

Intersectional Dynamics of Platformed Scientific Labor in e-Science

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Abstract

e-Science, multidisciplinary research that operates with large-scale data sets across distributed networks and grid systems, has largely been examined in relation to knowledge production within international and interinstitutional collaborations in higher education and research (HER), supported by shared e-infrastructures and advanced information and communication technologies (ICTs). As such, the rise of e-Science constitutes a major socio-technical change agent within HER. This article approaches e-Science as a digital science platform and investigates how it reshapes knowledge production practices and their intersectional gendered implications. The analysis draws on findings from a year-long qualitative study on a Swedish academic e-Science platform, hereafter referred to as eSci. The study identifies multiple and overlapping forms of work extension and intensification within eSci, including multi- and co-locational, (inter)disciplinary, translational, and interactional, as well as extension of work in the form of project-based recruitment of contingent staff. These transformations generate distinct responses from tenured and contingent staff, producing varied gendered effects and positioning precarity as a crucial intersectional dimension in gender analysis. Ultimately, the findings suggest that these dynamics undermine the inclusive potential of e-Science, limiting its capacity to attract and sustain the participation of women in a field that remains heavily male-dominated.

Keywords

digital science platforms; diversity; e-infrastructure; precarity; work extension; work intensification

1. Introduction

e-Science, referred to as “e-infrastructure” in the UK, “cyberinfrastructure” in the USA (Yu et al., 2021), and occasionally “e-research” (Fielding, 2007), is commonly defined as the use and development of grid middleware technologies to support distributed, multidisciplinary scientific collaborations, together with advanced computational tools, methods, and applications. Initiatives such as the Earth System Grid Federation (ESGF), which supports climate change research through open data (Chunpir et al., 2018), and LifeWatch ERIC, the European e-Science Infrastructure for Biodiversity and Ecosystem Research (Muri et al., 2023), exemplify how scientific communities increasingly organize around large-scale computational systems to process, manage, and maintain complex datasets. E-Science has thus been a central driver of the digitalization and datafication of research, contributing to the rise of “data-driven” sciences (Chard et al., 2017).

Initially focused on middleware grid development, state-sponsored e-Science programs have expanded to include science gateways that facilitate domain-specific access to computational resources (Neto & Chiarini, 2022). Contemporary e-Science architectures combine high-performance networks, data infrastructures, grid, cloud, and high performance computing (HPC) systems, authentication services, and domain-specific interfaces (Mustafee et al., 2019), enabling large-scale, distributed scientific collaboration.

Neto and Chiarini (2022) situate this evolution within the broader platformization of scientific research, understood as the fragmentation and digital reconfiguration of traditional academic infrastructures across the research lifecycle. Scientific digital platforms are conceptualized as digital governing systems that leverage network effects across one or more phases of research, with e-Science platforms constituting the middleware layer of this platform ecosystem and science gateways enabling domain-specific platforms built upon it (Neto & Chiarini, 2022). This framing reflects a growing recognition that digital platforms and infrastructures are increasingly intertwined within contemporary research environments (Perrotta, 2021; Piromalli, 2019; Plantin et al., 2018).

While platform studies in higher education have largely focused on educational platforms such as Coursera (Van Dijck et al., 2018), learning management systems (Grimaldi & Ball, 2019, 2021; Perrotta, 2021), research information management systems (Piromalli, 2019), and distance-learning platforms (Jütte et al., 2022), far less attention has been paid to the platformization of scientific research itself. Existing research has documented algorithmic management and monitoring in teaching and learning (Kerssens & De Haan, 2022; Williamson, 2019), often situating these developments within broader shifts toward managerial governance and academic precarity (Ivancheva & Garvey, 2022; Selwyn, 2016; Thompson, 2016). However, the implications of platformization for research labor remain relatively underexplored.

This gap has become increasingly consequential as recent studies of digitalized scientific labor document the proliferation of unrecognized, mundane (Ribeiro et al., 2023), or tedious (Bruns & Lingo, 2024) tasks, including biocuration (Davies, 2025; Davies & Holmer, 2024) and digitization work in herbarium labor (Enright & Smith, 2025). These findings point to a digitalization paradox (Ribeiro et al., 2023), whereby efficiencies associated with digital technologies are accompanied by increased fragmentation, repetition, diversification, and extension of work, dynamics that resonate with the discussion of work extension and intensification in the platform labor literature (Richardson, 2018, 2020).

This article seeks to address this gap through extensive qualitative material from an interinstitutional e-Science platform in Sweden. In examining the platformization of research labor in e-Science, it also attends to the gendered repercussions of these transformations. While recent research has addressed horizontal gender segregation in e-Science (Karakas & Griffin, 2024) and the multi-faceted dynamics underlying the persistence of gender inequality in the field (Karakas, 2024), the gendered and intersectional dimensions of digital research labor in e-Science platforms remain largely understudied. Taken together, this focus allows the article to connect the platformization of research in e-Science to the everyday organization of research work and inequalities within e-Science infrastructures.

