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DIVISION OF INTERNAL OVERSIGHT SERVICES
Evaluation Office

Evaluation of the Abdus Salam International Centre for Theoretical Physics (ICTP)

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Authors:
Aitor PEREZ, Team Leader, ECOPER.
Diego BLAS, Catalan Institution for Research and Advanced Studies (ICREA) Professor, Institut de Física d'Altes Energies (IFAE).
Flavia FERNANDEZ, Quality Controller, ECOPER
Martiño RUBAL, Independent Consultant and Tracer Study Expert

Evaluation reference group members:
Jean-Pierre CAYOL, Departmental Programme Coordinator, Department of Nuclear Sciences and Applications, Office of the Deputy Director General, International Atomic Energy Agency (IAEA)
Atish DABHOLKAR, ICTP Director, UNESCO
Ralf KAISER, ICTP Head of Programmes, UNESCO
Amal KASRY, Chief of Section, Basic Sciences, Research, Innovation and Engineering Section, Natural Sciences Sector, UNESCO
Antonio MASIERO, University of Padova, member of the ICTP Steering Committee appointed by the Government of Italy
Marc MÉZARD, University of Bocconi, Chair of the ICTP Scientific Council
Alice OCHANDA. Programme coordinator and Evaluation Focal point, Executive Office, Natural Sciences Sector, UNESCO
Sandro SCANDOLO, ICTP Head of Research, UNESCO

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Acronyms

BSP	UNESCO Bureau of Strategic Planning
CCA	Computerised Content Analysis
CERN	European Organization for Nuclear Research
CMSP	Condensed Matter and Statistical Physics
Covid-19	Coronavirus
EAIFR	East African Institute for Fundamental Research
ESP	Earth System Physics
ERG	Evaluation Reference Group
FAPESP	São Paulo Research Funding Agency
FGD	Focus Group Discussion
HECAP	High Energy, Cosmology, and Astroparticle Physics
IAEA	International Atomic Energy Agency
ICTP	Abdus Salam International Centre for Theoretical Physics
IPCC	International Panel on Climate Change
IOS	Division of Internal Oversight Services
MATH	Mathematics
MoU	Memorandum of Understanding
MMP	Master of Advanced Studies in Medical Physics
NiTheCS	National Institute for Theoretical and Computational Sciences
OECD-DAC	Development Assistance Committee of the Organisation for Economic Cooperation and Development
OWSD	Organisation for Women in Science for the Developing World
PWF	Physics Without Frontiers
QLS	Quantitative Life Sciences
RegCNET	Regional Climate research network
RBM	Results-Based Management
SAIFR	South American Institute for Fundamental Research
SEIIST	Southeast European International Institute for Sustainable Technologies
SESAME	Synchrotron-light for Experimental Science and Applications in the Middle East
SDG	Sustainable Development Goals
SISSA	International School for Advanced Studies
SMR	Scientific Meetings and Research
STI	Science, Technology, and Innovation
STEM	Science, Technology, Engineering, and Mathematics
STEP	Sandwich Training Education Programme
ToR	Terms of Reference
TRIL	Training and Research in Italian Laboratories
TWAS	The World Academy of Sciences
UIS	UNESCO Institute for Statistics
UN	United Nations
UNEG	United Nations Evaluation Group
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNESP	São Paulo State University

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Abstract and Acknowledgements

Abstract

The International Centre for Theoretical Physics (ICTP) is a high-level research centre based in Trieste, Italy dedicated to fostering theoretical physics and mathematical science. Created in 1964, by the Pakistani Physics Nobel Prize laureate, Doctor Abdus Salam, it is geared towards (i) enabling world-class scientific research, (ii) building the capacity of young scientists in the developing world through postgraduate and advanced study programmes, and (iii) advocating for international cooperation in science. As 2024 marks ICTP's 60th anniversary, this evaluation aims to assess the relevance and effectiveness of ICTP in achieving its objectives along these three pillars over the 2012-23 period. Its purpose is to showcase ICTP's successes whilst also drawing lessons from the past 10 years to help improve the centre's effectiveness.

Building on the evidence drawn from interviews with ICTP staff, students, and partners, a tracer study of all former ICTP attendants, as well as bibliometrics and web data analysis – the evaluation team found that ICTP remains highly relevant and unique as a centre that contributes to lessening the knowledge and capacity gap in science between the global North and the global South. The Associates Programme namely has enabled ICTP to maintain a strong relationship with its scientists over years, which has contributed to building and fostering the emergence of scientific hubs within countries whilst limiting the effects of brain drain. Recognised as a high-level institution by both its partners and students, research at ICTP has contributed to significant scientific breakthroughs and fostered innovation in its respective areas of work, setting it on par with similar high-level research institutions. The Centre's contributions to its third pillar remain unclear, with the evaluation having noted more variable contributions towards growing science at the grassroots level.

Acknowledgements

The Division of Internal Oversight Services (IOS) Evaluation Office and the Ecoper evaluation team would like to acknowledge and thank all those who participated in and contributed to this evaluation. The Ecoper evaluation team consisted of Dr. Aitor Pérez, Team Leader, Dr. Diego Blas, theoretical physics expert, Dr. Martiño Rubal, tracer study expert, and Ms. Flavia Fernández, Quality Controller. On behalf of IOS, the evaluation was managed by Ms. Taipei Dlamini, Evaluation Specialist, with the support of Mr. Alfonso Gonzalez Montesinos, Evaluation Consultant. An Evaluation Reference Group (ERG) composed of representatives from ICTP, the UNESCO Natural Sciences Sector, the government of Italy, and the International Atomic Energy Agency (IAEA) provided guidance and feedback throughout the evaluation process, further strengthening the quality assurance of the evaluation. The evaluation team is particularly grateful to ICTP Director, Dr. Atish Dabholkar, for hosting the evaluation missions at ICTP's premises in Trieste, Italy in May and July 2024, and Ms. Joanna Lacey, Executive Assistant, for her support in coordinating and facilitating these evaluation missions. We further thank all interviewees, as well as all survey respondents for their inputs.

Bernardin Assiene
Director of the Division of Internal Oversight Services

Executive summary

1. The International Centre for Theoretical Physics (ICTP), established in 1964 by Nobel Laureate Abdus Salam in Trieste, Italy, is dedicated to advancing scientific research, fostering international collaboration, and building scientific capacity globally. It was initially run by the IAEA and later administered by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) from 1995 onward. ICTP was designated a UNESCO Category 1 Institute in 2005. Its mission aligns with the United Nations (UN) Sustainable Development Goals (SDG), focusing on research in advanced theoretical physics and mathematics, capacity-building through various educational and career development programmes, and promoting international scientific cooperation. ICTP operates under a tripartite agreement between the Italian Government, IAEA, and UNESCO, with a biennial budget of 54 million USD and a staff of 161 members. The Centre's governance includes a Steering Committee, Scientific Council, and Directorate.

2. The evaluation report underwent a quality assurance process, with revisions made by the evaluation team and the Evaluation Reference Group (ERG). The report adheres to United Nations Evaluation Group (UNEG) guidelines and is aligned with the UNESCO Evaluation Manual, detailing objectives, methods, findings, and recommendations for ICTP's continued excellence and impact. The report, which is to be submitted to the UNESCO Executive Board in Spring 2025, reviews ICTP's strategy for 2020-24 and aims to inform the development of a new strategy for 2025-29.

3. The evaluation's objectives are to enhance accountability and learning by assessing its achievements from 2012 onwards and providing evidence-based recommendations for future programming. It evaluates the relevance of ICTP's programmes to developing countries' needs and UNESCO's priorities – with an emphasis placed on UNESCO's two global Priorities: Africa and Gender Equality –, the coherence of its activities within the UNESCO Natural Sciences Sector, the effectiveness of its capacity-building, research, and advocacy initiatives, the impact and sustainability of its efforts, and the efficiency of its resource management. The evaluation criteria include questions grouped into several categories: relevance, coherence, effectiveness, efficiency, impact, and sustainability, each tailored to assess ICTP's alignment with global and institutional needs, its integration within UNESCO, its achievement of objectives, resource management, contribution to scientific and societal advancements, and long-term viability.

4. The methodology was designed based on the Terms of Reference (ToR) issued by UNESCO's Division of Internal Oversight Services (IOS) and feedback from the ERG. It employed a mixed methods approach, ensuring reliability through the triangulation of various information sources. These methods included a desk review, two field missions to ICTP in Trieste, semi-structured interviews, focus group discussions (FGDs), a tracer study of ICTP students and fellows since 2012, a bibliometric analysis of administrative data covering 162,549 applications from 2013-2023, and web content analysis.

The findings of the evaluation, as grouped into the evaluation criteria categories are summarised as follows:

Relevance

5. ICTP's mission and foundational principles of excellence, inclusion, and international cooperation remain highly relevant to the needs of developing countries, as the North-South capacity gap persists, and new technological challenges and opportunities arise. ICTP addresses challenges faced by scientists in the Global South, such as lack of international collaborations and research infrastructures. The Centre's focus on scientific excellence and its international dimension attract students from developing countries, confirming the relevance of its model.

6. In addition to addressing geographic barriers to scientific excellence in the developing world, the Centre's direction and staff constantly look at other barriers that hinder talented people's access to scientific research, including gender inequalities. ICTP promotes science equality, ensuring that global talent can contribute regardless of background. The Centre has implemented various initiatives to promote gender equality and has formalised its commitment to align with UNESCO and European Commission (EC) gender strategies.

Coherence

7. ICTP exemplifies UNESCO's mission in the field of science. However, its uniqueness as a scientific research centre, along with communication issues, have hindered its full integration into the UNESCO Natural Sciences Sector. ICTP aligns its strategic goals with UNESCO's mission, focusing on developing countries and promoting inclusive science, but there is room to further highlight UNESCO's role in ICTP communications to reinforce the Centre's connection with UNESCO's broader mission.

8. UNESCO Headquarters and ICTP informants did not provide examples of direct collaboration between ICTP and the UNESCO Education Sector, but opportunities in the areas of science literacy, women in STEM, and the building and monitoring of higher-education capacities exist. ICTP staff perceive their work as complementary but different from UNESCO's, as they have little knowledge about the work UNESCO does in higher education. There is potential for closer collaboration in outreach activities related to science literacy and the promotion of women in STEM.

Effectiveness

9. ICTP's staff and stakeholders are satisfied with the Centre's performance but recognise the need to better define and monitor effectiveness and impact, as well as ICTP's work along its third pillar on advocacy. ICTP is a recognised centre of excellence and provides many examples of impactful research. The quality of research at ICTP is globally recognised and comparable to top universities and research centres. ICTP's academic excellence is illustrated through prestigious grants, publications, and citations. ICTP has reached a global scope with highly satisfactory programmes that grow scientific networks in developing countries and expose them to the highest standards of research. ICTP received thousands of visitors annually, with a growing trend in geographic diversity. The Centre's educational and career development programmes are highly regarded, fostering international collaboration and helping overcome scientific isolation in developing countries.

10. ICTP's collaboration modalities include Partner Institutes, Affiliated Centres, and Research Networks, each supporting scientific endeavours in developing countries. While ICTP has been successful in most of its collaboration modalities, there have been mixed results with Partner Institutes. Once again, it remains unclear how these collaborations contribute to ICTP's advocacy pillar.

11. ICTP's activities display positive trends in gender balance. This is acknowledged and highly appreciated by both male and female participants. ICTP's proactive gender strategy has shown progress in women's representation in its programmes, and both male and female participants provided positive feedback on ICTP's commitment to gender equality. However, gender balance needs to be further reflected in the composition of ICTP's research staff.

Impact

12. Some ICTP research areas like Earth System Physics and Quantitative Life Sciences have direct societal benefits and contribute to the SDGs. However, ICTP's primary function is to foster fundamental science, which enables long-term technological progress. Although this only generates impact in the long term, fundamental, theoretical physics is at the core of ICTP's mandate and remains ICTP's priority.

13. ICTP has a positive impact on the careers of developing countries' scientists who, to a large extent, return to their home countries, mitigating brain drain and enhancing local scientific communities. ICTP's programmes and activities significantly impact developing countries by advancing scientists' careers and contributing to local scientific communities.

Efficiency

14. ICTP has a stable and relatively high level of core funding, mainly provided by the Government of Italy, and is seeking to diversify its funding sources to maintain activity levels amidst increased inflation. The Centre has also demonstrated efficiency in providing high-quality study and research conditions. ICTP is attracting and retaining top-level researchers and scientists with a competitive pay and compelling mission. The Centre also collaborates with Italian higher education institutions and local hospitals to overcome limitations, enhance its efficiency and enable practical training.

15. ICTP offers different networking modalities with different implications for ICTP's limited staff. While these partnerships are beneficial, they demand significant administrative efforts. Partners for example tend to demand more support for their activities in the Global South. The IAEA and ICTP leverage cooperation opportunities, frequently collaborating on activities of mutual interest, while the relationship between ICTP and UNESCO is mainly administrative with limited strategic collaboration. ICTP projects its commitment to equality by attaining gender balance in its scientific committee and new research staff hires. Its management emphasises inclusiveness, with a significant share of funding allocated towards programmes for scientists from developing countries.

Sustainability

16. The Centre's significant programme and participant expansion during the last decade, along with inflation and infrastructure maintenance costs have put some pressure on its core funding. The Centre is seeking external funding and implementing efficiency measures to address these challenges. Ongoing strategic reflections at ICTP focus on the Centre's financial sustainability, its contribution to 'open science,' and projects for developing countries supported by a long-lasting agreement with its governing partners.

Based on the findings, the evaluation team reached the following conclusions:

17. Sixty years after its establishment, ICTP's mission and approach remain relevant to developing countries. ICTP is a centre of international excellence and is unique in its openness and dedication to scientists from the Global South. The Centre is proactively managed, demonstrating its capacity to adapt to emerging challenges and opportunities such as artificial intelligence, quantum computing, or climate research. Its capacity-building programmes effectively reach a global scope and provide talented male and female scientists with career opportunities that cannot be found in their home countries. Nevertheless, the Centre's impact on developing countries could be better monitored to further enhance the ICTP's ability to achieve its strategic goals along the three pillars of its mandate: excellent scientific research, capacity-building and international cooperation.

18. Focusing on the international cooperation pillar, ICTP facilities located in Trieste operate as a global scientific hub which is highly appreciated by students and scientists for its scientific and cosmopolitan value. Moreover, ICTP has demonstrated a strong capacity to deploy networks in developing countries that amplify its support to local scientific communities, both at training and research levels. There is a growing demand for more on-the-ground activities jointly organised by ICTP and its partners in developing countries. However, these activities incur higher costs for ICTP staff compared to those held in Trieste. The most ambitious collaboration model, the ICTP Partner Institutes, has yielded mixed results. Conversely, the Senior Associates Programme, which does not have such institutional implications, is effectively functioning as an international cooperation network, contributing to capacity-building in local scientific communities.

19. According to ICTP's mission statement, the international cooperation pillar includes an advocacy dimension. Despite some interesting ad hoc examples provided by ICTP's staff on the Centre's science diplomacy and influence on national governments, this dimension has neither been precisely defined nor planned. ICTP's goals and achievements are not clearly positioned within UNESCO's broader programming, and the UNESCO brand, mission, and organisation are not well known to ICTP participants. Additionally, ICTP's strategic planning is carried out with little involvement from UNESCO. Both parties recognise that strategic

cooperation has not been systematically sought in the past and acknowledge the need for improved communication and mutual understanding to attain closer collaboration and synergies.

20. The review of strategic documents and interviews with management staff reveal that these collaboration opportunities may arise in areas like the advocacy and international cooperation, science literacy, and the building and monitoring of higher education capacities. Moreover, ICTP can be showcased as a UNESCO capacity-building model that could be replicated in other higher-education and research areas. Any expansion made to the Centre, such as working towards closer cooperation with UNESCO or executing clearer action in the advocacy pillar, will require extra funding as the Centre's activities have expanded significantly, and core financing has been eroded by inflation. Such resources may require leveraging external funding and other partnerships, in line with ongoing efforts by ICTP's management.

ICTP Evaluation - Management Response

Recommendations	Management response
Recommendation 1: ICTP should enhance its strategic planning and monitoring by systematically measuring the impact of its educational and career development programmes on developing countries. Addressed to: ICTP Director with the support of BSP Time frame: December 2025	**ACCEPTED** ICTP accepts the recommendation and will continue to build on its monitoring framework and tools in order to measure the impact of its educational and career progression programmes in developing countries. ICTP will collaborate with BSP UNESCO for the implementation phase. Guidance will be sought from BSP on monitoring tools which can be utilized for this purpose. ICTP already has legacy systems (Sigma for example) in place for collecting and reporting data on research, training and outreach activities. ICTP is working on enhancing the collection of data in particular on alumni careers for improved measuring of impact by conducting tracer studies and surveys to collect metrics.
Recommendation 2: ICTP and the UNESCO Natural Sciences Sector should refine ICTP's third pillar on international cooperation and advocacy. Addressed to: ICTP Director and ADG/SC Time frame: December 2025	**ACCEPTED** ICTP is available to work closely with the UNESCO Science Sector to make its network available to UNESCO's partners to disseminate the ICTP model. ICTP can work towards the creation of a flagship project that advances joint action in ICTP's third pillar and serves the Science Sector's mission in concrete countries or regions, for instance through the ICTP Associates programme, Physics without Frontiers Programme and Postgraduate Diploma Programme to enhance the capacity building dimension. ICTP hosts UNESCO-TWAS on its campus in Trieste and regularly collaborates in scientific exchange and activities to promote the importance of basic sciences in enhancing decision-making capabilities and promoting sustainable development.
Recommendation 3: ICTP should set a localisation plan aimed at deploying an increasing number of activities in the Global South, with a focus on underrepresented regions Addressed to: ICTP Director with the support of the Executive Office of the Natural Sciences Sector and UNESCO field offices Time frame: December 2025	**ACCEPTED** ICTP is fully aware of the decrease in the number of external activities taking place in developing countries due to a decrease in funding. ICTP will consider the effectiveness of current mechanisms, priorities within the core funding, and the opportunities of partnerships and funding, in determining how best to amplify the benefits of ICTPs model in the Global South. Based on the experiences and outcomes of ICTP's current partner institutes, ICTP will streamline its efforts in strengthening the institutes and work towards a localisation plan. Affiliated centres can be used as a mechanism to consider an upgrade as future partner institutes. Resource mobilization will be undertaken in collaboration with Science Sector. ICTP will contact Field Offices of UNESCO and invite them to enter into partnerships in organising scientific activities (ICTP External Activities and ad hoc scientific events) in their respective regions. This should include partnership in designing, funding and executing the planned activities to open new avenues for collaboration. The support of the Executive Office of the Natural Sciences Sector will be required to support communication and networking.

Introduction

1. Established in 1964 by Pakistani Physics **Nobel Prize Laureate, Abdus Salam**, the International Centre for Theoretical Physics (ICTP) is a research institution situated in Trieste, Italy.[1] The Centre is dedicated to fostering scientific research, facilitating international collaboration, and building scientists' capacities worldwide. It primarily concentrates on advanced theoretical physics and mathematics, extending their applications to climate, materials, life, and other related sciences. The International Atomic Energy Agency (IAEA) supervised the establishment of ICTP until the United Nations Educational, Scientific, and Cultural Organization (UNESCO) assumed its administration in 1995. In 2005, UNESCO designated it as a 'Category 1' Institute[2], I.e. a centre, bound by UNESCO's rules and regulations, that has been granted functional autonomy.[3]

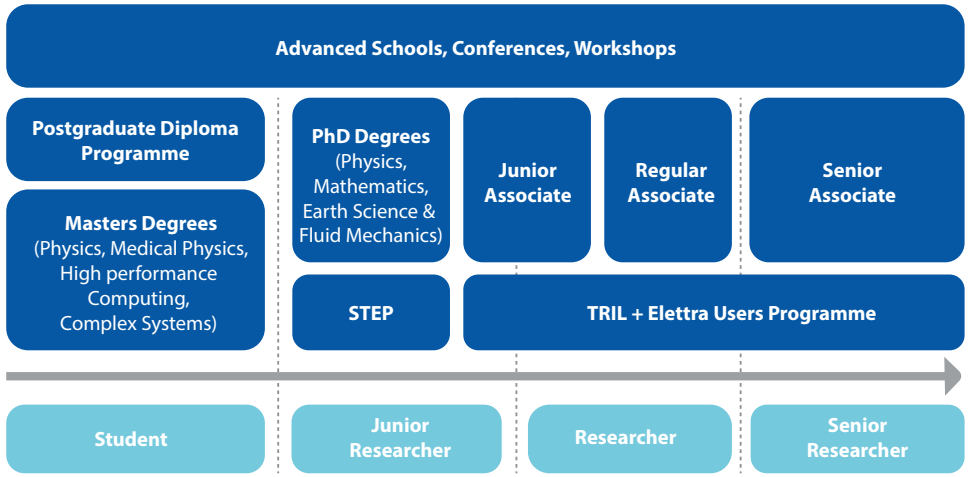
2. ICTP's **mission** is formulated as a three-fold mandate committed to the United Nations' (UN) Sustainable Development Goals (SDG), comprising research in frontier areas of science, building scientific capacity and supporting excellence in the developing world, and fostering scientific international cooperation and advocacy. These three interlinked and equally important goals are referred to as the three pillars of ICTP.[4]

3. The **research pillar** is organised in six sections: High Energy, Cosmology, and Astroparticle Physics (HECAP), Condensed Matter and Statistical Physics (CMSP), Mathematics (MATH), Earth System Physics (ESP), Quantitative Life Sciences (QLS), and Science, Technology, and Innovation (STI).

4. Under the **capacity-building pillar,** ICTP offers educational and career development programmes that attract many scientists and students from developing countries at different stages of their careers (see Figure 1). Educational programmes include the Postgraduate Diploma Programme, three Master's Degree programmes, three PhD programmes, the Sandwich Training Educational Programme (STEP), the Training and Research in Italian Laboratories (TRIL) programme and a Fellowship Programme for international PhD students to attend ICTP for up to six months per year over the course of their 4-year PhD programme. Career development programmes include the Associate Programme, which offers research opportunities for professional scientists based on regular visits to the Centre and joint research over 3 to 6 years, laboratory opportunities, and postdoctoral programmes.

