


**Project Acronym:** MuG

**Project title:** Multi-Scale Complex Genomics (MuG)

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**Project Coordinator**: Institute for Research in Biomedicine (IRB Barcelona)

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# Deliverable 1.2: Quality Plan

**Lead beneficiary**: Institute for Research in Biomedicine (IRB Barcelona)

**Dissemination level**: PUBLIC

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# Document history

| Version | Contributor(s) | Partner | Date | Comments |
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| 0.1 | Anna Montras | IRB Barcelona | 31/01/2016 | First draft, circulated to MuG technical board and supervisory board |
| 0.2 | Anna Montras | IRB Barcelona | 05/02/2016 | Minor comments from BSC implemented |
| 1.0 | Anna Montras | IRB Barcelona | 10/02/2016 | Approved by Supervisory Board |

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## Executive summary

The MuG quality plan includes information about technical quality control, procedures for risk monitoring and decision-making, and procedures to evaluate the achievements of the project according to its objectives. The present document completes the information included in D1.1: Project Handbook, in which the key tools regulating project execution are described. The present deliverable is also in agreement with and complements the procedures described in the Grant Agreement and Consortium Agreement.

# 1 INTRODUCTION

Quality assurance is defined as the planned and systematic activities implemented in a quality system so that quality requirements are fulfilled. Defining Quality involves, first of all, developing standards of quality, which establish the expected level of performance. Therefore, the first task undertaken by the MuG management team has consisted in establishing the quality criteria, followed by the definition of a plan to monitor the compliance with these criteria.


**Figure 1:** Quality Assurance Triangle

The present deliverable thus addresses quality criteria and quality assurance methods in internal management, communication and technical quality of the services developed by the project and offered by the MuG Virtual Research Environment. In the latter case, measures should be provided during the project to guarantee sustainability beyond the project end in 2018.

# 2 MANAGEMENT AND QUALITY ASSURANCE

This section addresses the general quality assurance procedures established to guarantee the excellence at all levels throughout the project.

### *2.1.1 Management structure and quality assurance*

The management hierarchy described in D1.1 is aimed at enhancing quality assurance at all levels: internal communication, excellence in the scientific and technical results and project impact and sustainability of the developed infrastructure.

The chairperson of each one of the boards (see figure2) will be the main responsible for the quality assurance responsibilities of the respective board as established in the quality plan.

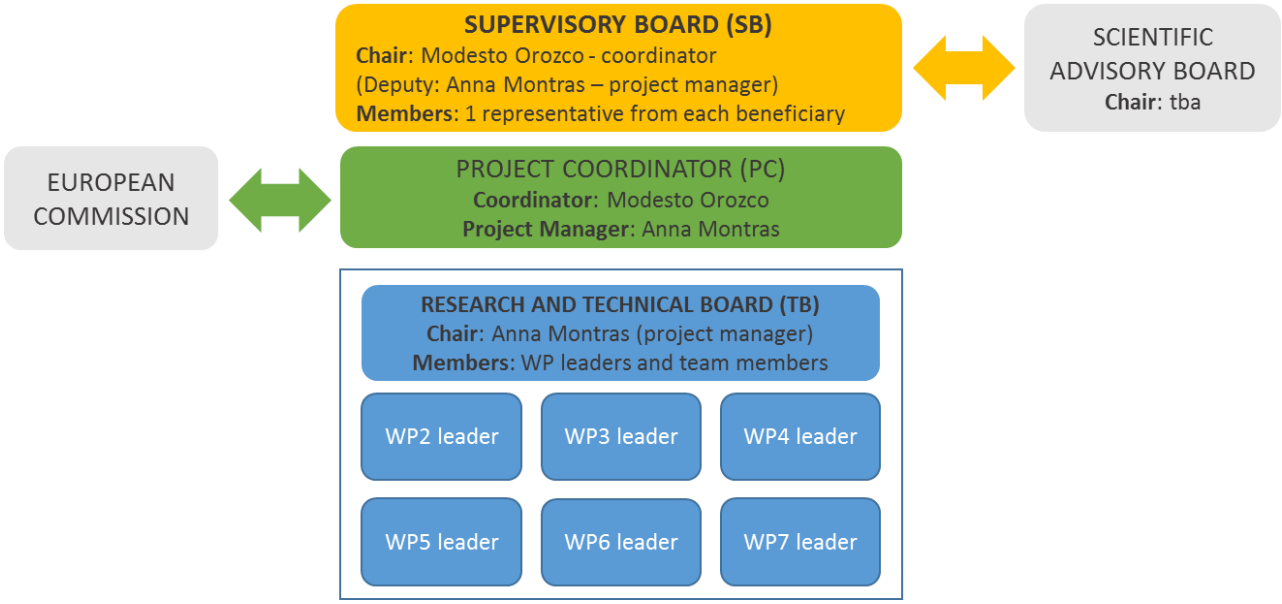



**Figure 2: MuG management structure**

The roles of the Coordinator, Technical Board (TB), Supervisory Board (SB) and Scientific Advisory Board (SAB) as well as the complete composition of the boards, with name and contact information for all members, are available in D1.1. Additional details on the functions of the boards are available in the consortium agreement.

