

# Making the invisible visible: A global examination of careers and recognition for Imaging Scientists in core facilities

Kerry Thompson<sup>1</sup> | Johanna Bischof<sup>2</sup> | Yara Reis<sup>3</sup> | Constadina Arvanitis<sup>4</sup> |  
 Olubunmi A. Balogun<sup>5</sup> | Claire M. Brown<sup>6</sup> | Mariana De Niz<sup>4</sup> | Marcela Díaz<sup>7</sup> |  
 Lize Engelbrecht<sup>8</sup> | Eunice Fabian-Morales<sup>9</sup> | Elnaz Fazeli<sup>10</sup> |  
 Georgina Fletcher<sup>11,12</sup> | Adan Guerrero<sup>13</sup> | Michelle S. Itano<sup>14</sup> | Eleanor Kable<sup>15</sup> |  
 Gregory T. Kitten<sup>16</sup> | Shinya Komoto<sup>17</sup> | Xiaoxiao Ma<sup>18</sup> | Peter John O'Toole<sup>19</sup> |  
 Andreia Pinto<sup>20</sup> | Cora Noemi Pollak<sup>21</sup> | Clara Prats<sup>22</sup> | Joanna W. Pylvänäinen<sup>23</sup> |  
 James Douglas Riches<sup>24</sup> | Jean Salamero<sup>25</sup> | Virginia Silio<sup>26</sup> | Stefan Terjung<sup>27</sup> |  
 Sophie Winter<sup>3</sup> | Graham Daniel Wright<sup>18</sup> | Lisa Yen<sup>28</sup> | Antje Keppler<sup>2,3</sup>

## Correspondence

Antje Keppler, Euro-BioImaging ERIC,  
 Heidelberg, Germany.  
 Email: [antje.keppler@eurobioimaging.eu](mailto:antje.keppler@eurobioimaging.eu)

## Funding information

CZI, Grant/Award Numbers:  
 DAF2021-225429, DAF2024-337146; NCI,  
 Grant/Award Number: CCSG P30  
 CA060553; Robert H Lurie  
 Comprehensive Cancer Center,  
 Grant/Award Number: 2023-329682;  
 RMS, Grant/Award Number:  
 UKRI-BBSRC (BB/Z000017/1);  
 NIH-NICHD Intellectual and  
 Developmental Disabilities Research  
 Center, Grant/Award Numbers: P50  
 HD103573, S10 OD032388, S10MH130455;  
 JSPS KAKENHI, Grant/Award Number:  
 JP22H04926; SingaScope—a  
 Singapore-wide microscopy infrastructure  
 network, Grant/Award Number:  
 NRF2017\_SISFP10; French National  
 Research Agency, Grant/Award Number:  
 ANR-24-INBS-0005 FBI BIOGEN

## Abstract

Imaging facilities underpin a growing share of modern life-science research, yet the career conditions and scholarly recognition of the Imaging Scientists in core facilities who design, deliver, and interpret imaging research remain uneven. This mismatch has previously been shown to risk loss of expertise, reduced service quality, and weaken long-term sustainability of shared research capabilities. To provide an evidence base for practical change, we synthesise findings from two complementary international community surveys run by Global BioImaging: a 'Top 5' survey on career development and job conditions (>290 responses spanning 43 countries) and an authorship&acknowledgement survey examining how publication credit is assigned for imaging-related contributions of core facility staff (>330 responses spanning 43 countries).

Across both surveys, respondents consistently link limited recognition to constrained career prospects. The career survey highlights recurring bottlenecks around progression routes, job stability and attractiveness, access to professional development, and the day-to-day consequences of being perceived primarily as service providers rather than scientific partners. The authorship&acknowledgement survey documents substantial variability in credit practices across facilities, disciplines, and regions, with many respondents reporting uncertainty about expectations, difficulty initiating credit discussions, and con-

Kerry Thompson and Johanna Bischof contributed equally to this work.

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2026 The Author(s). *Journal of Microscopy* published by John Wiley & Sons Ltd on behalf of Royal Microscopical Society.

cerns about bias and power dynamics. Taken together, the results suggest a reinforcing cycle: inconsistent credit reduces visibility and leverage for Imaging Scientists in core facilities, which in turn entrenches fragile career pathways and inhibits retention.

We translate these findings into targeted, stakeholder-specific actions. Recommendations focus on defining career paths that match facility roles, aligning evaluation with the full range of facility outputs (including methods, data, software, and training), and ensuring that institutions, funders, publishers, and research teams share responsibility for fair and consistent credit.

#### KEYWORDS

authorship and acknowledgement, career pathways, core facility, Global BioImaging, Imaging Scientists, scientific recognition, workforce development

## 1 | INTRODUCTION AND BACKGROUND

Advanced imaging has become an indispensable pillar of modern life sciences, underpinning discoveries across biology, medicine, materials science, and translational research. Over the past two decades, imaging workflows have increasingly migrated from individual laboratories into shared imaging core facilities, driven by growing technological complexity, cost, and the need for specialised expertise.<sup>1–4</sup> As a result, Imaging Scientists working in core facilities have become central contributors to experimental design, sample preparation, data acquisition, image analysis, data stewardship, documentation of experimental methods in publications, data visualisation, and user training.<sup>5</sup>

In this rapid evolution the professional roles, career pathways, and recognition of Imaging Scientists have not kept pace with their expanding responsibilities. In many research systems, these professionals occupy hybrid positions that combine academic, technical, and service-oriented functions, yet they are still mostly evaluated using frameworks that were designed either for traditional academic research or technical support staff roles. This data is reflected in the survey responses and has also been highlighted in many community discussions and forums. This misalignment creates structural vulnerabilities that affect recruitment, retention, professional development, and the long-term sustainability of imaging infrastructures.

In 2023, the Global BioImaging Working Group on Career Paths for Imaging Scientists published international best-practice recommendations<sup>5,6</sup> that defined the Imaging Scientist role and identified five interlinked, global career path challenges: (i) lack of recognition of scientific contributions, (ii) mismatch between academic

and service-oriented career structures, (iii) funding instability, (iv) limited access to training and professional development, and (v) workforce sustainability and staff retention. That work established a conceptual framework for understanding the Imaging Scientist career ecosystem and highlighted the urgent need for systemic change. Furthermore, it was the basis for the continued collection of data analysed in this manuscript.

Building on this foundation, the present manuscript provides a deeper analysis of global trends of the specific Top 5 Career Path Challenges that Imaging Scientists face, explored through a large-scale international survey, as well as a more in-depth look at authorship and acknowledgement practices, examined through a complementary survey focused on recognition of core facility staff in scientific publications.

These two components are tightly interconnected. Recognition through authorship and acknowledgement is not merely symbolic; it directly influences how Imaging Scientists are evaluated, promoted, and resourced within institutions.<sup>7,8</sup> Although publication metrics alone are insufficient to capture the full impact of facility-based work, they remain a dominant currency in academic evaluation and funding systems. Inconsistent or absent recognition therefore exacerbates many of the career path challenges previously identified, reinforcing misalignment between contribution and recognition.

To address these issues highlighted during informal community discussions, the Global BioImaging (GBI) Working Group adopted a community-driven approach, deploying two coordinated surveys across the GBI community between 2023 and 2025. The first survey focused on identifying and contextualising the Top 5 Career Path Challenges across regions, institutional settings, and stakeholder groups. The second survey examined global prac-

tices and perceptions related to authorship and acknowledgement of Imaging Scientists and imaging facilities. Through their international nature and broad response rate, the surveys also contain valuable general data about imaging core facilities around the world, which is why the full survey datasets are shared openly<sup>9</sup> in an anonymised fashion alongside this publication for further analysis by interested community members, complementing also the extensive data in the International microscopy core facility benchmarking survey.<sup>10</sup>

By integrating diverse global perspectives on these issues, we aim to (i) quantify and contextualise the most pressing career challenges faced by Imaging Scientists worldwide, (ii) provide empirical evidence on how current authorship and acknowledgement practices contribute to these challenges in different regional contexts, and (iii) identify actionable pathways for Imaging Scientists, institutions, funders, publishers, and research communities to strengthen recognition, career development, and the long-term resilience of imaging core facilities (Highlight Box 1).

## 2 | METHODOLOGY

This manuscript is based on data generated through two complementary, international, community-driven surveys developed and disseminated by the Global BioImaging (GBI) Working Group on Career Paths for Imaging Scientists.<sup>1</sup> The Working Group brings together imaging core facility professionals, researchers, and infrastructure representatives from all GBI partner communities, enabling broad geographical and institutional reach.

The Top 5 Career Path Challenges survey was deployed initially between 2023 and December 2024, with continued targeted dissemination into mid-2025 to address regional underrepresentation identified during preliminary analyses. The authorship and acknowledgement survey has been conducted since January 2025. Data for the analysis presented here was collected until December 2025, but the survey remains open for further contributions from the community, which will inform further analysis and work on the topic.

Questions in both surveys combined structured multiple-choice items with open-text responses to enable both quantitative analysis and qualitative insight into systemic challenges affecting Imaging Scientists and core facilities worldwide. The full set of questions from both surveys is available in Supplemental Document 1.

Both surveys were directed at Imaging Scientists and core facility staff, explicitly including individuals performing core facility equivalent roles in institutions without formalised core facilities. Contributors to the surveys also included members from the broader Imaging Scientist uni-

verse as described in our previous publication.<sup>5</sup> Surveys were piloted within the working group (data not included) and refined based on that initial feedback to ensure clarity of questions in different facility contexts and that sufficient background information was collected for analysis. Figure 1A was also included in the Top 5 survey at a later date to more accurately understand the respondent demographics as the study evolved—not all respondents have answered all questions.

Both surveys were disseminated centrally through the GBI network and the GBI partner communities—both virtually and at the GBI Exchange of Experience conferences and all the partner community meetings. Further distribution took place via international, national, and regional bioimaging community events, community channels online, individual networks, social media, and other partner communities, ensuring representation across continents, facility types, and imaging modalities. Responses were collected in a GDPR-compliant manner with respondents informed about the potential use of anonymised data in publications. Responses were anonymised prior to analysis. Quantitative data were analysed descriptively to identify global patterns and regional trends, while qualitative responses were thematically coded to contextualise and interpret the survey findings. Graphs were constructed in either Biorender or Microsoft Excel. Statistical analysis was performed in Microsoft Excel.

As with all self-reporting surveys, several limitations must be acknowledged in the interpretation of this data. Responses reflect individual experiences and perceptions, which are influenced by local institutional culture, career stage, and personal context, introducing potential perception bias. Institutional structures and terminology vary substantially across countries, which may affect how questions were interpreted. In addition, recognition practices often involve informal or private decision-making processes, meaning that some respondents may not have full visibility of institutional policies or publication-related discussions. Despite these limitations, the consistency of key themes across regions, facility types, and stakeholder groups suggests that the findings capture robust, systemic patterns. Collectively, the surveys represent the most comprehensive global dataset to date on career challenges and recognition practices affecting Imaging Scientists predominantly working in core facilities in life sciences.

