What Absence Costs

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Abstract

The records that make social facts are moving out of drawers and registries into systems that hold them for us: platforms, shared ledgers, and collaborations in which each party keeps its own log of signed records. Earlier work modeled such collaborations as machines that compose, and showed, in a form of the CALM theorem, that steps which only add records converge without coordination while a step that depends on a record being absent needs coordination. This paper asks what that result means for social ontology. We call the condition on records under which a social fact holds its grounding condition, and sort grounding conditions by monotonicity. A fact whose condition asks only that certain records exist can be settled by anyone who holds them, in any order. A fact that asks for an absence, such as that no objection is open, that a prescription is the latest, or that a license has not been revoked, cannot be settled by anyone until a seal declares a set of records complete. A seal is a status function declaration in Searle's sense, and the parties a question concerns can make it together, as a joint commitment in Gilbert's sense. Authority is needed where absence matters, and where it is needed it can be shared. We then ask who may seal, and answer with secondary rules written as co-signed records, frames built in layers by consensus, tiered thresholds, governing bodies that act through one facade, and appeals that end in institutions outside the collaboration. Replies to the main objections close the paper.

Keywords: social ontology; institutional facts; CALM theorem; joint commitment; documentality; governance

Introduction

A thousand-rupee note and a sheet of paper printed with the same inks weigh the same. The note buys groceries and the sheet buys nothing, and the difference lies in the shopkeeper, the bank that issued the note and everyone who will take it tomorrow because they expect others to take it too. Social ontology studies differences of this kind: how money, marriages, licenses, committees and decisions come to exist because people take them to exist (Searle, 1995). Much of that taking is now done through records, and the records are moving out of drawers and registries into systems that hold them for us: platforms, clouds, shared ledgers, and software agents that write records on our behalf. Each of these systems makes a choice, usually without saying so, about who settles which facts. A platform that holds everyone's records settles all of them. A global ledger makes every participant agree on every fact.

This paper asks which social facts need an authority behind them, someone with the standing to settle them, and which ones anybody holding the right records can settle alone. The answer we defend turns on whether a fact asks for something to exist or for something not to exist.

The question comes out of earlier work on collaborations among parties that keep their own records. *Collaboration Is Composition* (Karna, 2026a) models each party as a machine over an append-only log of signed records, and a collaboration as such machines wired together, so that a collaboration is itself a machine and can be wired into a larger one. It proves, in a form

of the CALM theorem (Hellerstein and Alvaro, 2020; Ameloot et al., 2013), that when every machine only adds to what it has, the parties reach the same logs and views whatever order their messages arrive in, with no orchestrator keeping them in step. It also proves that a step which depends on a record being absent can come out differently under two fair orders of delivery, and there the model asks for a coordinating signature, such as a co-signed receipt or a witnessed timestamp. That paper says where coordination is needed in a collaboration of machines. It leaves open what the coordinated steps are in the social world the records describe, and who may take them. This paper takes up both questions.

Our thesis is that the CALM line runs through social facts as soon as those facts are grounded in records kept in many hands. A fact whose grounding condition only asks that certain records exist can be settled by anyone who holds them, in any order, and never has to be taken back. A fact whose grounding condition asks for an absence cannot be settled that way by anyone, however careful, until some coordination has happened. We call the coordinating act a seal: a declaration, in Searle's sense, that a set of records counts as complete for a question. Once a seal exists the absence fact rests on the seal, which is a record like any other, and the fact travels freely again. A seal can come from a chair, a court or a registry, and it can also come from the parties the question concerns, signing together in the way Gilbert describes joint commitment. Authority is needed where absence matters, and where it is needed it can be shared.

A seal settles a question for everyone who accepts it, and whoever holds the standing to seal can seal in bad faith. The second half of the paper therefore asks who may seal. We argue that the rules which confer that standing have to be written as records too, as Hart's secondary rules, built by the people they bind through consensus, customized by groups through additions that stay monotone, and changed in any other way only through the legal pathways for changing regulation. Governing bodies act through one facade over a quorum of their members, and appeals end in institutions outside the collaboration.

The paper proceeds as follows. *Monotone, composable collaborations* sets out the setting of monotone, composable collaborations. *Social facts kept in records* introduces grounding conditions, and *Facts that ask for an absence* sorts them. *Seals* defines seals and shows how they can be shared. *Who may seal* asks who may seal. *Objections and replies* answers the objections a philosopher would raise, and *Conclusion* closes. Throughout, the claim is conditional: insofar as an institution's facts are functions of records (Ferraris, 2013), the sort applies to them.

Monotone, composable collaborations

The setting is a collaboration without a clerk. Each person or organization keeps its own log of signed records. Records are only ever added: a correction is a new record that points at the one it corrects, and a withdrawal is a new record too. Records travel between parties as messages, at any speed and in any order, and there is no shared ledger in the middle and no clerk whose copy counts as the copy. A digital signature does two jobs at once. It names who stood behind a record, and it binds them to its exact content, so that changing a single character makes a different record they never signed. Anyone who holds a record and the signer's public key can check both without asking anyone.

