Restructuring the National Research Infrastructure: the Indonesian Case

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Abstract: Purpose: This study asserts that Indonesia's 2021 research policy reform, despite its ambitious scope, has not achieved its intended improvements in national research governance. By evaluating strengths and weaknesses from the lens of service managers and researcher end-users, the study demonstrates the urgent need for targeted policy interventions to bolster Indonesia's research infrastructure.

Design/Methodology/Approach: This investigation adopted a qualitative single-case design to enable an in-depth examination. Primary data were collected through open surveys and semi-structured interviews involving 65 purposively sampled stakeholders (25 service providers and 40 researchers). Focus group discussions facilitated validation and collaborative solution development. The two-stage analytical framework combined the mutually exclusive collectively exhaustive (MECE) principle for systematic problem structuring with the Metaplan technique for stakeholder analysis.

Findings: Intended to address resource duplication and fragmentation, the centralization reform, resulted in new operational and organizational barriers instead. The study identified four key challenges: (1) unclear role definitions, which have left managers and researchers uncertain about responsibilities; (2) the geographical dispersion of facilities, which has prompted substantial access problems for users; (3) persistent information silos, which hamper knowledge sharing and collaboration; and (4) complicated bureaucratic procedures due to insufficient IT support. As a result, early reform efforts have rendered the system more centralized but less accessible, producing a more rigid research ecosystem that fails to meet the evolving needs of Indonesia's scientific community.

Originality/Value: This paper is the first comprehensive, empirical analysis of top-down centralization of research infrastructure management in a developing country. It argues that organizational agility—specifically clear communication, user-centric processes, and adaptable governance—is crucial to the success of such reforms. The analysis contends that structural consolidation alone will not yield intended results. Its evidence-based findings inform policymakers in Indonesia and offer guidance to others considering similar measures.

Keywords: agile organization; metadata; open science; research management

I. Introduction

A country's innovation and problem-solving ability are dependent on the strength of its research infrastructure. In other words, a modern knowledge economy relies on advanced laboratories, specialized equipment, data systems and skilled personnel. Ideally, a national research ecosystem is fully integrated, where resources are openly accessible, collaboration is encouraged, with purposeful and strategic initiatives to maximize impact and minimize waste. Such a system not only enhances economic competitiveness but also reinforces social welfare (Širá et al., 2020). In many countries, especially in

developing ones, however, this is largely aspirational rather than operational. A series of factors prevent the growth of a country's scientific and technological landscape.

Before 2021, Indonesia's research environment was fragmented and characterized by missed collaborative opportunities among government institutions, universities, and industry players. While decentralization allowed specialization, it has also caused inefficiencies among overlapping agendas and investments. This model was not sustainable; in 2019, Indonesia's investment in science and technology amounted to only 0.2% of GDP (Bappenas, 2019). As a result, researchers faced insufficient funding for operations and maintenance, as well as limited access to high-end facilities. These constraints severely hindered innovation and national development potential, which is common in resource-constrained settings (Caliari et al., 2020).

To tackle these ongoing issues, the Indonesian government launched a comprehensive major reform. It combined multiple government research organizations into a single national entity administered by a non-industrial system. This marks a notable departure from international practices. Countries such as the UK and China have started moving in that direction but none has achieved centralization in both physical and human research assets at a national scale (Anonymous, 2021). Most literature focuses on developed countries in Europe and North America (e.g., Grossi et al., 2018; Lindstrøm & Kropp, 2017), only offering limited insight for Indonesia. Those studies are based on the assumptions of resource abundance and mature institutions, which are not in line with Indonesia's setting. As such, there exists a critical knowledge gap concerning the management of centralized research infrastructures in developing countries. This study seeks to bridge that gap.

To guide the analysis, this paper employs a conceptual model that integrates organizational agility with the mutually exclusive collectively exhaustive (MECE) framework. According to Bazigos et al. (2015), organizational agility is defined by its ability to innovate with the speed of response, which is a key consideration in evaluating the new system. The MECE framework helps consolidate the problems and map their strengths and weaknesses. Through the utilization of MECE alongside stakeholder analysis, this study enables a dual perspective: one from research service managers and another from end-user researchers.

