

# **OVERVIEW OF EU-LIFE CORE FACILITIES BENCHMARKING SURVEY 2021**

**By EU-LIFE Core Facilities Working Group**



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## Introduction

The [EU-LIFE Core Facilities Working Group](#) (WG) surveyed core facilities at their institutes about their budgets and costs, operational practices, as well as staff profiles and staff support. This survey, carried out in the autumn of 2020, solicited information from core facility managers about individual core facilities, and from the WG members (i.e., core facility directors, coordinators, heads of programmes) about the portfolio of core facilities at their institute. With a feedback rate of 80% we were able to obtain a broad **overview of the operational practices, quantitative investment in infrastructure, and staff**, from 12 out of 15 partners, covering a total of 126 core facilities. In addition, managers from 102 core facilities provided information about the qualitative and operational aspects at individual sites.

Using the financial indicators provided by the core facilities, we were able to **compare the financial models** and investment models at different partner institutes (taking into account the institutes' relative sizes and a country-specific cost-of-living index) as well as by core facility type<sup>1</sup>. The resultant analysis also provided us with interesting insights about staff profiles (gender, qualifications, and turnover) and career-related features. Further below is an overview of our findings.

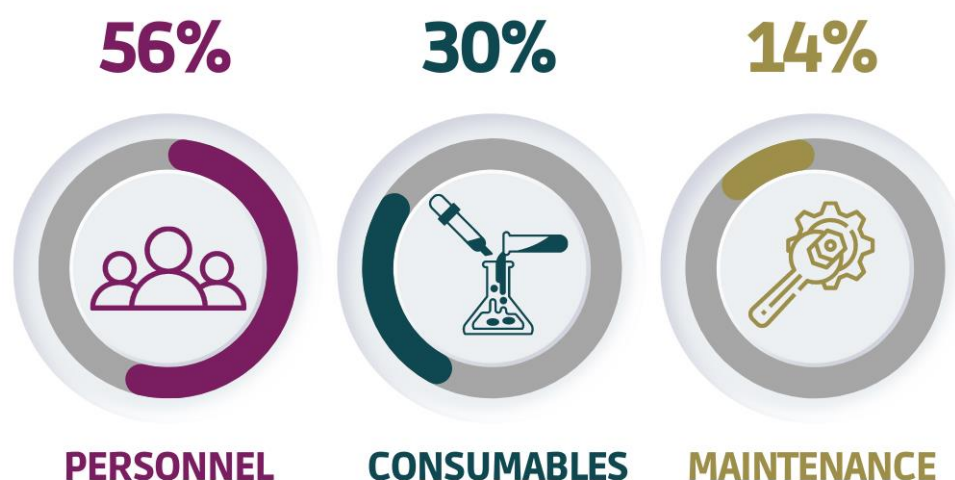
The Core Facilities' benchmarking survey was completed with the active participation of the members of the Core Facilities Working Group and the Core Facility managers who responded to the individual core facility survey. The accounting personnel and financial controllers of participating member institutes are also acknowledged for the financial data.

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<sup>1</sup> Due to the large response rate, it was also possible to analyse the feedback by technological focus: bioinformatics (7 facilities), cytometry (8), genomics (14), histology/pathology (4), imaging (13), mass spectrometry proteomics and metabolomics/lipidomics (11), protein technologies (8), screening (4), and structural biology (7), as well as animal facilities (10).

## Financial indicators and models

The financial comparison focused on **direct costs covering personnel, consumables, and maintenance** (of equipment) at core facilities, hereafter referred to as PCM costs. We found that personnel cost was the principal component, accounting for 55 - 65 % of the PCM costs at most institutes (Figure 1 depicts the average of each component).



*Figure 1. Averaged cost for personnel, consumables and maintenance across institutes surveyed (standard deviation is around 10% for each cost item)*

We also queried how these costs were covered: by invoicing to users, competitive grants, or allocated subsidies. Broadly, we find that partners fall into three financing models, 1) primarily or fully subsidised by the institute, 2) primarily or fully invoiced to the users, and 3) spread across invoicing and subsidies. Only one partner's core facilities' costs were primarily covered by competitive grants. Thus, even amongst the EU-LIFE institutes, there is a **range of cost coverage models**: core facilities whose costs are almost completely subsidised, to those having to cover (nearly) all their costs by invoicing users.