Karna (2026a) gives this setting a precise form. Each party acts through a box, a Mealy machine whose inputs and outputs are signed records and whose state is a fold over its log. A collaboration wires existing boxes together through mailboxes, and the result is again a box, so collaborations nest: a team that forms a team adds one more box and a few wires, and the boxes already there do not change. Nothing outside the boxes and the wires coordinates them,

and the model has no central coordinator. On this view an orchestrator, where one is useful, takes part as one more party, with its own log and its own signature.

A box is monotone when more records never take away an output it has already produced. The CALM theorem, for Consistency As Logical Monotonicity, says when a distributed program can give consistent answers without its machines stopping to agree. Hellerstein (2010) conjectured it, Ameloot et al. (2013) proved it, in a revised form, for networks of relational transducers, and Hellerstein and Alvaro (2020) give the general account: a program has a consistent implementation without coordination exactly when it is monotone. Their own illustration is garbage collection, where a machine may discard an object only when no other machine still refers to it, and the only way to know it has heard from everyone is to ask them all and wait. Karna (2026a) proves its own form of the result for boxes over signed records, with the proofs checked in Lean 4 (Karna, 2026b). When every box is monotone, the logs and views of a collaboration do not depend on the order or duplication of deliveries. A step that depends on a record being absent can come out differently under two fair delivery orders, and the model asks for a coordinating signature at that step, such as a co-signed receipt or a witnessed timestamp.

Trust in this setting is indexed by its observer. No view of the shared record exists apart from someone holding it. Each observer ranks what it holds inside its own fiber of trust, in the model's terms a fibration over observers, so parties holding the same signed records can rank them differently without any ranking being forced on another, and no number about a person is published for everyone.

Meaning is kept the same way. Each party keeps an olog (Spivak and Kent, 2012), a small categorical diagram of what its own records mean to it. Where parties need to share terms, they grow an ontolog of declared equivalences between their ologs, each added by co-signature and each carrying a round-trip law: a record exported into the other party's vocabulary and imported back comes out unchanged. A lab's "result" and a clinic's "report" become the same thing only when both have signed that they are.

Almost every move in such a collaboration is monotone: a proposal, a comment, a reading, a vote, a co-signature, each an addition that leaves the rest in place. A few moves depend on something being absent, such as an approval that requires no open objection, a revocation, or a slot that can be taken once. Those few are the subject of this paper.

Social facts kept in records

A child learning chess protests that a piece of wood cannot jump over the pawns. The wood cannot, and the knight can. Before the rules of chess there is no knight, only a carved horse's head on a base. Searle (1995) calls rules of this kind constitutive, and sets them beside regulative rules, which govern something that already goes on without them. Driving on the left is regulated; checkmate exists only because rules like "checkmate ends the game" were written. His formula for a constitutive rule is *X counts as Y in C*: carved wood counts as a knight in chess, and printed paper counts as a thousand rupees in Nepal. The rule assigns a status, and the status comes with powers and duties that the physical object could never carry alone, which Searle calls status functions. In later work he argues that one kind of act assigns every status: we make something the case by declaring that it is the case, as in "I now pronounce you married" or "the meeting is open", and he calls these acts status function declarations (Searle, 2010, pp. 13, 93).

Searle's account rests on what people accept. Ferraris (2013) rests his on what people write down. A wedding that nobody records becomes, once the guests who remember it are gone,

hard to tell apart from one that never happened. For Ferraris a social object is an inscribed act: a promise becomes a debt when it is written into an IOU, and a sale becomes a title when it is entered in a register. He distinguishes documents that inscribe an act, such as a will or a contract, from documents that merely register a fact, such as a temperature copied into a chart, and places social objects with the first kind. Records let a social fact outlast the moment it was made, and carry it to people who were never in the room.

Epstein (2015, ch. 6) supplies a distinction that the rest of the paper depends on. A neighborhood committee decides things by written proposal. At its founding meeting its members agreed on a rule: a proposal goes to a vote once three members have endorsed it, and an endorsement is a signed record saying so. Months later Sita files a proposal to fix the streetlight by the temple. Hari signs an endorsement, then Maya, then Bishnu, and the proposal is ready for a vote. Epstein's distinction separates what is at work here. Grounding is what makes a particular fact hold: these three signed endorsements make this proposal ready for a vote. Anchoring is what put the rule in place: the founding meeting at which the members accepted that three endorsements would be enough. Collective acceptance sets up the frame, and records fix the facts inside it.

Under a frame of this kind, every fact has what we call a *grounding condition*: a condition on the records that says when the fact holds. *The proposal has three endorsements* holds when there are three endorsement records from three members. *Hari endorsed it* holds when Hari's signed endorsement exists. A question about authority then becomes a question about grounding conditions: who can check a condition, and on whose records.

Facts that ask for an absence

In an imagined clinic, a family and its clinics keep a diabetic patient's records together. The patient's meter signs each glucose reading, the laboratory signs each result, doctors sign prescriptions, and a family member signs when a delivery of insulin arrives. Each keeps their own log, and records flow between them.

At two in the morning the night nurse looks at what has reached her. A reading of 7.2 was taken at ten past ten the evening before, signed by the meter. The laboratory's result from Tuesday is in. The last prescription she can see says ten units. Some of what she knows will hold whatever arrives next. The reading was taken, and nothing that arrives later can untake it. The laboratory reported its result; a correction would be a new record, and the old result would still have been reported. Facts like these ask only that certain records exist, and adding records can never make them false. Their grounding conditions are monotone: more input never takes away a conclusion already drawn.

