Grant agreement no. 823712

CompBioMed2

Research and Innovation Action
H2020-INFRAEDI-2018-1
Topic: Centres of Excellence in computing applications

D4.1 CompBioMed2 Compute and Data Services Strategic Plan

Work Package:	WP4	
Due date of deliverable:	Month 13	
Actual submission date:	29 October 2020	
Start date of project:	01 October 2019	Duration: 48 months

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Disclaimer

Project co-funded by the European Commission within the H2020 Programme (2014-2020)		
Dissemination Level		
PU	Public	YES
CO	Confidential, only for members of the consortium (including the Commission Services)	
CI	Classified, as referred to in Commission Decision 2001/844/EC	

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1 Version Log

Version	Date	Released by	Nature of Change
V0.1	20/08/2020	SARA	First draft template
V0.2	03/09/2020	SARA	Outline and list of authors
V0.3	23/09/2020	SARA	First draft ready, sent to co-authors
V0.4	07/10/2020	BSC, CBK, LRZ, UEDIN, UVA, UCL	Received comments and integrations from co-authors
V0.5	09/10/2020	SARA	First complete document sent to internal reviewers
V0.6	16/10/2020	USFD, BULL	Reviewers comments received
V0.7	23/10/2020	SARA	Reviewers comments addressed
V0.8	27/10/2020	UCL	Reviewers comments received
V0.9	28/10/2020	SARA	Reviewers comments addressed
V1.0	29/10/2020	UCL	Submitted to Commission

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3 Definition and Acronyms

Acronyms	Definitions
AM	Applications Manager
CoE	Centre of Excellence
DL	Deep Learning
DoA	Description of Action
HPC	High Performance Computing
HPDA	High Performance Data Analytics
HTC	High Throughput Computing
IP	Intellectual Property
IT	Information Technology
ITIL	Information Technology Infrastructure Library
ML	Machine Learning
OLA	Operation Level Agreements
PM	Project Manager
SLA	Service Level Agreement
SMS	Service Management System
TM	Technical Manager
WP	Work Package

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4 Public Summary

CompBioMed is a user-driven Centre of Excellence which serves users from academia, industry and clinical practice in promoting and enhancing computational methods and simulation tools in the biomedical domain. The Centre of Excellence (CoE) is also working as contact point for our users' community by acting as network and incubator centre to promote application usage and integration, through specialised trainings and support activities. The impact of the CoE within the Computational Biomedicine user community is critically dependent on the ability of the CoE to translate the work done within the consortium partners into tangible and usable services which can help to bring value to the end users.

Since the inception of CompBioMed2, leveraging the simulation community grown out of CompBioMed1, we have built several core services which are maintained and offered to our userbase. These services have been designed to support the needs of the biomedical community in delivering state of the art solutions, access to training material and efficient use of high-performance and high-throughput infrastructures.

This deliverable presents an overview of the existing CompBioMed services and we propose a set of guidelines and standards that will help in publishing the service portfolio and to enrich the service offering with more community-driven biomedical solutions. In this work we focus our attention on the currently available services within the project in order to define a service management system, and our plans for its development, to support the delivery of mature compute and data services for the community, which is the real focus of our work in CompBioMed.

5 Introduction

The CompBioMed CoE is centred on supporting the computational biomedical community in the development and provision of biomedical solutions. During the lifetime of the CoE we have been able to support our community through several activities, such as:

- delivering trainings and designing training material (https://www.compbiomed.eu/training-3/)
- supporting codes and tools (https://www.compbiomed.eu/services/software-hub/)
- enabling access to computing resources (https://www.compbiomed.eu/high-performance-computing-allocations/)

In order to efficiently deliver value from the solutions developed by both the CompBioMed partners and the biomedical community at large we need to be able to offer professional services which have clear scope and a straightforward delivery plan. Despite the fact that the CoE is not a fully integrated service provider, and it is not within our scope to become one, we need to be able to support the community with our combined expertise and translate the research and development work into solutions which can be adopted by Industry and the clinical sector.

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In this deliverable we propose a lightweight Service Management System (SMS) which will help to improve access and availability of the training material, tools, applications, collective know-how, etc. cultivated within the CoE, and support the community in the design and delivery of new computational services. The document has three main objectives:

- characterising the current CompBioMed service offering;
- defining the structure of the CompBioMed service governance and lifecycle;
- describing the plan for the improvement and extension of the CompBioMed SMS.

In this deliverable we propose a lightweight SMS using concepts and guidelines proposed by the FitSM framework (1). We used this standard as reference to prepare the templates and procedure presented here, which will be the base to build upon and develop the CompBioMed Service Portfolio. This work will help to enhance the accessibility and usability of the CompBioMed compute and data services as well as streamline the development and adoption of new services within our community.

The results presented here are part of the work performed within Work Package 4 “Operations and Services” Task 4.1:

Task 4.1 Services Management and Operations Control (M1-M48)
Leader: SARA; Partners: UEDIN, UVA, BSC, LRZ

The Task, which coordinates the operations to maintan and develop the CompBioMed Service Portfolio, will promote the use of the proposed standards and procedures and will collaborate with other WPs to ensure a full overview of the service planning and delivery.

This, as specified in the Description of Action (DoA), will be achieved through the release of the the CoE Milestones:

- MS13 Publish CompBioMed2 service portfolio (M25)
- MS17 Update CompBioMed2 service portfolio (M37)
- MS26 Release final CompBioMed2 service portfolio (M48)

These milestones will function as annual, version updates for the services offered by the CoE. The associated deliverables are as follows:

- D4.2 : Report on Maintenance and Development of CompBioMed Computational Services (M25)
- D4.3 : Report on Uptake of CompBioMed Services (M37)
- D4.5 : Final Release of CompBioMed Compute and Data Services (M48)

These deliverables will present the structure and evolution of the service portfolio (D4.2), monitor its evolution and its adaptation to meet the community requirements (D4.3 and D4.5), eventually providing help to develop sustainability and commercialisation strategies for the consortium and its members.

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6 Planned Activities or Activities Carried out

The overall methodology of CompBioMed will focus on three different strands of activity as a basis for the Centre of Excellence. Firstly, we work on research activities that allow us to **develop** codes, tools, and techniques to enhance the state of the art in computational modelling for biomedicine. Secondly, we work on the **optimisation** of both our codes and those contributed by the community by not only supporting their parallelisation but also by making them HPC-ready. Thirdly, we develop services to **support** our community's computational requirements. This methodology will allow us to promote and foster the use of HPC within computationally based biomedical research and to help translate this into medical and clinical practice through our incubation activities.

In this Section we present the templates and procedures which will be used to maintain and characterise the compute and data services offered through CompBioMed. We will show how we applied the established service management system to the current services maintained by the CoE, and the plan to develop and enhance our service portfolio.