## 3 | RESULTS

### 3.1 | Top 5 challenges

More than 290 responses from 43 countries were evaluated to gain a deeper understanding of the career path challenges faced by Imaging Scientists in various countries

**HIGHLIGHT BOX 1: Recommendations for stakeholders—what to change and who can change it****Hosting institutions**

- Define career paths that match hybrid facility roles (including service, research, innovation, training, and more).
- Recognise the entire scope of facility-enabled outputs for their staff evaluation (including methods, technology, workflows, and software development, data FAIRification, user training, collaboration building, and innovation management).
- Embed recognition expectations in internal policies (e.g., contribution statements, facility acknowledgement guidance).
- Provide protected time for staff development and community leadership.

**Funders**

- Ask applicants to include a ‘recognition and contribution plan’ for facility, technical, and support staff (authorship, acknowledgements, data stewardship).
- Allow eligible costs for facility scientist time beyond instrument access (experimental design, analysis, training, FAIR data work).
- Use evaluation criteria that reward shared capability building, not only PI-led publications.
- Support sustainability mechanisms and facility-led grants (multi-year operational funding, staff retention and training lines).

**Publishers**

- Require transparent contribution statements that make facility expertise visible (including experimental design, image acquisition, analysis, data curation).
- Encourage standardised facility acknowledgements (including use of PIDs and CRediT) and consistent citation of methods/tools.
- Provide clear editorial guidance on when specialist facility contributions warrant authorship versus acknowledgement.
- Promote metadata practices that improve discoverability of facility contributions.

**Principal investigators and research teams**

- Discuss credit early—before data collection—and revisit at milestones (design, analysis, manuscript drafting).
- Use facility-provided acknowledgement statements, follow authorship guidelines, and document contributions as they occur.
- Include Imaging Scientists as authors when their expertise shapes study design, interpretation, or analysis; acknowledge facilities and individual staff members consistently otherwise.
- Avoid ‘payment substitutes credit’ mentality: paying for access does not replace scholarly recognition.

**Facility leadership and existing Networks (including Global BioImaging partners)**

- Co-develop community guidelines and training for authorship/acknowledgement conversations, and tools and best practises for contribution tracking.
- Track recognition metrics over time (authorship/acknowledgement rates; satisfaction; guideline uptake) to benchmark progress.
- Use aggregated evidence to advocate for policy change at institutional and national levels.

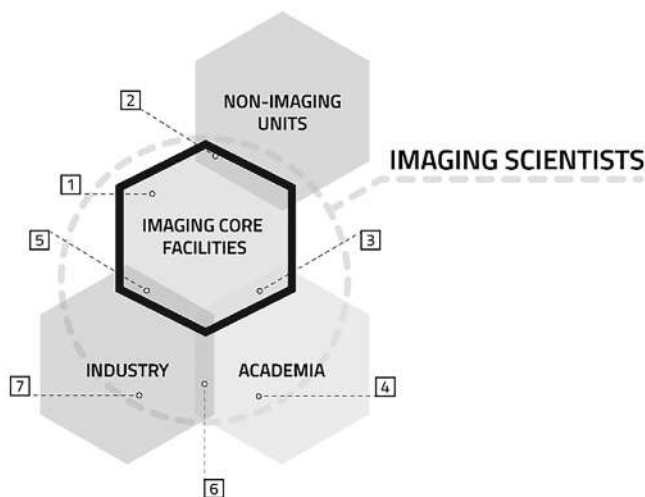
and continents (Figure 2). The data are presented as overall key challenges faced globally (Figure 3), along with a breakdown of continent-specific challenges (Table 1) and those within the Imaging Scientist Venn Diagram. Of note, approximately 82% ( $n = 238$ ), or approximately four out of five respondents, mention career path mismatch, lack of structured progression or misalignment between academic and core roles within their response to the survey.

Over 33% ( $N = 64$  respondents) who provided Group data occupy hybrid or cross-group roles (Figure 1B and

C). This suggests that current single-track career frameworks fail to reflect the structurally blended nature of modern research and core-facility work. It also highlights that hybrid roles, particularly those intersecting between Group 1 (Imaging core facility) and Group 4 (PIs), are a structural feature of modern research infrastructures rather than an exception, particularly in facility leadership.<sup>11</sup> The high frequency of: Group 1 (Imaging core facilities) + Group 2 (non-imaging CFs), Group 1 + Group 3 (Researchers), Group(s) + Group 4 combinations

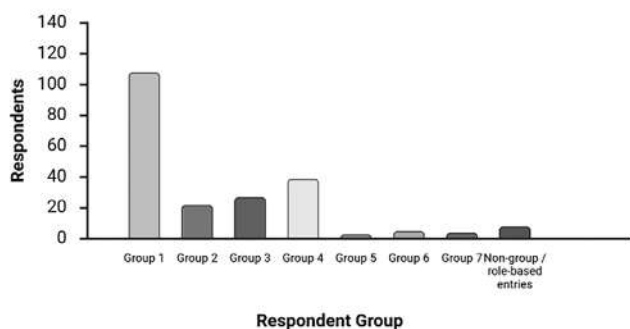
(A)

1	Dedicated Core Staff	Dedicated 100% to enabling access and providing support to imaging technologies (Facility operations, training, service, maintenance, and administration) EM/LM/HCS/Bioimaging/Image Analysis.
2	Core Staff with split remit	Shared role (may include staff working in another core facility other than imaging core (e.g. Image Analysis/Flow Cytometry/Histology/Sequencing/Mass Spec/Biomedical (Preclinical)/Medical/In Vivo Imaging/Animal Facility/Medical Imaging).
3	Not Core facility affiliated Imaging Scientists	(Academic) Staff engaged in the field of imaging technologies and applications, whether or not formally affiliated with a core facility, but who significantly contribute to core facility operations or perform equivalent core facility roles in institutions that lack dedicated core facilities.
4	Principal Researchers and Investigators	PIs with influence and/or responsibility for oversight, steering groups/committees. This may include roles in budget allocation, future-proofing, strategy, sustainability and staffing matters.
5	Industry-related	Industry funded positions or seconded staff working within core facilities.
6	Technology developers	In academia or industry, the people who are developing new imaging solutions.
7	Industry exclusive	Applications specialists, engineers and sales delegates.



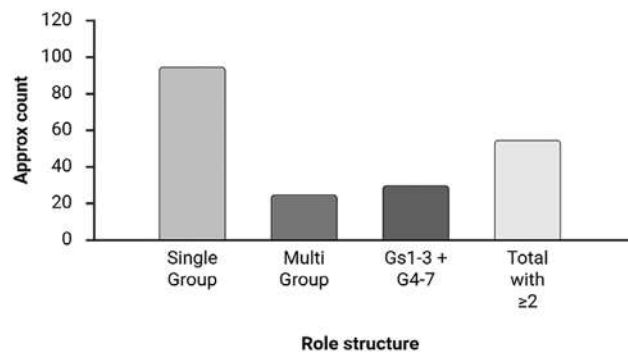
(B)

Breakdown of respondents per group from Venn Diagram

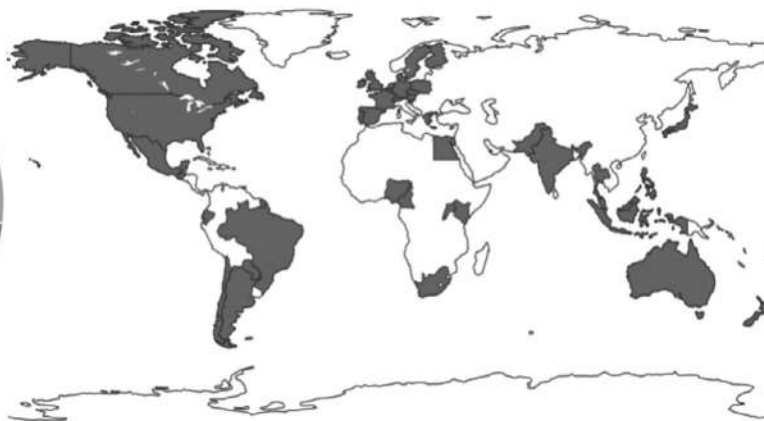


(C)

(Combination of) Group selections from Venn Diagram

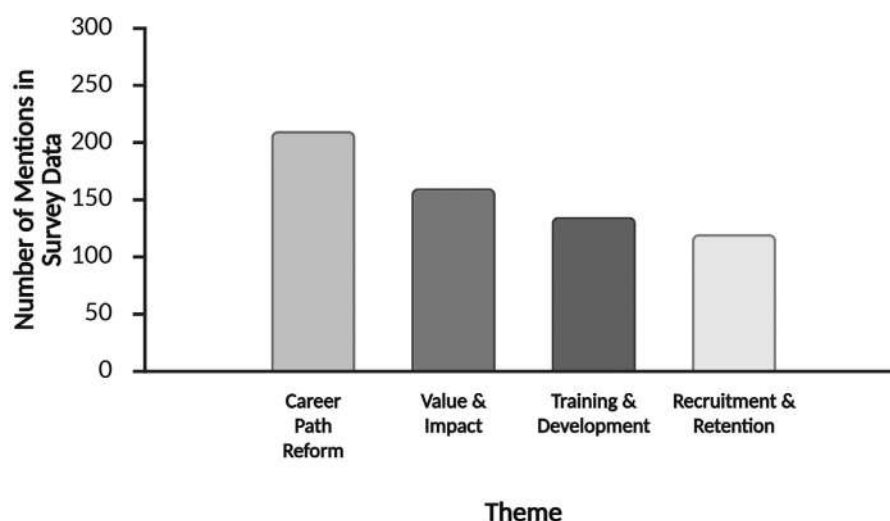


**FIGURE 1** (A) The varied roles of Imaging Scientists. This figure is modified from Wright et al.<sup>6</sup> (<https://doi.org/10.1111/jmi.13307>). Survey data encompasses contributions from all of the groups listed 1–7 above but primarily focuses on Groups 1–5. (B, C) Survey respondents per group and the group combinations selected from the Venn Diagram ( $N = 290$  respondents to survey,  $N = 193$  specific responses for B, C). Groups as per list in A. This data sheds light onto the role structure breakdown. Not all respondents to the survey provided this information as this question was added to the survey after its initial deployment.



**FIGURE 2** Proportional representation from respondents to the Top 5 survey. Location of contributors indicated on the map (not colour coded to donut chart) with detailed percentage breakdown per continent/geopolitical grouping (number of responses: Africa 19, Asia 52, Europe 56, North America 27, Oceania 82, South America 28). Please refer to Supplemental Document 2 for countries included in each geographical subdivision.

### Workforce priorities identified for Imaging Scientists across Top 5 Challenges survey responses



**FIGURE 3** Frequency of workforce priorities identified for Imaging Scientists across multi-selection survey responses. Respondents ( $n = 290$ ) were asked to prioritise two of the challenges based on urgency and need for change. Reform of the Imaging Scientist career pathway is the most frequently cited issue (210 mentions), followed by addressing recognition of value and impact (160 mentions).

