

*Sample: Capacity Plan*

*This document is a sample Capacity Plan. Version 11.5 (2015-04-21)*

# *Comments & usage guidance*

* *This sample was created to give an idea of how a Capacity Plan could look like. All contents are exemplary, and the sample may not fully reflect all contents and topics required in a given scenario in practice.*
* *For this sample and its contents, the terminology (terms and definitions) according to FitSM-0 applies.*
* *This sample considers that a number of SLAs are specified and signed between the service provider ACME IT and its customers. An example of the specification of an SLA is provided in document “FitSM\_Sample\_SLA”.*



Capacity Plan

# INTRODUCTION

This document describes the capacity plan the service provider ACME IT has defined to fulfill the demands of the SLAs agreed with its customers.

This document considers a set of services with SLAs signed between ACME IT and its customers, namely the services “Scientific data warehouse (SciData-1), Scientific data warehouse plus (SciData-2), Scientific data processing (SciProc-1), Data access (DatAcc-1), Data access plus (DatAcc-2), Data fast mobility (DFM-1) and Data Access Cloudifier (DACloud-1)”. *These SLAs have been specified according to the model provided in the sample document FitSM\_Sample\_SLA*.

The plan considers the number of subscribed services, and forecasts of service subscriptions aligned to the incremental provision of services at ACME IT.

A methodological approach based on target satisfaction levels has been used to estimate the resources needed to fulfill the SLAs at the agreed levels. This approach has been proved to be effective and it has been preserved from the past versions of this Capacity Plan (the method was proposed and implemented since Ver 8.3). The results of the estimation of technical and human resources are provided.

Finally, this document identifies the potential risks that would be prevented by implementing this capacity plan.

The most important changes of this capacity plan with respect to the last version (Ver 11.4) are: i) updates in capacity considering newly subscribed customers from last version; ii) updates on recommendations aligned to i).

# EXECUTIVE SUMMARY

This is a summary of conclusions drawn in this Capacity Plan. The technical analysis and justification of these conclusions can be found in the content of this document.

ACME IT will face an increased number of subscriptions by the 1st and 2nd quarter of 2015. In order to provision the services at the agreed levels, ACME IT should increase the capacity of CPU, memory, and storage. In addition, it has also to increase human resources and additional operational cost.

For the 1st quarter of 2015 the CPU capacity should increase from 2,024.00 CPU units to 2,511.00 CPU units. For the 2nd quarter of 2015 the memory capacity should increase from 1,024GB to 1,256GB; and the storage capacity should increase from 3,024,000GB to 3,256,000GB. In addition, ACME IT should consider hiring one more technical staff member by the 2nd quarter 2015 to support the company operations. Finally, economical resources should be allocated in line with the operational costs, which would be increased from 125,000 euro to 135,000 euro in the 1st quarter of 2015 and up to 142,000 euro by the 2nd quarter 2015.

# ANALYSIS OF CAPACITY EVOLUTION

This section provides the analysis of capacity for the service provider ACME IT. For this, the following services with corporative SLAs are considered: Scientific data warehouse (SciData-1), Scientific data warehouse plus (SciData-2), Scientific data processing (SciProc-1), Data access (DatAcc-1), Data access plus (DatAcc-2), Data fast mobility (DFM-1), and Data Access Cloudifier (DACloud-1).

The capacity planning defined to fulfill the demands of the SLAs agreed with its customers as well as an historical analysis are presented hereafter.

## Customer services’ analysis and prediction

The following table shows the evolution of the subscribed customers to each of the above services in the last two years (divided by quarter), and the potential growth in the following six months according to the experienced evolution in service subscriptions (gray shaded). The prediction of customers has been made considering the continuous increments experienced in the last years and also the time frame of the corresponding SLAs.

**TABLE 1. Evolution and prediction of subscribed customers per service at ACME IT**



## Analysis of Resources and Capacity Plan

The provision of ACME IT services requires planning on the following technical resources: CPU utilization; Memory utilization; HD utilization; and Access network rates. In addition, the operation cost and the technical staff are also resources subject of capacity planning. In this section the past, current and estimated resources needed to provision the services at the agreed SLA levels are presented.

