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## **A CRITICAL PERSPECTIVE ON QUANTIFICATION OF DEVELOPMENT IN ICT4D**

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# A CRITICAL PERSPECTIVE ON QUANTIFICATION OF DEVELOPMENT IN ICT4D

*Research in Progress*

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## Abstract

*Many donor-funded ICT4D interventions are implemented to quantitatively measure, monitor, and evaluate results of development projects and programs in the global South. We focus on how quantification processes aren't neutral and in the temptation of evidence-based efficiency, can potentially form new inequalities. Current studies within this field overlook the role of ICTs in the quantification process and how IT-enabled quantification systems potentially contribute in bringing institutional change with ethical and social implications for development. In this paper, using institutional logics, affordances, and the concept of IS artifact, we take a first step towards theorizing this problematic side of ICT4D and quantification. We further outline our plan to empirically illustrate this framework through an ongoing interpretive case study in Nepal. The case study explores a donor-funded public sector ICT4D intervention, implemented for assisting local governments to self-evaluate their institutional capacity through ICT-enabled quantification system. Finally, we contribute to the IS literature by providing a critical theoretical lens to scrutinize ICT4D interventions.*

*Keywords: ICT4D interventions, quantification, institutional logic, affordances, IS artifact.*

## 1 Introduction

One potential role of digitalization and ICTs within the international development field is to assist the monitoring and evaluation (M&E) of development activities. Many donor-funded ICT4D interventions in the Global South are deployed as management tools for development actors like bureaucrats, NGOs, and development managers to produce and communicate development results. A World Bank practitioner handbook suggests (Kusek and Rist, 2004, p. xi):

“...governments and organizations may successfully implement programs or policies, but have they produced the actual, intended results. Have governments and organizations truly delivered on promises made to their stakeholders?...The introduction of a results-based M&E system takes decision makers one step further in assessing whether and how goals are being achieved over time. These systems help to answer the all important “so what” question, and respond to stakeholders’ growing demands for results.”

A dominant tradition to generate development results is by explaining the outcomes and impacts of development policies, programs, and projects in terms of quantified performance indicators and input & output assessment metrics. As such, a particular normative view underlies the implementation of such quantitative M&E systems across development contexts. On one hand, international donors want to enable development actors as rational decision-makers, guided by data and evidence, who use development funds and resources to create meaningful impacts for communities, sectors, and nations.

On the other hand, donor driven M&E practices like self-assessment and rankings favour quantitative empiricism as objective system of evidence and evaluation (Merry, 2016). The latter notion has found tremendous currency as new possibilities to create, store, process and quantify volumes of data are emerging through digital technologies. In this work-in-progress paper, we shy away from this instrumental standpoint. We are not interested in enhancing this existing normative view of ICT-enabled quantification practices to generate development results. We take a critical stance to counter this view and instead identify ICT-enabled quantification practices as problematic across different social and ethical dimensions.

We build upon the work of scholars from sociology of quantification to conceptualize quantification as a broad social phenomenon with social, cultural, and ethical features (Espeland & Stevens, 2008; Mau, 2019). These scholars consider quantification not to be a rational, neutral, and accurate pursuit of objective reality. Quantification interventions are guided by specific self-interests, values, and beliefs of actors (Mennicken & Espeland, 2019), where organisations may redirect resources to meet new demands for organizational restructuring, procedures, guidelines, technologies, and trainings (Espeland & Yung, 2019). Quantification systems are also found to shift discretionary power away from actors governed by quantification and in turn make evaluators more powerful (Espeland et al., 2015). Similarly, others have found quantified knowledge produced by these systems creating new relations of visibility and invisibility as they depict a shallow representation of a complex and messy social reality (Merry, 2016).