Bringing together scholarship on the digitalization of scientific labor and research on platform work, this article examines e-Science as a digital science platform through a qualitative case study of an e-Science initiative in Sweden. Swedish e-Science collaborations were initiated in 2010 as state-funded strategic research areas, resulting in national, interinstitutional digital science platforms that support large-scale, interdisciplinary research across distributed computational infrastructures. Drawing on a year-long qualitative study of one such platform (hereafter referred to as eSci, a pseudonym), the analysis examines everyday scientific work with particular attention to its gendered dimensions.

Labor practices in e-Science display features commonly associated with platform work, including task fragmentation, work extension and intensification (Richardson, 2018), increased flexibility (Lehdonvirta, 2018), and greater autonomy over time and place of work (Morales & Stecher, 2023; Ruiner & Klumpp, 2023), contributing to the individualization of the scientific workforce. While the large-scale and interdisciplinary nature of e-Science collaborations is often celebrated for enabling new forms of knowledge production, these same features generate labor dynamics whose gendered implications remain insufficiently examined. Accordingly, the article addresses two research questions:

1. What are the main features of platformed scientific labor in e-Science?
2. What gendered implications do these features entail?

The article analyzes how platform-mediated research reshapes scientific labor and gender equality in this computationally intensive and male-dominated field (Zacharias et al., 2020).

The following section situates e-Science within scholarship on the platformization of knowledge production, followed by a methodology section outlining the qualitative case study design and analytical approach. The findings section identifies four interrelated forms of work extension and intensification in platformed e-Science labor and examines their gendered implications for tenured and contingent researchers. The discussion and conclusion situate these findings within feminist labor studies and research on precarity in higher education, reflect on limitations, and outline directions for future research.

2. E-Science and the Platformization of Knowledge Production

Existing research on platformization in HR has largely concentrated on educational processes, with scientific research itself receiving far less analytical attention. Studies have examined educational platforms (Van Dijck et al., 2018; Williamson, 2019), learning management systems (Grimaldi & Ball, 2021; Perrotta, 2021), open data practices in educational technologies (Raffaghelli & Manca, 2019), learning analytics (Perrotta, 2021;

Yang et al., 2019), and distance-learning infrastructures (Jütte et al., 2022), often emphasizing algorithmic management through dashboards and monitoring technologies (Kerssens & De Haan, 2022; Williamson, 2019). While this scholarship convincingly situates platformization within broader shifts toward managerial governance in higher education and research (HER; Ivancheva & Garvey, 2022; Selwyn, 2016), its focus on education leaves open questions about how platformization reorganizes scientific labor, particularly in data-intensive and infrastructural research settings such as e-Science.

As a precursor to data-driven sciences, e-Science plays a central role in the platformization of scientific labor and adjacent sectors such as health. E-infrastructures and science gateways are themselves conceptualized as subtypes of digital scientific platforms within the broader ecology of platformized research (Neto & Chiarini, 2022). Over time, e-Science has come to encompass (a) infrastructures enabling networked research, (b) science gateways providing domain-specific access to shared middleware systems, and (c) distributed research practices conducted on these infrastructures. Despite the conceptual elasticity of the term, once established and standardized, e-infrastructures function as platformized middleware layers for specific research clusters, such as the life or material sciences, upon which more specialized and sector-specific platforms are increasingly built.

The growing convergence of infrastructures and platforms has attracted sustained scholarly attention (Perrotta, 2021; Piromalli, 2019; Plantin et al., 2018; Plantin & Punathambekar, 2018). Van Dijck et al. (2018) distinguish infrastructural platforms from sectoral ones, defining the former as “online gatekeepers through which data flows are managed, processed, stored and channeled...upon which many other platforms and apps can be built” (p. 13). In scientific research, e-infrastructures perform a comparable gatekeeping function, and recent efforts in data-driven sciences explicitly seek to develop research infrastructure services aligned with platform-based operational models (Demchenko et al., 2021).

Beyond grid middleware for distributed research, e-Science researchers actively contribute to the further platformization of HER and other sectors, such as health, through further development of—at times sectoral—digital platforms. Examples include the COVID Symptom Study (Kennedy et al., 2022), which generated diagnostic predictions based on user-reported data, and CellexIVR (Legetth et al., 2021), a virtual reality platform for exploring complex datasets.

Most central to this article, however, labor undertaken within ICT-intensive e-Science environments displays several features characteristic of platform work: task unbundling (Macias et al., 2023), work extension and intensification (Richardson, 2018), increased flexibility (Felix, 2020), and greater autonomy over the timing and location of work (Macias et al., 2023). These dynamics unfold alongside growing individualization, often articulated through processes of subjectified labour and self-responsibilization (Sigl, 2016), weakening the collective sense of labor.

