RINGO | Readiness of ICOS

Readiness of ICOS for Necessities of integrated Global Observations

D6.15

Report to summarize the experiences of usage of the KPI approach

RINGO (GA no 730944)

Public Document

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Deliverable: D6.15 Report to summarize the experiences of usage of the KPI approach

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Date: 2.12.2020
Activity: WP6
Lead Partner: ICOS ERIC
Document Issue: 1
Dissemination Level: Public
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Approved by	Elena Saltikoff	ICOS ERIC	Dec 31st 2020
Version	**Date**	**Comments/Changes**	**Author/Partner**
Version 1			
Version 2.	18.12.2020	JMR	ICOS ERIC
Version 3.	30.12.2020	ECR	ICOS ERIC

Deliverable Review Checklist

A list of checkpoints has been created to be ticked off by the Task Leader before finalizing the deliverable. These checkpoints are incorporated into the deliverable template where the Task Leader must tick off the list.

- Appearance is generally appealing and according to the RINGO template. Cover page has been updated according to the Deliverable details. ☐
- The executive summary is provided giving a short and to the point description of the deliverable. ☐
- All abbreviations are explained in a separate list. ☐
- All references are listed in a concise list. ☐
- The deliverable clearly identifies all contributions from partners and justifies the resources used. ☐
- A full spell check has been executed and is completed. ☐

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Executive Summary

According to our experience, using the KPI approach in H2020 project management has both advantages and disadvantages. While it is an effective approach for monitoring the project progress, it can also add a layer of complexity especially in cases where the project is a development project for an organisation or an RI that not yet has an existing set of KPIs in use. Therefore the introduction of a KPI system for project management can be challenging to implement. However, depending on the scope of a project, the KPI approach can be utilised in favor of further developing the overall management structure of an organisation or RI.

INTRODUCTION

The main aim of the RINGO project was to build the "Readiness of ICOS for Necessities of integrated Global Observations".These following challenges were identified to be met:

1. Scientific readiness. To support the further consolidation of the observational networks and enhance their quality. This objective is mainly science-guided and will increase the readiness of ICOS RI to be the European pillar in a global observation system on greenhouse gases.
2. Geographical readiness. To enhance ICOS membership and sustainability by supporting interested countries to build a national consortium, to promote ICOS towards the national stakeholders, to receive consultancy e.g. on possibilities to use EU structural fund to build the infrastructure for ICOS observations and also to receive training to improve the readiness of the scientists to work inside ICOS.
3. Technological readiness. To further develop and standardize technologies for greenhouse gas observations necessary to foster new knowledge demands and to account for and contribute to technological advances.
4. Data readiness. To improve data streams towards different user groups, adapting to the developing and dynamic (web) standards.
5. Political and administrative readiness. To deepen the global cooperation of observational infrastructures and with that the common societal impact.

It was further noted that there exists no definition identified in e.g. the ESFRI Roadmap of how to measure the efficacy and impact of any Environmental Research Infrastructure. There were no defined requirements for Key Performance Indicators (KPI) that are used to monitor the operational ability of them.

The utilisation of a KPI system for the sole purpose of monitoring the performance of a development project, such as RINGO, would be short-lived and would not bring added value in the long term. Hence, KPIs defined in the project proposal phase should be aligned to serve the purpose of the overall management of the organisation or RI running the project, to gain a longer-lasting benefit.

The development of more purposeful KPIs was seen as fulfilling one of the goals in RINGO project – the strengthening of the ICOS RI's operability; especially as the RINGO project is also spread over the first operational phase of the RI and in which several other management structures were developed and implemented (e.g. Management Plan, Impact Assessment, fine-tuning the Station Labelling process, etc.) and as there were simultaneous discussions on the ESFRI level about the KPI approache in RIs. In the orginal project proposal we indicated that ICOS would complete a first set of ICOS RI Key Performance Indicators for the overall management of the RI. This was also in line with the first Scientific Evaluation of ICOS RI, which took place towards the end of the RINGO project, and for which KPIs were also used.