6.1 Building the CompBioMed Service Management System

The benefits of having an SMS can be summarised in the following four points:

- Being able to offer well-defined, repeatable, and manageable services
- Defining roles and responsibilities
- Providing a clear expectation on service levels and availability
- Increasing the quality and availability of services

Fully implementing an SMS within a Centre of Excellence such as CompBioMed is not straighforward. The CoE does not act as a single, centrally controlled organisation over all the service management processes, but more as an integrator promoting a collaborative approach. CompBioMed is not therefore a fully integrated service provider, but can be seen more as a federation of service providers, in which the partners can offer directly specific services or enhanced service components through collaborations and seeking support in the community. For this reason, we need to clearly understand the organisational context for each service and apply only selected service management components and specific procedures tailored to the structure of the CoE and the community requirements.

In this work we envision CompBioMed acting as service provider mainly in the following two ways:

CompBioMed as service owner: the service is designed and maintained by CompBioMed partners and its provision relies on the use of CoE resources and effort.

CompBioMed as community services enabler: the services and/or components are hosted and integrated by the CoE, which support their use, ensures consistency and promotes good practices across the spectrum of its offered services. However, the Service Owner remains the specific partner in charge of the plan and delivery. In this case, the CoE has more of an advisory role, bringing together customers and the federated member which is offering the service.

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For both cases we prepared tools and templates which will allow for better control of information at each level of the hierarchy and help to plan and organise strategies for the delivery of new community oriented services.

6.1.1 Introduction to FitSM

FitSM (1) is a free standard for lightweight IT Services Management protocol which provides simple and practical concepts and requirements to improve service offerings. FitSM was initially developed by the FedSM project (3), which was co-funded by the European Commission, FP7 contract number 312851 and is currently maintained by the non-profit organisation ITEMO e.V (3).

The FitSM framework is made up of several documents (4), providing guidance and input on different aspects of ITSM in federated organisations. The standard is applicable to all type of organisation, e.g, commercial and non-profit, and is composed of 6 different parts:

- FitSM-0: Overview and vocabulary
- FitSM-1: Requirements
- FitSM-2: Objectives and activities
- FitSM-3: Role model
- FitSM-4: Selected templates and samples
    - set of documents under continual development
- FitSM-5: Selected implementation guides
    - set of documents under continual development
- FitSM-6: Maturity and capability assessment scheme

These documents give a description of the terminology used within FitSM (FitSM-0), a list of generic and process-specific requirements (FitSM-1), the objectives and recommended activities to assist in the fulfilling of the requirements (FitSM-2) and the roles and responsibilities of each of the different members involved in the service management process (FitSM-3). In addition the standard provide also implementation aids in terms of templates, sample and guidelines on different aspect of the ITSM process.

The reason for choosing FitSM as guide for the design of our SMS, is that this standard is more accessible than classic service management solutions and more suitable for federated scenarios, and has already been adopted within multidisciplinary scientific communties as that represented by CompBioMed (e.g: EGI (5)). The framework is also compatible with the International Standard ISO/IEC 20000-1 (6) (requirements for a service management system) and the IT Infrastructure Library (ITIL) (7).

6.1.2 The CompBioMed service portfolio

The approach followed for the construction of the service portfolio in this work, can be summarised into the following three steps:

1. Design of the service portfolio framework
    - Establishment of a Service Portfolio structure
    - Establishment of templates, for example, the Service Portfolio and Service Catalogue

2. Service governance
    - Service governance (establishment of roles and responsibilities)

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- Service Portfolio management, including strategic development of IT services
- Financial management of IT services

3. Identifying, structuring, and describing IT services
   - Population of the Service Portfolio
   - Establishment of Service Catalogues/

The implementation of the defined tools and policies will improve the delivery of existing services and the design of new services. For the new services, the inputs from the computational biomedical community, as well as the ability to translate partners research into viable solutions, will be essential to be able to adapt the proposed Service Portfolio to the rapid developments in the field.

6.1.2.1 Designing the Service Portfolio

Given the heterogenous nature of our service offering within the Centre, we need to design a flexible and usable management system, which will help in supporting and extending the CompBioMed compute and data services, without introducing excessive overhead and thus hinder the development of new solutions.

The first important element for this purpose is our CoE Service Portfolio which will list and define the services that we offer or plan to offer in the future. The service portfolio is an "internal tool" for the service provider (either CompBioMed or the service owner) and is the basis for the service catalogue.

Once the structure of the services and their topology is clear, the design of the procedures, needed for the delivery of each service, will be defined on the basis of the CoE structure and workplan presented with the CompBioMed DoA.

According to FitSM a Service Portfolio is an *internal list that details all the services offered by a service provider, including those in preparation, live and discontinued.*

The standard also suggests that for each service the portfolio should include information such as its value proposition, service description, relevant technical specifications, service packages offered, etc.

The purpose of the portfolio is to organise, both internally and externally, the information related to the services the organisation provides. A service portfolio also helps in dissemination and sharing information within the organisation for effective service management and delivery.

The Service Catalogue is the customer-view of the internal Service Portfolio, providing a tool for end-users to access and request the services.

FitSM provides guidelines on how to identify and characterise different type of services. In this work we adapted the templates provided by the standard (FitSM-4) and extended them with domain or service specific information relevant for CompBioMed.

The CompBioMed Service Portfolio is composed of three main parts:

- Basic Service Information

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General information about the service to identify it and establish its scope. This information is required in both (internal) Service Portfolio and (public) Service Catalogue even if the information in the two might be presented differently (e.g., internal description may contain more information than the one presented in the catalogue).

- Service Management
  Service management information such as service management procedures, service owners and agreements. These information are more relevant within the Service Portfolio (as much of the activities related to the service provision and delivery should not be exposed to the end users), but fields could also be exposed in the Service Catalogue (e.g., contact information).

- Service Architecture
  This section presents how the service is delivered in more detail, describing the different parts, components and internal or external activities, the owners/providers should undertake to make the service available.

Details of the different fields for these three main sections, are reported in Table 1. The Table provides details of each section, with a brief description of the suggested fields as well as whether they are listed in the Service Catalogue (external) to be accessible by the users.

Table 1. CompBioMed Service Portfolio main structure.

	Field	*Description*	*Visible to Customers*
Service Basic Information	**Name**	*Name of the service. Unique and recognisable for end users.*	Yes
	Scope	One-line description of the scope and target of the service.	Yes
	Description	Extended description of the service structure and added value (internal and external description may differ).	Yes
	Access	Where the service is available for end users.	Yes
	Category	Service category (see section 6.1.2.2)	Yes
	Last Update	Date of the service catalogue last update.	Yes
Service Management	**Service owner**	Owner of the service which will take care of delivery and operations.	No
	Service Life Cycle	Status of the service within its lifecycle. Allowed values are: 1. Planned, 2. Alpha, 3. Beta, 4. Production, 5. Retired.	No
	Customer contact point	Contact point for end users.	Yes
	Internal contact point	Internal contact point for operations and service control.	No
	Roles	Roles and responsibilities for service management and incident handling.	No

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	Service Level Agreements	Form of agreement as to how the service is provided. Service Agreements should be included in both the Service Portfolio and Service Catalogue, though they may be shown in different ways.	Yes
	Procedures	List of internal procedures and activities to carry out in order to provision the service to end users.	No
Service architecture	**Service packages**	Description of the components and/or packages accessible to users within the service and their relationships within the service delivery process.	Yes
	Service building blocks	List of the internal service components (e.g.: computational resources, hardware, etc.) managed by the service owner and/or members of the service procedure necessary to deliver the service.	No

This information composes the portfolio entry for each of the services provided or planned within the consortium. An example is presented in section 6.2.2.2.

