CASE STUDY

IT Service management system for EMBL’s European Bioinformatics Institute’s IT department [version 1; peer review: awaiting peer review]

Montserrat González Ferreiro, Steven Newhouse

Technical Services Cluster, EMBL European Bioinformatics Institute, Hinxton, Cambridgeshire, CB10 1SD, UK

Abstract

EMBL-EBI, Europe’s biomolecular data hub, is a world leader in managing and analysing big data in biology and making it freely available to scientists worldwide. Research infrastructures (RI) like EMBL-EBI rely extensively on information technology (IT) services to conduct research and support the delivery of scientific services. These IT services are complex and diverse and IT service management (ITSM) has been shown in other domains to help to improve efficiency and productivity. ITSM is a collection of standards that help organisations develop a process-based approach for managing the full lifecycle of IT services, while keeping their users’ needs at the forefront and promoting continuous improvement. However, many organisations struggle with the design and implementation of an ITSM system as it involves the need for organisational change, and because the process approach can seem rigid and bureaucratic on the surface. This article aims to share the experience of the EMBL-EBI IT department in designing and implementing an ITSM system. ITSM implementation steps, benefits, challenges, opportunities, and practices are highlighted, critically analysed, and discussed.

Keywords
Service management, ITSM, implementation practises, research infrastructures, FitSM, ITIL, governance, control, ServiceNow

This article is included in the EMBL-EBI collection.
Introduction
The European Molecular Biology Laboratory (EMBL) is the only intergovernmental laboratory for life science research in Europe. Aimed at advancing the study and understanding of molecular biology, training young scientists and fostering innovation in science and technology alike. It has six sites in five host nations and one of which is EMBL’s European Bioinformatics Institute (EMBL-EBI).

In total, 85 members of the EMBL-EBI IT department provide IT services for more than 800 employees and visitors, operating IT services and a complex infrastructure, which is distributed across multiple data centres and buildings. The type of services provided by the EMBL-EBI IT department are access to and usage of systems and networks (Lovelock and Gummesson, 2004). The IT services include provision of robust and secure frameworks for deploying public bioinformatics services, virtualisation and cloud computing, database administration, software development, communications, authentication, desktop management, platforms for web services, website management, user experience design, web development and IT infrastructure management.

Four years ago, the EMBL-EBI IT department embarked on a journey to improve its efficiency and productivity by establishing a formal and strategic approach to design, deliver, manage, and continuously improve the IT services it provides, in order to align with the organisation's strategic goals and focus on user needs.

Selecting the right ITSM framework
The first step of our ITSM initiative was to select the right ITSM framework. An ITSM framework - a detailed method and a set of supporting tools - encompasses all procedures, processes, and policies that help organisations manage and deliver their IT service. We reviewed some of the most globally recognised ITSM frameworks: ITIL (Rudd, 2010), COBIT (Harmer, 2014), ISO/IEC 20000 (Clifford, 2011) and TOGAF (Desfray et al., 2014). The frameworks were useful and detailed, but it also seemed difficult to move from a very early maturity level to one at the level of these frameworks. Hence after reviewing FitSM (FitSM.eu, 2014), it seemed the right fit.

FitSM is a lightweight ITSM framework with 14 processes. It is an open standard developed taking research centres into consideration and it is compatible with ITIL, COBIT and ISO/IEC 20000 should we want to implement these frameworks in the future.

In order to construct an ITSM system based on the FitSM standard, we need to implement three levels: governance, control, and operational. The governance level involves top management and process owners, and includes the ITSM policy and other relevant policies, such as IT security, the ITSM plan on how to implement the overall ITSM system, process-specific plans, the communication plan, as well as the assessment program. At the control level are the process managers and process teams, as well as all the process definitions that outline the expected inputs, outputs, roles, and responsibilities. The operational level is made up of the teams and staff who create and implement the procedures.

Establishing the ITSM governance level
The governance framework provides a mechanism for senior management, as well as for team members at the operational level, to have a clear understanding and oversight of each other's expectations, objectives, performance, risk appetite, and reporting requirements. In addition, these aspects are effectively communicated to relevant persons in the organisation (Smith and Brooks, 2013).

Our first step was to use the FitSM-6 capability/maturity assessment tool to identify what our ITSM maturity level was, which turned out to mostly be initial, as there is some awareness, but not defined. We also decided to use it as a tool for future internal assessments.

Second, a simple ITSM governance structure was created, which optimised the use of existing ITSM governance structures in the EMBL-EBI IT department and clarified all ITSM roles in a way that facilitates the implementation of ITSM. The governance structure also considers the role model recommendations by FitSM (FitSM.eu, 2016) and the EMBL-EBI organisation model, which has a dominant rational component. As a rational model clearly defines roles and procedures, it is perfectly aligned with the intent of integrating an ITSM system. Figure 1 summarises the main elements of the ITSM governance structure.

