# Privacy as Knowledge Commons Governance

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Abstract

The Governing Knowledge Commons (GKC) framework, inspired by and adapted from the Institutional Analysis and Development (IAD) framework, structures analysis of commons governance arrangements around knowledge resources and production. Within the first few dozen empirical applications, scholars routinely encountered privacy concerns and values, along with rules-in-use that govern appropriate personal information flow, in systematically studying commons governance of knowledge production, often even when personal information was not associated with knowledge resources. This paper highlights the interdependence between knowledge flows aimed at creative production and personal information flows and discusses how meta-analysis of past case studies, originally presented in "Privacy as Commons," and current empirical case research, forthcoming in the edited volume *Governing Privacy in Knowledge Commons*, has yielded additional questions to supplement the GKC framework, based on the specific governance challenges around personal information.

## 1. Introduction

Although "privacy" and "commons" might on first impression seem conceptually orthogonal or even opposed, a deeper analysis suggests there are insights to be gained from studying information privacy as a question of knowledge commons governance. Privacy often is taken to connote constraint and control over information, while commons often connotes openness and sharing. Neither of these stereotypes, however, are accurate reflections. A more nuanced perspective reveals that sharing and constraint are two sides of the same coin, acting as complements, both in social situations ordinarily conceived in privacy terms and in institutions aimed at creative production through knowledge sharing. Privacy is not simply a matter of constraint, but is more usefully understood, as Helen Nissenbaum has argued, as a matter of "*appropriate flow* of personal information" for specific social contexts.[1] When defined as such, it becomes apparent both that privacy is not secrecy and that privacy often involves knowledge sharing. Indeed, true secrecy, in which information is completely unshared,[2] is a rarity. Privacy ordinarily entails both constraint and flow. Similarly, commons-based knowledge production, at least as understood within the GKC framework, is rarely free-for-all open sharing, but ordinarily combines sharing practices with constraints to overcome social dilemmas.[3] Thus, privacy may aptly be described not only as contextually appropriate information flow, but also as governance of personal information resources.

Given the close affinity between privacy and knowledge commons governance, progress may be made in theoretical and empirical studies of privacy by employing tools developed for the study of knowledge commons governance. In earlier work, Frischmann, Madison and

[1] Helen Nissenbaum, *Privacy in context: technology, policy, and the integrity of social life*, (Stanford, CA: Stanford University Press, 2009), p.127.
[2] Carl J. Friedrich, "Secrecy versus privacy: The democratic dilemma," *Nomos XIII: Privacy* (1971): 105-120; Gerald Neitzke, "Confidentiality, secrecy, and privacy in ethics consultation," In *HEC Forum*, vol. 19, no. 4 (Springer Netherlands, 2007): pp. 293-302.
[3] Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).

Strandburg[4] adapted Elinor Ostrom's Institutional Analysis and Development (IAD) framework for natural resource commons[5] to devise a Governing Knowledge Commons (GKC) framework for studying commons-based knowledge production. That framework has now been successfully employed in a number of case studies.[6] There is also surprisingly close correspondence between the GKC framework and Nissenbaum's contextual integrity framework for privacy, given their construction for quite different social concerns. Comparing the two, we identify two specific ways in which the knowledge commons approach can help to move the privacy research ball forward.

First, we propose to adapt the GKC framework as needed to provide a tool for systematic empirical study of real-world situations in which privacy is at issue. The knowledge commons framework provides a rigorous, yet flexible, means to systematize descriptive empirical case studies of how privacy operates in real world contexts; it is primarily an explanatory approach, rather than a descriptive theory, and structures analysis of nested and networked policy instruments and management strategies.[7] Accurate empirical understanding is an essential basis for more general theory and for effective policy design. Understanding that "appropriate" information flows take complex and variable forms means delving deeply into particular real-world situations. If general principles are to be gleaned from studying such various and heterogeneous situation, a systematic case study approach is needed. The IAD framework was applied successfully by Ostrom and collaborators to derive general "design principles" from case studies of natural resource commons.[8] The accumulation of knowledge commons case studies is only beginning, but general insights and testable hypotheses have started to emerge.[9] We anticipate that systematic case studies using an adapted knowledge commons framework will result in similar progress in our understanding of privacy.

Second, we propose that Nissenbaum's conceptions of "context-relevant informational norms," as grounds for distinguishing appropriate and inappropriate flows of information, and "transmission principles," as "terms and conditions under which such transfers ought (or ought not) to occur" between particular parties in a particular context, be supplemented with the more politically and procedurally grounded conceptions of governance and rules-in use employed in commons studies. Ostrom's concept of "rules-in-use" differentiates between nominal rules "on the book" and the actual (and perhaps unanticipated) practices that emerge from interactions within often complex structures of formal and informal institutional arrangements. Such "rules-in-use" include what has been called an "institutional grammar" of rules, social norms, and strategies,[10] as well as individual tactics of compliance and avoidance, power dynamics, and enforcement mechanisms. The commons governance perspective draws attention not only to the existence of transmission principles or rules-in-use of information flow in particular situations,

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[4] Ibid.
[5] Elinor Ostrom, *Governing the Commons*, (Cambridge University Press, 1990); Elinor Ostrom, *Understanding institutional diversity*, Vol. 241, (Princeton University Press, 2005).
[6] Frischmann, Madison, and Strandburg, *Governing Knowledge Commons*, 2014; Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing Medical Knowledge Commons*, Cambridge Studies on Governing Knowledge Commons, (Cambridge University Press, 2017).
[7] Colin J. Bennett and Charles D. Raab, *The governance of privacy: Policy instruments in global perspective*, (MIT Press, 2006).
[8] Ostrom, *Governing the Commons*, 1990;
[9] Frischmann, Madison, and Strandburg, *Governing Knowledge Commons*, 2014; Strandburg, Frischmann, and Madison, *Governing Medical Knowledge Commons*, 2017.
[10] Sue E. Crawford and Elinor Ostrom, "A grammar of institutions," *American Political Science Review* 89, no. 03 (1995): 582-600.

but also to their *origins* and dynamic characters and to the potentially contested legitimacy of the formal and informal processes that produce them. We believe that issues of procedural legitimacy and distinctions between nominal rules and rules-in-use are central both to empirical understanding of privacy and to normative evaluation and policy-making.