One thing she knows is different. *The current dose is ten units* asks for more than the prescription she holds. It asks that there be no later prescription, and the day doctor may have signed one at nine in the evening on a laptop that has not yet synchronized. The nurse can be careful and competent and still give the wrong dose, because the fact she needs depends on the absence of a record, and no amount of looking at her own records can establish an absence.

Absence facts turn up everywhere once they have a name: no objection remains open, this is the latest version, this license has not been revoked, this slot is still free. Each holds of some set of records and fails of a larger one, which makes its grounding condition non-monotone.[1]

[1]Every grounding condition does exactly one of the two: it asks only for records or it asks for an absence. When finitely many records lie between the smaller set and the larger, the absence comes down to a single record that the condition needs to be missing, and over finitely many records a condition that asks only for records is a positive Boolean expression in which records are present. We have proved these in Lean 4, as `sort`, `absence_step` and `positive_iff_posBool`, in the library `CosysSocial` of release `proofs-v1.1.0` (Karna, 2026c), which builds on the

Our claim is that the CALM theorem draws the same line through social facts that it draws through programs, as soon as the facts are grounded in records kept in many hands. A fact with a monotone grounding condition can be settled by anyone who holds the records, in any order, and never has to be taken back. A fact whose grounding condition asks for an absence cannot be settled that way by anyone, however diligent, until some coordination has happened.[2] The nurse's local fact, that she has seen no later prescription, is monotone and safe to state. The institutional fact, that no later prescription exists, is the one the dose depends on, and a late or partitioned record can falsify it.

Seals

Back at the committee, Sita's proposal has its endorsements and the vote passes. The committee's rule says a decision is final only when no objection remains open. The chair looks around the room and asks, "Any objections?" There is a pause. "Hearing none, the motion carries." The ritual is older than any computer, and it does what the CALM theorem says must be done. The chair cannot know that no member, anywhere, has an objection in their pocket. What the chair can do is declare that the objections raised by now are the ones that count. After that, a member who objects next week starts a new proposal, and this one stays closed.

In their exchange, Smith pressed Searle with the case of a painting that went undocumented for decades, whose owners held it on what Smith called a negative basis, the absence of any competing claim, and Searle answered that disputes of that kind are settled by judges and lawyers (Smith and Searle, 2003, pp. 289–290, 307). The sort says why both are right. A court closes the record: it declares that the claims before it are all the claims that count.

We call such a declaration a *seal*. A land registry seals the titles to a plot, and an editor closes an issue. Each performs a status function declaration in Searle's sense, making it the case that a set of records counts as complete for a question. Once the seal exists, the absence fact can be grounded in the seal itself, which is a record like any other. The decision of the meeting holds as long as the seal exists, and adding records can never remove it, so the fact has become monotone again.[3] Coordination was spent once, at the moment of sealing, and after that the fact travels freely. Seen this way, an authority may know no more than anyone else. In a world of records kept in many hands nobody can know that nothing is missing, and what an authority has is the standing to make what is missing stop counting.

Sealing together

A seal can come from somewhere other than a chair, a court or a registry. In Gilbert's best-known example, two friends agree to walk to the market together, and halfway there one of them speeds up and leaves the other behind without a word (Gilbert, 1990). Something has gone wrong, and both know it. The one left behind has the standing to object, and neither of them can call the walk off alone: it took both to begin it, and it takes both to end it. Gilbert calls what holds them a joint commitment, through which two or more people form a plural subject with commitments of its own that no single member can undo (Gilbert, 2013).

proofs for Karna (2026a). Each result below is named as it is there.

[2] In `proofs-v1.1.0` this is `calm_social`, stated in the network model of Karna (2026a): a grounding condition asks only for records exactly when every network whose machine answers it settles the same way under every fair order of delivery. Its conditions are given with the reply to the objection that the theorem does not transfer (*The CALM theorem does not transfer*). The nurse's side of it is `positive_iff_local_sound`: a conclusion each observer draws from its own records holds of all the records together exactly when its condition asks only for records.

[3] `sealed_positive` in `proofs-v1.1.0`. It asks one thing of the seal, that its authority rule never asks for more signatures as the log grows.

A seal can be made this way. Every party the question names signs a record naming the same set of records, and the seal exists when all the signatures do. Each signature is an open and checkable expression of readiness, every signer can see who else signed, and none of them can unseal it alone: reopening takes another record signed by the same parties, so even a change of mind becomes one more record in the history.[4] At the clinic this is a handover. Before the day doctor leaves, she and the night nurse co-sign the set of prescriptions the current dose is computed from, and the patient can sign it too. The nurse no longer has to guess whether a newer prescription is hiding somewhere, since she works from a set that the people responsible for it sealed together. What the handover settles is the dose as of the handover. "The latest handover" asks for an absence again, since a later one may always be on its way, so a prescription written after the handover opens a new question for the next handover to settle.[5] The authority to seal remains, shared among the people the question concerns.