### Estimation of resources utilization

A methodological approach based on users’ satisfaction levels has been used to estimate the technical resources that should be allocated to fulfill the SLAs at the agreed levels. This approach has been introduced in Ver 8.3 of the Capacity Plan and it takes into account two factors, namely almost satisfied FctrAS and fully satisfied (FctrFS) factors. These factors are used to estimate the minimum and the maximum amount of resources that should be allocated (Rscmin and Rscmax) to provide the services at the agreed levels, which in turn are calculated with the following two expressions:

Rscmin=(1-FctrAS)(Average Resource Requirements for SLA fulfillment) …….. (1)

Rscmax =(1+FctrFS)(Average Resource Requirements for SLA fulfillment) …….. (2)

The above expressions are specialized for each technical resource subject of capacity planning (CPU, memory, etc). For example, for CPU resource estimations these expressions are:

CPUmin=(1-FctrAS)(Average CPU requirement)

CPUmax =(1+FctrFS)( Average CPU requirement)

The values ACME IT has considered for the estimation of physical resources are: FctrAS=0.3 and FctrFS=0.2 respectively. The average resource requirement is obtained and/or mapped from the technical information of the actual agreed SLAs. The following table shows the values that have been considered for the estimation of technical resource requirements for ACME IT services:

**TABLE 2. Requirements of average resources per service**



### Historical estimations and resources’ usage

The Table 3 shows the historical resource allocation requirements (min and max), the actual resources used, and the evolution of the available capacity in 2013 and 2014 (divided in quarters) respectively. Non-technical resources are also provided in the tables. This document uses average values for resource utilization.

The minimum (Min) and maximum (Max) resource requirements are calculated with expressions (1) and (2) described in Section 3.2.1 respectively, for the average of each resource requirement per service presented in Table 2, and considering the amount of subscribed customers per service presented in Table 1. The resources “Actually used” are the amount of resources that have been used by the customers and they have been obtained making use of the appropriate monitoring tools. The “Available Capacity” is the capacity that ACME IT has had available to provide the services in each quarter. Traditionally, ACME IT has maintained its available capacity higher than the maximum capacity required (Max), and it has been increased when the actual capacity has reached 80% of the available capacity.