1 ICTP | Who We Are
2 UNESCO's Category 1 Institutes are those which build scientific capacity in Member States, particularly in developing countries.
3 UNESCO, Executive Board, 171st session, Report by the Director General on the revised and completed principles and guidelines regarding the establishment and operation of UNESCO institutes and centres (Category 1) and institutes and centres under the auspices of UNESCO (Category 2), March 2005. Functionql autonomy is defined as follows: "Functional autonomy means that the institutes and centres are given sufficient delegated authority and flexibility to carry out their mandate fully and effectively {…} in particular, functional autonomy allows the entities concerned to respond more flexibly to requests and to attract funds which may not otherwise have been directed to UNESCO. Functional autonomy should not translate into general rules applicable in all cases, but rather allow the design of diversified approaches {…} while recognising the need for shared standards in matters related to accountability, transparency, management principles, and reporting practices."
4 ICTP | Our Mission

Figure 1. Overview of ICTP educational and career development programmes



Source: Evaluation Terms of References (ToR).

5. Under the **international cooperation and advocacy pillar,** ICTP has established partnerships and networks around the world through Partner Institutes, Affiliated Centres, research networks, and joint collaborative activities aimed at developing science in the developing world.

6. Today, ICTP operates under a **tripartite agreement** between the Italian Government, the IAEA, and UNESCO, ratified by the Italian Parliament in January of 1995. Decisions on ICTP are made through the following bodies:

   - **Steering Committee**: ICTP's Director and a representative from each of the three governing partners set general guidelines for the Centre's activities, determine budget levels, and consider the Director's proposals on programmes, work plans, and financial plans.
   - **Scientific Council**: thirteen distinguished scientists, including several Nobel Prize laureates and Fields medallists, advise ICTP's programmes while considering worldwide academic, scientific, and educational trends that are relevant to the Centre's objectives.
   - **Directorate**: The Director is responsible for all scientific and administrative aspects of the Centre, working closely with a Senior Coordinator of ICTP's Research Division, a Senior Coordinator of Programmes and Advancement, and a Special Advisor on Operations.

7. ICTP's biennial **budget** amounts to 54 million USD. This includes contributions from the Italian government amounting to 47 million USD, 5 million USD from the IAEA, and 1 million USD from UNESCO. The remaining 2 million USD are sourced from Voluntary Contributions from various entities.

8. ICTP has a **staff** of 161 members, including 45 permanent faculty members. Additionally, there are 236 non-staff contract-holders each year, comprising research fellows, students, and consultants. Over the years, ICTP has leveraged support from a large **network of scientific institutes** with which it cooperates regularly to favour scientific research and exchanges. These include:

   - **Italian universities** (e.g. University of Trieste), which collaborate through research, education, and by accrediting joint programmes
   - Regional ICTP Partner Institutes
   - ICTP Affiliated Centres
   - Research networks
   - The Physics Without Frontiers (PWF) volunteer network

9. This **evaluation report** has been organised according to the UNESCO Evaluation Manual as follows: Section 1 indicates the objective of the evaluation, intended use, and users. Section 2 presents the evaluation questions and explains the evaluation methods used to answer them. It also describes the quality assurance and data triangulation processes. Then, the Findings section provides evidence-based answers to the evaluation questions, followed by supporting evidence and analysis. The report then concludes with a higher-level assessment and explanation of the Centre's performance, with three recommendations for improvement.

1. Evaluation objective and scope

10. The evaluation aims to promote **accountability and learning,** assessing achievements from 2012 onwards and providing evidence-based recommendations for ICTP's future programming. The evaluation assesses the relevance of ICTP's programming to developing countries and UNESCO's priorities, the coherence of its programming within the UNESCO Natural Sciences Sector, the effectiveness of its capacity-building, research, and advocacy initiatives, the impact and sustainability of its activities, and the efficiency of its resource management (see Box 1).

Box 1. Evaluation criteria: standard definition and customisation to ICTP

Relevance	**Is the intervention doing the right things**? Relevance is defined as the extent to which the intervention objectives and design respond to: beneficiaries; global, country, and partner/institutional needs; policies; and priorities; and continue to do so if circumstances change. In this case, the evaluation will assess the extent to which ICTP's mission and programme design remain relevant to developing countries and UNESCO Global Priorities.
Coherence	**How well does the intervention fit?** Coherence measures the compatibility of the intervention with other interventions in a country, sector, or institution. This evaluation will focus on ICTP's coherence within UNESCO.
Effectiveness	**Is the intervention achieving its objectives?** Effectiveness is defined as the extent to which the intervention achieved, or is expected to achieve, its objective and results, including any differential results across groups. This evaluation will look at the achievement of ICTP's goals across its three pillars.
Efficiency	**How well are resources used?** Efficiency measures the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way. In this case, the evaluation will look at how ICTP manages key resources like scientific funding, scientific talent, and networks.
Impact	**What difference is the intervention making?** Impact measures the extent to which the intervention has generated or is expected to generate significant positive or negative, intended or unintended, higher-level effects. According to ICTP's mission, ICTP's impact is defined as contribution to scientific breakthroughs, societal benefits, and the development of scientific communities in the developing world.
Sustainability	**Will the benefits last?** Sustainability measures the extent to which the net benefits of the intervention continue or are likely to continue. This evaluation will assess ICTP's mechanisms and frameworks to ensure the long-term delivery of its mandate.

Source: Based on the Development Assistance Committee of the Organisation for Economic Cooperation and Development's (OECD-DAC) standards and ToR.

11. The **main users** of this evaluation are ICTP's Senior Management, the UNESCO Natural Sciences Sector, the ICTP Steering Committee, and the ICTP Scientific Council. Secondary users are UNESCO Member States, associated networks, and the general public.

12. ICTP was last **evaluated in 2011** by the Evaluation Office of UNESCO's Division of Internal Oversight Services (IOS). At the request of the Natural Sciences Sector, the current evaluation was included in the IOS's corporate biannual evaluation workplan for 2024-2025. The evaluation report will be submitted to the UNESCO Executive Board in Spring 2025. Its results are likely to be integrated in the review of the ICTP strategy for 2020-24 and the elaboration of a new strategy for the 2025-29 period.

13. The evaluation covers the 2012-2023 period and the full scope of ICTP's activities along its **three pillars**.

14. The evaluation adhered to the United Nations Evaluation Group (UNEG) and UNESCO guidelines[5] and was **sensitive to UNESCO's Global Priorities: Priority Africa and Gender Equality**, which were considered when selecting interviewees and participants for focus group discussions (FGDs) and during data analysis.

15. In line with the principles of a **utilisation-focused evaluation**, the IOS and the evaluation team sought participation from evaluation users. The evaluation methodology and workplan was discussed with the ERG, and the survey questionnaire for the tracer study was tested with ICTP staff and students prior to being disseminated.

16. The thematic scope of the evaluation was set through dialogue with the ERG by adopting a list of 19 **evaluation questions** grouped under the standard OECD-DAC evaluation criteria. (see Table 1).

17. The draft evaluation report was shared with the **Evaluation Reference Group** (**ERG)** for their input. Afterwards, the main findings and tentative recommendations were presented to them and discussed during a validation workshop in September 2024 to ensure understanding and ownership of the process.

5 Including UNEG's Norms and Standards for Evaluation, Ethical Guidelines for Evaluation, and Integrating Human Rights and Gender Equality in Evaluation, as well as the UNESCO Evaluation Policy and UNESCO Evaluation Manual.

Table 1. Evaluation criteria and questions

Criterion	EQ	Questions	Findings[I]
Relevance (R)	R1	How relevant is ICTP's programming to the needs of **developing countries**, including scientists' needs and societal needs?	1
	R2	To what extent does ICTP's programming advance UNESCO's **Global Priorities on Gender Equality and Africa**?	2
Coherence (C)	C1	How does ICTP **add value to UNESCO**'s Natural Sciences Sector and complement the Basic Sciences Division?	3
	C2	How does ICTP's programming integrate **intersectoral approaches**, namely on science and education?	4
Effectiveness (E)	E1	What is the degree of **achievement of ICTP's stated objectives** along the three pillars: scientific research, capacity-building, and science advocacy?	5
	E2	To what extent is the **scientific research** undertaken at ICTP impactful and recognised? What fields has it contributed to?	6
	E3	How effectively has the ICTP capacity-building pillar addressed **scientists' needs**?	7
	E4	How effective has ICTP's outreach strategy been in terms of expanding **ICTP's influence worldwide** and enhancing developing countries' capacities, particularly in Africa?	8
	E5	To what extent has ICTP encouraged and supported the increased **consideration of women scientists along its three pillars**?	9
	E6	What are ICTP's **strengths and weaknesses** along its three pillars?	10
Efficiency (F)	F1	How are **human and financial resources** managed to ensure efficiency?	11
	F2	How successful is ICTP in **attracting and retaining** top-level researchers and scientists from around the world, as well as leveraging funding and partnerships to support research activities?	12
	F3	What processes and mechanisms does ICTP have in place to ensure effective **collaboration, knowledge-sharing, and networking** among researchers, alumni, and partner institutions?	13
	F4	To what extent does ICTP interact with the **IAEA and UNESCO's Naturals Sciences Sector** for programme coordination, and leverage cooperation opportunities and synergies with other UNESCO entities?	14
	F5	To what extent has ICTP ensured that its advisory bodies are gender-responsive and its research and capacity-building **activities are inclusive**, including for people with disabilities?	15
Impact (I)	I1	What evidence is there of ICTP's contribution to **scientific breakthroughs, policy development, and societal benefits** resulting from its research?	16
	I2	Has ICTP fostered the development and enhancement of **science in developing countries**? If so, how is this manifested?	17
Sustainability (S)	S1	Does ICTP have mechanisms in place to enable the **sustainable use of its resources** and infrastructure?	18
	S2	Has ICTP put in place a **sustainability framework** to enable its continuity and ensure a long-term delivery of its mandate?	19

I Responses to the evaluation questions are provided in the Findings section, which grouped by criterion and question and follow this order. Findings related to Question E6 are not presented in a specific section but distributed across different questions and criteria.

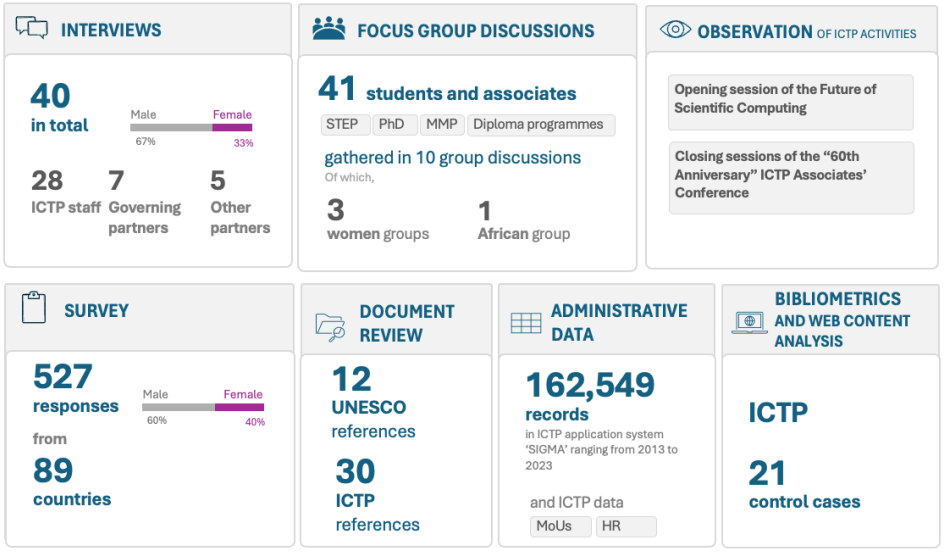
2. Methodology

2.1. Methods and sources

18. The evaluation plan was **designed** by the evaluation team, building on the Terms of Reference (ToR) issued by UNESCO IOS and considering the feedback provided by the ERG.

19. From a methodological standpoint, the evaluation followed a mixed methods approach and sought reliability by **triangulating different sources** of information. Evaluation methods included desk review of ICTP documents and administrative data, two field missions to ICTP premises in Trieste, semi-structured interviews, focus group discussions (FGDs), a tracer study targeting all ICTP students and fellows since 2012, bibliometric analysis, and web content analysis. This combination of techniques allowed for a broad and participatory evidence base, as presented in the following figure.

Figure 2. Evaluation methods and sources



20. Considering the selected methods and available sources, the evaluation was organised into eleven tasks with different **data collection tools** (see Annex VII). These tools included: interview questionnaires for ICTP staff, governing partners, and other partners; questionnaires for FGDs with students and associates; lists of indicators for administrative data analysis, web content analysis, and bibliometrics; and a multilingual online tracer study (i.e. survey questionnaire). The survey questionnaire was supported with the online platform Alchemer, bibliometric analysis with Inspire, web content analysis with Google advanced search, and geographic visualisation of ICTP outreach with Flourish.

2.2. The evaluation process and limitations

21. Following the review of institutional documents listed in Annex II, two members of the evaluation team and two members of IOS conducted a 5-day **mission to ICTP** in Trieste in May 2024. Interviews were arranged with ICTP staff, members of their Scientific Council and Directorate, and representatives from Italian partner institutions. The mission coincided with an ICTP symposium which allowed for the evaluators to observe ICTP activity sessions. A second mission to ICTP was conducted by one member of the evaluation team and one member of IOS in early July 2024 for further data collection, and to observe the yearly Associates Conference. The evaluators and IOS conducted additional **online interviews** targeting governing partners and other ICTP partners.

22. ICTP provided the evaluators with different sets of **administrative data,** including data on applications and admissions extracted from the SIGMA database system by the Information and Communications Technology Unit (see Annex VII). This data covered the 2013-2023 period and comprised 162,549 applications, of which 54,547 were admitted and resulted in participation in ICTP activities. The database included 23 types of activities which were clustered in two broad categories: short-term activities (visits, workshops, conferences, etc.) and long-term programmes (Diploma, Master, PhD, STEP, TRIL, and Associates).

23. An **online survey questionnaire** targeted cohorts from 2013 to 2023 for all ICTP long-term programmes except the Associates one, forming a total target group of 1,327 beneficiaries. The questionnaire was first tested through in-person meetings during the first mission to ICTP, and then sent via email and shared on ICTP's social media and website.[6] The survey was open for 2 weeks in June 2024 and was available in English, French and Spanish. Responses amounted to 527 respondents, yielding a response rate of 40%.

24. As part of ICTP's research performance analysis, the evaluators **compared ICTP bibliometric data** with that of other centres of excellence, identified as such by the ICTP sections themselves (see Annex VII. D. Bibliometrics). These same control cases were used for a **comparative web content analysis** focused on frequencies of key terms related to gender and developing countries.

25. The evaluation benefitted from free access to information and collaboration from all stakeholders, namely ICTP's Directorate and staff. Some **limitations** were found during the implementation of certain evaluation tasks, but these did not challenge its reliability. Limitations included: the lack of an up-to-date census of former students, which was overcome with the advertisement of the survey through ICTP's social media; a bias of the selected bibliometric database towards theoretical physics in detriment of applied research sections; and incomplete gender data in applications and admissions between 2013 and 2016. As for the web content analysis, the evaluation team initially intended to measure the salience of developing countries in ICTP with Big Data algorithms, allowing for breakdown by region and country. However, the algorithms failed to scrap most of the control cases' webpages.

2.3. Quality assurance

26. Data collection was guided by eleven questionnaires, one per evaluation task, with each questionnaire item connected to an evaluation question within a matrix (for the full matrix, see Annex V). During data collection, the **evaluation matrix** was used to keep track of the triangulation of sources for each evaluation question, as presented in Table 2.

27. The selection of participants for interviews and focus groups covered the six ICTP research sections, different programme levels (diploma, PhD, and postdoctoral), and different types of partners. Specific FGDs were convened with women and African scientists. This report was elaborated according to the **UNESCO Evaluation Manual**, subject to review and edition by a quality controller from the evaluation team, and further revised by the ERG and IOS.

6 ICTP | Measuring ICTP's Impact

Table 2. Triangulation of sources

Number of items in each evaluation tool that inform each evaluation question.

Criterion	EQ#	EQ key	1. Document review of ICTP files	2. Review of institutional documents	3. Administrative data analysis	4. Bibliometrics	5. Tracer study	6. Interviews with governing partners	7. Interviews with ICTP staff	8. Interviews with partners	9. Interviews with heads of centres	10. Focus groups with ICTP end users	11. Big Data	Total
Relevance	R1	Response to needs		1	1			2	1	1				6
	R2	Gender and Africa		1	1			1						3
Effectiveness	E1	Achieved objectives		1				1						2
	E2	Research performance	4			3	2		1		1	1		12
	E3	Educational performance			1		2	1	1			1		6
	E4	Advocacy performance		1	1		1	1	1	1		1	5	12
	E5	Women scientists		1			1	1	1			1	2	7
	E6	Strengths and weaknesses					4	1	1	1	1	1		9
Efficiency	F1	Human and financial resources			1		1	1	1		1	1		6
	F2	Attracting and retaining top scientists	1				1	1	1		1	1		6
	F3	ICTP networks	1	1			2	1	1	1		1		8
	F4	Governing partners		1				1						2
	F5	Inclusiveness		1				1	1		1			4
Sustainability	S1	Sustainable management	1	1				1						3
	S2	Sustainability framework	1	1				1						3
Coherence	C1	Sector coherence		1			1	1						3
	C2	Intersectoral approaches		1				1						2
Impact	I1	Real-world impact				1	1	1	1			1		5
	I2	Developing countries	2	1		2	3	1	1	1		1		12
Total			**10**	**13**	**5**	**6**	**19**	**19**	**12**	**5**	**5**	**10**	**7**	**111**

Source: Evaluation matrix and tools (see Annex V and Annex VII).

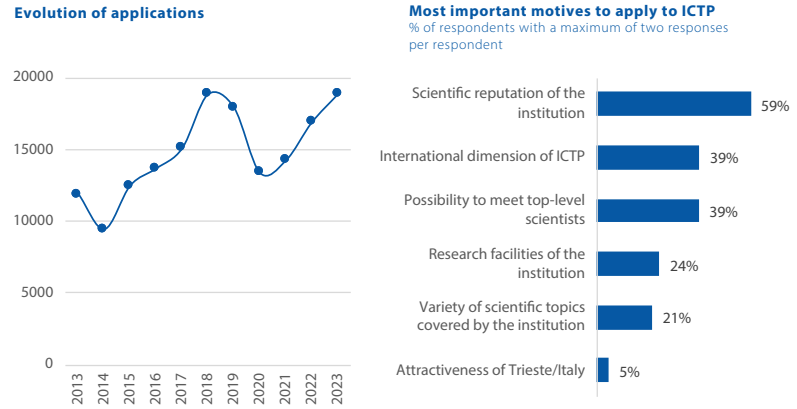
3. Findings

3.1. Relevance

Finding 1. ICTP's mission and foundational principles of excellence, inclusion, and international cooperation remain highly relevant to the needs of developing countries, as the North-South capacity gap persists, and new technological challenges and opportunities arise.

28. When ICTP's Directorate and research staff describe the logic and relevance of the centre's various programmes, they frequently recall Abdus Salam's **founding vision.** While ensuring the highest standards for scientific excellence, ICTP addresses challenges that scientists in the Global South continue to face, like the absence of international collaborations, research ecosystems, and computational infrastructures. Students from the Global South increasingly apply to ICTP motivated by its scientific excellence and international dimension (see Figure 3), which confirms the validity and relevance of the ICTP model. Additionally, in response to a tracer study open question on the Centre's added value, the most recurrent topic in former students' responses was ICTP's openness to the Global South (see Annex VI. Question 30).

Figure 3. Students from developing countries are most attracted to ICTP's research excellence and international dimension



Source: SIGMA (Annex VII) and Tracer Study (see Annex VI. Question 12, n=292).

29. According to all evaluation informants, including representatives from other research centres, ICTP's focus on developing countries and inclusiveness makes it a **unique institution** among centres of scientific excellence. Staff from ICTP, Partner Institutes, and Italian partners indicate that this is a compelling case for working at and collaborating with ICTP, and for solidifying support from non-research partners.

30. ICTP is committed to being at the forefront of technology and innovation, playing an active role in emerging fields such as artificial intelligence and internet applications growth, which risk increasing the North-South scientific divide.[7] It also leverages technological innovation to address these risks with strategic initiatives like the International Consortium for Quantum Computing, promoting 'open science' in this traditionally restrictive field. While ICTP has expanded into applied sciences, such as ESP and QLS, which are highly relevant to the SDGs, its focus remains on research in **fundamental sciences**, understanding that "today's science is tomorrow's technology."[8]

7 Indeed, the latest data from the UNESCO Institute for Statistics (UIS) reports capacity differences ranging from 25 scientists per million inhabitants in Guatemala, compared to 9,000 per million inhabitants in South Korea. In regional averages, the largest gap is between Sub-Saharan Africa (173 scientists per million inhabitants) and Europe and North America (3,879 per million inhabitants).

8 ICTP | Our Mission

Finding 2. In addition to addressing geographic barriers to scientific excellence in the developing world, the Centre's direction and staff constantly look at other barriers that hinder talented people's access to scientific research, including gender inequalities.

31. ICTP's strategic documents and webpage insist on the concept of **science equality** and the Centre's commitment to harness global talent – irrespective of geographical origin, gender, class, or ethnic background – to remove all factors that may hinder talented scientists from the developing world from contributing to scientific discourse.[9]

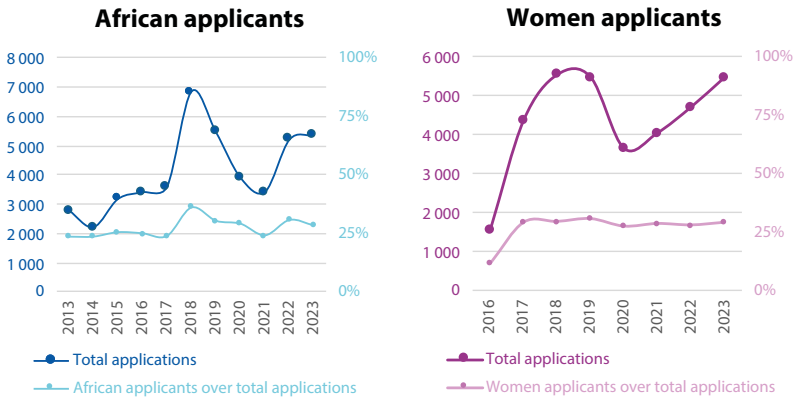
32. With regards to gender, ICTP recognises **prevalent gender imbalances in sciences** and is committed to fostering change.[10] The Centre began tracking the gender of applicants in 2002,[11] and since then, has carried out communication activities that promote gender equality in science. These activities include the celebration of the International Day of Women and Girls in Science, the Career Development Workshop for Women in Physics,[12] and the inclusion of female figures in ICTP success stories and communication materials. In 2024, the Centre further formalised its commitment to gender equality by adopting a plan to align with the UNESCO Gender Strategy and the policies of the European Commission (EC) for the promotion of gender equality in research and innovation.[13]

33. Unlike gender, **Africa is not subject to specific planning and monitoring**, but the region is included in ICTP's broader focus on the developing world. Concrete examples of engagement in Africa include collaboration with the National Institute for Theoretical and Computational Sciences (NiTheCS) in South Africa and the establishment of an ICTP Partner Institute, the East African Institute of Fundamental Research (EAIFR) in Rwanda, among others.