However, this approach did not completely override the idea of using KPIs related to the RINGO project management. There were KPIs identified in the project proposal that were aimed at the monitoring of the project progress (table 1), but due to the nature of the RINGO project (a development projet), the majority of these KPIs could be seen as being in line with the overall performance monitoring of ICOS RI. The approach was taken into active use during the project. It is, hence, important to not get confused by the different levels and contexts of KPIs that were defined within the scope of the RINGO project, but which served different purposes and were / would be used in different time frames:

1. KPIs defined for the monitoring of the project management and progress:

Table 1. KPIs defined in the project proposal for measuring the efficiency of the project management

Performance measure	How we measured
Project Coordinator provided a list of key project deliverables and milestones, which were clearly defined and mentioned in the Grant agreement	Monitoring the timely completion of Deliverables and milestones and uploading them on Participant Portal
Number and consistency of reports of performance provided during the project as important high-level record of the progress. Sub-KPIs: Number of persons trained by cooperation within the project.	Bi-monthly Executive Board meetings were held to discuss project progress. In addition, separate task leader meetings were held regularly, and progress report requested. Training was not deemed possible within the resources of the project.
Management efficiency and accuracy: internal reports on time according to defined milestones and of sufficient quality	A Quality Contol and Quality Assuarance (AC/QA) protocol was introduced, which resembled a standard peer-review. This protocol was accepted at the RINGO EB meeting held in Antwerpen 2018. (See Appendix 1. gantt chart of deliverable AC/QA process.)
Deviations from the project budget and deliverables 3.2.1.3	Regular resource planning meetings

2. KPIs defined to monitor the success of the project

The aim was to use KPIs that were identified in the proposal writing phase in order to test their applicability to the project use, and further develop a set of KPIs to be proposed to be used to ICOS RI level. Table 2 demonstrates this approach:

Table 2: KPIs defined in the project proposal

KPI defined in the project proposal – to enable the development of early KPIs that could be further developed after the project and used on RI level	Adoption and implementation of the KPI during the project	Likely to be adopted long-term – subject to further discussions with RICOM and GA
Number of new countries in preparation of joining the ICOS ERIC. Sub-KPIs: Number of additional stations provided by new countries.	During the RINGO project, Spain joined ICOS RI, starting with two stations.. The final number of stations tha will be provided is under discussion.	yes
Geographical coverage of the network.	Calculations of combined footprint of Atmosphere stations, number of ecosystem stations per ecosystem type (such as forests and wetlands), and draft of a measure to assess coverage of ocean stations.	Yes (included in the Evaluation materials)
Number of persons trained.	Not relevant within the resources	TBC.
Number of new methods/parameters standardized and made operational within ICOS ERIC Sub-KPIs: Number of new instruments or methods tested	Flask samples method is a highlight. Narrative included in annual reports of thematic centres. Making ATM measurements onboard SOOPS	Yes, (included in the Evaluation materials) TBC
Number of specifications or protocols developed	Assessed per domain in the evaluation.	
Number of industry contacts during the development of future activities. Sub-KPIs: Number of physical access cases.	Assessed as narrative in the evaluation report	
Number of results provided for further developments	See above	
Number of publications on global climate and biogeochemical cycles research in which ICOS has a key roles;	A list of RINGO publication was compiled	yes

Number of publications on new scientific approaches based on newly available data types	See above	yes
Degree of connectivity of ICOS in global observation systems Sub-KPIs: Number of MoUs signed.	A MoU with GERI was signed and others discussed	yes
Number of global data portals that are connected to ICOS via metadata	constantly growing, but at least 3 SOCAT, GLODAB, FLUXNET,	yes
Measures of societal relevance of ICOS data and products (to be developed during the project). Sub-KPIs: Citation of ICOS-related publications in reports of IPCC, GCP and UNFCCC.	During the project, a Socio-Economic Assessment was conducted. Separate Key Impact Indicators were developed and a separate approach for SEI discussed for further development	Yes – in the SEI framework; not as a KPI
Amount of data cites in respective reports.	Citations of all ICOS publications calculated by Lund University. Promoting use of data citations in the research community.	yes
Development of a general societal impact assessment scheme for ENV RIs in the ESFRI framework.	This work was started in relation to WP1 (the SEI assessment). Recommendation for SEI measurments for ENVRIs were included, this work is to continue.	Yes – in the SEI framework; not as a KPI
Volume of project training organized and number of persons attending ICOS training	In WP2, training for new countries planning to join ICOS RI was provided. Training will be further addressed in relation to ICOS Community Engagment Plan. In addition, number of PhD and MSc students who used ICOS data in their thesises has been counted.	yes