### 2.1.2 Meetings

Rules are established in the Consortium Agreement. A summary is provided hereafter for ease of access to this information.

#### 2.1.2.1 Convening meetings

**Technical Board (TB) and Supervisory Board (SB)**: ordinary face to face meetings of the TB and SB shall take place at least every (6) months. According to the provisions of the consortium agreement (CA) the chairperson of the respective board shall convene ordinary face to face meetings of the Research and Technical Board (TB) and of the Supervisory Board (SB) at least once every six (6) months.

Regular remote meetings shall also be held:

- Skype meetings of the TB working groups shall be convened ad-hoc by the members of the working groups.
- Monthly teleconferences of the TB (with representatives from each WP) shall be convened by the coordinator (project manager) as chair of the TB.

**Scientific Advisory Board (SAB)**: the appointed chairperson of the SAB shall convene yearly ordinary meetings of the SAB. It is foreseen that SAB and SB/TB meetings are scheduled in a coordinated way, taking advantage of regular SB/TB meetings (every 6 months). The coordinator, as chair of the SB, shall coordinate with the SAB to schedule meetings.

The chairperson of the respective boards is responsible for convening extraordinary meetings at any time upon written request of any member.

#### 2.1.2.2 Notice of a meeting

**Technical Board and Supervisory Board ordinary meetings**: The chairperson shall give notice of a meeting in writing to each Member as soon as possible and within at least twenty-one (21) calendar days preceding an ordinary meeting and fourteen (14) calendar days preceding an extraordinary meeting.

**Scientific Advisory Board**: Advance notice should be given to the members of the SAB at least sixty (60) calendar days in advance.

#### 2.1.2.3 Meeting agenda

The chairperson shall send a written agenda within at least fourteen (14) calendar days preceding an ordinary meeting or seven (7) calendar days preceding an extraordinary meeting.

Any Member may add an item to the original agenda by written notification to all of the other Members within at least seven (7) calendar days preceding an ordinary meeting or two (2) working days preceding an extraordinary meeting. During a meeting the members present or represented can unanimously agree to add a new item to the original agenda.

#### 2.1.2.4 Minutes of meetings

The rules established in the consortium agreement (article 6.2.5) apply for the production and approval of meeting minutes:

*The chairperson of a consortium body shall produce written minutes of each meeting which shall be the formal record of all decisions taken. He shall send the draft minutes to all Members* ***within 10 calendar days*** *of the meeting.*

- *The minutes shall be considered as accepted if, within* ***21 calendar days*** *from sending, no Party has sent an objection in writing to the chairperson with respect to the accuracy of the draft of the minutes.*
- *The chairperson shall* ***send the accepted minutes to all the Parties*** *and to the Coordinator, who shall safeguard them.*

*If requested the Coordinator shall provide authenticated duplicates to Parties*

### 2.1.3 Continuous reporting: deliverables and milestones

As defined in the Description of Action (DoA), article 19, it is the obligation of the coordinator to submit the deliverables identified in the technical annex, monitoring their (i) timely submission and (ii) compliance with the expected quality standards. The following procedures have been defined to regulate the preparation, revision and submission process.

#### 2.1.3.1 Deliverable Writing Procedure:

It is the responsibility of the technical board (TB) to provide the content for deliverables related to their respective work packages (Consortium Agreement, section 6.3.2.3.6). The following procedure has been established:

1. Work package/task leader prepares the table of contents and shares it with other contributors (as early as possible) (deadline **5 weeks** before due date). Work package / task leader may also appoint specific reviewers from other WPs ad-hoc for the deliverable. Given the great degree of interaction between WPs in MuG, the default procedure will be that all members of the technical board will be asked to revise the deliverables.
2. Contributors send their inputs to the work package/task leader (**4 weeks** before due date)
3. Revision by other members of the technical board (complementary WPs, assigned according to their related knowledge) (Deadline **3 weeks** before submission deadline).
4. Work package/task leader checks consistency, asks for additional inputs/corrections when necessary, and harmonizes the content (deadline **2 weeks** before submission deadline).