This Article primarily aims to convince readers that the commons approach to information privacy "has legs", in that it has a good chance of producing new and useful insights. Applications of the GKC to privacy issues that arise in previously studied knowledge commons cases supports this objective. Those studies have produced insights into a variety of aspects of knowledge production within communities, ranging from the various social dilemmas that communities may face when seeking to achieve their objectives to the institutional governance choices they rely on to overcome those dilemmas. Furthermore, the nature of sharing knowledge within commons has been explored to elucidate differences in sharing along four distinct community designs: centralized, intermediate distributed, fully distributed, and non-commons.[11] These case studies are exemplary, rather than representative of the range of situations in which privacy debates arise. Nevertheless, the analysis highlights empirical patterns and raises issues that are worthy of further exploration; in particular, the knowledge commons perspective highlights the interdependence between knowledge flows aimed at creative production and personal information flows, broadly conceived. Inappropriate flows of personal information not ordinarily deemed "sensitive," such as an individual's views, opinions or ideas, can stifle socially valuable information sharing or have other undesirable effects.

We thus hypothesize that those who systematically study privacy within and across communities and local contexts routinely encounter knowledge commons concerns, values, and institutions and that in many communities within which privacy is a hotly contested issue one also encounters difficult questions about knowledge production, sharing, curation, and use—or more generally, knowledge governance.

## 2. Theoretical Background

In order to explore the utility of integrating the Governing Knowledge Commons (GKC) Framework (2.1) with Nissenbaum's Contextual Integrity Framework (2.2), it is first necessary to understand and compare them, and to identify points of synergy and possibilities for augmentation (2.3), including research questions to be explored in further developing the GKC framework.

### 2.1. The Governing Knowledge Commons (GKC) Framework

Commons governance of natural resources is often explored through Ostrom's Institutional Analysis and Development framework (IAD). **Commons,** as used in the literature upon which we build here, refers to community management or governance of resources. "The basic characteristic that distinguishes commons from non-commons is *institutionalized sharing of resources* among members of a community".[12] Commons governance can take many forms and need not involve the kind of complete openness often associated with discussions of "the

[11] Jorge L. Contreras and Jerome H. Reichman, "Sharing by design: Data and decentralized commons," *Science* 350, no. 6266 (2015): 1312-1314.
[12] Michael J. Madison, Brett M. Frischmann, and Katherine J. Strandburg. "Constructing commons in the cultural environment." *Cornell L. Rev.* 95 (2009): 841.

commons" or "the public domain" in the legal literature, nor should it be conflated with the type of resources that are managed.

Ostrom's work initially emphasized the appropriateness of commons governance for "common pool resources," meaning "a natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use."[13] In economic terms, common pool resources are rivalrous and non-excludable and commons governance of such resources generally aims to address so-called "tragedies of the commons," social dilemmas associated with overuse—congestion, depletion and destruction. Commons governance is used by a wide variety of communities to manage many different types of resources, however, and responds to various obstacles to sustainable sharing and cooperation. Some of those obstacles derive from the nature of the resources and others derive from other factors, such as the nature of the community or external influences.

When we refer to knowledge commons, we mean commons governance applied to knowledge resources, broadly defined, where:

> **Knowledge** refers to a broad set of intellectual and cultural resources. … We emphasize that we cast a wide net and that we group information, science, knowledge, creative works, data, and so on together.[14]

In this sense, knowledge resources may lie at any point along the data, information, knowledge, wisdom hierarchy.[15] Personal information, broadly defined, is one type of knowledge resource, which can produce value when it is shared and managed appropriately.

As recognized by Hess and Ostrom and confirmed by later GKC studies, "sharing of knowledge often is sustained by commons governance."[16] Indeed, case studies of knowledge commons have illustrated the use of commons governance to manage not only knowledge, which is a classic public good,[17] but also classic private goods, such as money, that must be shared to accomplish a community's goals and objectives.

We anticipate that commons governance will often be applied to flows of personal information for related, but somewhat distinct reasons. If personal information can flow without constraint, the subjects of the information may either be disinclined to share it at all, opting for secrecy, or, if secrecy is not possible, may be unfairly harmed by the flow. Commons governance can provide for the beneficial and managed flow of personal information within a legitimate and trusted institutional structure, thus encouraging subjects to share it in a particular social setting and reducing the potential that harm will result from doing so.

The GKC knowledge commons framework (which is adapted for knowledge resources from Ostrom's IAD framework) is represented in figure 1.