6.1.2.2 Services in CompBioMed

The FitSM vocabulary define a service as: *"Way to provide value to customers through bringing about results that they want to achieve."*

Already from phase 1, CompBioMed has continuously worked to provide value to end-users by offering different types of services to the biomedical community. Acting mainly as a federated service provider the Centre has supported computational biomedicine users with the expertise and resources coming from the consortium's Core and Associate Partners. Indeed, the Associate Partner scheme itself should be considered an additional service in which we incorporate non-beneficiaries directly into our work and allow them to make use of our broadening dissemination activities.

These activities have resulted in the creation of six main services:

1. CompBioMed Training Portal
2. CompBioMed Scalability Support
3. CompBioMed Software Hub
4. CompBioMed Visitor Programme
5. CompBioMed HPC Allocations
6. CompBioMed Incubator Registry

If we analyse the characteristics of the current offer, and take into account the additional fields in which the CoE is expanding in this second phase (e.g., ML/Data Analysis research within WP3 and incubation activities from WP5) we can categorise the CoE service offer into five core groups (in parenthesis the associated services from the list above):

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- Training (1)
  Delivery of training and training material within the computational biomedicine and HPC domains. Development of tools and expertise to promote HPC and computational modelling in clinical and healthcare sectors.

- Technical support (2, 5)
  Providing access to HPC, HTC, HPDA resources and simulation tools. Parallelisation/porting/scaling/optimizing codes and workflows for current and future exascale architectures. Hardware/software co-design.

- Research and Development (3)
  Innovate in the field of computational biomedical modelling. Assist with the use of simulation tools and advanced tools supported by the CoE. Access to simulated or real-world, anonymised data, and computational medicine techniques.

- Networking (4)
  Promote collaboration and exchange of expertise within CoE academic, industrial and clinical partners.

- Consulting (6)
  Incubation activities to assist software, tools and service owners from the biomedical community. Consultancy in biomedical modelling and numerical tools.

These five core groups reflect the approach and the methodology followed by the CoE to support the computational biomedicine community. The categorisation can be directly mapped on to the CoE's description of work, making it easier to define roles and procedures within the CoE's partners.

6.1.2.3 CompBioMed Service Level Agreements

In ITSM the Service Level Agreements (SLAs) are documented agreements between the Service Provider and end-users that specify the level of service to be provided and the service targets on how it will be provided. In this work, we will use the templates provided by FitSM to build our CoE SLAs.

In CompBioMed we will adopt two types of SLA: "Corporate Level SLA" and "Service/Customer specific SLA".

Corporate Level SLA are generic documents that cover all SLAs and Services offered by a provider. They work particularly well for situations where the customer groups do not have specific (or variable) demands and it can be extended and replaced by a specific agreement when needed. The CompBioMed Corporate Level SLA, based on the FitSM template found here: https://www.fitsm.eu/download/333/, is shown in Annex 10.2 and will be used for all the services reported in section 6.1.2.2.

Service/Customer specific SLA defines an agreement for a single service or specific subset of that service, and its customers. Such SLAs are therefore specific to the characteristics of the service to which they refer or can be drawn up based on specific demands of the customers. At this

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moment we do not provide a service specific SLA, but we will use the SLA template from FitSM (available here: https://www.fitsm.eu/download/357/) to define one if and when needed.

6.1.2.4 CompBioMed Operation Level Agreements

In ITSM the Operation Level Agreements are documented agreement between a service provider and another part of the service provider's organisation or a federation member to provide a service component or subsidiary service needed to allow provision of services to customers.
In CompBioMed Service Portfolio, we will define specific procedures for each service which will provide a description of the activities needed to support the coordination of the different parts of the delivery process. These will constitute our set of Operation Level Agreements and will be monitored by the SMS owner and the Internal helpdesk to meet the agreed SLAs.

6.1.3 Service management and governance

Once the structure of the service portfolio has been determined, and the specific solutions identified, we need to define the procedures and roles within the consortium, for the provision and delivery of the supported services.

In this section we define:

- Service governance (establishment of roles and responsibilities for service planning and delivery)
- Service portfolio and catalogue management (operations and control activities to manage active services and plan the delivery of new services)

6.1.3.1 Service governance in CompBioMed

In order to design a lightweight but effective SMS, we need to map the service governance onto the CoE management structure, without introducing additional overhead in the daily operations and planned activities

The CompBioMed CoE has a clear management structure, which has been proven to be effective for a CoE of our type and scale. An overview of the project management structure is presented in Figure 1 (for more details of the structure and details on the roles of the different members in the project management team, please consult section 3.2 of the CoE's Description of Action).

The work plan for CompBioMed is divided into six work packages (WPs), each dealing with a specific set of activities, overviewed by WP leaders who are responsible for the quality of the work done and the coordination with other work packages.

The different WPs are represented within the Executive Board, which is responsible for quality assurance of all deliverables of the CoE and will implement all required procedures, by the Project Manager (PM) for WP1 and WP6, the Applications Manager (AM) for WP2 and WP5 and the Technical Manager (TM) for WP3 and WP4.

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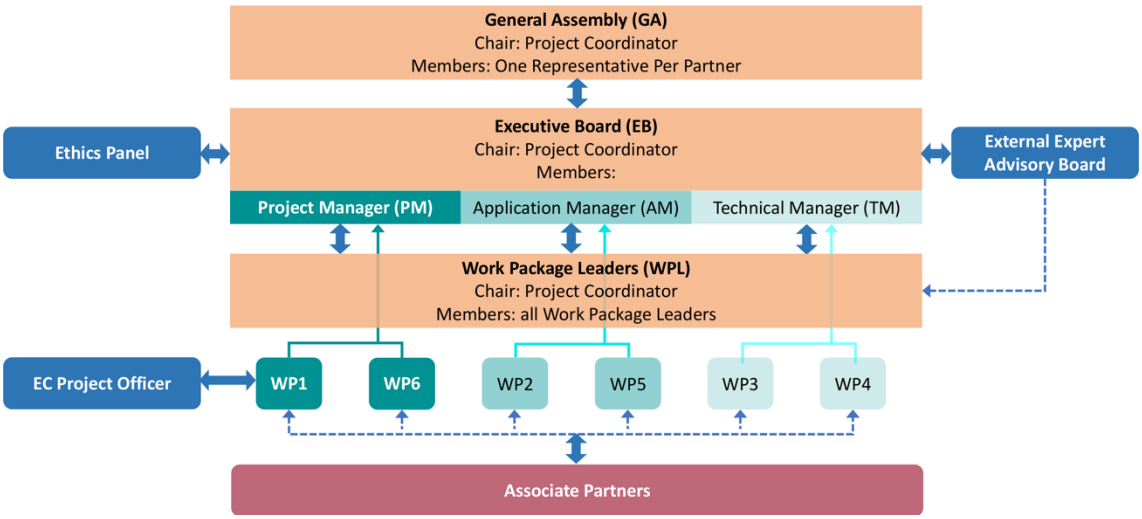

Figure 1: Management structure of the CompBioMed2 CoE as presented in the CompBioMed2 DoA.