For the third step, we created an ITSM problem statement to identify the issues that must be addressed by the ITSM system, and we created balanced scorecards (Kaplan and Norton, 1992) that considered perspectives from the financial, user, internal business process, and the innovation and learning aspects that are depicted in Figure 2. Next, we developed an ITSM policy that addressed the issues identified in the ITSM problem statement and helped us achieve the balanced
scorecard targets. The policy structure has the following elements: a purpose, a motivation, a scope statement, an IT-business alignment and definition of objectives, a description of the process approach, commitment to continuous improvement, leadership and contact information, and policy revision plans.

As a fourth step in developing the governance framework, we conducted a stakeholder analysis (Mendelow, 1981) to identify the key actors in ITSM and assess their level of interest and power to influence the actions to be developed. We used this analysis to determine the engagement strategy with all stakeholders and how we could involve them in co-creating and delivering services.

In the fifth step, we developed specific process plans for the FitSM processes we considered to be the building blocks of our ITSM: Service Portfolio Management, Service Level Management, Service Reporting Management, Incident and Service Request Management, and Problem Management.
Finally, a communication plan was created to inform all stakeholders how, when, and why communication would occur around the ITSM system, rather than individual processes and services, which will be described elsewhere.

**The start of the ITSM control level**

ITSM Control Frameworks are similar to Internal Control Systems in organisations, but instead of focusing on the overall activities, they focus on specific ITSM activities. Using the control framework, the organisation can establish processes that will assist in making decisions and allocating resources to meet ITSM goals and objectives described in the IT Service Management Policy that support IT-Business alignment and try to fill service quality gaps.

In our case, we adapted the FitSM implementation template for a process definition (FitSM.eu, 2014) by adding a section with the overall process inputs and outputs, a section with a communication matrix for the process team and stakeholders, and a section on risk assessment for the process implementation using a SWOT analysis and an impact and probability matrix.

With the template in place, we defined the Service Portfolio Management process and Service Level Agreement process. The ITSM Committee made the decision that our department would create a Service Portfolio and a Service Catalogue internally, since our ITSM maturity level was still low and it was premature to invest in an ITSM platform. The ITSM Committee also decided to define a corporate Service Level Agreement (SLA) covering all IT services provided and to implement a triage system in Request Tracker, the ticketing system at the time. Thus, we focused on addressing the department's cultural change through FitSM training and incrementally introducing ITSM processes using well-known tools.

**Setting up the ITSM operational level**

Along with the internal development of the control level, the different teams in the IT department began identifying services and collecting and centralising step-by-step instructions in procedures that other colleagues could follow easily. The procedures were defined using the FitSM template (FitSM.eu, 2014), but workflows were added to make it more visual and taking into consideration that they would be useful if an ITSM software platform was implemented in the future.

Having procedures documented allowed teams to delegate simple tasks to junior members, and repetitive tasks were automated using in-house development tools.

**Evolving the ITSM governance, control and operational levels**

Two-and-a-half years after we started our ITSM journey, we had reached a maturity level that prompted the IT department to consider other options, such as centralising information in a way that it is easy to read and understand, expanding self-service opportunities, taking advantage of automation, and incorporating governance into change management.

At the time the IT department used a combination of software products and services to track incident and user requests (mainly Request Tracker), share knowledge (Wikis, Confluence, Google Docs, and the intranet content database), the internally developed Service Portfolio and Service Catalogue, and internally developed service monitoring and service request management.

The number of tools we had made it difficult to integrate and centralise management to benefit our users' experience and IT team's productivity. Furthermore, the current tools could not meet previous requirements such as implementing SLAs and producing reports. That's when we decided to search for an ITSM software platform.

**Choosing the right platform for ITSM implementation**

The ITSM Committee of the IT department evaluated five ITSM platforms based on their Gartner Magic Quadrant For ITSM Tools score (Doheny et al., 2019), recommendations from similar research supporting organisations and their professional experience with them.

The assessment took about three and a half months and included establishing requirements, demos, forming working groups, facilitating workshops, testing, and extensive communication and meetings to clarify requirements and scope, exploring solutions with regard to the tool and accompanying training, business implementation, and meetings with similar organisations.