The study critically assesses the implementation of Indonesia's centralized research infrastructure, concluding that centralization has not generated the expected efficiency. It highlights ongoing inefficiencies and urgent governance needs. It subsequently compares the new centralized model with the previous decentralized model that was enforced in universities and the private sector. Containing evidence-based recommendations, this study sets out to directly improve Indonesia's research ecosystem. In doing so, it addresses a significant gap in the scholarly discourse on large-scale centralization of research infrastructure within developing countries—a gap that this article aims to fill.

II.   Literature Review

2.1   Theoretical Framework

The effective governance and management of national research infrastructure (RI) are fundamental to a nation's innovation capacity and global competitiveness. Research infrastructure is the ecosystem of facilities, resources, and services used by scientists (Borcan et al., 2017) that determines scientific output and technological growth. The debate surrounding RI governance centers on the trade-offs among centralized, decentralized, and hybrid models, each influencing efficiency, autonomy, and resilience. While developed nations have cultivated mature RI ecosystems (OECD, 2023), developing economies encounter resource constraints and inefficiencies. This literature review critically synthesizes key studies on RI governance and management. It assesses Indonesia's new centralized RI system, identifies its strengths and limitations from managers' and users' perspectives, and proposes policy recommendations for its development.

The imperative for reform within the Indonesian research landscape is powerfully articulated by Hidayat and Darmawati (2019), who diagnose a system plagued by chronic underfunding, a dearth of researchers, and a profound lack of coordination. Their qualitative, descriptive study paints a stark picture of a pre-2021 ecosystem in which research efforts were fragmented across numerous government ministries and institutions. This fragmentation resulted in the national research budget—a meager 0.25% of GDP—being distributed ineffectively, leading to research outcomes that were often misaligned with policy needs and unattractive to industry. The authors' central thesis is that a reconstruction of research management is necessary, and they propose "synergy" between government agencies as the primary solution. This study is foundational as it presents an essential baseline, outlining the very problems of inefficiency and redundancy that Indonesia's centralization policy seeks to remedy. However, its primary limitation lies in its conceptual vagueness. While correctly identifying the problem, the proposed "synergy" solution is not operationalized into a concrete governance

model. It answers what is needed but falls short of prescribing how it should be achieved, thereby creating a clear entry point for research that examines a specific and radical "how": the wholesale centralization of national research assets.

This move toward centralization, while potentially transformative, is not without its own set of complex governance challenges. The work of Helmrich et al. (2021) offers a critical lens through which to view such large-scale structural shifts. In their review of infrastructure governance, they argue that no single configuration—centralized, decentralized, or distributed—is inherently superior. Instead, the effectiveness of any model is highly context-dependent and that true resilience lies in a system's ability to adapt its governance structure to changing conditions. Crucially, they highlight that governance structures are frequently overlooked in the technical and logistical discourse surrounding infrastructure. This contribution is vital, as it provides a theoretical counterweight to a purely technocratic or efficiency-driven argument for centralization. It validates the current study's focus on the nuanced interplay between organizational structure, process management, and stakeholder experience, rather than simply assuming that consolidation will automatically yield positive results. A notable limitation of Helmrich et al. (2021) is its conceptual nature; it lacks empirical validation from a real-world case of national RI restructuring. The present study directly addresses this gap by providing a rich, empirical analysis of such a case in action.

2.2 Empirical Review and Conceptual Framework

The global landscape reveals a wide array of approaches to RI coordination in practice. Blain et al. (2020) describes the United States' Natural Hazards Engineering Research Infrastructure (NHERI), which operates through a Network Coordination Office and comprises a suite of experimental facilities. The NHERI model eschews a centralized top-down organization. Instead, it relies on coordination and networking among specialized entities organized in a distributed manner. This exemplifies a useful reference for a hybrid model that achieves national level coordination while preserving institutional autonomy. It shows that synergy is possible even when operations are not entirely integrated, as was the case in Indonesia. The distinction enables a deeper examination of Indonesia's centralization measures. Nevertheless, the NHERI model functions within the high-resource setting of the U.S. The National Science Foundation applies directly to resource-constrained settings like Indonesia. A key question arises. The model relied on an existing institution with a long-standing, effective record of collaboration. This is in stark contrast with the Indonesian context, where the primary obstacles involve overcoming fragmentation and underdevelopment.