**TABLE 1** Regional breakdown of the top listed challenges.

Region	Primary challenge	Secondary challenges	Insights
Europe	Recognition	Career path mismatch; funding	Strong cultural undervaluation; structural barriers despite mature infrastructure.
North America (the United States, Canada, Mexico)	Recognition	Career path mismatch; talent	Similar to Europe: under-recognition of Imaging Scientists, staff leaving for industry.
South America	Funding instability	Recognition; career path mismatch	Severe systemic underinvestment; unstable infrastructure; undervaluation also strong.
Africa	Funding instability	Training deficits; talent shortages	Most severe funding constraints globally; foundational capacity-building needed.
India	Training deficits	Recognition; talent	Rapidly expanding research ecosystem but limited national training infrastructure.
SEA and Japan	Funding instability	Recognition; career path mismatch	Mixed-income region: uneven infrastructure, strong recognition concerns.
Oceania	Career path mismatch	Recognition; funding; talent	Highest global prevalence of mismatch; structural HR misalignment dominates.

in the selections indicate that blended academic, technical, leadership, and service identities are the norm, not edge cases. Group 4, at over one quarter of all responses, functions as a core identity group that cuts across Groups 1–3. This would strongly support arguments for new diversified career frameworks and recognition models. The data empirically supports the argument that current career tracks and single-label role classifications, along with

binary ‘academic vs support’ models, do not reflect how people actually work.

The Top 5 Career Path challenges dataset reveals a consistent frustration with structural undervaluation and resource limitations, balanced by a forward-looking recognition of Imaging Scientists’ evolving roles in data, AI, and translational research. The responses collectively point toward a need for institutional reform, structured career

frameworks, and sustainable investment in both people and infrastructure.

When asked about what actions should be taken to improve the current situation, 62% responded the implementation of clear career paths for Imaging Scientists, 52% raising awareness and visibility on the scientific value and impact Imaging Scientists have, 42% sustainable funding to attract and retain staff, and 40% professional training and development activities for Imaging Scientists.

### 3.2 | Global comparative analysis of challenges faced by imaging core facility scientists

A comparative analysis across seven world regions—Europe, Africa, India, South East Asia (SEA) and Japan, North America (the United States, Canada and Mexico), Central and South America, and Oceania (Australia and New Zealand)—reveals a complex but coherent global landscape of structural challenges affecting Imaging Scientists and core facility personnel (see Table 1).

Data analysed as part of the regional study has assisted with identifying the main challenges in different parts of the world. The in-depth analysis of the groups represented on the Venn Diagram illuminates how the challenges each group experiences cascade through the ecosystem and who experiences each consequence. Specific highlights from those participants who selected Group 1 are included in the sections below. Of particular concern, the data indicates that some in the field experience ‘burnout’ due to chronic understaffing and operational bottlenecks. References to the word ‘staff’ appear 71 times in the Group 1 data. Many of these mentions relate to ‘insufficient/inadequate/lack of staffing’ and ‘complex hiring procedures’, compounded with ‘lack of acknowledgement’ or ‘recognition’ or ‘understanding of the role’ which all contribute to burnout. Together, these perspectives demonstrate that imaging science requires coordinated global action that is both universal in recognising shared systemic barriers and locally adaptable in addressing region-specific resource contexts, institutional maturity levels, and the needs of Imaging Scientists working in different role contexts.

### 3.3 | Comparative analysis: regional and stakeholder perspectives

Career progression emerges as the single most universal challenge, identified as critical across all regions and stakeholder groups (50% of responses from participants who identified as Group 1 primarily), yet this challenge is

experienced distinctly: *high-income regions* report career path misalignment with academic promotion systems, while *low-income regions* describe an absence of formalised career frameworks entirely. Facility staff (Groups 1–3) experience this as blocked advancement and HR misclassification, while principal investigators (Group 4) observe it through high turnover and talent loss to industry. Representative quotes from Group 1 reflecting on this challenge include ‘Core facility roles don’t fit traditional academic or technical job ladders. This leads to unclear promotion paths’, ‘Flat hierarchies leave no room for career progression within a facility. Therefore ambitious staff must leave to progress’, and ‘No dedicated career track as a core facility staff’. The prevalence and dominance of short-term contracts (between 1 and 3 years) were mentioned frequently and clearly contradict the need for deep expertise and institutional memory. The resulting feeling of instability in the position and undervaluation leads to talent loss. Heavy workloads due to staff shortages are explicitly cited as a barrier to skill upgrading by Imaging facility staff. Participants cite being too busy to train/develop skills, but conversely needing these advanced skills to remain competitive in the field. What is clear from the data is that this is not just about participants wanting promotion, it is about the complete absence of clear pathways for skill development and growth in roles that do not fit existing academic or technical frameworks.

Funding instability similarly *affects all regions and roles* but operates through different mechanisms: *low-income regions* face absolute resource scarcity that prevents basic infrastructure development, whereas *high-income regions* struggle with strategic challenges such as cost-recovery models and insufficient long-term planning. 23% of Group 1 participants highlighted this as their top challenge and explicitly mentioned ‘expectation to cover all operational costs, including running costs, equipment maintenance and salary’ and ‘Lack of financial support to acquire new equipment’ as part of their responses in this category. The stakeholder analysis demonstrates how these funding constraints cascade: *facility staff cannot replace aging equipment, principal investigators face research delays, and industry partners find institutional markets unreceptive to innovation*.

Recognition deficits, prominently reported in *high-income regions* but less emphasised in Africa where foundational barriers dominate, illustrate how cultural undervaluation translates into structural consequences. Groups 1–3 report personal undervaluation and insufficient authorship credit, while Groups 5–7 observe that lack of recognition directly impedes funding decisions and technology adoption.

**TABLE 2** Stability in the above listed factors are a necessity for any high-performing research and imaging environment. Underfunding at any point in the ecosystem reverberates across all other points.

Constraint	Systemic impact
Career instability	Undermines retention, weakens facility continuity, erosion of institutional memory
Underfunding	Limits scientific capability, delayed technology adoption, workforce instability
Insufficient recognition	Shapes funding decisions, career structures, institutional priorities
Training limitations	Impede scientific reproducibility, reduce facility efficiency, weaken institutional competitiveness
Excessive workload	Compromised data quality, constrained innovation and reduced community training capacity
Capital underinvestment	Stagnant imaging capability, plateauing scientific output, less competitive workforce and research environment

The imaging ecosystem is interconnected. Improvement requires a systems-level approach:  
Funding → Staffing → Recognition → Training → Research outputs → Innovation → Investment

Training gaps are universally reported but reflect vastly different barriers: *low-income regions* lack accessible programs on even foundational techniques and face geographic and language constraints, while *high-income regions* require more specialised training in advanced modalities. Across all contexts, facility staff report insufficient time for professional development, principal investigators note reduced data quality from inadequately trained users, and industry identifies a widening scientific literacy gap. Further to this, data from Group 1 indicates that there are often language barriers as most international training courses are run in English only and the perpetuation of barriers to training accessibility. Participants note there tend to be few local opportunities, and international courses are held mostly in the global north, are over-subscribed, and geopolitical uncertainty has made attaining visas increasingly difficult.

Critically, the analysis of both datasets converge on the finding that these challenges are deeply interconnected (see Table 2): *lack of recognition is perceived to constrain investment, unstable funding restricts staffing and training, underdeveloped career pathways weaken retention, and insufficient training undermines scientific output.*

While the survey data are self-reported and do not establish causal relationships, the consistency of observed patterns across regions, facility types, and stakeholder groups strongly suggests the presence of underlying structural interdependencies within the global imaging ecosystem—highlighting the importance of coordinated, international approaches such as those driven by Global BioImaging in identifying systemic challenges that may not be visible individually at local or national scales.

Solutions to global systemic challenges must therefore operate also at the systems level:

1. Establishing regional—or ideally global—career frameworks with national flexibility

2. Differentiating funding strategies by economic context while addressing cascade effects,
3. Building recognition culture that demonstrates operational return on investment, and
4. Creating geographically accessible training with protected time across all professional roles

The health of the imaging ecosystem depends not on optimising individual components but on the alignment and mutual support of all regions and stakeholder groups simultaneously (Figure 4).

Across all respondent groups, the findings highlight the urgent need for a coherent, sustainable strategy for imaging science that recognises Imaging Scientists as intellectual contributors, invests in modern infrastructure, establishes transparent career pathways, stabilises funding, and provides structured training across roles. This has been reported in the literature over the past decade as core facilities have developed and evolved.<sup>12</sup>

**These patterns paint a consistent picture across global facilities:**

**Need for clearer career pathways:** Core facility imaging staff globally identify career progression as their overwhelming top challenge. The data reveals a workforce caught between institutional expectations for expertise and sustainability, and systematic barriers to professional development, stability, and recognition. There is a clear need for structural career frameworks that recognise the hybrid academic/technical expertise of Imaging Scientists (for more details see, Ref. 5 (Annex B)). Academic promotions rarely extend to facility-based experts, and in the event they are available, the academic merit criteria often do not adequately recognise the distinct responsibilities and performance of an Imaging Scientist, compared to a traditional academic role, leading to an under-evaluation of the Imaging Scientists. In the survey data, the word ‘mismatch’ is mentioned 266 times, the word ‘career’ 543 times and ‘progression’ 42 times. These pertain to

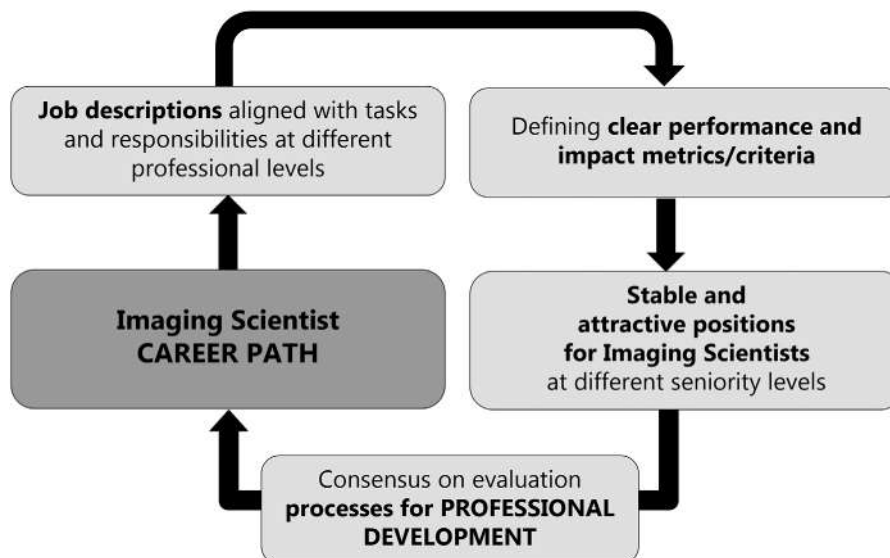


FIGURE 4 Recommendations for the required steps and interdependencies on the establishment of the Imaging Scientist Career Path.

statements like the following ‘No career progression available under current professional staff classification’, ‘Lack of career progression opportunities, especially due to hybrid technical-academic nature of roles’, ‘Lack of Clear Career Progression Path: Core facility roles often lack structured pathways for career advancement, making it challenging for professionals to envision long-term growth’ and ‘Career opportunities (there is no long term career path within most imaging facilities)’.

