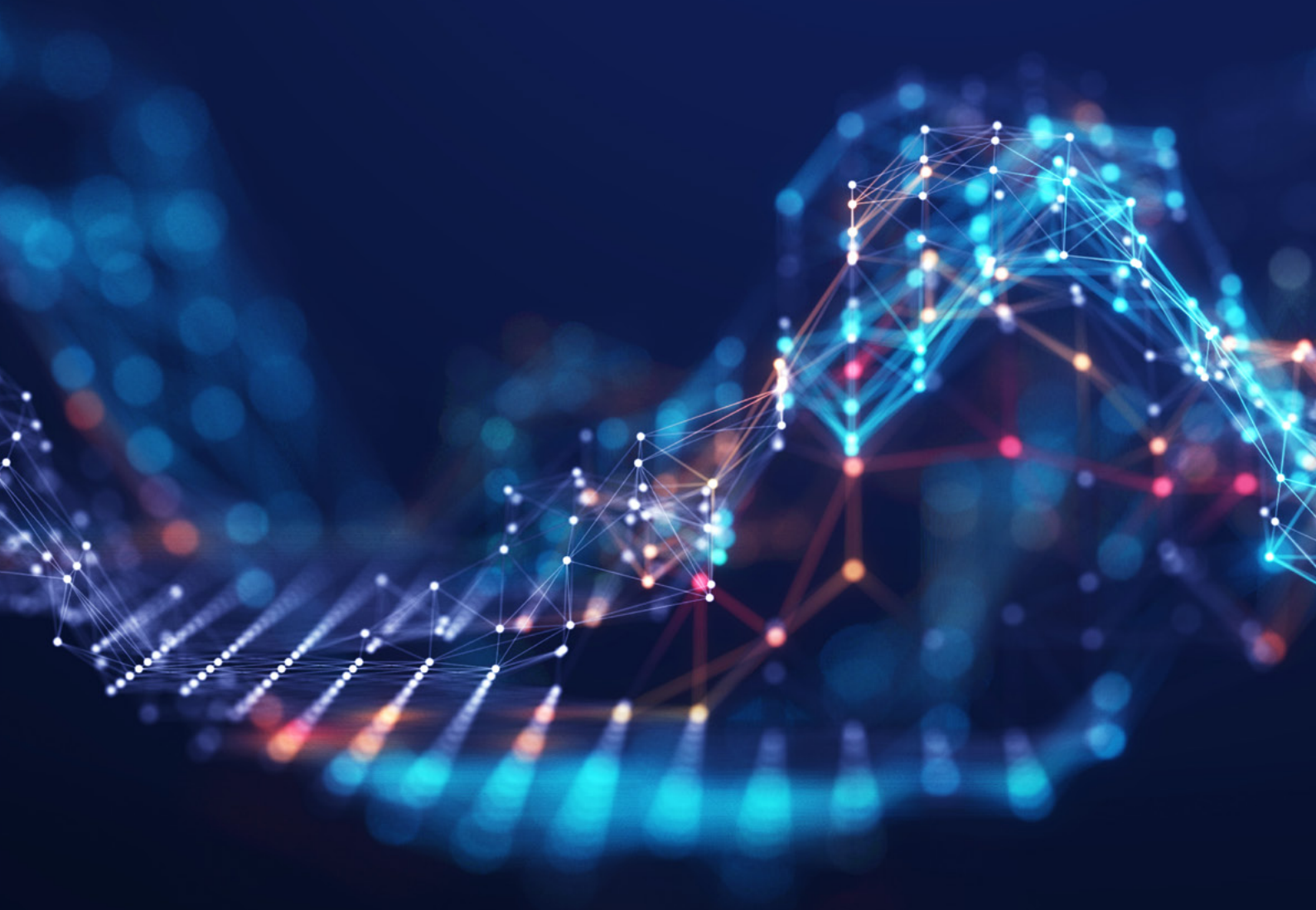
CENTRE FOR SCIENCE FUTURES | International Science Council

Harnessing ‘digital’ for science in lower-resource settings



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About the International Science Council

The ISC is an international non-governmental organization with a unique global membership that brings together 250 international scientific unions and associations, national and regional scientific organizations including science academies, research councils, regional scientific organizations, international federations and societies, and academies of young scientists and associations. The ISC works at the global level to catalyse change by convening scientific expertise, advice and influence on issues of major importance to both science and society.

