> • Windows servers; • AIX servers; • Active Directory; • Application processes; • Databases; • Network elements (Juniper routers); • Web pages access. <p>The monitoring tools are also used to produce reports on the utilisation of CI's.</p> <p>Implementation and configuration of the monitoring tool is part of the monitoring improvement project. The definition and maintenance of monitors and thresholds are defined in the Application Development process for ITSM SMT (Service Management Tool).</p>
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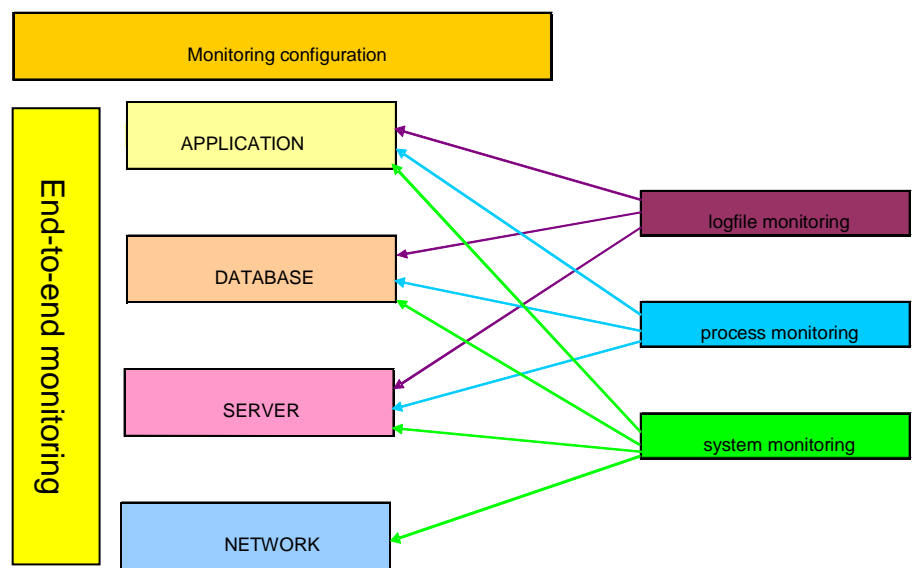


Figure 4-8: Monitoring Configuration

Examples of manual verifications, as mentioned in the ODL, are:

- Log files checks;
- Backup verifications;
- File systems allocations;
- Table spaces status;

It is important that the utilisation of each resource affecting an IT service be monitored on an ongoing basis to ensure that hardware and software resources are being used optimally and that all agreed-upon service levels are achieved.

As a basis, monitoring uses the capacity baseline, which defines the normal operating levels. If thresholds beyond the normal are exceeded, events/alarms are raised and exception reports are produced. These thresholds and baselines are determined from the analysis of previously recorded data (see CAP.3.2). After analysing the event, an incident may have to be raised to further diagnose and resolve the issue. This also ensures that all incidents related to performance and capacity are registered; as a result, all these incidents can be tracked and traced in the ITSM SMT.

Most monitoring tasks are short- or medium-term in nature and rely on underlying tools and principles for operation. Collected information is recorded by monitoring tools and stored in a Database (e.g. SCOM Database). These records contain a time stamp (automatically created at insert) or sampled over a determined period. The amount of sampling and resources required to do so must also be examined. The CDB has to contain information points to identify historical trends and patterns.

