D1.4 Socio-economic impact study and documented refined KPIs

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(Development and long-term sustainability of new pan-European research infrastructures)

Research and Innovation Action (RIA)

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EU-OPENSCREEN-DRIVE

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Partner responsible	EU-OS
Author(s)	Bahne Stechmann (EU-OS), Katja Herzog (EU-OS), Tanja Miletic (EU-OS), Robert Harmel (EU-OS), Charlotte Wit (EU-OS)

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1 Glossary

AoM	Assembly of Members
CCMF	Central Compound Management Facility
EACL	European Academic Compound Library
ECBD	European Chemical Biology Database
ECBL	European Chemical Biology Library
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum on Research Infrastructures
FBDD	Fragment-based Drug Discovery
HTS	High-Throughput Screening
KPI	Key Performance Indicator
PSF	Partner Site Forum
SOP	Standard Operating Procedure
RI	Research Infrastructure
UX	user experience

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2 Introduction

EU-OPENSCREEN is the European Research Infrastructure (RI) which supports scientists in developing novel chemical compounds that exhibit specific biological responses on organisms, cells or cellular components in a defined, well-understood and specific manner. These chemical compounds can be used by researchers as research tools (or 'probes') to study fundamental cellular processes, such as signalling or metabolic pathways in immune responses, tissue repair etc. EU-OPENSCREEN applies screening of collections of >100,000 compounds, by using robotics-based high-throughput screening platforms in an automated process, and subsequent hit-to-probe optimization to develop these chemical probes.

Most of the funding for the establishment and operation of RIs is provided by public funders. In the case of European Research Infrastructure Consortia (ERICs), these are their respective group of RI member countries, which is complemented by EU project funding and other revenue sources. These funders regularly evaluate the outcome and return on their investment.

Distributed RIs have various stakeholder groups, which have different needs, priorities, and motivation to participate and support the RI. The incentives and needs of these different stakeholder groups can vary strongly and may in some cases conflict.

Consequently, the operation and performance of RIs are regularly monitored by these different stakeholders in various formats, including:

- ERIC member and observer countries via 5-year evaluation of the ERIC;
- Current and future ERIC member and observer countries through periodic reviews and/or national RI roadmap procedures;
- ESFRI (European Strategy Forum on Research Infrastructures) as part of the period evaluation of ESFRI landmark projects and ESFRI Roadmap updates;
- Partner sites discuss the different activities and goals of the RI regularly in the Partner Site Forum (PSF) and contribute to the definition of the RI's goals;
- Users of the RI are systematically asked to provide feedback on user satisfaction to continuously strive to improve the user experience (UX).

European RIs, like any other organizations, need to regularly measure, monitor, and improve their performance. Key Performance Indicators (KPIs) are a valuable tool for RIs to measure progress towards their goals, make informed decisions based on data, and to continuously improve their operations.

The KPIs must align with the RI's strategic goals and objectives. They should be quantifiable and enable organizations to evaluate their performance effectively. They provide insights into critical aspects of an RI's operations, such as providing relevant services to users and enabling scientific excellence, providing education and training, user satisfaction, optimising data usage, and financial performance. Two widely recognized frameworks for setting effective KPIs are the SMART and RACER criteria:

SMART Criteria:

- **Specific**: KPIs should be clearly defined and specific to the desired outcome or objective of the RI. They should avoid ambiguity and provide a clear direction for the monitoring of the RI's performance.
- **M**easurable: KPIs must be quantifiable, allowing the RI to gather and analyse relevant data in a meaningful manner. This enables objective assessment and comparison of the performance in specific areas over time.

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- **A**chievable: KPIs should be realistic and attainable, considering the RI's capabilities and available resources. They should encourage RI staff to strive for continuous improvement of all functions without setting unattainable objectives.
- **R**elevant: KPIs should align with the RI's strategic goals and objectives and reflect those areas that have the highest impact on the overall performance and success of the RI.
- **T**ime-bound: KPIs should have a defined timeframe or deadline for achievement to provide a sense of urgency and monitor progress effectively.

RACER Criteria:

- **R**elevant: Analogues to SMART criteria, KPIs need to be relevant to the organization's goals and objectives and reflect important areas that define the organisation's success.
- **A**ligned: KPIs should be aligned with overall strategy of the RI and other organizational performance metrics.
- **C**omprehensible: KPIs should be easily understandable by all stakeholders involved, including employees, managers, and executives. Clear communication and transparency foster a shared understanding of performance expectations.
- **E**ngaging: KPIs should be designed in a way that engages and motivates employees. They should be meaningful, actionable, and tied to rewards or incentives to drive performance improvement.
- **R**eliable: KPIs should rely on accurate and reliable data sources. Data collection processes should be robust and consistent to ensure the integrity and validity of the KPI measurements.