Figure 1. GKC Framework

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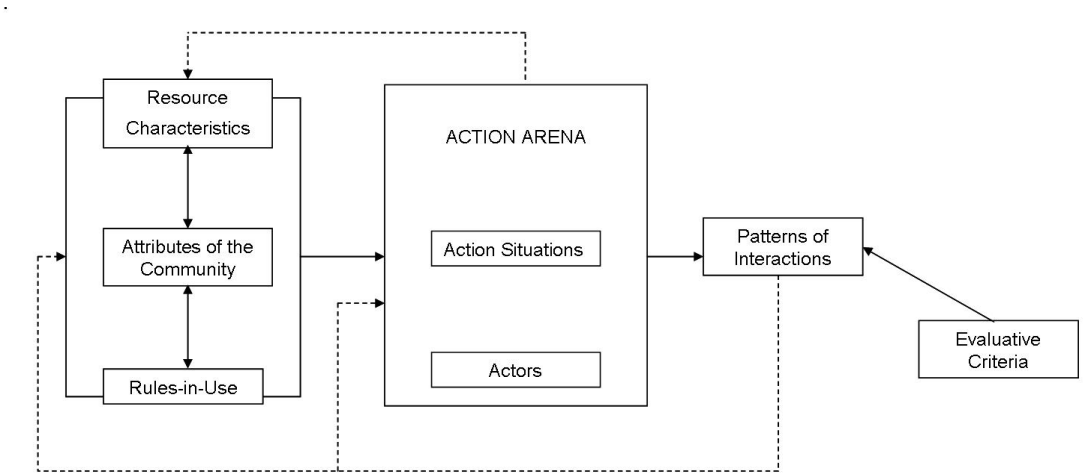
[13] Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action*, (Cambridge University Press, 2015), p.4.
[14] Frischmann, Madison, and Strandburg, *Governing Knowledge Commons*, 2014, p.2.
[15] Nicholas L. Henry, "Knowledge management: a new concern for public administration," *Public Administration Review* (1974): 189-196.
[16] Charlotte Hess and Elinor Ostrom, eds., *Understanding knowledge as a commons: from theory to practice*, (MIT Press, 2007).
[17] More extensive discussions of the public goods nature of knowledge are presented by Frischmann, Madison, and Strandburg, *Governing Knowledge Commons,* 2014 and Hess and Ostrom, *Understanding knowledge as a commons*, 2007.




Using the IAD framework, Ostrom and colleagues explored patterns of community interactions.[18] *Action arenas* serve as the core units of IAD and GKC analysis, functioning as policy analysis equivalent of social action and interaction settings[19] or Goffman's frames.[20] An action arena is simply a recurring type of situation in which community actors interact with one another. Interactions in an action arena produce outcomes, denoted here as patterns of interaction, which can then be evaluated according to some community or socially generated criteria. The figure depicts how effects flow between conceptual building blocks. Thus, resource characteristics, community attributes (including members and roles) and a set of governing "rules-in-use" are inputs to an action arena. Patterns of interactions accumulate, feeding back to create new action situations and influencing resource characteristics, community attributes, and rules in use. Knowledge resources also are a direct output of some knowledge commons action arenas.

Focusing on action arenas facilitates examination of resource sharing in dynamic local contexts, as opposed to simply examining interactions in broad contexts.[21] The "action arena" concept is flexible and can be applied at a variety of levels of generality, depending upon the question of interest to the analyst. Analyzing an action arena is meaningful only if one can specify resource characteristics, community attributes, and rules-in-use that are "exogenous" or fixed over a number of action situations and if one can describe meaningful "patterns" in the outcomes of the interactions. If an action arena is too general, such a description will not be possible, while if an action arena is defined too specifically, meaningful patterns cannot emerge. Finally, note that the concept of an action arena can also apply to governance activities that determine rules to govern knowledge creation and flow or membership qualifications.

The IAD and GKC frameworks include a step in which "evaluative criteria" are applied, but do not explicitly provide a yardstick for normative assessment. In the classic studies of natural resource commons, the normative goal is often implicitly assumed to be sustainable use

[18] Michael D. McGinnis, "An introduction to IAD and the language of the Ostrom workshop: a simple guide to a complex framework," *Policy Studies Journal* 39, no. 1 (2011): 169-183; Ostrom, *Governing the Commons*, 2015.
[19] Tom R. Burns and Helena Flam, *The shaping of social organization: Social rule system theory with applications*, (Sage Publications, 1987).
[20] Erving Goffman, *Frame analysis: An essay on the organization of experience*, (Harvard University Press, 1974).
[21] Ostrom, *Understanding institutional diversity*, 2005.

of the resource by the community. Applications of the GKC framework to innovation and knowledge production have generally focused on whether the community is successful in terms of its internally-defined goals and objectives, while recognizing that the goals of a knowledge commons community could, in principle, be out of step with, or adverse to, the values and objectives of society at large.

For purposes of analysis and empirical study, the high level GKC framework shown in Figure 1 can be unpacked into a more detailed set of research questions, as shown in Table 1.

Table 1. A Revised GKC Framework

| **Knowledge Commons Framework and Representative Research Questions** |
|---|
| **Background Environment** |
| What is the background context (legal, cultural, etc.) of this particular commons? |
| What normative values are relevant for this community? |
| What is the "default" status of the resources involved in the commons (patented, copyrighted, open, or other)? |
| How does this community fit into a larger context? What relevant domains overlap in this context? |
| **Attributes** |
| What resources are pooled and how are they created or obtained? |
| What are the characteristics of the resources? Are they rival or nonrival, tangible or intangible? Is there shared infrastructure? |
| What is personal information relative to resources in this action arena? |
| What technologies and skills are needed to create, obtain, maintain, and use the resources? |
| What are considered to be appropriate resource flows? How is appropriateness of resource use structured or protected? |
| Who are the community members and what are their roles? |
| What are the degree and nature of openness with respect to each type of community member and the general public? |
| What non-community members are impacted? |

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| What are the goals and objectives of the commons and its members, including obstacles or dilemmas to be overcome? |
| Who determines goals and objectives? |
| What values are reflected in goals and objectives? |
| What are the history and narrative of the commons? |
| What is the value of knowledge production in this context? |
| **Governance** |
| What are the relevant action arenas and how do they relate to the goals and objective of the commons and the relationships among various types of participants and with the general public? |
| Are action arenas perceived to be legitimate? |
| What legal structures (e.g., intellectual property, subsidies, contract, licensing, tax, antitrust) apply? |
| What are the governance mechanisms (e.g., membership rules, resource contribution or extraction standards and requirements, conflict resolution mechanisms, sanctions for rule violation)? |
| What are the institutions and technological infrastructures that structure and govern decision making? |
| What informal norms govern the commons? |
| What institutions are perceived to be legitimate? Illegitimate? How are institutional illegitimacies addressed? |
| Who are the decision makers and how are they selected? Are decision-makers perceived to be legitimate? |
| How do nonmembers interact with the commons? What institutions govern those interactions? |
| Are there impacted groups that have no say in governance? |
| **Patterns and Outcomes** |