Typical resources monitored with RCM include processors, memory, disks and network bandwidth and network connections. Data regarding

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	<p>these resources are collected on an ongoing basis. As with SCM, there are times when RCM is reactive, for instance in cases where a lack of resources or inefficient use of resources causes specific performance problems.</p> <p>Monitors are established on the most important CIs, as defined in the ICT Architecture (DLV.8.6.1.3.1 and/or DLV.8.6.1.3.2). The data are analysed to compare usage and performance levels against thresholds. The results of the analysis are included in the MPR/MSR, and recommendations made as appropriate. ChM provides the control mechanism to act on the recommendations. This may take for example the form of load balancing, conducting performance tuning activities and adding or removing resources.</p> <p>The goal is to monitor all infrastructure resources using standard monitoring tools covering performance, capacity and availability aspects.</p> <p>Standard monitoring templates will be used to define a reusable set of monitors such as:</p> <ul style="list-style-type: none"> • Log file monitor (including event logs) to detect events generated by applications or operating system on the server; • Disk space utilisation; • Database table space capacity and extent management; • Performance metrics on the server (e.g. average CPU load); • Ping time measurement between systems; • Transactions time (e.g. ping response times, web page access); • Monitoring processes/services running on a server (e.g. monitor Database processes); • Queue monitoring; • Monitor batch duration (such as backup schedules). <p>The collected monitoring data (capacity and performance data) is stored in the CDB.</p> <p>This sub-process is currently in place, except for monitoring network bandwidth which is not done.</p>
<div data-bbox="284 1619 507 1738"> <div>CAP.3.2</div> <div>Analyse resource capacity and performance data</div> </div>	<h3>CAP.3.2 Analyse resource capacity and performance data</h3> <p>The data collected from monitoring is analysed by the ITSM Capacity Analyst, to identify trends from which the normal utilisation or baselines are established. By ongoing monitoring and comparison with these baselines, exception conditions in the utilisation of individual components can be defined.</p> <p>These baselines are important since they allow the proper identification and adjustment of thresholds and alarms (needed by monitoring activities as defined in CAP.2.1 and CAP.3.1).</p>

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	<p>This activity is triggered on a periodic basis and at least monthly to prepare the data for the monthly capacity input for the MPR/MSR.</p> <p>The following input is collected and used for this analysis:</p> <ul style="list-style-type: none"> • Collected capacity and performance data (stored in the CDB) from CAP.3.1; • Consolidated capacity data stored in the Capacity Database; • Current capacity baselines; • Capacity and performance events from CAP.3.1; • Capacity and performance related incidents (history) and problems (outstanding); • Change history (overview of implemented changes); • Resolved capacity incidents and problems; • Capacity forecast (to match actual consumption against the planned usage); • Implemented changes (related to CAP). <p>Trend analysis is done on the resource utilisation and service performance information that has been collected by the SCM and RCM sub-processes. The data is held in spreadsheets and the graphical, trending and forecasting facilities, including Capacity Database, are used to show the utilisation of a particular resource over a previous period of time, and how it can be expected to change in the future.</p> <p>The analysis of capacity data identifies issues such as:</p> <ul style="list-style-type: none"> • Bottlenecks or hot-spots within the IT infrastructure; • Inappropriate distribution of workload across available resources; • Inappropriate configuration settings of resources (such as Database indexes); • Inefficiencies in the application design; • Unexpected increase in workloads or transaction rates; • Inefficient scheduling of tasks. <p>Based on the continuous monitoring, trends in the use of resources will become apparent. Additional information from the CMDB is used to identify contributing factors – for example, if an implemented change coincides with any deviation from the normal utilisation.</p> <p>Monitoring data is analysed to identify trends from which the normal utilisation and service levels, or baselines, can be established. By regular monitoring and comparison with these baselines, exception conditions in the utilisation of individual components or service thresholds can be defined, and breaches or near misses in the SLAs can be reported.</p> <p>The data is manipulated using spreadsheets supporting the computation</p>
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	<p>of trends and increase/decrease rates for number of successive months.</p> <p>The outcome of these analysis activities defined above are:</p> <ul style="list-style-type: none"> • Analysed and consolidated capacity data (identified trends, ...); • Capacity baselines; <p>This sub-process is currently in place.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CAP.3.3</p> <p>Identify areas for configuration tuning</p> </div>	<p>CAP.3.3 Identify areas for configuration tuning</p> <p>The ITSM Capacity Analyst uses the analysed and consolidated capacity data (identified trends ...) from CAP.3.2, to identify tuning alternatives of IT resources and propose recommendations on the design and use of systems. The goal is to ensure the optimal use of existing resources.</p> <p>The activities involved in this elementary process include:</p> <ul style="list-style-type: none"> • Identifying capacity and performance bottlenecks; • Identifying and evaluating performance tuning alternatives; • Recommending tuning activities to make the best use of resources by raising a RfC; • Identifying performance and capacity related problems (to be investigated by the Problem Manager). <p>The ITSM Capacity Analyst proposes a broad range of improvement actions such as move traffic, change priority traffic, change time for batch jobs, upgrades, ...</p> <p>There may be occasions where optimisation of infrastructure components and resources is needed to maintain or improve performance or throughput. This is executed through workload management, which is a generic term to cover actions such as:</p> <ul style="list-style-type: none"> • Rescheduling a particular service or workload to run at a different time; • Moving a service or workload from one resource to another in order to balance utilisation or traffic. <p>Analysis of the monitored data may identify areas of the configuration that could be tuned to better use the system resource or to improve the performance of the particular service. If these improvements and or configuration tuning actions are identified, an RfC is initiated which will be further handled by the Change Manager.</p> <p>The actual system tuning implementation is executed by ICT Infrastructure Management to whom the tasks resulting from the RfC will be assigned.</p> <p>The tuning actions/RfCs are discussed with other service delivery process stakeholders (Application Management for example) during the CAB meeting.</p> <p>The impact of system tuning changes can have major implications on end-users utilising the service. Implementing the tuning changes under</p>