Recently, the European Strategy Forum on Research Infrastructures (ESFRI) established a thematic working group which is dedicated to developing a common approach to monitoring the performance of RIs, based on Key Performance Indicators (KPIs). The set of proposed KPIs should be applicable to different RIs, but it was recommended that each RI refines the KPIs based on its specific needs, operational model, access policies etc. in consultation with its funding organisations and affiliated partner sites. The proposed ESFRI KPIs will also be used by ESFRI for the periodic reviews of the ESFRI Landmark projects. The final report of the ESFRI Working Group on monitoring RIs performance has been published in January 2020 and is available online: https://www.esfri.eu/latest-esfri-news/report-esfri-working-group-monitoring-ris-performance.

The final set of KPIs[1] is presented in the table below:

[1] https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf

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Objective	KPIs
Enabling scientific excellence	1. Number of user requests for access 2. Number of users served 3. Number of publications 4. Percentage of top (10%) cited publications
Delivery of education and training	5. Number of master and PhD students using the RI 6. Training of people who are not RI staff
Enhancing collaboration in Europe	7. Number of members of the RI from ESFRI countries 8. Share of users and publications per ESFRI member country
Facilitating economic activities	9. Share of users associated with industry and publications with industry 10. Income from commercial activities and the number of entities paying for service
Outreach to the public	11. Engagement achieved by direct contact 12. Outreach through media 13. Outreach via the RI's own web and social media
Optimising data use	14. Number of publicly available data sets used externally
Provision of scientific advice	15. Participation by RIs in policy related activities 16. Citations in policy related publications
Facilitating international co-operation	17. Share of users and publications per non-ESFRI member country 18. International trainees 19. Number of members of the RI from non-ESFRI countries
Optimising management	20. Revenues 21. Extent of resources made available

As the authors of the ESFRI report note, narratives that complement the KPIs and provide additional context should be included in the monitoring and the periodic review of ESFRI Landmarks by ESFRI.

Applying KPIs to monitoring the performance of an RI has many benefits: KPIs provide a structured approach to measure, monitor, and evaluate performance of various activity areas of the RIs. They help align the individual efforts of individual team members, partner sites and other stakeholders within the RI with the RI's strategic goals to ensure efficiency. Gathering objective data for the different KPIs informs decision making and increases transparency and accountability by making the data available to all stakeholders in the RI. The data help the RI to identify areas of improvement and to decide on mitigation activities on necessary adjustments to proactively take measures to improve performance and efficiency. Transparent periodic performance evaluation of the RI will increase the confidence of the involved funding organisations, partner sites, users and RI staff that their time and monetary investment, and personal effort is worthwhile.

The ERIC Forum, a collective initiative of 23 European Research Infrastructure Consortia (ERICs) and aspiring ERICs, published a position paper on the development of KPIs for RIs, which is available online: https://www.eric-forum.eu/2019/07/09/eric-forum-position-paper-on-the-development-of-kpis-for-research-infrastructures/. One important conclusion of this position paper is that KPIs should be used as an internal management tool to evaluate the performance of RIs on an individual basis, but that they should not be used to compare ERICs.

During the EU-OPENSCREEN-DRIVE project and the preparation of this report, the authors participated in and contributed to the discussion of the ESFRI consultation by providing written comments to consultations or ESFRI stakeholder meetings; participated in the discussions on KPIs in the framework of the ERIC Forum; exchanged experiences and views of individual RIs during in-depth bilateral discussions; and followed the discussion about KPIs and impact assessments

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which took place in other EU initiatives, such as RI-PATHS (https://ri-paths-tool.eu/en) and ACCELERATE (https://www.accelerate2020.eu/).

With the aim to customise and refined the KPIs, and to define a procedure for the data collection associated with the KPIs, the authors consulted the EU-OPENSCREEN partner sites, presented the refined KPIs to the EU-OPENSCREEN Partner Site Forum, and discussed the refined KPIs with the EU-OPENSCREEN Assembly of Members and the Operational Management Board of EU-OPENSCREEN (https://www.eu-openscreen.eu/about/governance.html). The proposed EU-OPENSCREEN KPIs build on the ESFRI KPIs, but also include KPIs based on previous requests from national funders, member states, and partner sites. The purpose of this deliverable is to propose and establish a common framework of refined EU-OPENSCREEN specific KPIs for the monitoring of EU-OPENSCREEN.