Using this lens, relevant critical studies within international development have echoed numerous social and ethical concerns related to quantification practices and systems. First, they show quantification efforts undertaken to enable accountability and learning to have *perverse and counterintuitive consequences*. In East Africa, development professionals were using M&E indicators to appease donors to secure future funding opportunities. It was found that they were less concerned about generating genuine learnings to improve their practice, and instead more concerned about boosting their successes around these indicators, while avoiding documentation of failures at all costs to not hurt their performance (Springer, 2021). In India, a community-based monitoring tool that was introduced with the intention to empower and improve management skills of local community workers, was more successful in discrediting community workers' local knowledge and disciplining them when they failed to meet targets (Biradavolu et al., 2015). Second, critical studies explain quantitative standardization promotes a *narrow view of social reality* through decontextualization and methodological biases. For instance, authors have found that standardized categories used in global and national development policies like 'fragile states' (Rocha De Siqueira, 2014), 'international migrant' and 'economically viable farm' are either formalized in Western context (Gorodzeisky & Leykin, 2022) or take a selective and homogenous view of social phenomenon (Roger, 2014). Although quantification enables widespread diffusion of standardized categories and makes global comparison a possibility, it does so by compromising heterogeneity of countries (Berten & Leisering, 2017).

Third, critical studies reveal quantification instruments function as *discursive and political tools*. In environmental governance, techniques like footprinting are implemented to measure and manage life cycle impacts of foods and other products on sustainability. But evidence suggest corporations and agri-businesses enjoy powerful position to construct measures that frame sustainability to serve their own political interests and business motives (Freidberg, 2014). Similarly, studies also demonstrate competing quantification interventions from state and non-state actors, rather than objectively clarifying differences, further trigger political disputes (Noucher et al., 2021).

We find that existing critical studies take only a nominal account of ICT-enabled material practices of quantification. Turning to IS and ICT4D, only a few studies try to critically theorize the role of ICTs in quantifying development results. These studies have either investigated quantification as an organizational practice (Kelly, 2018), without linking it to the broader organizational field where it

operates or have concerned with the organizational field without relating it to the socially constructed and historically evolving culture of quantification (Bernardi & De Chiara, 2011).

Therefore, our main contribution will be to address these shortcomings by critically explaining how ICT-mediated practices problematically materialize a culture of quantification in a particular organizational field of development. To accomplish this, we first build a theoretical scaffolding to support our inquiry. This scaffolding brings together key concepts from institutional theory, IS theory, and affordance theory. More broadly, we conceptualize quantification as an **institutional logic** (Ocasio et al., 2017; Thornton & Ocasio, 1999) — a system of socially and historically constructed cultural elements *shaping* and *shaped by* everyday material phenomena. And focus more on ICT-enabled material phenomena in terms of **affordances** or action possibilities perceived (Leonardi, 2011; Majchrzak & Markus, 2012) and generated by (Strong et al., 2014; Thapa & Sein, 2018) different actors and groups with information system artifacts (**IS artifacts**) (Lee et al., 2015). IS artifacts include combination of social artifacts like organizational structures, procedures and guidelines; technological artifacts like ICTs and other non-digital instruments; information artifacts like information and knowledge-based products, visuals, reports, and maps.

Our next plan is to use these theoretical ideas to empirically illustrate the social and ethical implications of quantification in an ICT4D context. For this, we are engaged in an ongoing interpretive case study of a self-assessment M&E system implemented across local governments in Nepal. This system is a part of a multilateral donor-funded initiative to support evidence-based local governance in Nepal. This case study presents us an opportunity to empirically explore IT-enabled quantification in practice and how these material practices are shaping the organizational field of local governance in Nepal. The overall research question guiding our in-progress interpretive study is: *How do affordances of IS artifact(s) shape and are shaped by logic of quantification in the field of local governance? What critical implications emerge from such shaping(s)?*

Rest of this paper discusses our proposed theoretical approach based on quantification, institutional logics and IS affordances and our tentative methodological approach for empirical investigation. We end by highlighting our study's expected contributions to IS and ICT4D research.

## **2 Theory: Quantification, Institutional Logics & IS artifact affordances**

Quantification is considered a natural, and often, a taken for granted trait of modern society. We use numbers as markers to identify objects but more prominently, we employ a shared numerical system of value and measurement to unite different objects (Espeland & Stevens, 2008). In other words, numbers *supposedly* support our 'rational' and 'modern' society by transforming all the qualitative differences in objects in terms of quantity. Examples include "prices that assess the value of goods and services, votes that indicate political preferences, scores that evaluate the quality of wine or water, and standardized tests that assess ability or capacity" (Espeland & Stevens, 2008, p. 408). A general theoretical and practical tendency is to discuss the features of quantification with technical implications of accuracy and objectivity. For instance, how to make effective and accurate metrics to classify, measure, and aggregate, so that we can generate a more objective account of social reality that is closer to the 'truth'.