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	<p>the formal Change Management process results in:</p> <ul style="list-style-type: none"> • Less adverse impact on the users of the service; • Increased user productivity; • Increased productivity of IT staff; • Reduction in the number of changes that need to be backed-out, but doing so becomes easier; • Greater management and control of business critical application services. <p>It is important that further monitoring takes place to assess the effects of the change. It may be necessary to make additional changes or to back out some of the original changes (see CAP.3.1 Monitor resource capacity and performance).</p> <p>This sub-process is currently in place.</p>
<div style="border: 1px solid black; padding: 2px; width: fit-content;"> CAP.3.4 Produce resource capacity input (for MPR/MSR) </div>	<p>CAP.3.4 Produce resource capacity input (for MPR/MSR)</p> <p>Each month the capacity input is generated to be consolidated into the MPR/MSR by Service Level Management. This report, created by the ITSM Capacity Analyst, contains the capacity and performance statistics of the critical IT resources (including network, servers, storage). For main configuration items such as the servers, summaries are created (this includes for example % of resource utilisation).</p> <p>This capacity input also contains an overview of performance and capacity related incidents and problems as reported by users and/or business stakeholders.</p> <p>Sources used to create the resource capacity input includes:</p> <ul style="list-style-type: none"> • Analysed performance and capacity data in the CDB (from CAP 2.2); • Capacity and performance related incidents; • Capacity and performance related problems (outstanding and resolved in last period). <p>The resource capacity input is part of DLV.8.2.2.2 Monthly Service Report – Capacity statistics. This input is combined with the service capacity input as defined in CAP.2.4. The capacity inputs are consolidated in the MSR delivered by Service Level Management.</p> <p>If applicable, the resource utilisation for CIs is extrapolated (based upon trends detected using data collected over multiple months) to estimate the remaining time before reaching a critical threshold (such as 100% of disk space usage). If the obtained number of weeks prevision is below two years, the value is reported in bold font in the MSR.</p> <p>The ITSM Capacity Manager also puts remarks/warnings in that MPR/MSR report, when the remaining capacity approaches a low value, following the instruction received from the SLM process. For</p>

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	<p>example, the disk space allowed for a Database is indicated in the MSR, plus the consumed Giga bytes per month. If the available disk space is low, a warning is entered in the MSR as a risk.</p> <p>This sub-process is currently in place.</p>
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CAP.4: Produce and Maintain Capacity Database

The production and continuous maintenance of the Capacity Database needs to be planned carefully. With many different hardware and software components, applications, service providers and stakeholders in a highly distributed environment it is unlikely that all the necessary platforms can be incorporated into the Capacity Database at once.