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| What benefits are delivered to members and to others (e.g., innovations and creative output, production, sharing, and dissemination to a broader audience, and social interactions that emerge from the commons)? |
| What costs and risks are associated with the commons, including any negative externalities? |
| Are outcomes perceived to be legitimate by members? By decision-makers? By impacted outsiders? |

## 2.2 Nissenbaum's Contextual Integrity Framework

Commonalities between Nissenbaum's contextual integrity framework and the GKC framework are immediately apparent. Nissenbaum's framework centers around "contexts", which she defines as "structured social settings characterized by canonical activities, roles, relationships, power structures, norms or rules) and internal values (goals, ends, purposes)." A context, in Nissenbaum's framework, is a social setting in which people undertake "activities," depending on their "roles," subject to "norms (or rules)" (broadly defined), guided by "internal values (goals, ends, purposes)." This is in parallel to rule-in-use determination by community goals and objectives in an action arena.

For purposes of discussing privacy as contextual integrity, Nissenbaum focuses on "context-relative informational norms" characterized by four key parameters: contexts, actors, attributes (or information types), and transmission principles. In knowledge commons terms, one can imagine an action arena involving communication of personal information. Nissenbaum's "attributes" are the resource characteristics of the knowledge commons framework; her "actors" are the community members who are the subjects, senders or recipients of the information, and her "transmission principles" are the "rules-in-use" of the knowledge commons framework that specify what information resources can be shared with whom and on what terms. Note that Nissenbaum's framework, like the GKC framework, does not depend on defining any particular type of information as innately "private" or "sensitive." Indeed, the impossibility of such global characterization of information is one of the insights of her theory. "Personal" information is simply information about or connected to an individual and the issue of contextual integrity is simply whether the information flows according to a transmission principle that is appropriate for the context.

Having set out the parameters of the descriptive framework, Nissenbaum constructs a three-step process for normatively evaluating new information practices. First, determine whether the information practice appears to violate the entrenched informational norms of its context and identify the norm that is violated. If there is such a violation, the practice should be deemed in prima facie violation of contextual integrity. Second, consider whether the new practice has problematic ramifications for high-level moral and political values, such as autonomy and freedom. Third, consider whether the new practice aligns with the values and goals of the particular context in which it occurs. If it does, the practice might signify that the entrenched contextual norms themselves are no longer appropriate and should evolve. Such a

conclusion would rebut the prima facie determination that the new practice violates contextual integrity.[22]

Nissenbaum describes three ways in which the contextual integrity framework could be employed in confronting privacy controversies. First, the framework has explanatory power, in that it identifies why a new information practice produces resistance or discomfort. She argues that simply understanding what is going on in a particular instance may affect the debate. Second, she argues that contextual integrity provides a framework for evaluating a changing information practice. Finally, an information practice that violates an entrenched informational norm in a way that has problematic ramifications for high-level moral and political values should be redesigned or abandoned. The framework focuses debate on real disagreements about the values at stake.

## 2.3 Some Comparative Notes

While there are many commonalities between the knowledge commons framework and the contextual integrity framework, there also are some interesting differences that we believe point the way to fruitful application of the knowledge commons perspective to privacy.

The most important difference between the two constructs for present purposes is that Nissenbaum's framework envisions actors as individual participants in a broadly defined social context, such as education, healthcare, or the commercial market, while the knowledge commons framework envisions actors as members of a "community" involved in producing or managing a set of resources, with the broader context ordinarily accounted for as part of the "background environment", as with the nested contexts navigated by privacy advocates[23] or subject to polycentric governance.[24] This distinction is by no means categorical; depending on the resources in question, one can imagine applying a commons-based analysis to a large "community" consisting, for example, of healthcare professionals or teachers. One might also imagine applying the contextual integrity framework to a local community.

The difference in perspective between the frameworks does lead the analysis in somewhat different directions, however. Most significantly, the knowledge commons perception of actors as members of a community, rather than as individuals situated in a broad, exogenously defined context, shifts the focus from questions of consistency with externally defined norms and rules to questions of community governance, involving not only what background norms and rules are in force in a given action arena but also how – and by whom – those rules are determined. The GKC framework inquires into how the rules-in-use of a particular community are co-determined by the background environment, including rules and norms determined at higher contextual and societal levels. Emphasis on governance adds a layer to empirical analysis that will be quite useful in analyzing privacy issues.

Comparing and combining insights from the Contextual Integrity and GKC frameworks may also shed light on the normative analysis of personal information flows. The GKC framework has focused primarily on community goals and objectives, while the normative phase of Nissenbaum's contextual integrity analysis has emphasized values from higher-level social

[22] Nissenbaum, *Privacy in context*, 2009.
[23] Colin J. Bennett, *The privacy advocates*, (MIT Press, 2010).
[24] Thomas Dietz, Elinor Ostrom, and Paul C. Stern "The struggle to govern the commons," *Science* 302, no. 5652 (2003): 1907-1912; Ostrom, *Governing the Commons*, 1990; Ostrom, *Understanding institutional diversity*, 2005.

contexts or foundational ethical and moral principles. Focusing on governance thus raises key questions: Who should be in charge of deciding appropriateness of information flows? How is appropriateness evaluated? How is the legitimacy of privacy as knowledge commons governance contested and reinforced? As with substantive appropriateness, procedural legitimacy is contextual.[25] Legitimacy, as consensus about social good or appropriateness as reached through participatory decision-making of all potentially impacted,[26] raises governance issues that may be addressed through commons institutions.