**TABLE 3. Historical of resources’ usage**



### Estimation of resources for the two first quarters of 2015

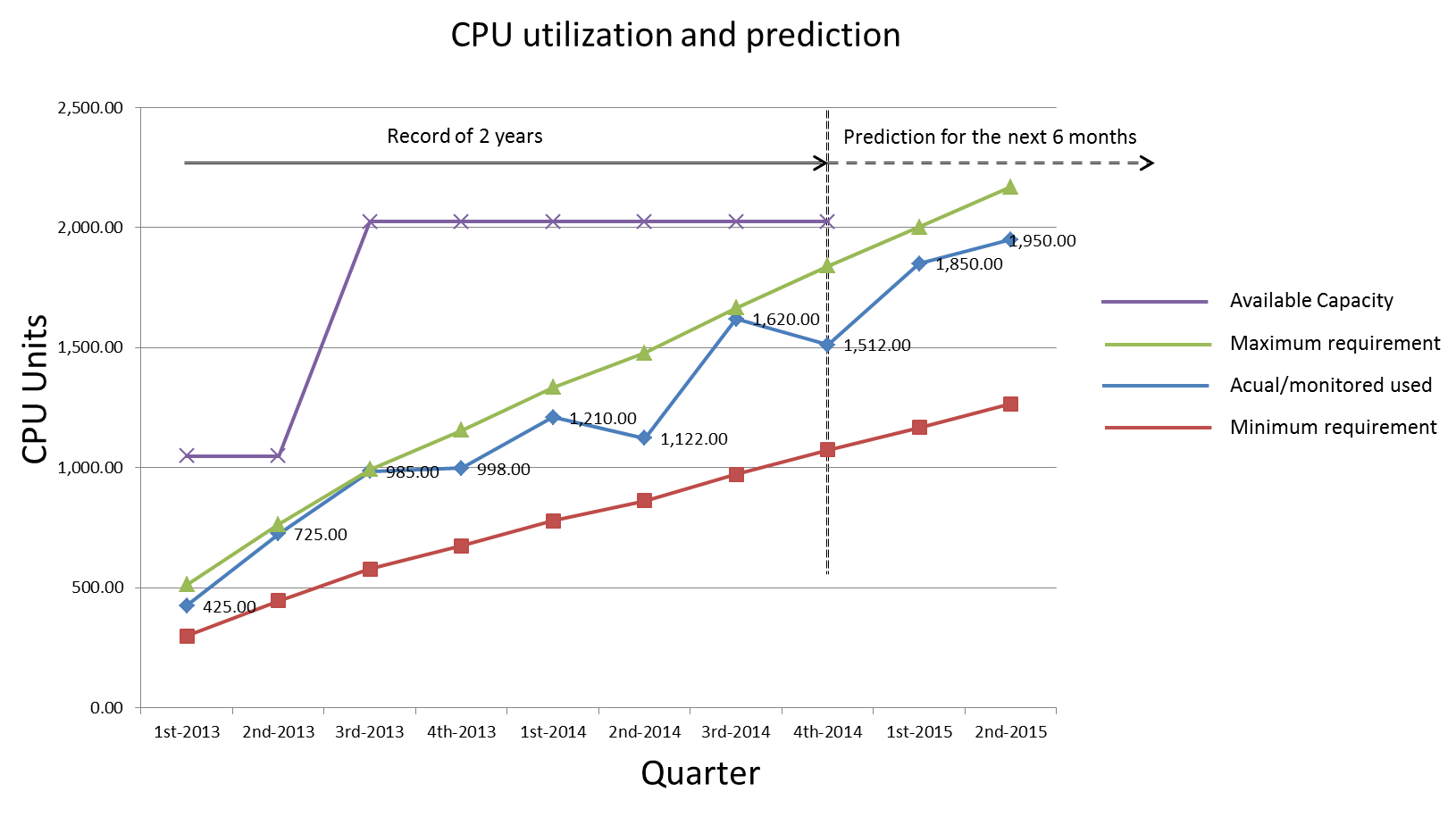
This section presents the estimation of resources utilization for the next half year based on trends observed in the past and the approach based on satisfaction levels described earlier.

The Table 4 presents estimations for the minimum, maximum and actual resources to be used for the first half of 2015 at ACME IT. In addition, the table shows the capacity that is proposed to be available (Prop. Avail. Capacity - gray shaded) at ACME IT for the same period.