34. The following graph shows that African and female students and scientists have **increasingly applied to ICTP activities over the years,** indicating that ICTP activities are attractive and relevant for these priority groups.

Figure 4. The increasing number of applications from women[14] and African scientists over time indicate ICTP's relevance for UNESCO's Global Priorities

Number of applications to ICTP activities, including short trainings and events, 2013-24



Source: SIGMA data provided by ICTP (see Annex VII).

9 See ICTP Annual Report 2022 and the webpage on ICTP and the Developing World.

10 According to UIS data, women represent 31.5% of world researchers.

11 The 2019 Annual Report states that, "since 2002, when ICTP first started keeping track of gender statistics at the institute, women scientists from developing countries have visited ICTP more than 18,000 times for its research and educational opportunities." However, according to data analysis performed through SIGMA, ICTP's applications and admissions management system, it was revealed that full disaggregation of beneficiaries by gender was not reached until 2017.

12 The workshop combines a variety of highly interactive exercises, talks, panel discussions, skill-enhancing training sessions, and other activities designed to empower women in physics. Its mission is to provide a safe and bias-free environment where women can share their experiences, gain self-confidence, and acquire the skills necessary for career success. See ICTP I Empowering Gender Equality.

13 ICTP Gender Equality Action Plan

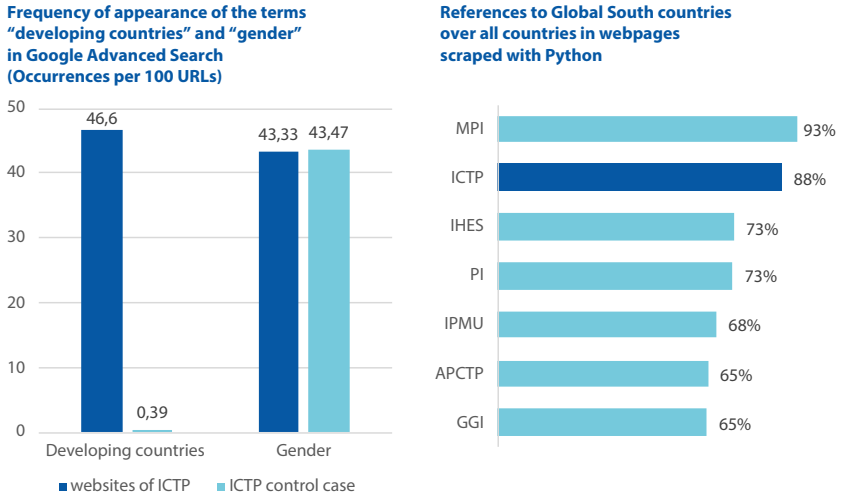
14 The graph starts in 2016, because before 2016, ICTP's SIGMA database did not report on applicants' gender (see Annex VII for more data)

3.2. Coherence

Finding 3. ICTP exemplifies UNESCO's mission in the field of science. However, its uniqueness as a scientific research centre, along with communication issues, have hindered its full integration into the UNESCO Natural Sciences Sector.

35. ICTP aligns its strategic goals with **UNESCO's mission and vision**. Its staff participates in the development of UNESCO's eight-year strategy and four-year planning programme. ICTP's mission focuses on developing countries, providing them with tools, training, and connections to bridge the North-South divide in science. This includes strengthening science, technology, and innovation (STI) systems and policies, international scientific cooperation, protecting the environment and natural heritage through STI, and advancing science education for women and girls.[15] The Centre also resonates with UNESCO's priorities in science, particularly inclusive science, women in STEM, and open access.[16] However, there is room to further highlight and actively promote UNESCO's role in these initiatives within ICTP communications to reinforce the Centre's direct connection with UNESCO's broader mission. The comparative analysis of ICTP's web content revealed that ICTP stands out among other centres of excellence due to the centrality of developing countries, while gender equality does not appear to be significantly more prominent on ICTP's webpage. This suggests that gender equality principles are generally endorsed by the most advanced research centres.

Figure 5. ICTP stands out among centres of excellence for its focus on the Global South, but less so for its focus on gender



MPI: Max Planck Institute for Physics (Germany)
ICTP: International Centre for Theoretical Physics (Italy)
IHES: Institut des Hautes Etudes Scientifiques (France)
PI: Perimeter Institute for Theoretical Physics (Canada)
IPMU: Kavli Institute for the Physics and Mathematics of the Universe (Japan)
APCTP: Asia-Pacific Centre for Theoretical Physics (South Korea)
GGI: Galileo Galilei Institute (Italy)

The control cases for the web scraping reflected in the figure of the left are IHES, PI, IPMU, APCTP and GGI.

Source: ICTP and other centres of excellence's webpages (see Annex VII.E).

36. Key features of ICTP that were highly appreciated by students and scientists were the international and multicultural atmosphere (see para. 53), which along with gender sensitivity (Figure 10), **exemplify UNESCO's approach to science**. Moreover, ICTP staff provided examples of science cooperation fostered by ICTP that has positive effects on collaboration by governments in sensitive topics. These include a regional synchrotron facility like SESAME[17], international collaboration between civil protection services in Northern Africa to prepare for earthquakes;

15 UNESCO Medium-Term Strategy 2014-2021 and UNESCO Medium-Term Strategy 2022-2029
16 UNESCO | Overview of the Natural Sciences Sector
17 ICTP was involved in its launch and joined the Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME) Council as an observer. Currently, ICTP continues to support SESAME through an ICTP-SESAME MoU on joint research, training programmes, and scientific events.

or data-sharing between national authorities in Asia on seismic activities. These examples illustrate the significant impact ICTP has on UNESCO's core priority of fostering international scientific cooperation, particularly in politically sensitive areas, directly contributing to UNESCO's efforts in the field of science diplomacy.

37. Although ICTP is a UNESCO Category 1 Institute which operates within the Organization's framework, the UNESCO brand is not very visible in ICTP communications and ICTP's own brand is more recognised by the scientific community. Moreover, ICTP and UNESCO staff recognise that they have always had **limited interaction**, although it has increased in the past couple of years. For instance, there has been collaboration on the celebration of ICTP's 60th anniversary. On this note, UNESCO's Executive Board highlighted ICTP's contributions to Member States through advanced scientific training, outreach, and continued focus on Africa, while also acknowledging the Centre as an integral part of UNESCO's International Basic Science Programme.[18]

38. When describing the apparent distance between ICTP and UNESCO, evaluation informants often mentioned that ICTP was initially administered by IAEA and was a centre with a focus on high-energy theoretical physics and later expanded to condensed matter physics and mathematics, which are areas of interest for IAEA. After ICTP was designated as a Category 1 Institute administered by UNESCO, the relationship between both entities became mainly administrative with **dialogue focusing on compliance** rather than strategic opportunities. On this note, the 2011 Evaluation of ICTP described limited collaboration between UNESCO and ICTP, recommending the creation of an institutionalised collaboration framework with designated staff to coordinate collaborative efforts between both parties. While efforts have been made to address this, there remains a need for more structured and strategic coordination between UNESCO's Natural Sciences Sector and ICTP to foster joint initiatives.

39. Moreover, there are **communication challenges** between ICTP and UNESCO. ICTP staff expressed that their work in scientific research, which is different from science policy work, is neither well understood nor valued at UNESCO. Addressing this communication gap is essential, as both ICTP's research and UNESCO's policy work contribute to advancing the global science agenda. Greater mutual understanding between the two entities could lead to new synergies, particularly in areas where ICTP's scientific expertise can inform UNESCO's policy initiatives. At the same time, ICTP staff do not know much about the work done at UNESCO Headquarters and Field Offices in natural sciences. The evaluation found that both parties acknowledge that they have not sufficiently discussed strategic and programmatic issues, nor invested time into exploring possible collaboration between them or synergies between ICTP's engagement with scientists and UNESCO's engagement with governments and institutions.

Finding 4. UNESCO Headquarters and ICTP informants did not provide examples of direct collaboration between ICTP and the UNESCO Education Sector, but opportunities in the areas of science literacy, women in STEM, and the building and monitoring of higher-education capacities exist.

40. Neither UNESCO Headquarters nor ICTP informants have provided any example of direct collaboration between ICTP and the UNESCO Education Sector. ICTP staff indicated that they do complementary but different work, as they perceive UNESCO to be more focused on children, high school, and undergraduate students. The work of UNESCO in higher education is **not well-known at ICTP**, despite UNESCO's trajectory in facilitating recognition of qualifications and academic mobility or enhancing capacity in tertiary education and research with programmes like the Campus Africa Flagship Programme.[19]

41. The tracer study and FGDs revealed that most ICTP former students in developing countries work in universities and have teaching responsibilities. Consequently, while ICTP builds research capacities, it also contributes to **teacher development** in higher education. The Centre has set up a global network connecting higher education institutions and university professors with UNESCO, although these networks have not been utilised by the UNESCO Education Sector so far.[20]

18 UNESCO | Celebration of the 60th Anniversary of ICTP
19 UNESCO | Flagship Programmes
20 See UNESCO's approach to global networks at UNESCO | Networks.

42. The review of the mission and scope of ICTP and the UNESCO Education Sector indicate that there is also space **for closer collaboration in outreach activities** related to science literacy and the promotion of women in STEM. ICTP's work in these areas includes: collaboration with the Organisation for Women in Science for the Developing World (OWSD) and The World Academy of Sciences (TWAS) in the observation of the International Day of Women and Girls in Science;[21] the Physics without Frontiers (PWF)[22] programme, which mobilises volunteer scientists to support universities in the Global South through projects with an outreach dimension, including science diplomacy, awareness-raising, or interaction with the industry; and the Science Dissemination Unit, which focuses on spreading science beyond ICTP.[23] Summer schools in developing countries further enhance ICTP's outreach potential with regards to higher education (see para. 57).

3.3. Effectiveness

Finding 5. ICTP's staff and stakeholders are satisfied with the centre's performance in all three pillars but recognise the need for improvement in defining and monitoring effectiveness and impact.

43. The ICTP Strategic Plan of 2020 outlined **objectives guided by ICTP's three pillars**: scientific excellence, scientific capacity-building in developing countries, and international cooperation and advocacy. Under **scientific excellence,** objectives included upgrading computing facilities, intensifying learning activities to foster collaboration, and enhancing ICTP's infrastructure. Under scientific capacity-building, objectives included strengthening and expanding North-South and South-South collaborations through ICTP's Category 2 Partner Institutes,[24] strengthening and enhancing existing educational programmes, mobilising ICTP's global community through online engagement, and offering open access to computational resources. For international cooperation and science advocacy, the objectives were to bolster programmes like PWF and partnerships with IAEA and UNESCO. These objectives do not include performance indicators nor timeframe targets.

44. The ICTP Strategic Plan of 2020 is unclear on the objectives and **scope of ICTP's advocacy** work under the third pillar. The Plan states that "basic sciences, the culture of science, and fact-based enquiry are essential preconditions to meet the Sustainable Development Goals with informed development policies,"[25] yet it fails to set clear goals or performance indicators for ICTP in this domain. Stakeholders interviewed agreed that what ICTP is trying to accomplish in terms of advocacy is not sufficiently developed. Key informants described performance under this pillar as "international relations" that contribute to the educational and research pillars through networking, partnerships, and activities in developing countries (i.e. summer schools) (see para. 55-59). ICTP's contributions to science diplomacy are also mentioned in evaluation interviews but lack precision or an explicit framework.

45. ICTP annual **reports demonstrate success** in education and research activities with clear data that is relevant to ICTP's mission, although it is not compared against targets. Such data features positive trends in the production of scientific articles and citations, an increasing number of participants in ICTP activities, and geographic diversity. The tracer study collected very positive views on the institution's effectiveness in research and education (see Figure 8). On a scale from 0 to 5, former students' scores exceeded 4.5, and such scores were consistently positive across genders and income groups (see Annex VI, Question 15).

46. Evaluation interviews provided numerous examples of how ICTP impacts the careers of scientists from developing countries and their communities (see para. 67),

21 See note on the observation of the last International Day of Women and Girls in Science.
22 The Physics without Frontiers programme supports capacity-building projects designed by universities in the Global South and submitted to ICTP through a call for proposals.
23 The ICTP Science Dissemination Unit organises workshops on topics like "Science Dissemination for the Disabled" or "Low-cost 3D Printing for Science, Education, and Sustainable Development," and runs a Scientific Fabrication Laboratory that forms part of the FabLabs global network and promotes STEM education in fairs where prototypes are showcased.
24 UNESCO Category 2 Institutes contribute to the execution of UNESCO's programme through capacity- building, the exchange of information, theoretical and experimental research, and advanced training. They are under the auspices of UNESCO through formal arrangements approved by the General Conference but are not legally part of the organisation. For examples of collaboration with Category 2 Institutes, see paragraph 56.
25 ICTP Strategic Plan Summary 2020-2024

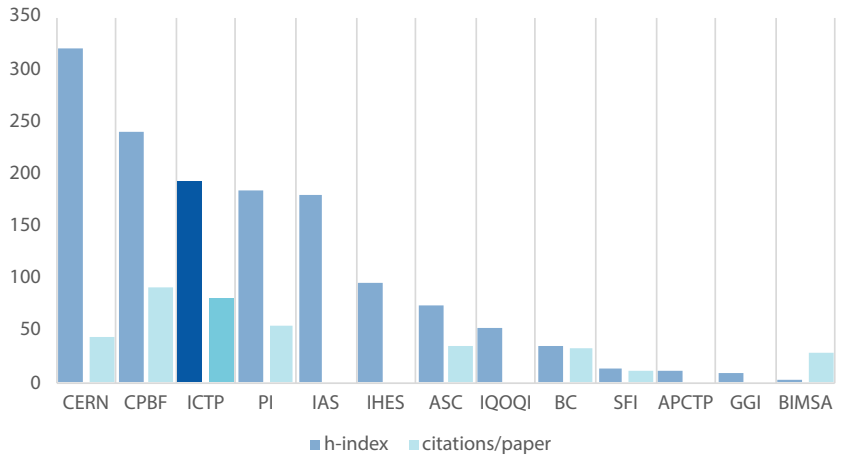
in line with success stories showcased on the Centre's webpage.26 Yet, ICTP staff recognise **the need for improvement** in terms of impact monitoring, reporting, and planning. The 2011 ICTP Evaluation highlighted fragmented and incomplete systems for collecting and reporting data on research, training, and outreach activities. To address these limitations, ICTP has several ongoing plans including the improvement of alumni data, keeping track of their status, communities, and bibliographical information (see para. 89), as well as conducting a study with the United Nations University's Institute of Merit in Maastricht, Netherlands, to evaluate the effectiveness of their Associates Programme.

Finding 6. ICTP is a recognised centre of excellence and provides many examples of impactful research.

47. All evaluation informants, including Senior Associates and representatives of other research centres, agree that the quality of research at ICTP is recognised globally, and that ICTP's '**research impact**'[27] is comparable to that of top universities and research centres around the world. ICTP annual reports and interviews illustrate ICTP's academic excellence through the successful awarding of prestigious grant programmes to ICTP fellows (e.g. European Research Council grants), the number of articles the Centre has published in reputable peer-reviewed journals, and their citations.[28]

48. ICTP's research performance has been measured through **bibliometrics**, which is the production of indicators based on citations of an author or a scholarly article in other scientific documents. More precisely, ICTP bibliometric indicators were assessed against those of comparable research centres in each of the ICTP research sections.[29] It was found that **ICTP outperforms most of the selected control cases**, which do not have an inclusive mission like ICTP, allowing them to allocate all resources and efforts exclusively to the pursuit of scientific excellence.

Figure 6. Bibliometrics confirm ICTP's scientific excellence[30]



CERN: European Organization for Nuclear Research (France)
CPBF: Center for the Physics of Biological Function (USA)
ICTP: International Centre for Theoretical Physics (Italy)
PI: Perimeter Institute for Physics (Canada)
IAS: Institute for Advanced Study (USA)
IHES : Institut des Hautes Etudes Scientifiques (France)
ASC: Arnold Sommerfeld Center for Theoretical Physics (Germany)
IQOQI: Institute for Quantum Optics and Quantum Information (Austria)
BC: Barnard College, Columbia University (USA)
SFI: Santa Fe Institute (USA)
APCTP: Asia Pacific Centre for Theoretical Physics (South Korea)
GGI: Galileo Galilei Institute (Italy)
BIMSA: Beijing Institute of Mathematical Sciences and Applications (China)

Source: Bibliometric data extracted from INSPIRE (see Annex VII).

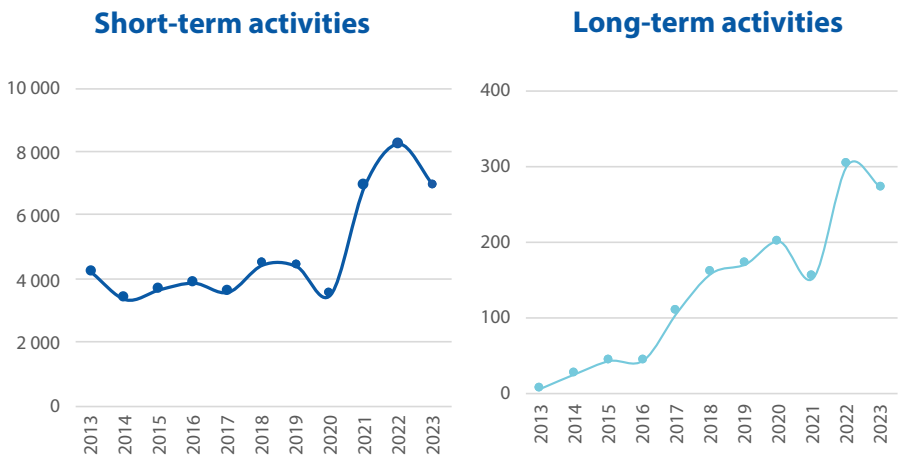
49. Former ICTP students also highlight ICTP's excellence, its ability to attract top-level researchers and scientists, and capacity to address emerging scientific needs and challenges. (Annex VI. Question 19). Indeed, **ICTP international conferences and workshops** gather many attendees from all over the world, including from developing countries (Para. 51).

26 ICTP Success Stories
27 The definition used here for 'research impact' is what ICTP and academia refer to as "bibliometric performance," while the Impact section in this report refers to the longer-term effects of ICTP's work beyond the realisation of its stated objectives (e.g. impact on students' careers or impact on societal progress).
28 For ICTP's self-assessment of bibliometric performance see: ICTP: A Year in Review
29 To identify these, the evaluation team asked the Heads of each sector to provide a list of comparable universities and research centres in their field of expertise.
30 The h-index provides the highest number of publications from a scientist that received h or more citations each, while the other publications have no more than h citations each.

Finding 7. ICTP has reached a global scope with highly satisfactory programmes that grow scientific networks in developing countries and expose them to the highest standards of research.

50. During the period under evaluation, ICTP received thousands of visitors every year, a growing trend that reached a peak of 8,216 visitors in 2022 (see Annex VII. A. Applications and admissions). The geographic diversity of these visitors is represented in Map 1. The examination of ICTP's SIGMA application system disclosed that the Centre's initiatives expanded to the point of **reaching a total of 54,547 participants** between 2013 and 2023 (Figure 7).

Figure 7. The number of participants in ICTP's activities continues to grow

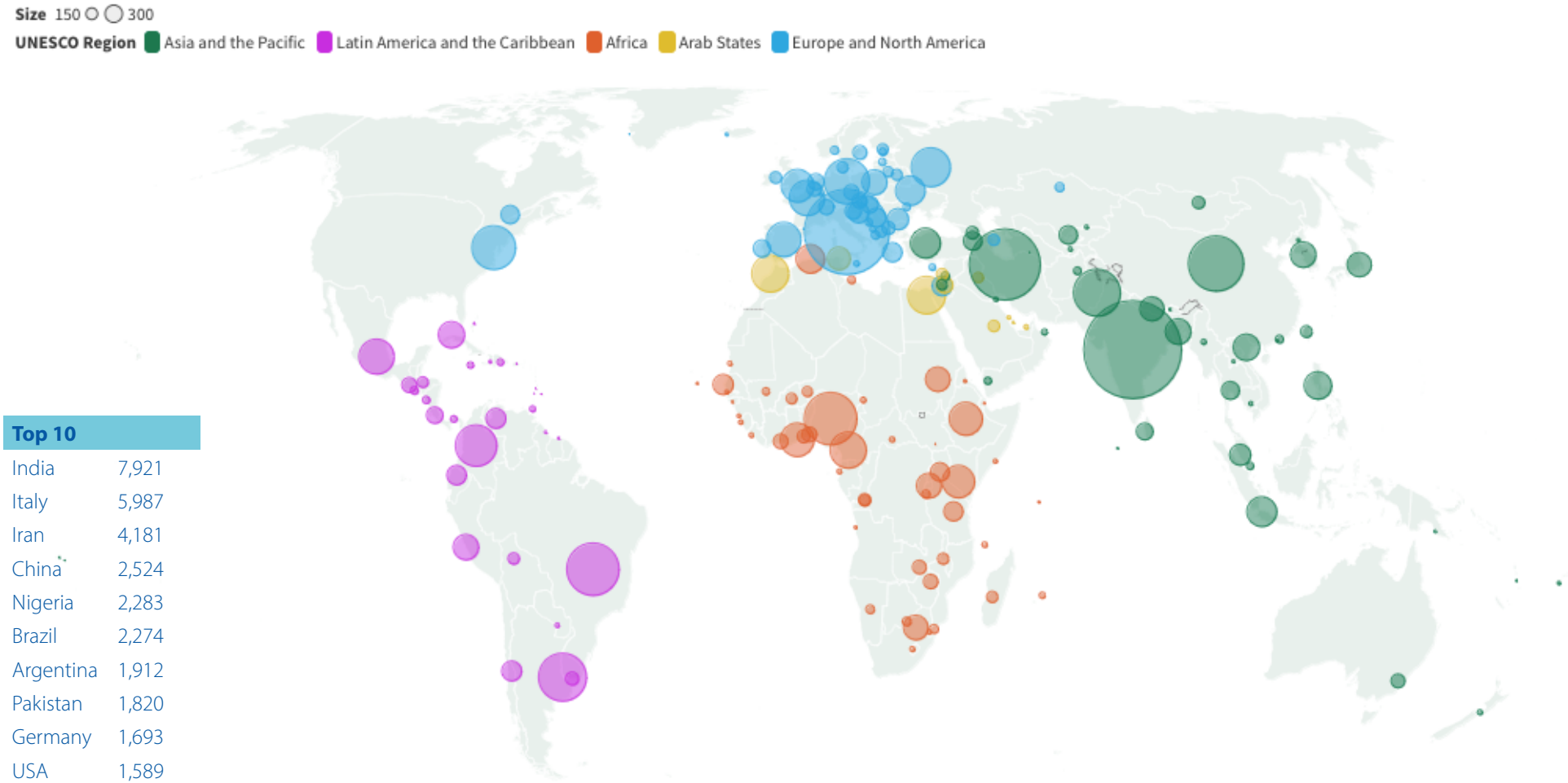


Short activities include visits and Scientific Meetings and Research (SMR) workshops. Long-term activities are education and career development programmes like the Diploma or Senior Associates programmes (see Annex VII).