There are also many changes and releases (events) executed frequently which trigger the start of this elementary process. This makes the development and updating of the Database an even more challenging task since these must be incorporated and taken into account as well. This sub-process facilitates a systematic and structured approach to gradually enhancing and updating the Database. The activities are executed for each application individually until all applications, related business plans; services and Infrastructure resources are incorporated.

CAP.4.1 Identify and agree scope

The scope and selection of the thread, business applications, associated services and Infrastructure resources is initiated by the ITSM Capacity Manager. One application is selected and scoped at a time; subsequently the relevant services and involved Infrastructure resources relevant to that application are scoped by the ITSM Capacity Manager. This activity is triggered on a periodic basis.

The approach described above enables all stakeholders to cope with the enormous amount of information to be processed and facilitates incremental improvement of the data structure of the Capacity Database while being populated with information. In particular the scoping activities include the following:

- Determine and select application including functional and technical dependencies across platform boundaries;
- Determine used and relevant services;
- Identify service Infrastructure and associated resources;
- Establish the scope of relevant data and information sources. This includes available documentation, historical statistic sources and format, current monitoring tools;
- Based on the results of the previous activities identify the relevant stakeholders.

The activities in this elementary process are iterative. Due to the cohesive and distributed nature of the environment, all stakeholders must contribute to the mentioned activities. The ITSM Capacity Manager engages various stakeholders to agree on the scope. This is

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Identify and agree
scope

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	<p>achieved through meetings and workshops. Stakeholders are involved at specific points during the scoping. Once the scope has been agreed the ITSM Capacity Manager works with Business Perspective to ensure that the required resources within ITSM are allocated in order to proceed with the execution of the next elementary process. DG TAXUD A4 remains responsible for allocating any external party resources as agreed and required for the execution of the next steps. The stakeholders involved are:</p> <ul style="list-style-type: none"> • DG TAXUD A4/ISD; • DG TAXUD A4/APM; • DG TAXUD A3/Tax; • DG TAXUD A3/Exc; • DG TAXUD A3/Cust; • ITSM Infrastructure Management; • ITSM Application Management; • ITSM Business Perspective Management; • External parties: DIGIT/DC, CCN, x-DEV.
<div>CAP.4.2</div> <div>Define metrics and correlation</div>	<p>CAP.4.2 Define metrics and correlations</p> <p>The current and expected business requirements for services can only be understood when appropriate metrics and the correlation between them have been defined. The scope as agreed during CAP.4.1 establishes the boundaries for defining these metrics.</p> <p>To understand what drives the capacity and growth of an IT system it is essential to have quantitative data in the form of metrics at all levels of Capacity Management and the correlation between them established. These levels are;</p> <ul style="list-style-type: none"> • Business level; • Service level; • Resource level. <p>Correlation is required in order to translate business activity from one level to another and map the relation between them. Once all the Business metrics have been defined and correlated it can later be used as inputs to identify the planning of the physical infrastructure necessary to support the business requirements.</p> <p>The definition of metrics for all previously mentioned levels and for each application within the Customs, Excise and Taxation thread is a time consuming and complex exercise which involves many</p>