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3 Performance indicators

3.1 Number of Users and User requests

The size of the user community depends on a many factors but reflects the attractiveness of the RIs. In the following, we categorized different groups of scientific users of EU-OPENSCREEN, which differ in terms of services and partner sites requested, estimated budget and source of funding for the implementation of the scientific user projects, access policies, etc.: (i) Screening users (2.1.1.), (ii) Medicinal chemistry users (2.1.2.), (iii) Chemoproteomics users (2.1.3.), (iv) Fragment-based Drug Discovery (FBDD) users, (v) Chemists submitting compounds (2.1.5.), (vi) Database users (2.1.6.), and (vii) Trainees (2.1.7.).

3.1.1 Screening users

Biologists (including molecular biologists, biochemists, pharmacologists, cell biologists etc.) who developed a suitable assay which can be used in high-throughput screening (HTS) campaigns, constitute an important user group. The users are expected to have a robust assay, which will be transferred to one of the EU-OPENSCREEN screening partner sites, where the assay is used to screen the EU-OPENSCREEN compound collection (https://www.eu-openscreen.eu/services/compound-collection.html).

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Gender of the user
- Host institution
- Type of user: (i) academic user from member country, (ii) academic user from observer country, (iii) academic user from any other country, (iv) industry user
- Assigned partner site
- Country partner site(s)
- Estimated budget and source of funding
- Library usage: (i) pilot library, (ii) European Chemical Biology Library (ECBL), (iii) European Academic Compound Library (EACL), (iv) fragment library
- Compound replenishment fee: yes/no (see also 2.5.3)
- Research area: (I) neurodegenerative disease, (ii) cancer, (iii) infectious diseases, (iv) rare diseases, (v) metabolic disease, (vi) inflammation and immunology, (vii) cardiovascular diseases, (viii) respiratory diseases, (ix) gastrointestinal diseases, (x) other diseases.
- Project implementation stage: (i) application submitted, (ii) project start date, (iii) pilot screen completed, (iv) primary screening completed, (v) hit validation completed, (vi) project end date.
- Data deposited in European Chemical Biology Database (ECBD, https://ecbd.eu/): yes/no
- Embargo period extended: yes/no
- Output: (i) scientific publication, (ii) patent

Collection method and tools:

All applications must be submitted centrally by the users to the EU-OPENSCREEN Central Office via the dedicated Contact Form. After a pre-evaluation of the suitability of the application, the applicant is invited to submit a full application form by connecting to the ARIA online submission

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platform (if not differently indicated). EU-OPENSCREEN is also exploring additional web-based platforms for user access management and monitoring in ongoing EU projects. For example, in the Horizon Europe project AgroServ, ISIA (https://isia.cnrs.fr/) is used to display technologies, installations and services offered by the different European Research Infrastructures, submit and manage proposals. A dedicated project management platform (Asana) is used to collect all relevant information of the proposals. The information collected with ARIA and Asana will facilitate the retrieval of data for the above mentioned KPIs. In comparison with the data for the other KPIs, the collection of information about project output (scientific publications and patents) will be more time-intensive and manual (e.g., through PubMed search; see also 2.2.4).

3.1.2 Medicinal chemistry users

Following the validation of compounds generated in screening user projects, users are offered to progress compounds in collaboration with EU-OPENSCREEN chemistry partner sites.

The following parameters will be collected:

- Country of user (i.e., country of host institution)
- Nationality of user
- Gender of user
- Host institution
- Type of user: (i) academic user from member country, (ii) academic user from observer country, (iii) academic user from any other country, (iv) industry user
- Research area: (I) neurodegenerative disease, (ii) cancer, (iii) infectious diseases, (iv) rare diseases, (v) metabolic disease, (vi) inflammation and immunology, (vii) cardiovascular diseases, (viii) respiratory diseases, (ix) gastrointestinal diseases, (x) other diseases
- Assigned partner site
- Country partner site(s)
- Estimated budget and source of funding
- Project implementation stage: (I) application submitted (i) Project start date, (ii) target structure selection (iii) synthesis and biological validation of advanced hit compounds, (iii) project end date
- Output: (i) scientific publication, (ii) patent

Collection method and tools:

Like the applications of the screening users, applications for the medicinal chemistry services must be submitted centrally by the users to the EU-OPENSCREEN Central Office via the dedicated Contact Form. It is expected that most applicants have implemented a screening project with EU-OPENSCREEN, so that most relevant information has already been submitted to the ARIA online submission platform. The project management platform (Asana) is used to track the implementation of these user projects and to facilitate the collection of data for the KPIs above. In comparison with the data for the other KPIs, the collection of information about project output (scientific publications and patents) will be more time-intensive and manual (e.g., through PubMed search, see also 2.2.4).