Source: SIGMA.

51. ICTP educational and career development programmes (long-term activities) provided opportunities to 1,497 students and scientists from the Global South, while short-term activities admitted 53,050 visitors from all over the world, as visualised in the following map. In total, between 2013 and 2023, **ICTP welcomed students from 182 countries**.

Map 1. ICTP conferences, workshops, and research visits reached out to over **53,050 scientists worldwide** between 2013 and 2023.

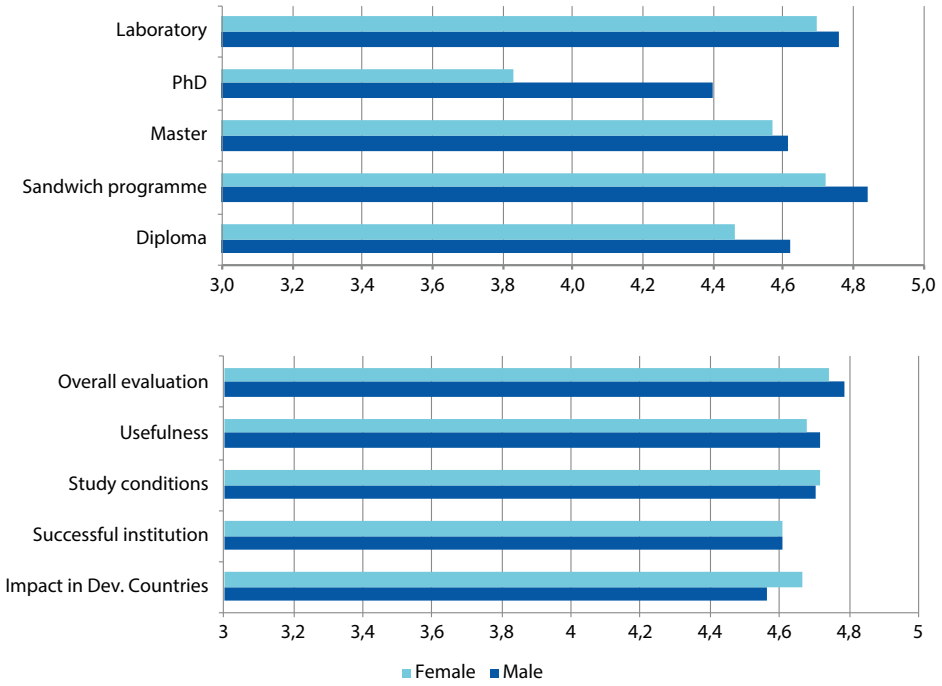


Top 10	
India	7,921
Italy	5,987
Iran	4,181
China	2,524
Nigeria	2,283
Brazil	2,274
Argentina	1,912
Pakistan	1,820
Germany	1,693
USA	1,589

Source: Participants admitted to ICTP's 'Short activities' according to ICTP data obtained from SIGMA, 2013-2023. 'Short activities' include attendance to workshops, conferences and research visits organised by ICTP in Trieste and abroad. (see Annex VII. A. Applications and admissions). High quality visualisation available at Flourish.

52. The tracer study revealed a highly positive evaluation of the institution and its educational programmes, with respondents expressing **great satisfaction** with its programmes, services, and overall functioning (see Figure 8). In FGDs, students and associates confirmed this feedback and praised ICTP for its well-organised programmes, as well as for the scientific quality of its staff.

Figure 8: ICTP former students rate their satisfaction over 4.5 on a 0-to-5 scale.

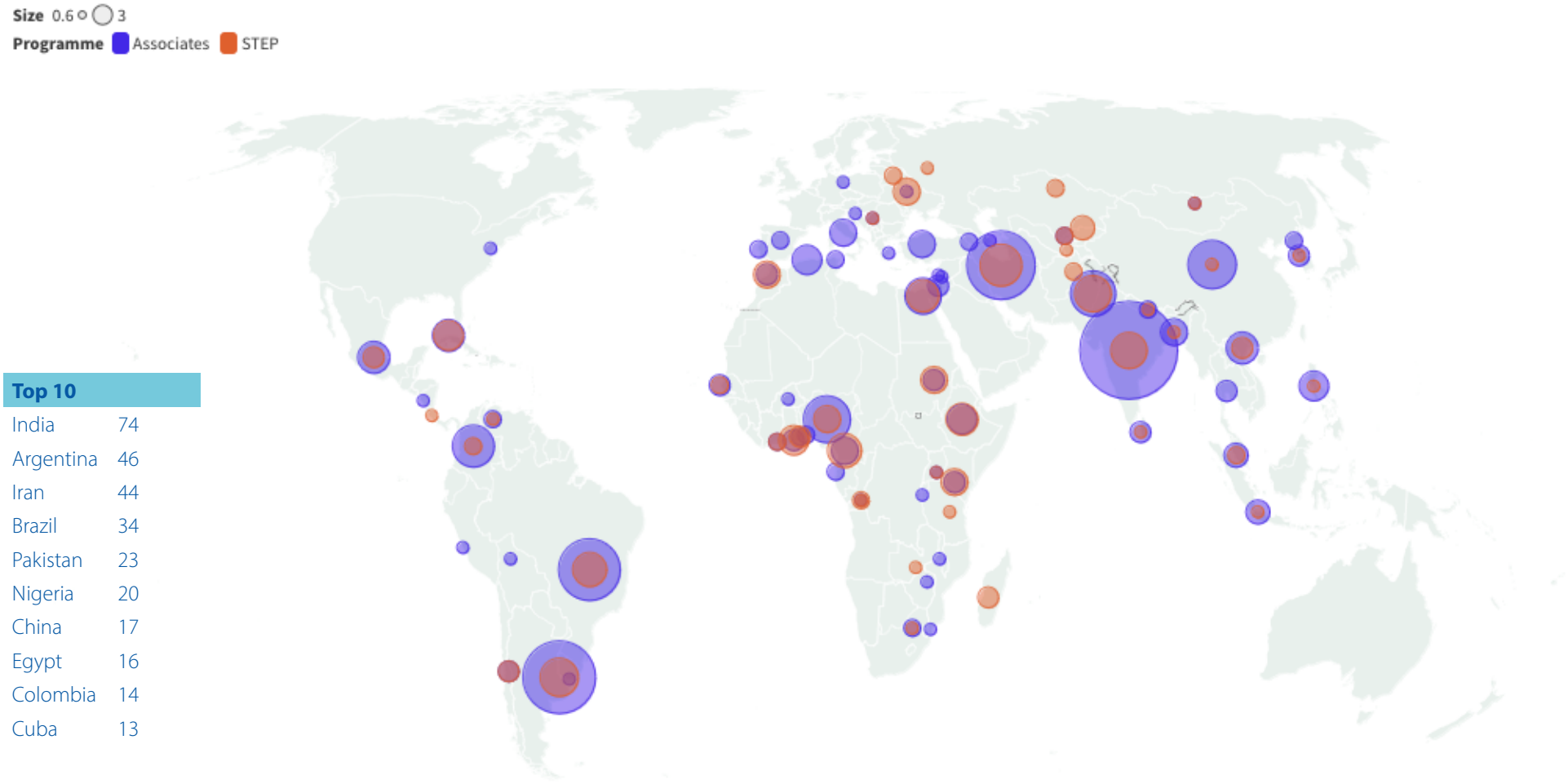


Source: Tracer study (see Annex VI).

53. In FGDs, students expressed how ICTP provided a **supportive environment** in which they felt welcomed, safe, and free to study and work with scientists from all over the world, regardless of their nationality, origin, or scientific background. This was later confirmed through the survey, with former students rating the "sense of belonging to ICTP" (47%) and "finding people from diverse contexts" (38%) as the most valued aspects of the ICTP experience (Annex VI. Question 20). They also indicated that "having an experience in an international and multicultural atmosphere" (42%) and "establishing academic networks" (34%) were the **elements deemed more useful** for advancing their scientific career (Annex VI. Question 16).

54. As for the **Associates,** they confirmed in FGDs that this programme effectively implements the Abdus Salam vision as it allows for scientists established in developing countries (See Map 2) to **keep up with high quality research** through regular visits to the Centre. According to discussions with Associates, the programme is effectively combating scientific isolation, and fostering collaboration, networking, and professional development. In the same vein, the **STEP programme** offers fellowships to PhD students in developing countries, including in Affiliated Centres, so that they can enrich their doctoral studies with ICTP's staff, networks, and facilities.

Map 2. The STEP and Associates Programmes linked **366 scientists** across the developing world with ICTP's high scientific standards.



Top 10	
India	74
Argentina	46
Iran	44
Brazil	34
Pakistan	23
Nigeria	20
China	17
Egypt	16
Colombia	14
Cuba	13

Source: ICTP participants in Associates and STEP programmes between 2012 and 2023, according to ICTP data. High-quality visualisation available at Flourish.

Finding 8. While ICTP has been successful in most of its collaboration modalities, with Partner Institutes, there have been mixed results. It remains unclear how these collaborations contribute to ICTP's advocacy pillar.

55. ICTP in Trieste is often described by informants as a **global hub**, facilitating collaboration between researchers from developing countries and top universities. Additionally, the Centre has set up different modalities of collaboration and networking, and currently has four Partner Institutes, eight Affiliated Centres, and seven research networks located in developing countries all over the globe.[31]

56. The most ambitious of ICTP's collaboration modalities is the establishment of four **ICTP Partner Institutes** (located in Brazil, Rwanda, China, and Mexico), which are UNESCO Category 2 Institutes and aim to replicate the ICTP model at a regional scale, thereby contributing significantly to UNESCO's international network and capacity-building efforts in basic sciences. The ICTP South American Institute for Fundamental Research (ICTP-SAIFR) in Brazil, according to all respondents, has been successful in achieving its mandate. It is producing high-quality research while organising regional events, often with support from ICTP staff and networks, and running its own Associates Programme. In Rwanda, the East African Institute for Fundamental Research (ICTP-EAIFR) has also received support from ICTP in teaching and organising scientific events, although the overall performance of the centre has been hampered by administrative challenges. Despite these challenges, the ICTP-EAIFR's role as a UNESCO Category 2 Institute highlights its importance in advancing UNESCO's objectives in the region. On the other hand, the ICTP-Asia Pacific in China is conducting research without collaboration from ICTP or other countries' centres. In Mexico, the Meso-American Institute for Sciences, under the umbrella of the University of Chiapas (UNACH), never reached a relevant activity level, according to ICTP informants.

57. ICTP **Affiliated Centres** are institutes or university departments in developing countries which have established a formal collaboration with an ICTP section. They facilitate participation in the Associates and STEP Programmes, and the organisation of **summer schools**, described by evaluation informants as an effective way to further enhance developing countries' access to high-level education and research.

58. ICTP **Research Networks'** rationale is similar to that of Affiliated Centres and Partner Institutes, supporting collaborative scientific endeavours across disadvantaged regions to reduce isolation and prevent brain drain. What distinguishes Research Networks is that despite receiving less funding (only for travel expenses) and organisational support from ICTP than Affiliated Centres and Partner Institutes, they still foster South-South cooperation. Research Networks are based on scientists' common research interests and collaboration around a coordinating partner that manages the network and host's activities. These networks, aligned with UNESCO's mission, demonstrate ICTP's role in strengthening scientific collaboration and capacity-building in line with UNESCO's objectives in the basic sciences.

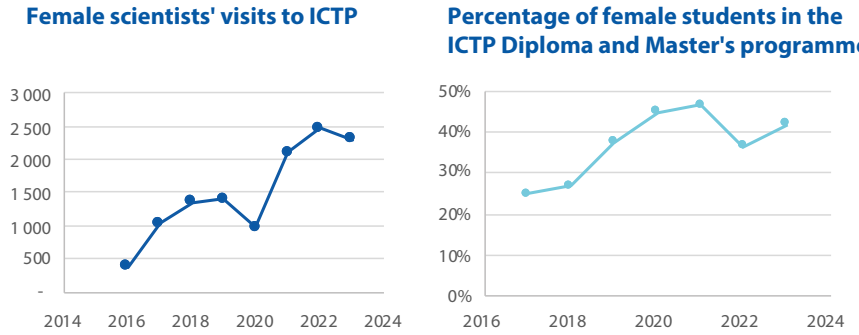
59. ICTP's international networks sustain scientific connections worldwide (see Map 1). During the evaluation, ICTP's staff, Associates, and partners provided numerous examples of how ICTP's international networks are effectively supporting research and capacity-building. However, the evidence in ICTP interviews and documents do not provide a clear description of the advocacy pillar's dimension (see para. 44), with no reference to policies. In several interviews, ICTP's staff explained that based on the scientist-to-scientist cooperation activities, the Centre extends its connections to governments and enables research development projects like the SESAME Project[32], the Southeast European International Institute for Sustainable Technologies (SEEIIST), or the future African single-zone radiation source.

31 ICTP and the Developing World
32 See foontnote 17 above on the SESAME project.

Finding 9. ICTP's activities display positive trends in gender balance. This is acknowledged and highly appreciated by both male and female participants.

60. According to ICTP's own reports, their "proactive gender strategy is slowly but surely moving ICTP in the right direction."[33] Since 2016, ICTP applications are fully disaggregated by gender and the implemented measures have shown **progress in terms of women representation in ICTP programmes**. This has been confirmed by SIGMA data on visits and participation in early-career programmes, although both trends stabilised after the Coronavirus (Covid-19) pandemic (Figure 9).

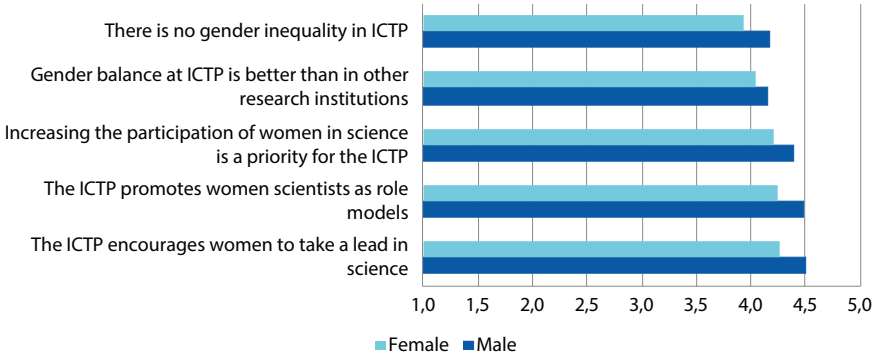
Figure 9. Female visits to ICTP increase while participation in early career programmes approach a gender balance.



Source: SIGMA data provided by ICTP (see Annex VII).

61. Male and female participants in ICTP programmes provided **positive feedback on ICTP's commitment to gender equality** during the evaluation focus groups and survey (see Figure 10). ICTP's efforts to encourage women to lead in science and serve as role models were particularly well recognised, but gender equality could be further promoted in the composition of ICTP's research staff (Para. 90). Notably, women perceive the efforts to encourage their participation in science slightly less favourably than men do, which aligns with broader findings in the literature on the gender gap in science and research institutions.[34]

Figure 10: ICTP is perceived as a gender-sensitive institution



Source: Tracer Study (see Annex VI, Question 23. N=369).

3.4. Impact

Finding 10. Some ICTP research areas have an immediate societal impact. However, the development of fundamental science, which remains ICTP's priority, only generates impact in the long term.

62. The societal benefits of ICTP are evident for some of the research sections, notably Earth System Physics (ESP) and Quantitative Life Sciences (QLS), which have **direct relation to concrete SDGs**. The ESP section, which conducts research on earthquakes and climate change, has made efforts to strengthen climate science in Africa, and has collaborated with disaster risk reduction in Algeria, Iran, India, Nepal and Pakistan. The ESP section maintains a range of models and datasets and coordinates the Regional Climate research network (RegCNET), encompassing over 600 participants worldwide. Through this research area, ICTP engages with policymakers, bridging the gap between scientific research and practical applications. While their primary focus is on theoretical science, they actively provide data for informed decision-making. The section has also provided examples of science diplomacy by fostering connections between countries in sensitive regions (Para. 36).

33 The ICTP 2019 Annual Report stated that Centre started to keep track on gender in 2002, and the 2022 Annual Report reported that the Diploma programme reached a gender balance in that year. The SIGMA data reviewed by the evaluators comprehensively disaggregates applicants' and participants' data since 2016 onwards.

34 "Men and women differ in their perception of gender bias in research institutions."

63. The QLS section explores the interfaces between statistical physics, biology, ecology, neuroscience, information theory, and artificial intelligence. It has obvious connections with environmental challenges included in the SDGs, and it has also contributed to the **UNESCO Recommendation** on the Ethics of Artificial Intelligence.[35]

64. In the field of medical physics, the Centre contributes to **developing countries' healthcare systems** by training thirty physicists every year. It also contributed to the set-up of Southeast European International Institute for Sustainable Technologies (SEEIIST), which aims to develop a regional centre of excellence for Hadron Cancer Therapy and Biomedical Research with Protons and Heavy Ions (para. 59).

65. Despite the practical applications of some of its research sections and educational programmes, ICTP's impact as a **theoretical physics** centre cannot be reduced to direct economic nor societal impact, as its primary function is to foster fundamental science that later enables technological progress. Besides, training in fundamental science is key for efficiently addressing the long-term promotion of STI in developing countries. This is acknowledged in ICTP's mission statement and is recognised by former ICTP students in developing countries (See Figure 11 and Para. 28).

Figure 11. ICTP's value lies in its scientific contributions above its direct societal or economic effects.

Source: Tracer study (Annex VI. Question 17, n= 407).

66. Examples of ICTP's contributions to **scientific breakthroughs** include its participation in the CERN-led ATLAS experiment, participation in the drafting of reports by the International Panel on Climate Change (IPCC), research on solar neutrinos, and the design of the open-source programme 'Quantum Espresso,' widely used for materials calculations and simulations.

Finding 11. ICTP has a positive impact on the careers of developing countries' scientists who, to a large extent, return to their home countries, mitigating brain drain and enhancing local scientific communities.

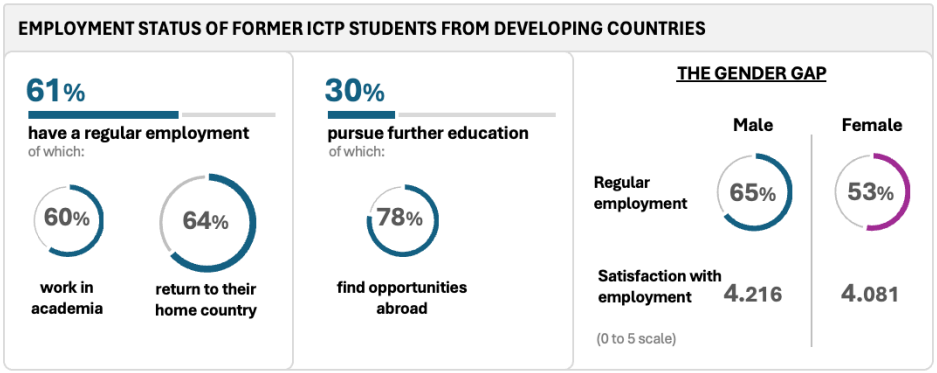
67. Evaluation informants unanimously agreed that ICTP has made significant strides in impacting developing countries through its various programmes and activities, giving opportunities to individuals to not only advance their own careers, but to contribute to the scientific communities in their home countries. These impressions are often shared along with **anecdotal evidence,** such as the success stories disseminated on the ICTP webpage (e.g. the first woman in Pakistan to earn a PhD in quantum physics and a Ghanian climate scientist serving as vice chair of the IPCC's technical committee, among others).

68. In FGDs, ICTP's educational and capacity-building programmes were described as a **stepping stone** connecting researchers to opportunities, mentoring, and resources, and making a difference in scientific careers. Former and current students agreed that ICTP positively impacts their personal lives and careers by providing a supportive environment, awards for recognition, and opportunities for global collaboration. They also emphasised the importance of ICTP's opportunities for networking and visibility. Some of the students interviewed commented that attending sessions at ICTP, arranging meetings with professors, and sharing their work helped them connect with fellow scientists and gain recognition.

69. Survey data confirmed the strong orientation of former students to academia and the role of ICTP in their perceived success. In fact, a large majority ended up finding regular employment, mainly at university or research centres, and reported being highly satisfied with their employment. More importantly, former ICTP students with regular employment showed a return rate to their home countries as high as 64%, which confirms that ICTP is effectively mitigating **brain drain** from developing countries.

35 UNESCO | Recommendation on the Ethics of Artificial Intelligence

Figure 12. Survey data demonstrates ICTP's positive impact on scientists' careers, with some differences between men and women.



Source: Tracer study (see Annex VI. Question 24-n=430, Question 25-n=266, Question 26-n=250).