In the context of developing countries, Caliari et al. (2020) highlight particularly salient issues in Brazil's research infrastructure through econometric analysis. They discovered a strong correlation between RI modernity and advancement on one hand, and laboratory size, inter-institutional collaboration and collaboration with industry on the other. The authors systematically reviewed evidence indicating that, for developing economies, mere infrastructure is insufficient; instead infrastructure scale, connectivity, and innovation-orientation are essential. These result further strengthens the diagnosis offered by Hidayat and Darmawati (2019), which discusses the importance of linkage industry as well as providing empirical support of compartmentalization: even the most skilled researchers cannot foster national development without such connections. The Brazilian experience, with its regional disparities and funding obstacles, is a relevant reference for Indonesia. This indicates that turning a developing country into a high-quality RI ecosystem has its own challenges. Even though their analysis is robust, they essentially diagnose the characteristics of existing infrastructure. Their analysis does not evaluate the impact of any specific top-down governance reforms—an area that the present study addresses directly

When combined, the literature provides compelling justification for the current research. Hidayat and Darmawati (2019) underscore the acute problems of fragmentation and inefficiency in Indonesia, necessitating reform. Helmrich et al. (2021) reveal that centralization does not offer a cure-all solution and that evaluation must be nuanced and governance-focused. The cases of NHERI (Blain et al., 2020) and Brazil (Caliari et al., 2020) illustrate contrasting models and offer contextual similarities, but none refer to a country-wide top-down centralization of RI management in a resource-constrained setting. A large gap in knowledge exists regarding how the policies actually play out and their practical impact. The literature does not address what the emergent strengths and weaknesses are when a country goes from a decentralized RI model to a fully centralized one. What are the moments and experiences of the different stakeholders the managers who must put the system into practice and researchers who are its intended users? To fill this critical gap, this study undertakes the first comprehensive, empirical assessment of the Indonesian case. The findings offer invaluable lessons for governance theory and evidence-based policy-making in Indonesia and beyond.

III. Methodology

This study employed a qualitative case study design to conduct an in-depth investigation of Indonesia's national research infrastructure restructuring. This approach was adopted for its exceptionally suitability in exploring complex,

contemporary phenomena within their real-world context, particularly when the boundaries between the phenomenon and its context are not clearly defined (Yin, 2018). The primary objective of this research was not to measure discrete outcomes, but to elucidate he nuanced processes, stakeholder experiences, and emergent governance challenges arising from radical policy shift.

A qualitative methodology facilitates rich, descriptive data to discover the 'how' and 'why' of new centralized model enforcement, capturing perspectives that quantitative metrics alone would overlook. Given the aim of assessing service quality, identifying procedural strengths and weaknesses, as well as comprehending the interplay between organizational structure and user experience, a descriptive and exploratory qualitative approach provided the necessary depth and flexibility to achieve such objectives. The research was conducted within Indonesia's newly integrated national research institution, established as a result of a landmark government policy enacted in September 2021.

This policy merged dozens of previously autonomous government research bodies into a single entity, representing a fundamental reconstruction of the nation's scientific enterprise. This setting presents a unique, single-case study of a nationwide, top-down centralization of research infrastructure management in a developing country—an unprecedented phenomenon with limited precedent in the existing literature. Fieldwork and data collection were performed over a seven-month period, from October 2022 to April 2023. This time frame was strategically decided to be approximately one year after the initial integration, allowing sufficient time for the new institutional structures and processes to take root, and for initial patterns of efficacy and difficulty to become observable, while participants' recollections of the previous decentralized system remained vivid.

To ensure a thorough and multidimensional understanding of the reform, data were gathered from multiple sources. Primary data collection methods included open-ended surveys, semi-structured interviews, and a series of focus group discussions (FGDs). This approach allowed for both broad exploration and deep, targeted inquiry. Participants were drawn from two key stakeholder groups central to the research infrastructure ecosystem: service providers—including managers and administrators from the newly established centralized infrastructure division—and service recipients, comprising active researchers across diverse scientific fields.

A purposive sampling strategy was applied to select individuals who had direct experience with both the pre-2021 decentralized system and the current centralized model, thereby enabling robust comparative insights. A total of 65 individuals participated in the study, including 25 service providers and 40 researchers, representing a broad spectrum of roles and disciplines within the national institution.

IV. Results and Findings

The analysis of data gathered from open-ended surveys, semi-structured interviews with both service providers and researchers, and a series of FGDs revealed a complex landscape of challenges following the centralization of Indonesia's national research infrastructure. The findings, systematically categorized using an affinity diagram and validated through the MECE framework, converge into two primary domains of concern: the organizational component, which pertains to the fundamental structure and human resources of the new system, and the process management component, which addresses the operational workflows and user-centricity of the services provided. This section outlines the validated findings within these two domains, highlighting the specific issues that emerged as critical barriers to the effective functioning of the newly integrated research ecosystem.