While this resemblance may appear counterintuitive given the elevated status of academic research as opposed to the lower-status forms of platform work associated with gig economy, the latter remaining the dominant empirical focus of platform labor studies (Dorschel, 2022), it becomes intelligible when situated within the broader transformation of higher education toward new managerialism and projectified academic labor (Carvalho et al., 2022), which has intensified precarity, and gendered and racialized inequalities (Ivancheva & Garvey, 2022). In this context, e-Science reproduces work practices strikingly similar to

platform labor, particularly for contingent researchers. Accordingly, the article focuses on three interrelated features (work extension and intensification, autonomy over time and place, and increasing individualization) to examine changes in knowledge production associated with e-Science.

Feminist labor studies on digital work conceptualize work extension and intensification as central effects of platformization (Richardson, 2018, 2020). Extending work includes multi-locational labor beyond the traditional workplace, co-creation, and outsourcing, accompanied by intensified efforts of self-organization, coordination, and self-monitoring (Richardson, 2018, 2020). These dynamics exemplify platformized spaces of coordination that extend beyond single organizations (Richardson, 2020), a process mirrored in networked interinstitutional e-Science platforms. Recent studies of digitalized scientific labor further document the proliferation of repetitive, time-consuming, and often unrecognized tasks accompanying digitalization in scientific research (Bruns & Lingo, 2024; Davies, 2025; Davies & Holmer, 2024; Ribeiro et al., 2023). The sections that follow examine how such dynamics materialize in e-Science, identifying specific forms of work extension and intensification and analyzing their intersectional gendered repercussions.

3. Methodology

This study adopts a qualitative case study design to examine platform-mediated scientific labor and its gendered implications in an e-Science initiative in Sweden. The empirical focus is on eSci, an e-Science platform established in 2010 by three Swedish universities in response to the Swedish Government's Research Policy Bill, which designated e-Science as a strategic research area.

eSci is formally affiliated with the Faculty of Science and Technology at University A, which serves as the coordinating institution. University B contributes complementary disciplinary strengths, particularly in digital humanities and cognitive sciences, while University C has a smaller involvement, with researchers primarily focused on the development of computational methods, tools, and applications. Researchers are affiliated with the platform either through projects funded by eSci or through principal investigators or departments whose research teams are recognized as part of the platform's organizational structure.

As a nationally funded, interinstitutional platform that integrates advanced computational infrastructures with collaborative research, eSci constitutes a particularly suitable case for examining how platformization reorganizes scientific labor. Since its establishment, eSci has funded scientific research projects situated at the intersection of computational tool development and their application across multiple research domains, including environmental sciences, life sciences, medicine, and cognitive sciences. Platform-mediated work within eSci is enabled through e-infrastructures provided by NAISS (the National Academic Infrastructure for Supercomputing in Sweden), HPC2N (High Performance Computing Center North), and computational science and scientific computing centers affiliated with the participating universities. Researchers affiliated with eSci are involved both in developing and using computational methods, tools, and applications, as well as in managing and analyzing large datasets. These activities are embedded in transdisciplinary research projects spanning material science, environmental sciences, life sciences, cognitive sciences, and medicine, and form the empirical basis for examining how digital infrastructures shape everyday work practices and access to resources.

The study draws on multiple qualitative data sources in order to capture both the formal organization of the platform and researchers' situated experiences of working within it. The empirical material consists of:

1. Publicly available online information, including informants' publication records, institutional affiliations, professional biographies, and materials published on the official eSci website.
2. Observations conducted during project presentations and seminars organized by eSci.
3. Documentation from calls for applications and annual reports published by eSci.
4. A total of 45 semi-structured, one-on-one, in-depth interviews with researchers affiliated with eSci, conducted by the author between March and May 2022.

The interviews lasted approximately 60 minutes on average and addressed participants' educational trajectories, pathways into eSci, understandings of e-Science, experiences of collaboration, everyday work practices, and perceptions of challenges and opportunities related to gender equality. In addition, the author participated in eSci activities during the Autumn 2021 and Spring 2022 semesters as a participant observer, gaining insight into everyday coordination practices and platform-mediated labor as they unfolded in real time. This participation included online seminars and project presentations organized by the platform, as well as the in-person Data-driven Life Sciences Conference hosted by University A.

The interview sample comprised 18 women and 27 men, including PhD students, contingent junior faculty (primarily doctoral candidates and postdoctoral researchers), and tenured senior faculty. Among the interviewees, 28 were tenured faculty members (11 women and 17 men), while 17 were contingent faculty members (7 women and 10 men). This distribution reflects the stratified and gendered employment structure characteristic of computationally intensive research environments and enables an analysis of how platform-mediated work practices are experienced differently across career stages and contractual positions.