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Terminology

Here are definitions of some of the key terms used throughout the report:

- **Digital.** A broad definition that encompasses lives and the connection between people and/or machines. It includes both digital tools but also operations, culture and products that take advantage of digital technologies.
- **Digital journey.** The pathway an organization takes as it identifies and acts on opportunities or gaps to improve its systems, services, or structures using digital technologies and methods.
- **Digital literacy.** The skills and confidence needed to use digital tools effectively.
- **Digital maturity.** The extent to which an organization embeds digital tools, mindsets, and ways of working into its everyday operations, strategy, and culture.
- **Digital transformation.** This can be used to describe everything from small changes like creating new products and services; to the wholesale restructuring of company operations, cultures and products to take advantage of digital technologies.
- **Technical assistance.** Practical, tailored support provided by digital and organizational experts to guide science organizations through their digital transformation journeys.

Foreword

Recent years have seen growing awareness of how new, foundational technologies like quantum computing and artificial intelligence will have profound effects on how science systems are practiced and organized in the future. These technological drivers of change are acting as a backdrop to other, more prominent changes to science systems in recent years, which have demanded more agile, open, and digitally astute science organizations.

Scientists in low- and middle-income countries often face barriers that limit their ability to fully engage these opportunities of the digital age, and science organizations have a role to play in ensuring technology is harnessed to improve equity, and not exacerbate existing digital divides.

It is therefore critical that science organizations, particularly those who might have a footprint in low and middle-income contexts, or who find themselves lagging behind in embracing digital tools and ways of working, must evaluate their current capacities. Understanding existing strengths and weaknesses provides a natural starting point for science organizations to evaluate best practices from other institutions, and ultimately take action to harness digital tools and ways of working.

This report is a result of the ISC Digital Journeys project, which follows on the 2024 discussion paper Science organizations in the digital age. The paper captured contemporary understandings of 'digital' and highlights where science organizations can act to use digital tools and ways of working to achieve their mission.

The Digital Journeys project took this forward, exploring how science organizations can be better supported through tailored strategic and technical assistance, and by convening a peer network that met regularly from January to June 2025. We are grateful to the ISC Members who joined this pioneering cohort, and their experiences have shaped the insights shared in this report.

Finally, this report acts as a call to action: to make digital a core part of organizational strategy and to adopt a tailored, iterative approach, reflecting some of the core skills required to lead effective digital transformation.

By supporting science organizations to harness the potential of digital technologies, we can improve the value provided to their stakeholders and ensure that no one is left behind in this period of rapid technological change. It is an ambitious goal, but a necessary one, and we must act now.

Salvatore Aricò
CEO, International Science Council

Chapter 1: Digital transformation in science organizations

Why digital matters for science organizations

Science, technology, and innovation (STI) systems are undergoing significant change, driven by a shift toward interdisciplinary and transdisciplinary approaches, new models of collaboration across public and private sectors, and growing expectations that science will play a more direct role in solving urgent global challenges (OECD, 2020). These trends are redefining how science is organized, funded, and communicated, particularly in ways that emphasize openness, agility, and societal impact (UNESCO, 2021).

Yet, while these transformations present opportunities for science systems worldwide, individuals and organizations in lower resource settings, and especially those in low- and middle-income countries (LMICs), face persistent barriers to fully participating in and benefiting from these opportunities, such as limited infrastructure, underfunding, and underrepresentation in global research networks (Bello and Galindo-Rueda, 2020).

Meanwhile, artificial intelligence and digital tools are creating concrete opportunities for all science organizations, whether that is through digitized archives that broaden access, online platforms that widen participation for remote researchers, or AI-enabled workflows that raise efficiency (Figure 1). The Royal Society of Chemistry exemplifies this; by modernizing core systems and putting digital at the heart of strategy, it has aligned tools, culture and governance, unlocking new value and reshaping core activities - from new forms of membership, to data services and online learning (Chillingworth, 2025).

Digital transformation offers a route for science organizations with a footprint in LMICs to react to changes to the global science system, but doing so requires focused effort to ensure they do not fall behind organizations that are more advanced in using digital tools and methods.

Prioritizing digital is therefore especially urgent for research and innovation activities based in, or conducted by, scientists in LMICs. It can help address long-standing inequalities and equip stakeholders with the skills and systems they need to connect, lead, and contribute on equal footing.

Digital transformation to…		
Engage and connect	**Create new value through products and services**	**Evolve skills, structures and operating models**
• Use digital platforms like webinars, virtual conferences and social media to reach broader and more diverse audiences • Track website performance and audience behaviour using e.g. Search Engine Optimization (SEO) tools • Create opportunities for dialogue through online feedback forms and virtual communication channels • Share science with the public using digital storytelling, videos and engagement • Strengthen relationships with stakeholders through regular digital updates and targeted content	• Offer new ways for members to connect, learn and collaborate through digital forums and peer exchange • Build and share digital research libraries, open-access content and data visualization tools • Support wider participation in science through citizen science platforms and online training • Use AI-powered tools to make research processes more efficient and impactful • Make funding and membership more accessible through online grant applications and flexible models	• Use digital tools to support internal communication, project tracking and collaboration • Improve management of finances, grants and data through digital systems • Simplify day-to-day tasks like voting, reporting and admin with e-governance tools • Support teams to build digital confidence and adapt roles to new ways of working • Store and manage information more efficiently using shared databases and cloud systems