**Need for recognition and suitable staff evaluation:** A persistent challenge for Imaging Scientists is the lack of a formal institutional career ladder for professionals whose roles uniquely blend academic, technical, and service-oriented expertise. In many research institutions, there is no clearly defined pathway for progression, from entry-level assistant roles to intermediate technical and scientific positions, and ultimately to leadership roles such as core facility manager or senior imaging specialist. Establishing structured positions with transparent competencies and promotion criteria is essential not only for professional recognition but also for sustaining high-quality imaging support within research ecosystems. This gap highlights the need for a global conversation: *we must collectively advocate for research institutions worldwide to formally acknowledge and develop career frameworks that reflect the complexity and value of Imaging Scientists’ contributions.*

**Need for sustainability of positions:** In addition, the need for sustainable and reliable funding, both for operations and staff (recruitment and retention), remains a pressing concern. There is often a lack of long-term strategic institutional support for core facility infrastructure, which impacts the stability and attractiveness of the available positions. Cost recovery mechanisms, whilst key to

recouping day-to-day expenses are generally not sufficient to ensure growth and development of the facility, and are dependent on the overall success of grant income in the local ecosystem and fluctuate year-on-year.

**Need for professional development and training activities:** Following from the lack of clear career paths and job descriptions, there is a consequent lack of accessible tailored professional development activities. Training pathways for Imaging Scientists are underserved, and existing opportunities to upskill or specialise are perceived as inaccessible or inconsistent. The inaccessibility arises from a range of different factors. In many cases Imaging Scientists do not have the opportunity to take advantage of existing training opportunities due to financial and/or time allocation constraints, especially in core facilities with small teams. Training opportunities are furthermore not equally distributed across career stages. Overall, this demonstrates the lack of recognition of the importance of systematic skills development and the resulting lack of structured support for the technical and professional development of Imaging Scientists.

#### 4 | AUTHORSHIP AND ACKNOWLEDGEMENT PRACTICES REGARDING IMAGING SCIENTIST CONTRIBUTIONS

Across the Top 5 Career Path Challenges, recognition emerges as a foundational prerequisite for sustainable career development of Imaging Scientists (Figure 3 and 4). While a broad set of appropriate metrics beyond publications is needed to capture the full scope of core

facility contributions, the primary mission of imaging facilities remains the support of excellent research, and scientific publications are the principal means by which this research is communicated—making fair recognition of Imaging Scientists' contributions in authorship and acknowledgement an essential component of the research process.

Imaging Scientists contribute substantially to research design, data acquisition, analysis, and interpretation, and facility expertise is often recognised by the researchers directly involved in experiments. Authorship, however, is not determined by professional role but by the principle that it should be granted to anyone who has made a valid scientific contribution, including significant intellectual or technical input. In practise, authorship and acknowledgement decisions are typically made late in the publication preparation process and by individuals who may be less aware of the scope of facility contributions.

The following section presents results from an international survey examining how authorship and acknowledgement practices for Imaging Scientists are currently applied across regions, facility types, and institutional contexts, and how these practices influence professional recognition and career development.

## 4.1 | Global landscape mapping

To date, the Global BioImaging Authorship and Acknowledgement Survey has collected more than 330 responses from Imaging Scientists and core facility personnel across all GBI partner communities, representing a diverse range of institutions, imaging facility types, and geographical contexts (Figure 5A and B). Respondents included staff from Electron Microscopy, Light Microscopy, Pre-clinical and Clinical Imaging, and Image Analysis facilities (Figure 5D), as well as individuals providing core facility-equivalent support in settings without formalised core facilities (Figure 5C). Although efforts were made to reach Imaging Scientists from all geographic regions and all Global BioImaging communities are included in the analysis below, response rates are quite diverse across the world, with particularly high response rates in Europe and Australia, and lower rates in geographic areas where core facilities are not yet institutionally well-established, such as South America, Africa and South East Asia.

### 4.1.1 | Global patterns in recognition

Across the global dataset, the survey indicates a diverse landscape of authorship and acknowledgement practices

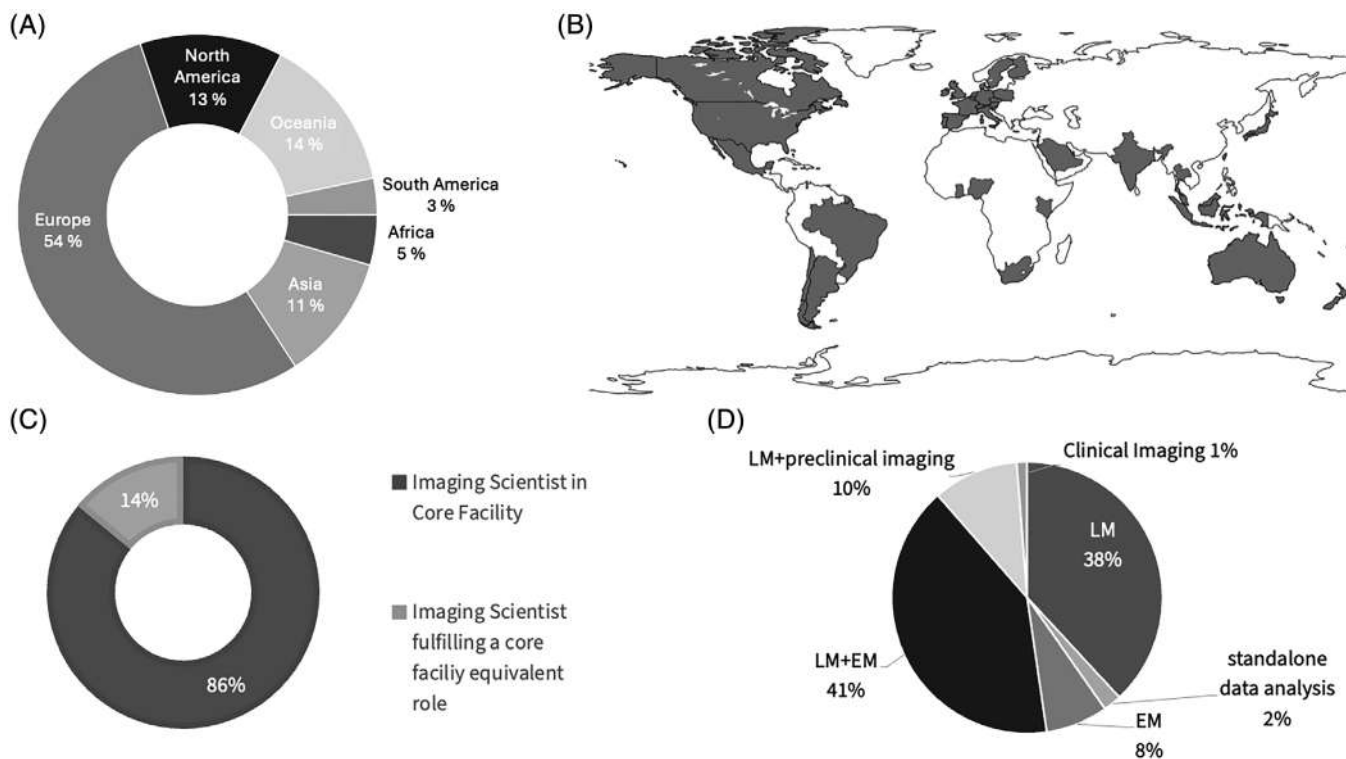
among imaging core facilities, with variation by technology, facility size, and region. When asked about their overall experiences with authorship, respondents consistently described a mixed situation (Figure 6): most indicated that core facility staff were included as co-authors in only around half of the publications they contributed significantly to (Figure 6C). First or last authorships were extremely rare, which is expected given the role that core facility staff normally play in research leading to publications. But co-authorship also occurred only inconsistently, which represents a critical sign for underrepresentation of Imaging Scientists in authorship lists. Acknowledgements were far more frequent, with 'sometimes' and 'often' being the most common reporting categories across all respondents. Satisfaction with recognition remained generally low to moderate (Figure 6B), reflecting persistent frustration that meaningful intellectual and technical contributions are not routinely translated into formal professional credit.

### 4.1.2 | Facility- and region-specific differences

Clear patterns emerged when comparing facilities by technological focus (Figure 7). Respondents from electron microscopy (EM) facilities reported significantly higher levels of recognition in authorship. They receive co-authorship more frequently and also expressed greater satisfaction with their recognition overall. Many EM facility respondents also felt more empowered to advocate for appropriate credit, both for themselves and for their colleagues.

In contrast, respondents from light-microscopy-only (LM) facilities, and those combining LM with pre-clinical imaging, reported lower levels of co-authorship. A chi-square test of independence showed a significant difference in response distributions for authorship across groups ( $\chi^2(12) = 35.44, p < 0.001$ , Cramér's  $V = 0.20$ ). Post hoc pairwise comparisons (Mann-Whitney  $U$  tests with Bonferroni correction) revealed that LM facilities differed significantly from both EM facilities ( $p < 0.001$ ) and LM + EM facilities ( $p = 0.001$ ), with LM facilities reporting lower frequencies of authorships. No other pairwise differences were statistically significant. Similar analysis of responses on acknowledgement showed no statistically significant patterns across facilities.

A considerable proportion of respondents from LM and LM + preclinical facilities indicated very low satisfaction with their recognition. Facilities that offered both LM and EM reported more balanced results. Other facility types were represented by too few responses to allow meaningful analysis.



**FIGURE 5** Survey respondent characterisation. (A) Regional breakdown of respondents to the survey on authorship and acknowledgement of Imaging Scientists in core facilities (number of responses: Africa 15, Asia 38, Europe 181, North America 43, Oceania 47 and South America 11). (B) World map with all countries of respondents to the survey highlighted (not colour coded to donut chart). (C) Distribution of survey respondents between those working in a core facility and those fulfilling core facility equivalent roles in institutions without formalised CFs. (D) Breakdown of the service areas of the CF represented by the respondents (light microscopy (LM)—123; standalone data analysis—7; electron microscopy (EM)—24; light and electron microscopy (LM + EM)—132; light microscopy (LM) and preclinical imaging—33; clinical imaging—4).