With this structure in mind, and based on the FitSM guidelines (see FitSM-3), we propose the following three role models for the CompBioMed Service Management system:

Service Management System manager

The SMS manager will overview and maintain the service management system, setting the key goals and providing overall direction for the SMS. This role will function as primary contact point for the organisation of the entire SMS, approving changes and identifying opportunity for improving effectiveness and efficiency of the system. They will make sure that the procedures defined within the SMS are implemented according to the defined OLA (incidents report, problems management, etc.). In CompBioMed, the "WP4 Operation and service" leader will act as SMS manager, as part of the work and activities planned in Task 4.1 "Services Management and Operations Control".

Service owner

The service owner is responsible for specific services within the portfolio and acts as an "expert" for the service in technical and non-technical concerns. The service owners will act as the primary contact point for all (process-independent) concerns in the context of the service and report to the SMS manager every major event, situation or change connected to the service.

Each manager in the executive board (i.e. PM, TM, AM) is designated to overview (acting as service and processes owner) specific service categories (see 6.1.2.2) with the following division of tasks:

- Project manager: "Training" and "Networking" services
- Application manager: "Research and Development" and "Consulting" services
- Technical manager: "Technical support" services

This will guarantee a centralized control of the operations, while assuring the involvement of each partner in the different WPs. In this context using categories (instead of defining ownership for specific services) will allow for a transparent and straightforward control over the procedures to transition new ideas and community requirements into usable solutions.

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For external services, e.g., services for which CompBioMed acts as service enabler but does not have any ownership, the service owner will not be assigned to a partner or member of the CoE, but will remain the provider who designed and maintains the service. In this case the SMS manager will support the service lifecycle from the CompBioMed prospective.

Service delivery team

The service delivery team is composed of individuals involved in the execution of one or more activities within a service, but not taking a steering role. They contribute to the delivery of the service by participating in processes and activities and report to the service owner for any incident or problem encountered.

Service specific roles will be defined within each of the services in the portfolio. These will strongly depend on the nature of the offer and they will be assigned based on the activities, within the specific Work Package, needed to deliver and maintain the service.

6.1.3.2 Service Portfolio Management

The service portfolio management will (i) provide a framework to update and maintain the information about the services, (ii) design and transition new or changed services (add or decommission services in the catalogue) and (iii) identify and support the organisational structure to deliver value to the end-users (e.g. capacity management, performance evaluation).

The service portfolio management we envision for CompBioMed can be summarised in three main parts:

1) Service Design

In this phase we will collect input from the biomedical community and the CoE customers to design the "service concept". This will represent the initial idea and scope of the service, which will be evaluated by the CompBioMed partners (from the WPs involved in the design) and the SMS manager, who will align the concept to the structure of the SMS. We will use the individual WP meetings (regular meetings between the partners of each work package to discuss the work done and plan the future activities within the specific area of interest) to disseminate information within consortium partners and identify potential inventions and use-cases that can be transformed into "service concept". In alignment with the Innovation Plan (D1.4) (8), each IP identified will be assessed and evaluated to be included in the CoE IP registry, which will serve as framework to govern the Service Portfolio developments (for more details see Section 7.1 of Deliverable D1.4 (9) (9)).

Once agreed between the involved partners and the SMS manager, the "service concept" will be transitioned into the "service prototype" which will be used for testing and to evaluate the necessary resources.

2) Service Operations

This part of the service portfolio management deals with delivery of the service to the end user and related operations. The "service prototype" will be evaluated by the responsible service owner and the SMS manager who works with the WP leaders to identify synergies across the CoE and allocate the required resources (i.e. technical resources and effort from partners). This will allow the transition into the production service which will be added to the catalogue and eventually become accessible to end-users/customers.

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Work Package Leaders meetings are held regularly between the leaders of the different WP and the Project coordinator and these will be used to share information about new and existing services and communicate changes in the SMS structure. WP4 will provide effort to create and maintain the item in the catalogue and oversee the related operations. WP4, through Task 4.1 "Services Management and Operations Control", will implement changes in the SMS structure and function as central point for incident handling and problems management redirecting to the specific service owner and delivery team when needed.

3) Service Monitor

We will perform regular evaluations of the usability and performances of the offered services, which will help us to improve the value provided to end users. Service Owners and the SMS manager will evaluate service performance and capacity requirements to propose changes within the service catalogue structure and decommission specific services when needed.

The Executive Board, which includes the service owners (PM, TM, AM and project coordinator) will overview this process and will work together with the SMS manager to evaluate performance against agreed targets and detect nonconformities. This structure will allow a better coordination of the service management processes and involvement of the External Expert Advisory Board and the Ethics Panel (see CompBioMed DoA for more detailed information).

A schematic of the service portfolio management is presented in Figure 2, where the different phases of the service lifecycle are showed and the main roles involved are reported.

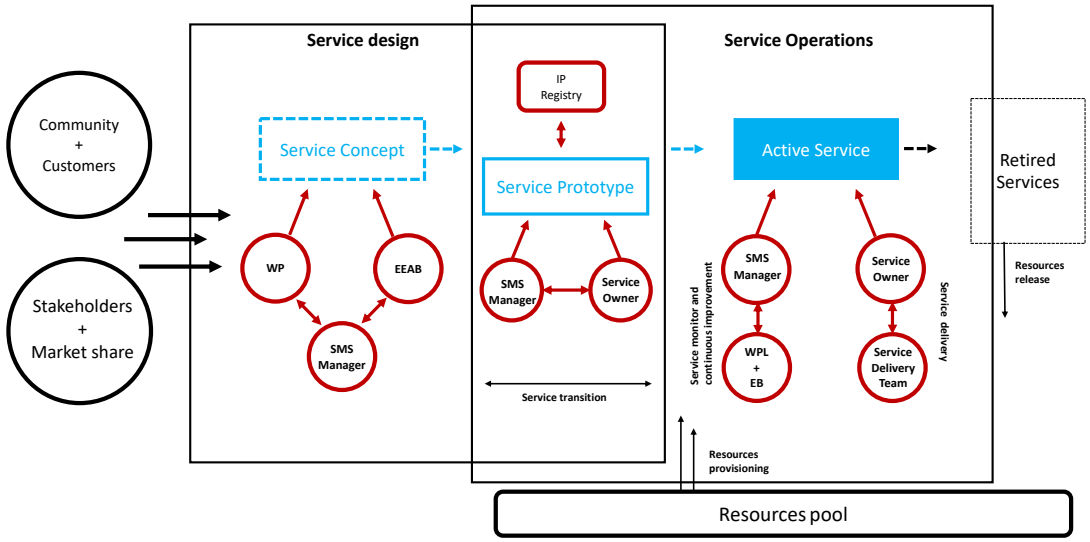

Figure 2. Schematic of the Service Portfolio Management structure for the CompBioMed services.

6.1.3.3 Tools to support operations

Currently the following tools have been used to support the operations within the SMS:

CompBioMed website

This is the main access point to all the outcomes and results produced by CompBioMed.
The CompBioMed website, namely www.compbiomed.eu, hosts the CoE service catalogue, which is reachable from the top bar field labelled "CompBioMed Services".