#### 2.1.3.2 Deliverable review and submission

1. Work package/task responsible sends deliverable to the Supervisory Board for a final quality check. (deadline **2 weeks** before EC submission deadline)
2. Work package /task responsible implements any requested corrections and sends the deliverable to the Coordinator (Project Manager) – deadline **1 week** before submission deadline to EC.
3. Coordinator (Project Manager) submits deliverable to EC participant portal.

#### 2.1.3.3 Milestone achievement

Monitoring of the degree of achievement for all milestones is a task to be undertaken in meetings of the Technical Board. The monitoring of the milestones is directly related to the assessment of Key

Performance Indicators, as the targets for some KPIs are directly measurable by the degree of achievement of certain milestones.

- The revision of the degree of achievement of the Milestones shall be a regular activity to be undertaken by WP leaders and should be addressed in monthly TB meetings.
- The Supervisory Board shall monitor the status of milestones.

### 2.1.4 Periodic reporting to EC

The links to the official templates and the schedule of reporting periods are provided in D1.1. The internal procedure to be followed to complete the periodic EC reports (M18 and M36) is established hereafter:

1. Periodic reports are to be completed within 60 days of the finalization of the two reporting periods into which the project is divided.
2. The coordinator shall remind the partners one month before the end of the period (M17 and M35) about the need to commit the necessary resources to prepare all financial statements, use of resources and technical achievements.
3. The coordinator will ask contributors in the TB to provide the required technical inputs about their respective WPs. A standardized structure will be provided together with guidelines.
4. TB members to provide technical inputs and financial statements to the coordinator within 15 days after the end of reporting period.
5. Coordinator to harmonize contents and ask for additional inputs when needed. A draft of the complete report to be circulated within 30 days after the end of the reporting period.
6. The coordinator sends the report to the SB for revision.
7. The coordinator submits the periodic report and reminds all beneficiaries to submit their financial statements.

In addition, the same procedure will be followed to collect the required information to complete the **3 Annual Reports** that are set as milestones of the project (MS1, MS2, MS3).

### 2.1.5 Decision making

Decision making is regulated by the procedure defined in the consortium agreement signed by all beneficiaries (article 6.3.1.2). The main decision making body is the Supervisory Board, and thus, all decisions shall be escalated to the SB. The SB may rely on additional advice from the SAB in decision-making. Decisions are, as a rule, taken during meetings.

### 2.1.6 Publication and exploitation of results

#### 2.1.6.1 Internal procedures related to publication of results

The obligation to disseminate results (article 29.1 Grant Agreement) applies unless it is in contradiction with the obligation to protect results (article 27.1).

It is a key target of the MuG project to **foster the publication of the project results** in top-ranked journals. This goal is clearly defined as a KPI for WP2. However, it may occur that some specific results may have the **potential for exploitation**. In this case, it is important that relevant information that might jeopardize the exploitability of these results is not disclosed.

As stated in Article 27.1:

*Each beneficiary must examine the possibility of protecting its results and must adequately protect them – for an appropriate period and with appropriate territorial coverage if:*

*a) The results can reasonably be expected to be commercially or industrially exploited*
*b) Protecting them is possible, reasonable and justified*

*When deciding on protection, the beneficiary must consider its own legitimate interests and the legitimate interests (especially commercial) of the other beneficiaries.*

The following internal communication **procedure is established for publication of results funded (or partially funded) by MuG**, in order to ensure that all beneficiaries agree on publication in advance:

1. The beneficiary willing to publish results funded or co-funded by MuG shall inform the Coordinator (leader of WP2: Outreach training and exploitation plan) about the intention to publish at least 3 weeks before the intended submission date of the publication. The following information should be submitted to the coordinator:
    - A description (abstract) of the results to be published
    - Author list
2. The coordinator shall review the information and seek advice in order to establish the potential risk of disclosing sensitive information that might compromise the foreseen exploitation plan. The coordinator will consult with:
    - Other beneficiaries, via the Supervisory Board
    - IPR consultants
3. The coordinator will provide feedback in writing to the beneficiary that has submitted the request to publish within 2 weeks of receiving the information.
4. In case the recommendation is to hold the publication of the results, the SB shall be informed promptly. The SB shall seek an agreement on the way to proceed that contemplates the legitimate interests of all beneficiaries, as stated in article 27.1 of the Grant Agreement.
5. In case the decision is made to go ahead with the publication, the obligation to provide open access to publication and data applies (see 2.1.6.2 below).

#### *2.1.6.2 Open access to publications*

Whenever the decision to publish has been made by the beneficiary and approved by the SB, the obligation applies to ensure open access to publications for all beneficiaries, as stated in the grant agreement (Article 29.2).