4.1 Organizational Component

The first category of issues relates to the organizational architecture of the centralized institution. Participants consistently reported that, although unified in theory, the new structure resulted in considerable practical and functional obstacles. Three sub-components were identified: structure appropriateness , role clarity, and availability of key individuals to facilitate the new system.

First, the suitability of the structure was a predominant concern. Researchers frequently reported that the physical arrangement of infrastructure did not align with their practical requirements. Despite the administrative centralization, research facilities and laboratories remain scattered across numerous, geographically distant campuses. This has prompted major accessibility issues, turning what was previously straightforward access into a logistical challenge.

One researcher noted, "Before, the lab was in my building. Now, the equipment I need is officially managed by a unit across the city, and getting samples there and back is a major undertaking." This geographical dispersion directly contradicts the reform's intended efficiency gains, introducing new hurdles that did not exist in the decentralized model. Although the attempt to cluster infrastructure by equipment type may appear logical from a management perspective, it

has often failed to account for the integrated nature of research projects, which may require access to different types of equipment in close proximity.

Second, both service providers and researchers reported a pervasive lack of clarity in roles and responsibilities. The consolidation of dozens of institutions with differing cultures and procedures into a single entity has led to widespread uncertainty regarding accountability for specific tasks. Service providers expressed doubts concerning the precise scope of their authority and reporting lines, while researchers struggled to identify the appropriate contact person for service requests, maintenance issues, or technical support. This ambiguity has led to notable delays and frustration. As one service manager articulated,

"We are still figuring out the full extent of our duties. Sometimes a request comes in, and we are not sure whether it falls under our unit or another unit. This causes a lot of back-and-forth communication that slows everything down."

Third, the analysis uncovered a critical shortage of key individuals with the necessary expertise and mandate to act as effective intermediaries within the new centralized framework. For all its shortcomings, the previous decentralized model relied on informal networks and experienced local operators with deep institutional knowledge. The new structure has disrupted these networks without adequately replacing them. A recognized deficit exists in the number and quality of trained operators, supervisors, and laboratory managers essential for the smooth functioning of the infrastructure. Furthermore, participants emphasized the absence of designated coordinators or liaisons to bridge the communication gap between central management units and end users, resulting in a system that is perceived to be disconnected and unresponsive.

4.2 Process Management Component

The second area of challenges is associated to the operational processes involved in managing and delivering research infrastructure services. Research output and user satisfaction have been severely affected by these issues. Collectively, they manifest in four subcomponents: sharing of knowledge, user-focused mindset, standardization of procedures and information technology support.

A common problem in this domain was a major disruption in knowledge sharing at workplaces. The centralization of research infrastructure has caused critical information to be locked away within organizational silos, erecting barriers to collaboration between management units and even between researchers who were once colleagues.

 Expertise related to equipment maintenance history and specific testing protocols was often lost during the transition, as experienced personnel—those who previously operated the equipment—were reassigned to other roles. The new centralized service units have had a sharp learning curve and the quality of technical support has consequently fallen.

One participant noted, "The new operator does not know the quirks of this machine. I used to troubleshoot it myself, but now I can't and the official process takes weeks. It used to be easy."

In addition, the new system has been consistently criticized for not having an external focus on user needs. Researchers reported that the offered services were often not delivered timely, o with sufficient flexibility and quality. As service provision has become more centralized, the relationship between the user and provider has become more transactional than collaborative. One obvious example was of the equipment supervisors hoarding the equipment for their own projects. Thus, their experience as regular users was never put to use by the researchers. This suggests a system favoring internal functions during the execution of the main mission of serving the research community.

The absence of standardized procedures has also brought about massive inefficiencies. Participants pointed out that a coherent supply chain management system for laboratory consumables and services is yet to be developed which delays procurement. Moreover, the lack of standardized protocols for research proposals has prompted researchers to adopt disparate technologies and methods for similar objectives, yielding inconsistencies in data quality that complicate comparisons. This absence of a common standard reduces synergy between diverse research endeavors, which, in turn, leads to fragmented research funding despite the centralized organizational structure.