Social scientists across disciplines are now breaking this veneer of rationality and objectivity, and instead questioning the features of quantification in terms of their social and ethical implications. In their seminal paper on the sociology of quantification, Espeland & Stevens (2008) define quantification as "a social process of producing and communicating numbers" that has "implications for organization and character of modern life" (p.402). This is to say that quantification is driven by different social goals and interests (Mennicken & Espeland, 2019). Individuals want to assess their personal data to improve their self-productivity. Private organizations want economic gains by auditing their organizational performances, and governments want useful knowledge to govern and administer its citizens.

These social drives to quantify give rise to other social features of quantification. Firstly, quantification intervenes social reality. It merely doesn't describe the world-as-it-is but constitutes and reshapes it. Secondly, quantification is a resource intensive process demanding "training, discipline, and standardization" (Mennicken & Espeland, 2019). Much of the resources needs to be redirected in building new data/statistical infrastructures and generating new capacity to produce credible numbers (Jerven, 2013). Thirdly, quantification creates a tension between expert knowledge (knowledge that is quantified) and local knowledge (knowledge that is left out and not quantified) (Merry, 2016).

As ICT4D researchers, it is important that we explore the ethical dimension underlying these social features of quantification and question how they are creating new orders of inequalities (Mau, 2020). In a more recent work, Espeland & Yung (2019) explain this ethical dimension along the lines of *power*, *attention*, and *opportunity*. New power imbalance is created when outsiders and evaluators gain more power, while the ones governed by the quantification system lose their discretion. Attention gets focused on seeing a shallow view of the world as complex reality is simplified and summarized through quantified data. New opportunity structures are created that unfairly shape people's access to opportunities, rewards, and resources, discouraging people and organizations to pursue goals that aren't captured by quantified measures.

We echo Espeland & Yung's (2019) ethical concerns and believe that critical ICT4D research needs to be steered towards uncovering the problematic side of IT-enabled quantification system that are increasingly rolled out in the name of rationalizing and modernizing 'underdeveloped' institutions of Global South. To do so, we start out by building upon Merry's (2016) notion of quantification as a cultural system of "practices, techniques, and assumptions" in "particular institutional and bureaucratic settings" (p. 9). More closely, we engage with recent work on conceptualizing quantification as an institutional logic (Chun & Sauder, 2022). An institutional logic is "the socially constructed, historical patterns of cultural symbols and material practices, assumptions, values, and beliefs by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their daily activity"(Thornton & Ocasio, 2008).

When imagined as an institutional logic, quantification can be better studied as a broader and enduring system of culture and not just a technological intervention or tool. Chun & Sauder (2022, p. 339) suggest:

"As quantification becomes more pervasive both within organizations and organizational fields, the more necessary it is to investigate how these external interventions evolve over time. In an increasing number of contexts, quantification transitions from an external pressure to a coherent set of expectations and a new means for legitimating actions and decisions (...) In these cases, the reactivity generated by the introduction of quantitative measures eventually results in permanent changes to routines and procedures, and the effects of quantification—on organizational thinking, process, and behavior—are institutionalized. Quantification, in these situations, is fruitfully understood as a logic that organizes and coordinates activity"

We argue that an institutional logic perspective equips ICT4D inquiry with a language to better articulate the (re)shapings of power, attention, and opportunities by quantification based information systems. It does so by richly explaining quantification as a cultural system that is *socially constructed*, *historically contingent*, and *materially instantiated* (Haveman & Gualtieri, 2017). It helps us unpack quantification as a *socially constructed* logic of values, assumptions, beliefs, and norms. As hinted earlier, the elements valorizing quantification are, broadly speaking, a decontextualized rationality based on expert knowledge and numerical standardization, and a form of efficiency based on control and discipline. They influence people and organizations to make sense of their everyday activities and evaluate or judge the worth of people and things (Haveman & Gualtieri, 2017). Similarly, this perspective enables us to look at quantification as a *historically contingent* system. Its prominence in an organizational setting, for instance local governments or universities, must be studied in a historical context of our organizational field of interest, for instance the field of local governance or the field of higher education. The changing institutional order of fields across time, influences the degree of importance of an

institutional logic (Ocasio et al., 2017). Lastly, this perspective helps us understand quantification culture as shaped in *material phenomena*. Material phenomena of quantification include quantification instruments and technologies, policies, procedures and practices, organizational structure, and knowledge products.