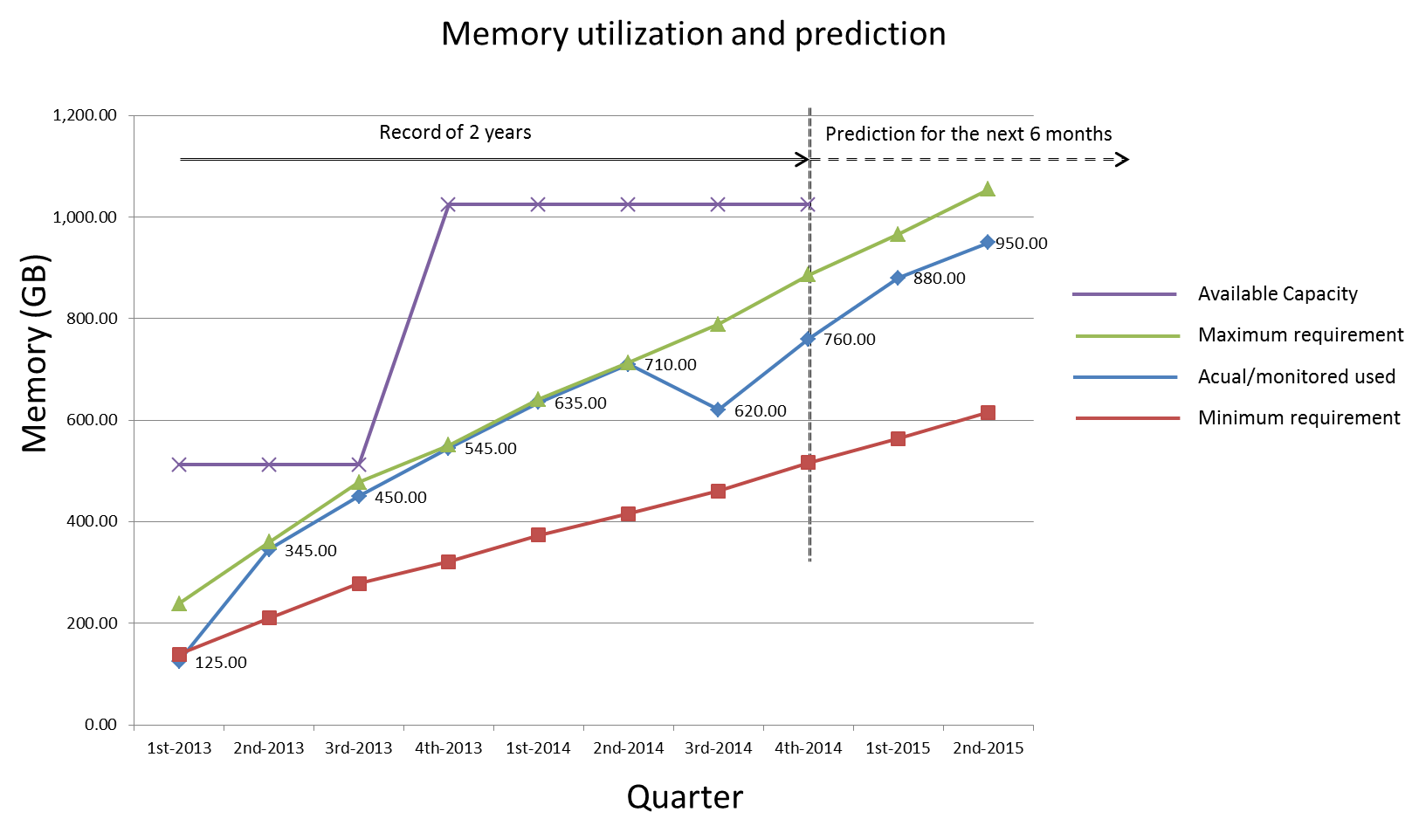
**TABLE 4. Estimations of resources requirements and usage**