Data obtained from online sources, calls for applications, and annual reports were analyzed using content analysis to identify research clusters, membership structure, level of involvement of each university, and projects undertaken by each university. Interview transcripts and fieldnotes were analyzed using thematic analysis (Braun & Clarke, 2006). This approach was employed to identify patterns relevant to the study's research questions concerning changing work practices in e-Science and their gendered implications in male-dominated, ICT-intensive research contexts.

The analysis combined deductive and inductive coding strategies. Initially, the data were coded deductively using themes related to gender awareness and collaboration dynamics within the platform, including recruitment practices, work-life balance, changes in work practices associated with e-Science, strategies for engaging in collaborations, challenges of collaborative work, and interdisciplinary research practices. In a second, inductive phase, additional themes emerging from the data, such as work extension and intensification, self-responsibilization, individualized forms of positive action, and preference for industry over academia, were identified and iteratively refined. These themes were subsequently situated in dialogue with theoretical frameworks on platformed and digital scientific research, digital labor, and gendered inequalities in HER, enabling an assessment of how platform-mediated arrangements may reproduce or reconfigure existing forms of inequality.

In accordance with the ethical principles of the Swedish Ethical Review Authority (*Etikprövningsmyndigheten*), which approved the study (No. 2022-00276-01), all interviewees were assigned pseudonyms and their institutional affiliations anonymized. Participants received written information about the project and provided informed consent for the use of their pseudonymized data in this and related publications.

4. Findings

4.1. Extension and Intensification of Scientific Research Work

The data analysis revealed that changes in knowledge production work with the advent of e-Science were mostly realized in terms of work extension and intensification within the eSci platform. More specifically, I identified four types of work extension, each accompanied by varying levels of work intensification: (a) multi and co-locational extension, (b) (inter)disciplinary extension, (c) translational and interactional extension of work, and (d) the extension of work involving project-based recruitment of contingent staff.

4.1.1. Multi and Co-Locational Work Extension

The first type of work extension observed in the eSci platform was a multi- and co-locational extension. In this context, the term “co-locational work extension” is used to signify the extension of the workplace made possible by telework, while “multi-locational extension” signifies the form of interinstitutional work facilitated by national e-infrastructures. e-Scientists affiliated with eSci conducted their work both online and at their physical offices. Some of them were also responsible for fostering interinstitutional connections among the three universities involved in the eSci platform. This conceptualization slightly differs from that of Richardson (2018), who does not use the term “co-locational work extension” and defines multi-locational work extension as “the work that takes place beyond the workplace” (p. 247). The interinstitutional nature of the e-Science work in the platform required me to distinguish between the two in this context.

This type of co-locational work extension typically entails an intensification of work due to the additional work required to arrange home space as an office and manage domestic and/or caregiving responsibilities alongside academic work (Richardson, 2018). Female researchers in eSci held mixed views on co-locational work extension, as is noted in the literature (Richardson, 2018). Some believed it adversely affected their work-life balance, while others found it advantageous. Lara (tenured senior researcher) expressed her concerns in this manner: “Regarding work-life balance, many things are terrible, because we can now easily work wherever we want, at any time, and stay connected all the time.” She also highlighted that this situation posed a greater challenge for women who still had a larger share of domestic responsibilities. In contrast, another female researcher found co-locational extension as a significant convenience: “Now I can feed my horses during lunch time without rushing back home” (Kristin, tenured senior researcher). One other female researcher, on the other hand, compared traditional lab work to e-Science work and acknowledged that the latter indeed involved work intensification:

It's fine when the lab is closed, and you cannot be there, for example, during holidays. But your computer is always there....If the computation doesn't work, you end up sitting there until midnight, and we still do that at home....If you're at home, you may be better able to attend to your cats, dogs, and kids. However, it distracts you from work....So, nobody expects you to reduce your workload

because of that, really. If anything, people expect you to increase your workload. (Olga, tenured senior researcher)

4.1.2. Interdisciplinary Work Extension

The second type of work extension involved an (inter)disciplinary work extension. As previously mentioned, e-Science entails collaborative interdisciplinary work at the intersection of various scientific disciplines and computational methods, tools, and applications. Within eSci, this had distinct implications for developers of computational methods, tools, and applications, as well as users in specific application areas.