Open access to publications is key in making research more visible to the entire community and is an obligation for publications of results funded (or partially funded) under the H2020 e-infrastructures work programme. However, this is not to be confused with an obligation to publish results[1].

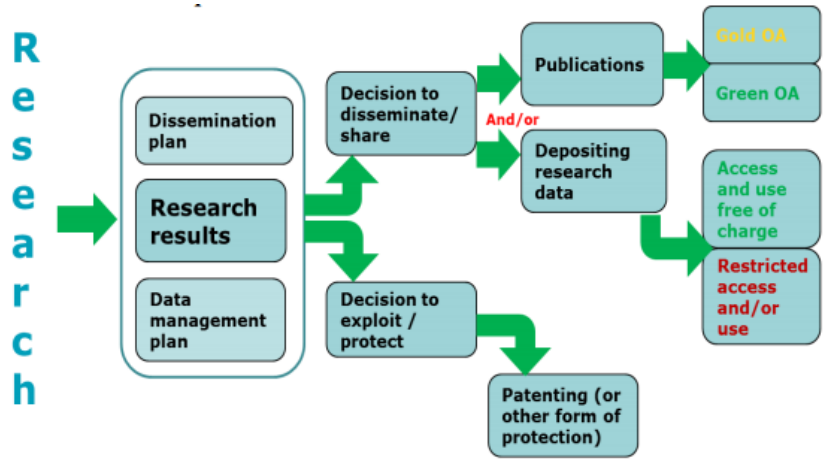



**Figure 3:** Dissemination and exploitation rules and position of open access to scientific publications and research data in this context. Figure credit: European Commission, 2015[2]

To comply with the contractual obligations, each beneficiary shall undertake the following actions in their approved publications:

1. *As soon as possible and, at the latest on publication, deposit a machine-readable electronic copy of the published version or final peer-reviewed manuscript accepted for publication in a repository for scientific publications. [..] at the same time the research data needed to validate the results presented in the deposited publication*
2. *Ensure open access to the deposited publication – via the repository:*
    a. *On publication (if an electronic version is available via the publisher)*
    b. *Within 6 months of publication in other cases*
3. *Ensure open access – via the repository – to the bibliographic metadata, in standard format and including:*
    a. *The terms "European Union (EU)" and "Horizon 2020".*
    b. *EINFRA-9-2015 ; MuG ; grant number: 676556*
    c. *Publication date and length of embargo period if applicable*
    d. *A persistent identifier*

### *2.1.6.3 Dissemination events organized or attended by MuG beneficiaries*

All partners should periodically update the provided excel file available on Basecamp with relevant events and indicate: (i) if they are organizers, (ii) if they are attending, (iii) potential interest for MuG.

https://3.basecamp.com/3126297/buckets/97795/google_documents/51087509

Whenever results related to the project are presented in any conference or event of any nature, the usual procedure to communicate the information to be published should be followed (see section 2.1.6.1). The following information should be submitted to the coordinator every time results funded or co-funded by MuG are presented and if the participation (Travel, registration costs, etc) is funded by MuG.

- A description (abstract) of the results to be published and/or interest of the event for the project
- Author list
- Details on the event where the presentation takes place.

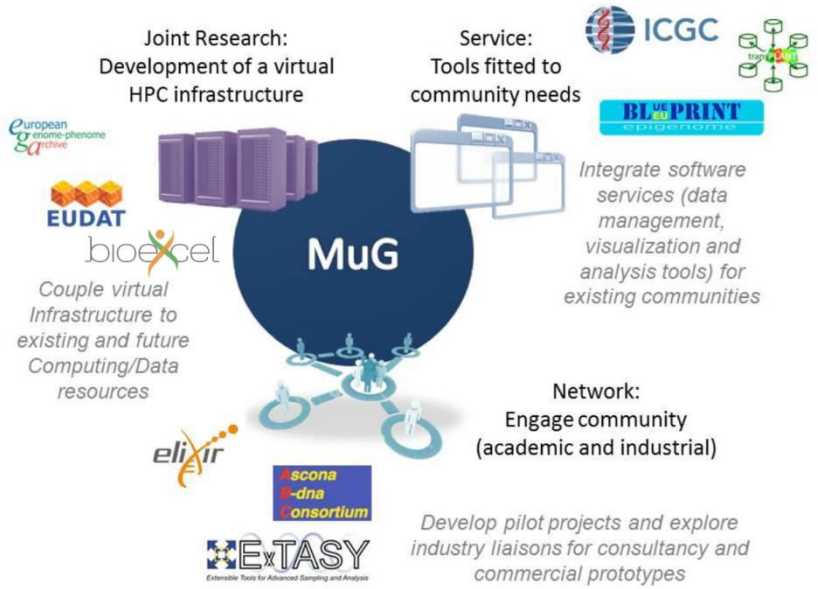
Ensuring that MuG results and funding is acknowledged in any dissemination action that will be charged to the project is key in order for the beneficiary to be able to claim related travel costs.