70. **A gender gap** was observed among former ICTP students who now have regular employment: out of the total employed, 65% are male and 53% are female, indicating a gap of over 10 percentage points. Similarly, it was found that female former students are more likely to continue their studies, with 5% more women than men pursuing further education. Career choices for men and women with regular employment show no significant differences, with both primarily choosing academic careers (63% and 62%, respectively) over the private sector (15% and 16%, respectively) and non-academic public sector (15% and 16%, respectively).

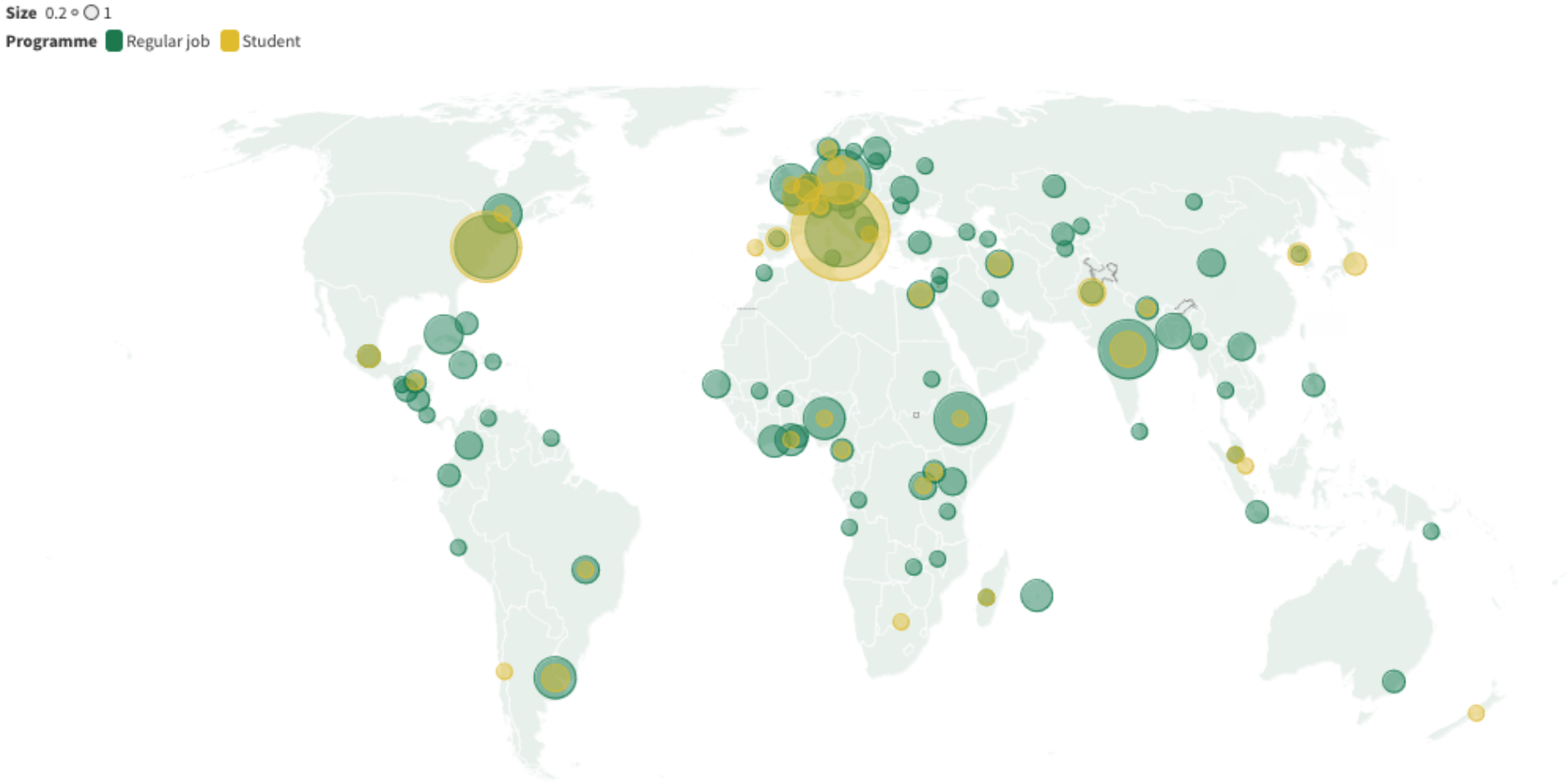
71. Almost 80% of ICTP students pursuing further education tend to find **opportunities outside their home country**. This confirms the impression shared by ICTP's staff about Diploma students using their ICTP degree as a gateway to obtain doctorate degrees in prestigious universities, in three out of four cases. The geographic destination of former ICTP students is presented in Map 3 with two series that allow to distinguish the different career options of those who work, usually in academia, and those who pursue further education.

Box 2. ICTP success factors

Data reveals that ICTP is successful in providing higher education and research opportunities to scientists and having a positive impact on their home countries, thus reducing brain drain. The following is a summary of the factors that have led to the Centre's success according to this evaluation:

- Founder Abdus Salam's vision on ICTP and its dual mission for excellence and capacity-building; an institution which upholds the highest academic standards while providing education and research opportunities to talented scientists from countries where such opportunities do not exist
- Attraction and retention of top scientists as faculty
- The Associates Programme, which aims to combat scientific isolation in the Global South; nominated Associates receive temporary funding and the opportunity to regularly visit the centre while simultaneously holding a regular academic position in a developing country.
- The deployment of research networks and partnerships that amplify effects on developing countries
- A donor and host government which ensures stable and significant funding and is committed to achieving development goals; synergies with the science and higher education systems of that host country
- Alignment with the UNESCO mission, values, and global priorities, and its recognition as a UNESCO Category 1 Institute
- Involvement of another UN agency with thematic expertise relevant to the Centre's governance mechanism (i.e. the Steering Committee). This reflects the UN's ambition to 'deliver as one' through concrete joint initiatives
- Functional autonomy of the Centre and the presence of scientists in governance bodies like the Directorate and the Scientific Council
- Priority given to developing countries, and education and capacity-building programmes exclusively meant for students and young scientists from developing countries
- The organisation of numerous activities of various lengths that make the Centre an international and multicultural hub for inclusive scientific collaboration

Map 3. Most former ICTP students pursuing further education access North-based universities but settle in the Global South for work.

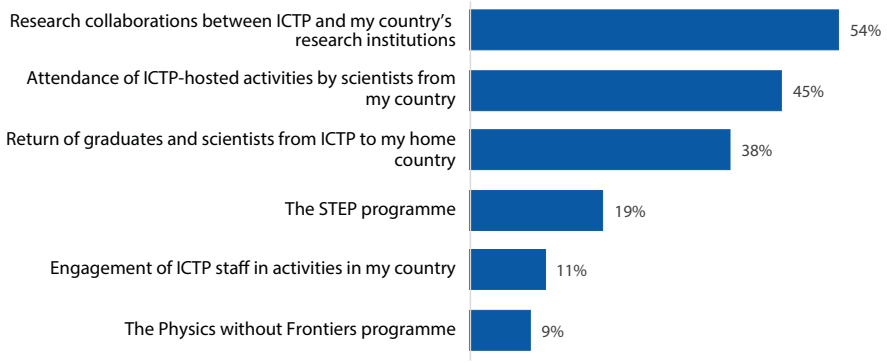


Source: Tracer study (See Annex VI)." High-quality visualisation available at Flourish.

72. Despite ICTP's impact, brain drain is an issue in developing countries and was evoked in FGDs, including by African scientists. They indicated **that inadequate local support for science** undermines scientific development in their countries and suggested to enhance ICTP's mission by providing follow-up on graduates' careers, mentoring services, and advice on financial and professional opportunities.

73. Moreover, tracer study respondents consider that ICTP has a direct impact on the development of scientific research and education. According to respondents, impact is **more effectively achieved through collaborations** between their home institutions and ICTP. The idea of expanding institutional collaborations that allow to localise more activities in developing countries was also suggested in FGDs as a way to enhance impact. On this note, the analysis of SIGMA data revealed that activities held outside Italy have not increased despite the overall expansion of ICTP activities (see Figure 18 and para. 95).

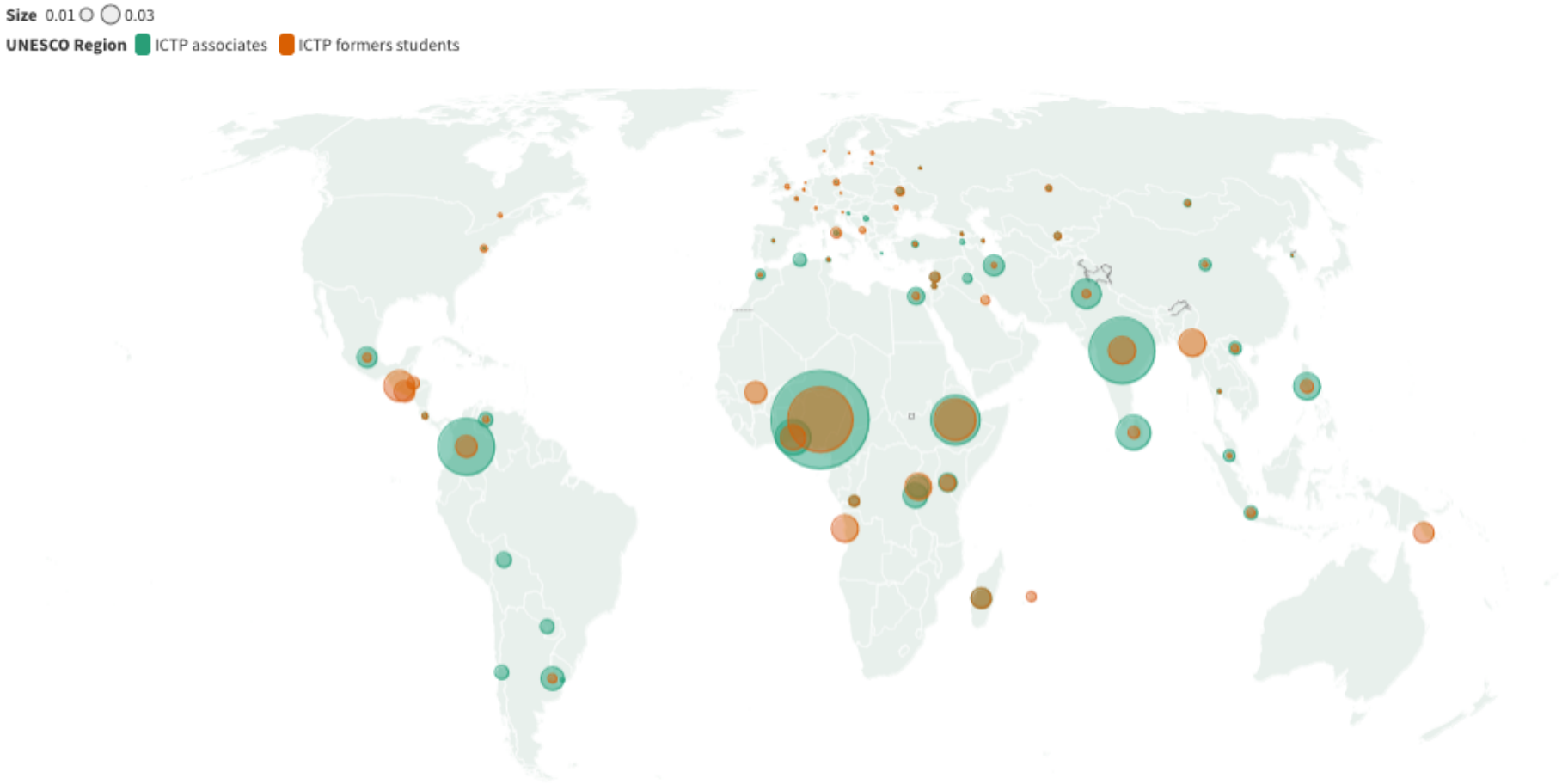
Figure 13. Research collaborations are perceived as the most effective means to achieve impact.



Source: Tracer study (See Annex VI. Question 18).

74. Until now, ICTP had only measured the impact on employment of its Master of Advanced Studies in Medical Physics (MMP) programme, concluding that about 10% of all medical physicists working in developing countries received training at ICTP. A more comprehensive approach to **impact assessment**, especially regarding graduates' destinations and career paths, would consist in the replication of a tracer study (like the one summarised in Figure 13) with a breakdown by country and programme, which could lead to strategic analyses of programmes based on impact. ICTP is not systematically using the feedback collected from post-visit reports and satisfaction surveys to assess the impact of its Associate and STEP programmes on institutions from developing countries. The Centre is working on improving its follow-up mechanisms, including the use of an online platform for networking and tracking career progress. Map 4 further explores ICTP's impact by normalising data on participants in ICTP activities per country, with UIS data on scientists per million inhabitants. This map suggests that ICTP is making a bigger difference in Sub-Saharan Africa. The ratio reflected in Map 4 could potentially be considered as a measurable indicator of ICTP's impact on the development of scientific research at the country level.

Map 4. Ratio of ICTP-trained scientists amongst the number of researchers per million inhabitants in a given country



The size of the dots represents a ratio calculated by dividing the number of scientists trained by the ICTP in a given country by the density of scientists registered in that country. The density of scientists is measured using SDG indicator 9.5.2: "researchers (full-time equivalent) per million inhabitants". The data used for this map is extracted from the reports of the UNESCO Institute for Statistics (UIS), which collects the country-level data used to measure this indicator and regularly produces statistics on this. The number of scientists trained by the ICTP captured in this map include two types of participants: (i) ICTP former students: students who were enrolled in ICTP educational programs during the period covered by the evaluation (2013-2023), who are currently working (as reflected in the responses to the evaluation's tracer study), and (ii) ICTP associates: individuals registered in the ICTP Associates programme at the time of the evaluation in 2023-2024. Therefore, the circles are larger when more scientists from a country have benefited from the ICTP and when the country's available scientific capacities are lower.

Source: SIGMA data on Associates, Tracer Study and UIS statistics. High-quality visualisation available at Flourish.

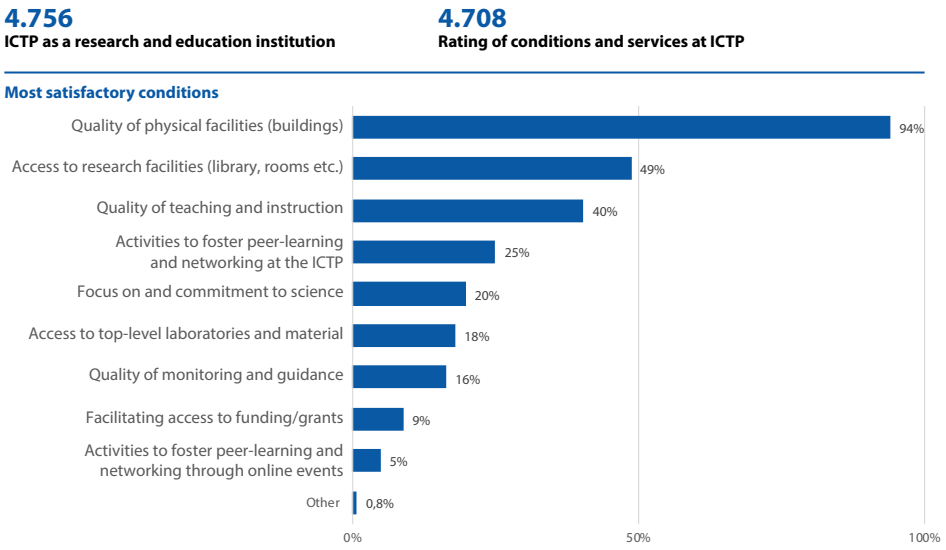
3.5. Efficiency

Finding 12. ICTP has a stable and relatively high level of funding and is diversifying its funding sources to maintain activity levels amidst increased inflation.

75. The institution has demonstrated efficiency in providing high-quality study and research conditions, as shown in the following figure. According to the survey and FGDs, the **most satisfactory conditions** include research facilities, the quality of teaching and instruction, and the organisation of activities that foster peer-learning and networking. More resources could be allocated to mentor and monitor students.

Figure 14. Students are highly satisfied with the quality of ICTP.

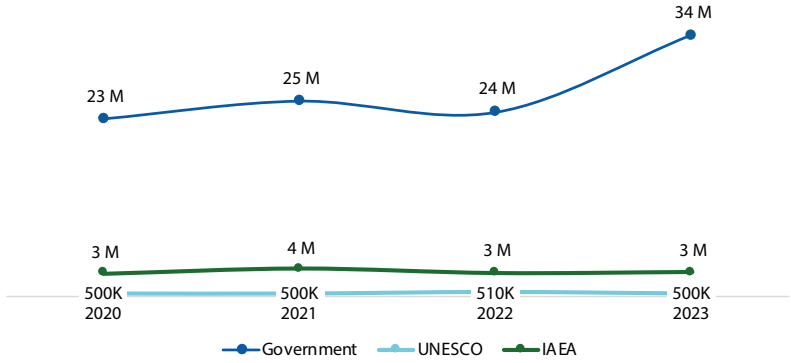
Satisfaction rate (0 to 5 scale) and most satisfactory conditions



Source: Tracer study (see Annex VI. Question 21).

76. On the financial front, ICTP has a **stable and significant support** from the Government of Italy (Figure 8). This support has remained constant over the past 25 years and provided ICTP with a budget equal to the rest of the UNESCO Natural Sciences Sector combined. Additionally, Italy has recently provided 10 million USD-worth of extra funding in 2022 for infrastructure development.

Figure 15. Italy has provided most of ICTP's core funding (in USD).



Source: ICTP data on MoUs (Annex VII) and evaluation ToR (Annex I).

Finding 13. ICTP is attracting and retaining top-level researchers and scientists with a competitive pay and compelling mission, while enhancing its efficiency by working with Italy's science system.

77. ICTP's **unique mission, international environment, and competitive pay** attract many researchers and administrative staff. Although permanent positions are not available, the current five-year contracts system provides job security. The tracer study confirmed that one of ICTP's primary strengths is its capacity to attract top-level scientists (See Annex VI. Question 19).

78. While representing a unique institution worldwide, ICTP faces two major limitations: its **limited faculty** of 47 research staff and its inability to operate as a higher-education institution entitled to **accreditation** and able to issue diplomas and graduation certificates. So far, ICTP has overcome these limitations by partnering with Italian higher education institutions. ICTP runs joint programmes with the International School for Advanced Studies (SISSA) and the University of Trieste, which include official accreditation, and provide fellowships through the Training and Research in Italian Laboratories (TRIL) programme. It

also collaborates with Italian public institutes (i.e. OGS, CNR, INGV, SZN, INFN)[36] and provides additional opportunities for diploma students to pursue a PhD in Italy. ICTP has also explored the possibility of partnering with the United Nations University to get accreditation, and negotiations are ongoing to facilitate this.

79. The institute's model of organising programmes and workshops is also highly appreciated by evaluation informants, as it allows scientists to meet in person, share knowledge, and stay at the forefront of research. They also highlight **the flexibility of ICTP** in organising workshops on emerging topics, such as the intersection of machine learning, information theory, computer science, and theoretical physics. This adaptability enables ICTP to sense the evolution of science and address emerging scientific challenges. Survey respondents agreed that ICTP is successful in attracting top-level researchers and scientists, addressing emerging global scientific needs and challenges, and driving innovative scientific research.

Finding 14. ICTP offers different networking modalities with different implications for ICTP's limited staff. Partners tend to demand more support for their activities in the Global South.

80. ICTP Partner Institutes are meant to leverage the collaboration with ICTP through a formal and robust agreement with institutions from developing countries. This is the case of ICTP-SAIFR, formed by the São Paulo State University (UNESP) and the São Paulo Research Funding Agency (FAPESP), a public foundation providing grants, funds, and programmes to support research, education, and innovation at private and public institutions and companies in the state of São Paulo. According to interviews and document review, ICTP staff believes a successful partnership like this allows the Centre to localise activities with the same standards, maintaining the visibility and convening power of the UNESCO brand more directly. However, ICTP staff also acknowledges that these partnerships have been successful in two of four cases, and that establishing them is much more time-consuming than other collaboration modalities, with actual results being largely dependent on the host institutions' capacity and institutional commitment. Such factors are beyond ICTP's control.

81. Active Affiliated Centres are more numerous, as they are **designated and managed by research sections.** They are established through an open call for proposals which allows ICTP to select the best partners. Their contribution appears through the organization of summer schools, participation in the STEP programme, research involvement, and joint publications. ICTP provides financial support for conferences, workshops, and schools held and located in supported countries. These agreements focus on a region's specific needs and are a proactive form of mirroring successful ICTP activities in the Global South. However, the organisation of activities in Affiliated Centres demands more administrative efforts from ICTP staff than activities in Trieste, therefore, this modality is still limited to one Affiliated Centre per section.[37]

82. FGDs and interviews revealed that the Senior Associates Programme, designed for scientists between the ages of 46 and 65, goes beyond providing support to individual careers and operates as an international cooperation network. **Senior Associates tend to use ICTP connections to mobilise support towards their scientific institutes and communities**. In their applications and reports, they provide information on their capacity-building work, but FGDs with senior associates indicated that the planning and reporting of their relationship with ICTP is more focused on research. They also highlighted that they had more support for their institution-building work when it was possible to associate their home institutions under the "federated institutes programme" and funding was available to incorporate students to ICTP's missions.

83. Alumni also constitute a network for knowledge exchanges. According to the survey, more than half of former ICTP students maintain connections with ICTP and participate in at least one activity after leaving the Centre. The ICTP activity with most alumni mobilisation is Networks, followed by schools, conferences, and research projects (see Annex VI. Question 23). Evaluation informants agree that

36 National Institute of Oceanography and Applied Geophysics (OGS), National Research Council (CNR), National Institute of Geophysics and Volcanology (INGV), Stazione Zoologica Anton Dohrn Napoli (SZN), National Institute for Nuclear Physics (INFN).

37 With the exception of HECAP, which has two Affiliated Centres.

the potential of the alumni network has not been fully harnessed, and ICTP is currently working on a "**global portal,**" an Internet portal that will support a more formal network, maintaining contact with alumni, monitoring their careers (see para. 46), and potentially supporting fundraising.

84. Connections with UNESCO Field Offices and other networks have not been sufficiently explored, apart from a few exceptions in the fields of artificial intelligence or earth sciences. Many informants insist that ICTP's strength lies in scientist-to-scientist cooperation, fostering personal relationships and collegiality, while senior associates and some ICTP informants think that stronger UNESCO visibility and coordination **could further empower scientists** in developing countries for advocacy purposes by providing access to policymakers, international cooperation entities, and funding.