Developers of the “epistemic IT” (Vann & Bowker, 2006), ICTs designed for use by scientists, predominantly hailed from male-dominated IT, computational science, physics, and theoretical chemistry departments. They generally believed that domain-specific knowledge, while beneficial, was not indispensable. These developers saw themselves as “supporting sciences” (Lara, tenured senior researcher) “with advances in computer science, and distributed computing, high performance computing, numerical methods, etc.” (Arun, male, tenured senior researcher), “to help accelerate science” (Mikael, male, tenured senior researcher) or “benefit other disciplines” (Stefan, male, tenured senior researcher). This was often accompanied by a work extension in the form of technical support. Lara shared a challenge they encountered when they had to split certain positions into support and research, a problem partially resolved by creating full-time positions for each, such as the appointment of a digital humanities expert within the humanities department. This work extension into other disciplinary domains within application areas also raised concerns, particularly among junior faculty, that a strong focus on computational methods might be perceived as technical rather than scientific work, while being too closely aligned with application areas could distance researchers from scientific computing.

On the other hand, researchers in application areas experienced work extension and intensification primarily in the form of an ongoing need for self-training during non-working hours and seeking online advice. For them, interdisciplinarity often involved working in parallel with developers of computational methods, tools, or applications, i.e., by providing large genomic data sets or assisting in training AI for diagnosing tumor tissues. It also entailed using computational tools, methods, or operating systems like Unix for parallel programming. While the need for computational self-training was a shared experience among all interviewed researchers, whether developers or users, the challenges it posed were more pronounced for the latter. “In life sciences, many times, a lot of people who haven’t been trained in hardcore computational methods are still doing things a bit ad hoc, that you’re a self-learner,” a scientist remarked (Sofia, female, tenured senior researcher). She also noted that the need for self-training had different implications for men and women:

I would guess that many of them search for new [computational] methods, often outside working hours. And despite the fact that here in Sweden we have quite even parental leave and everything, it could still be more difficult for women in their mid-career.

Furthermore, collaborative work for all the interviewed researchers implied a form of work intensification that I call “translational and interactional work.”

4.1.3. Translational and Interactional Work Extension

All the researchers acknowledged the challenge of communication inherent in interdisciplinary collaboration. They unanimously stated that researchers from different disciplines did not share a common language and had distinct research questions and objectives within the same project. For instance, Barbara (female, PhD candidate) mentioned that the concept of “dynamics” meant “being time-dependent or involving a series of events” in fluid dynamics, while it referred to “the force or the load of air” in structural dynamics. Birgitta (female, tenured senior researcher), on the other hand, pointed out that “modelling” entailed assigning rules to specific entities to guide their actions, whereas in biology, it meant describing observed phenomena.

This divergence in terminology and approach sometimes led to conflicts between clinical and technical, or scientific and engineering solutions. As indicated in science and technology studies (STS), interdisciplinarity in e-Science demands an additional investment of labor (Vann & Bowker, 2006). In line with research in organizational ecology, which underscores the individual cost of collaborative work (Boix Mansilla et al., 2016), the researchers unanimously attested that translating different disciplinary terminologies and aligning research questions and objectives were exceedingly time-consuming. Oscar informed the author that they had to hire two consultants to facilitate team administration and undertake this alignment work. Developers, in particular, felt that this additional work was neither gratifying nor adequately compensated.

Ingrid (female, senior researcher) articulated the lack of reward for computational tool developers, saying:

And, of course, the incentive for the person who has the [computational] tool is not that great from a research perspective....And I think that the reward for the person spending all that time discussing to understand what part of my toolbox can be used here is not so great.

Sara (female, tenured senior researcher) echoed this sentiment, remarking: “When you work with people from highly applied disciplines, you must have time in learning their language. And this is not financed.” Thomas (male, tenured senior researcher) concurred:

You know, it’s very easy to say that you’re going to work together with someone else [from another discipline]. And you think that there will be a synergy effect and so on. But the fact is that it’s very hard. It takes a lot of resources and money. And we don’t have that to a sufficient extent.

4.1.4. Extension of Work Towards Contingent Labor Force

The third form of work extension in eSci involved recruiting a contingent labor force, primarily comprising, but not limited to, PhD candidates and postdoctoral researchers, to undertake research-related tasks. In fact, a significant portion of eSci funding was allocated to the temporary hiring of such personnel. As previously stated, some projects also utilized temporarily contracted consultants to facilitate the time-consuming collaborative work alignment, thereby creating yet another “third space” (Whitchurch, 2024), which is recorded to mobilize exclusionary mechanisms within HER (Whitchurch, 2025). Stefan (postdoctoral researcher) also highlighted the emergence of a new job role within academic e-Science projects, that of research software engineer. He remarked:

Often, you have a situation where postdocs and researchers dedicate a substantial part of their work to developing software to support different bits of the research. And from that has emerged a little bit of a professional role.

It is observed in these examples that the contingent employment of a qualified research labor force is sustained under different job titles.