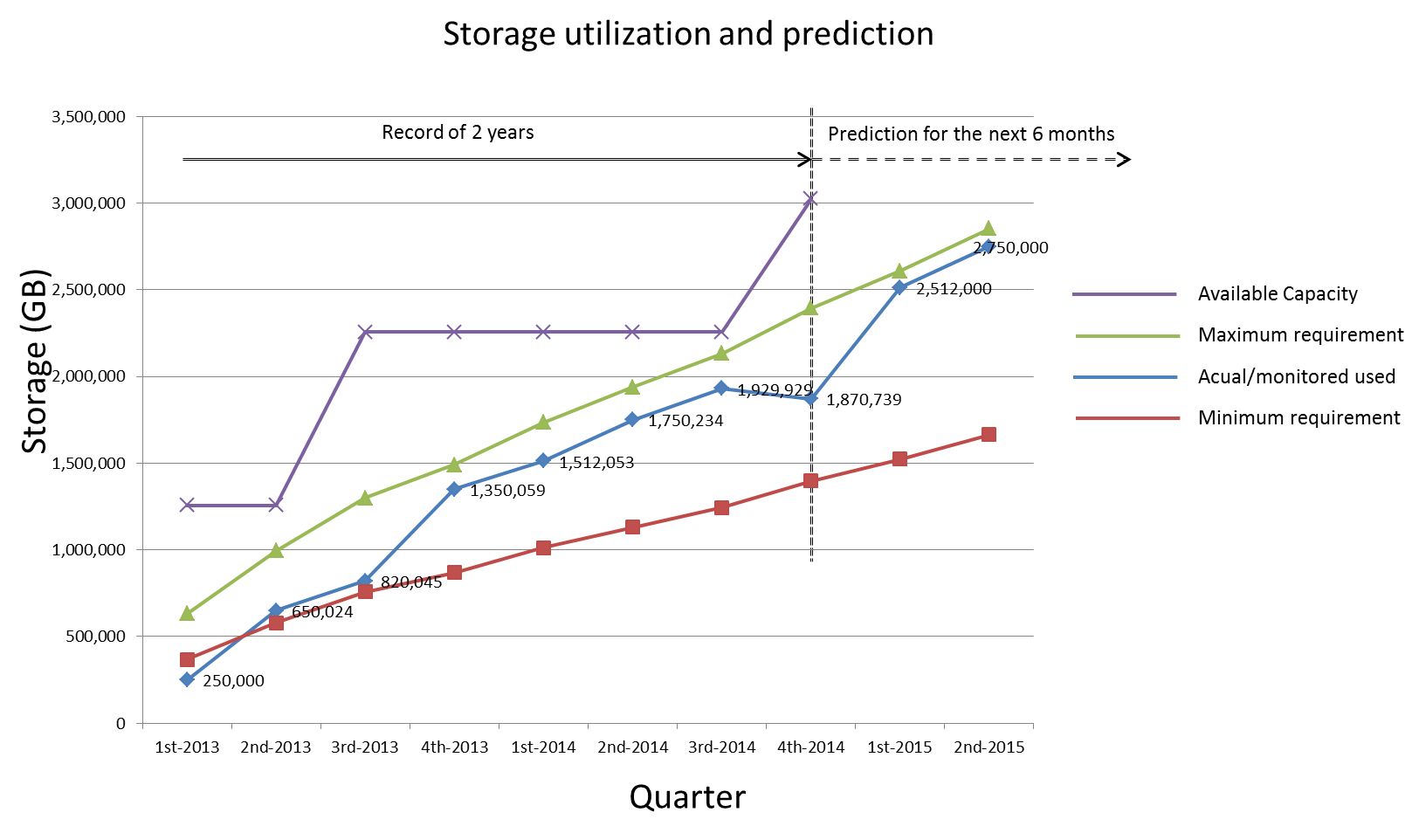
Graphical representations of the historic and estimations for resources utilization are provided in the next three figures, each corresponding to CPU, memory and storage utilization respectively.



**FIGURE 1. Evolution and estimations of CPU requirements and usage**



**FIGURE 2. Evolution and estimations of memory requirements and usage**



**FIGURE 3. Evolution and estimations of storage requirements and usage**

# RESOURCE ALLOCATION PROPOSAL SUMMARY

The estimations of resources made at ACME IT have produced reasonable results if they are compared with the actual resources utilized (and monitored) for the last two years. The approach taken has been proved to be efficient for resource estimations.

In general terms, the available capacity at ACME IT should be maintained above the maximum calculated requirements, and it has to increase when the 80% of the available capacity is used. With this regard, in order to meet the requirements of the users forecasted for the 1st and 2nd quarters of 2015 (see last two columns on Table 1), ACME IT should increase the capacity of CPU, memory and storage according to the following details:

For the 1st quarter of 2015 the CPU capacity should increase from 2,024.00 CPU units to 2,511.00 CPU units. For the 2nd quarter of 2015 the memory capacity should increase from 1,024GB to 1,256GB; and the storage capacity should increase from 3,024,000GB to 3,256,000GB.

In addition, ACME IT should consider hiring one more technical staff member by the 2nd quarter 2015 to support the company operations. Finally, economical resources should be allocated in line with the operational costs, which would be increased from 125,000 euro to 135,000 euro in the 1st quarter of 2015 and up to 142,000 euro by the 2nd quarter 2015.

# TECHNICAL RISKS

The technical risks for not following the plan presented in this document are summarized as follows:

* For the 1st quarter, shortages on CPU capacity would have a rather sensible negative impact on users of the service Scientific data processing (SciProc-1). The quality of service for these users would be severely degraded.
* For the 2nd quarter shortages on capacity for storage and memory would have a major negative impact on services Scientific data warehouse plus (SciData-2), Data fast mobility (DFM-1) and Data Access Cloudifier (DACloud-1).

# Document control

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