What a signature can vouch for

Cameras have begun to sign their photographs, attaching a credential that says which device made a picture and that nothing has changed since. In September 2025 a photographer, Adam Horshack, showed that a camera with this feature could be made to sign a picture it never took. Its multiple-exposure mode signed an overlay of an image taken with a second camera, and the result passed the public verification tool (PetaPixel, 2025c); a later attempt had it sign an image made with a generative model (PetaPixel, 2025a). The manufacturer suspended the service (PetaPixel, 2025b) and then announced that the certificates it had issued would be invalidated (PetaPixel, 2025a).

The case shows what a signature can make true. Validating a content credential checks its signature and the signer's credential, whether that credential was valid and unrevoked when it signed, and that the content has not changed since (Coalition for Content Provenance and Authenticity, 2025). Those checks establish the kind of fact a signature can ground: this signer vouched for this file. Whether the scene in the file took place is a different kind of fact, and no signature settles it. As generative models write more records of events that never happened, the question to ask of a record moves from what it shows to who stands behind it.

It also shows where absence enters. A credential stays valid only while its certificate has not been revoked. Statuses of this kind are defeasible in the lawyer's sense (Hart, 1949): they hold unless something defeats them, such as a revocation, an appeal, or an exception that comes to light later. Every defeasible status, from a valid license to a current dose, hides an absence. A verifier that never received the revocation goes on calling the credential valid, with nobody having done anything wrong, because its grounding condition asked for an absence and nobody had sealed the list of revocations it consulted. In the camera's case the commonly used validation tools did not check revocation by default (PetaPixel, 2025a), so a revoked credential could go on passing. A revocation list that is published, signed and dated is such a seal, and a verifier that checks one can say that a credential was valid as of that list.[6]

Where authority goes

The systems that now hold our records each settle facts in their own way. A platform that holds everyone's records settles all of them, monotone or not, and becomes the authority

[4] `joint_needs_each` and `reopen_needs_each` in `proofs-v1.1.0`: while one of the parties has signed nothing, there is neither a seal nor a reopening.

[5] `dose_asOf_handover_positive` and `latest_asks_absence` in `proofs-v1.1.0`.

[6] `valid_asks_absence` and `valid_asOf_positive` in `proofs-v1.1.0`, whose examples also check the camera's case.

over facts that never needed one. A global ledger makes every participant agree on every fact, including the many that only ask for a record to exist. The sort points to a third design. Records stay with the people who signed them, every monotone fact is settled by whoever holds the records, and coordination is spent only where a fact asks for an absence, among the people that fact concerns, who seal it together. Authority is needed where absence matters, and where it is needed, it can be shared. That leaves the question of who may hold it.

Who may seal

The sort so far says where authority is needed: wherever a grounding condition asks for an absence. It says nothing yet about who holds that authority, how they came to hold it, or what happens when they use it badly. A seal settles a question for everyone who accepts it, and whoever has the standing to seal can also seal in bad faith. Signatures and validators offer no help with this. A signature establishes that a key vouched for a record, and a validator establishes that the record has the form its kind requires. A chair who closes the call for objections an hour early, a clinician who signs within her rights for reasons she would never state and an administrator who backdates a revocation all produce records that pass every check. This section asks what kind of fact a charge of abuse is, where the rules that confer standing come from, how those rules change, and how disputes about their use are settled.

What a charge of abuse asks for

A charge that someone abused their standing mixes facts of different kinds, and the sort applies to each part on its own.

Part of it is procedural. The chair gave notice of the vote on the fifth of the month; the call for objections stayed open for three days; the endorsements came from members. Each of these asks only that certain records exist, so each is monotone, and anyone holding the records can check it. A procedure written into a frame turns a good share of what people mean by fair dealing into facts of this kind.

Part of it asks for an absence. The chair had no undisclosed interest in the contract; no objection was still open when the motion carried; the office-holder's grant had not been revoked when she signed. These are the facts the sort singles out. Nobody can settle them from their own records, and each needs a seal from someone with the standing to declare a set of records complete: a register of interests closed on a date, a chair's call for objections, a revocation list signed as of a time.

The rest asks for something no record grounds: what the chair intended, whether the clinician's reason was the one she gave, whether a member was pressed to vote outside every channel the records cover. The camera that signed a scene it never photographed belongs with these. A signature shows who stands behind a record and leaves open whether what the record reports took place. A body with the standing to judge such facts can judge them, and its judgment then becomes a record like any other, though no computation over records could have produced it.

Bad faith is therefore partly an absence fact and partly a fact about minds. The part that leaves records can be made monotone by procedure or settled by a seal. The part that leaves none falls to judgment, and a design of records can make that judgment, once given, attributable to whoever gave it and open to appeal.

Secondary rules as anchoring

Epstein (2015) separates grounding, what makes a particular social fact hold, from anchoring, what puts the frame principles in place. The sort applies to grounding conditions under a fixed frame. For the frame itself, Hart's account of law supplies the vocabulary.

Hart (2012, ch. 5) imagines a community governed only by primary rules, rules that require or forbid conduct, and names the defects such a regime would suffer. It is uncertain, since the group has no agreed way to identify which rules are its rules. It is static, since nothing provides for changing the rules on purpose. And it is inefficient, since disputes over whether a rule was broken have no one with the authority to settle them, and the pressure to comply stays diffuse. Hart pairs each defect with a kind of secondary rule that remedies it: a rule of recognition, rules of change and rules of adjudication.