The full list of requirements that we shared with different ITSM software platform providers can be seen in Table 1.
| Requirement type                        | Requirement                                                                 |
|----------------------------------------|-----------------------------------------------------------------------------|
| 1. Access                              | R1.1 Licences for approximately 50 to 70 concurrent agents.                 |
|                                        | R1.2 Provide support for both internal and external users.                  |
| 2. Storage                             | R2.1 ITSM data should be stored in EMBL-EBI systems as well as the cloud.   |
| 3. Security                            | R3.1 Access control should be available.                                   |
| 4. Data protection                     | R4.1 The platform should be compliant with the European General Data Protection (GDPR) requirements. |
|                                        | R4.2 Data protection tasks need to be supported by workflows.              |
| 5. Training                            | R5.1 Training should be available for platform administrators, IT department users, and end users. |
| 6. Support model                       | R6.1 On-demand consulting and implementation partner services should be available. |
| 7. Service Portfolio Management        | R7.1 A Service Portfolio must be able to be defined and maintained.         |
|                                        | R7.2 The Service Portfolio must include items such as Services, Service Components, Configuration Items, SLAs, and knowledge. |
|                                        | R7.3 Integration of the Service Portfolio with the Service Catalogue and Configuration Management Database should be possible. |
| 8. Service Level Management            | R8.1 A Service Catalogue must be able to be defined and maintained.         |
|                                        | R8.2 The Service Catalogue must include items such as Services, Service Components, Configuration Items, SLAs, and knowledge. |
|                                        | R8.3 Integration of the Service Catalogue with the Service Portfolio and with the Configuration Management Database should be possible. |
|                                        | R8.4 SLAs should be easily implemented and tracked.                        |
|                                        | R8.5 SLA breaches must be notified.                                        |
| 9. Service Reporting Management        | R9.1 Reports need to be produced easily according to specifications.        |
| 10. Service Availability and Continuity Management | R10.1 Availability of services needs to be monitored, measured, and shown. |
|                                        | R10.2 Monitoring, measuring, and demonstrating the availability of service components should be possible. |
|                                        | R10.3 Configuration items must be monitored, measured, and shown to be available. |
|                                        | R10.4 Service availability and continuity plans must be able to be stored.  |
|                                        | R10.5 Creating workflows for assisting with continuity and recovery issues must be possible. |
| 11. Service Capacity Management         | R11.1 The performance of services needs to be monitored.                    |
|                                        | R11.2 Information that facilitates capacity planning must be accessible.    |
|                                        | R11.3 Automating access to services is essential.                          |
|                                        | R11.4 Capacity plans must be able to be stored.                            |
|                                        | R11.5 Nice to have: Ability to understand infrastructure trends and adjust automation accordingly. |
|                                        | R11.6 Nice to have: Virtual agent to increase self-service capabilities.    |
| 12. Information and security management | R12.1 Information security tasks need to be supported by workflows.         |
|                                        | R12.2 Information assets need to be stored (such as policies).              |
|                                        | R12.3 A searchable knowledge base should be available.                     |
| Requirement type                        | Requirement                                                                                                                                                                                                 |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13. Customer Relationship Management   | R13.1 Including contact information and making it easy to get in touch with them is necessary.                                                                                                               |
|                                        | R13.2 User feedback should be collected (such as through surveys after closing a service request).                                                                                                            |
|                                        | R13.3 Information about who uses our services must be stored.                                                                                                                                               |
|                                        | R13.4 Nice to have: Machine learning and AI applied to user behaviour.                                                                                                                                     |
| 14. Supplier Relationship Management   | R14.1 Information about our suppliers must be stored.                                                                                                                                                      |
| 15. Incident and Service Request       | R15.1 The ability to handle incidents automatically should be available.                                                                                                                                    |
| Management                             | R15.2 The ability to handle service requests automatically should be available.                                                                                                                              |
|                                        | R15.3 Service requests should be able to be identified and tracked.                                                                                                                                       |
|                                        | R15.4 Incident reports should be able to be identified and tracked.                                                                                                                                        |
|                                        | R15.5 Service desk capabilities to receive, classify, identify, track, prioritise and respond to service requests and incident reports must be available.                                                   |
|                                        | R15.6 Workflows for managing incidents must be feasible.                                                                                                                                                |
|                                        | R15.7 Workflows for managing service requests must be feasible.                                                                                                                                           |
|                                        | R15.8 Workflows that offer self-service to our users must be feasible.                                                                                                                                     |
|                                        | R15.9 Nice to have: Cognitive automation (text analysis, intelligent incident reports and service requests classification)                                                                                     |
| 16. Problem Management                 | R16.1 Information needs to be visualised in a way that helps identify root causes.                                                                                                                       |
|                                        | R16.2 Information that will enable us to recognize recurring incidents must be provided.                                                                                                                  |
|                                        | R16.3 Documenting workarounds and temporary fixes should be possible.                                                                                                                                     |
| 17. Configuration Management           | R17.1 Building a Configuration Management Database should be possible.                                                                                                                                     |
|                                        | R17.2 A method for automatically discovering Configuration Items should be available.                                                                                                                     |
| 18. Change Management                  | R18.1 Managing changes and related workflows with approval requests notified to the appropriate people should be feasible.                                                                                   |
|                                        | R18.2 It should be possible to publish and notify changes in an easy way.                                                                                                                                   |
|                                        | R18.3 Integrated, automated change management workflows must be possible.                                                                                                                                   |
| 19. Release and Deployment Management  | R19.1 It should be possible to publish and notify planned releases.                                                                                                                                         |
|                                        | R19.2 Integrated, automated release management workflows must be possible.                                                                                                                                   |
| 20. Continual Service Improvement      | R20.1 Storing plans to identify, plan, implement and review improvements should be possible.                                                                                                                |
We eventually selected ServiceNow as the ITSM platform because it meets our requirements, it follows the ITIL framework which is compatible with FitSM by simplifying its implementation, is financially sustainable, has a pool of experts and staff trained to support it (including staff among the IT department who have used it in other companies and similar organisations), and is modular and flexible. Also, despite being outside the scope of the project, it was also considered as a potential resource for other EMBL-EBI departments in the future.