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	<p>stakeholders and subject matter experts. Active involvement is crucial and must not be underestimated.</p> <p>Activities executed by the ITSM Capacity Manager as described in this elementary process underpin a cohesive approach to gradually defining relevant metrics and the correlation between them enabling the translation of business events to impact on IT services, IT resources and into specific Capacity requirements. There are three types of metrics that this elementary process defines:</p> <ul style="list-style-type: none"> • Business metrics – these metrics are associated with a core business activity executed as part of a business process. These metrics are the basis for defining business demand and enable the impact of that demand to be determined. An example in the case of the Customs thread business metrics are: <ul style="list-style-type: none"> a. # mandatory consultations performed annually; b. # AEO applications submitted per annum; c. # AEO certificates amended per year. • Service metrics – service metrics are metrics that quantify the use and exchange of information from an end user perspective. They quantify the characteristics (e.g. working patterns) of each of the IT services and the demands that the users and transactions have on the underlying infrastructure. Example metrics include: <ul style="list-style-type: none"> a. # of Asynchronous CCN messages per application; b. # of Synchronous CCN messages per application; c. # of HTTPS messages; • The above service metrics are sometimes a correlation made of more detailed application metrics monitored as per application. These metrics relate to the use of the application functionality and the generated output as a result of using that functionality. The output can have different formats and depends on the application being referred to. In the case of the Taxation thread this can be for example: <ul style="list-style-type: none"> d. # Of VAT messages; e. # Of O_MCTL messages; f. # Of F_L2F2F messages. • Resource metrics – includes metrics that quantify the behaviour of Infrastructure resources such as network bandwidth, CPU, memory and storage. Example metrics include: <ul style="list-style-type: none"> a. % of total CPU utilization allocated to VIES b. % of total memory utilization allocated to VIES c. % of total storage utilized by VIES
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	<p>d. % of network volume utilized by VIES</p> <p>Defining and agreeing the metrics requires input from many different sources and stakeholders. The ITSM Capacity Manager will, through workshops and meetings with relevant stakeholders agree on the metrics that should be used and document these as required.</p> <p>Once the metrics have been agreed the ITSM Capacity Manager commences with the next step, which is the establishment of the correlation between the metrics. Correlation is any linear relationship between two measured quantities that renders them dependent. These relationships must be established in order to translate the dependence between the metrics into concrete variables allowing activities from one level to be translated to the next level if appropriate.</p> <p>The ITSM Capacity Manager collaborates with the appropriate stakeholders through workshops or other means to define and agree to the correlation between each metric within all three levels (Business, Service, Resource)</p>
<div>CAP.4.3</div> <div>Establish measurements</div>	<p>CAP.4.3 Establish measurements</p> <p>Measurements are used to record the behaviour of metrics. Based on the metrics defined within the previous elementary process the ITSM Capacity Manager decides what should and can be measured. This is not only based on the capabilities of the existing toolset but also on the maturity of other Capacity Management sub-processes and their ability to produce the required output for this elementary process.</p> <p>The methods, tools and existing data vary between the different service providers. The measurements should be SMART (Specific, Meaningful, Available, Relevant and Timely) and focus placed on what should be measured vs. what can be measured. This must be quantified prior to commencing with the next elementary process.</p> <p>The ITSM Capacity Manager compiles a list of what should be measured driven by the metrics defined within the preceding elementary process and identifies together with the stakeholders for each application in scope the following:</p> <ul style="list-style-type: none"> • What should be measured and at what level? • What is currently being measured? • How are measurements taking place? • What can be measured in relation to the defined metrics? • What format is required and what format is available? • Frequency of measurements required.