A collaboration over signed records that has nothing beyond the records and each observer's trust suffers all of Hart's defects. Which keys count as members is settled by each observer inside its own fiber of trust (Karna, 2026a), so the group has no rule of recognition it can point to. Nothing says how its frame changes, and a dispute over whether an absence held has nobody to seal it. The objection from bad faith, in its strongest form, is aimed at a regime like this one, and against such a regime it succeeds.

The remedy is to write the secondary rules down as records, co-signed by the parties they bind.

- A rule of recognition says which records count for the group: the founding record that names the members' keys and the group's constitutive rules, such as the committee's rule that a proposal goes to a vote once three members have signed endorsements of it.
- A rule of change says how the frame may change. A change of frame asks that no party still holds the old terms, which makes it absence-sensitive (*Grounding is confused with anchoring*), so a rule of change names the seal that settles each change.
- A rule of adjudication names who has the standing to seal a disputed absence, and the procedure they follow.

Each of these is a record its parties co-sign, so the frame is anchored in Epstein's sense, by the collective acceptance of those it binds, and anyone bound by it can inspect that acceptance. Schneider (2024) calls the default of online platforms *implicit feudalism*, a bias, cultural and technical, toward communities run as fiefdoms, and Schneider et al. (2021) observe that the governance tools online communities are given typically assign unchecked power to administrators and moderators. A platform keeps its secondary rules in its operator's control of the servers, and here the same rules are records signed by the people they bind.

Frames in layers

Frames come in layers, and so do the vocabularies they are written in. Each person keeps an idiolect, the olog of what their own records mean to them. A group, such as a family, a clinic or a committee, keeps a sociolect, the ontolog its members have co-signed. A nation keeps a national dialect, the legal and administrative vocabulary its institutions use. Rules, goals, targets and policies sit at the same layers as the vocabularies: a patient's own targets and the plan she wrote down for herself; a clinic's policies and a committee's rules; a nation's laws and the indicators it reports.

The system these layers make up is built by the people in it, through consensus and unanimity. A frame binds only the parties who co-signed it, and a procedure inside a frame, such as a quorum, a majority vote or a panel, binds because everyone it binds co-signed the

procedure first. A majority vote then binds only those who agreed to be bound by majority votes. Unanimity across a nation is out of reach, and unanimity among the parties a given rule binds comes within reach when the rule lives at the smallest layer that contains all of them. Each layer is anchored by the collective acceptance of its own members, and a rule that concerns one clinic stays with that clinic.

Groups customize the system by adding to it. A group adds the concepts of its sociolect, its own rules, targets and policies, and the views its members read through, each co-signed by the members it binds. A customization of this kind is monotone: it leaves in force everything the members and the layers around them already hold, so it needs no coordination beyond the co-signatures of those it binds.[7] A change that takes something away asks for more. Narrowing a right a member holds, setting aside a rule of a wider layer, or rewriting a settled term asks that nobody still relies on what is removed, which is an absence.[8] Within its own frame a group can make such a change only by the co-signature of every party it binds, the way the parties to an agreement amend it. A change that takes something from a wider layer goes the way regulation changes, through the legal pathways for adjusting it, where a body with the standing to seal decides.

Layers meet by translation. A term crosses from one vocabulary into another only when both sides have signed that the two terms mean the same, and the translation carries a round-trip law: exporting a record into the other vocabulary and importing it back returns the record unchanged. Where a mapping is many-to-one, a lens keeps the part the wider vocabulary drops, so the round trip still holds.[9] A sociolect never overwrites the idiolects of its members, and a person's term reaches the national vocabulary through the group's, with each step co-signed by the parties on both sides.

National law binds people who never co-signed it, and no frame can make it consensual. What a frame can do is record the point of contact: a group co-signs a record that it takes up a national rule, and where a national rule clashes with a local one, the clash sits on the record and goes up the chain of appeal that ends outside the collaboration (*Disputes, sanctions and nested appeal*). Recognition then runs in both directions. The state recognizes the group's right to organize, which is one of Ostrom's principles, and the group records which of the state's rules it has taken up.

The contractualist test, in tiers

The frame we have defended elsewhere for collaborations of this kind holds rules to a contractualist test: a rule that changes what others may do stands only if every party it binds has co-signed it.[10] The test follows Scanlon (1998, p. 153), on whose account an act is wrong when principles that no one could reasonably reject, as a basis for informed and unforced general agreement, would disallow it. The co-signatures are the record that nobody bound by the rule rejected it.

Applied to every decision, the test gives every party a veto, and a veto is a power that can be used in bad faith too. A member who blocks every proposal until a side demand is met abuses her standing as plainly as a chair who closes objections early. Scanlon's qualifier carries the weight: what counts is reasonable rejection, and a rejection can be checked for reasons

[7] `extends_facts` and `extends_positive` in `proofs-v1.1.0`.

[8] `inForce_asks_absence` in `proofs-v1.1.0`: a rule in force from its adoption until a repeal asks for an absence once a repeal can be written, and asks only for records while none can (`inForce_positive`).