Figure 1: Examples of ways science organizations can harness digital technologies. Categorization taken from *Science organizations in the digital age* (International Science Council, 2024)

The ISC Digital Journeys project

The Digital Journeys project was launched by the ISC to strengthen the digital capacity of science organizations, with a particular focus on research and innovation based in, or conducted by, scientists in LMICs. The project was funded by the International Development Research Centre and delivered by the ISC's Centre for Science Futures, in partnership with Brink. It is part of Science Systems Futures, a wider programme of work that aims to explore how emerging technologies are transforming the practice and organization of science worldwide, with a focus on empowering science, technology, and innovation in the Global South.

The project set out to explore how science organizations can be better supported on their digital journey through tailored strategic and technical assistance, and by creating a peer network of science organizations, a cohort that met regularly between January and June 2025.

The cohort brought together a diverse group of eleven ISC Members (see Figure 2), who varied in structure, mission, and size.

Their experiences informed the development of the Digital Maturity Framework (Chapter 2), which were used to identify each organization's strengths, gaps and opportunities for improvement. The findings presented here are a synthesis of that research.

Every organization differs in how it uses digital tools and ways of working, shaped by its history, resources, governance and culture. The sample of eleven cohort members is small, so the findings should be read as illustrative rather than definitive. Even so, the process surfaced real challenges, practical successes and lessons that may be useful to others navigating similar journeys, and we believe these are findings that could be replicated elsewhere.

Figure 2: Map of ISC Members who took part in the Digital Journeys cohort

Common barriers and challenges

The ISC Digital Journeys initiative set out to explore how science organizations can be better supported on their digital journey. While each participating organization brought its own context and priorities, many shared common motivations: strengthening digital capacity, engaging in peer exchange, and forging stronger global connections.

Across the cohort, common challenges emerged in how digital tools and ways of working were harnessed, and sharing these can help frame guidance for future action.

The science organization

Funding and resource constraints

Across the Digital Journeys cohort, one of the most consistent barriers raised was a lack of dedicated funding and capacity for digital transformation. While most organizations recognized the value of digital tools and systems, they struggled to invest in them proactively.

Many participants shared that digital initiatives were typically funded in a reactive way, tied to specific events or external funding opportunities, rather than embedded into long-term strategy:

> *"We don't really budget for new tools. It's hard to ask for money unless there's an event or something very visible. So, we tend to wait until there's an obvious need."*

> *"We are lucky because one of our board members helped us get a platform for free, but if we wanted to switch, I don't think we could afford it."*

Others described the challenges of maintaining or upgrading bespoke systems due to developer costs, leading them to opt for more generic commercial platforms that were easier to manage, but less tailored to their needs.

Several organizations admitted that system upgrades only happen when something breaks, or when external donors fund specific infrastructure. This often results in short-term fixes and fragmented systems, rather than activities following a cohesive digital strategy. Even seemingly basic costs like web hosting, digital repositories, or cloud storage were raised as barriers.

Decision-making structures

For many cohort members, decision-making around digital transformation was shaped, and often slowed, by formal governance models. Where boards or executive committees held authority over strategic and financial decisions, sourcing funds for digital projects became a complex, multi-step process, with long lead times for approvals and limited flexibility.

For one ISC member, strategic direction is shaped by a new president every four years, elected during a global congress. The president proposes their vision, including major digital goals like overhauling the website or rebuilding internal systems, which is then presented to the board for approval. Day-to-day execution falls to a small executive committee, which, while able to act on smaller projects, needs formal board approval for larger digital investments. This process can take up to a year.

> ***"If this is a decision that's in my budget, I can make it. If it's a major budget, we need board approval."***

Another decision-making challenge occurs in cases of outsourced administration. An organization may be hosted and managed by a third-party company, which runs the operations, and often the finances, on behalf of the science organization. As a result, major decisions, including around digital infrastructure, need to go through this external company, providing another layer of decision-making and making it harder to sign off and execute digital projects.

These board-driven or committee-led governance structures can create long cycles between identifying need and action, with limited room for experimentation or quick pivots. This is essential in the digital realm, where adoption depends on user choice, progress is tested and measured incrementally, and tools require continual maintenance and improvement. The gap between decision-making structures and good practice for developing digital tools is a key theme that science organizations must navigate.

Organizational shape and team responsibilities

If governance structures influence the pace of decision-making, then internal staffing models determine who can act on those decisions. Across the ISC Digital Journeys cohort, many science organizations are powered by small teams or volunteers who 'wear many hats'. This reality constrains the time and availability of skills required to drive and deliver a digital strategy.