3. Further development of KPIs and KIIs to be adopted on the RI level

Based on the experiences gained after the Impact Analysis carried out in WP1 that identified a set of Key Impact Indicators (KII), a structure for differentiating Key Performance Indicators from Key Impact Indicators was developed in D1.1. This enabled an effective way to align the RIs operations with its strategy and the identification of the RI's outputs and the resulting impact more clearly. The Impact Analysis identified KIIs that were presented to the Project General Assembly. This was done during the RINGO Annual meeting held in Antwerpen in March 2018, where the project participants were allowed to contribute to the selection of KIIs that were presented there. Further work on the SEI approach and measurement in ICOS and ENVRI context will continue after the RINGO project.

Towards the end of the RINGO project, ICOS RI went through its first Scientific Evaluation process. During this process, a set of detailed performance indicators were developed to match the requirements of the evaluation that would be performed every five years, as stated in the ICOS ERIC statutes. The evaluation board and Head Office team further developed KPIs for ICOS RI (annex 2). These KPIs will serve as the corner stones for the performance monitoring for IOCS RI and can be used in future evaluations, or adapted to better suit any occurring contexts of the RI, after having been approved by the ICOS General Assembly

The KPIs developed to monitor the success of RINGO (table 1) will be further defined to be adopted for a longer-term use. Additional KPIs will also be defined together with the maturing of the RI that is now entering its second five-year operational phase. This will be done with the help of the Management Plan that is currently being finalised.

EXPERIENCES OF APPLYING THE KPI APPROACH

The use of the term KPI in the RI context has been gaining momentum in recent years, being a topic in the ESFRI Working Group and also part of many projects' agendas. It is not without its downfalls, however. The concept itself is a somewhat ambiguous one; being easily confused with socio-economic impact indicators and being somewhat complex to define especially in the context of RIs that have a very diverse operational dimensionality. While the application of KPIs to monitor the progress of a project is justified and can be seen effective, it adds some complexity. Many organisations and RIs have defined KPIs to monitor their performance, or are in the process of doing so. Thus, developing a separate set of KPIs for project progress monitoring poses a risk of being unnecessarily laborous, if intended to be used by the whole of the project consortium.

This is especially true if the organisation or RI is in the beginning of its first operational phase and does not yet have a defined set of KPIs in use. With its tendency of being a multi-scalar method (KPIs for the organisation, KPIs for e.g. ESFRI, KPIs for project management), the KPI approach is, hence, one that is not so straightforward to be comprehended within the project consortium. It can also be perceived as creating an extra layer of work for project management, despite there usually being methods to monitor the project's progress in place they are perhaps not called KPIs).

As a more effective approach, it might be useful to view the usage of KPIs in project management from a broader angle:

If the project participants are already familiar with the KPI concept and perhaps more ready to apply the KPI system to the projects they manage, developing a set of project management KPIs (that would be broadly similar to be applied to all the projects in their management portfolio) could be seen as functioning as part of their existing set of operational KPIs. For example, if there is a KPI related to 'functional project management', a developed set of project management KPIs could be seen as one the performance indicators in this category. It would enable the usage of the project management KPIs in several projects, with only minor adjustments according to the aims of the project in question.