[9] `Translation.injective` and `translate_positive` in `proofs-v1.1.0`: a translation with such a complement loses no record, and a fact that asks only for records in the wider vocabulary still does when read through it.

[10] The test sits beside a second condition, that no party can write to another's log, so a party bound by nothing it did not sign also keeps everything it did sign.

only if it states them. Projects that run on consensus have reached the same requirement in practice. At the Apache Software Foundation a negative vote from a qualified voter stops a proposed code change, and a veto without a justification is invalid and has no weight (Apache Software Foundation, nd). The contractualist test can take the same form here: a refusal to co-sign stands as a rejection when it is a signed record carrying its reason, and the reason is itself open to dispute under the rules of adjudication.

Even with reasoned vetoes, unanimity suits some decisions and not others. We propose tiers, each fixed in the frame by the unanimous co-signature of its parties at the outset.

1. The constitutive rules, which make up the frame itself. A change needs the co-signature of every party the rule binds, and vetoes count with their reasons, so the contractualist test applies in full to the rules that define the group.
2. Offices. The standing to seal is held on a grant that expires and is renewed by co-signature. A quorum named in the frame may suspend an office-holder at once; removal needs a higher threshold and a decision by a panel under the rules of adjudication.
3. What concerns one person alone. A person's access to their own records, their leaving with their own history and their right to appeal are fixed in the frame as matters that need that person's own signature, and no quorum reaches them.[11]

Projects that govern themselves in the open set their thresholds in the same order. Debian's developers may recall the project leader by a general resolution, overrule the technical committee by a two-to-one majority, and amend their constitution only by three to one (Debian Project, 2022). Python's core team may remove a member of the steering council, or the whole council, by a vote of no confidence that succeeds when at least two thirds of those voting express a lack of confidence (Python core team and community, 2018). In both, changing the frame costs more than using it, and removing an office-holder costs more than the everyday decisions the office makes.

A recall under the second tier keeps faith with the joint commitment that created the office. On Gilbert's account a joint commitment can be ended only by its parties together (Gilbert, 1990, 2013), and here the parties used that power at the outset, when they co-signed a frame that lets a named quorum suspend an office. A suspension follows the terms of the commitment it suspends. The third tier gives Gilbert's point its widest reach: for what concerns one person alone, that person is always among the parties who must sign.

Who seals for the sealers

Offices and panels hold the standing to seal, so their own make-up has to resist the members who sit on them. A member with elevated standing can poison what the body seals from inside: by sealing alone in the body's name, by backdating a record the body relies on, or by rotating out the members who would refuse. Separating the body that suspends from the body that judges does not reach this, since each body can be poisoned in the same way.

A governing body can be built as a composite collaborator, decentralized inside and presenting a single facade outside. Inside, each member keeps their own log and key and works under the same discipline as everyone else, adding records freely and sealing only where an absence matters. Outside, the body acts through one facade, a signature that readers check without needing to know how the body is wired. In the model of Karna (2026a), parties

[11] `personal_beyond_quorum` in `proofs-v1.1.0`: while the person has signed nothing, no record of such a matter stands, whatever the rest of the body signed.

wired together present one interface to the rest of a collaboration, and a governing body is one more composite of that kind, standing as a facade over the layer it governs.

The facade's signature needs a quorum of the members. It can be a threshold signature, which verifies as a single key once enough members have contributed their shares (Connolly et al., 2024), or a list of co-signatures under the record that founded the body. A quorum asks for any large enough subset of the members, where the authority rules of Karna (2026a) ask for a fixed set of signatures. It is a positive Boolean condition on the signatures a record carries, the kind of expression that already describes provenance there, so a record that a quorum signed keeps its standing as the log grows.[12] Either way each member's part stays in the body's inner log, so the attribution that accountability depends on survives behind the facade. Changing who sits on the body changes its frame and falls under the first tier, which keeps a captured majority from rotating the honest members out on its own authority.[13] Members hold expiring grants, and the facade's key is renewed at each epoch, so a stolen or poisoned share loses its value when the epoch ends. The facade that suspends and the facade that judges have disjoint members.

A quorum raises the price of capture and leaves capture possible: enough colluding members can still seal in the body's name. The regress ends at the founding co-signature that anchored the body and at the institutions outside the collaboration where the chain of appeal ends.

What a suspension costs

A suspension is a revocation, and revocation asks for an absence: an office-holder's signature counts only if no suspension of it came first. A suspension therefore takes effect for each reader when that reader receives it, and an act the office-holder signed in the meantime is concurrent with the suspension from that reader's point of view. No arrangement of signatures makes a suspension take effect everywhere at once.[14] The delay is part of what absence costs, and a frame can only state it: a window within which a suspension is honored, paid for by fresh checkpoints that readers fetch while the window lasts. An office's seals carry the same cost. A seal made on a grant that can be suspended counts only if no suspension of the grant came first, so it asks for an absence, and the fact it seals grows with the log, as in *Seals*, only as of a sealed checkpoint of grants.[15]