**ITSM platform proof of concept**

In view of the limited ServiceNow expertise of the EMBL-EBI IT department, we decided to start the implementation with a proof of concept, together with a ServiceNow Implementation Partner, Engage ESM.

Development of the proof of concept took two and a half months. It covered the following areas: Core system setup and core data, Authentication design, Service Portal (the ServiceNow equivalent of the Service Portfolio and the Service Catalogue), implementation of a corporate Service Level Agreement, Service Request management, Incident and Problem management, Change management, basic knowledge base creation, and reporting.

In addition to the functionality in scope, information assets were created to support the proof of concept that were extremely valuable for documenting the ITSM processes. As an example, a matrix for incidents categories and assignment groups.

Creating a basic Configuration Management Database was initially also in scope but was not achieved as time constraints meant priority was given to finishing work on other areas and learning more about how to integrate legacy systems and automate tasks.

Also, it must be mentioned that we faced some challenges during the proof-of-concept development due to the pandemic situation in 2021, since the team was working fully remotely, which presented challenges for clear and efficient communication with all the stakeholders.

**ITSM platform implementation current and future work**

Having completed the proof-of-concept phase, our platform was one step closer to being offered to the users of the IT services and the IT department staff.

When evaluating how the ITSM platform should be implemented, we have always considered which would be the processes that would create the greatest value for the end users and increase efficiency for the IT department. Hence, the current steps for the fully in-house development of ServiceNow involve building a comprehensive user-facing knowledge base as well as replacing our current RT-based ticketing system with a basic Service Portal, which allows end-users to report incidents and submit service requests.

It is important to note that a comprehensive knowledge base was not one of our initial goals, but this changed in response to suggestions from organisations using mature ServiceNow platforms, stressing how up-to-date instructions and information can empower end users to resolve issues themselves without contacting the IT department, thus saving IT support effort.

Configuration management is one of the first processes that many IT department members were focused on. Despite exploring autodiscovery for our configuration management database, we discussed it with other organisations (RIs and private companies) who recommended we not consider it a priority at this stage of our ITSM maturity level, since the effort would outweigh the benefits.

In the future, we are planning to develop a more comprehensive Service Portal that will allow granular types of incidents and service requests to be defined, as well as fully fledged problem and change management processes.

**Conclusion**

In this document, we present an example of the steps and results of the formal and strategic approach adopted by EMBL-EBI's IT department for designing, providing, managing, and continuously improving IT services aligned with business goals. In order for an ITSM system to be successful, it should be based on standards that consider the ITSM maturity level of the organisation, a solid governance framework, a well-established control framework, and an operational level that is backed by a technology platform that standardised and simplified ITSM tasks while also providing a user-oriented interface. We have shared an example of how to select an ITSM standard, a governance structure, a control, and an operational level, as well as the requirements considered to select a software platform and the steps to follow in order for other organisations to benefit from our experience.
**Data availability**
No data are associated with this article.

**Acknowledgements**
The authors would like to thank all their colleagues working in the EMBL-EBI IT department (the Technical Services Cluster), the Technical Services Cluster Service Management Committee for providing feedback on discussions about the implementation of ServiceNow, to Oihane Fano-Bilbao for her work as support project manager of the proof-of-concept project, and to Daniel Gant for reviewing the text of this article.

Moreover, the authors would like to thank Gyorgy Balazs and Natalie Kane from CERN, the École Polytechnique Fédérale de Lausanne, James Fleming from the Francis Crick Institute, and the Science and Technology Facilities Council who kindly shared their ITSM expertise and experience.

And finally, the authors would like to thank the Milano-Bicocca faculty members Benedetta Trivellato and Laura Mariani, who supervised Montserrat’s field project on the governance and control framework for the EMBL-EBI IT department as part of the Executive Masters in Management of Research Infrastructures programme (EMMRI), as well as all the academic team and students who shared their knowledge.

An earlier version of this article can be found on OSF preprints (DOI: 10.31219/osf.io/9quxj).

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