Many organizations in the cohort are led by a small secretariat, or are without a formal administrative body at all. Where secretariats do exist, they are typically comprised one to three staff members, who are responsible for managing digital tools, membership databases, communications, and overall operations.

Furthermore, with formal roles such as Executive Director, Membership Officer, or Administrator, staff reported human resource constraints and limited mental bandwidth. Digital tasks were often added on top of existing responsibilities, with little room for long-term planning or experimentation. There is an overall sense that going the extra mile to deliver digital projects would require extra time, and this takes a physical and emotional toll.

On the other hand, in organizations without a formal secretariat, digital responsibilities often fell to elected temporary volunteers or rotating leadership teams. One cohort member described

decision-making happening mostly through ad hoc meetings or WhatsApp chats, with little continuity or documentation.

Whether formally staffed or volunteer-led, many of the cohort members had in the past shown strong enthusiasm for digital innovation, but lacked the organizational structure to sustain it. As a result, efforts to modernize systems or introduce new tools stalled, often due to overdependence on a few individuals, unclear ownership, or the absence of institutional support to individual changemakers.

Institutional memory and knowledge bottlenecks

For many science organizations, the continuity of digital systems and processes relies heavily on a small number of individuals. When digital knowledge such as how platforms are maintained, which tools are used, or how systems are set up, is concentrated in one or two people, it creates serious vulnerabilities.

These knowledge bottlenecks pose risks not only when individuals leave or retire, but also when systems need to be scaled, updated, or repaired. In several cases, cohort members reported that the departure of long-serving staff led to significant disruption, particularly when documentation was lacking or outdated.

One ISC member, for example, recently saw the departure of a long-serving staff member who had managed digital systems for decades. This created a pivotal moment to assess existing systems and knowledge, as well as to transfer the legacy information the individual held about the maintenance and archiving of the website.

Many organizations lacked structured systems for archiving institutional memory. Without clear processes for maintaining digital records, historical data and rationale for past decisions can easily be lost, making it difficult for incoming staff to build on previous work or adapt existing systems.

For many cohort members, these gaps in institutional memory made it difficult to build sustainable digital systems. Without clear documentation, shared workflows, or accessible archives, even basic upgrades became time-consuming and continuity across leadership transitions was hard to maintain.

Legacy and constrained systems

Several cohort members described operating with legacy systems that are difficult to sustain, adapt, or evolve. Many platforms had been developed incrementally over years, often without formal documentation or plans for future upgrades, leaving current teams dependent on long-standing developers or volunteers to keep things running.

One ISC member, for example, maintained a highly customized system that had been “patched” for over two decades, with little documentation, and the present team had to reverse-engineer its workings in order to maintain or archive content. Another example relates to a member who did not have direct access to their website backend, relying instead on a volunteer to make even simple updates. These examples reflect a wider pattern of reliance on external stakeholders for digital tasks, limiting long-term adaptability.

Other organizations pointed to basic operational challenges, such as still sharing files by email, lacking shared drives or centralized data practices. Even when members used digital tools, such as email campaigns, webinars, or social media, they noted inefficiencies in how these tools were coordinated or shared across teams.

In some cases, constraints are relational. For instance, an organization may have an official partnership with another that necessitates alignment in tools or systems used, and where approval processes must be followed for the use of software beyond an agreed-upon list. Of course there might be clear benefits to such alignment, particularly when it comes to resourcing or integration, but this setup is one that makes it harder for individual organizations to innovate or tailor tools and systems that might serve them particularly well.

Together, these situations point to a general challenge in organizations having the ability to maintain, deliver, or evolve their own systems.

In-house technical capacity

The ISC invited prospective cohort members to complete a short survey to better understand their interests, confidence levels, and digital capacity. One of the questions from the survey asked: "How would you rate your organization's capacity to deliver a new digital product or service?" on a scale of 0 (no capacity) to 5 (very high capacity). This question was the lowest-rated area across the Digital Journeys cohort, highlighting a shared challenge around in-house technical skills. Without in-house expertise, it becomes difficult to evaluate, maintain or adopt new tools with confidence.

An observation among ISC members was that the one or two individuals who may be responsible for using a tool were often junior or self-taught, and lacked structured support or mentoring. One interviewee shared that although a core task is updating their organization's website using WordPress, they believe they have a very limited understanding of app's functionality and use a plug-in with reduced capabilities as a way to accommodate for this perceived lack of skills:

> ***"I'm not really a developer. I come into this more with a background in design...and I don't really have a mentor."***

Limited in-house technical capacity also limits how well organizations can engage with external providers. Organizations described difficulties negotiating service-level agreements or translating consultancy advice into action due to a lack of internal knowledge and technical reference points.