3.1.3 Chemoproteomics and MS-based services

After the EU-OPENSCREEN-DRIVE project, scientists will be offered support in chemoproteomics and compound disposition studies from 2024 onwards. A key learning from the chemoproteomics projects in WP5 was that successful prosecution of chemoproteomics studies typically requires the

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involvement of two or more EU-OPENSCREEN and/or external expert sites to achieve full technical coverage of all necessary experimental and analysis activities. All chemoproteomics applications must be submitted centrally by the users to the EU-OPENSCREEN Central Office via the dedicated Contact Form.

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Gender of user
- Host institution
- Type of user: (i) academic user from member country, (ii) academic user from observer country, (iii) academic user from any other country, (iv) industry user
- Assigned partner site(s)
- Country partner site(s)
- Estimated budget and source of funding
- Research area: (I) neurodegenerative disease, (ii) cancer, (iii) infectious diseases, (iv) rare diseases, (v) metabolic disease, (vi) inflammation and immunology, (vii) cardiovascular diseases, (viii) respiratory diseases, (ix) gastrointestinal diseases, (x) other diseases.
- Project implementation stage: (i) application submitted, (iii) project start date, (iii) probe preparation, (iv) setup of proteomic/MSI workflow (v) proteomic/MSI sample and data analysis (vi) project end date
- Output: (i) scientific publication, (ii) patent

Collection method and tools:

The ARIA online submission platform and project management platform (Asana) are used to collect all relevant data for each chemoproteomics project. Like the KPIs of the screening and chemistry projects, the collection of information on the project output (scientific publications and patents) will be more time-intensive and manual (e.g., PubMed).

3.1.4 Fragment-based Drug Discovery (FBDD) users

In addition to chemoproteomics services, scientists are offered access to use the EU-OPENSCREEN fragment library for Fragment-based Drug Discovery (FBDD) studies as a new service, which has been established during the DRIVE Project. The applicants must submit their applications/ user declaration form to the EU-OPENSCREEN Central Office using ARIA. The FBDD are implemented by EU-OPENSCREEN partner sites but can also be implemented by iNEXT-Discovery and INSTRUCT partners. After the completion of the FBDD projects, users are offered to progress their identified compounds in collaboration with EU-OPENSCREEN chemistry sites, which will be tracked under 2.1.2.

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Gender of user
- Host institution
- Type of user: (i) academic user from member country, (ii) academic user from observer country, (iii) academic user from any other country, (iv) industry user
- Assigned partner site
- Country partner site(s)

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- Estimated budget and source of funding
- Research area: (I) neurodegenerative disease, (ii) cancer, (iii) infectious diseases, (iv) rare diseases, (v) metabolic disease, (vi) inflammation and immunology, (vii) cardiovascular diseases, (viii) respiratory diseases, (ix) gastrointestinal diseases, (x) other diseases.
- Project implementation stage: (i) application submitted, (ii) project start, (ii) fragment screen, (iii) hit validation, (iv) project end.
- Data deposited in European Chemical Biology Database (ECBD, https://ecbd.eu/): yes/no
- Embargo period extended: yes/no
- Output: (i) scientific publication, (ii) patent

Collection method and tools:

The ARIA online submission platform and project management platform (Asana) are used to collect all relevant data for each FBDD project. Like the KPIs of the screening, chemistry, and chemoproteomics projects, the collection of information on the project output (scientific publications and patents) will be more time-intensive and manual (e.g., PubMed).

3.1.5 Technology co-developments users

After the EU-OPENSCREEN-DRIVE project, companies with disrupting technologies in the field of chemical biology and screening are invited to collaborate with our partner sites. Typically, project will cover further refinement, expansion and validation of a provided technology. In some cases, collaborations could be extended to secondary industry or academic user that could make immediate use of the technology co-development results for their research to raise impact. All technical co-development applications must be submitted centrally by the users to the EU-OPENSCREEN Central Office via the dedicated Contact Form.