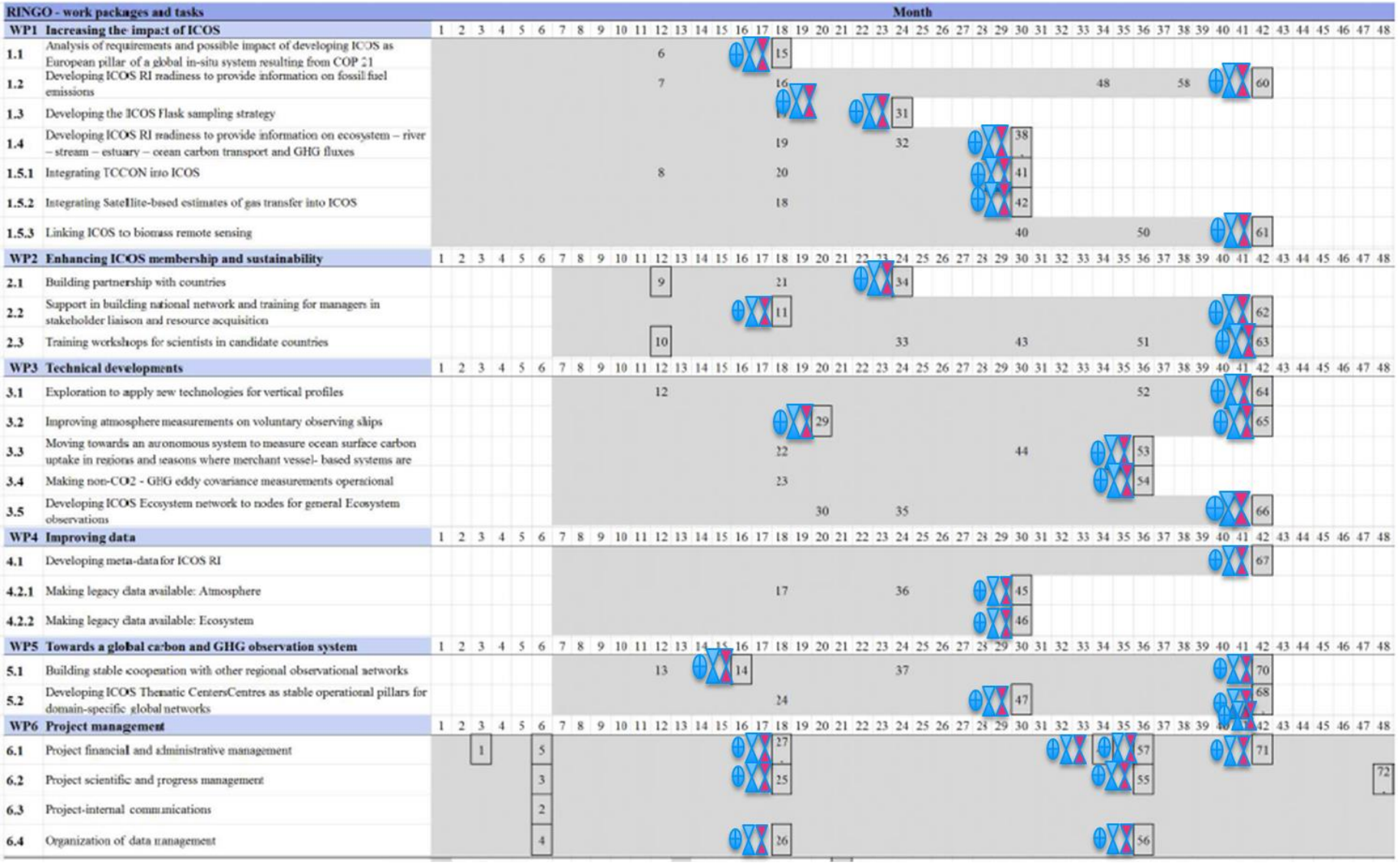
If the consortium does not have an existing set of KPIs in use already, introducing KPIs for the project could be confusing. The KPI approach could, hence, be used in the favor of the development of the organisational KPIs, especially in projects in the development calls. This was partly what was done in the RINGO project, as described earlier. As the purpose of the project was to develop the RI's operational capacity, conducting an impact assessment was one of the project's deliverables. During the work carried out for the impact assessment, it was quicly identified that the approach needed to be seen from a wider perspective: in order to identify relevant impact indicators, the RI needed to also have its KPIs aligned with them.