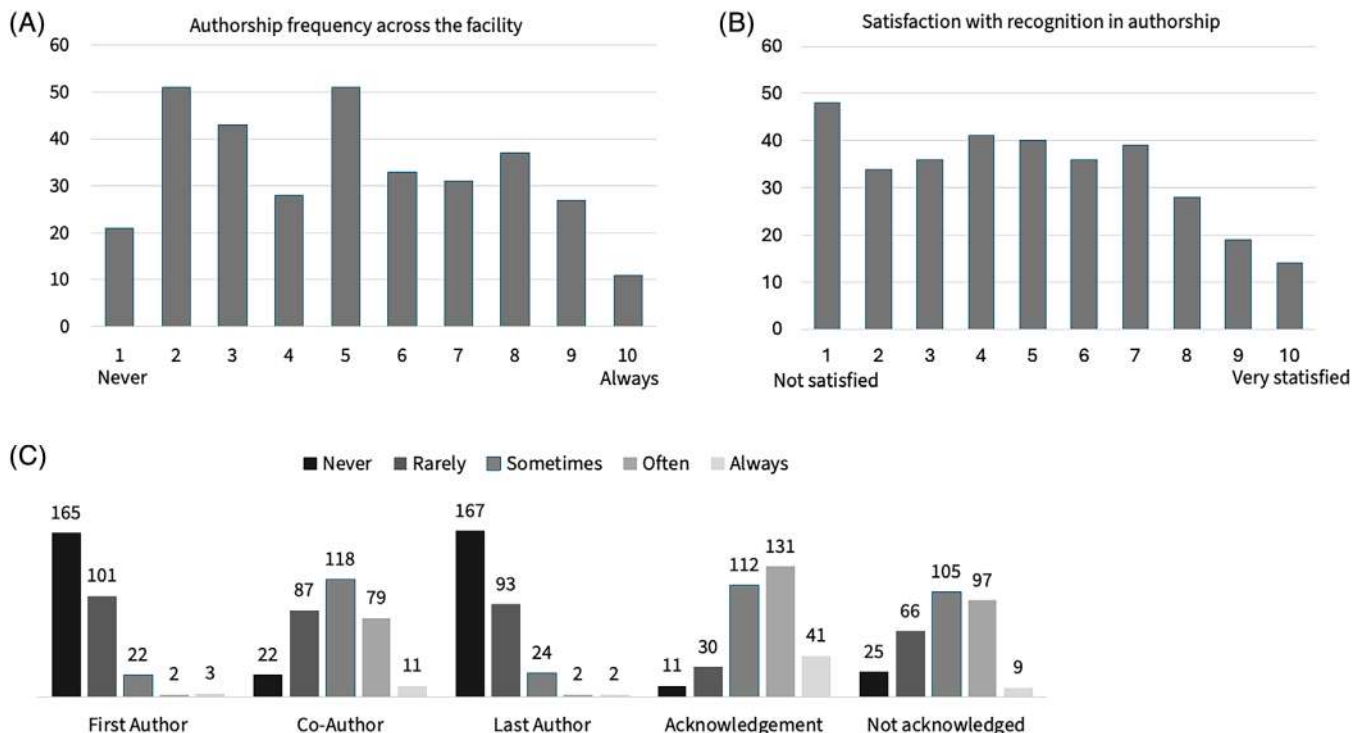
These differences in authorship and acknowledgement levels between EM facilities and LM + EM facilities and other imaging facilities may be due to differences in the way EM facility staff are involved in user projects. Although this is not universal, in many EM facilities, staff are more centrally involved in both sample preparation and image acquisition compared to LM facilities, where oftentimes users are trained for self-sufficient use of microscopes. In all facility types, Imaging Scientists provide key contributions, but different levels of involvement and perhaps varying perceptions of technical complexities of different methods may impact the recognition levels.

Facility size also somewhat shaped recognition practices and perceptions. Very small facilities ( $n = 79$ ), those staffed by only one or two individuals, reported broadly similar authorship and acknowledgement frequencies to other facilities, but consistently lower satisfaction. Respondents in such settings emphasised in their free text responses that recognition encompasses more than authorship alone; institutional support, career development opportunities, and clarity of expectations also play a critical role, and these often seem to lag behind in very small facilities.

These respondents were also more likely to work in institutions without any formal authorship or acknowledgement guidelines.

Large facilities ( $n = 48$ ), with more than ten staff members, described similar authorship patterns but reported more frequent acknowledgements and generally higher satisfaction with recognition. Approximately 70% of respondents in this group indicated that their institution had formal guidelines in place, although nearly one-third of these felt that the guidelines were insufficiently clear or well-developed. Medium-sized facilities ( $n = 202$ ) (five to ten staff members) displayed a more complex pattern: authorship and acknowledgement practices resembled those of larger facilities, but personal satisfaction was split into two nearly equal sub-groups, one cluster of respondents reporting fairly high satisfaction, and another reporting very low satisfaction. Institutional support was also less consistent in this group, with only about 55% confirming the existence of official guidelines.

Geographical patterns added further complexity, confounded by both different levels of core facility existence and survey responses in different regions. Respondents



**FIGURE 6** Authorship rates and satisfaction ( $n = 330$ ). (A) Response rates on a scale from 1 (*Never*) to 10 (*Always*) assessing how frequently core facility team members are given authorships of publications for their contributions to these publications. (B) Response rates on a scale from 1 (*Not satisfied*) to 10 (*Very satisfied*) for individual satisfaction with the current recognition of core facility Imaging Scientists in authorship. (C) Frequency of core facility team members acknowledged in publications in the different forms.

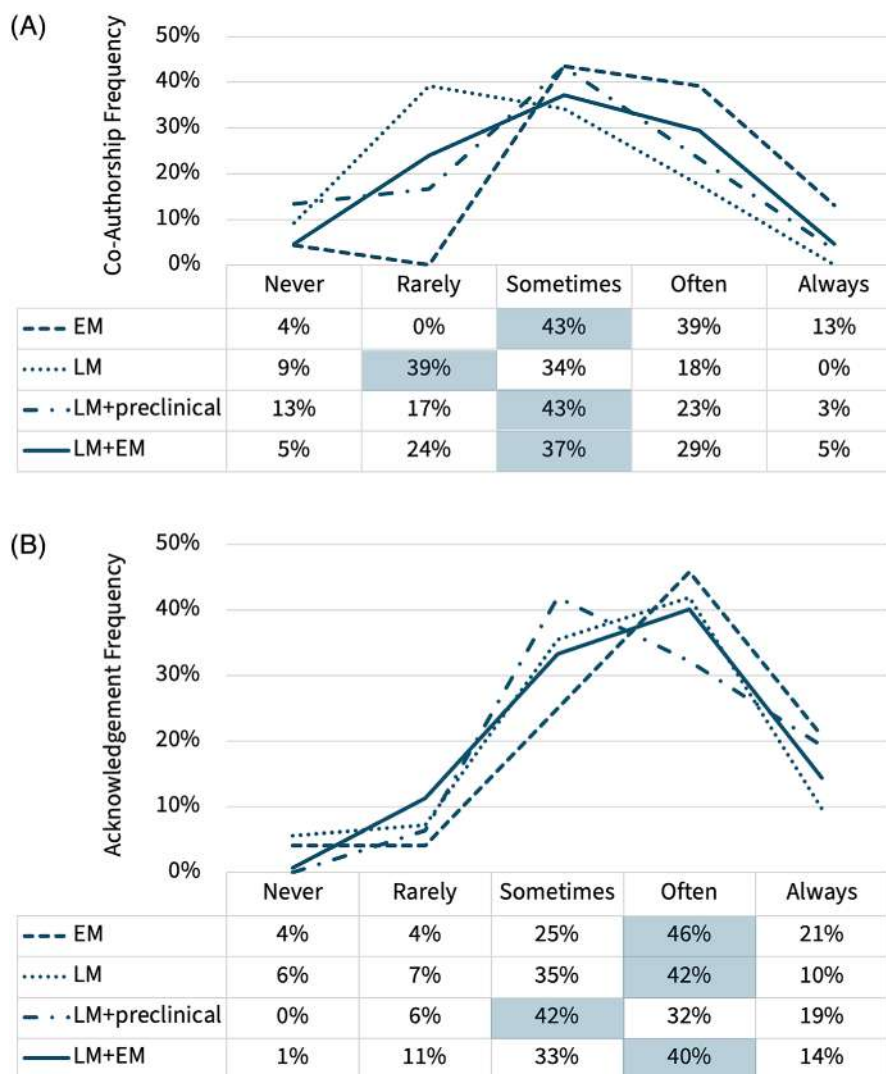
from Japan reported moderate institutional support but comparatively high levels of co-authorship and acknowledgement, coupled with higher personal satisfaction than the global average. In contrast, responses from Southeast Asia and Africa indicated predominantly medium levels of acknowledgement, low levels of authorship, and predominantly mid to low satisfaction, though additional responses may refine this interpretation as the survey continues. Respondents from India described almost no access to institutional authorship guidelines, extremely low levels of authorship, moderate levels of acknowledgement, and resultantly low personal satisfaction.

Respondents from Central and South American countries showed a distinct pattern: institutional guidelines were scarce, yet levels of co-authorship were moderate, acknowledgements comparatively high, and satisfaction remained heterogeneous—roughly half of respondents described moderate satisfaction, while the remainder reported very low satisfaction. Responses from Australia were particularly striking, given the strength of national imaging networks: fewer than half of facilities reported institutional guidelines, and 26% indicated that existing guidance lacked clarity. At the same time, an individual check of 20 Australian universities, including all G8 institutions—performed by an Australian member of the

GBI working group—showed that all these institutions have institutional guidelines which specifically include non-standard data collection and analysis of research data as sufficient to warrant authorship (Riches, 2026, Personal Communication). Therefore, these responses likely reflect a lack of awareness and lack of promotion of existing guidelines, which is likely also the case in other regions. Co-authorship was generally described as occurring ‘sometimes’, acknowledgements were frequent, and satisfaction was surprisingly low.

European respondents reported the highest levels of institutional guidance (61%), moderate co-authorship rates, and strong acknowledgement practices. Indeed, several European facilities reported being ‘always’ acknowledged. Correspondingly, European respondents expressed relatively high satisfaction with recognition.

In North America, fewer than half of respondents had institutional guidelines, and 31% of those described their guidelines as poorly developed. Co-authorship levels were lower, acknowledgements moderate, and personal satisfaction distinctly bimodal: one large cluster of respondents expressed relatively high satisfaction, while another indicated very low satisfaction. These regional trends should be contextualised by differences in facility-type representation in the dataset—Europe and Australia, for example,



**FIGURE 7** Rate of (A) co-authorship and (B) acknowledgement compared across different facility types from those offering only electron microscopy (EM), only light microscopy (LM), combinations of light microscopy and preclinical imaging techniques (LM + preclinical), and combination of light and electron microscopy (LM + EM) ( $n = 319$ ). Response rates from other facility groups were too small for reliable analysis.

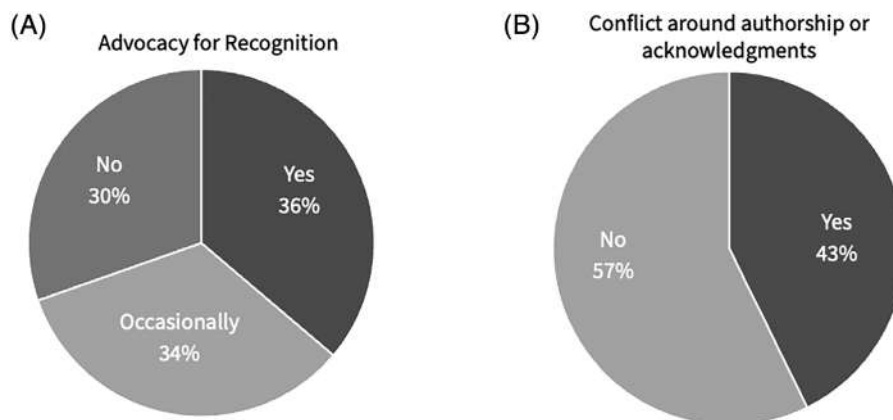
had stronger participation from EM facilities which are associated with higher acknowledgement rates.