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Gender of user
- Host institution
- Type of user: (i) academic user from member country, (ii) academic user from observer country, (iii) academic user from any other country, (iv) industry user
- Assigned partner site(s)
- Country partner site(s)
- Estimated budget and source of funding
- Project implementation stage: (i) application submitted, (ii) project start date, (iii) co-development implementation, (iv) secondary user application, (v) project end date
- Output: (i) scientific publication, (ii) patent, (iii) company Standard Operating Procedure (SOP)/protocol (iv) new product

Collection method and tools:

The ARIA online submission platform and project management platform (Asana) are used to collect all relevant data for each technology co-development project. Similar to the KPIs of the screening, chemistry, chemoproteomics and FBDD projects, the collection of information on the project output (scientific publications and patents) will be more time-intensive and manual (e.g., PubMed).

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3.1.6 Chemists submitting compounds

With the aim to make synthetic or natural compounds accessible to a broader scientific community and to allow chemists to uncover novel bioactivities of their compounds, EU-OPENSCREEN offers chemists the opportunity to make their compounds available, in a regulated and transparent framework, to a wider community of biologists, who test these compounds in suitable bioassays. By doing so, chemists can expose their compounds to a broad range of different biological/drug targets to uncover the unknown bioactivities of their compounds, which would otherwise not be practical through individual one-to-one collaborations. Once a compound has been identified as a validated hit compound, a research collaboration between the chemist (who submitted the compound) and the biologist (who developed the bioassay) can be initiated.

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Gender of user
- Host Institution
- Type of user: (i) academic user, (ii) industry user
- Career stage
- Number of submitted compounds
- Implementation stage: (i) MTA signed, (ii) compounds quality-controlled with QC/structural data deposited in ECBD, (iii) compounds shipped to EU-OPENSCREEN partner sites, (iv) compounds bioprofiled, (v) compounds tested in screening projects, (vi) compounds identified as a validated hit
- Output: (i) scientific publication, (ii) patent

Collection method and tools:

The project management platform (Asana) is used to collect all relevant data and track the status of the compound submission. The collection of information on the project output (scientific publications and patents) will be manual (e.g., PubMed).

3.1.7 Database users

EU-OPENSCREEN is committed to the FAIRification of its data and to maximize the reuse of the generated data. Compound data, primary screening data and bioprofiling data are deposited in EU-OPENSCREEN's European Chemical Biology Database (ECBD, https://ecbd.eu/), which is hosted by our Czech partner site IMG Prague. There are data links to other public databases, such as the ChEMBL database (https://www.ebi.ac.uk/chembl/), hosted by EMBL-EBI. Overall, the database users arguably represent the largest user community of EU-OPENSCREEN.

The following parameters will be collected:

- Country of the user (i.e., country of host institution)
- Nationality of user
- Host Institution
- Number of datasets deposited in the ECBD

Collection method and tools:

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The ECBD host tracks the number of registered users, who submit screening and compound data to the database. However, tracking the use of EU-OPENSCEEN datasets via ChEMBL or other public databases is currently not foreseen as part of the EU-OPENSCREEN monitoring.

3.1.8 Trained scientists

Supporting and providing training opportunities for external scientists, staff at EU-OPENSCREEN's partner sites and at the EU-OPENSCREEN Central Office is one of EU-OPENSCREEN´s core activities. Examples of scientific training topics are assay development, assay technologies, instrumentation and automation, compound management, and informatics. To further collaboration and exchange of experience among consortium partners, staff exchanges between partner sites and external training of staff at partner sites is a major focus. EU-OPENSCREEN also provides training to students, postdoctoral scientists and independent researchers to train the next generation of European researchers and to ensure the optimal use of the EU-OPENSCREEN research infrastructure. The Central Office organises annual open calls for proposals, and EU-OPENSCREEN partner sites are eligible to submit a formal request for training (e.g., external training, staff exchange) or proposal to organise a practical training workshop. The training activities are funded through the contributions of EU-OPENSCREEN member and observer countries, as well as through EU grants.

The following parameters will be collected:

- Number of training activities by type of training: (i) webinar, (ii) training school, (iii) practical workshop, (iv) staff exchanges, (v) external training
- Number of trainees per type of training
- Career stage of trainee
- Host country of trainee (i.e., country of host institution)
- Host institution of trainee
- Nationality of trainee
- Type of researcher: (i) academic, (ii) industry
- Estimated budget per training activity

Collection method and tools:

The training activities are coordinated by the EU-OPENSCREN Central Office, which also collects and tracks the data for these training KPIs. The data is managed manually, with the use of a project management platform (Asana).