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Each catalogue entry displays the information related to the service in a homogenous style and a unique look and feel.

CompBioMed Intranet

The CoE intranet (https://www.compbiomed.eu/intranet/) is an internal part of the website accessible only to authenticated users. This section contains internal information and non-public documents. The intranet will host the Service Portfolio, which will be accessible to all Core Partners.

CompBioMed github

GitHub is a version control system hosting service used for collaborative editing and track changes of files. The CompBioMed GitHub is available at: https://github.com/compbiomedeu

CompBioMed slack channel

Slack is a proprietary business communication platform. CompBioMed public and private channels are hosted within the "In Silico World Community of Practice" workspace (https://insilicoworld.slack.com/)

CompBioMed GoToMeeting/GoToWebinar

GoToMeeting and GoToWebinar (9) are part of a web-hosted service used for online meetings, desktop sharing, video conferencing, and the delivery of on-line seminars/webinars. We use GoToMeeting for the internal and public teleconference, and GoToWebinar to deliver on-line seminars/webinars.

External Contact points

In order to improve communications and to provide a clear channel through which users and customers can reach us, we use specific email addresses as contact points for the offered services. The following emails can be used to reach out with CoE partners for specific requests or questions:

- contact@compbiomed.eu: general contact point for external users.
- support@compbiomed.eu: contact point for questions and matters related to CompBioMed support activities.
- allocations@compbiomed.eu: contact point for information and support related to the CompBioMed HPC allocations.
- software@comptiomed.eu: email to get information or support for the applications supported by CompBioMed.
- training@compbiomed.eu: questions and requests related to the CompBioMed training activities.

All emails are monitored using the CompBioMed Helpdesk (see section 6.3.1).

6.2 The current layout of the CompBioMed service portfolio

As a starting point, the current layout of the CompBioMed Service Catalogue is defined and aligned with specifications described in the previous section.

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We will then describe additional services which we plan to deliver in the future of the CoE and provide an example of a Service Portfolio entry for one of the currently maintained services, which will serve as base for building the complete Service Portfolio which will be presented in deliverable D4.2 (M25).

6.2.1 The CompBioMed service catalogue layout

Currently the CompBioMed service catalogue is composed of six services:

- CompBioMed Training Portal
- CompBioMed Scalability Support
- CompBioMed Software Hub
- CompBioMed Visitor Programme
- CompBioMed HPC Allocations
- CompBioMed Incubator Registry

Table 2 show an example of the service catalogue description for the CompBioMed HPC allocation service. The full list of all the services currently maintained by the Centre is reported in Annex 10.1

Table 2. CompBioMed Service Catalogue description for the CompBioMed HPC Allocations service.

Service Basic Information	**Name**	*HPC Allocations*
	Scope	Request compute time to access the CompBioMed HPC systems.
	Description	Since the beginning of the CoE, CompBioMed has been granting allocations on several large scale HPC resources to support the work of the CoE. Within the CoE we have offered, to the consortium partners, both Core and Associate Partners, the opportunity to access some of the systems managed by CompBioMed organisations (LRZ, EPCC (UEDIN), and SURFsara) and obtain direct support from the HPC experts at each site. This has been crucial for partners to efficiently use the resources and employ the queue systems on board the supercomputers. Industrial users do not need different permissions to access the systems. The allocations may be used for commercial purposes but it requires approval by the system administrators. Access to these resources is managed centrally. Anyone wanting to make use of an allocation on one or more of the systems available to the consortium or extend an existing allocation should fill in the request using the online form.
	Access	*https://www.compbiomed.eu/high-performance-computing-allocations/*
	Category	Technical Support
	Last update	10/07/2020
Service Management	**Customers contact**	allocations@compbiomed.eu

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	Service Level Agreements	Corporate SLA
Service Building Blocks	**Service packages**	Allocation request form Online form to request access to one of the CompBioMed partners HPC systems. CompBioMed HPC system information List with description of the HPC systems accessible through the programme.

6.2.2 The CompBioMed service portfolio layout

It is not within the scope of this deliverable to define the complete structure of the CoE service portfolio, as this will be discussed in detail in the following deliverable D4.2 "Report on Maintenance and Development of CompBioMed Computational Services". However we will now provide an overview of the upcoming services we are planning to release, as well as an example of the service portfolio content for one of the existing, the "CompBioMed HPC allocation", which will serve as a basis for the population of the CompBioMed portfolio which will be released in Month 25 of the CoE (Milestone MS13, "Publish CompBioMed2 service portfolio").

6.2.2.1 Upcoming and enhanced services

In this subsection we present an overview of some "Service concepts" we are currently planning to develop within CompBioMed.

Parallelisation support

Scope and description:

Support to organisations in their initial steps towards parallelising existing serial applications or codes and deploying them on HPC resources.

Relevant Tasks in the CoE*:*

- Task 2.4 Emergent Community Application Support (Leader: UEDIN; Partners: BSC, UCL)
- Task 4.3 Optimising Biomedical Application Usage of Current and Emerging e-Infrastructures (Leader: SARA; Partners: UCL, UEDIN, UVA)
- Task 4.5: Relations with EU Initiatives and Other User Communities (Leader: UEDIN; Partners: SARA, CBK, UNIBO, LRZ)

Co-design support

Scope and description:

Exploit principles of co-design in optimising applications to provide guidelines for the design of future computing architectures.

Relevant WP/task in the CoE*:*

- Task 4.6 Route to the Exascale (Leader: LRZ; Partners: BULL, BSC, UNIGE, UVA)

Containerisation support

Scope and description:

Support to deploy community codes in container environments (such as Docker or Singularity) in order to transition those codes from supercomputing centres to public cloud platforms.

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Relevant WP/task in the CoE*:*
- Task 5.5: Containers for Cloud-HPC (Leader: USFD; Partners: UCL, ACE, BSC, SARA)
- Task 4.2 Resources Management and Services Deployment (Leader: SARA; Partners: LRZ)

SaaS and collaborative environments
Scope and description:
Support the use of collaborative environments and support Software as a Service models to improve access to community codes.

Relevant WP/task in the CoE*:*
- Task 4.4 Access Models for Biomedical Compute and Data Services (Leader: ACE; Partners: UNIGE, LRZ)
- Task 5.2: Application Hardening (Leader: BSC; Partners: USFD, BULL, UPF, UNIGE, UEDIN)
- Task 5.3: Preparing Content for External Use and Commercialisation (Leader: UNIBO; Partners: UVA, BSC, UPF, ACE, UNIGE, CBK, UCL)

Data support
Scope and description:
Develop and integrate tools and applications to enable access to community produced data and generate added value (Data Management and Analytics). Provide support in data policies and GDPR.