We focus more on the problems of quantification culture as shaped by material phenomena, afforded and mediated by ICTs. We note that IT-enabled material practices receive marginal attention in current understandings on quantification. Only a handful of studies have attempted theorizing the ethical implications of IT-enabled quantification practices in a developmental context. Within IS and ICT4D, we know of only two relevant studies. Kelly's (2018) critical work on impact evaluation activities in international development and Bernardi & De Chiara's (2011) study about the failure to implement an integrated M&E information system for HIV/AIDS programs in Kenya. While we note that these two important studies are successful in connecting ICT-enabled material practices of quantification and broader institutional processes, they are limited in exploring quantification as an enduring institutional logic, and how over time, it shapes the principles that organize particular organizational field(s) of international development. For instance, Kelly's (2018) work reveals how quantification and market logics influence organizational practice of development evaluation but pays less attention to the evolving organizational field of foreign aid in the local Indian context, where he sets his study. And even though Bernardi & De Chiara (2011) take account of the organizational field of public health governance in Kenya, they only sparsely relate the field in terms of a quantification logic.

To address these shortcomings in our study, we turn to an emerging strand of IS scholarship that proposes an integration of institutional logics and IS affordances. This scholarship calls for shifting localized socio-material interpretations to institutional level generalization (Berente & Seidel, 2022; Seidel & Berente, 2013), and analyzing co-shaping of IT materiality and institutional/societal level changes (Faik et al., 2020). IS scholars have used the institutional logics perspective for understanding how organizational IS practices are influenced by societal level logics and organizational field's logics (Ismail et al., 2018; Malik & Nicholson, 2020; Slavova & Karanasios, 2018). Similarly, Faik et al. (2020) show that an affordance view of IS practices enables an understanding of how practices and logics mutually shape each other, in a top-down and bottom-up relationship. They argue that *logics focus the attention of actors* to generate specific affordances from IS practices but *affordances realized in practices can in turn activate new logics*. For example, a market logic focuses attention of businesses to use specific features of an e-commerce platform for its transactional affordances. But businesses can engage a loyal customer base from the platform, generating community building affordances. The new affordance activates a community logic that may potentially refocus the business's attention to introduce community building practices.

We believe that the integration of logics and affordances is useful for undertaking a cross level critical analysis of IT-enabled quantification. It helps us navigate across micro, meso, and macro processes from organizational material practices, institutional logic to organizational field. Remaining faithful to this perspective, we develop an integrated theoretical approach to conceptualize material phenomena, quantification logic, and the organizational field of local governance. We do this in three steps. First by adopting a typology of material artifacts, second by adopting an understanding of how material artifacts come into practice and third by relating the material phenomena to a broader institutional logic and the immediate organizational field of interest.

Particularly, we classify IT-enabled material practices of quantification as information system artifacts (Lee et al., 2015). We identify IS artifacts as *social artifact*, *technological artifact*, and *information artifact*. According to Lee et al.'s (2015) typology, social artifacts entail artifacts like organizational structures, procedures and guidelines that construct relationships and social interactions; technological artifacts entail material objects like ICTs and other non-digital instruments that are means for actors to achieve a goal or solve a problem; information artifacts entail instantiated information like database, visuals & graphs, reports, maps, and different kinds of knowledge products.

Next, we understand the material phenomena of different IS artifacts through the lens of affordances or in terms of possible actions afforded by IS artifacts. We define affordances as the possibilities of action that goal-oriented actor(s) perceive and actualize in practice with physical and digital artifacts and systems (Leonardi, 2010, 2011; Strong et al., 2014; Thapa & Sein, 2018). We follow the Gibsonian articulation of affordances and consider affordance as a non-deterministic and relational concept (Greeno, 1994; Hutchby, 2001). This is to say that affordances are shaped but not determined by a system’s material features or by an actor’s goals, abilities, and characteristics. They only emerge in relationship when materiality of system interacts with human agency of actors (Leonardi, 2011).