Concurrent revocation also opens a way to abuse standing, and builders of local-first software have met it as the problem of duelling administrators. Administrators with equal rights revoke each other concurrently, and the merged state does not say who prevails. A rule that breaks the tie by seniority can be gamed: a senior administrator who has been revoked can backdate a revocation of the other so that the two appear concurrent, and seniority then rolls back the revocation the senior received. Dougal (2026) argues that a Byzantine administrator can exploit concurrency in this way to sway the outcome, so that an arbiter outside the group's merge has to order concurrent events, and proposes optional epoch events that give a bounded total order within each epoch. In the terms of this paper an epoch event does the work of a seal: it declares which revocations count as earlier, and from then on their order is a fact grounded in a record. An arbiter held by one party would be the elevated member of *Who*

[12] `quorum_monotone`, `posBool_monotone` and `claimBy_mono` in `proofs-v1.1.0`, where `claimBy_conj` recovers the rules of Karna (2026a). Over finitely many signatures, every rule that more signatures never undo has this form (`rule_iff_posBool`).

[13] `facade_attribution`, `facade_minority` and `no_rotation_by_capture` in `proofs-v1.1.0`.

[14] `suspension_splits` in `proofs-v1.1.0`: a network of one reader has two fair orders of delivery, under one of which the reader counts the act while under the other it never does.

[15] `office_seal_asks_absence` and `office_seal_asOf_positive` in `proofs-v1.1.0`.

seals for the sealers, and an arbiter built as a facade over a quorum orders the epoch without any single member holding that power.[16]

The case shows what a seal can do about bad faith and where it stops. The epoch event never detects that the senior administrator backdated anything. A device's timestamp is a claim the device makes about itself, and the records cannot ground its truth. What the seal takes away is the advantage: once a witness the parties named in advance has fixed the order, a later claim about an earlier time gains nothing.[17] Much of the design of secondary rules has this shape, leaving intent to judgment and taking the profit out of the abusive move.

Disputes, sanctions and nested appeal

Ostrom (1990, Table 3.1, p. 90) found that institutions which governed common resources for generations share a set of design principles, among them monitors who are accountable to the users or are users themselves, sanctions graduated by the seriousness and context of an offense, conflict-resolution mechanisms that are cheap and close at hand, recognition by outside authorities of the users' right to devise their own institutions, and, in larger systems, governance organized in nested layers. A review of 91 studies that tested the principles found them well supported and proposed a reformulation (Cox et al., 2010). Each maps onto a design of records without strain.

Monitoring comes almost free, since every act is a signed record and its signer is known. What remains is that the people an act concerns can see it, which is a question of who receives which records. Sanctions can be graduated as records of increasing weight: a concern noted on the record, a suspended grant, a recall, a removal, each sealed by whoever the frame gives standing for it. A dispute is a record that opens a procedure, and the procedure has the shape of a path of arrows: filed, answered, decided, appealed, each step a signed record that answers the one before, with the decision a seal on what the dispute considered.[18]

Nesting is where a design of records meets the institutions around it, and the layers of *Frames in layers* give the nesting its order. The Internet Engineering Task Force gives a working example of nested appeal among peers. Someone who disagrees with a working group's decision takes it first to the group's chairs, then to the responsible area director, then to the steering group and finally to the architecture board, whose decision is final (Bradner, 1996, §6.5.1), and every activity in the process is kept in a publicly accessible record (Bradner, 1996, §8). At the top of any such chain sits a body outside the collaboration, such as a professional council or a court. Searle's reply to Smith's cases of contested property, that problems of that kind are addressed by legal or political means (Smith and Searle, 2003), puts it there, and Ostrom's principle of outside recognition says why a chain of appeal needs to end in an institution that recognizes the group's own rules.

Who should sit on a panel is a question the evidence leaves open. In a survey experiment with Facebook users, Pan et al. (2022) found expert panels perceived as more legitimate than algorithms or juries of users, and found that agreeing with a decision mattered more to its perceived legitimacy than the process that produced it. A frame can choose either kind of panel, and it gains from making the choice in advance and on the record, before any particular outcome is at stake.

[16] Other designs choose a different frame principle in advance. A strong-removal rule invalidates every concurrent act of a removed or demoted manager and lets mutual removals both stand (p2panda contributors, nd), which settles the duel without an arbiter by removing both, and moves the risk of abuse to whoever can remove.

[17] `backdate_changes_outcome` and `epoch_fixes_order` in `proofs-v1.1.0`, on a small instance of the duel.

[18] In Hirschman's (1970) terms, refusing a party's records inside one's own fiber of trust is exit, and a dispute is voice. The design keeps exit open for everyone at no cost, and the rules of adjudication are what make voice worth using for those, such as patients and employees, who cannot easily leave.

Stake as a record

A familiar answer to abuse is to make office-holders stake something they can lose, money or reputation. A design of records can carry reputation without a new institution, since a person's signed history is already in the records: the decisions they sealed, the disputes decided against them, the suspensions they served. We keep that history as a record and leave it unscored. Each observer reads it inside its own fiber, as trust is read everywhere else in the design, and nobody publishes a number about a person. A published score would rank people for every observer at once, which would bring back the single authority the design keeps out, and would hand anyone set on abuse a single target to game. Money and licenses stay with the institutions that already hold them under law: a clinician's license with the council that grants it, a bond with a regulated custodian. The records give those institutions what they need in order to act, an attributable history of what the office-holder signed.