Change management and culture

While enthusiasm for digital was widespread across the cohort, most of the science organizations showed lack of familiarity with the kinds of innovation and change management processes that enable digital transformation to take root and grow. This was one of the most common limitations acknowledged in the cohort, and formed a key part of technical assistance offered.

Furthermore, when encouraged to think about digital as more than just tools, and as something that involves new mindsets and enabling environments, several participants found the framing unfamiliar but helpful, and expressed interest in developing these skills further.

The stakeholders the science organization works with

Limited insight into stakeholder engagement

While technology offers the potential for more diverse and interactive engagement with stakeholders, many organizations in the cohort described engagement efforts as focused primarily on broadcasting information in a one-size-fits-all manner, through newsletters, webinars, or website updates.

One of the areas most consistently lacking among the cohort members was mechanisms to gather structured feedback or understand how stakeholders interact with the products, services and content delivered by the organization. Feedback, when collected, tended to be post-event and informal, and several organizations noted that they do not gather engagement data systematically at all. This limits the ability to adapt experiences based on real user needs and preferences. As one cohort member put it:

> *"Evaluation mainly occurs following the hosting of a webinar, seminar or biennial conference using Google forms and/or hardcopy questionnaire."*

This lack of visibility into how stakeholders engage with the organization is compounded by the absence of stakeholder relationship management tools, and the fact that digital touchpoints such as webinars, newsletters, and websites often operated in silos. As a result, many organizations in the cohort struggled to build a unified view of their audience or track how relationships evolved over time.

More than half of the cohort (60%) described their engagement model as primarily one-way. Only a small number of organizations mentioned analyzing user engagement data to inform decisions.

Unequal access to technology and tools

Some organizations in the cohort highlighted the persistent digital divide as a result of unequal access to technology, tools and digital infrastructure, which shapes theirs and their stakeholders' ability to fully engage with digital offerings. For one member, there was a clear contrast in digital access that was especially dependent on urban and rural populations. For another, they faced a context of war and displacement, noting severe constraints in their ability to offer online training or host virtual meetings, both for national scientists and the wider diaspora.

Equally, some organizations pointed to there being an overwhelming number of digital tools available to stakeholders, with limited guidance on how to navigate or benefit from them. One common example is of an LMIC researcher not being aware of an online knowledge repository hosted by a scientific organization that could provide training opportunities for them. The mismatch between what is technically available and what is accessible or practical to users reveals a critical gap for even the best-intentioned tools.

Stakeholder readiness and digital confidence

Even when digital tools are in place, stakeholder readiness often lags behind. Many organizations reported that members, especially in LMIC contexts, face challenges with digital literacy and limited familiarity using online platforms or accessing digitally-enabled services. For example, a national entity that offers training and services, such as product testing and small-scale ISO-certified manufacturing, must find ways to ensure their mission of promoting science reaches the wider population.

Whilst stakeholder readiness varies greatly, even within groups, there is some correlation with the scientific discipline which an organization serves, with more digitally-led disciplines reporting higher stakeholder readiness. Nevertheless, most organizations in the cohort reported hesitancy among stakeholders to adopt new platforms, with the science organizations struggling to explain the purpose or benefits of particular tools, which further constrained participation.

"The majority of our stakeholders are astronomers and they are used to using complex digital tools in their professional lives."

"Our target demographic consists primarily of middle-aged and older adults with limited digital literacy."

From shared challenges to a framework for action

Understanding that common challenges exist across science organizations in how digital tools and ways of working can be harnessed provides an opportunity to formulate a common framework or language for making more specific assessments about comparative strengths and areas for improvement. This can help science organizations diagnose and reflect on these characteristics, look at what others have done for inspiration, and seek out support and guidance that is relevant to them.

Chapter 2: The ISC Digital Maturity Model

Digital maturity: a starting concept

In searching for a common framework for science organizations to reflect on and use, the language of digital maturity offers a stable foundation.

Digital maturity is described here as the extent to which an organization embeds digital tools, mindsets, and ways of working into its everyday operations, strategy, and culture. It is not about adopting a single tool or completing a one-off project. It is about developing the capacity to adapt, evolve, and make informed decisions as digital technologies and stakeholder needs change over time.

In this way, digital maturity is the foundational context that organizations work with as they use digital approaches to reach their goals. It includes elements like vision and strategy, infrastructure, procurement, skills and leadership, data practices, and the preparedness of stakeholders engaged with by the organization. Individual goals for digital will differ by organization, as will the level of maturity needed to achieve them.

In this sense, digital maturity is also a means to an end. To achieve certain goals, one organization may need to build up internal skills; another may need to foster increased engagement with stakeholders. That is why maturity should not be seen as a benchmark of success but rather as a way to frame action, and as something constantly evolving.