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	<p>Following the above activities a gap analysis is performed by the ITSM Capacity Manager. The gap analysis identifies any shortcomings in processes and the ability of ITSM (Business monitoring included), CCN and DIGIT to measure and collect the required data. The purpose of this activity is to ensure that all required measurements for Capacity are done and the captured data available, analysed, reviewed and understood. The consequences of the gap are determined and the scope adjusted if required. At this point of the process, all measurements and thus input required for Capacity as per the agreed scope needs to be available.</p>
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> CAP.4.4 Gather information and data </div>	<p>CAP.4.4 Gather information and data</p> <p>To prepare for the update of the Capacity Database, the ITSM Capacity Manager collects a large amount of data and information from different sources. The collection of data takes place at all three levels within Capacity Management. The type and range of data is different for each level and is derived from different sources as required. Following is a list of known sources used to collect data from:</p> <ul style="list-style-type: none"> • Business demands, plans, forecasts (MCP) and volumes (from BP); • Anticipated and planned projects, releases and changes (from ChM); • Capacity trends identified (from the capacity trend report produced in CAP.1.2); • Anticipated or running projects (portfolio and project initiatives) from project portfolio management; • Release plans and schedules (e.g. maintenance, upgrades ...) from Release Management; • Application capacity data aggregated at a high level; • Service capacity data aggregated at a high level (from SCM and Business monitoring); • Resource capacity data aggregated at a high level stored in the CDB (from RCM CAP.3.1); • Capacity forecast (rolling forecast) (from CAP.1.3). <p>Furthermore a range of other information elements supporting and enabling appropriate forecasts to be produced need to be collected and agreed amongst the relevant stakeholders. This includes:</p> <ul style="list-style-type: none"> • Assumptions and restrictions; • Growth factors and exceptions to current trends; • Factors of influence and seasonal variations; • Average data sizes and volumetric.

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<div>CAP.4.5</div> <div>Update Capacity Database</div>	<h3>CAP 4.5 Update Capacity Database</h3> <p>When the necessary data and information is produced and collected by each of the Resource, Service and Business Capacity Management sub-processes, the Produce and Maintain Capacity sub-process uses the data and the information to update the Capacity Database.</p> <p>The ITSM Capacity Analyst, under supervision of the ITSM Capacity Manager, models the data and the information in a standard, consistent format in order to manage it as a resource within the Capacity Database. Modeling the data and the information allows it to be organised and stored within the structure of Capacity and enables the data to be shared with other Capacity Management processes.</p> <p>Subsequently Capacity is updated using the output of the preceding elementary processes. The ITSM Capacity Manager involves the necessary ITSM Stakeholders in the update when and as needed.</p>
<div>CAP.4.6</div> <div>Formalise Capacity Database</div>	<h3>CAP.4.6 Formalise Capacity Database</h3> <p>The ITSM Capacity Manager engages with stakeholders (ITSM Infrastructure Management, ITSM Application Management and Business Perspective) to review and finalise the used correlations and forecasting models internally.</p> <p>External parties may have to be involved in the formalisation of Capacity Database. These include:</p> <ul style="list-style-type: none"> • DIGIT/DC; • CCN; • x-DEV. <p>The result of this elementary process is the formalised and approved updated Capacity Database, currently in the format of Microsoft Excel documents.</p> <p>The final goal of the Capacity Database is to serve as relevant input for the Capacity Plan.</p>

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<div data-bbox="284 369 384 398">CAP.5.1</div> <div data-bbox="323 409 472 461">Gather data for Capacity Plan</div>	<p><u>CAP.5: Produce and Maintain Capacity Plans</u></p> <p>CAP.5.1 Gather data for Capacity Plan</p> <p>To prepare the creation and/or update of the Capacity Plan, the ITSM Capacity Analyst collects a large amount of data from different sources which include:</p> <ul style="list-style-type: none"> • Resource performance and capacity data (from RCM); • Trend analysis and capacity reports on resources (monthly reports); • Capacity requirements and forecasts on resources (from RCM); • Anticipated projects, releases and changes; • Capacity Database.
<div data-bbox="284 871 368 900">CAP.5.2</div> <div data-bbox="323 911 472 963">Analyse Capacity data</div>	<p>CAP.5.2 Analyse Capacity data</p> <p>The data collected by the previous activity (CAP.5.1) and data stored in the Capacity Database is reviewed and analysed.</p> <p>The purpose of this activity, performed by the ITSM Capacity Analyst, is to ensure that all required capacity data for the Capacity Plan are available, analysed, reviewed and understood.</p> <p>At this point of the process, all input requested for producing the Capacity Plan needs to be available.</p> <p>This sub-process is currently in place.</p>
<div data-bbox="284 1303 368 1332">CAP.5.3</div> <div data-bbox="323 1344 472 1395">Update Capacity Plan</div>	<p>CAP.5.3 Update Capacity Plan</p> <p>The Capacity Plan is updated using the output of the preceding elementary processes (the Capacity Plan is managed as a CI). The ITSM Capacity Analyst involves the necessary ITSM Stakeholders in the creation or update of the Capacity Plan, when needed. For example:</p> <ul style="list-style-type: none"> • ITSM Infrastructure Manager; • ITSM Continuity Manager; • ITSM Availability Manager; • ... <p>One Capacity Plan is maintained:</p> <ul style="list-style-type: none"> • Capacity Plan for the Commission IT services; <p>The Capacity Plans document the current and predicted levels of resource utilisation and service performance. They need to:</p> <ul style="list-style-type: none"> • Include in their forecast of future requirements: the resources that support the delivery of IT services or the planning of new ones. <p>Any recommendations the plan makes will include quantified details of necessary resources, any relevant impact and associated benefits.</p>