Relevant WP/task in the CoE*:*
- Task 3.1: Data and Analytics Requirements Analysis (Leader: LRZ, UCL; Partners: UOXF, UEDIN, SARA)
- Task 3.2: Data Storage System Deployment and Maintenance (Leader: LRZ; Partners: UCL)
- Task 3.3: Data Staging Systems (Leader: UEDIN; Partners: SARA)
- Task 3.4: Data Curation (Leader: LRZ; Partners: UCL, SARA)
- Task 3.5: High Performance Data Analytics for Research (Leader: UOXF; Partners: UCL, UVA, BSC, BULL, USFD, UEDIN)

6.2.2.2 Example of Service Portfolio in CompBioMed

In order to provide a solid base for the construction of our portfolio, we describe here one of the currently maintained services, namely the "CompBioMed HPC Allocations" service. This can be used as sample to build the complete CompBioMed Service Portfolio.

	Field	*Description*	*Visible to Customers*
Service Basic Information	**Name**	*HPC Allocations*	Yes
	Scope	Request compute time to access to the CompBioMed HPC systems.	Yes
	Description	We grant allocations to access some of the systems managed by CompBioMed organisations (LRZ, EPCC (UEDIN), and SURFsara) and obtain direct support from the HPC experts at each site. This support has been crucial for partners to efficiently use the resources and employ the queue systems on board the supercomputers. Industrial users do not need different permissions to access the systems. The allocations may be used for commercial purposes, but for specific systems it may requires approval by the system administrators (i.e.: Cartesius@SURFsara). Access to these resources is managed	Yes

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		centrally. Anyone wanting to make use of an allocation on one or more of the systems available to the consortium, or extend an existing allocation should fill in the request using the online form.	
	Access	*https://www.compbiomed.eu/high-performance-computing-allocations/*	Yes
	Category	Technical Support	Yes
	Last Update	1/10/2020	Yes
Service Management	**Service owner**	Technical manager	No
	Service Life Cycle	Production	No
	Customer contact point	allocations@compbiomed.eu	Yes
	Internal contact point	T4.2 “Resources management and provisioning” task leader	No
	Roles	CoE PI review and approve allocations requests. Manage service capacity. Task 4.2 leader Manage allocations requests and pass relevant information to the PI and Partner HPC teams for resource provisioning. HPC team Provision of resources to users. Account creation on the target system and support applicants in using and accessing the system.	No
	Service Level Agreements	CompBioMed Corporate SLA Addition: approval subject to internal evaluation	Yes
	Procedures	Allocation request User can request access to one of the available systems through the “Allocation request form”. The request will be logged, and the Task 4.2 leader will communicate to the HPC team and CoE PI the relevant information for the delivery of the service. Request assessment The PI of the CoE will review the application to evaluate the conformity to the CoE goals and objective and according to the capacity of the service (allocations available). Support provisioning The request is tracked through our Internal Helpdesk to provide support and ensure OLA and SLA are executed. Resource provisioning After approval of the request, the HPC team will contact the requestor to provision the resources and support the usage of the target system.	No

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Service architecture	**Service packages**	Allocation request form Online form to request access to one of the CompBioMed partners HPC systems. CompBioMed HPC system information List with description of the HPC systems accessible through the programme.	Yes
	Service building blocks	CompBioMed internal allocations Pool of internal allocations on partners HPC systems. Support team at HPC centres Support user to access and use the system and provide the required software	No

6.3 Enhancement of the CompBioMed Service Management System

In this section, we describe future plans for the extension and enhancement of the SMS proposed in this document.

6.3.1 Internal Helpdesk

As the number of services offered increases, along with the associated demand from end-users, we need to provide a better control of the internal management of the services and the implementation of specific agreement between the member of the consortium and external collaborator (Operation Level Agreements).

For this reason, within the activities of WP4, CompBioMed partner UEDIN, is working on building an internal helpdesk system which will

- ensure all services are supported,
- ensure each service has a contact Expert
    - either a mailing list or a collection of email address
        - never a single-point-of-failure
- monitor the status different service requests,
    - submitted via the Slack channel, multiple CompBioMed email addresses, webforms, face-to-face contacts, etc.
    - run by a named Helpdesk Operator
    - provide a triage for the simpler requests,
    - provide customer-facing conduit to the more technically-minded experts,
- possibly include OLA and SLA monitoring for both CompBioMed and third-party services
    - i.e., planned processes and procedure are executed timely and effectively.

6.3.2 Integration of the service catalogue with other EU initiatives

Several EU funded initiatives have already been working to facilitate access to the services developed within the HPC and HTC domain by organisation and project. At the moment we are in collaboration with different initiatives in order to integrate our services in their service catalogue/portal and exploit the extended visibility which these tools can offer:

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- EOSC (10)
  The European Open Science Cloud (EOSC) is an initiative of the European Commission set up to implement a large infrastructure to support open science and open innovation in Europe. One of tools developed by the project is the EOSC Marketplace (11), which is an Integrated platform that allows easy access to different type of services and resources for various research domains. Currently the CompBioMed Software-Hub and Training portal are offered through this marketplace, and we are currently working to extend this to the other services offered within CompBioMed.

- FocusCoE (12)
  FocusCoE members are working on the design of a web-based tool capable of supporting the dissemination and outreach initiatives of the individual CoEs. The portal (described in the FocusCoE deliverable D5.2 "Report on the proposed information system to support dissemination and outreach") will serve as centralise access point for all the services developed and maintained by the different CoEs and will list and categorize the technological and scientific offerings available making them easily accessible to all stakeholders: industry, academic & scientific organizations, and public administrations. We are currently collaborating with FocusCoE to include the CompBioMed services in the production ready version of the portal.

- LEXIS (13)
  The LEXIS project will build an advanced engineering platform at the confluence of High performance computing (HPC), Cloud and Big Data which will leverage large-scale geographically-distributed resources from existing High performance computing (HPC) infrastructure, employ Big Data analytics solutions and augment them with Cloud services. Driven by the requirements of the pilots, the LEXIS platform will build on best of breed data management solutions and advanced distributed orchestration solutions augmenting them with new, efficient hardware capabilities in the form of Data Nodes and federation, usage monitoring and accounting/billing supports to realize an innovative solution.
  Within the activities of WP3, we recently started a collaboration with the LEXIS project for the integration of CompBioMed and LEXIS data management and computing resources.

- HPC Europa 3 (14)
  The HPC-Europa3 Project offer grants for travel, accommodation, subsistence and computing time at one of the HPC centres, for visits lasting between 3 and 13 weeks in total. The HPC Centres within HPC-Europa3 are as follows: CINECA (Italy), EPCC (UK), BSC (Spain), HLRS (Germany), SURFsara (Netherlands), CSC (Finland), GRNET (Greece), and KTH (Sweden). Our Centre has limited funds to support visitors, and we work closely with the HPC Europa3 project which can support the programme. we have formed a Memorandum of Understanding, or MoU, between CompBioMed and the HPC Europa3 Project and visitors have already started to exploit this opportunity.

- POP CoE (15)
  Pop is a Centre of Excellence in HPC focusing on Performance Optimisation and Productivity and provides performance assessment, optimization and productivity services for academic AND industrial code(s) in all domains. We have established

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collaborations with POP to help with the parallelisation of CompBioMed applications and to extend this type of support to our community.