Finally, our analytical strategy would be to first see how the quantification logic, in a top-down manner, guides different IS artifact practices and generates specific affordances. We then relate these affordances that emerge in practice by abstracting them to the institutional logics that get activated. We will further interpret the activated logics in terms of their bottom-up effects. For instance, how the activation of the new logics is creating changes to the organizational field’s structures of power, attention, and opportunity, and in return how these bottom-up processes are reconstructing the quantification logic of the field. Table 1 summarizes the main concepts that will guide our data analysis and theorization.

<b>Concept</b>	<b>Description</b>	<b>Source</b>
Quantification	A socio-technical process of producing and communicating numbers that structures the organization and the character of modern life. It is driven by diverse social goals and interests, and shapes critical effects on orders of power and inequality, view of reality, and opportunity structure to access resources and opportunities	Espeland & Stevens (2008); Mennicken & Espeland (2019); Merry (2016)
Institutional Logics	Socially constructed, historical patterns of cultural symbols and material practices, assumptions, values, and beliefs by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their daily activity.	Thornton & Ocasio (2008); Thornton et al. (2012); Haveman & Gualteiri (2017)
Quantification Logic	A socially constructed and historically contingent cultural system of values, norms, beliefs, that guide the material practices of quantification instruments & technology, organizational processes, and knowledge products.	Chun & Sauder ( 2022)
Organizational field	Environment or the context where an organization is an actor among many other members (international organizations, government institutions, business firms, NGOs, local organizations, journalists).	Haveman (2022); Mignerat & Rivard (2009)
IS Artifact	A combination of social artifact, technology artifact, and information artifact. Social artifacts construct relationships and social interactions; technology artifacts are means for actors to achieve a goal or solve a problem; information artifacts entail instantiated information.	Lee et al. (2015)
IS Affordances	Potentials for actions emerging from the features of the IS artifact and the goals of social actors. Logics and affordances exist in a recursive relation: logics focus attention of actors towards specific IS affordances and in turn, IS affordances prompt actors to activate new logics.	Faik et al. (2020); Leonardi (2011); Thapa & Sein (2018)

*Table 1. A summary of key concepts used in our study*

### 3 Planned Study

To empirically explore our research question, we will conduct an interpretive case study (Walsham, 1995) of a self-evaluation M&E information system named **LISA** (Local Government Institutional Capacity Self-Assessment), recently implemented across municipalities in Nepal to enable these local institutions to assess and evaluate their local institutional capacity. LISA, a US\$ 3 million IT-enabled M&E intervention, is a part of a larger US\$ 130 million multi-donor funded initiative to support Nepal's 7 provincial governments and 753 local governments to become "fully functional, sustainable, inclusive and accountable to their citizens". Five development partners including the UK, Switzerland, Norway, the EU, and the UN fund the large share (100 million) of the budget while a sizable share (30 million) is funded by the Nepali government. The initiative began in 2019 and is expected to complete within 2023. The initiative conceived LISA to develop a culture of self-assessment in local governments. A self-assessment system was felt important for local governments to learn about their institutional capacity and to use that learning to identify areas where they could demand capacity building support from provincial and national government.

Local governments evaluate and score their institutional capacity based on 100 indicators that are variously spread across 10 thematic sectors. Indicators are further classified into three sub-categories (general scenario indicators, process scenario indicators, statistical scenario indicators). For each indicator, the local government must supplement their measurement with a standard means of verification document. The entire assessment is completed, and standard verification documents are uploaded in a web-based online M&E platform hosted by the ministry. Through LISA, the initiative aims to institutionalize self-assessment culture in all Nepali local governments and expects to bring positive effects. The normative view of the initiative is that LISA is an incentive for local governments to perform better and as an informative tool to trigger discourses in local assembly and media. Nevertheless, as we've suggested so far, quantification interventions have social and ethical features that need to be fully explored. Our interest to carry out an interpretive case study of LISA will be to critically reflect on how the implementation of the system might have both intended and unintended consequences.