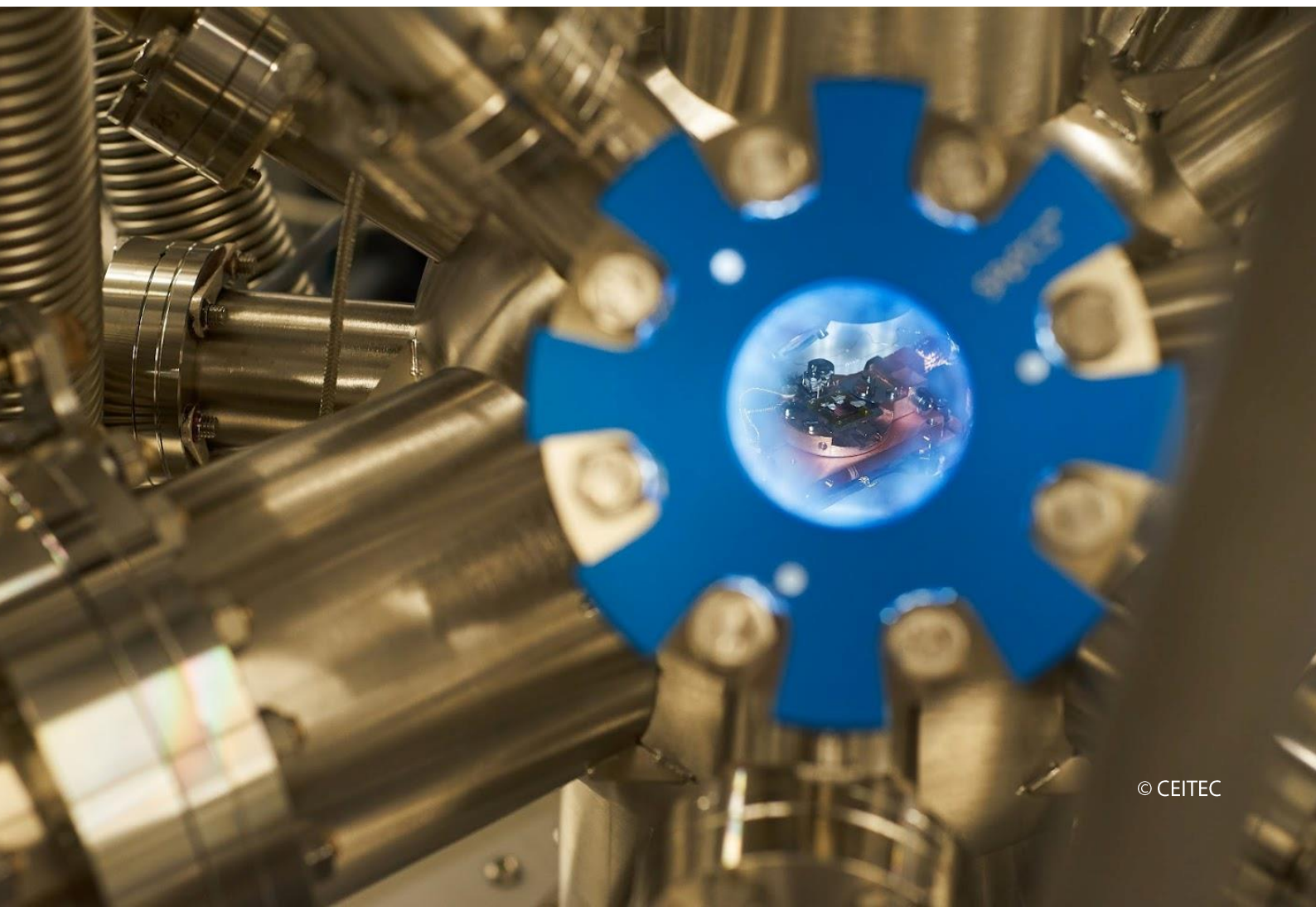
We may thus infer that the funding source influences a core facility's 'business model': the pressure to cover costs by service income and/or grants, or the lack of pressure due to allocated institutional, or affiliated partners' (e.g., universities) subsidies, drives the pricing model and by extension the user base. Furthermore, institutional policy can result in internal users getting a (highly) subsidised price for services provided. We found that most core facilities charge their internal users a combination of consumables and/or equipment maintenance/depreciation costs, with only 2 core facilities indicated charging the full cost of personnel, consumables and maintenance to internal partners. External academic users

in comparison are, by and large, charged the full direct costs, with some institutes adding on the overhead cost.