What existing models offer, and where they fall short

The concept of digital maturity is well-established and widely used across sectors to help organizations understand their capacity to adopt digital tools and ways of working.

Many digital maturity models recognize that transformation is not just about adopting new tools, but about how well an organization uses its existing strengths and aligns internal structures to support new ways of working. This includes strengthening leadership, using new skills and methodologies, and ensuring enabling systems and processes are in place. The existing models also acknowledge that progress happens over time through learning and experimentation (Egodawele, Sedera and Bui, 2022).

Some of the most prominent examples include McKinsey & Company's Digital Quotient model (2015), Boston Consulting Group's Digital Acceleration Index (2023), and Deloitte's Digital Maturity Model, which were all introduced in the 2010s.

While these and other existing digital maturity models offer valuable frameworks for assessing and guiding digital transformation, most have been developed with commercial enterprises and business objectives in mind. This, presents challenges in applying them directly to science organizations, which are typically mission-driven, measured by long-term impact, and might have far less resources at their disposal, particularly in low- and middle-income contexts where resourcing may be comparatively low.

Two notable outliers to the above critiques are the Harvard Kennedy School's (HKS) Maturity Model for Public-Sector Digital Services (Eaves and McGuire, 2018), and the Digital Maturity Model by Digital Leadership, which were built specifically with public sector and mission-based organizations in mind. While these models address many of the shortcomings outlined above, they are still general-purpose frameworks or, in the case of the HKS model, are specific only to digital services provided by public institutions. In this way, they are not tailored to the complete needs and realities of science organizations when it comes to assessing digital maturity.

For example, a key area where science organizations may deviate from assumptions made in existing digital maturity models is the inextricable link they have with their stakeholders, and specifically the digital maturity of these stakeholders. Existing frameworks often assume that customers are digitally fluent. However, science organizations engage with a broad range of stakeholders, including individual scientists and the general public, for whom a certain level of digital maturity cannot be assumed.

In this vein, the ASToN Network, which was a digital transformation cohort of African local authorities that ran between 2019-2023, made the distinction between the digital maturity of the local authority and that of the territory (e.g. city) in which the local authority operates. It therefore makes space to acknowledge that the digital maturity of the stakeholders engaged with by an organization, be it the local technology ecosystem or the citizens the local authority serves, makes a difference (ASToN Network).

Both the Digital Leadership and ASToN frameworks have been invaluable sources of inspiration for the framework presented below.

Organizational digital maturity

Vision and Strategy
Relevant digital strategy or plan that is integrated with the organization's strategy, and with a sense of digital future-proofing. The organization has a clear view of where digital tools and ways of working could support progress, and there is support and autonomy to implement the plan.

Systems and mechanisms
Up to date tools and infrastructure that are integrated with each other and designed for accessibility. Supportive planning and delivery processes, including enabling budgets and procurement frameworks.

Skills, experience and culture
In-house technical intelligence, including experience leading digital projects and in leading partnerships for implementation. The organization has experience using a range of innovation methodologies, including user-centered design, a culture of experimentation and iteration, and an appetite for organizational change.

Data
Data is collected and evaluated across the organization, including how stakeholders use products and services. Every piece of data is relevant, transparent and secure.

Stakeholder digital maturity

Culture of engagement
There is frequent and deep engagement with the organization and the services it provides, with candid feedback on where user needs could be better met.

Access to technology and tools
Supportive infrastructure, including fast and reliable internet access, penetration of digital devices, and access to the organization's software and tools.

Stakeholder readiness
Stakeholders are digitally literate and use digital tools regularly in their professional lives. Stakeholders are proactive in learning more about digital technologies and their relevance to their work.

Figure 3: Dual perspectives of the ISC Digital Maturity Framework

A new model for science organizations

Drawing inspiration from the above established models, the ISC Digital Maturity Framework retains the core idea of assessing multiple dimensions of digital readiness, but emphasizes both the internal capabilities of the organization and the digital maturity of the external stakeholders they engage with (**Figure 3**).

This dual focus reflects the interconnected nature of science networks, and the critical importance of stakeholder readiness and engagement, as illustrated in Chapter 1's sections on unequal access, under-engagement and the readiness of different stakeholder groups.

Two lenses: Organizational and stakeholder maturity

The framework is intentionally split into two parts: organizational maturity and stakeholder maturity. By considering both sides, the framework helps organizations diagnose mismatches in digital maturity that may go unnoticed in other models. **Figure 4** is a matrix that highlights how these different configurations of digital maturity implicate the kinds of strategies that science organizations should take.

For example, an organization may have strong organizational maturity - a clear digital vision, functional infrastructure, and an experienced team - but it serves a set of stakeholders who, in the aggregate, face significant barriers to digital engagement. In this case, even well-designed digital tools may fall flat unless they are adapted to the users' contexts.