3.2 Scientific deliverables/outcomes/results

Under 3.1, the proposed metrics focus on the size of EU-OPENSCREEN's scientific user community. The following KPIs under 3.2 will focus on the scientific deliverables, outcomes, and results from EU-OPENSCREEN's activities. Many of these indicators are linked to the indicators under 3.1, so the proposed indicators under 3.2. do not necessarily result in collecting more data or tracking additional indicators but will rather be used to present EU-OPENSCREEN relevant KPIs from a different perspective.

3.2.1 Screening projects results

In order to monitor the outcomes and deliverables of the scientific (user) screening projects, the following information is collected:

- Number of submitted screening project proposals

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- Number of initiated screening projects
- Number of ongoing screening projects
- Number of completed pilot screening projects
- Number of completed screening projects using the ECBL or EACL
- Number of primary screening datasets deposited in the ECBD
- Number of publications, including journal and publication year, resulting from screening user projects
- Number of patents resulting from screening user projects

Collection method and tools:

The data for the KPIs above are collected in the context of 3.1.1.

3.2.2 Chemistry project results

The following information is collected to monitor the outcomes and deliverables of the scientific (user) chemistry projects:

- Number of submitted project proposals
- Number of initiated projects
- Number of ongoing projects
- Number of completed projects
- Number of publications, including journal and publication year, resulting from the scientific chemistry projects
- Number of patents resulting from scientific chemistry projects

Collection method and tools:

The data for the KPIs above are collected in the context of 3.1.2.

3.2.3 Chemoproteomics projects results

In order to monitor the outcomes and deliverables of the scientific (user) chemoproteomics projects, the following information is collected:

- Number of submitted chemoproteomics project proposals
- Number of initiated chemoproteomics projects
- Number of ongoing chemoproteomics projects
- Number of completed chemoproteomics projects
- Number of publications, including journal and publication year, resulting from chemoproteomics user projects
- Number of patents, resulting from chemoproteomics projects

Collection method and tools:

The data for the KPIs above are collected in the context of 3.1.3.

3.2.4 FBDD projects results

In order to monitor the outcomes and deliverables of the scientific (user) FBDD projects, the following information is collected:

- Number of submitted FBDD project proposals

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- Number of initiated FBDD projects
- Number of ongoing FBDD projects
- Number of completed FBDD projects
- Number of publications, including journal and publication year, resulting from FBDD user projects
- Number of patents, resulting from FBDD user projects

Collection method and tools:

The data for the KPIs above are collected in the context of 3.1.4.

3.2.5 Technology co-development projects results

In order to monitor the outcomes and deliverables of the technology co-development projects, the following information is collected:

- Number of submitted technology co-development project proposals
- Number of initiated technology co-development projects
- Number of ongoing technology co-development projects
- Number of completed technology co-development projects
- Number of publications, including journal and publication year, resulting from technology co-development user projects
- Number of publications, including journal and publication year, resulting from technology co-development user projects
- Number of products including supplier name and launch year, resulting from technology co-development user projects

Collection method and tools:

The data for the KPIs above are collected in the context of 3.1.5.

3.2.6 Compound submissions

The compound submission model is a unique opportunity for chemists and pharmacologists to uncover potential bioactivities of their synthetic compounds or natural compounds. The submitted compounds are quality-controlled, reformatted and stored at EU-OPENSCREEN's Central Compound Management Facility (CCMF) as part of EU-OPENSCREEN's European Academic Compound Library (EACL) and shipped to affiliated partner sites so that the submitted compounds are bioprofiled and screening is scientific (user) screening projects.

A dedicated section on the EU-OPENSCREEN website will provide an overview of the numbers of submitted compounds and chemists who submitted compounds to EU-OPENSCREEN. This website will be continuously updated and will hopefully help raise awareness among the broader scientific community of the benefits of sharing compounds. The following metrics will be used to monitor the outcomes of EU-OPENSCREEN's compound submission model:

- Number of signed MTAs
- Number of chemists who submitted compounds to EU-OPENSCREEN
- Number of submitted compounds
- Number of compounds sent to EU-OPENSCREEN partner sites
- Number of bioprofiled compounds
- Number of screening projects using the EACL

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- Number of submitted compounds validated as active hit compounds
- Number of initiated collaborations

Collection method and tools:

The data for the KPIs above will be collected in the context of 3.1.5. Though the compound submission model uses a federated approach with local ambassadors, the Central Office and CCMF coordinate the signature of the MTA, shipment, receipt, quality control, reformatting, storage and shipment of the compounds to partner sites. Therefore, the metrics listed above are collected by the Central Office and CCMF using a project management platform (Asana).