Finding 15. The IAEA and ICTP leverage cooperation opportunities, while the relationship between the ICTP and UNESCO is mainly administrative.

85. ICTP's main interaction with its governing partners takes place within the **Steering Committee,** where the budget and annual accounts are approved, as well as strategic plans and annual reports. However, strategic plans are designed by the Centre's Directorate in consultation with the **Scientific Council**, which spends more time at its annual meetings monitoring the content and quality of research programmes and agendas. Although there are communication channels between both bodies, governing partners do not participate in the scientific council, as its members are prestigious scientists in the fields of ICTP's sections. In general, ICTP is run by scientists and for scientists, with a high degree of autonomy.

86. IAEA and ICTP frequently collaborate on **activities based on common scientific interests**. ICTP and UNESCO do not collaborate this way, with only the Earth System Physics Section reporting regular exchanges with staff at UNESCO Headquarters and field offices.

87. ICTP staff often describe UNESCO and ICTP as having a merely **administrative relationship**. Indeed, ICTP is administered as a UNESCO Category 1 Institute, which follows UNESCO rules and systems, including accounting, auditing, procurement, and human resource management. In this area, ICTP's peculiarities as a research centre have given rise to some problems in adapting UNESCO regulations to activities that are not found in other UNESCO entities, such as accessing research grants or transferring funds to Associates. The 2012 and 2016 UNESCO Audits revealed areas that required the Directorate's attention, such as the administration of allowances and entitlements, contracting, procurement, and selection processes.

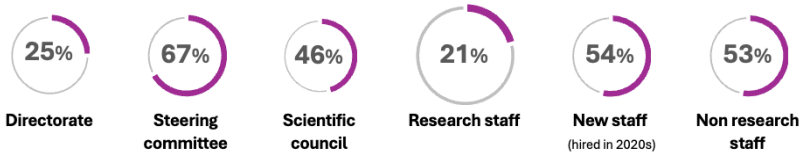
Finding 16. ICTP projects its commitment to equality by attaining gender balance in its scientific committee and new research staff hires.

88. The most important aspect ICTP's **management from an inclusive perspective** is that a large share of its funding is allocated to high-quality programmes devoted to scientists from developing countries, covering not only education and research, but also travel costs, scholarships, and stipends.

89. Through its selection system, SIGMA, ICTP staff tracks applicant features, filtering data by gender, age, and country of origin. This allows them to further **prioritise some target groups, although quotas are not imposed**, while excellence remains a requirement. ICTP staff indicated that they tend to select a higher share of women over men applicants, compared to the overall distribution of applications, which was confirmed with SIGMA data only for long-term programmes (see Annex VII. A. Applications and Admissions). Regarding inclusion of African scientists, FGDs expressed that ICTP could better advertise its programmes in the African continent to encourage more incoming applications from there. However, the analysis of applications and admissions data indicate that applications from the continent are already relatively high and that some mentoring prior to applications could be more useful for these underrepresented countries to increase their participation in ICTP.

90. ICTP's staff shows commitment towards the **promotion of women scientists** by showcasing success stories of women scientists. On this note, the Centre has sent a clear message by forming a **gender-balanced steering committee**, but its research staff and directorate remains imbalanced. New hires indicate this will change through generational handover (see Figure 16).

Figure 16. Women's participation in ICTP has been increasing with the Steering Committee and recently recruited staff, enhancing gender equality.

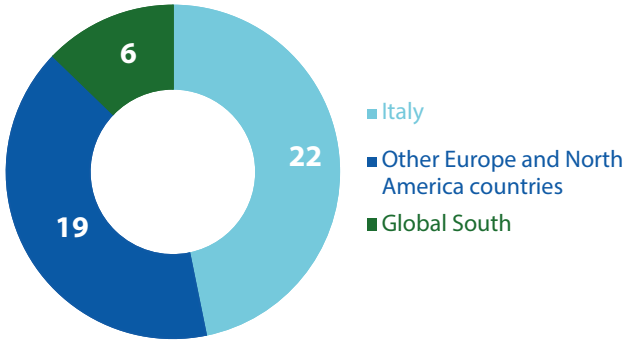


Source: ICTP HR files and webpage (See Annex VII).

91. ICTP's management emphasises inclusiveness and states that diversity is actively sought across **various dimensions** in addition to gender. Special attention is given to some countries facing difficulties such as political conflicts. On this note, the Centre has allocated a specific budget for scientists from countries in conflict and has set up a mental health support system. No information has been collected on ICTP's inclusion of people with disabilities except for a publication by the Science Dissemination Unit. Finally, it must be noted that the ICTP research staff does not reflect the geographic diversity of the Centre's programmes and mission.

Figure 17. Nearly half of ICTP's research staff consists of Italian nationals

Number of staff per geographic origin in June 2024



Source: ICTP HR files and webpage (See Annex VII).

3.6. Sustainability

Finding 17. The Centre's significant expansion during the last decade, along with inflation and infrastructure maintenance costs have put some pressure on its core funding.

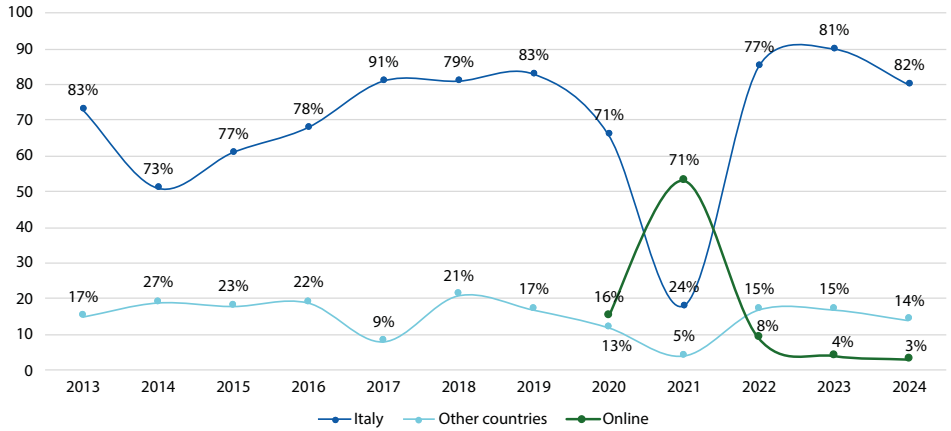
92. The Centre has **expanded significantly** over the last 10-12 years in terms of programmes, sections, and participants. Its core funding has been stable, and its main donor remains committed to sustaining funding for ICTP. However, last year's **inflation** has caused ICTP's staff to try to keep up with activities with a smaller budget in real terms. Staff also explained that prior to this, the Centre had already undergone efficiency gains by reducing the number of administrative staff and automating some administrative processes. Some researchers also highlighted that their bureaucratic burden has increased at the expense of their research work.

93. The Centre is compensating for inflation with a **proactive search of sponsors,** including private sponsors that can also add technical and strategic value to some projects, such as the quantum computing consortium. It also proactively seeks **external funding for events and fellowships**. Currently, external funding constitutes a small but growing part of ICTP's overall budget.

94. As suggested in the ICTP Strategic Plan Summary 2020-2024, ensuring ICTP's sustainability would require **upgrading its infrastructure**, including scientific and academic resources. This upgrade is under way and includes renovations, energy efficiency measures, and ICTP system upgrades (i.e. digitalising the ICTP library).

95. During the Covid-19 pandemic, ICTP successfully transitioned all its activities online. After the pandemic, the focus has been on returning to normality, and it has not sufficiently harnessed **online learning and networking** (Figure 18), which could produce efficiency gains.

Figure 18. The share of ICTP activities outside Trieste remains relatively low.



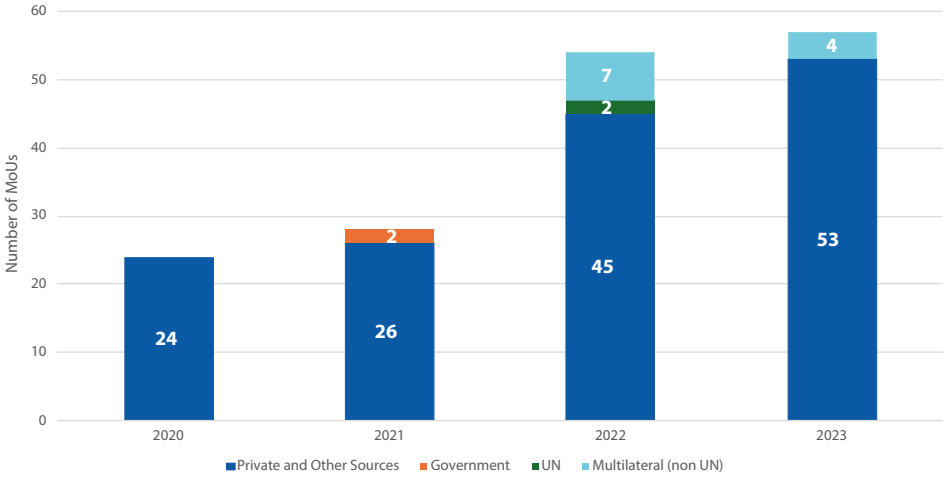
Source: SIGMA. (See Annex VII).

Finding 18. Ongoing strategic reflections at ICTP focus on the Centre's financial sustainability and contribution to 'open science.'

96. ICTP has valuable and durable assets, such as a **proven intervention model** (see Box 2), scientific excellence, and reputation. This model attracts applications and partners, as well as staff demonstrating a sense of duty and pride in contributing to ICTP's mission. This is understood by governing partners and supported with a tripartite, long-lasting agreement, including the Government of Italy's significant financial commitment. Additionally, networks with alumni, sponsors, long-term institutional partners, and individual associates can further enhance an efficient and sustainable use of ICTP's resources.

97. The expansion of the Centre's activities and the inflationary contexts (see para. 92) prompt ICTP to rethink its sustainability and financing models. This leads to the transition from a regular programme budget **to growth** funded through Voluntary Contributions and projects. ICTP is actively seeking external funding for events and fellowships and has significantly increased its Memoranda of Understanding (MoU) with sponsors and donors.

Figure 19. The increasing number of MoUs has resulted in more voluntary contributions granted to fund ICTP.



Source: ICTP data on MoUs (See Annex VII).

98. ICTP's **Directorate** includes a Special Advisor to the Director on Operations, with a UNESCO operations background, who specifically looks at the centre's operational and financial sustainability. The Director is particularly active in exploring and leveraging partnerships, and diversifying the Centre's financial resources.

99. The frameworks to ensure ICTP's sustainability are quadrennial strategic plans. Due to the ongoing celebration of ICTP's 60th anniversary, the Centre's director delivered a reflection on "**ICTP Vision 2064,"** which drew on the centre's 60-year track record of excellence and inclusion in global science, as well as its UN-affiliated assets like political neutrality and convening power. This vision strongly emphasises the evolving concept of 'open science' and the promotion of strategic projects for developing countries on technological development and shared infrastructures (Para. 61). This includes the new flagship project to set up an **International Consortium for Quantum Computing,** which leverages financial support from multinational companies like IBM, AI Alliance, and other corporations, in line with a financial diversification strategy.

100. It is unclear whether ICTP and UNESCO have sustainability frameworks for **expanding ICTP's activities through Partner Institutes**. On the one hand, the establishment of a Category 2 Institute entails a Member State's commitment to financial sustainability, institutional autonomy, and strategic alignment. On the other hand, experience shows that these institutes face serious sustainability challenges; participants in other ICTP networking modalities have also demanded mechanisms to support establishing spin-offs of ICTP collaborations in Affiliated Centres and the home institutions of ICTP associates. The strategic planning and management of ICTP are not currently funding other partners such as Affiliated Centres, research networks, or Associates' home institutions.

Conclusions

101. Sixty years after its establishment, **ICTP's mission and approach remain relevant** to developing countries. ICTP is a centre of international excellence and is unique in its openness and dedication to scientists from the Global South. The Centre is proactively managed, demonstrating its capacity to adapt to emerging challenges and opportunities such as artificial intelligence, quantum computing, or climate research.

102. Its capacity-building programmes **effectively reach a global scope and provide talented male and female scientists with career opportunities** that cannot be found in their home countries. Nevertheless, the Centre's impact on developing countries could be better monitored to further enhance its three pillars towards its strategic goals.

103. In the international cooperation pillar, ICTP facilities located in Trieste operate as a **global scientific hub** which is highly appreciated by students and scientists for its scientific and cosmopolitan value. Moreover, ICTP has demonstrated a **strong capacity to deploy networks** in developing countries that amplify its support to local scientific communities, both at training and research levels.

104. There is a growing demand for more **on-the-ground activities jointly organised** by ICTP and its partners in developing countries. However, these activities incur higher costs for ICTP staff compared to those held in Trieste. The most ambitious collaboration model, the ICTP Partner Institutes, has yielded mixed results. Conversely, the Senior Associates Programme, which does not have such institutional implications, is effectively functioning as an international cooperation network, contributing to capacity-building in local scientific communities.

105. According to ICTP's mission statement, the international cooperation pillar includes an **advocacy dimension**. Despite some interesting ad hoc examples provided by ICTP's staff on the Centre's science diplomacy and influence on national governments, this dimension has not been precisely defined nor planned.

106. ICTP's goals and achievements are **not clearly positioned within UNESCO's** broader programming, and the UNESCO brand, mission, and organisation are not well known to ICTP participants. Additionally, ICTP's strategic planning is carried out with little involvement from UNESCO. Both parties recognise that strategic cooperation has not been systematically sought in the past and acknowledge the need for improved communication and mutual understanding to attain closer collaboration and synergies.

107. The review of strategic documents and interviews with management staff reveal that these **collaboration opportunities may arise** in areas like the advocacy and international cooperation pillars, science literacy, and the building and monitoring of higher education capacities. Moreover, ICTP can be showcased as **a UNESCO capacity-building model** that could be replicated in other higher-education and research areas.

108. Any expansion made to the Centre, such as working towards closer cooperation with UNESCO or executing clearer action in the advocacy pillar, will require **extra funding,** as the centre's activities have expanded significantly, and core financing has been eroded by inflation. Such resources may require leveraging external funding and other partnerships, in line with ongoing efforts by ICTP's management.

Recommendations

109. ICTP is globally recognised as a unique centre of excellence and has been able to maintain its uniqueness thanks to the attractiveness of its mission and style, the success of its training and research activities, its relevance to developing countries and global development challenges, as well as the stable support of its governing partners and collaborative networks. Therefore, any recommendation for the future direction of the Centre must be based on continuity and fidelity to the founding mission and scientific cooperation approach envisioned by its founder, Abdus Salam.

110. To further enhance ICTP's mission, the evaluation team has formulated three recommendations for ICTP that derive from the findings and conclusions and that could be incorporated into the elaboration of the new ICTP strategy for 2025-2029. Additionally, it is suggested that the UNESCO Natural Sciences Sector, Bureau of Strategic Planning (BSP), and Field Offices collaborate on the implementation of two of these recommendations.

Recommendation I.

ICTP should enhance its strategic planning and monitoring by systematically measuring the impact of its educational and career development programmes on developing countries.

Addressed to: ICTP Director, with the support of BSP

To be implemented by: June 2025

ICTP should develop tools to regularly monitor the impact of its different activities on developing countries and better leverage the data it already collects to better plan its activities. Collecting and using such metrics would enhance ICTP's capacity to measure its impact, showcase its achievements, and identify gaps where it could further invest its efforts.

Suggested actions include:

1. To replicate **tracer studies**: As in this evaluation, a tracer study approaches the impact of an educational programme by collecting data on programme graduates' employment status years after their programme completion. Information on the country of employment of former ICTP students and Associates is highly relevant for the follow-up of ICTP's mission and is relatively easy to collect among alumni.

2. To draw on **data from existing systems** (i.e. SIGMA) to monitor the effectiveness of various programmes: ICTP could also extract "business intelligence" from its SIGMA system used to manage applications and admissions to their various programmes, and from Associates' applications and annual reports. In particular, Senior Associates' reports could aggregate interesting information on the capacity-building effects of ICTP's networks.

3. To integrate a **Results-Based Management** (RBM) system in line with UN good practices: The incorporation of these indicators and sources to ICTP's strategic planning could be guided by RBM principles, as done in UNESCO and other UN Agencies.

4. To draw on **associates' applications and annual reports** to aggregate data on capacity-building.

5. To capitalise on ICTP's experience and produce an "ICTP toolkit" while **linking programmes to concrete capacity-building, advocacy goals, and indicators**, further enhancing ICTP's and UNESCO's know-how.

Recommendation II.

ICTP and the UNESCO Natural Sciences Sector should refine ICTP's third pillar on international cooperation and advocacy.

Addressed to: ICTP Director and Assistant Director-General for UNESCO Natural Sciences

To be implemented by: December 2025

ICTP and the UNESCO Natural Sciences Sector should jointly clarify how ICTP's international cooperation activities are to be used for advocating the promotion of science in developing countries and globally. Such clarification should include a definition of the different roles that ICTP, UNESCO Headquarters, and Field Offices play, as well as areas for potential collaboration and synergies. To improve collaboration and mutual understanding between ICTP and other UNESCO entities, it is suggested for this strategic reflection to include a flagship project that advances joint action in ICTP's third pillar and serves the UNESCO Natural Sciences Sector's mission in concrete countries or regions.

Suggested actions include:

1. To leverage ICTP's networks to **monitor science and higher education** globally (e.g. the UNESCO Science Report).

2. To **disseminate the ICTP model** among UNESCO's financial and technical partners, exploring the possibility of replicating the model in other areas of science and higher education to expand UNESCO's capacity-building work.

3. To enhance the capacity-building dimension of the Senior Associates programme by **awarding Senior Associates with a UNESCO designation** and by raising the networking, resource mobilisation, and advocacy of applications and reports related to the Senior Associates subprogramme.

Recommendation III.

ICTP should set a localisation plan aimed at deploying an increasing number of activities in the Global South, with a focus on underrepresented regions.

Addressed to: ICTP Director with support from the Executive Office of the UNESCO Natural Sciences Sector and UNESCO field offices

To be implemented by: December 2025

To amplify the benefits of ICTP's model in the Global South and strengthen its networks in developing countries, ICTP should increase on-the-ground activities in collaboration with local institutes. To achieve this, ICTP should first assess the costs and benefits of its various network modalities, including Partner Institutes, Affiliated Centres, research networks, and the Senior Associates Programme. Based on this assessment and in collaboration with other UNESCO entities, ICTP could develop a localisation plan focusing on countries and regions that are underrepresented in its activities and face higher barriers to conducting quality research.

Suggested actions include:

1. To capitalise on the **successful experience of the ICTP-SAIFR partnership** in comparison to other Partner Institutes in a view to inform future partnership negotiations and renegotiations.

2. To plan and monitor the capacity-building effects deriving from the Senior Associates programme

3. To enlarge the **Physics Without Frontiers** programme and further mobilise volunteer support from North-based centres of excellence in order to meet the demands for support from South-based universities, in particular for the mentoring of talented students that may increase participation in ICTP's programmes.

4. To mobilise **UNESCO Field Offices** in support of ICTP's localisation efforts by enhancing visibility and supporting sustainability and fundraising.

5. To seek synergies with capacity-building programmes of the **Natural Sciences Sector** across developing countries (e.g. the Remote Access to Laboratory Equipment initiative).

Annexes

Technical annexes

(available upon request at ios@unesco.org)

Annex V. Evaluation matrix

Annex VI. Tracer study

Annex VII. Data analyses

- A. Applications and admissions
- B. HR data
- C. Memoranda of understanding
- D. Bibliometrics
- E. Web content data

Annex VIII. Evaluation tools

- Questionnaire 1: Review of institutional documents
- Questionnaire 2: Review of ICTP files
- Questionnaire 3: Administrative data analysis
- Questionnaire 4: Bibliometrics
- Questionnaire 5: Tracer study
- Questionnaire 6: Interviews with governing partners
- Questionnaire 7: Interviews with ICTP staff
- Questionnaire 8: Interviews with developing countries' partners
- Questionnaire 9: Other centres of excellence
- Questionnaire 10: Focus groups with ICTP end users
- Questionnaire 11: Computerised content analysis

Annex I. Terms of Reference

Terms of Reference (ToR)

Evaluation of the Abdus Salam International Centre for Theoretical Physics

Background

1. Founded in 1964 by Nobel Laureate Abdus Salam, the Abdus Salam International Centre for Theoretical Physics (ICTP) is a leading research centre based in Trieste, Italy, designed to promote scientific research, international exchange, and capacity-building for scientists across the world. Its focus is mainly on the areas of advanced theoretical physics and mathematics, including their applications in climate, materials, life, and other related sciences. It was initially established under the auspices of the International Atomic Energy Agency (IAEA). As the scope of its activities expanded, UNESCO became increasingly involved and eventually took over the administration of the Centre in 1995.

Governance

2. Today, the ICTP is governed through a tripartite agreement between the Government of Italy, the International Atomic Energy Agency (IAEA) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO), which was approved by the Italian Parliament in 1995. ICTP-related decisions are thus taken collaboratively through a Steering Committee composed of the ICTP Director and a representative of each of the three entities.[38] In addition to the Steering Committee, a Scientific Council composed of 13 eminent scientists, including several Nobel laureates and Fields medallists, advises ICTP on its programmes of activity having due regard to major academic, scientific and educational trends in the world relevant to the Centre's objectives.

3. ICTP was also granted the status of a Category 1 Institute under the auspices of UNESCO. Category 1 institutes follow UNESCO's rules and regulations, in close collaboration with UNESCO Headquarters, and are granted functional autonomy.[39] Functional autonomy allows the Centre to have sole responsibility for the preparation of its programme and budget, the authority to draw up detailed implementation plans and to accept income, incur obligations, make expenditures, transfer funds, and establish reserves.[40] ICTP is the only Category 1 institute under the purview of UNESCO's Natural Science Sector.

Mandate

4. The ICTP's mandate is articulated around three main pillars:

   a. **Scientific research**: ICTP conducts world-class research in frontier areas of science, seeking to foster and promote excellence in science.

   b. **Capacity-building:** ICTP offers advanced study programmes and research facilities in physical and mathematical sciences, especially targeting scientists from the developing world, with a view to bridge the knowledge gap. Inclusive science is at the core of its mandate. The training delivered focuses on various levels of research from the postgraduate level to more advanced levels.

   c. **Science advocacy and international cooperation**: ICTP provides an international forum of scientific contacts for scientists from all countries and aims to promote scientific research worldwide.