# 3 EXCELLENCE IN PROJECT EXECUTION AND RESULTS

## 3.1 Key performance indicators: definition and monitoring

The key performance indicators have been divided into three categories, corresponding to the key areas addressed by the MuG developments.

1. **Service:** Tools fitted to 3D/4D genomics community needs (user driven).
2. **Joint research:** development of a virtual HPC infrastructure
3. **Network:** community engagement, academy and industry




The success of MuG shall be measured by the degree of achievement of the goals related to each one of the 3 areas. In addition, performance in terms of sustainability of the developed infrastructure and services beyond the 3-year MuG project is evaluated separately (see section 4).

Sections 2.1.1, 2.1.2 and 2.1.3 list the KPIs related to (i) tools, (ii) infrastructure and (iii) engagement and the measures defined to monitor them.

### *3.1.1 Service: quality of the developed tools*

The development of tools that respond to user needs is one of the pillars of MuG. A number of KPIs are defined in the following table. WP6 and WP7 members will undertake periodic assessment of the degree of achievement of the targets, which will be reported in yearly reports.

| KPI description | Metric description | Target 2016 | Target 2017 (cumulative) | Target 2018 (cumulative) |
|---|---|---|---|---|
| Software releases | Number of (major) software releases (foreseen periodically) | 1 | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| Feedback from early users (WP7 pilot cases) | Degree of achievement of WP7 milestones (MS27-33) | MS29 | MS27<br>MS28<br>MS30<br>MS31 | MS32 and MS33 Positive evaluation on the use of the tools reported in D7.1, D7.2 and D7.3. |
| Degree of acceptance of tools by external users | Number of external users that have contributed to specifications and evaluation.<br>Opinions expressed in surveys by external users. | 10 external users have expressed needs. | 10 external users have provided positive feedback. | 20 external users have provided feedback (25% in industry). |

### *3.1.2 Joint research: quality of the developed infrastructure*

The development of efficient tools that solve the user's problems is not enough to nucleate the community and achieve the expected results in terms of joint research. The key to nucleating the community is to develop a virtual HPC infrastructure that the users are willing to embrace.

Assessment of the degree of accomplishment of the targets will be undertaken yearly by WP5 and reported in the annual reports (MS1, MS2 and MS3).

| KPI description | Metrics description | Target 2016 | Target 2017 (cumulative) | Target 2018 (cumulative) |
|---|---|---|---|---|
| Timely delivery of MuG virtual research environment deployment. | Prompt and on-time achievement of WP5 milestones. | First prototypes of computational infrastructure set-up.<br><br>User support tools available on VRE portal.<br><br>MS17, MS18 | Release of programming models<br><br>MS19 | -100% completion infrastructure deployment.<br>-100% user support tools available.<br>-Completion of testing.<br>-MS20 |
| Satisfaction of WP7 pilot cases with developed infrastructure | Inputs from WP7 pilot cases | MS29 | MS27<br>MS28<br>MS30<br>MS31 | MS32 and MS33 Positive evaluation on the global use of the VRE reported in D7.1, D7.2 and D7.3. |
| Acceptance by external users | Number of external users that have contributed to specifications and evaluation.<br>Opinions expressed in surveys by external users. | 10 external users have expressed needs | 10 external users have provided positive feedback | 20 external users have provided feedback (25% in industry). |

### 3.1.3 Network: excellence in engaging academy and industry users

The performance of the project in terms of reaching the actual community is to be measured indirectly by the success of dissemination activities and events. KPIs related to dissemination, training and exploitation will be further discussed in D2.3 (Plan for dissemination and use of knowledge). Further information on the metrics, targets and action plan to achieve them will be provided.