This resulted in the development of the ICOS strategy and the structure for the Management Plan, both of which were also developed during the lifetime of RINGO, despite not having been directly identified as the outcomes of the project. Subsequently, the RI's scientific and operational management was due an evaluation during the project, stemming from the ICOS ERIC statutes. The experiences gained during RINGO were put in good use during the evaluation process, in which KPIs were further developed. Simultaneously, the use of the KPI approach in managing projects has become more clear and can be applied easier in further projects.

List of Acronyms and abreviations:

ENVRI	Environmental Research Infrastructure
ESFRI	European Strategy Forum on Research Infrastructures.
FLUXNET	Network of Flux research. 1) The data portal and 2) measurement site network.
GERI	Global Ecological Research Infrastructure
GLODAP	Global Ocean Data Aanalysis Project for carbon
ICOS	Integrated Carbon Observation System
KPI	Key Performance Indicators
RI	Research Infrastructure
RINGO	Readiness of ICOS for Necessities of integrated Global Observations
SEI	Socio-Economic Impact
SOCAT	Surface Ocean CO2 Atlas
SOOP	Ship of opportunity

Appendix 1. QA/QC used for monitoring the ongoing progress of the deliverables of RINGO



The oval symbol indicate that a reviewer must be assinged and he/she must agree. Blue "hourglass" indicate the 1 draft for review and red 2nd improved draft for approval.

Key performance area to be evaluated	**Rationale:** The context of the key performance area being evaluated. **Why?** The justification why we are evaluating this area of the RI specifically; why is it necessary, and definitions of any concepts if needed – (almost like in a journal article, even if less scientifically)	**Objective:** Description of the 'ideal end product' that ICOS should reach for - for example, a 'well-functioning RI'. **What?** What is it, exactly, that we want to evaluate? (almost like the research questions).	**Criteria:** What elements do we need to look at in the set objective? What is the evaluation based on? **How?** How can we measure performance? What are the elements to look at?	**KPIs:** These tell us how the RI is performing in the critical performance areas and, by monitoring the KPIs, we can increase performance / show performance **How well?** KPIs allow to determine if an objective is, in fact, achieved. They are either benchmarked against an ideal state or follow over time trends by repeating their recording.	**Sub-indicators**: (alternative words: 'parameters', 'variables', 'measurables') These tell us what exactly we are measuring – this follows he 'integrated KPI' -idea we had in the RINGO D1.1.
Management					
1.1 General management	General management in a distributed research infrastructure such as ICOS RI shall ensure the smooth functioning of the entire organisation. It includes also compliance to laws, agreements and regulations. Since this is the first evaluation of ICOS at the end of the implementation phase, it should focus on the managerial achievements.	Aim: well administrated RI To ask: How well internal management functions to oversee, integrate and steer core activities?	Elements to look at: • Management processes are in place • Documentation is available • Processes are well executed	KPI 1: Implementation of basic processes and availability of the basic documents describing them.	Process descriptions are comprehensive and including responsibilities. Cooperation agreements are signed and enable smooth organisation of work. Participants value the execution of meetings high. Minutes are comprehensive.
1.2 Operational management	Operations are the core of any research infrastructure. The performance of stations and central facilities (CFs) needs to be thoroughly monitored.	Aim: well operating RI To ask: How well internal management functions to oversee, integrate and steer the performance of stations and central facilities?	Elements to look at: • Technical requirements for ICOS instrumentation are available • ICOS approved operation practices for variables are available • Stations are labelled • Data coverage in temporal and spatial dimensions is effective • New technologies are implemented	KPI 2: Availability of technical requirements for ICOS instrumentation KPI 3: Availability of ICOS approved operation practices for variables	Percentage of atmosphere variables that are standardised for instrumentation. Percentage of ecosystem variables that are standardised for instrumentation. Percentage of ocean variables that are standardised for instrumentation. Percentage of atmosphere variables that have approved operation practices. Percentage of ecosystem variables that have approved operation practices.