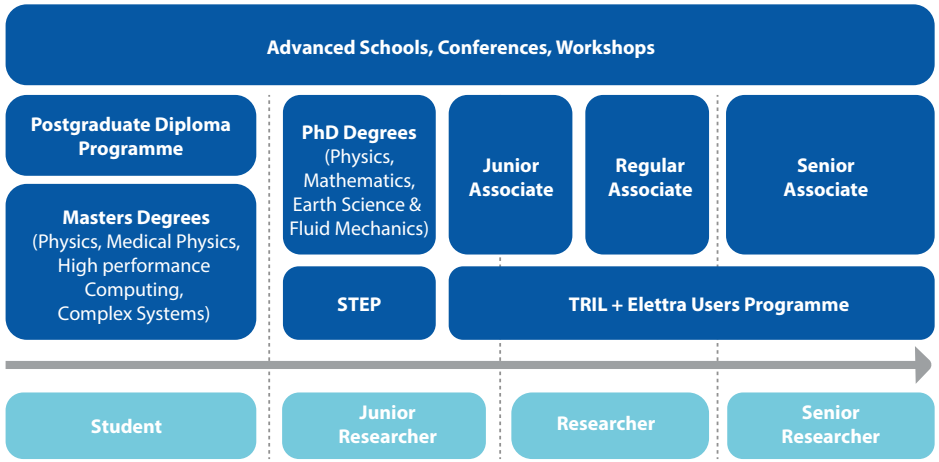
38 The Steering Committee is composed of the ICTP Director, the Assistant-Director General of the Natural Sciences Sector of UNESCO, the Deputy Director General of the Nuclear and Sciences and Applications Department of the IAEA, and an eminent Italian scientist representing the Government of Italy.

39 UNESCO, Executive Board, 171st session, *Report by the Director General on the revised and completed principles and guidelines regarding the establishment and operation of UNESCO institutes and centres (Category 1) and institutes and centres under the auspices of UNESCO (Category 2)*, March 2005.

40 Ibid, paragraphs 32 to 34 define functional autonomy as follows: "Functional autonomy means that the institutes and centres are given sufficient delegated authority and flexibility to carry out their mandate fully and effectively {…} in particular, functional autonomy allows the entities concerned to respond more flexibly to requests and to attract funds which may not otherwise have been directed to UNESCO. Functional autonomy should not translate into general rules applicable in all cases, but rather allow the design of diversified approaches {…} while recognising the need for shared standards in matters related to accountability, transparency, management principles, and reporting practices."

5. ICTP hosts a large diversity of scientists and students on its campus in Trieste, Italy with a focus on developing its **educational programmes** (Figure 20). Every year, ICTP invites over 6,000 scientists from around the world, 70% of whom are from 140 developing countries. It offers its flagship pre-doctoral diploma programme,[41] three Master's degree programmes,[42] three PhD programmes, and the STEP programme that enables international PhD students to attend ICTP for up to six months a year over the course of their four-year PhD programme. ICTP also offers *ad hoc* capacity-building opportunities for professional scientists to regularly visit the centre and conduct research (i.e. Associates Programme) or attend cutting-edge conferences. To further support scientists from the developing world, ICTP offers scholarships worth 1 million euros a year, which allows it to financially support over 50 postgraduate students.

Overview of ICTP's educational programmes (previously Figure 1)



Source: ICTP.

6. Trieste has one of the highest ratios of 'scientist per habitant' in Europe. It is a major scientific hub, with over 30 scientific institutions based in the city.[43] ICTP collaborates with several universities, namely the University of Trieste and SISSA, through partnerships aimed at fostering capacity-building and exchange opportunities for ICTP students. As ICTP is not a certifying entity, these partnerships also allow the students to validate their courses in ICTP with a graduate degree issued by one of the partner universities.

- Over the years, ICTP has developed a large network of scientific institutes with which it cooperates regularly to favour scientific research and exchanges. These initiatives are led and coordinated by its Office of External Activity. Below is the current list of initiatives:
- **Four ICTP Partner Institutes**:

  a. The ICTP South American Institute for Fundamental Research (SAIFR) in Brazil

  b. The East African Institute of Fundamental Research (EAIFR) in Rwanda

  c. The ICTP-Asia Pacific in China

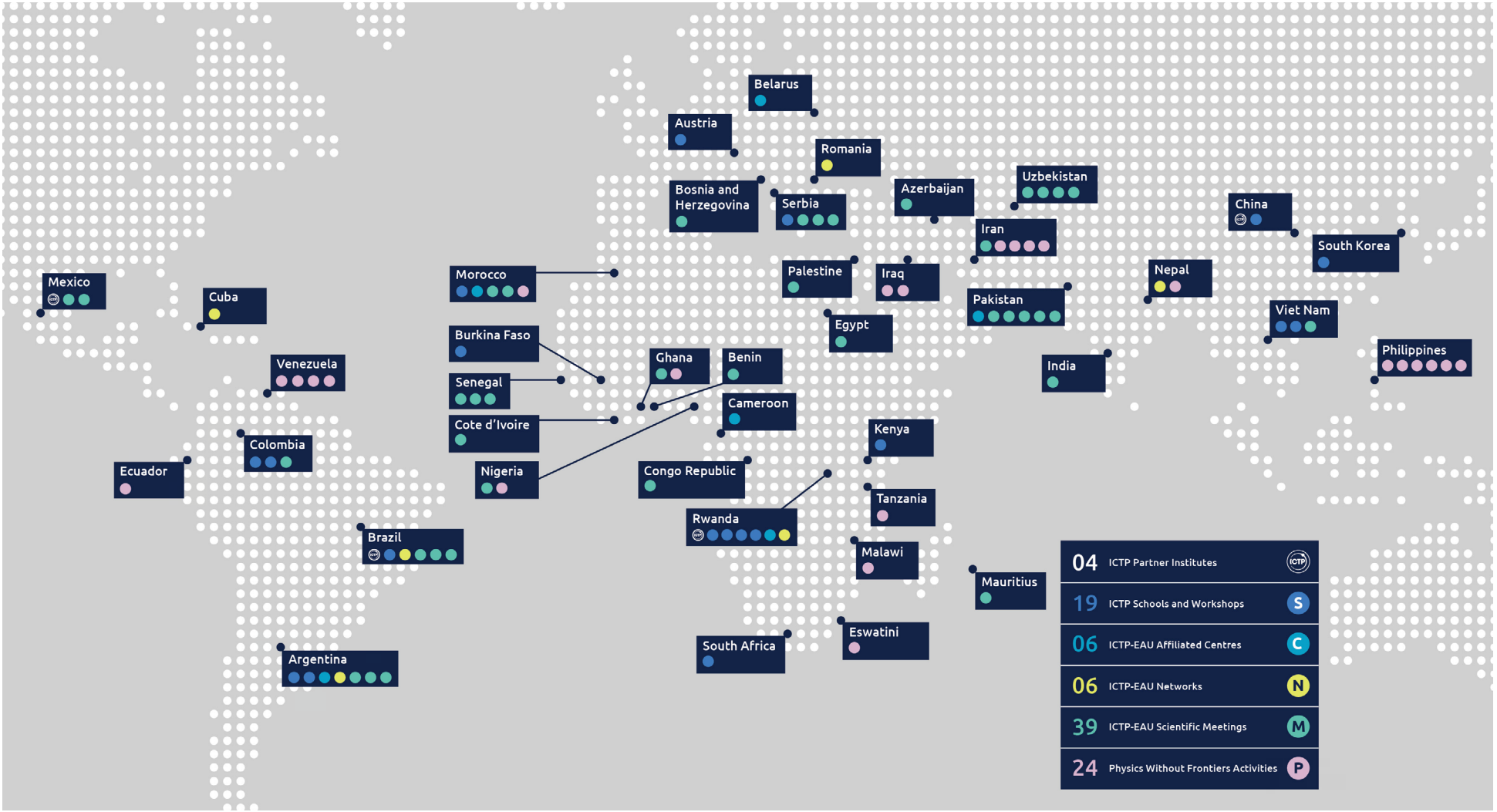
  d. The Meso-American Institute for Sciences in Mexico

The regional centres aim, like ICTP, to foster science in countries and sub-regions with the goal of creating regional hubs of quality scientists with a strong research culture. These independent entities, Category 2 Institutes under the auspices of UNESCO,[44] are governed by their own Steering Committees, with the participation of an ICTP representative. ICTP does not directly control or govern these institutes, and the degree of cooperation with ICTP varies from one Partner Institute to another.[45]

41 The Diploma programme is a one-year undergraduate programme. It is divided into 5 sections, each registering a yearly intake of 20 students. The 5 sections are: (i) High Energy, Cosmology and Astroparticle Physics; (ii) Condensed Matter Physics; (iii) Earth System Physics; (iv) Mathematics and (v) Quantitative Life Sciences. For more information, see ICTP Postgraduate Diploma Programme.
42 See ICTP Master's Degree Programmes.
43 See MIB Trieste - Research Institutes and Centers of Higher Education.
44 A Category 2 Institute is not legally part of UNESCO but is an 'institution proposed by Member States to contribute to the achievement of UNESCO's Approved Programme and Budget (C/5) including global strategies and action plans as well as sectoral programmes and priorities through the implementation of international and regional cooperation, research, knowledge production, policy advice and capacity enhancement' (UNESCO General Conference, 40th session, 2019, *Strategy for Category 2 institutes and centres under the auspices of UNESCO* (40C/79).
45 For example, as of December 2023, ICTP had a formal memorandum of understanding with the institutes in Brazil and Rwanda, but none for those in China and Mexico.

- Six ICTP Affiliated centres in developing countries (Argentina, Belarus, Cameroon, Morocco, Pakistan, and Rwanda). They aim to facilitate information exchange between ICTP and research centres and universities in these countries to enhance training and research opportunities for scientists.
- Six ICTP networks (Argentina, Brazil, Cuba, Nepal, Romania and Rwanda). These networks facilitate cooperation of scientists around specific projects, bringing together interested institutes and partially financing these projects.
- The "Physics without Frontiers" (PWF) volunteer network has been bringing together interested physics and mathematics students and scholars to work together on international collaborative assignments since 2012. It also includes a mentoring scheme for young scientists.

Figure 20. Mapping of ICTP's outreach activities in 2022



Source: ICTP.

Situating the ICTP in UNESCO Natural Sciences Sector's Programme and Budget

7. In UNESCO's Approved Programme and Budget for 2022-23 (41C/5), the Centre is presented as contributing to capacity-building in science in line with UNESCO's mandate. The document reads:

"UNESCO's work in capacity development is at the heart of its mandate in science. UNESCO will therefore continue to implement its capacity-building mandate in the sciences through supporting, strengthening, and extending its network of research institutes and affiliated centres through the International Centre for Theoretical Physics (ICTP) which fosters research and capacity-building to advance scientific expertise in developing countries, including through short and long-term education and training programmes"[46]

8. As outlined in the 41C/5, ICTP's activities contribute to the achievement of the following outcomes and outputs of UNESCO's Medium-Term Strategy for 2022-29 (41C/4):

Outcome 4: Advance international cooperation in science, technology and innovation (STI)

Output 4. SC.4: Member States' capacities strengthened to improve STI policies and access to scientific and technological advancements, and enhance knowledge-sharing, including through open science.

Output 4. SC.5: Institutional and human capacities in basic sciences, technology, research, innovation, and engineering enhanced to advance knowledge for sustainable development.

9. In line with these outputs, the ICTP is expected to focus specifically on developing countries' scientific expertise in physics, mathematics, artificial intelligence, quantitative life sciences, and quantum information.[47]

Human and Financial Resources

10. In terms of human resources, ICTP is headed by an Assistant-Director General. The Centre is further composed of 161 staff,[48] including 45 permanent faculty staff members. There are also over 236 additional non-staff contract holders per year, including research fellows, students, and consultants.

11. The UNESCO budgetary resources specifically dedicated to ICTP come from the Natural Sciences' Sector's regular programme budget and stand at roughly 1 million USD per biennium (see Table 3). These are complemented by voluntary contributions from different sources, the largest donor being the Government of Italy. In the 2022-2023 period, of the total budget of more than 54 million USD, Italy's was 87% of ICTP's biennual budget. IAEA contributes approximately 5 million USD per biennium.

Table 3: Dedicated budget for ICTP in UNESCO's Approved Programmes and Budgets (in USD)

Biennium	Period	UNESCO Regular Programme Budget	Voluntary Contributions
41 C/5	2022-23	909,000	53,220,000
40 C/5	2020-21	909,200	45,600,000[49]
39 C/5	2018-19	819,400	53,900,000
38C/5	2016-17	1,015,000	53,970,000
37C/5	2014-15	1,015,000	66,650,500
36C/5	2012-13	1,015,000	69,198,300

Source: UNESCO's Approved Programme and Budget documents (figures in USD).

46 UNESCO Programme and Budget for 2020-21 (41C/5)
47 Resolution 20 of UNESCO General Conference, 41st session's Resolutions.
48 ICTP's staff includes 119 fixed term staff, 34 under Project Appointment and 8 under temporary appointment.
49 By mistake, the figures for the ICTP Voluntary Contributions reflected in the 40C/5 were in euros instead of US dollars. Hence, the apparent decrease in budget. This, however, does not accurately reflect the total.

12. While UNESCO's budgets are reflected in USD, ICTP's revenues are registered in euros. Keeping in mind the fluctuations in exchange rates, ICTP's budget has remained fairly stable over the past 10 years at around 46 million euros per biennium.

Table 1: ICTP revenues (in Euros)

Biennium	Period	ICTP Total revenues
41 C/5	2022-23	46,357,895
40 C/5	2020-21	46,146,193
39 C/5	2018-19	46,255,089
38C/5	2016-17	46,618,610
37C/5	2014-15	46,594,399
36C/5	2012-13	46,529,530

Source: ICTP's budget documents (figures in EUR).

Purpose and Use

13. ICTP was last evaluated in 2011 by the Evaluation Office of UNESCO's Division of Internal Oversight Service (IOS). In 2017, an evaluation of UNESCO's work on basic sciences touched marginally on aspects of ICTP's work. At the request of the Natural Sciences Sector, the IOS Evaluation Office will conduct an evaluation of the ICTP as part of IOS's corporate biannual evaluation plan.

14. The evaluation of the ICTP will assess:

- The relevance of ICTP's work in theoretical physics and mathematics and related fields
- The effectiveness and impact of ICTP's capacity-building, research, and advocacy initiatives
- The coherence and complementarity of its action with UNESCO's strategic objectives
- The efficiency of its approach
- The sustainability of its activities

15. The evaluation will adopt both a retrospective and a forward-looking perspective with action-oriented recommendations formulated on the basis of substantive findings.

16. While one dimension of the evaluation will be summative (i.e. to assess what has been achieved so far), its design will focus on assessing and exploring relevant formative elements to assist the UNESCO, IAEA, and the Government of Italy in decision-making and help strengthen the thematic area by providing evidence-based and future-oriented recommendations to help in adaptation and in shaping ICTP's future programming.

17. In pursuit of the main evaluation purposes, indicated above, the evaluation team will collect data, draw conclusions, formulate lessons learnt and articulate recommendations based on its assessment and analysis. It should provide evidence about key achievements of ICTP as a Category 1 Institute of UNESCO.

18. The Organisation's work is also guided by two Global Priorities endorsed by the UNESCO Member States: Priority Africa and Priority Gender Equality. The flagship programmes for Priority Africa are outlined in the UNESCO Operational Strategy for Priority Africa (2022-2029) as contained in Annex VII of the 41C/5. The ambitions for Priority Gender Equality, previously reflected in a standalone document - the UNESCO Priority Gender Equality Action Plan (2014-2021) – are now embedded in UNESCO's regular programming in the C/5. The evaluation shall assess the contributions made in this field to UNESCO's global priorities by collecting data on the gender dimensions and gendered impact of ICTP's actions in the area of scientific capacity building and theoretical physics, as well as focusing, as appropriate, on the specific needs and challenges of the African continent.

19. The main audiences for this evaluation are: ICTP Senior Management, the ICTP Steering Committee, and the ICTP Scientific Council. The secondary users are UNESCO Member States, associated networks, and the general public.

Evaluation questions and Scope

20. IOS conducted an evaluation of the ICTP in 2011. The current evaluation will focus on ICTP's activities over the past 10 years, from 2012 to 2023, and cover the full spectrum of activities led by ICTP.

21. The evaluation will develop evidence-based and future-oriented recommendations concerning ICTP's work. The evaluation will be guided by the revised OECD/DAC Evaluation criteria of relevance, coherence, efficiency, effectiveness, impact and sustainability[50]. An evaluation criterion is a standard used in evaluation as a basis for evaluative judgement. Evaluation criteria provide different lenses through which an evaluation can assess an intervention, programme, or entity. The criteria provide complementary perspectives, giving a holistic picture of the intervention. Interventions should be relevant to the context, coherent with other interventions, achieve results in an efficient way and have positive, lasting impacts for sustainable development.[51]

22. The evaluation will answer the following indicative list of questions:

Relevance

- How aligned is ICTP's programming and research activities with the needs of all scientists in the developing world irrespective of their gender?
- To what extent does ICTP's programming and research address emerging scientific needs and challenges and drive innovative scientific research?
- To what extent does ICTP's programming and research activities advance gender equality in the basic sciences?
- To what extent does ICTP's research and capacity building activities consider the science-Policy-society nexus to address pressing global scientific, social, and economic issues?
- To what extent is ICTP research also informed by indigenous knowledge at the local level?

Coherence

- To what extent does the work of the ICTP complement that of UNESCO's Division for Basic Sciences?
- What is the ICTP's added value vis à vis the Natural Sciences Sector's programming?
- Do ICTP activities favour intersectoral approaches on science and education? If so in what way?

Effectiveness

- To what extent is scientific research undertaken in ICTP impactful and recognized? What fields has it made a contribution in?
- How effectively has ICTP addressed current challenges for scientists in general and women scientists in particular?
- How effective has ICTP been in achieving the objectives it has set out along the 3 pillars – scientific research, capacity-building, and science advocacy?
- To what extent has ICTP encouraged and supported the increased consideration of women scientists?
- To what extent has ICTP aligned its strategic approach with UNESCO's global priorities Africa and Gender Equality as well as other priorities like Youth and SIDS?

50 The OECD-DAC defines the evaluation criteria as follows:

Relevance: Is the intervention doing the right things? Relevance is the extent to which the intervention objectives and design respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change.

Coherence: How well does the intervention fit? Coherence measures the compatibility of the intervention with other interventions in a country, sector or institution.

Effectiveness: Is the intervention achieving its objectives? The extent to which the intervention achieved, or is expected to achieve, its objectives, and its results, including any differential results across groups.

Efficiency: How well are resources used? Efficiency measures the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way.

Impact: What difference is the intervention making? Impact measures the extent to which the intervention has generated or is expected to generate significant positive or negative, intended or unintended, higher-level effects.

Sustainability: Will the benefits last? Sustainability measures the extent to which the net benefits of the intervention continue or are likely to continue.

51 OECD - Applying Evaluation Criteria Thoughtfully

- To what extent does ICTP consider disability inclusion in its capacity building and research activities?
- How effective has ICTP's outreach strategy been in terms of expanding ICTP's influence worldwide and enhancing local capacities?
- How successful is ICTP in attracting and retaining top-level researchers and scientists from around the world?
- What are the ICTP's strengths and weaknesses?
- What measures has ICTP taken to ensure the translation of its research findings into practical applications and real-world impact?

Efficiency

- Are human and financial resources used efficiently?
- How efficient is the management of ICTP's various networks (I.e. affiliated centres, networks?)
- To what extent are cooperation opportunities and synergies with other UNESCO entities leveraged to advance scientific research and science policy worldwide?
- What processes and mechanisms does ICTP have in place to ensure effective collaboration and knowledge sharing among its researchers?
- To what extent has ICTP leveraged its alumni and existing networks to strengthen its research and outreach activities?
- To what extent does ICTP interact regularly and coordinate with the IAEA and UNESCO's Naturals Sciences Sector for programme coordination (e.g. work plan processes and drafting strategic documents, briefings, etc..)?
- How well does ICTP leverage, attract and retain external funding and partnerships to support its research activities?

Impact

- Has ICTP fostered the development and enhancement of science in developing countries? If so, how is this manifested?
- To what extent has ICTP ensured that its advisory bodies (steering committee and scientific council) are gender responsive to ensure a balanced and more inclusive decision-making processes?
- What evidence is there of ICTP's contribution to scientific breakthroughs, policy development, and societal benefits resulting from its research?

Sustainability

- Does the ICTP have mechanisms in place to enable sustainable use of its resources, infrastructure, and long-term impact of its work?
- Has ICTP put in place a sustainability framework to enable its continuity and ensure long-term delivery of its mandate?

23. These questions will be agreed upon and further refined, prioritised and validated during the inception phase. A set of further sub-questions may be identified and guided by the following key dimensions.

Methodology

24. While the bidding evaluation team is free to propose their own methodologies, it is important that they be appropriate to answer the above-mentioned questions. It is expected that the overall design will include several of the suggested methods of data collection below:

    a. **document review** of relevant documents pertaining to ICTP's work. These shall include: ICTP documents and data bases such as publication lists and bibliometric reports, strategic plans, and other strategy documents (e.g. developed by the Scientific Council and Steering Committee); UNESCO documents and data bases such as UNESCO Programme and Budget (C/5), UNESCO Medium-Term Strategy (C/4), project progress and monitoring reports, regular programme and extrabudgetary for past and ongoing projects, previous evaluations and studies by UNESCO, ICTP, and third parties.

b. **Semi-structured interviews** with key stakeholders and beneficiaries. These may include: ICTP staff; UNESCO current and former staff members and consultants at Headquarters and in the Field Offices; relevant government officials from the Government of Italy; the IAEA and other relevant international organisations (both within and outside the UN System), research institutions and networks; NGOs; UNESCO Chairs and other networks; ICTP fellows, associates, students, and candidates; and other relevant stakeholders. They will be identified by applying a sampling strategy that ensures adequate geographical representation and participation of women and men.

c. **Online survey(s)** directed to groups of relevant stakeholders including UNESCO Member States and partners, ICTP Programmes participants, and former ICTP students/fellows. For maximum outreach, all surveys will be disseminated in English and French, at least.

d. **Observation field mission(s)** to ICTP premises in Trieste, Italy to conduct data collection, enable direct observation, and interact with researchers and staff to gain an understanding of their work and assess the effectiveness of research management and collaboration processes. (Please include travel costs in your financial proposal).

e. **Data analysis** based on triangulation of gathered evidence and formulation of preliminary findings as well as evaluation recommendations.

f. **Participatory stakeholder workshop** to be held remotely to validate the findings and discuss the preliminary recommendations and lessons learnt as presented in the draft evaluation report, prior to the finalisation of the evaluation report.

g. **Other methods and evaluation approaches** that the evaluator(s) may propose.