The GKC emphasis on community governance as a co-determinant of rules-in-use thus brings the tool of procedural legitimacy into play in assessing whether the transmission principles for personal information are normatively "appropriate." The question becomes not only whether the rules affecting the flow of personal information are substantively appropriate for a given specific context, but also whether the rules have been adopted through a governance process that imparts legitimacy to the, sometimes unequal, ways they affect particular individuals or groups. Procedural legitimacy is at issue in three distinct ways. First, one may consider whether the commons governance structure constructs rules-in-use via procedures (whether formal or informal) that are perceived as legitimate by various types of community members. Previous GKC cases have focused primarily at this level of inquiry. Second, one may ask whether governance practices of a given community are legitimate in that they adequately account for the interests of impacted outsiders. The interests of outsiders may sometimes, but not always, be legitimately accounted for by exogenous rules or norms that constrain the development of rules-in-use. Third, and finally, one might ask whether the exogenous rules and norms to which a community is subject are adequately responsive to member interests. In principle, all three of these questions are important to the normative evaluation of any knowledge commons. However, questions of legitimacy promise to be of particular importance in analyzing privacy issues, because rules-in-use governing flows of personal information may often pay inadequate attention to the interests of the subjects of the information, who may or may not be participants.

By drawing attention to procedural legitimacy, the knowledge commons framework may be particularly helpful in confronting challenges faced by the contextual integrity framework by assessing the appropriateness of transmission principles for personal information flows in real world nested or overlapping social contexts, as identified throughout the literature,[27] or unresolved substantive ethical disagreements. Indeed, focusing on governance may provide the only practical way forward for normative evaluation and policymaking when information flows involve overlapping contexts with differing values or communities in which values are contested.

In addition, we believe that integration of these two perspectives also facilitates examination of the meaning of privacy in a more nuanced and multidimensional way. For example, while Solove has drawn attention to the ambiguity surrounding privacy as a concept[28] and its diversity of meanings,[29] and Bennett has addressed the diversity of potential harms with

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[25] Evelyn Pinkerton and Leonard John, "Creating local management legitimacy," *Marine Policy* 32, no. 4 (2008): 680-691; Nicolas P. Suzor & Darryl Woodford, "Evaluating consent and legitimacy amongst shifting community norms: an EVE Online case study." Journal of Virtual Worlds Research, 6(3), 2013: pp. 1-14. Available at SSRN: https://ssrn.com/abstract=2330108

[26] Jurgen Habermas, *Between facts and norms: Contributions to a discourse theory of law and democracy*, (MIT Press, 1996).

[27] Bennett, *The privacy advocates*, 2010.

[28] Daniel J. Solove, "Conceptualizing privacy," *California Law Review* (2002): 1087-1155.

[29] Daniel J. Solove, "A taxonomy of privacy," *University of Pennsylvania Law Review* (2006): 477-564.

respect to possible missuses and inappropriate flows of privacy,[30] our exploration of privacy as governance of knowledge production and flow in the cases discussed below highlights issues of appropriate information flow pertaining to information about individuals that might not traditionally have been deemed "personal" or "sensitive."[31]

Moreover, viewing privacy as governance of information flow highlights the sense in which privacy may pertain not only to individuals, but also to communities. First, constructing boundaries, within which information can be controlled by community members, is often important in encouraging participation in knowledge sharing or for other community goals and objectives. Second, knowledge commons structures often constrain not only the flow of information about the identities of participants, but also the sharing of ideas and opinions, which, while not traditionally considered to be "personal information," may in fact be intensely personal. In such cases, privacy constraints on personal information flow enable knowledge production by encouraging trust. Third, what is personal differs from one situation to another, just as privacy harms and appropriateness of flows do. While some types of information, such as health or sexuality information, are often denoted "sensitive," these types of information may be shared freely and appropriately in some situations, while transmission of less traditionally sensitive types of information may be appropriately constrained or barred in other situations. In this sense, an understanding of "personal information" need not be laid out in advance or once and for all. Instead, the "personal information" issue is reflected in a set of questions to raise in each case: In what context is particular information "personal"? What is personal in this particular context?

## 3. Suggestions from meta-analysis

Meta-analysis of previous GKC studies to examine governance of and by personal information flows produced additional questions to amend the GKC framework questions, as presented in table 1.[32] Fourteen cases were identified, meeting those criteria, including:

A. Galaxy Zoo,[33]
B. Online Creation Communities,[34]
C. Biobanks,[35]
D. LINK indigenous knowledge commons,[36]

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[30] Bennett, *The privacy advocates*, 2010; Bennett and Raab, *The governance of privacy* 2006.
[31] The broader perspective on "personal information" illuminated by existing knowledge commons case studies is consistent with, though distinct from, arguments about the need for a broad understanding of "personal information" in an era of data aggregation and mining (e.g. Omer Tene and Jules Polonetsky. "Privacy in the age of big data: a time for big decisions." *Stan. L. Rev. Online* 64 (2011): 63-69.).
[32] Sanfilippo, Frischmann, and Strandburg, "Privacy as commons," 2018.
[33] Michael J. Madison, "Commons at the Intersection of Peer Production, Citizen Science, and Big Data: Galaxy Zoo," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[34] Mayo Fuster Morell, "Governance of online creation communities for the building of digital commons: Viewed through the framework of the institutional analysis and development," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[35] Andrea Boggio, "Population Biobanks' Governance: A Case Study of Knowledge Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[36] Kate Joranson, "Indigenous knowledge and the knowledge commons," *The International Information & Library Review* 40, no. 1 (2008): 64-72.

E. the Rare Disease Clinical Research Network,[37]
F. the Oncofertility Consortium,[38]
G. Patient Innovation project,[39]
H. the Sentinel Initiative,[40]
I. The Open Neuroscience Movement,[41]
J. Aviation Clubs,[42]
K. Nineteenth century newspaper editors,[43]
L. Congress,[44]
M. Biomedical data commons,[45] and
N. Genome Commons.[46]

Many of these cases were selected from edited volumes on governance of knowledge commons and medical commons,[47] though others were selected from the Ostrom Workshop's Digital Library of the Commons.[48] The units of analysis for this re-analysis include both individuals and collectives within the commons, as well as their information flows, so as to support a holistic design. Cases are summarized in Table 2.