Often these limitations are something to be worked with, rather than directly influenced. For example, organizations like the UK Government have been lauded for their approach to designing for simplicity and accessibility (GOV.UK Design System), rather than ideal conditions, in order to foster the most successful outcomes for their stakeholders.

Science organizations, too, must understand and respond to the digital environments of their stakeholders, not by waiting for everyone to catch up, but by creating tools and experiences that meet users 'where they are'. Understanding the digital maturity of stakeholders in this way can frame strategy and ultimately the actions that are in the control of the science organization.

On the other hand, an organization may serve a digitally confident stakeholder base, be that researchers who are fluent in online tools, or who engage with digital publishers, while its own system is sub-optimal and ultimately restrictive. These organizations may struggle to meet stakeholder expectations for responsiveness or even relevance.

This reality can also present an opportunity. Stakeholders can become co-creators of digital change, offering insights, pressure, and partnership to help modernize systems and processes.

Low organization/High stakeholder

What this looks like: Digitally fluent stakeholders; Outdated or fragmented internal systems.

- Risks: Unmet stakeholder expectations; Disengagement; Decline in organizational relevance
- Opportunities: Learn from stakeholder practices; Partner for co-creation and rapid feedback; Leverage peer energy

High organization/High stakeholders

What this looks like: Strong internal systems and digital strategy; Stakeholders actively use and expect useful digital tools.

- Risks: Complacency around new trends and changes; Potential blind spots around emerging or outlying digital divides
- Opportunities: Sustain momentum through continuous iteration; Co-create next-generation tools and services; Invest in inclusion for underrepresented users

Low organization/Low stakeholders

What this looks like: Minimal digital engagement internally and externally; Outdated processes and tools.

- Risks: Loses credibility and relevance; Worsening research and innovation outcomes; Low confidence in change
- Opportunities: Start with small, visible digital wins; Build momentum and trust incrementally; Use digital as an entry point for broader transformation

High organization/Low stakeholders

Effective internal capacity and tools; Low digital access, confidence, or engagement among stakeholders.

- Risks: Underused tools or platforms; Perceived irrelevance or frustration from stakeholders
- Opportunities: Act as a capacity-builder; Tailor tools and training to stakeholder context; Build digital literacy and trust through inclusive outreach; Design for accessibility

Figure 4: Comparative matrix for the digital maturity of the organization and its stakeholders. The ISC digital maturity self-assessment can offer deeper insight into specific aspects of each quadrant of the matrix, helping identify areas for improvement.

Chapter 3: Opportunities to improve digital maturity

Common patterns across the ISC Digital Journeys cohort

By looking at both the internal capacities of science organizations, and the digital realities of the stakeholders they serve, the ISC Digital Maturity Framework can be used to categorize and identify patterns of digital maturity and opportunities for improvement shared across multiple organizations.

As part of the ISC Digital Journeys project, the framework was used to help understand the cohort members as they completed a set of structured questionnaires, surveys, and interviews.

Each organization was assessed across the seven dimensions of digital maturity. They received a score and an associated label for each dimension (Basic, Emerging, Developing, Advanced, Optimized) which, while not used as a universal benchmark, was used to identify relative strengths and areas for improvement.

The goal of the digital maturity assessment exercise was not to rank organizations, but to surface practical, context-specific insights. The emphasis was on reflection, learning, and making meaningful progress from wherever each organization started.

Some of the findings from the assessment are shown below, along with their implications for how digital maturity could be improved across similar organizations.

1. No organization scores highly across all seven dimensions

The assessment clearly shows that no organization in the cohort is fully mature in all categories. This reinforces the idea that digital transformation is a continuous journey rather than a final, perfected state, and that while the different kinds of maturity may be interconnected, they are distinct and require different strategies to improve them. Digital maturity cannot progress in a linear way, and organizations must continuously evaluate all areas.

2. Internal strategy and vision is holding back ambition

The average low scores in the Vision and Strategy category reflect the lack of any formal digital strategy in many of the science organizations assessed. Many organizations are adopting digital tools on a project-driven and reactive basis, rather than through a structured, long-term plan. This shortcoming directly impacts overall digital ambitions and both the direction and interconnectedness of any digital activities. The implications for many science organizations is that by collectively setting direction, they can immediately have more clarity for their digital activities. Simple exercises like articulating a vision statement, and linking this vision statement to concrete objectives, can immediately help do this.