Ultimately, the major point of failure identified in the new system was the IT support system. Researchers and managers alike described the centralized databases as unreliable, while information systems for accessing the services were cumbersome and not user-friendly. The existing IT architecture is regarded as another red tape that restricts access to research infrastructure instead of a cohesive, integrated digital ecosystem. A serious technological failure currently hinders the efficiencies of the centralized model.

V.   Discussion

The radical restructuring of a nation's research infrastructure is a monumental undertaking, fraught with both promise and peril. This study's primary contribution lies in its granular, evidence-based examination of the initial consequences of Indonesia's ambitious shift from a fragmented, decentralized research landscape to a fully centralized governance model. The findings outline a complex and often contradictory reality: although centralization aimed to remedy the well-documented problems of resource duplication and a lack of strategic focus (Hidayat & Darmawati, 2019), the reform has, in its early stages, inadvertently presented a new array of formidable organizational and process-related barriers. The core of the issue is not that centralization as a concept is flawed, but that its implementation has failed to establish an agile and user-centric ecosystem, leading to significant disruptions in research productivity and stakeholder frustration. The discussion critically examines these findings by integrating them within the broader theoretical and empirical literature, exploring their implications for policy and practice, acknowledging the study's limitations, and proposing avenues for future inquiry.

The central tension emerging from the study's findings is the disconnect between the structural ideal of centralization and its operational manifestation. The data unequivocally show that the new system is plagued by unclear roles, geographically scattered facilities that hinder access, and information silos that persist despite the unified organizational framework. These outcomes provide compelling empirical support for the theoretical arguments of Helmrich et al. (2021), who cautioned that no single infrastructure configuration is inherently superior and that governance structures are often the most critical, yet overlooked, component. The Indonesian case exemplifies this thesis: the top-down imposition of a centralized structure, without a corresponding emphasis on agile processes and robust governance mechanisms, has not automatically yielded the desired efficiencies. Rather, it has cultivated a rigid bureaucracy that struggles to respond to the dynamic needs of its primary users, the researchers. This contrasts sharply with the more positive centralization outcomes observed in other sectors, such as the financial division studied by Yunindhar and Nugroho (2018), who suggested that the unique culture and operational demands of scientific research make it particularly resistant to a one-size-fits-all bureaucratic model.

Furthermore, the findings of this study resonate with the challenges identified in other developing countries, while also highlighting Indonesia's unique path. Similar to Brazil, Indonesia grapples with the need to scale up and modernize its research infrastructure to foster innovation (Caliari et al., 2020). Yet, where the Brazilian context emphasizes the necessity for greater industry linkages and inter-agent collaboration, the present study unveils a more fundamental, internal problem: the new centralized system has weakened the pre-existing, albeit informal, networks between researchers and the infrastructure they relied upon. The loss of direct access and the introduction of cumbersome, multi-layered approval processes represent a significant disruption to the research workflow, a danger highlighted by Baruffaldi and Gaessler (2021), who warned that such disruptions to physical capital may have enduring negative effects on knowledge creation. This finding is novel and substantial, as it suggests that in the drive for top-down efficiency, the reform may have dismantled the very bottom-up, informal systems that, while imperfect, previously enabled research to proceed. The new model has, in effect, traded the problem of fragmentation for the problem of inaccessibility.

VI.   Conclusion and Recommendations

6.1 Conclusion

Restructuring national research infrastructure is a critical endeavor, yet it carries inheremt risks, especially in developing countries. In 2021, Indonesia initiated a major reform of unprecedented scale by establishing a national research agency to address fragmented research efforts and inefficient resource allocation. However, on-the-ground effects of these large-scale top-down centralization remains poorly understood—a major gap in the literature on governance. Through a qualitative case study design, this study examined the early consequences of the reform. Interviews with 65 stakeholders (service managers and researchers) and internal policy documents were analyzed to collect data. A two-stage analytical framework was applied: first, the MECE principle was used to systematically identify key challenges; second, the Metaplan technique was employed to validate findings with stakeholders and generate practical solutions. The study's results show that while centralization was intended to bolster efficiency, its implementation has introduced significant operational blocks.

Key issues include ambiguous role definitions, limited access to facilities in far-flung locations, siloed information systems, and unwieldy bureaucracy disrupting established research and working processes. Instead of correcting the fragmentation problem, the reform has effectively replaced it with a new challenge: inaccessibility and rigidity. The system, as currently structured, lacks the agility required to respond to user needs, undermining its intended purpose. This research counters the simplistic assumption that centralization leads to efficiency, specifically with regard to research

infrastructure. Empirically, it demonstrates that governance effectiveness is more strongly linked to user-centric processes—those grounded in clear communication, responsive service delivery, and adaptive management—than to structural reorganization alone. The results offer an important, evidence-based warning to policymakers that without a similar focus on agile and user-centric process management, top-down centralization may dismantle informal, functional networks and entrench, rather than boost, national research productivity.