The status of KPIs will be monitored by the WP2 leader (IRB Barcelona) throughout the project and count with the monitoring of the SB and external SAB advisors. Results of the first evaluation will be reflected in D2.4: Monitoring of the Plan for the dissemination and use of knowledge.

| KPI and metrics description | Metrics description | Target 2016 | Target 2017 (cumulative) | Target 2018 (cumulative) |
|---|---|---|---|---|
| Interest of companies to collaborate with MuG. | Number of contacts established with industry. | 1 | 3 | 10 |
| Presence in the media | Number of published news reports. | 5 | 15 | 30 |
| Scientific publications | Number of publications in top-ranked scientific journals | 3 | 6 | 12 |
| Citations | Number of citations in top-ranked scientific journals | n.a. | n.a. | We expect to collect citations in top-ranked journals during the last year of the project. |
| Presence in International congresses | Number of events where MuG results are presented | 5 | 10 | 10 |
| Attendees in training workshops (indirect measure of users reached, together with VRE portal usage) | Number of attendees in two workshops (2017 and 2018). A significant increase is expected due to (i) dissemination plan, (ii) quality of VRE services. | 0 | 30 | 70 |
| Project website functionality and performance | • Implemented means of improving performance | • Communication / dissemination | • Updated web. | • MuG VRE portal fully operational. |

| | | | | |
|---|---|---|---|---|
| | • Implemented new features<br>• Frequence of updates<br>• Cross links to and from other websites in the fied.<br>• Google analytics statistics | functionality. implemented.<br>• Weekly updates. | • MuG VRE portal. implemented.<br>• increasing visitors. | • Increasing visitors. |
| Impact on social media (twitter, youTube) | No twitter followers<br>No videos on YouTube<br>No subscribers YouTube | 50<br>2<br>10 | 100<br>10<br>50 | 150<br>15<br>100 |
| Generation of commercial prototype projects | No commercial prototype projects. | 0 | 0 | At least 1 prototype with a third party SME. |
| Candidate technologies for IPR protection | Number of evaluated technologies<br>Number of protected technologies | 0<br>0 | 1<br>0 | 2<br>1 |

### *3.1.1 KPI monitoring procedure*

Monitoring KPIs throughout the project becomes important to define means to improve quality. TB, SB and SAB meetings are key tools in this continuous process of quality assurance.

- The degree of achievement of the KPIs shall be a regular activity to be undertaken by WP leaders. KPIs, together with risks, should be addressed in monthly TB meetings.
- During regular meetings of the Supervisory Board (every 6 months) the status of KPIs shall be assessed.
- The Supervisory Board may at any time consult with the SAB regarding possible measures that could be undertaken to increase performance for the different indicators.
- Assessment of the KPIs will also be one of the key points in the agenda during SAB yearly meetings.
- A live table of KPIs will be maintained in BaseCamp for easy monitoring by all partners.

## 3.2 Risk Management

A number of risks were identified in the Description of Action (DOA) in relation with the different work packages. A risk management plan is established hereafter with the aim to identify new unforeseen risks and to monitor the already identified ones.

Early risk identification is essential in order to be able to elaborate a contingency plan. Having a clear picture of the risks is the key to being able to define a plan to overcome them. Therefore, the identification of new risks has been taken into account in the quality assurance process at all levels (management, scientific/technical and impact).

### 3.2.1 Procedure for risk assessment:

- Each WP should communicate during regular meetings (monthly) of the TB if (i) previously identified risks are likely to materialize or (ii) new risks have been detected that might affect the execution (either within one WP or affecting other WPs that should be made aware of this).
    i. When an already identified risk materializes, the TB shall elaborate a list of measures to mitigate the risk or a contingency plan and submit them to the SB. The SB may refer to the SAB for consultation.
    ii. When a new risk is identified, a risk level assessment and contingency plan shall be elaborated and submitted to the SB. The SB may refer to the SAB for consultation.
- Risk management is part of the foreseen continuous reporting to EC. Newly identified risks shall be reported in the participant portal and the materialization of previously acknowledged risks should be reported. The coordinator will submit new risks once the SB is aware and a risk level has been determined (low/medium/high).
- Results of risk monitoring, deviations incurred due to risks materializing and measures undertaken to mitigate the effect of such risks shall be reported in periodic reports (M18 and M36).

### 3.2.2 List of identified risks per work package

A full list of risks that have already been identified for the different work packages are described below (risk reference according to DOA):

**Potential risks for Work Package 1**:

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R1** | Partner is not competent to carry out allocated tasks | Low | High | Partners have been carefully selected based on: -different required expertise (HPC, biomolecular life science, software development); -track record in their field (number of scientific publications and citations for research partners; level of innovation; academic excellence) and –balance of the consortium. The consortium agreement includes measures to be taken if a partner still would not deliver the tasks committed, such as replacement by another partner and a corresponding budget reallocation. |
| **R2** | Lack of coordination between technical WPs | Low | High | Tasks have been scheduled to allow parallel developments. One of the priorities of the TB activities will be to monitor parallel progress of WPs to avoid eventual bottlenecks. TB and SB will take the necessary actions to pace the progress of the WPs or reschedule their tasks if necessary. |