6.3.3 Extend and enhance existing services

Within CompBioMed we are not only focused on identifying new services for the community, but also improving existing services and continuously extending the value offered through them. In particular, we are currently working on the enhancement of two of the main services we maintain:

The CompBioMed Software-hub

As described in Section **Error! Reference source not found.**, this service currently offer access to information and contact points related to the code and applications supported by the CoE. In the future we are planning to extend the components of the service and to improve the type of support offered. In particular we are working to:

- Provide a better categorisation of the supported applications and extend the possibility to include also external codes (not maintained by consortium partners) which will come from the incubation activities in WP5.

- Align the content of the Software Hub with WP2 research activities, to improve the support offered through the service and display up-to-date information about the individual components. WP2 has planned yearly releases of the Fast Track Applications available within CompBioMed (see WP2 deliverable and milestones in DoA) including 'Best Practices' guidelines to help external users of the underlying codes and extended technical information on code efficiency and parallel performances.

- Extend the supported applications with models and workflow from the ML/DL and HPDA domains. WP3, is currently working in supporting Machine Learning techniques within Core Partners and we plan to provide access to the outcomes of these activities through the Software Hub highlighting connections with the already supported

The CompBioMed Training portal

We are currently working on extending the offer of the CompBioMed Training Portal (see section **Error! Reference source not found.**) In order to fully exploit and maximise the impact of our training work we believe it would be beneficial to investigate the range of possibilities presented from entry level self-select online courses, through to fully bespoke Masters level modules. An essential part of this is the difficult nature of HPC access as we try to broaden the take up of this training and so emphasis will be given to minimising this challenge by the use of desktop and workstation at entry level, emulation of HPC analysis at intermediate level and cloud computing (already in progress) for the advanced courses.

6.3.4 Financial service management towards commercialisation

The CompBioMed Innovation Plan (D4.1), outlines how all services, software and know-how developed during the CoE can be assessed for their innovation potential. It provides guidance to support individual researchers in making that assessment and undertaking any planning of specific exploitation routes. In order to provide support for the sustainability of the CoE and to offer clear business opportunity around the service delivered and maintained by the consortium partners (both Core and Associate Partners), we will work to extend our Service Portfolio with

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clear information related to the commercialisation and business value for suitable cases. We will provide support to produce a relevant business canvas which will help to identify the value proposition and the unique selling points of each service throughout its lifecycle.

In the Sustainability Plan described in detail in CompBioMed1, the first phase of our CoE (CompBioMed1 deliverable D4.3) we already proposed an example for the CompBioMed business canvas, as well as potential directions for commercialisation of the offered solutions. In relation to the CompBioMed service offering, we will work specifically to integrate the ongoing activities on the CoE sustainability models with the development of the CoE Service Portfolio including information about the business case, costs to access the service and funding resources. This will help in identifying the value proposition and key activities, for the offered solutions and eventually provide inputs for the definition of the Business Plan for the continuation of CompBioMed.

7 Risk Management

Risk	Level	Mitigation
Complicated SMS will introduce overhead	Low	We designed the SMS to introduce as little overhead as possible, aligning procedures and roles with the already well-established organisation within the CoE. We will be monitoring the status of the service and its provisioning, adjusting and extending procedures if needed.
Lack of innovation and diversity in the service offer	Low	We will use the IP registry and support of the EEAB to building on the innovation infrastructure established during the first 3 years of operation of the CoE in Phase 1 (CompBioMed1). The large network of associate partners established in CompBioMed will provide an extensive source of ideas and use-cases.
Lack of customers/users	Low	The design and provision of services will be user-driven and coming from specific requirements of the community. We have an extensive network of core and associate partners, with already established collaborations, who will help in promoting services and capture needs.
Information related to existing or upcoming services too scattered. Risk to miss updates and input.	Medium	Within the SMS proposed here we will intensify the control and overview of IP capture within the different WP (e.g.: dedicated reports within WP meetings).

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		The roles proposed here will help in overviewing the service lifecycle and support in the service building processes.
Failure to meet SLA	Medium	The SMS manager will monitor service provision and discuss with Service Owners and Team how to improve the service delivery. The proposed internal helpdesk system will help with the OLA and to identify responsibilities and points of failure in the service provisioning.

8 Conclusions

In this deliverable we presented the plan for management of the CoE's Service Portfolio and how this will be adopted to deliver value to CompBioMed end-users. The Service Management System proposed will be used to better monitor the services designed within the CoE and to summarise and plan the release of new services which will be made available for the computational biomedicine community. The work presented here provides the basis on which to plan efficient strategies to stream CompBioMed generated services to targets such as the pharmaceutical industry, clinical research and medical device manufacturers and will help to further develop and support services to the community in the areas of HPC, HTC, and HPDA infrastructures and their combinations in workflows, as well as in efficient data management tools and storage systems.

The main purpose of this Service Management System is to increase the quality and availability of the CompBioMed compute and data services by providing clear expectations on service level and availability and by defining clear responsibilities and procedures which will help in offering well-defined, repeatable, and manageable services. We described the templates and procedures which will be used to maintain and characterise the CoE service offering and how we apply the established SMS to the current services maintained by the CoE. The deliverable also describes our plan to develop and enhance our service portfolio and how this will be implemented within the project management structure and is aligned with the CompBioMed innovation management system which is already in place within the consortium partners.

9 Bibliography

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10 Annexes

10.1 Annex I: CompBioMed Service Catalogue

10.1.1 The CompBioMed Training portal

Service Basic Information	**Name**	*Training portal*
	Scope	Central repository for training material and webinars developed in CompBioMed.
	Description	The CompBioMed Training Portal is a sustainable open access educational and training resource for Computational Biomedicine community. It displays past and upcoming training events organised by CompBioMed, the training material developed for each course (course slides, code examples, exercises, audio/video recording) and relevant training courses offered by CompBioMed partners. A portfolio of related courses and materials useful in engaging potential newcomers to computational methods in the field will be compiled and maintained to facilitate a "one stop shop" approach. The objective of the CompBioMed Centre of Excellence is to train future generations of scientists within the field of computational biomedicine, by running training courses on topics such as HPC use, software engineering and algorithm design, as well as training medical practitioners in the basic medical and clinical contexts of HPC simulation, at events with maximum community exposure such as community workshops and leading international conferences.
	Access	*https://www.compbiomed.eu/training-3/*
	Category	Training
	Last update	03/08/2020
Service Management	**Customers contact**	training@compbiomed.eu
	Service Level Agreements	Corporate SLA
Service architecture	**Service packages**	Webinars List of upcoming and past webinar events organised by CompBioMed. Include links to recorded webinar and training material. Training events List of upcoming and past training events. Include links to event recordings and training material. Training repository Repository with past and present training course offered by our partners that are relevant for the CompBioMed user community. University education Experimental-computational workflow in molecularly-based medicine that can be delivered to medical students.