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[37] Katherine J. Strandburg, Brett M. Frischmann, and Can Cui, "The Rare Diseases Clinical Research Network and the Urea Cycle Disorders Consortium as Nested Knowledge Commons," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[38] Laura G. Pedraza-Fariña, "Constructing Interdisciplinary Collaboration: The Oncofertility Consortium as an Emerging Knowledge Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[39] Pedro Oliveira, Leid Zejnilović, and Helena Canhão, "Challenges and opportunities in developing and sharing solutions by patients and caregivers: The story of a knowledge commons for the Patient Innovation project," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[40] R. Abbott, "The Sentinel Initiative as a Knowledge Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[41] Maja Larson and Margaret Chon, "The Greatest Generational Impact: The Open Neuroscience Movement as an Emerging Knowledge Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[42] P.B. Meyer, "An Inventive Commons: Shared Sources of the Airplane and its Industry," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[43] Laura J. Murray, "Exchange Practices among Nineteenth-Century US Newspaper Editors: Cooperation in Competition," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[44] Brigham Daniels, "Legispedia," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[45] Jorge L. Contreras, "Leviathan in the Commons: Biomedical Data and the State," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017).
[46] Jorge L. Contreras, "Constructing the genome commons," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014); B.J. Evans, "Genomic Data Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017); Peter Lee, "Centralization, Fragmentation, and Replication in the Genomic Data Commons," In Katherine J. Strandburg, Brett M. Frischmann, and Michael J. Madison, eds., *Governing medical knowledge commons*, (Cambridge University Press, 2017); G. Van Overwalle, "Governing Genomic Data: Plea for an 'Open Commons'," In Brett M. Frischmann, Michael J. Madison, and Katherine J. Strandburg, eds., *Governing knowledge commons*, (Oxford University Press, 2014).
[47] Frischmann, Madison, and Strandburg, *Governing Knowledge Commons*, 2014; Strandburg, Frischmann, and Madison, *Governing Medical Knowledge Commons*, 2017.
[48] Digital Library of the Commons, 2009, https://dlc.dlib.indiana.edu/

Table 2. Examples of privacy commons within empirical case studies of knowledge commons

| **Knowledge Commons** | **Case Synopsis** | **Privacy Concerns** | **Personal Information** |
|---|---|---|---|
| **Biomedical Data Commons**<br>National Center for Biotechnology Information (NCBI) | *Biomedical data commons govern large-scale collaborative repositories of sensitive clinical and scientific medical data* | State stakeholder roles—including creators, funders, convenors, collaborators, endorsers, and consumers—are central to tensions surrounding appropriateness of knowledge flows within biomedical data commons. Given the sensitive nature of health information, including its personally identifiable nature, the potential for misuse and breaches of patient expectations and privacy is high and contentious. | Clinical medical records; Research subject and Researcher personally identifiable information; Researcher activities and uses of resources |
| **Indigenous Knowledge Commons**<br>**Local and indigenous knowledge systems (LINKS)** | *Indigenous knowledge commons pool, structure, preserve, and control access to threatened, local knowledge, in order to ensure persistence for future generations and conserve language and knowledge diversity* | Access, dissemination, and use controls for indigenous knowledge (IK) are both important and contentious issues, given the sensitive nature of indigenous knowledge within traditional and context specific cultures. While IK may be not be personal with respect to an individual, it is highly personal with respect to the community, making trust and legitimacy within IK commons imperative to appropriate | Participant personal information; traditional knowledge associated with private community and spiritual practices |

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| | | preservation and control of knowledge resources, particularly given the involvement of community outsiders in providing and maintaining infrastructure for the commons. | |
| **Biobanks** | *A collaborative commons established to aggregate biological data, including tissue samples, supporting large-scale biomedical research* | Externalities of research collaborations relative to biomedical specimens center largely on harms to individuals who have provided data and samples, due to inappropriateness of information flows, including: privacy invasions, social stigma or discrimination, and anxiety. | Clinical medical records; Biological samples and test results; Research subject and Researcher personally identifiable information; Researcher activities and uses of resources |
| **Genome Commons**<br><br>**Genetic Association Information Network (GAIN)**<br><br>**1000 Genomes**<br><br>**Encode** | *Genomic data as a common pool resource, rather than a public good, within large-scale, collaborative investigations and shared repositories* | Given the intensely personal nature of genomic information being aggregated, exchanged, shared, and commercialized through a variety of projects and communities, there is disagreement about appropriate information flows and different commons have created different rules about permissible data flows. These range from full genome commons, with open access to all for any use, to much more restricted regimes. Privatization is a disruptive force in this | Genetic information associated with individuals and populations; Research subject and Researcher personally identifiable information; Researcher activities and uses of resources |

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| | | community, at the expense of insights. | |
| **Rare Disease Clinical Research Network** | *A network connecting patients of rare diseases to clinical researchers for treatment development* | Given the sensitive nature of health information, a variety of concerns about privacy and appropriate information flow have arisen, including: appropriate consent for release of patient contact information to researchers, control over release of data to third parties | Clinical medical records; Research subject and Researcher personally identifiable information; Patient contact information; Researcher activities and uses of resources |
| **Oncofertility Consortium** | *A collaborative interdisciplinary research network connecting scientists, practitioners, and patients around fertility issues for cancer patients and survivors* | Governance issues in this case center on institutionally enforcing appropriate flows between practitioners and researchers, with strong boundaries guarding the collaborations, given the intensely personal nature of patient information. | Clinical medical records; Research subject and Researcher personally identifiable information; Researcher activities and uses of resources |
| **Patient Innovation Project** | *A knowledge sharing community established among patients and their non-professional caregivers* | This community emphasizes active knowledge production within patient support systems, pooling patient networks in an open online environment and, in some sub-communities, sharing data with pharmaceutical companies. Boundaries and enforcement of appropriateness of flows, for the benefit of patients, is critical to encouraging participation. | Research subject and Caregiver personally identifiable information; Participant activities and uses of resources; Relationship and interaction information between patients and pharmaceutical companies |