#### 4.1.3 | Institutional frameworks and barriers

Institutional frameworks have the power to impact recognition practices significantly. However, as outlined above, the presence of institutional guidelines varies widely—with them being fairly widespread in some regions, while almost absent in others. However, even in settings with existing official policies, there are challenges around Imaging Scientists' and researchers' awareness of these, their clarity and applicability to core facility contributions, and core facility staffs ability to enforce existing rules without fear of repercussions. 13% of respondents who provided

descriptive reasons for lack of authorship and advocacy for it ( $n = 158$ ) reported that in their local contexts facility staff are explicitly excluded from authorship considerations by local (institutional or facility) policies or institutional culture, while another 8% were blocked by unclear expectations or inconsistently applied policies.

Proactive initiatives to improve recognition were described as being driven predominantly by core facilities themselves, with 55% of respondents identifying the facility as the main source of advocacy for authorship and acknowledgement. Departments played only a limited role (11%), and other institutional or community initiatives accounted for a mere 7%. Survey respondents identified several major barriers to appropriate recognition: lack of awareness among researchers, institutional culture resistant to change, the absence of clear policies,



**FIGURE 8** (A) Frequency at which core facility staff report advocating for themselves or their colleagues when it comes to recognition in both authorships and acknowledgements. (B) Percentage of staff reporting having experienced conflict around authorship or acknowledgement discussions.

and insufficient advocacy mechanisms. Each of these was selected by approximately 20–25% of respondents, reflecting the distributed, multi-factorial nature of the problem.

#### 4.1.4 | Equity, bias, and advocacy

The survey also indicated concerning biases in recognition practices. 13% of female core facility staff reported experiencing gender bias directly, and an additional 46% selected ‘not sure’, suggesting that almost 60% of women perceived some likelihood or potential of bias. In contrast, only 4% of male respondents reported gender bias, with 23% unsure. Respondents also noted differences in recognition between staff members with and without PhDs (with 21% reporting bias and 24% uncertain), as well as patterns linked to seniority, where 15% perceived bias and an additional 15% were unsure. These patterns, particularly regarding the acknowledgement of facility staff with and without PhDs, seem to be robust as they are similar independent of respondents seniority or facility role.

Patterns of self-advocacy also emerged. Approximately two-thirds of respondents reported advocating for themselves and/or their colleagues either regularly or occasionally (Figure 8A). This behaviour appeared largely independent of facility size, although regional variation existed: self-advocacy was somewhat more common in Europe and lower in Japan, with other regions showing no distinct trends. The one-third of respondents who did not advocate often cited a belief that advocacy would be ineffective, reluctance to initiate potentially conflict-laden discussions, or fear of retaliation from senior researchers. 43% reported having experienced conflicts regarding recognition in publications (Figure 8B). Respondents also noted

insufficient leadership support, both within facilities and at higher institutional levels, as a major deterrent to advocacy.

Systemic factors outside of the control of both the researchers using the facilities and the Imaging Scientists themselves further contributed to the problem: many Imaging Scientists reported in the survey that they simply learned about publications too late to engage in discussions on authorship. At the same time, survey respondents highlight that their facility users often fully recognise the importance of the facility contributions but that these are often more junior researchers, while the PIs who make final authorship decisions on manuscripts rarely use the facilities themselves and therefore have less understanding of the core facility contributions.

The widespread perception that payment for facility services negates the need for authorship recognition also influences facility staff psychologically, making some facility staff themselves undervalue their own contribution. Perspectives on this opinion often shift when people are made aware that all contributors to research are paid for their work. Some respondents also noted a conceptual disconnect: because publications are not part of their performance evaluation or personal motivation, they feel less compelled to advocate despite recognising the broader professional implications.

#### 4.1.5 | Impacts on careers and facility sustainability

Respondents reported inadequate recognition as being linked to several key consequences: impaired job evaluation, reduced promotion and career advancement opportunities, and diminished ability to secure funding. In contrast, impacts on attracting new users or staff were

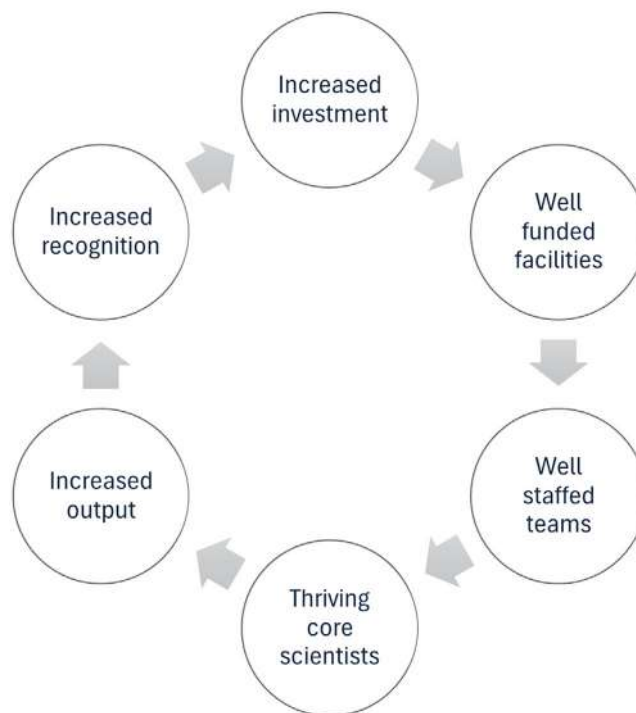
perceived as relatively minor, suggesting that the consequences of insufficient acknowledgement are primarily internal, affecting careers, retention, and institutional visibility, rather than external.

The survey did not address the external impact of lack of acknowledgement from a research or university ecosystem standpoint, where such a lack of long standing co-authorships between PIs and imaging facility staff may impact researchers ability to convincingly propose complex and ambitious imaging workflows in their grants, leading to a potential loss of funding for the institution.

Taken together, the survey findings demonstrate that inadequate recognition is not a localised issue but a global, structural problem that affects Imaging Scientists across facility types, institutions, and continents. Several themes emerge clearly. First, cultural and institutional expectations strongly shape recognition practices: facilities with clear policies or established cultures of collaboration report higher satisfaction and more equitable authorship outcomes. Second, lack of awareness among researchers, particularly regarding the intellectual contributions of core facility staff, remains a fundamental barrier. Survey respondents raised the challenge that some scientists and institutional leaders still perceive Imaging Scientists in core facilities as technicians who take pictures, rather than as experts with specialised and unique expertise who make valuable contributions in their field. Third, the burden of securing appropriate recognition rests disproportionately on individual Imaging Scientists, who must advocate for authorship despite often lacking institutional or facility leadership support. This reliance on individual advocacy is neither sustainable nor equitable, and underscores the need for systemic interventions. The implementation of project onboarding processes clearly describing the role of core facility staff, aligning contribution expectations, intellectual property acknowledgments and clear institutional recommendations or guidelines could reduce these inequities.

Importantly, the findings highlight that improved recognition is not only a matter of fairness. Authorship and acknowledgement data serve as critical evidence for evaluating facility impact, securing institutional resources, and demonstrating return on investment to funders (Figure 9).<sup>8</sup> Strengthening recognition practices therefore enhances both career progression for individuals and institutional sustainability for imaging facilities.

Identifying the origin of data (and associated metadata) through appropriate acknowledgement is also essential to ensuring data FAIRness, and it should be accepted that central facilities are major generators of data in modern life-science research.<sup>2</sup> By involving facility staff in the publication process, either through authorship or appropriate acknowledgement, richer information about the sample



**FIGURE 9** Circular dependencies conceptual model—changes in any of the above circles can cause a knock on effect on the others.

preparation and acquisition can be added, cross-checked and validated by the larger research team.

These implications directly reinforce the need for clear policies, visible guidelines, appropriate mechanisms for crediting facility contributions, and a shift toward shared credit and responsibility between researchers, facility managers, and institutional leadership. Although this comprehensive study, the first of its kind worldwide, specifically addresses the case of Imaging Scientists working in imaging facilities, most of the reflections and recommendations match with published data from initiatives focussing regionally or on core facility scientists generally.<sup>13–15</sup>

## 5 | RECOMMENDATIONS AND COMMUNITY-DRIVEN SOLUTIONS

The survey findings highlight that improving recognition practices requires action at multiple levels, but they also demonstrate that effective, community-driven solutions already exist. Across regions, Imaging Scientists and core facility communities, including non-imaging specific communities such as CTLS<sup>2</sup> and ABRE,<sup>3</sup> have begun to develop practical tools and initiatives that translate policy principles into everyday practice. These efforts provide concrete



**FIGURE 10** Imaging facility guidelines for acknowledgement—downloads and distribution with detailed percentage breakdown per continent/geopolitical grouping (not colour coded to donut chart). Number of downloads: Africa 11, Asia 72, Europe 169, North America 65, Oceania 25, and South America 28. Of note—this campaign was run during holiday periods in the Southern Hemisphere which may reflect the lower levels of engagement. Please refer to Supplemental Document 2 for countries included in each geographical subdivision.

examples that can be adapted, scaled, and adopted by other institutions and national communities (Highlight Box 2).

One such example is the continued development and dissemination of the *Imaging Facility Guidelines for Acknowledgement*, originally developed by the Royal Microscopical Society<sup>4</sup> and BioImagingUK. Recognising the need for global accessibility, the Global BioImaging Working Group has developed translations of these guidelines into so far 13 languages and the development of accompanying guidance on their practical use within facilities. These materials aim to facilitate early and transparent discussions about authorship and acknowledgement, support consistent recognition practices, and lower barriers for facility staff to advocate for the application of existing guidelines in day-to-day interactions with users. The initial campaign saw over 400 downloads across more than 40 countries (Figure 10) with the most downloaded editions being English, Portuguese, Spanish, Japanese, Chinese, Bahasa Malaysia, and French, reflecting strong global uptake and relevance.<sup>5</sup> Their broad international interest underscores the value of shared, community-owned tools for addressing recognition challenges.

Beyond imaging-specific initiatives, broader efforts across the research ecosystem further demonstrate that increased visibility and recognition of technical expertise is achievable. In the United Kingdom, the *Times Higher Education Technician of the Year Award*, and the inclusion of facilities in the national *Research Excellence Framework* driven by the *Hidden REF* initiative,<sup>6</sup> all elevate the visibility of technical expertise across a wide range of research expertise. The *Technical Specialists Network (TSN)*<sup>7</sup> and the *Institute for Technical Skills and Strategy (ITSS)*<sup>8</sup> further strengthen career development opportunities for technical staff through dedicated funding and training, building

on initial advocacy work by the Technician Commitment initiative,<sup>9</sup> which is now also starting to find adoptions beyond the United Kingdom where it originated.

Although these initiatives are often regionally rooted, they provide transferable models and reinforce the message that Imaging Scientists are part of a wider community of technical professionals facing similar structural challenges and that progress in one domain can catalyse change in others as has been demonstrated with initiatives like the Technician Commitment. It has had a transformative impact on UK technical staff by formally recognising their value, strengthening career pathways, and improving visibility and support structures. This momentum is now resonating internationally, helping to catalyse a growing global movement to elevate and professionalise technical roles across research and innovation systems.

Together, these examples show that reducing inertia and improving recognition does not require starting from scratch. Building on existing guidelines, sharing best practices, and aligning local actions with international recommendations can meaningfully improve recognition, support career development, and strengthen the sustainability of core facilities.

## 6 | A CALL TO ACTION ON RECOGNITION

The findings presented in this manuscript demonstrate that inadequate recognition of Imaging Scientists working in core facilities is a global and systemic issue with direct consequences for career development, institutional sustainability, and research quality.