3.2.7 Number of training activities

The outcome of the training activities will be collected under 3.1.7.

3.2.8 Track user feedback

Users are routinely asked to evaluate the services provided by EU-OPENSCREEN and its partner sites. The Central Office collects the feedback directly from the users using the ARIA platform.

3.2.9 Central Compound Management Facility (CCMF) support

The CCMF plays an important role in the operation of the research infrastructure. EU-OPENSCREEN's integrated central compound management facility stores the jointly used compound collections and provides the partner sites across Europe with quality-controlled compound sets for the characterization of their biological activities in user projects. The fully automated, integrated compound management facility allows for a cost-effective and reproducible dispensing, copying and reformatting of microplates in various formats (96/384/1536) depending on the different needs of the partner sites ad users. It is flexible to accommodate the different needs by accurately picking individual compounds from the collections for customized sets.

The following information is collected to monitor the operation of the CCMF:

- Number of cherry pick samples provided to partner sites
- Number of full-deck library plates provided to partner sites
- Number of submitted compounds received, quality controlled and stored

Collection method and tools:

The metrics for the KPIs listed above are collected by the Central Office and CCMF team, with the support of a project management platform (Asana).

3.2.10 European Chemical Biology Database (ECBD)

EU-OPENSCREEN is committed to the FAIRification of its data. A significant proportion of the financial contributions of the EU-OPENSCREEN member and observer countries is invested in developing and operating an open-access database. EU-OPENSCREEN's ECBD, hosted by the partner site IMG in Prague, serves as an internal data sharing environment as well as a public data resource for the integration and analysis of EU-OPENSCREEN's high-quality bioactivity data by the broader scientific community.

The following information is collected to monitor the impact of the ECBD:

- Number of private datasets

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- Number of public datasets
- Publications referring to the use of ECBD datasets

Collection method and tools:

The metrics for the ECBD-related KPIs are collected by the ECBD host, in collaboration with the Central Office.

3.3 Governance

Under section 2.3, the number of EU-OPENSCREEN ERIC member and observer countries as well as the official EU-OPENSCREEN partner sites, which are hosted exclusively by member countries, is monitored. The rights and duties of member/observer countries and partners are described in the statutes and the rules of procedure.

3.3.1 EU-OPENSCREEN ERIC members/observers

The EU-OPENSCREEN ERIC member and observer countries support the research infrastructure and provide the core funding for its operation. The number of member and observer countries is continuously monitored. Each member and observer country is eligible to nominate up to two delegates to the AoM, but only member countries have one vote in the AoM. The list of member and observer countries, and their respective delegates to EU-OPENSCREEN's Assembly of Members (AoM) is listed on the EU-OPENSCREEN website, which is always kept up to date.

The following information on member and observer countries is collected:

- Name of member country
- Name of observer country
- Date of entry (or withdrawal, if applicable) of each member/observer country
- Financial contribution per country

Collection method and tools:

All data are collected manually by the Central Office.

3.3.2 List of partner sites

Member countries nominate potential EU-OPENSCREEN partner sites, which are externally evaluated and approved by the AoM. Only member countries are eligible to host partner sites. The number of partner sites per country is balanced between the member countries. Partner sites are privileged partners in EU-OPENSCREEN led grant proposals. Only partner sites are eligible to receive a copy of the EU-OPENSCREEN compound collections and to use them in scientific projects, apply for training activities or implement so-called shared services, such as bioprofiling or hosting of the EU-OPENSCREEN database.

The following information on partner sites is collected:

- Name of partner site, including contact details
- Host country of the partner site

Collection method and tools:

All data are collected manually by the Central Office.

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3.4 Finance

The research infrastructure is funded predominantly by members and observers, in addition to project-related European Horizon 2020 and Horizon Europe grants. Other income sources contribute to support individual activities of the research infrastructure. The following data are collected to monitor the incomes of the research infrastructure:

- Contribution of each member and observer country
- Income of each third-party grant by beneficiary/partner site
- Collected compound replenishment fees
- Income from other sources
- Income/financial benefits from scientific user projects that are executed by partner site
- Income/financial benefits from user from a member country

Collection method and tools:

All data are collected by the Central Office finance team, partially using the Microsoft Oracle Netsuite.