25. Preference will be given to proposals that suggest innovative methods and analytical approaches. The specific methods will be further refined during the inception phase, in consultation with the Evaluation Reference Group (ERG) and the evaluation team.

26. The evaluation team will use a mixed methods approach involving quantitative and qualitative data from multiple sources. Any findings require triangulation with more than one data source. The evaluation approach and data collection methods should also seek to be human rights-based, gender-sensitive and take into consideration the diverse cultural and social contexts in which the activities are being implemented. Whenever relevant and possible, data should be disaggregated by sex, age, ethnicity, and disability.

27. The evaluation team should submit an inception report at the end of the initial stage of the evaluation to agree upon the detailed methodological approach, evaluation matrix, and workplan. This will have to be presented and discussed at an inception meeting with the evaluation reference group.

28. In line with UNESCO's Evaluation Policy , the evaluation will have to comply with the United Nations Evaluation Group (UNEG) Norms and Standards for Evaluation, UNEG Guidelines for Integrating Human Rights and Gender Equality in Evaluations and UNEG Ethical Guidelines for Evaluation. The evaluation team will also have to ensure that ethical, human rights and gender equality principles are duly integrated at all stages of the evaluation process.

29. The draft report and final evaluation report should be professionally edited for language to ensure clarity and conciseness. *(Please include editing costs in your financial proposal.)*

Roles and Responsibilities

30. The evaluation will be managed by UNESCO's Division of Internal Oversight Services (IOS) and conducted with the support of a team of external consultant(s). The evaluators are expected to contribute specific evaluation expertise along with knowledge and expertise of the substantive field of basic sciences (theoretical physics and mathematics preferably). IOS will be responsible for the quality assurance of the evaluation process and all deliverables. The final evaluation report will also be assessed against the UNESCO Evaluation Report Quality Checklist as contained in Guidance 13 of the UNESCO Evaluation Manual https://unesdoc.unesco.org/ark:/48223/pf0000383948. The evaluation team will be expected to develop a detailed evaluation methodology including an evaluation matrix and data collection tools, to enable data collection and analysis and to prepare the draft and final reports in English.

31. An ERG shall accompany the evaluation process and provide feedback on the inception report and draft evaluation report. The reference group will include representatives from different entities, namely ICTP, UNESCO's Natural Sciences Sector, the UNESCO Cabinet, the International Atomic Energy Agency, and the Italian Government. The reference group shall exchange/meet periodically and be consulted in the different stages of the evaluation, as appropriate.

32. The evaluation team will commonly be responsible for their own logistics: office space, administrative and secretarial support, telecommunications, printing, travel, etc. Suitable office space will be provided when the consultants are working in UNESCO premises. The evaluation team will be responsible for administering and disseminating all research instruments, e.g. surveys, with the support of the IOS Evaluation Office. The ICTP and Natural Sciences Sector will provide access to relevant documentation and contact details of relevant stakeholders and distribution lists. IOS will also facilitate access to UNESCO staff at both Headquarters and ICTP and provide contacts of representatives of external stakeholders and partners.

Required qualifications

33. The evaluation foresees a level of effort of around 75-85 professional working days. The recommended composition of the evaluation team includes at least two core members (i.e. one team leader and/or a senior evaluator and a subject matter expert). Note that alternative and larger team compositions will also be considered.

34. The assignment targets companies. Individual professional consultants can also apply for this assignment for an estimated 35-40 professional working days each, so long as they are registered as companies in their country of residence. In that case, please clearly indicate which role you are applying for (senior evaluator or subject matter expert). You must also be prepared to be paired with an individual consultant of UNESCO's choosing for this assignment.

Mandatory qualifications

The applicant(s) should possess the following mandatory qualifications and experience. Not meeting these mandatory criteria will disqualify a proposal.

The firm /legal entity (applies only if the applicant is a company):

- It must have been registered as a company for at least three years.
- It must have at least three previous contracts/references.

The consultant(s):

1. Team Leader and/or Senior evaluator:

- An advanced University degree at master's level or equivalent in evaluation, political science, social sciences, economics, public administration, or any field related to the topic of the evaluation.
- Broad expertise in project/programme evaluation, with a minimum of 10 years of professional experience in this field demonstrating a strong record in designing, conducting and leading evaluations.
- At least 7 years of working experience acquired at the international level or in an international setting.

- Excellent oral communication skills in English.
- Analytical and demonstrated excellent drafting skills in English (demonstrated in a sample of work).

2. Subject matter expert:

- An advanced University degree at PhD level or equivalent in areas relevant to the topic of the evaluation such as natural sciences, mathematics, physics or any related field.
- At least 5 years of professional experience in any of the STEM or technical fields of relevance to ICTP.
- Excellent oral communication in English.
- Demonstrated excellent report writing skills in English.

3. The proposed team members should collectively have the following mandatory qualifications:

- No previous involvement in the implementation of the activities under review.
- At least three examples of professional experience in academic accreditation processes.
- At least three examples of conducting assignments for the UN.
- Examples of work demonstrating understanding and application of UN mandates in Human Rights and Gender Equality and/or of gender- and culturally sensitive approaches in evaluation.

Desirable qualifications

The following qualifications collectively across all team members will be considered an advantage:

- At least three work experiences leading studies, research and/or evaluations in the area of basic sciences.
- Knowledge of ICTP thematic areas of work.
- Good working language skills in Italian.
- Working knowledge of other UN languages (French, Spanish, Russian, Arabic, Chinese).

35. Firms/institutions are required to provide evidence that demonstrates that the mandatory and relevant desirable criteria are met. According to the evaluation grid, proposals with additional references/proof of evidence to the minimum requirements shall receive higher scores.

36. Verification of these qualifications will be based on the provided curriculum vitae and may include a reference check. Names, titles, and contact details of three references should be provided as well as a web link or an electronic copy of one recently completed report with relevance to the assignment. Candidates are also encouraged to submit additional references such as research papers or articles of relevance.

37. If there are several team members, preference will be given to a gender-balanced and culturally diverse team. The evaluator(s) should make use of collaboration with national and / or regional evaluation experts where possible and appropriate, in particular for country case studies and/or in-country data collection.

Deliverables and schedule

Deliverables

The assignment will consist of the following main deliverables:

1. The inception report, which should be presented at an inception meeting. This report will outline the detailed methodological approach to take on the assignment and outline when and how the activities for this will be undertaken (work-plan) (max. 15 pp. excluding annexes)
2. The draft evaluation report, which should be presented at a stakeholder workshop. This report should include (a) the evaluation background, including a description of the evaluand and the evaluation methodology; (b) the evaluation findings; (c) conclusions and lessons learnt and (d) recommendations. In addition, it will include an executive summary of 2-4 pages (max. 30 pp. excluding annexes).

3. The final evaluation report. The report should be developed according to UNESCO IOS Evaluation Office template and quality guidelines, which will be provided at the onset of the evaluation. The final report will then be formatted by UNESCO to match the IOS Evaluation Office layout and branding for UNESCO corporate evaluation reports.

Schedule

The evaluation is expected to start in March 2024 and be concluded by July 2024. The overall indicative timetable of key activities and deliverables is shown below. Those in bold are the deliverables associated with payments:

Activity / Deliverable	Indicative date
Desk review and preparation	March 2024
Scoping interviews	Late March 2024
Draft inception report	Early April 2024
Inception workshop	Mid-April 2024
Final inception report	**Late April 2024**
Data collection (including mission to Trieste)	May 2024
Data analysis & write-up of draft evaluation report	June 2024
Draft evaluation report	**Mid-June 2024**
Stakeholder workshop (review of draft report)	Mid-July 2024
Final evaluation report	**Late July 2024**

ToR References

Relevant Evaluation Resources

UNEG (2020). *UNEG Ethical Guidelines for Evaluation*. New York City: United Nations Evaluation Group. Retrieved 14 June 2021 from: http://www.unevaluation.org/document/detail/2866

UNEG (2010). *UNEG Quality Checklist for Evaluation Reports.* New York City: United Nations Evaluation Group. Retrieved 29 May 2020 from: http://uneval.org/document/detail/607

UNEG (2014). *Integrating Human Rights and Gender Equality in Evaluations*. New York City: United Nations Evaluation Group. Retrieved 29 May 2020 from: http://www.unevaluation.org/document/download/2107

UNEG (2017). *Norms and Standards for Evaluation*. New York City: United Nations Evaluation Group. Retrieved 29 May 2020 from: http://www.unevaluation.org/document/download/27

UNESCO (2023). UNESCO Evaluation Manual. Paris: UNESCO. Retrieved 12 June 2023 from: https://unesdoc.unesco.org/ark:/48223/pf0000383948

UNESCO (2022). *UNESCO Evaluation Policy*. Paris: UNESCO. Retrieved 12 June 2023 from:

https://unesdoc.unesco.org/ark:/48223/pf0000381664.locale=en

Relevant Resources on ICTP

- ICTP website : https://www.ictp.it/
- ICTP partner institutions:
  - Chiapas, México – Mesoamerican centre for theoretical physics https://mctp.mx/
  - Sao Paulo, Brazil - ICTP South American Institute for Fundamental Research : https://www.ictp-saifr.org/
  - Kigali, Rwanda – ICTP East African Institute for Fundamental Research: https://eaifr.ictp.it/
  - Shanghai, China: ICTP Asia Pacific : https://ictp-ap.org/
- UNESCO Natural Sciences Sector:
  - Basic Sciences, Research, Innovation and Engineering: https://www.unesco.org/en/basic-sciences-engineering?hub=79845
  - Capacity building in basic sciences: https://www.unesco.org/en/basic-sciences-engineering/capacity?hub=79845
- IAEA website on nuclear science: https://www.iaea.org/topics/nuclear-science
- 2011 IOS Evaluation of ICTP: https://unesdoc.unesco.org/ark:/48223/pf0000211877.locale=en
- 2017 IOS Evaluation of UNESCO's work in capacity building in basic sciences and engineering: https://unesdoc.unesco.org/ark:/48223/pf0000258938.locale=en

Annex II. Bibliography

ICTP Sources

- Annual Report 2017
- Annual Report 2018
- Annual Report 2019
- Annual Report 2020
- Annual Report 2021
- Annual Report 2022
- Audit of ICTP – 2012
- Audit of ICTP – 2016
- Evaluation of ICTP – 2011
- ICTP | Empowering Gender Equality
- ICTP | Governance
- ICTP | Measuring ICTP's Impact
- ICTP | MoU
- ICTP | Our Mission
- ICTP | Physics Without Frontiers
- ICTP | SESAME
- ICTP | SESAME Center Inaugurated
- ICTP | Success Stories
- ICTP | Who We Are
- ICTP | Women in Science
- ICTP and the Developing World
- ICTP Gender Equality Action Plan
- ICTP Master's Degree Programmes
- ICTP Postgraduate Diploma Programme
- ICTP Science Dissemination Unit
- Strategic Plan 2015
- Strategic Plan Summary 2020-2024
- Technical Report 2017
- Technical Report 2020

UNESCO Sources

- About the UNESCO Natural Science Sector
- Audit - Accountability framework of Category 1 Institutes – 2019
- Strategic Results Report 2016
- Strategic Results Report 2020
- UNEG Ethical Guidelines for Evaluation
- UNEG Integrating Human Rights and Gender Equality in Evaluation
- UNEG Norms and Standards for Evaluation
- UNESCO | Celebration of the 60th Anniversary of ICTP
- UNESCO | Flagship Programmes
- UNESCO | Networks
- UNESCO | Recommendation on the Ethics of Artificial Intelligence
- UNESCO Evaluation Manual
- UNESCO Evaluation Policy
- UNESCO Institute for Statistics
- UNESCO Medium-Term Strategy 2014-2021

- UNESCO Medium-Term Strategy 2022-2029
- UNESCO Operational Strategy for Priority Africa (2022-2029)
- UNESCO Priority Gender Equality Action Plan (2014-2021)
- UNESCO Programme and Budget for 2020-21 (41C/5)
- UNESCO's Category 1 Institutes

Other Sources

- "Men and women differ in their perception of gender bias in research institutions."
- Alchemer
- Flourish
- Google advanced search
- INSPIRE
- MIB Trieste - Research Institutes and Centers of Higher Education
- Nature
- OECD - Applying Evaluation Criteria Thoughtfully
- OECD - DAC Evaluation Criteria
- SCIMAGO

Annex III. List of interviews

ICTP students and associates

Gender	Name	Gender	Name
Mr	Abdelmoneim Suleiman	Mr	Jose Cuevas
Mr	Adnan Noor Mian	Mr	Julian Alzate Cardenas
Mr	Ali Naji	Mr	Luis Foa Torres
Ms	Ambelu Tebabal Yirdaw	Ms	Meena Devi Jeypragasam
Ms	Camille D. Perlada	Ms	Michelle Reboita Simoes
Ms	Carolina Brito	Mr	Mikheil Tsisishvili
Mr	Celestin Kurujiyibwami	Mr	Mohammad Reza Ejtehadi
Mr	Christian Llemit	Mr	Narayan Adhikari
Mr	Christopher Godwin Udomboso	Ms	Neena Goveas
Mr	Claude Alain Kouadio	Mr	Oscar Alberto Zapata Noreña
Mr	Carlos Sandoval	Mr	Pablo Marquet
Mr	Dadhoul Remah	Ms	Pragya Shukla
Ms	Debora Princepe	Mr	Prasenjit Ghosh
Mr	Denilson Amador Mejia	Mr	Raju Khanal
Ms	Diana Lopez Nacir	Ms	Roaa Omer
Mr	Diyor Khazratov	Mr	Salim Davila Vergara
Mr	Edward Donkor	Mr	Sudipto Muhuri
Ms	Elizabeth Gasparim	Ms	Thi Kim Thanh Nguyen
Ms	Farah Ben Hammouda	Mr	Yassine Hassouni
Mr	Fikreselam Gared Mengistu		
Mr	Fouad El Haj Hassan		
Mr	Franck Michael Tchakounte		
Mr	Gebremedhin Kinfe		
Ms	Germaine Neza Hosana		
Ms	Hala Elkhozondar		
Ms	Imrana Zahid		
Ms	Jana Fakher		

ICTP staff

	Name	Position	Institution
Mr	A. Celani	Quantitative Life Sciences, Head of Section	ICTP
Mr	Atish Dabholkar	Director	ICTP
Mr	Bobby Achyara	Professor	ICTP
Ms	Corinne Degoutte	Fundraising and Institutional Advancement Officer	ICTP
Mr	Claudio Arezzo	Mathematics, Head of Section	ICTP
Mr	Dr Enrique Canessa	SDU coordinator	ICTP
Mr	Fred Kucharski	Professor - External affairs unit	ICTP
Mr	George Thompson	Emeritus scientist	ICTP
Mr	Giovanni Villadoro	Diploma Programme coordinator	ICTP
Mr	Graziano Giuliani	Scientific Programming Specialist	ICTP
Ms	Joanna Lacey	Director Office, Senior Secretarial Assistant	ICTP
Mr	Karim Aoudia	Earth Systems Physics, Head of Section	ICTP
Mr	Luciano Bertocchi	Former director	ICTP
Mr	Marco Esposito	Medical Physics, Research Scientist	ICTP
Mr	Marco Zennaro	STI Unit Coordinator	ICTP
Ms	Marta Venuti	Head Budget and Finance	ICTP
Ms	Mary Ann Williams	Public Information Officer	ICTP
Mr	Misha Kiselev	Diploma Programme coordinators	ICTP
Ms	Nadia Bingelli	Professor	ICTP
Ms	Nutan Wozencroft	Special Advisor to Director for Operations	ICTP
Mr	Paolo Creminelli	HECAP head of section	ICTP
Mr	Renato Padovani	Professor	ICTP
Mr	Ralph Gebauer	Professor	ICTP
Mr	Ralph Kaiser	Senior Coordinator, Programmes and advancement	ICTP
Mr	Rosario Fazio	CMSP, Head of Section	ICTP
Mr	Sandro Scandolo	Senior Coordinator of the ICTP Research Division	ICTP
Mr	Shaun Kennedy	Information and Communication Technology unit.	ICTP
Ms	Snezana Stantic	IT Engineer	ICTP
Ms	Vanja Gutovic	Education Specialist	UNESCOHQ

ICTP Scientific Council

Gender	Name	Position	Institution
Mr	Marc Mezard	Computational science professor. Chair of ICTP Scientific Council	Bocconi University Milano
Ms	Mercedes Pascual	Professor Biology and Environmental studies.	New York University
Mr	Peter Zoller	Professor for Theoretical Physics	University of Innsbruck

Governing partners

Gender	Name	Position	Institution
(H.E.)Mr	Liborio Stellino	Ambassador and Permanent Delegate to UNESCO	Italian Permanent Delegation to UNESCO
Mr	Alessandro Garbellini	Director for Multilateral Scientific Cooperation	Italian Ministry of Foreign Affairs
Ms	Alice Ochanda	Programme Coordinator, Executive Office of the Natural Sciences Sector	UNESCO
Ms	Amal Kasry	Chief of Section, Basic Sciences, Research; Innovation and Energy Section Natural Sciences Sector	UNESCO
Mr	Antonio Masiero	Professor; University Padova	Italy
Mr	Giuseppe Pastorelli	Deputy Director General for the promotion of Italy abroad & main director for Innovation and integrated promotion	Italian Ministry of Foreign Affairs
Ms	Lidia Arthur Brito	Assistant Director General for Natural Sciences	UNESCO

Other partners

Gender	Name	Position	Institution
Mr	Andrea Romanino	Director	International School for Advanced Studies (SISSA)
Ms	Catherine Meriaux	Director	East African Institute for Fundamental Research (ICTP-EAIFR)
Mr	Cosimo Solidoro	Director	National Institute of Oceanography and Applied Geophysics (OGS)
Ms	Ketty Segatti	Vice-director of the Central Directorate for training, education and family	Friuli-Venezia Regional government
Mr	Nathan Berkovits	Director	East African Institute for Fundamental Research (ICTP-EAIFR)

Annex IV. Evaluators' short biographies

Aitor Pérez, Ph.D. – Evaluation Team Leader

Aitor has over twenty years of experience in development cooperation, including fifteen as an external evaluator and researcher. As an evaluator, he has worked for UNCTAD, UNESCO, UNICEF and the ILO, as well as EU Institutions and several NGOs. He has conducted over forty evaluations and analyses in more than fifty countries, predominantly in Sub-Saharan Africa, on topics including TVET, entrepreneurship, employment, child labour, social protection, and development finance. As a researcher, Aitor has worked as a research fellow in think tanks such as FRIDE and the Elcano Royal Institute, conducting development policy analyses with a focus on development finance, private sector development, and the politics of aid. He regularly collaborates with the Trans-European Political Science Association (TEPSA) and the G20 think tank network, T20. He has published research results in Third World Quarterly, the Journal of Contemporary European Research, the Canadian Journal of Development Studies, Progress in Development Studies, and the Routledge book series 'Rethinking Development.' He is also a lecturer at the University of Salamanca in the master's degree programme for Global and International Studies.

Diego Blas, Ph.D. – Theoretical Physics Expert

Professor Blas is a world leader in theoretical physics in the areas of cosmology, particle physics, and gravitation. He was a staff member at the European laboratory, CERN, where he oversaw the Cosmology area of the Department of Theoretical Physics (CERN-TH). He has also been a CERN-TH delegate for APPEC and the CERN's Knowledge Transfer Group. He is an elected member of the LISA (the ESA's largest space mission) Consortium Constitutional Committee, with the mandate to restructure the Consortium of more than 1,800 scientists. He is also an elected member of the Executive Committee of C-PAN, the Spanish network of particle physics. His scientific impact ranks at 42, being twice in an h-index[52]. He has been awarded with the Buchalter Prize of Cosmology and has supervised PhD researchers at MIT, CERN, and other prestigious centres. He is often invited to speak and attend conferences on theoretical physics, such as EPS-HEP 2023 or SUSY 2024, as well as to participate in dissemination activities, including CERN's art and science and high school outreach programmes. His previous collaboration with ECOPER focused on the dissemination of global ideas on scientific policies.

Martiño Rubal, Ph.D. – Education Sector Expert

Martiño is an expert in education with extensive experience designing and implementing tracer studies, a social scientist, and STI programmes manager. As a staff member of the European Training Foundation (ETF), he helped develop the ETF, ILO, and CEDEFOP methodology to conduct tracer studies. His recently implemented tracer studies in higher education around the globe, namely Jordan (for the EU Delegation), and several Latin American and Caribbean countries (for the Inter-American Development Bank and the GIZ: Colombia, Paraguay, and Ecuador). Previously, while working at the ETF, he led the implementation of tracer studies in Palestine, Kyrgyzstan, Moldova and North Macedonia. Mr. Rubal has substantial experience in analysing qualitative and quantitative data from tracer studies and other surveys to measure the systemic impact of research and education cooperation programmes in developing countries. He led the STI programme and also gained experience in research management at the University of A Coruña (2019-2021), where he managed a programme aimed at increasing the university's excellence in science. He supports researchers, including by preparing projects for outstanding grant programmes, such as the European Research Council, Marie Skłodowska-Curie Actions (MSCA), or Science with and for Society (SWAFS).

Flavia Fernández – Quality Controller

Flavia obtained a bachelor's degree in Global Affairs with a concentration in international development from George Mason University (Viriginia, U.S.A) and completed a master's degree programme in Global and International Studies with a focus on business and negotiation from Universidad de Salamanca (Salamanca, Spain). Flavia has prior professional experience in the non-profit sector, working in organisations geared towards higher education and immigration. She has also worked for the local government in Virginia's Fairfax County, contributing to the health department's Covid-19 emergency response. In 2022, Flavia began working at ECOPER assisting in UN evaluation assignments with documentary review and conducting English report edition and quality assurance. In 2023, Flavia participated in the evaluation of the UNESCO Creative Cities Network (UCCN) as a quality controller.

52 The h-index provides the highest number of publications from a scientist that received h or more citations each, while the other publications have no more than h citations each.

DIVISION OF INTERNAL OVERSIGHT SERVICES

Evaluation Office