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|---|---|---|---|
| **Sentinel Initiative** | *This system supports active monitoring of food and drug safety and health information* | This FDA initiative fosters collaborative aggregation by supporting the autonomy of contributors in determining appropriateness of their own data flows. | Clinical trial data; Participant and research subject personally identifiable information; Participant activities and uses of resources; Proprietary health and safety information |
| **Galaxy Zoo** | *A data-intensive, peer-produced, global citizen-science project* | A key contentious issue within this commons regarding privacy relates to appropriate use of the information, rather than to access to the information. The consensus is that the data is public, but non-commercial in nature. | Participant activities and uses of resources; Participant personally identifiable information |
| **The Open Neuroscience Movement** | *Collaborative aggregation of clinical brain imaging data for neuroscience and neurological technology innovation* | Privacy concerns, beyond patient privacy issues, are central to encouraging participation; without clear boundaries and enforcement of use constraints toward non-proprietary adaptations, contributions would be minimal and collaborators would not feel secure in the network. | Clinical medical records; Research subject and Researcher personally identifiable information; Patient contact information; Researcher activities and uses of resources |
| **Online Creation Communities (OCCs)**<br>**Wikipedia**<br>**Flickr**<br>**wikiHow,**<br>**Openesf** | *Peer production communities that exist to generate and share knowledge* | A majority of OCCs support publicly visible exchanges between members of the commons, yet this institutionalized openness often affords privacy to members, given that participation is possible in anonymous and pseudonymous ways. Some OCCs provide | Participant activities and uses of resources; Participant and non-participant personally identifiable information; Relationships and interactions between participants; Images of participants and non-participants |

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| | | control of information flows to sub-communities or individuals, as in Openesf and Flickr, respectively. | |
| **Aviation Clubs** | *A community of practice emerged around early aviation enthusiasts and their efforts to make scientific progress, supported by extensive correspondence* | Secrecy and inaccessibility, as barriers to information flow within the commons, presented a threat, in that "if the secret-holders were more successful than the commons participants, then the point of the commons would largely have evaporated."[49] In this sense, appropriate information flow was uninhibited within the commons. | Participant activities and uses of resources; Participant and non-participant personally identifiable information; Relationships and interactions between participants |
| **Nineteenth Century U.S. Newspaper Editors** | *Newsgathering as a collective, collaborative enterprise among journalists, editors, and news organizations* | Contention and negotiation within these commons were visible, not only to members, but also to outsiders. Privacy in disagreements was minimal, given the cost-minimizing exchange practices of editors to dispute through their papers, rather than through private correspondence. | Participant and non-participant personally identifiable information; Relationships and interactions between participants; Participant decisions and opinions |
| **Congress** | | Openness—in terms of membership, access to members, and access to knowledge—presents some of the most significant information flow issues associated with Congress as a | Participant and non-participant personally identifiable information; Relationships and interactions between participants; Participant decisions and opinions |

[49] Meyer, "An Inventive Commons," 2014.

lawmaking commons. Issues of secrecy, transparency, and control over information flows informing lawmaking, as well as about lawmakers, including relative to conflicts of interest, are important to understanding how Congress operates.

Analysis of these 14 cases highlights differences in strategies, norms, and rules associated personal information flows with public-driven, member-driven, and imposed knowledge commons, sometimes addressing specific privacy harms.

This meta-analysis provided proof of concept for the proposed GKC framework for the study of privacy institutions. It also begins to provide interesting insights into patterns of institutional organization and rules-in-use and into the particular privacy concerns that appear to ground those structures. Patterns vary primarily according to whether the commons approach is public-driven, member-driven, or imposed. Endogenous and exogenous sources of rules-in-use also affect compliance and perceptions of legitimacy. Those who experience negative consequences of information flow rules-in-use that are adopted without their participation contest legitimacy, either directly or by engaging in work-around strategies.

This reanalysis also situates the examination of privacy governance within a nuanced exploration of privacy values, drawing on Solove's taxonomy. The distinctive origins of institutions and the nature of knowledge work within communities lead different sorts of communities to emphasize different categories of privacy concerns (e.g. with respect to information collection or dissemination). These different concerns (e.g. secondary uses or decisional interference) yield different types of commons rules-in-use and structure. The study also highlights a set of concerns associated with information collection that does not appear to be included in Solove's taxonomy. The concern stems not from surveillance or interrogation, per se, but from the participatory nature of knowledge commons and the discontinuity between typical top-down collection arrangements and the grass-roots arrangements of knowledge commons. In these cases, collection concerns emphasize the group and intermediaries, rather than governments or firms.

Our analysis also highlights the importance of stakeholder perceptions of legitimacy regarding commons decision-making, both by members and by impacted individuals who are not members of the commons community. Legitimacy concerns differ by role, consistent with work by Bennett.[50] Some legitimacy failures and issues are likely underrepresented in the set of cases studied here, given the skew toward successful commons governance regimes, and should be addressed in future work.

Procedural legitimacy issues, overall, are related to impacts of the commons on the outside community, work-arounds and attempts to subvert constraints, contestation of appropriateness of information flows, and negative externalities. While many of these issues

[50] Bennett, *The privacy advocates*, 2010.

appear most starkly when focusing on privacy concerns, this analysis of privacy from a governance perspective draws attention to legitimacy questions that may be of more general importance in the study of knowledge commons, but may have been overlooked. Thus, this study has helped to identify important questions to augment the GKC framework more generally, as illustrated in table 1.