3.5 Outreach

Raising awareness among the broader scientific community of the opportunities for external scientists to advance their own research is key to attract scientific users. The Central Office coordinates the outreach activities and is actively supported by the partner sites. The following metrics are collected to monitor the outreach activities:

- Number of newsletters
- Number of newsletter recipients
- Number of website views
- Number of posts on LinkedIn
- Number of posts on X/Twitter
- Number of followers on LinkedIn and Twitter
- Views of posts/tweets
- Number of policy-related activities and related publications

Collection method and tools:

All data are collected manually by the Central Office.

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4 Socio-Economic Impact

This report focusses preliminarily on the definition of KPIs for the periodic monitoring of the RI's performance. Wherever reasonable, these KPIs are aligned as much as possible with the KPIs as set out by the ESFRI Strategic Working Group on monitoring RIs performance. The KPIs will be used during the upcoming 5-year evaluation of the RI's performance in 2024 and the next periodic ESFRI monitoring exercise.

Based on these evaluations, a more comprehensive socio-economic impact assessment that looks at the broader impact of the RI on both societal and economic aspects will be considered. The consortium believes that such a comprehensive socio-economic impact study is too complex and demanding at this early stage of the operation of the RI.

EU-OPENSCREEN shall be periodically evaluated every 5 years, as stipulated in EU-OPENSCREEN's Rules of Procedure. EU-OPENSCREEN's Assembly of Members will mandate external reviewers to evaluate the operation and impact of EU-OPENSCREEN in 2024.

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5 Conclusion

Monitoring the performance and operation of EU-OPENSCREEN is an important activity, to inform the Central Office staff, partner sites and member/observer countries represented in the Assembly of Members about the outcome and results of the different activities of the research infrastructure as well as about areas which need to be improved. The data needed for the monitoring are mostly collected by the Central Office, using various online tracking platforms and tools.

The refined KPIs for EU-OPENSCREEN are based on the KPIs which have been initially proposed by the thematic working group established by the European Strategy Forum on Research Infrastructures (ESFRI). All stakeholders of EU-OPENSCREEN, including the member and observer countries, partner sites and staff at the Central Office and CCMF have been consulted in the refinement of the KPIs. Other thematically similar RIs have also been consulted. The current list of refined KPIs is specific for EU-OPENSCREEN, but closely aligned with ESFRI's KPIs, which will facilitate the monitoring of EU-OPENSCREEN's KPIs by its stakeholders and by ESFRI (as part of the current evaluation of ESFRI Landmark projects).

The table below shows the alignment between EU-OPENSCREEN's refined KPIs with the KPIs proposed by ESFRI:

Objective	ESFRI KPIs	EU-OS KPIs
Enabling scientific excellence	1. Number of user requests for access	3.1.1-3.1.7
	2. Number of users served	3.1.1-3.1.8
	3. Number of publications	3.1.1-3.1.7
	4. Percentage of top (10%) cited publications	3.1.1-3.1.7
Delivery of education and training	5. Number of master and PhD students using the RI	3.1.8, 3.2.7
	6. Training of people who are not RI staff	3.1.8, 3.2.7
Enhancing collaboration in Europe	7. Number of members of the RI from ESFRI countries	3.3.1
	8. Share of users and publications per ESFRI member country	3.1.1-3.1.8
Facilitating economic activities	9. Share of users associated with industry and publications with industry	3.1.1-3.1.8
	10. Income from commercial activities and the number of entities paying for service	3.1.1-3.1.8, 3.4
Outreach to the public	11. Engagement achieved by direct contact	3.5
	12. Outreach through media	3.5
	13. Outreach via the RI's own web and social media	3.5
Optimising data use	14. Number of publicly available data sets used externally	3.2.10
Provision of scientific advice	15. Participation by RIs in policy related activities	3.5

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	16. Citations in policy related publications	3.5
Facilitating international cooperation	17. Share of users and publications per non-ESFRI member country	3.1.1-3.1.8
	18. International trainees	3.1.8, 3.2.7
	19. Number of members of the RI from non-ESFRI countries	3.3.1
Optimising management	20. Revenues	3.4
	21. Extent of resources made available	3.4

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