**Potential risks for Work Package 2:**

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R3** | Failing to deliver project results and training to relevant audience | Low | High | Training activities will be closely aligned with those of related initiatives such as PRACE PATCs, EGI, EMBL-EBI or ELIXIR. This shall guarantee a parallel means of reaching a wide audience. |
| **R4** | Not enough users are taking advantage of MuG to reach critical mass for sustainability. | Medium | High | The major focus of the initial implementation of the project is the establishment of an efficient marketing strategy to reach potential users in the 3D/4D community. If these efforts are not sufficient to maintain a required user base, MuG will adapt the BEP and services offered to match user demand. SAB members will be asked for advice on their respective fields of expertise and the dissemination plan will be adapted accordingly. |
| **R5** | Lack of adoption of the computational framework | High | High | MuG computational framework will be built on the bases of existing solutions and could be added to existing infrastructures without major reconfiguration. |

**Potential risks for Work package 3.**

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R5** | Technical limitations for the visualization for certain data types | High | Medium | Partners have already developed visualizers for most of the data types involved in MuG. Integration on WP3 will combine mostly existing solutions in a common offer. If data types could not be offered in an integrated environment, a trimmed-down visualization will be included and original visualizers will be triggered to allow a closer analysis. |

**Potential risks for Work package 4**:

| Risk Number | Description of risk | Risk Level (likeliness) | Potential Impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R6** | Insufficient analysis of data requirements | Low | Medium | MuG partners are well positioned in their respective fields and hold an in deep knowledge of the technical requirements involved. The multi-scale expertise of MuG partners is a key to reduce risks in this part of the proposal. Special attention will be put to enhancing communication among the partners throughout the project with the aim to mitigate this risk. |
| **R7** | Lack of access and availability of data due to technical incompatibility | Medium | High | To be mitigated by adoption of accepted standards and a highly modular design of ETL pipelines. |
| **R8** | Changes in technology may change the input data formats with an impact on the effectiveness of data models design. The rapid evolution in the addressed field might change the formats or add new kinds of measurements | High | High | This risk cannot be prevented and adaptation will be necessary. To mitigate the impact of such changes on the effectiveness of the developed solution the project shall undertake the following actions:<br>i. Technology watch: continuously monitor the state of the art in the technology throughout the project to allow prompt reaction and minimize impact.<br>ii. Design data model so that adaptation and extension to new input formats can be supported.<br>iii. Rely on advice from SAB and external users of our applications. |
| **R9** | Lack of access to data due to policy or security restrictions | Medium | Medium | To be mitigated by flexible options for secure local deployment of resources as well as secure data encryption and user and dataset permissions management. |

**Potential risks for Work package 5:**

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R10** | Infrastructure not released on time | Medium | Low | The application adoption and execution frameworks selected can be deployed on a reduced scale for development. This would ensure that the application |

| | | | | |
|---|---|---|---|---|
| | | | | porting is not affected by delays on the availability of the infrastructure. |
| **R11** | Unsuitability of the programming models for a specific use case. | Low | High | The COMPSs programming framework has already been used to port applications from many scientific fields. Also extensions according to the requirements will be developed in order to minimize risks. |
| **R12** | Lack of adoption of the computational framework. | High | High | MuG computational framework will be built on the bases of existing solutions and could be added to existing infrastructures without major reconfiguration. |
| **R14** | Slow integration of analysis tools into MuG's computational framework | High | Medium | Although full integration of tools with WP5 programming models will give an optimal performance, computational framework is also able to implement applications in their original form. This will assure an early inclusion of tools functionality allowing for a slower optimization process. |

**Potential risks for Work package 6**

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R13** | Lack of acceptance of the analysis solutions offered in MuG | Low | High | MuG partners are extremely well positioned in their respective communities of expertise. Their present tools have already a significant user community that is expected to easily accept the new paradigm as a natural evolution of already existing tools. |
| **R14** | Slow integration of analysis tools into MuG's computational framework | High | Medium | Although full integration of tools with WP5 programming models will give an optimal performance, computational framework is also able to implement applications in their original form. This will assure an early inclusion of tools functionality allowing for a slower optimization process. |

**Potential risks for Work package 7**

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on project | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R15** | Lack of completeness in the data available | High | Medium | Pilot projects have been chosen precisely due to the high amount and diversity of data available. MuG has allocated a small budget for generating new high-quality data and for experimental validation. |
| **R16** | Problems in deriving new omics data. | Medium | Medium | Centers supporting the proposal have large experience in collecting high resolution data. In case that problems arise, the extraction procedures will be changed and as ultimate possibility the model organism could be changed. |
| **R17** | Discovery of missing requirements during the development of pilot projects | Medium | Low | The development of pilot projects will guide the generation of project requirements. The modular nature of data management and computational framework will ease adaptation to new requirements. |
| **R18** | Limitations of computer resources for atomistic simulations. | Medium | Low | ABC simulations are very CPU-demanding and might have troubles if access to HPC is limited. In this case, we would use the ABC distributed model that has already worked in the past. |

# 4 EXCELLENCE IN INFRASTRUCTURE AND SERVICES DELIVERED BY MuG VRE

The key performance indicators by which the project results shall eventually be evaluated is the impact made by the developed Virtual Research Environment, which is the main recipient of all efforts undertaken by MuG aimed at benefitting the genomics community.