Both the project-based nature of academic work in e-Science and the increasing reliance on more and more complex platformed infrastructures for research have contributed to the expansion of the contingent labor force under various job titles. Within this context, diverse responses have emerged in relation to work extension and intensification among the tenured and contingent academic labor force. In the following section, I will delineate these two distinct responses and examine their implications for promoting gender equality in e-Science.

4.2. Responses to Extension and Intensification of Work and Its Gendered Repercussions

4.2.1. Responses of Tenured Faculty

Tenured researchers in eSci exhibited strong resistance to (inter)disciplinary, as well as translational and interactional work extensions. They were observed employing three intertwined strategies in response to this type of work extension and intensification within the platform work context. The first involved staying in established networks, where they had developed a common language with researchers from other disciplines over time. Most researchers reported that they sought collaborators within their pre-existing academic networks. Ingrid (tenured senior researcher), for instance, expressed a preference for working with researchers she already knew, citing the difficulty of establishing effective communication with new collaborators, by saying “it is actually quite difficult to come to the point where we can talk to each other.” Daniel (male, tenured senior researcher) added: “I see many colleagues around me who have their tight-knit group of colleagues they met during their PhD years and have stuck with them throughout careers.” While some developers went as far as avoiding collaboration due to the additional time and effort it demanded, most researchers favored working with familiar collaborators over time.

The second strategy involved maintaining disciplinary boundaries, with researchers from different disciplines working in parallel. Daniel also noted: “In eSci, the impression is that the level of ambition is not about bringing the disciplines into e-Science...but rather facilitating the use of e-Science across disciplines, but still within their disciplinary silos.” An analysis of co-authorship practices in University B, the institution in eSci with the highest disciplinary diversity, based on data from the university’s official website, revealed that only 10 out of 113 researchers had their top three collaborators from a different department or center (Karakas & Griffin, 2024).

The third strategy involved promoting interdisciplinarity by recruiting PhD candidates or postdoctoral researchers with a diverse disciplinary background. However, this approach placed much of the burden of interdisciplinary and translational work extension on contingent faculty members, contributing to increased levels of self-responsibility among them (see Section 4.2.2).

The aforementioned findings underscore the existence of constraints within eSci that hinder the promotion of collaboration among new researchers. It has previously been noted in STS that “the formal infrastructure built to facilitate and structure collaboration within large-scale interdisciplinary research projects can be in tension with the ways researchers collaborate” (Aicardi & Manfoud, 2024, p. 403). In this context, it is observed that the substantial costs associated with (inter)disciplinary, multi-locational, and interactional/translational work extensions and intensifications in eSci curtailed the potential of e-Science collaborations to foster collaborations among new researchers.

This had two notable implications for advancing gender equality within eSci. Karakaş and Griffin (2024) and Karakaş (2024) have previously reported that e-Science researchers see potential in e-Science collaborations to attract increasing numbers of women from more gender-equal sciences, such as life sciences, medicine, and environmental sciences, to the IT-intensive fields of research, by engaging in collaborative interdisciplinary e-Science projects at the intersection of computational technology development and application areas. However, researchers’ preference to continue working in established collaborations and uphold disciplinary boundaries to resist work extension and intensification hinders the realization of this potential. Indeed, Karakaş and Griffin (2024) also record minimal mobility of researchers from biological sciences and medicine, which exhibit higher gender parity, to the male-dominated IT fields of research. Furthermore, enacting interdisciplinarity primarily through the recruitment of contingent labor force with backgrounds in other scientific disciplines placed an additional burden on the latter, resulting in increased self-responsibilization (see Section 4.2.2).

Additionally, tenured faculty members mostly adopted what we might term an individualized positive action to enhance gender diversity in eSci recruitment processes. The research unveiled that female researchers were frequently recruited for e-Science projects through the active outreach of supervisors or senior researchers who specifically contacted and encouraged women to apply for PhD or post-doc positions. As Lucia (female, tenured senior researcher) expressed: “Before I talk to you, I just called a woman I knew, a woman who might want to apply for a PhD position, so I just actually actively called her.” Lara (tenured senior researcher) mentioned that they personally identified female candidates and encouraged them to apply for available positions. This approach further reinforced existing networks within the contingent labor force as well. Although deemed “quite effective” by Lara, candidates who were not within the network of the senior faculty members actively involved in the recruitment process are likely to go unnoticed, thereby perpetuating established networks and impeding the potential to collaborate with new partners.

4.2.2. Responses of the Contingent Faculty

4.2.2.1. Self-Responsibilization

As previously mentioned, female contingent labor force recruited for e-Science projects outside their trained disciplines displayed a heightened sense of self-responsibility, driven to overperform in various fields encompassed by their e-Science projects. Oriane (female, PhD candidate) shared her perspective on this matter regarding her contributions to her research group: “I believe there has been a significant fear of not meeting expectations.”