Overall core facilities are established and supported to prioritise covering the internal research needs of the institute, particularly those core facilities that are highly subsidized by institutional funds. However, those that are open to external academic users can play an important role in initiating and building collaborative networks and providing scientific support to a wider community.

To be a part of larger research infrastructures (e.g., ESFRI projects and landmarks), core facilities are required to be “open” to external researchers and to share resources and know-how. Such “openness” is also encouraged by funding bodies to diminish the risk of under-use of equipment arising from technology duplication in geographic proximity.

External commercial users are typically charged full costs, as well as a surcharge for the expert knowledge and support included in the service. In general, commercial users are often seen as a financing tool to balance the core facility budget, typically when internal service income or central subsidies do not adequately cover the basic running costs.



## Management models

The 12 EU-LIFE institutes that participated in the survey had a representative, at the institutional level, for their portfolio of core facilities. Notably, eight partners have **centralised oversight** with a head or director of a programme or department who takes a direct, or advisory, role for decisions related to core facility equipment, personnel, evaluation and lifecycle. Interestingly, the centralised oversight still bestowed managers at the individual core facilities with considerable autonomy concerning financial and operational decisions and actions.

At the level of individual core facilities, a variety of oversight procedures and management tools were deployed. Most facilities used a **combination of evaluation tools** comprising user surveys, user committees and peer review committees to provide feedback on operational questions covering service quality, user needs, equipment investment, priorities, and the core facility's mission. Whereas user surveys target a wide user base, with the option for anonymity allowing for feedback on sensitive issues that may otherwise remain hidden, user committees permit deeper discussions than user surveys. Both evaluation instruments reflect the core's attention to user needs and requests. Peer-reviews committees, which include external experts, are perceived as a 'step up' from user committees, with feedback on core facility performance vis à vis (inter)national standards.

Institutional policies can play an important role in implementing systematic evaluations of core facilities by user or peer-review committees. The latter, in particular, can serve as a neutral, independent body to advise, support and/or justify institutional decisions to invest, or disinvest, in a particular core facility.



## Management tools

Administrative management software (AMS) is used widely at core facilities and range from home-built solutions to commercial (e.g., Agendo, iLab, Stratocore, Trello) and non-commercial options (e.g., OpenIRIS). They are typically used for equipment reservation and to track equipment usage. We note a number of imaging, mass spectrometry and structural biology core facilities also monitor equipment downtime.

Of key relevance to the use of AMS by core facilities, is the **incorporation of Electronic Lab Notebooks (ELNs)** in their operations. While only around 40% of core facilities reported using ELNs, the uptake of ELN use is on the rise.

The importance of ELNs is acknowledged in our WG as is the need to link ELNs to AMS. Such a link would not only help synchronise core facility activities and collaborations between core facility staff and researchers, but also facilitate Research Data Management plans and making data FAIR.

Institutional support, by way of policies and resources, would undoubtedly accelerate the use of ELNs at core facilities.



## Core Facility Staff Profiles and Indicators

A broad overview of core facility staff at the different partners was obtained based on the number of full-time equivalents (FTEs), the gender distribution, qualification (PhD/no PhD), number of years of experience of the core facility manager, and staff turnover (number of staff who left versus recruited in the preceding five years).

We found that the **percentage of staff holding a PhD** strongly depended on the core facility type<sup>1</sup> with e.g., 80% or more of structural biology facility staff holding a PhD, as do a majority of the bioinformatics, imaging, and proteomics core facilities staff. When considering the **experience of core facility managers**, the average was 15 years in the same technology or field (an average of 11 years at histology/ pathology facilities to 20 years at the protein production and structural biology facilities).

Data on staff leaving and recruited at the core facilities allowed us to calculate the **staff turnover rate** both at institute level and for the different types of core facilities. We found that mass spectrometry, imaging, structural biology, and bioinformatics facilities systematically 'grew', perhaps reflecting the relatively greater technological expansion in these fields and the need to broaden the scope and specialization of their staff. While growth could reflect advancement, it appears that it is often accompanied by a high turnover rate. The latter typically entails additional investment to recruit and integrate new staff. Such an indicator can thus be used to evaluate, and deploy, extra support where required.

The current survey was unable to link attrition rates to the closing and opening of core facilities, but future surveys will collect and correlate this data.