6.2   Recommendations

Based on the study's findings, two distinct but complementary sets of recommendations are proposed: immediate policy and governance interventions to address structural flaws in the new system, and practical, operational improvements to enhance daily usability and user satisfaction.

Policy and Governance Recommendations.

First, a detailed governance charter must be developed and disseminated across all levels of the national research institution. The study found that a general lack of clarity regarding roles, responsibilities and authority is a major source of ineffectiveness and frustration. The charter should clearly state the mandate of each management unit and their reporting lines, as well as specifying how service providers, researchers, and the administration should interact with one another. This will eliminate the ambiguity which has caused processing delays and provide assurance in the establishment of a strong culture. This policy intervention is the first step to turning the confounding architecture into a true integration and functioning body.

Second, the government and institutional leadership must undertake a strategic review of the current infrastructure clustering model. Despite centralization, the geographic distribution of research facilities poses significant barriers of accessibility for researchers. A better model might be thematic research hubs that bring together compatible equipment and expertise, even if this requires certain management devolution to regional centers of excellence. This shift should be data-driven: analyses of researcher needs, equipment usage, and logistical costs should drive changes. Such a model would enhance ease-of-access and promote discipline interaction instead of being constrained by a top-down organizational chart.

Third, a solid human capital development plan for research infrastructure personnel. This study identified a severe shortage of operators, laboratory managers and central administration-research liaisons. The institution should focus on training programs to further develop the technical and managerial skills of existing workforce. In addition, it should establish and empower new roles such as service coordinators or user-support specialists, whose primary purpose is to communicate with and assist researchers in resolving issues and advocating for their needs within the administrative system. The loss during the transition of informal support network can be rebuilt and foster a more user-friendly responsive service environment.

6.3   Limitations and Future Research

Recognizing this study's limitations objectively and transparently is key to interpreting its findings and helps inform future studies. The main limitations of this study relate to its case study design, time-frame, and qualitative data. First, the study was designed as a single-case study which concentrated only on the Indonesian context. This approach offered a detailed and intimate picture of historical developments which were important policy reforms but restricted the generalizability of the findings. The implementation and the eventual results of the centralization policy, in the specific Indonesia political, economic, and academic culture, cannot be replicated in other countries' settings. Thus, while the identified issues like the conflict between structural centralization and operational agility provide important lessons in caution, they should not be viewed as predetermined outcomes for any country plotting a similar course. The conclusions are contextually robust, shaped by the unique political, economic, and academic dynamics of Indonesia's research ecosystem, and should be adapted thoughtfully elsewhere.

The study's time period also poses another major limitation. The collection of data was conducted approximately one year after the integration of research institutions began. Although the time frame proposed was designed to capture initial outcomes, it is merely a snapshot at the start of life of a long-term reform strategy. It is extremely likely that most of the identified problems—such as the lack of role clarity, inefficient procedures, and underdeveloped IT systems—are common during the transitional phase. As the institution grows, staff gain familiarity, and governance structure continues to improve, these issues may naturally diminish. As a result, this research cannot differentiate between transient implementation problems and structural issues. Making such a determination requires a longitudinal perspective and the results should be interpreted as an early diagnosis rather than a final verdict on the success of the centralization initiative.

To conclude, the qualitative nature of the study, while its biggest strength, also limits its statistical generalizability. Findings are derived from the views of 65 purposefully selected participants, carefully selected to represent a diverse range of roles and disciplines. The use of Metaplan validation workshops helped verify that findings resonated with many stakeholders. Nevertheless, the sample may not capture the full range of the vast and complex national research institution. In addition, this investigation presents information on barriers and disruptions to respondents' research workflows. However, it provides no quantitative information to enable an assessment of the reform's impact on KPIs. The study may prove useful to researchers facing access and efficiency challenges. Nevertheless, it cannot measure shifts in publication output, patent filings, or external funding acquisition. The qualitative lens provides an understanding of the human and process aspects of the reform. However, one still needs to engage in other qualitative analysis to learn about the overall impact.

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