We draw our empirical material from (1) first-hand semi-structured interviews with rural municipality users of the LISA system (IT officers and local bureaucrats), local development consultants who play as intermediaries to facilitate the use of the system (2) observation notes generated from visiting two rural municipalities (3) policy and strategic documents on LISA published by government and donor agencies (4) relevant existing literature to understand the changing institutional order of local governance and rural governance systems of Nepal. The interpretive case study will be developed in several steps. We will start by describing the organizational field of Nepal's local governance and locating logic of quantification within the field from a historical perspective. Using evidence from secondary materials, we will discuss the shifting centrality of institutional logics that has guided the actions, goals, and material practices of local governance since Nepal became a modern state in the 1950s until the present time. This discussion will highlight the emergence and stabilization of the quantification logic in the organizational field.

Next, we build the case narrative of LISA by interpreting the self-evaluation system as an IS artifact. We demarcate *technology artifact(s)*, *information artifact(s)* and *social artifact(s)* as constituting the LISA information system and discuss how they come together to *afford* the quantification of local institutional capacity. For instance, we will interpret the affordances from LISA's social artifacts like trainings and self-assessment procedures, the affordances from LISA's IT artifacts like the online portal and digitized documents, but also non-IT artifacts like evaluation indicators, and finally the affordances from LISA's information artifact like LISA scores, data visualizations, and capacity development action plans. Narratives from LISA's implementers -- the state actors and international donors -- about LISA's affordances will be compared with narratives from rural municipality actors and local intermediaries. In particular, we will take account of the views of its primary users: municipal department bureaucrats, IT



officers, chief administrator of the municipality, locally elected leaders and citizens. We will contextualize their experiences with the perspectives from critical intermediaries like LISA experts and trainers, local development consultants, IT vendors, and civil society organizations.

Our findings will help identify what kinds of affordances are generated by actors from an IS artifact to serve the goal of quantification. These findings will critically highlight broader problematic implications of the relationship between IS artifact and logic of quantification, and the ways this is shaping the institutional order of local governance in Nepal. Mainly, we expect to explain what new norms are routinized with the reimagination of local governance field through IS enabled quantification practices. And in routinizing these new norms of quantification, who is experiencing empowerment and who is experiencing marginalization. This will be complemented by an explanation about what realities the knowledge products generated and communicated with the self-assessment system are making visible and what realities remain invisible. Similarly, our study will also explain how the self-assessment system is shaping a local government's access to resources and opportunities. Are old orders of inequality reduced or further amplified?

## **4 Expected Contributions**

At a theoretical level, we are interested in understanding how quantification guides ICT4D practices in generating unintended critical consequences. To do so, we conceptualize quantification as an institutional logic or a broad cultural system with symbolic and material dimensions. The logic guides the way actors realize ICT4D practices but the logic is also shaped by the different IS artifact affordances of the IS-enabled quantification system. We argue that observing and interpreting the recursive relation between the quantification logic and the IS artifact affordances will help reveal the problematic effects of quantification. At an empirical level, we focus on the implementation of LISA -- a monitoring and evaluation based ICT4D intervention in Nepali municipalities. Our goal is to interpret how different affordances of LISA are realized by actors and what kind of critical shifts (power relations, knowledge generation, access to opportunities) can be observed and interpreted in the organizational field of local governance in relation to the IS artifact affordances of LISA.

As such we seek to make two main theoretical contributions. First, we contribute by theoretically explaining the problematic side of quantification in an ICT4D context. Our focus on quantification extends critical ICT4D scholarship (De et al., 2018; Díaz Andrade & Urquhart, 2012; Lin et al., 2015) which so far has only sparsely engaged with the phenomenon of quantification. And although we focus on critical implications of ICT-enabled quantification for producing development results in the field of local governance, future ICT4D researchers can build on our work to study quantification in other novel ICT4D settings and organizational fields, for instance carbon marketing (World Bank, 2022). Second, we contribute to IS literature on IT materiality and institutional change by integrating the concepts of quantification logic and IS artifact affordances and demonstrating IT-mediated material phenomena mutually shape an institutional logic and influence institutional order of a field. At a practical level, our work on the ethical dimension of quantification based ICT4D intervention can serve as a starting point to initiate engaged scholarship (Mathiassen & Nielsen, 2008) with ICT4D practitioners to develop collaborative actions to overcome inequalities of power, visibility, and opportunity that are generated through quantification systems.

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