Barbara, a PhD candidate with an engineering background, found herself facing challenges when she became involved in an e-Science project that intersected technology development and evolutionary biology as part of her doctoral studies. She highlighted the issues arising from the biology department's limited capacity to effectively undertake interdisciplinary projects. She noted:

But me being on the fringe, I know that it's going to cause an issue because at every meeting we have on my progress, there's new information and new directives and new things that are applied....The issue is mine because I need to learn where I am right now.

In an era where scientific disciplines are increasingly reliant on a shared e-infrastructure while university organizational structures are sometimes ill-prepared to accommodate cross-disciplinary e-Science projects, the additional burden of operating at the intersection of technology and domain-specific knowledge under grant-based, and thus precarious conditions, places an additional strain on a contingent labor force. Particularly junior female researchers internalize these structural challenges and interpret them in personalized and individualized terms, feeling compelled to (over)perform to compensate for the demands of cross-disciplinarity.

4.2.2.2. The Logic of Choice

The findings also underscored a distinct response to the abovementioned work extensions and intensifications within the contingent labor force: All the interviewed PhD candidates and junior researchers, especially women, expressed a preference for working in industry due to the lack of work-life balance in the platformized academic research environment.

Other researchers confirmed that computationally competent PhDs from a variety of disciplines would rather pursue careers in industry. They believed that in the future, this could pose "a very big problem" (Thomas, male, tenured senior researcher) in terms of finding suitable candidates for recruitment into academic e-Science projects. There was a widespread recognition that female data scientists of the future, in particular, were highly sought after in industry, granting them certain advantages. However, especially the project-oriented nature of platformized academic e-Science disproportionately impacted women negatively. Both senior and junior researchers perceived that researchers had "more choice" in industry in terms of maintaining a work-life balance. Elena (female, PhD candidate) remarked:

Working from home is always going to be a part [of working in academic e-Science]. The thing [is] that you can always do more. And I also think that there's a lot of companies where you are expected to work a lot more than normal hours, and from home as well. But maybe in industry, you have an opportunity to choose, or at least you can hopefully identify the companies that are a certain way and choose the one that you're interested in.

While tenured senior faculty shared the view that there were more options and a better work-life balance in industry, it was consistently observed that, rather than addressing the structural issue stemming from the burden of work extension and intensification in the platformized academe, choosing to opt out of academia to work in industry was viewed as the solution. However, it remains uncertain whether these female researchers would necessarily encounter the welcoming environment in the technology or IT industry that they anticipated, given existing research on gendered barriers to women's career advancement in the

technology sector (Ahuja, 2017; Orser et al., 2011), as well as studies on women's entrepreneurship in technology (Wheadon & Duval-Couetil, 2018). Organizational inequality regimes maintain gender inequality in the IT sector (Kirton & Robertson, 2018), as well as the presence of a glass ceiling in high-tech firms (Fernandez & Campero, 2017). Furthermore, women in Sweden's highly gendered IT sector, steeped in "invisible gendered systems," must cultivate individual-level career resilience to progress (Tokbaeva & Achtenhagen, 2021). Thus, the rhetoric of choice may be at odds with the reality of gendered organizations, whether in academia or industry.

5. Discussion

This study contributes to scholarship on platform labour by extending its analytical focus to platformized scientific research in HER. Feminist platform studies have shown that platform-mediated work often undermines gender equality by intensifying labor, individualizing responsibility, and redistributing risk toward already vulnerable workers (Gerber, 2022; Morell, 2022; Schneider, 2022). By examining e-Science as a digital science platform (Neto & Chiarini, 2022), this article demonstrates that similar dynamics shape scientific knowledge production, a domain that has only recently been analyzed in relation to platform labor and academic precarity (Carvalho et al., 2022; Hall, 2016; Stewart et al., 2024).

The findings align with feminist organization studies showing that networked and project-based organizational forms frequently reproduce inequalities rather than mitigating them (Gill, 2002; Hebson & Grugulis, 2004). E-Science reorganizes scientific labor through multiple, overlapping forms of work extension and intensification: multi- and co-locational work; interdisciplinary extension; translational and interactional labor; and the project-based displacement of these demands onto a contingent workforce. Together, these dynamics expand the temporal, spatial, and epistemic boundaries of scientific work, intensifying labor through constant connectivity, blurred work-life boundaries, ongoing self-training, and sustained coordination across disciplinary and institutional divides. Although flexibility is sometimes experienced as enabling, these burdens are unevenly distributed and frequently gendered, reflecting persistent asymmetries in caregiving responsibilities and institutional support.