### HIGHLIGHT BOX 2: Practical tips for core facilities to improve recognition practises identified by survey respondents and GBI Working Group members

- Familiarise yourself with existing institutional guidelines and promote their uptake.
- Initiating authorship and acknowledgement discussions during project kick-off or training sessions.
- Use facility policies or terms and conditions to formalise expectations and provide clear text for acknowledgement.
- Regular reminders (email signatures, booking systems, computer login screens, acknowledgement posters).
- Maintaining visible records of publications that acknowledge the facility.
- Support users in drafting methods sections, which enables the facility to learn about ongoing manuscripts—and ensure correct details are included for improved methods reporting.
- Monitor talks, reports, and publications and address discrepancies where appropriate.
- Provide training for researchers, especially Early Career Researchers, on working with core facilities and applying authorship guidelines.
- Work with institutional leadership to add checkboxes to indicate facilities that were used for their projects to graduate thesis submission portals.
- Adopt Persistent Identifiers (PIDs), for example, Research Organization Registry (ROR) IDs to standardise facility citation.
- Engaging with publishers and funders to introduce mandatory acknowledgement fields or prompts in submission systems, such as inclusion in STAR methods,<sup>9</sup> and use of the CRediT taxonomy.<sup>10</sup>
- International collaboration to adapt existing international recommendation standards and provide templates, onboarding checklists, and policy language.

Addressing these challenges requires coordinated action across the research ecosystem. Researchers, facility managers, institutional leadership, publishers, funders, and international networks all have a role to play in embedding fair and transparent recognition practices into everyday research workflows. While community-driven tools and

initiatives already provide practical pathways forward (Highlight Box 2), their impact ultimately depends on institutional commitment and systemic uptake.

We therefore encourage research institutions to critically review their authorship and acknowledgement practices, ensure that existing guidelines are clearly communicated and implemented, introduce the position of a research integrity office as a neutral mediator in cases of academic integrity challenges, and empower Imaging Scientists to participate meaningfully in discussions around credit for their work. In parallel, publishers and funders should strengthen mechanisms that promote transparent reporting of facility contributions, including consistent acknowledgement practices and the use of persistent identifiers.

More broadly, recognition must be embedded within evaluation frameworks. Hiring, promotion, and performance assessments for Imaging Scientists and other core facility professionals should reflect the full scope of their contributions: multidisciplinary technical expertise, methodological innovation, training, service provision, data stewardship, and community-building, rather than relying predominantly on traditional publication metrics alone.<sup>11</sup> Aligning evaluation practices with the realities of facility-based science is essential for establishing equitable, attractive, and sustainable career pathways.<sup>16,17</sup>

By acting collectively and building on existing momentum, the research community can ensure that Imaging Scientists and all core facility experts—who enable, accelerate, and safeguard scientific discovery - receive appropriate recognition, and that core facilities are fully integrated as valued contributors within the academic research ecosystem.

## 7 | CONCLUSION

This study provides a comprehensive, global analysis of the structural challenges facing Imaging Scientists working in core facilities, integrating evidence from two complementary international surveys. Together, the findings demonstrate that career progression, recognition, funding stability, training access, and workforce sustainability are deeply interconnected elements of a single ecosystem. Across regions and institutional contexts, the absence of clear career frameworks and consistent recognition mechanisms emerges as a critical constraint on both individual careers and the long-term viability of imaging infrastructures.

By examining authorship and acknowledgement practices alongside the Top 5 Career Path Challenges, this work highlights recognition as a key mechanism underpinning many of the systemic issues identified. Although no single

metric can capture the full impact of Imaging Scientists, visibility in scientific publications remains a key interface between facility-based contributions and institutional and funding evaluation systems. Inconsistent recognition therefore reinforces career path misalignment and limits the ability of facilities and individuals to demonstrate impact, secure resources, and sustain expertise.

Importantly, the findings also show that progress is already underway. Community-driven initiatives, shared guidelines, and emerging institutional and national frameworks demonstrate that recognition practices can be improved when responsibility is shared and solutions are grounded in everyday research practice. Imaging Scientists are part of a broader global community of technical specialists, and the imaging field is well positioned to continue to contribute leadership and transferable models for recognition reform. We hope to revisit this data in the years to come to benchmark progress in the field, including through a planned follow-up of the Top5 Challenges survey in the next 5 years or so. Such longitudinal approaches will be important to assess how improvements in recognition practices relate to broader outcomes, including career development, job satisfaction, and retention of Imaging Scientists, and to better understand the interdependencies between these factors. The authorship and acknowledgement survey still remains open for further input and an updated dataset will be released on Zenodo once completed.

Advocacy for career paths for Imaging Scientists in core facilities has to go hand-in-hand with advocacy for core facilities themselves and their sufficient funding and recognition as foundational pillars of local research ecosystems. In times of shrinking research budgets, core facilities represent an important pathway by which institutions can ensure effective and efficient resource use and return on institutional investments. Beyond institutional use, making core facility resources and expertise openly accessible for external users, both from academia and industry, can support facilities economically and through increased impact and networks. Advocacy for institutional support for open access core facilities has to happen on the individual institutional level; however, the Global BioImaging community has developed an overview of arguments targeting various stakeholder groups in support of any Imaging Scientist engaging in this advocacy.<sup>18</sup>

Building on earlier international recommendations, this manuscript provides an evidence base to support coordinated, system-level change and first suggestions to the different types of stakeholders how they can each contribute to this change (see Highlight Box 1). Strengthening recognition practices is not only a matter of fairness; it enhances research quality, reproducibility, data integrity, and institutional resilience. Ensuring

sustainable career pathways for Imaging Scientists and securing the future of imaging core facilities are inseparable goals. Addressing them requires recognition to be embedded at the core of research ecosystems so that sustainability, excellence and innovation are not undermined.

## AUTHOR CONTRIBUTIONS

**Kerry Thompson:** Conceptualisation; methodology; writing (original draft); writing (review and editing); formal analysis; visualisation; supervision; endorsement. **Johanna Bischof:** Conceptualisation; methodology; writing (original draft); writing (review and editing); formal analysis; visualisation; supervision; endorsement. **Yara Reis:** Conceptualisation; methodology; writing—review and editing; endorsement. **Constadina Arvanitis:** Writing—review and editing; endorsement. **Olubunmi A. Balogun:** Writing—review and editing; endorsement. **Claire M. Brown:** Writing—review and editing; endorsement. **Mariana De Niz:** Conceptualisation; writing—review and editing; endorsement. **Marcela Díaz:** Writing—review and editing; endorsement. **Lize Engelbrecht:** Conceptualisation; writing—review and editing; endorsement. **Eunice Fabian-Morales:** Writing—review and editing; endorsement. **Elnaz Fazeli:** Writing—review and editing; endorsement. **Georgina Fletcher:** Conceptualisation; writing—review and editing; endorsement. **Adan Guerrero:** Endorsement. **Michelle S. Itano:** Conceptualisation; writing—review and editing; endorsement. **Eleanor Kable:** Conceptualisation; Endorsement. **Gregory T. Kitten:** Conceptualisation; writing—review and editing; endorsement. **Shinya Komoto:** Writing—review and editing; endorsement. **Xiaoxiao Ma:** Writing—review and editing; endorsement. **Peter John O'Toole:** Conceptualisation; methodology; writing—review and editing; endorsement. **Andreia Pinto:** Conceptualisation; endorsement. **Cora Noemi Pollak:** Endorsement. **Clara Prats:** Conceptualisation; writing—review and editing; endorsement. **Joanna W. Pylvänäinen:** Endorsement. **James Douglas Riches:** Conceptualisation; investigation; methodology; writing—review and editing; endorsement. **Jean Salamero:** Conceptualisation; writing—review and editing; endorsement. **Virginia Silio:** Conceptualisation; writing—review and editing; endorsement. **Stefan Terjung:** Writing—review and editing; endorsement. **Sophie Winter:** Conceptualisation; project administration; endorsement. **Graham Daniel Wright:** Conceptualisation; methodology; writing—review and editing; endorsement. **Lisa Yen:** Conceptualisation; writing—review and editing; endorsement. **Antje Kessler:** Supervision; funding acquisition; conceptualisation; writing—review and editing; endorsement.

## AFFILIATIONS

- <sup>1</sup>Anatomy Imaging and Microscopy Facility, School of Medicine, College of Medicine, Nursing and Health Science, University of Galway, Galway, Ireland
- <sup>2</sup>Euro-BioImaging Bio-Hub, Euro-BioImaging ERIC, Heidelberg, Germany
- <sup>3</sup>Global BioImaging, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany
- <sup>4</sup>Center for Advanced Microscopy and Nikon Imaging Center, Feinberg School of Medicine, Northwestern University, Chicago, Illinois, USA
- <sup>5</sup>College of Health Sciences, Bowen University, Iwo, Nigeria
- <sup>6</sup>Advanced BioImaging Facility (ABIF), McGill University, Montreal, Quebec, Canada
- <sup>7</sup>Advanced Bioimaging Unit, Institut Pasteur of Montevideo, Montevideo, Uruguay
- <sup>8</sup>Central Analytical Facilities: Confocal Microscopy, Stellenbosch University, Stellenbosch, South Africa
- <sup>9</sup>Department of Genetics, Harvard Medical School, Boston, Massachusetts, USA
- <sup>10</sup>Biomedicum Imaging Unit, Faculty of Medicine, University of Helsinki, Helsinki, Finland
- <sup>11</sup>BioImagingUK, Oxford, UK
- <sup>12</sup>The Royal Microscopical Society, Oxford, UK
- <sup>13</sup>Laboratorio Nacional de Microscopía Avanzada, Instituto de Biotecnología, UNAM, Cuernavaca, Morelos, México
- <sup>14</sup>Neuroscience Microscopy Core, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
- <sup>15</sup>Sydney Microscopy and Microanalysis, University of Sydney, Sydney, Australia
- <sup>16</sup>Center of Microscopy, Federal University of Minas Gerais, Belo Horizonte, Minas Gerais, Brazil
- <sup>17</sup>Scientific Imaging Section, Okinawa Institute of Science and Technology, Optics and Imaging Facility, National Institute for Basic Biology, Okazaki, Japan
- <sup>18</sup>A\*STAR Microscopy Platform, Agency for Science, Technology & Research (A\*STAR), Fusionopolis, Singapore
- <sup>19</sup>Department of Biology, University of York, York, UK
- <sup>20</sup>Leica Mikrosysteme Vertrieb GmbH, Wetzlar, Germany
- <sup>21</sup>Confocal and Epi-Fluorescence Microscopy Platform, Instituto de Investigación en Biomedicina de Buenos Aires—CONICET, City of Buenos Aires, Argentina
- <sup>22</sup>Danish BioImaging Infrastructure and Center for Core Facilities, University of Copenhagen, Copenhagen, Denmark
- <sup>23</sup>Faculty of Science and Engineering, Åbo Akademi University, Turku, Finland
- <sup>24</sup>Central Analytical Research Facility, Queensland University of Technology, Brisbane, Australia
- <sup>25</sup>France-BioImaging/CNRS, Paris, France
- <sup>26</sup>Centre for Cell and Molecular Dynamics Core Facility, University College London, London, UK
- <sup>27</sup>Advanced Light Microscopy Facility (ALMF), European Molecular Biology Laboratory (EMBL), Heidelberg, Heidelberg, Germany
- <sup>28</sup>Microscopy Australia, The University of Sydney, Sydney, Australia