					Percentage of ocean variables that have approved operation practices.
				KPI 4: Effective station labelling	Number of labelled stations over time
				KPI 5: Comprehensive temporal data coverage	Temporal coverage of raw data (L0)
					Temporal coverage of processed and quality-controlled data (L2)
					Coverage of ecosystem life cycle
				KPI 6: Comprehensive spatial coverage of observations	Spatial extension: network is large enough to picture the GHG status in Europe.
					Density: Network is dense enough to provide detailed information
					Biomes, climate zones, and land use covered
				KPI 7: Implementation of new technologies	New instruments tested/implemented
					New methodologies tested/implemented
					New data procedures developed/implemented
					Number of upstream industry cooperation activities
1.3 Data Management	The functioning of the data life cycle is an essential prerequisite to assure the service provision of the research infrastructure, in particular the timely release of comprehensive, quality-assured data for users following the FAIR principles. An evaluation of the data life cycle considering these aspects shall be performed. Define: what does 'data life cycle' mean in this context?	Aim: Effectively managed data To ask: How well is the data management organised in ICOS RI?	Elements to look at: • Data workflows are well defined and effective • Data are timely • Data are compliant with FAIR principles • All data and data-related services are available via the Carbon Portal as the single-access point/centralised entry gateway	KPI 8: Definitions of data workflows	Completeness of data workflow descriptions
				KPI 9: Timeliness of data provision	Timeliness of NRT and L2 data (to be defined)
				KPI 10: Data compliance with FAIR principles	Number of FAIR principles that ICOS complies to
				KPI 11: Availability of all data and data-related support and services via Carbon Portal	All data and data-related support are available via the Carbon Portal as the single-access point/centralised entry gateway
					Number of services for users
Finances					

2.1 Core funding	The strategic goal of financial management in a distributed research infrastructure such as ICOS RI is to achieve overall transparency, fiscal discipline. Furthermore, the analysis of the mid-term financial situation provides measures to mitigate financial risks. Define: what does 'mid-term financial situation' mean in this context? Remark: The implementation of the internal processes of financial management (budgeting, accounting, reporting, management of internal payments have been transferred to KPI 1)	Aim: well-functioning financial management related to core funding To ask: How well is financial management functioning in the RI? Are the financial resources sufficient? Are the financial resources efficiently used? Are the financial resources well distributed internally? Are the financial resources sustainable?	Elements to look at: • Amount of core funding is in line with operations • Measures to monitor mid-term financial sustainability are implemented • Risk mitigation methods are in use	KPI 12: Amount, trend and volatility of core funding.	Data on funding
					Perception of funding sufficiency
				KPI 13: Equity ratio	ICOS ERIC equity ratio
					CF?
				KPI 14: Mid-term financial sustainability	Mid-term financial sustainability of ERIC
					Mid-term financial sustainability of Central Facilities
					Mid-term financial sustainability of Station Networks
					Measures for monitoring financial sustainability exist
					Mitigation methods to prevent financial risks are monitored and applied as necessary
2.2 Project funding	The ability to secure project funding as well as its internal distribution provides important information about the significance of the RI, its position within the research landscape and the internal integration. Define: what does 'securing funding' mean in this context? Remark: results may also be important for funding organisations to reflect the efficiency of their funding	Aim: well-functioning financial management related to project funding To ask: how well is project funding managed in the RI? Does project funding support the further development of ICOS?	Elements to look at: • Project funding is actively seeked and reported • Project funding is effectively used and usage monitored	KPI 15: Amount, trend and volatility of external funding.	Data on funding (including success rate)
					Perception on internal integration of and participation in research projects as well as their impact.
Internal engagement and integration					