## 4. Privacy governance case studies

Drawing on insights from that meta-analysis, privacy commons case studies were solicited from interdisciplinary authors studying governance of personal information in a variety of contexts. These cases, forthcoming in *Privacy Governance in Knowledge Commons,*[51] highlight a number of common challenges and themes: questions of legitimacy and trust; cooperation for collective management; boundary negotiation and socialization; emergence of rules-in-use and privacy work-arounds; and participants as resources.

Legitimacy and trust, while key themes throughout this collection of cases, are the specific concepts of interest for two contributions.

Helen Nissenbaum analyzes conceptual overlap between the CI and GKC frameworks in "Contextual Integrity and Knowledge Commons," highlighting four key claims: (1) privacy is appropriate flow of personal information; (2) flows conform with entrenched contextual informational norms; (3) contextual informational (privacy) norms refer to five independent parameters (subjects, senders, recipients, information types, and transmission principles); and (4) privacy is respected when an action conforms to legitimate, social and individual, norms. This conceptual work importantly relates communities and contexts, so as to facilitate analysis of privacy as governance.

Scott Shakleford, in "Governing the Internet of Everything," draws on Ostrom's design principles relative to connected devices and in considering multi-stakeholder internet governance. In considering norm creation and sanctions, relative to collective action problems, governance of personal information is particular important to establishing trust in (sub-) communities and networks.

Cooperation and collective management, in successful data commons arrangements, are explored relative to digital agriculture and finance.

Steven Wolf examines privacy as, and, and for knowledge commons relative to distributed innovation and assembling of big data for digital agriculture and precision farming. He compares public, private, and collective management of common pool data resources in agriculture, emphasizing the dangers of commons governance as a panacea in this context.

Jean Camp examines border gateway protocol (BGP) hijacking, wherein BGP is a club good, in an empirical study of routing over 6 months relative to 50 financial institutions. Functional governance in this context is largely about full cooperation, rather than enforcement through consequences, given both the broad context and the lack of regulatory enforcement via prosecution.

Boundary negotiation and socialization in contexts are examined in the contexts of housing and scholarly communications.

[51] Sanfilippo, Fichmann, and Strandburg, *Privacy Governance in Knowledge Commons*, 2020.

In "Privacy Recommoning," Dimeji Onafuwa explores the case of eDIGS, including tenancy data, and questions surrounding pluriversal perspectives on knowledge commons. The focus is on tensions between openness, particularly around open data production, and commons' boundaries, highlighting questions around permeability, inclusion, and ostracism.

Brett Frischmann, Ari Waldman, and Katherine Haenschen address "Privacy Commons across Academic, Commercial, and Public Policy Contexts." They compare the evolution of the Chatham House Rules, Gordon Research Conferences, and the Broadband Internet Tech Advisory Group (BITAG) in order to understand community rules-in-use about privacy as information flows, in contrast to professional norms. Issues of non-compliance and processes of professionalization are also of particular interest.

Rules-in-use and work-arounds, designed to conform to expectations of appropriate information flow rather than default and exogenously imposed flows, are at the center of four diverse empirical cases.

In "Technical Frameworks to Support Privacy as a Public Good," Darakshan Mir differentiates between public goods and "for the public good" in order to assess privacy relative to individualism and the collective, as participatory and networked privacy. The transition from group coordination to structured governance is at the center of her inquiry, as she documents the formation of rules-in-use relative to personal information, integrating social preferences with enforcement mechanisms.

Apu Kapadia considers "Workarounds to manage privacy in the era of pervasive photography." In a study of emergent social norms around the creation, collection, and 'public' sharing of photos online by college students, Kapadia employs experience modelling as a research method to produce design suggestions, explore workarounds in practice, and better understand collaborative privacy.

Chase McCoy and Kyle M. L. Jones assess "Institutional Data Labor" through a sociotechnical integration research (STIR) design, in order to understand governance and practice around educational data mining and learning analytics. Their study probes at the value of student data to institutional research, uncovering real student privacy challenges and innovative privacy-protective rules-in-use, addressing exogenous and regulatory governance gaps.

Yan Shvartzschnaider, Noah Apthorpe, and Madelyn Sanfilippo use contextual integrity (CI) as a gauge for GKC, in order to understand the different origins of norms and expectations regarding information flows stemming from Internet of Things (IoT), smart home devices. Through a survey of public perceptions regarding privacy and IoT devices, they gauge how rules-in-use develop and are shared around personal information flows through smart devices. The case is unusual in that smart device users are not a clearly bounded community and don't necessarily interact, but the study is designed to assess multi-modal distributions of privacy expectations in way that identifies how privacy governance and preferences are bounded by sub-communities.

Participants as resources and the co-emergence of communities and knowledge resources are examined in political organizing, historical invisible colleges, and emerging health cooperatives.

Madelyn Sanfilippo and Katherine Strandburg explore privacy as governance within online social movements. Their empirical study of the Day Without Immigrants movement, the

March for Science, and the Women's March illustrated that privacy relative to social media use and political movements, governed participation networks and knowledge resource construction, highlighting aspects of participatory privacy as key to both community and resource formation.

A historical case, in "The Republic of Letters," explores how privacy shapes the Republic of Letters as early open science. Michael Madison considers personal information, not as a resource per se, but rather as key to self-organization processes into "invisible colleges." In this case, private knowledge production underlies public shared knowledge resources, as both reputational compensation and key to sanctions. This is an exemplar case for study through the GKC lens, given the co-emergence of the community and knowledge resources, through contribution and participation, while highlighting new questions about exclusion and public knowledge.

Felix Gille and Effy Vayena explore the Swiss MIDATA cooperative in "How citizens maintain privacy and governance over health data." MIDATA exerts cooperative control over the uses of personal health data through a combination of individual decisions and collective review of project proposals for biomedical research. Within this privacy commons, the board, which reviews research proposals, serves as governance and as a resource to build trust, while participants, across the Swiss population, are also, themselves, a resource.

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