## ACKNOWLEDGEMENT

KT acknowledges CZI grant DAF2021-225429 (<https://doi.org/10.37921/723688hijigu>) from the Chan Zuckerberg Initiative DAF, an advised fund of Silicon Valley Community Foundation. JB and AK are funded by Euro-BioImaging ERIC (<https://ror.org/05d78xc36>). YR is supported by a grant for the Global BioImaging project from the Chan Zuckerberg Initiative DAF, an advised fund of Silicon Valley Community Foundation. CA is a member of the Northwestern University Center for Advanced Microscopy (RRID:SCR\_020996) generously supported by NCI CCSG P30 CA060553 awarded to the Robert H Lurie Comprehensive Cancer Center. CMBs contribution was made possible in part by grant number 2023-329682 from the Chan Zuckerberg Initiative DAF, an advised fund of Silicon Valley Community Foundation and the McGill University Advanced BioImaging Facility (ABIF), RRID:SCR\_017697. MDN is a member of the Northwestern University Center for Advanced Microscopy (RRID:SCR\_020996) generously supported by NCI CCSG P30 CA060553 awarded to the Robert H Lurie Comprehensive Cancer Center. EF acknowledges support by Biomedicum Imaging Unit, University of Helsinki, as a part of Biocenter Finland infrastructure. GF acknowledges support by BioImagingUK is co-funded by the RMS and a research grant from UKRI-BBSRC (BB/Z000017/1). MI via the UNC Neuroscience Microscopy Core (RRID:SCR\_019060) is supported, in part, by funding from the NIH-NICHD Intellectual and Developmental Disabilities Research Center Support Grant P50 HD103573, S10 OD032388 (Zeiss LSM 980 confocal microscope system) and S10 MH130455 (ASI ct-dSPIM microscope system). GK acknowledges support of the Center of Microscopy is a National Multiuser Center (CNM) supported by a grant from FINEP (Financier of Studies and Projects, an organization of the Brazilian federal government under the Ministry of Science of Technology). SK acknowledges support of JSPS KAKENHI Grant Number JP22H04926, Advanced Bioimaging Support (ABiS). XM and GDW acknowledge Singapore's National Research Foundation under its Shared Infrastructure Support grant awarded to SingaScope—a Singapore-wide microscopy infrastructure network (NRF2017\_SISFP10) and A\*STAR for continued support. JS is a member of the national infrastructure France-BioImaging (<https://ror.org/01y7vt929>) supported by the French National Research Agency (ANR-24-INBS-0005 FBI BIOGEN). SW is supported by a grant for the Global BioImaging project from the Chan Zuckerberg Initiative DAF, an advised fund of Silicon Valley Community Foundation. LY acknowledges support of Microscopy Australia (<https://ror.org/042mm0k03>) by the Australian

Government through the National Collaborative Research Infrastructure Strategy (NCRIS).

Open access funding enabled and organized by Projekt DEAL.

## CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in Zenodo at <https://zenodo.org>, reference number <https://doi.org/10.5281/zenodo.18282372>

## ENDNOTES

<sup>1</sup> <https://globalbioimaging.org/working-groups/career-paths>

<sup>2</sup> <https://ctls-org.eu/>

<sup>3</sup> <https://abrf.org/>

<sup>4</sup> <https://www.rms.org.uk/library/core-facilities-publication-policy.html>

<sup>5</sup> <https://globalbioimaging.org/documents/imaging-facility-guidelines>

<sup>6</sup> <https://hidden-ref.org/>

<sup>7</sup> <https://itss.org.uk/tsn/>

<sup>8</sup> <https://itss.org.uk/>

<sup>9</sup> <https://www.techniciancommitment.org.uk/>

## REFERENCES

- Hockberger, P., Weiss, J., Rosen, A., & Ott, A. (2018). Building a sustainable portfolio of core facilities: A case study. *Journal of Biomolecular Techniques*, 29(3), 79–92. <https://doi.org/10.7171/jbt.18-2903-003>
- Kivinen, K., van Luenen, H., Alcalay, M., Bock, C., Dodzian, J., Hoskova, K., Hoyle, D., Hradil, O., Christensen, S. K., Korn, B., Kosteas, T., Morales, M., Skowronek, K., Theodorou, V., Van Minnebruggen, G., Salamero, J., & Premvardhan, L. (2022). Acknowledging and citing core facilities: Key contributions to data lifecycle should be recognised in the scientific literature: Key contributions to data lifecycle should be recognised in the scientific literature. *EMBO Reports*, 23(9), e55734. <https://doi.org/10.15252/embr.202255734>
- Jürgens, A., Tedeschi, G., D'Errico, G., Kilian, K., Zawadzki, K., Daniel, O., Leibfried, A., Poschet, G., Lau, L., & Helm-Petersen, N. (2024). Navigating the frontier: Research infrastructures, core facilities and a new paradigm at European Universities. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2365613>
- Tranfield, E. M., & Lippens, S. (2024). Future proofing core facilities with a seven-pillar model. *Journal of Microscopy*, 294, 411–419. <https://doi.org/10.1111/jmi.13314>
- Wright, G. D., Thompson, K. A., Reis, Y., Bischof, J., Hockberger, P. E., Itano, M. S., Yen, L., Bialy, N., Brown, C. M., Chaabane, L., Chew, T., Chitty, A. I., Cordelières, F. P., De Niz, M., Ellenberg, J., Engelbrecht, L., Fabian-Morales, E., Fazeli, E., Fernandez-Rodriguez, J., ... Keppler, A. (2023). Charting a course for success: International recommendations for imaging scientist careers in core facilities. Zenodo. <https://doi.org/10.5281/zenodo.10200758>
- Wright, G. D., Thompson, K. A., Reis, Y., Bischof, J., Hockberger, P. E., Itano, M. S., Yen, L., Adelodun, S. T., Bialy, N., Brown, C. M., Chaabane, L., Chew, T.-L., Chitty, A. I., Cordelières, F. P., De Niz, M., Ellenberg, J., Engelbrecht, L., Fabian-Morales, E., Fazeli, E., ... Keppler, A. (2024). Recognising the importance and impact of Imaging Scientists: Global guidelines for establishing career paths within core facilities. *Journal of Microscopy*, 294, 397–410. <https://doi.org/10.1111/jmi.13307>
- Basta, P. V., Taatjes, D. J., & White, A. N. (2025). Optimizing research visibility: The role of investigators and shared (core) research resources in publications using RRIDs. *Journal of Biomolecular Techniques*, 36(3), 3fc1f5fe.66784717. <https://doi.org/10.7171/3fc1f5fe.66784717>
- Clissold, K. A., & Itano, M. S. (2025). How do you measure the success and impact of a core facility? *Biotechniques*, 77(7-8), 263–270. <https://doi.org/10.1080/07366205.2025.2555118>
- Thompson, K. A., Bischof, J., Wright, G. D., Reis, Y., Hockberger, P. E., Itano, M. S., Yen, L., Adelodun, S. T., Bialy, N., Brown, C. M., Chaabane, L., Chew, T.-L., Chitty, A. I., Cordelières, F. P., De Niz, D., Ellenberg, J., Engelbrecht, J., Fabian-Morales, J., Fazeli, E., ... & Keppler, A. (2026). Survey datasets for “A Global Examination of Careers and Recognition for Imaging Scientists in Core Facilities”. Zenodo. <https://doi.org/10.5281/zenodo.18282373>
- Schmidt, A. J., Cho, E., Condon, N. D., Kable, E., & McMillan, P. J. (2026). International microscopy facility benchmarking survey. *Journal of Microscopy*, 1–19. <https://doi.org/10.1111/jmi.70079>
- Weber, M., & Huisken, J. (2021). Multidisciplinary is critical to unlock the full potential of modern light microscopy. *Frontiers in Cell and Developmental Biology*, 9, 739015. <https://doi.org/10.3389/fcell.2021.739015>
- Smith, D. B., Ferdous, A., & Oxford, J. T. (2023). Shared core facilities serve as hubs for biomedical research network at institutions of emerging excellence. *Journal of Biomolecular Techniques*, 34(1), 3fc1f5fe.2f22458d. <https://doi.org/10.7171/3fc1f5fe.2f22458d>
- Adami, V., Homer, N., Utz, N., Lippens, S., Rappoport, J. Z., & Fernandez-Rodriguez, J. (2021). An international survey of training needs and career paths of core facility staff. *Journal of Biomolecular Techniques*, 32(1), 1–9. <https://doi.org/10.7171/jbt.21-3201-002>
- Fletcher, L., Harrington, C. A., Nilsen, A., Petrie, S. K., & Chitty, A. I. (2023). Creating a career path for shared research resources personnel. *Journal of Biomolecular Techniques*, 33(4), 3fc1f5fe.418fa1db. <https://doi.org/10.7171/3fc1f5fe.418fa1db>
- Ferrando-May, E., Hartmann, H., Reymann, J., Ansari, N., Utz, N., Fried, H.-U., Kukat, C., Peychl, J., Liebig, C., Terjung, S., Laketa, V., Sporbart, A., Weidtkamp-Peters, S., Schauss, A., Zuschratter, W., Avilov, S., German BioImaging Network. (2016). Advanced light microscopy core facilities: Balancing service, science and career. *Microscopy Research and Technique*, 79(6), 463–479. <https://doi.org/10.1002/jemt.22648>
- Lippens, S., Audenaert, D., Botzki, A., Derveaux, S., Ghesquière, B., Goeminne, G., Hassanzadeh, R., Haustraete, J., Impens, F., Lamote, J., Munck, S., Vandamme, N., Van Isterdael, G., Lein, M., & Van Minnebruggen, G. (2022). How tech-savvy employees make the difference in core facilities: Recognizing core facility expertise with dedicated career tracks: Recognizing core facil-

- ity expertise with dedicated career tracks. *Embo Reports*, 23(6), e55094. doi: [10.15252/embr.202255094](https://doi.org/10.15252/embr.202255094)
17. Brown, C. M. (2018). Careers in Core Facility Management. *Cold Spring Harbor Perspectives in Biology*, 10(8), a032805. <https://doi.org/10.1101/cshperspect.a032805>
18. Global BioImaging Management Board. Added value of open access core facilities. Zenodo. <https://doi.org/10.5281/zenodo.10591802>

## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

**How to cite this article:** Thompson, K., Bischof, J., Reis, Y., Arvanitis, C., Balogun, O. A., Brown, C. M., De Niz, M., Díaz, M., Engelbrecht, L., Fabian-Morales, E., Fazeli, E., Fletcher, G., Guerrero, A., Itano, M. S., Kable, E., Kitten, G. T., Komoto, S., Ma, X., O'Toole, P. J., ... Keppler, A. (2026). Making the invisible visible: A global examination of careers and recognition for Imaging Scientists in core facilities. *Journal of Microscopy*, 302, 274–294. <https://doi.org/10.1111/jmi.70089>