3.1 Internal engagement	ICOS RI is essentially a mosaic of communities that take different geographical and focus-driven forms and operates on several scientifically differing domains. Due to ICOS RI consisting of several types of organisations, institutes of different agendas and histories and different cultural, political and linguistic areas, the perceived purpose of ICOS RI, the motivation to be part of ICOS RI, and the expectations from it vary among its members. This also means that the willingness and ability to engage with the RI activities and integrate with all of its components vary. It's important to know and to enhance motivation, identity and engagement as well as structures that support or hinder them. In the context of the evaluation and this report, 'engagement' refers to a range of behaviours: willingness to and interest in participating in activities – the signs of motivation. 'Integration', on the other hand, refers to the RI's ability to include different parts of the RI into activities (meetings, events, documents, consultations, trainings, projects), the ability to improve activities and respond in an agile way to new opportunities or challenges and the potential for improving the RI's structure.	Aim: Engaged community To ask: How engaged and motivated ICOS RI is internally?	Elements to look at: • People identify with the RI • People are motivated	KPI 16: RI members identifying with ICOS	People feel their work is recognised as important / not important in ICOS (**felt level of recognition**)
					People express as feeling as part of / not feeling part of ICOS (**identification with**)
					People utilise / don't utilise the existing ICOS communication channels (social media, website, others) (**awareness, behaviours, identification with)**
					People apply / don't apply the ICOS branding in their everyday work (**awareness, behaviours, identification with**)
				KPI 17: Motivation of people involved in the ICOS RI operations	people participate / don't participate in organised activities (**participation**)
					people express interest / express being not interested in participating in and / or organising activities (**interest**)
					people participate / don't participate in organising common activities (**participation**)
3.2 Internal integration and structure		Aim: Integrated RI To ask: How integrated the RI is internally?	Elements to look at: • The organisational structure of ICOS RI is inclusive • The organisational structure of ICOS RI enables the improvement of activities • The organisational structure of ICOS RI functions well in managing the RI	KPI 18: The inclusiveness of the organisational structure of ICOS RI	Existing ways of including all parts of the RI, felt level of inclusiveness
				KPI 19: The ability of the organisational structure of ICOS RI to improve activities	identified ways of possible improvements; felt level of the ability to improve activities
				KPI 20: The suitability of ICOS RI's organisational structure to manage the RI	Felt quality of the organisational structure, felt need to alter the structure
Cat 4 ICOS data and user expectations					
4.1 A priori design	The design of the observational networks should reflect user needs and international standards. Define: user expectations and needs (what do we mean by them in this context)?	Aim: A well-designed observational network that reflects user needs and international standards To ask: How well is the network designed and how well does it reflect the user needs and international standards?	Elements to look at: • ICOS participates or enables participation in international efforts to co-design standards for ICOS measurements.	KPI 21: ICOS-related participation in international efforts to co-design standards for ICOS measurements	Number of ECVs covered by ICOS observations
					Number of international cooperation activities to standardise observations.
4.2 Data download	Data download is a key success parameter for the attractiveness of ICOS. Define: what does 'data download' mean in this context?	Aim: ICOS data is downloaded and cited extensively To ask: How extensively is ICOS data downloaded and cited?	Elements to look at: • ICOS data is downloaded from CP by all ICOS domains • ICOS data is downloaded via other portals (e.g. FLUXNET, SOCAT, ObsPack…)	KPI 22: Total amount of ICOS data downloads	Total amount of atmosphere data downloads from Carbon Portal: per year, per month, per parameter
					Total amount of ecosystem data downloads from Carbon Portal: per year, per month, per parameter
					Total amount of ocean data downloads from Carbon Portal: per year, per month, per parameter