Interdisciplinarity emerges less as a neutral collaborative ideal than as a key site of unrecognized labor. Developers of computational tools undertake epistemic service and support work, while researchers in application areas face continuous demands for computational competence, often beyond formal working hours, pressures especially pronounced for junior and mid-career women. Translational and interactional labor, involving the alignment of epistemic languages, research questions, and evaluative criteria, is widely acknowledged as essential yet remains weakly institutionalized, underfunded, and poorly rewarded, becoming a major source of work intensification. These demands are systematically displaced onto contingent researchers: PhD candidates, postdoctoral researchers, consultants, and emerging "third space" roles (Whitchurch, 2024), such as research software engineers, producing sharp stratifications between tenured and contingent faculty. While tenured researchers can buffer themselves through established networks, disciplinary boundaries, and selective delegation, contingent researchers experience heightened self-responsibilization, insecurity, and pressure to overperform. These differentiated responses have clear gendered consequences, as strategies that stabilize senior researchers' workloads tend to reproduce existing hierarchies, while contingent women in particular internalize structural constraints and increasingly frame exit to industry as a rational response to unsustainable academic conditions.

Situating these findings within the literature on digitalized scientific labor further illuminates the “digitalization paradox” identified by Ribeiro et al. (2023): While digital infrastructures promise efficiency and collaboration, they generate expanding layers of unrecognized and mundane work (Bruns & Lingo, 2024; Davies, 2025; Davies & Holmer, 2024). In e-Science, this includes coordination across disciplinary and institutional boundaries, epistemic translation, infrastructural maintenance, and computational support, labor central to platform functionality yet weakly recognized within academic evaluation systems, reinforcing hierarchical and gendered divisions of labor.

The analysis also advances research on precarity in the academy, described as the “gig economy” of HR (Stewart et al., 2024), by showing how platformization intensifies stratifications between tenured and contingent academic labor. While the gendered implications of contingent employment under new managerial governance are well documented (Docka-Filipek & Stone, 2021; Steinþórsdóttir et al., 2019), this article demonstrates how precarization is reconfigured through the platformization of scientific research. The project-based organization of e-Science, combined with reliance on complex e-infrastructures, indeed shifts expanding forms of mundane or tedious digital labor (Bruns & Lingo, 2024; Davies & Holmer, 2024; Ribeiro et al., 2023) onto contingent workers operating under multiple job titles.

Finally, while some platform scholars conceptualize platforms as potential commons capable of fostering cooperative and more equitable work arrangements (Garrido-Skurkowicz & Steglich, 2022; Poderi, 2019), the findings from eSci suggest that such potentials remain largely unrealized. Rather than enabling collective responses to work extension and intensification, platform-mediated arrangements reinforce individualized coping strategies. The absence of shared mechanisms for distributing interdisciplinary and translational labor equitably limits the capacity of e-Science platforms to function as commons and undermines their inclusive potential.

6. Conclusion

This article examined the organization of platformed scientific labor in e-Science and its gendered implications within HER. Drawing on a qualitative case study of a Swedish e-Science platform, the analysis identified multiple, overlapping forms of work extension and intensification that are structurally embedded in platform-mediated research. These dynamics intersect with employment status to produce differentiated experiences for tenured and contingent researchers, positioning precarity as a central intersectional mechanism through which gender inequality is reproduced in e-Science.

The findings challenge celebratory accounts of the digitalization of scientific research as seamlessly enabling. While e-Science enables large-scale, interdisciplinary collaboration through shared infrastructures, the extended digital work therein simultaneously intensifies workloads, individualizes responsibility, and shifts the costs of coordination and flexibility onto contingent researchers. In this context, gender equality initiatives that rely on individualized interventions or assumptions about the openness of platforms remain insufficient to counteract structurally embedded inequalities.

The study also highlights important directions for future research. By focusing on Sweden, a context shaped by the Nordic gender equality paradox in IT and computing, understood as the apparent contradiction between widely celebrated gender-egalitarian frameworks and persistent gender segregation in the ICT

sector (Corneliussen, 2021), the analysis demonstrates that platformized scientific labor can generate gendered inequalities that cannot be explained solely by national equality regimes. This underscores the need for comparative research across HR systems to assess how different policy and institutional frameworks mediate the gendered effects of platformized scientific labor. Finally, while gender is central to this analysis, the findings also point to emerging intersectional dimensions, particularly the increasing racialization of the contingent academic workforce in e-Science. Further research is needed to examine how race, nationality, and migration status intersect with gender and precarity in platformed scientific research environments.

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Conflict of Interests

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. While eSENCE provided the funding and served as the site of analysis, the funder had no role in the study design, data collection and analysis, interpretation of results, or the writing of the manuscript.

Data Availability

The interview transcripts generated during the study are available from the author upon reasonable request, subject to ethical considerations and the protection of participant confidentiality.

LLMs Disclosure

No large language model (LLM) was used during any part of the research process, including the design of the study, data collection, analysis, or interpretation.

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