### Gender distribution of core facilities staff and managers

Among the total core facility staff of 800 FTEs spanning twelve partner institutes, there is a nearly equal number of male and female staff (FTEs). Female staff comprised 40 – 60 % of total core facility staff, at eight out of twelve institutions. At four institutions however, the gender distribution was notably disproportionate: two partners had around 70% male staff, and two partners had 65% and 70% of female staff. By core facility type<sup>1</sup>, bioinformatics, structural biology, and mass spectrometry cores had a majority of male staff. These facilities also had a prevalence of PhD-qualified staff, but the data at hand did not allow us to correlate this factor to the gender imbalance.



Comparing the overall gender distribution among the core facility staff to that of the research staff, we note that the disparity of the male to female staff ratio at core facilities is not a reflection of the overall gender balance at the parent institute; the gender distribution of researchers is closer to equity with female researchers making up 40 – 60% of all researchers at all member institutes (six member institutes being within 5% of parity).

In the case of **gender distribution of core facility managers** (see Figure 2), three institutes were at (close to) parity, and at one, the proportion of female managers was similar to that of the overall staff; the rest however had a disproportionately lower number of female managers compared to the gender distribution of their staff (Figure 2). This relationship, with a relatively lower number of female managers versus that in the core facility staff pool, resembles that of the relatively lower number of female PIs versus the total number of female researchers, at several of the partner institutes. Thus, the phenomenon of the “leaky pipeline” also appears to apply for the academic career path of core facility staff.



Figure 2. Average gender distribution of core facilities staff and managers at the 12 surveyed institutes. Out of a total of 800 FTEs there are an equal number of male and female FTEs, but on average, there are about twice as many male managers as female managers.

The disparity in the gender of core facility managers was further analysed to see if there was a **correlation between the bulk of the male and the bulk of the female managers versus their responsibility** concerning human resources (number of FTEs, staff qualification and turnover) and financial resources. We find that at eight out of twelve partner institutes the male core facility managers combined had 70% or more of the total

staff under their responsibility, thus leaving the female managers with, on average, smaller sized facilities under their charge.

Similarly, the bulk of financial responsibility was largely conferred on the group of male managers versus the group of female managers at nine out of twelve partner core facilities (direct costs incurred by their facility). These intriguing trends of disparity were at times identifiable with certain types of core facilities, and at times, at specific partner institutes.

Thus, one would need to make a careful cross-comparison of data to determine if there might be specific core facilities that preponderate and contribute to the disparity, or if this was a global issue to be addressed at the institutional level. Teasing out such trends reveals that one cannot take equality of gender distribution among core facility managers at face value.

When male managers, on average, have more responsibilities as judged by the number of staff they supervise and budget they manage, the situation should be carefully monitored at each institute and at each core facility to determine whether an additional effort must be made to provide equal opportunities to all genders.

## Staff careers

Information about the career and career support available for core facility staff revealed several areas where additional support and action from the WG could help the progression of staff careers.

83% of core facilities reported having **descriptions for the role of core facility managers**.

To facilitate operations and transparent management, the WG recommends that all core facilities have a job description for their managers.

In the case of **staff career development** plans, only 23% of core facilities reported having one. Career development includes gaining a diversity of experiences to nurture different skills; all activities that facilitate gaining experience supports and motivates the staff.

In the case of core facility staff, it is particularly important to have institutional support and resources to carry out technological development, with allocated time to do so. The lack thereof can be particularly difficult for core facility staff who struggle to find time to train

themselves and be involved in technological development, or to collaborate with researchers. This eventually results in career stagnation and in less motivated staff and can lead to the core facilities not keeping abreast with the latest technological developments.

We note that it is also very important to encourage involvement in activities that are not limited to the service portfolio of the facility. This could include R&I, teaching, participation in conferences and networks or even personal development.

Such wider activities were found to be accessible to staff at the majority of bioinformatics, cytometry, imaging, mass spectrometry, and protein technologies facilities.

On the positive side, we also observed that a fair number of core facilities have access to a variety of training activities covering soft-skill courses, personalized coaching and technical courses and workshops. A small minority of core facility staff also has the opportunity for sabbaticals, which clearly allows staff to sustain and grow their technological knowledge, as well as their professional network. The WG plans to initiate a staff-exchange programme at the EU-LIFE level.

## Conclusion

The core facilities survey and the resultant report has allowed the WG to identify specific issues that could be addressed collectively to best support our core facilities and their staff, and ensure that they remain at the forefront of research.

Specifically, the WG will draft guidelines on the core facility lifecycle (best practices on opening and consolidating a facility), staff careers and core facility acknowledgement to sustain and support core facility infrastructures, which are crucial to the research carried out at our institutes.



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