					Total amount of atmosphere data downloads from other sources: per year, per month, per parameter
					Total amount of ecosystem data downloads from other sources: per year, per month, per parameter
					Total amount of ocean data downloads from other sources: per year, per month, per parameter
					Percentage of ICOS data cited
					Total amount of other data downloads from Carbon Portal: per year, per month, per parameter
4.3 Data usage	Data usage is a key success parameter for the scientific value of ICOS data. Define: what does 'data usage' and 'scientific value' mean in this context?	Aim: Extensive usage of ICOS data To ask: How extensively is ICOS data used and does the usage reflect the scientific value of it?	Elements to look at: • ICOS data is used across different scientific fields • ICOS data is used and cited in scientific publications	KPI 23: Research areas where ICOS data are used	Number of research areas according to Clarivate Web of Science
				KPI 24: Usage of ICOS data in publications and number of citations of publications using ICOS data	Number of publications per year
					Cumulative number of citations
				KPI 25: Application of ICOS data in (globally leading) models (narrative)	Number and type of models that use ICOS data for calibration or validation
				KPI 26: Use of ICOS data towards support of satellite observations	Direct validation of satellite retrievals
					Validation of satellite-derived products
				KPI 27: Usage of ICOS data in educational tools and activities	Number of educational tools developed by ICOS (e.g. Jupyter notebooks)
					Number of education events using ICOS data
4.4 Active data promotion and meeting user / stakeholder expectations	The mission of ICOS, as described in the ICOS Statutes, is to facilitate research by providing data but also through other related means. Additionally, the mission is to contribute with timely information relevant to the greenhouse gas policy and decision-making (Article 2 of ICOS Statutes). Define: what does 'data promotion' mean in this context?	Aim: Actively promoted data and met user / stakeholder expectations To ask: How well is data promoted and the user / expectations met?	Elements to look at: • ICOS facilitates successfully scientific initiatives • ICOS Science Conferences successfully enable scientific exchange • Articles are published in online media / general media outlets • The RI is present in social media	KPI 28: Facilitation of scientific initiatives	Number of articles out of the ICOS-lead initiatives
					Number of authors in the articles out of ICOS-lead initiatives
				KPI 29: Enabling scientific exchange through ICOS Science Conferences	Number of Abstracts submitted to the Science conference
					Number of participants in the Science conference
				KPI 30: Engagement with social- and general media	Number of online media articles in general media outlets: Annual number of articles
					Social media presence: Number of Twitter followers
			Elements to look at:		Share of data users from private sector

4.5 Downstream private sector cooperation for ICOS data usage	The value of ICOS data and knowledge based on ICOS data increases when taken up by the private sector that develops services and solutions on climate change mitigation and adaptation.	Aim: ICOS RI cooperates with private sector / ICOS data is used by the private sector To ask: how extensively is ICOS data used by the private sector?	ICOS engages with downstream projects with private sector	KPI 31: Engagement in downstream projects with private sector	Number of projects with private sector Publications with private sector
International cooperation					
5. Integration of ICOS in European and Global GHG information systems	Being a regional research infrastructure in Europe, ICOS needs to integrate itself into a global system of greenhouse gas observation since greenhouse gases don't stop at national borders. Data and information derived from global observations are thus a common societal objective, to address "the need for an effective and progressive response to the urgent threat of climate change on the basis of the best available scientific knowledge" (Paris Agreement). Define: what does 'integration' mean in this context?	Aim: ICOS is well integrated in European and global GHG information systems To ask: How well is ICOS integrated in European and global GHG information systems?	Elements to look at: • ICOS cooperates with the main actors of the the European & global GHG information systems • ICOS participates in events of regional or global relevance • ICOS forms formal agreements (MoUs) with other RIs or organizations • ICOS has common observational sites with other RIs at country level • ICOS data is disseminated through data integration initiatives (such as GAW, FluxNet, SOCAT…) • ICOS data supports Global carbon cycle and GHG observations • ICOS is relevant in the global response to climate change	KPI 32: Cooperation with the main actors of the European & global GHG information systems	Number and intensity of cooperation projects
				KPI 33: Participation in events of regional or global relevance	Number of events participated per year
				KPI 34: Formal agreements (MoUs) with other RIs or organizations	Number of formal agreements (MoUs) with other RIs or organizations
				KPI 35: Synergies and co-locations with other RIs	Number of common observational sites with other RIs at country level
				KPI 36: Dissemination of ICOS data through data integration initiatives (such as GAW, FluxNet, SOCAT…)	Narrative, numbers in KPI 22.
				KPI 37: Global carbon cycle and GHG observations system support of climate action	
				KPI 38: ICOS' relevance in the global response to climate change	