3. Stakeholder readiness is the strongest, but engagement is low

Most organizations scored relatively highly on the Stakeholder Readiness category, which is the strongest across the cohort. Many organizations reported digitally literate stakeholders, who are capable of using digital tools particularly in research and academic contexts. However, it is apparent that this readiness is not fully leveraged due to low levels of stakeholder engagement with the science organization. Many engagement strategies remain one-directional, such as through newsletters and social media, rather than using dynamic platforms that foster two-way communication. The discrepancy suggests that organizations need to adopt more interactive platforms and feedback mechanisms to build sustained, collaborative relationships. This can be achieved through small changes to existing communications activities, or through small-scale outreach, such as informal focus groups, to better understand how stakeholder groups prefer to engage.

4. Bottom-up systems change is constrained by insufficient top-down commitment

While organizations recognize the value of digital tools, innovation and change management processes are often perceived as risky, making it challenging to implement bottom-up change. Without strong top-down commitment, it therefore becomes difficult to embed digital transformation into the organization's culture and operations, hindering progress and creating a gap between strategy (where it does exist) and execution.

The assessment reveals a significant gap in leadership's understanding of the critical importance of digital transformation, particularly affecting the Vision and Strategy, and Skills, Experience & Culture categories. This highlights the importance of leadership buy-in, which spans across the maturity framework. In some cases, this gap may stem from a low level of familiarity, which can be addressed through training. When it comes to buy-in, this can take various forms, such as participation in strategy workshops or regular communication of progress and insights on what is working. The goal is well-informed leadership who see the strategic importance of digital tools and ways of working to achieve their goals, and who understand that the cultural changes needed to fully embrace digital tools and ways of working need to be encouraged and supported by them.

5. Low data literacy and analysis of data

Data maturity stands out as the weakest area across the cohort. There is inconsistent data collection and analysis, which prevents organizations from understanding stakeholder behavior, tracking engagement, and evaluating impact. Organizations are missing valuable opportunities to optimize their services and improve engagement. Science organizations can address this by understanding their data landscape, standardizing data collection to focus on the most essential information, and building skills and mechanisms to ensure that data use becomes a key asset rather than a topic to avoid. For science organizations that host data, such as online articles or journals, this also means understanding how to apply the FAIR data principles for greater impact.

From a digital maturity assessment to practical action

Digital maturity is the foundational context that organizations must work with to achieve their goals related to harnessing digital tools and ways of working. As a science organization, understanding your relative strengths and weaknesses to know where to act is crucial.

The ISC Digital Journeys project developed a self-assessment tool to allow any science organization a space for reflection to do just that. You can use the self-assessment tool to evaluate your organization's current digital maturity and identify areas for improvement.

However, assessing digital maturity is just a starting point: it is what comes next that matters most. The Strengthening Digital Maturity Toolkit brings together insights, case studies, and tools from the ISC Digital Journeys cohort, offering practical steps to improve digital maturity.

The hope is that science organizations can use the digital maturity framework and the associated guidance to embrace digital tools and ways of working that suit their unique contexts and ambitions.

Conclusion

Science organizations thriving in the digital age

New developments in science, technology and innovation systems are reshaping how science organizations can deliver value. The digital age brings new opportunities, but the capacity to seize them is uneven. To ensure all science systems are fit for the future, investment in digital maturity, especially for organizations with a footprint in LMICs, is essential. Ensuring that no one is left behind means recognizing the diverse contexts in which digital tools are applied, and working closely with those who need additional support.

The ISC Digital Maturity Framework was developed to give language and structure to digital maturity in science organizations. It sets out seven dimensions that describe not only the organization's internal capacity but also the readiness of the stakeholders it serves. Because every context differs, there is no single pathway, but there is significant scope to learn from peers and from established practice.

This report has highlighted numerous opportunities for science organizations, showing that digital maturity can be improved across the board. Digital transformation involves whole-organization change - leadership, culture and mindset - and it is a continual process, evolving in step with wider goals. Insights from the 11-member cohort suggest that the greatest potential for change lies in strategy: specifically, linking an organization's mission to a clear, purposeful digital strategy.

Yet many organizations in the cohort lacked such a long-term vision or shared direction. This is a prerequisite for the strategic autonomy practitioners need to act in nimble, iterative ways, the very conditions in which digital tools can be built effectively and add value. Securing leadership buy-in as part of strategic conversations about the role of digital is therefore strongly recommended. This acts as a transversal recommendation that underpins every area of digital maturity.

Beyond this, the primary recommendation is to use the companion guide to this report, the Strengthening Digital Maturity Toolkit. It offers practical next steps for teams to prioritize, plan and execute improvements that align digital with their mission.

Senior leaders are encouraged to become fluent in digital maturity concepts and examples from other organizations. We encourage practitioners to put the tools into practice: complete the self-assessment, review the toolkit, and share what you learn. Funders are urged to invest in the digital maturity of science organizations by supporting hands-on technical assistance and cohort-based peer learning, creating the conditions for meaningful digital transformation.

The future of impactful, inclusive science is one where digital tools and ways of working are embraced, in every system, for everyone.

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