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	<p>The plan documents the current levels of resource utilisation after consideration of the business strategy and plans. The plan should include any recommendations quantified in terms of resources required, cost, benefits, and impact etc., based on the review of developers' documents.</p> <p>In general it contains:</p> <ul style="list-style-type: none"> • Current and recent resource usage; • Options for service improvement. <p>At this moment, an update of the capacity plan is not done yet because the creation of the first capacity plan is still ongoing. After the acceptance of the initial capacity plan, the update of the capacity plan will be done on a regular basis.</p>
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; padding: 2px;">CAP.5.4</div> <div>Formalise Capacity Plan</div> </div>	<p>CAP.5.4 Formalise Capacity Plan</p> <p>The ITSM Capacity Manager engages with stakeholders (ITSM Infrastructure Management, ITSM Application Management, and Business Perspective) to finalise and review the Capacity Plan internally and insures it is approved (including the financial consequences of the plan) by DG TAXUD A4/ISD, according to the formal review cycle. External parties may have to be involved to formalise the plan. This includes: DIGIT/DC, CCN and NA Operations.</p> <p>The Capacity Plan will be subject to a formal T1/T2/T3 review cycle (also referred to as SfR/SfA cycle).</p> <p>The result of this elementary process are the formalised and approved Capacity Plans:</p> <ul style="list-style-type: none"> • Capacity Plan for Commission IT services (DLV8.2.2.1.1, DLV8.2.2.1.2); • Capacity Plan for the trans-European IT services (DLV8.2.2.2.1, DLV8.2.2.2.2).
<div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; padding: 2px;">CAP.5.5</div> <div>Implement Capacity Plan</div> </div>	<p>CAP.5.5 Implement Capacity Plan</p> <p>After the Capacity Plan has been approved, the ITSM Capacity Analyst initiates the required capacity related changes, planned in line with the acquisition plan (e.g. to initiate projects or releases, issue purchase orders ...).</p> <p>This activity determines the RfC's to be raised (and the related RfAs to be launched), including the required information to document the request.</p> <p>The Change Manager will coordinate the activities to actually implement the capacity related changes.</p>

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<div>CAP.5.6</div> <div>Prepare RfC</div>	<h3>CAP.5.6 Prepare RfC</h3> <p>The ITSM Capacity Analyst prepares an RfC, to be handled further by the ITSM Change Manager, in order to implement the changes being raised during the execution of preceding activity “CAP.4.6”.</p>
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5. List of possible improvement actions

The following actions are proposed for the continuous improvement of the Capacity Management process:

- Establish a formal governance model, which should list:
 - The currently used capacity data sources;
 - The capacity data sources that are missing, and associated follow up actions that are undertaken;
 - Timely organised capacity meetings and communications for the 3 Capacity categories: Business, Service and Resource for the support of the Capacity Management processes described in this document.
- Find and add correlations or dependencies between the 3 different Capacity categories (Business, Service and Resource), as to see a top down impact of any Business Capacity change in the forecast model.