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10.1.2 CompBioMed Scalability Support

Service Basic Information	**Name**	*Scalability Support*
	Scope	Support service to improve scalability of biomedicine solutions and applications.
	Description	CompBioMed offers free support to improve the scalability of your computational biomedicine solutions with high performance computers. Are you struggling because your code doesn't run in an acceptable time? Perhaps you are trying to simulate over 1000 virtual patients? Or do you need to perform some large-scale sensitivity analysis to get your solution certified by a regulatory authority? Whatever is the reason, we can help. Thanks to the funding of the European Commission, the CompBioMed Centre of Excellence in Computational Biomedicine now offers free support to organisations in their initial steps towards improving the scalability of existing computational biomedicine applications and deploying them on high performance computing resources.
	Access	*https://www.compbiomed.eu/compbiomed-scalability-channel/*
	Category	Technical Support
	Last update	19/06/2020
Service Management	**Customers contact**	support@compbiomed.eu
	Service Level Agreements	Corporate SLA
Service Building Blocks	**Service packages**	Slack channel #scalability public channel in combination with "In Silico World" Community of Practice hosted on Slack. Contact form Contact form to request support.

10.1.3 CompBioMed Software Hub

Service Basic Information	**Name**	*Software Hub*
	Scope	Service aggregator for the software developed and used by the computational biomedicine community.
	Description	The CompBioMed Software Hub addresses the needs of the computational biomedicine research community, which can use the Hub to access the resources developed, aggregated and coordinated by CompBioMed. Software for Cardiovascular, Molecular Medicine and Neuro-musculoskeletal Medicine. The

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		CompBioMed Software Hub contains links to documentation, media, tutorials and training material, for the software related to the CompBioMed CoE.
	Access	*https://www.compbiomed.eu/services/software-hub/*
	Category	Research and development
	Last update	23/10/2020
Service Management	**Customers contact**	software@compbiomed.eu
	Service Level Agreements	Corporate SLA
Service Building Blocks	**Service packages**	Individual applications pages Each application has a separate page with information on the application and useful links to resources to help in using the application CompBioMed User guides A focus on specific applications accessible through CompBioMed, with technical instructions on how to access and run the code, with examples coming from our network of developers and users within the consortium.

10.1.4 CompBioMed Visitor Programme

Service Basic Information	**Name**	*Visitor programme*
	Scope	A flexible scheme designed to support knowledge exchange between CompBioMed partners.
	Description	The key driver of our network building activities will be the provision of training to the Computational Biomedicine community on HPC access, usage and related software development, complemented by a substantially funded Visitor Programme (formally Innovation Exchange Programme), which will allow exchange for personnel between Core Partners, Associate Partners and other interested participants. The Visitor Programme is a flexible scheme designed to support knowledge exchange between two organisations, at least one of which should be a Core or Associate Partner (but can involve a third party). Personnel at all levels will be able to utilise funds within our budget for conducting work to promote knowledge exchange in a partner of their choice.
	Access	*https://www.compbiomed.eu/innovation/visitor-programme*
	Category	Networking
	Last update	02/09/2020

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Service Management	**Customers contact**	contact@compbiomed.eu, online form.
	Service Level Agreements	Corporate SLA
Service Building Blocks	**Service packages**	Visitors and hosts list Up-to-date list host available for visits. Database of previous exchanges List with records and information of previous and past exchange founded within the visitor programme. Visitor programme news feed Collection of news regarding the visitor programme. [EXTERNAL] HPC Europa 3 programme Information and link to the HPC Europa 3 exchange programme.

10.1.5 CompBioMed HPC Allocations

Service Basic Information	**Name**	*HPC Allocations*
	Scope	Request compute time to access the CompBioMed HPC systems.
	Description	Since the beginning of our CoE, CompBioMed has been granting allocations on several large scale HPC resources to support the work of the CoE. Within the CoE we have offered, to the consortium partners, both Core and Associate Partners, the opportunity to access some of the systems managed by CompBioMed organisations (LRZ, EPCC (UEDIN), and SURFsara) and obtain direct support from the HPC experts at each site. This has been crucial for partners to efficiently use the resources and employ the queue systems on board the supercomputers. Industrial users do not need different permissions to access the systems. The allocations may be used for commercial purposes but it requires approval by the system administrators. Access to these resources is managed centrally. Anyone wanting to make use of an allocation on one or more of the systems available to the consortium or extend an existing allocation should fill in the request using the online form.
	Access	*https://www.compbiomed.eu/high-performance-computing-allocations/*
	Category	Technical Support
	Last update	10/07/2020
Service Management	**Customers contact**	allocations@compbiomed.eu
	Service Level Agreements	Corporate SLA

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Service Building Blocks	**Service packages**	Allocation request form Online form to request access to one of the CompBioMed partners HPC systems. CompBioMed HPC system information List with description of the HPC systems accessible through the programme.

10.1.6 CompBioMed Incubator Registry

Service Basic Information	**Name**	*Incubator registry*
	Scope	Central repository of EU innovation incubators and business accelerators which work within the Biomedical domain.
	Description	The CompBioMed Incubator Register arose from a task designed to support the exploitation of results of commercial potential, and we act as a focal point for connecting parties where this exploitation might benefit from support for commercialisation activities. This Register is freely available to the general public and can be considered to be a "living" database where we welcome the registration of any Incubator or Accelerator initiatives known to the community. The main purpose of incubators, which in many cases are run by non-profit organisations like universities, government bodies or civic groups is to help initiate start-ups and support their growth. In the event of a potential idea or innovation that you may wish to realise you may refer to the Central Incubator Register in order to seek appropriate support within the context of an incubator, accelerator, technology transfer office or lab & office facilities. In many cases they can provide practical support such as spaces to work, seeding funding, mentoring, training etc. Importantly they also provide exposure to potential commercial partners and sources of finance. Please feel free to contact us directly and we will be able to think with you and advise on the best course of action.
	Access	*https://www.compbiomed.eu/services/central-incubator-registry/*
	Category	Consulting
	Last update	18/07/2019
Service Management	**Customers contact**	contact@compbiomed.eu
	Service Level Agreements	Corporate SLA
Service Building Blocks	**Service packages**	Incubators list Updated list of EU based business incubators working within the biomedical domain.

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10.2 Annex II: CompBioMed Corporate SLA

- **General**

This corporate Service Level Agreement (SLA) is valid for all services provided according to the current valid CompBioMed service catalogue, if no other agreements are in place. The Corporate Level SLA may be extended or replaced by specific SLAs.

- **Service delivery & operating times**

The CompBioMed services according to the service catalogue are in general delivered during 24 hours per day, 7 days per week, to seamlessly support business operations. Planned and announced interruptions may reduce the effective operating time of a service.

- **Overall availability target**

For each service provided, the minimum annual availability target is 90%, independent from the criticality of the service. This means that in one year, the service must not be unavailable for more than 88 hours, if the effective operating time is 8,760 hours. Planned and agreed interruptions (e.g., for maintenance) are not considered as unavailability, since they are not part of the effective operating time.

- **Planned interruptions, incidents & support**

For planned interruptions and (unplanned) incidents, the following targets apply:

- Support and incident handling between 9:00 and 16:00 (UTC+1) on Mondays to Fridays
- Target resolution time in case of incidents
    - Administration: up to 3 business days
    - Shallow level technical support: up to 3 business days
    - Deep level technical support: up to 3 months or to be agreed with client before work begins

Any planned interruption will be announced in advance via the agreed communication channels and through the CompBioMed website. Any incident reported through approved channels will be acknowledged and reacted upon within less than 1 day (target reaction time) during support hours.

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Grant Agreement No **823712**"*