A broad qualitative description of the parameters that measure the success of the MuG VRE would be:

(i) The VRE provides a pre-packaged bunch of tools and services that comply with the required demands of the community and are provide in a user-friendly enough way to make users daily work easier.

(ii) The benefits of the VRE reach the widest number of users of heterogeneous profiles (academy, industry) and coming from all around the world (beyond the circle of influence of the MuG project consortium members).

## 4.1 VRE Key Performance Indicators

We have distinguished, in the quality plan, between (i) performance indicators related to the quality in project implementation during the 3-year EU funded project and (ii) the actual key performance indicators of the VRE, which evaluate the impact of the MuG-VRE not only during the 3-year project but also its sustainability potential beyond the EU-funded project.

| KPI description and metrics | Target 2017 | Target 2018 (cumulative) |
|---|---|---|
| Number of services integrated in existing platforms such as ELIXIR, BioExcel, EGI. | Contacts established with platforms. | MuG services fully integrated in target platforms. |
| Number of users from academy and industry, aiming at increasing the ratio industry/academia. | To reach 90% academy users vs 10% industry users. | To reach 80% academy users vs 20% industry users. |
| Contacts with industry / number of companies expressing interest to collaborate with MuG | 2 | 10 |
| % satisfied users with training workshops on use of infrastructure | 100% users give positive (>5/10) evaluation of training workshops | 100% users give positive (>5/10) evaluation of training workshops |
| Access to data (number of user accesses to data) | 30% of estimated potential users in academia and 5% in industry are reached (potential users to be estimated based on performance in field) | 50% of estimated potential users in academia and 25% in industry are reached (potential users to be estimated based on performance in field) |

## 4.2 MuG VRE: quality assurance means and procedures

As part of the quality assurance plan there is the impact of the services offered by the MuG VRE is key in measuring the results and the success of measures undertaken. In terms of assuring a good performance in terms of impact, the consortium clearly targets interaction with other H2020 projects as a priority, in line with the EU roadmap of bringing the scientific community closer to research infrastructures and coordinating the efforts of the other similar initiatives.

To this end, beyond ensuring the highest quality in all individual technical and scientific areas involved in MuG, we also count with external supervision with the aim to ensure that the impact is further enhanced by interacting with complementary initiatives.

To this end, the consortium counts with the essential support of the following key tools:

- The **Scientific Advisory Board,** whose roles go beyond quality assurance in the individual areas by incorporating members of the major initiatives on e-infrastructures in Europe.

- **A strong dissemination, training and communication plan** (to be defined in detail in D2.3). The project manager will monitor the progress and degree of achievement of the dissemination and training plan.
- **Technology transfer advisors** will be consulted during the project to define the best strategy towards sustainability of the VRE in time. Such strategy should make sure to prevent isolation of the MuG VRE and promote joint strategies with other VREs, COEs and other complementary initiatives.

## 4.3 Risks affecting the MuG VRE sustainability

The risks related to the development tasks of the project are described in detail in section 2, under each relevant work package.

The main risk affecting the sustainability of the MuG VRE is the lack of acceptance by the community. Measures will be undertaken to ensure the visibility of MuG activities to the community and to engage users during the duration of the project (3 years), which in combination with a good exploitation plan shall be a guarantee for sustainability.

| Risk Number | Description of risk | Risk Level (likeliness) | Potential impact on sustainability | Proposed risk-mitigation measures |
|---|---|---|---|---|
| **R4** | Not enough users are taking advantage of MuG to reach critical mass for sustainability. | Medium | High | The major focus of the initial implementation of the project is the establishment of an efficient marketing strategy to reach potential users in the 3D/4D community. If these efforts are not sufficient to maintain a required user base, MuG will adapt the BEP and services offered to match user demand. SAB members will be asked for advice on their respective fields of expertise and the dissemination plan will be adapted accordingly. |

# 5 REFERENCES

[12] European Commission. Directorate-General for Research & Innovation. (2015). Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020. Version 2.0. 30th October 2015.