The imagined clinic

In the imagined clinic, a clinician's standing to sign prescriptions for the clinic rests on a grant from the clinic that expires and is renewed. The clinic's frame names who may grant and suspend it, for instance its medical director together with one other clinician, acting as one facade. A patient who believes a clinician has abused that standing can move at every tier. Inside her own fiber she can stop treating the clinician's new records as ones she acts on, which needs nobody's agreement, and she keeps her own records whatever happens, since they concern her alone. She can file a dispute, a signed record that opens the clinic's procedure. The clinic's panel can suspend the grant as a sanction, and the suspension reaches the clinic's devices within the window its frame states, under a witness's seal, so that no prescription signed afterwards can be backdated into the gap. If the clinic's own procedure fails her, her last appeal goes to the council that licensed the clinician, which holds the stake that matters most and can judge what the records cannot, namely why the clinician signed.

Against the central alternative

The comparison with a central platform turns on where the seals are and who can see them. A platform seals every fact, monotone or not, and its sealing leaves records that only the operator reads. Abuse within the operator's standing, or within the standing of the moderators it appoints, stays out of sight of those it affects unless the operator chooses to show it. A collaboration that keeps its secondary rules as records seals only where absence matters, every seal is a signed record naming its signers, and every office rests on a grant that expires. Abuse there becomes attributable and contestable. Accountability needs both, and it also needs a body that hears disputes, since attribution with nobody to hear the dispute leaves the injured party holding a well-documented grievance and nowhere to take it. A collaboration with records and no secondary rules can therefore end up worse than a platform, which at least has an operator to complain to. With its secondary rules written as records and anchored by those they bind, the collaboration offers what a platform withholds: seals in view, offices that lapse, and appeals that end in institutions outside it.

Collectives abuse standing too, and the layers and tiers are meant for them as much as for office-holders. A collective binds only the parties who signed; changing its frame needs every bound party's co-signature, with reasoned vetoes; its customizations add to the wider layers and take nothing from them except through the legal pathways; suspensions are quick and reversible while removals are slow; the body that suspends differs from the one that judges; what concerns one person alone lies beyond every quorum; and the chain of appeal ends

outside the collaboration. Abuse stays possible under these rules, and it moves slowly, in view, against people who keep a remedy. Who holds a seal remains a political question, and the sort shows only where that question has to be asked.

Objections and replies

Status functions need collective acceptance, and records do not supply it

The objection. Institutional facts exist only as long as they are recognized (Searle, 1995, 2010). A log that nobody accepts creates nothing, so grounding conditions on records leave out the one thing that makes a social fact social.

Reply. We do not claim that records replace acceptance. Acceptance attaches to the constitutive rule, such as the committee's rule that a record signed by three members counts as an endorsement. Given the rule, each new fact under it is fixed by the records, which is how Searle treats standing declarations that apply a rule to case after case (Searle, 2010), and how Ferraris (2013) treats documents that inscribe acts. The sort concerns the facts that a frame, once accepted, makes depend on records.

Grounding is confused with anchoring

The objection. Epstein (2015) separates what makes a social fact hold from what puts the frame in place. A sort of grounding conditions says nothing about the frame, and the frame is where the interesting questions of authority live.

Reply. The sort applies to grounding conditions under fixed frame principles, as *Social facts kept in records* states. It also has a corollary for anchoring. Changing a frame asks that no party still holds the old terms, which is an absence, so a change of frame needs coordination too. *Who may seal* develops what that requires.

A signature evidences a fact and does not make it

The objection. Smith presses the point that a record of something is not the thing: an IOU records a debt and is not itself the debt (Smith and Searle, 2003, p. 289). A signed record can show that a fact holds without being what makes it hold.

Reply. The thesis concerns constitutive records: documents that inscribe an act, in Ferraris's sense, and what Smith (2012) calls document acts. An endorsement, a co-signed seal and a prescription are acts performed by signing. Many records are evidential, such as the meter's glucose readings, and the thesis does not make them constitutive of the glucose level. Even an evidential record grounds institutional facts about itself, such as that this reading was entered by this meter, and grounds them monotonically.

A co-signature is not a joint commitment

The objection. Joint commitment, in Gilbert's sense, requires open expressions of readiness under common knowledge, and creates obligations directed to the other parties. A cryptographic co-signature may amount to two individual commitments, or to a conditional exchange of promises. Theorists of shared intention also deny that joint commitment is needed for joint action (Kopec and Miller, 2018).

Reply. A co-signed seal meets Gilbert's conditions in the respects that matter here. Each signature is an open expression of readiness. The record names every co-signer and is shared among them, which approximates common knowledge. The seal can be reopened only by a further record co-signed by the same parties, which matches Gilbert's condition that a joint commitment ends only by the parties together (Gilbert, 2013). We offer this as a sufficient reading of a co-signed seal as a joint act, and leave open whether every joint action requires one.

Absence facts reduce to positive facts with a timestamp

The objection. "No objection by the deadline" is a positive fact about what a log contains at a time, so absence facts need no special treatment.

Reply. Locally this is true, and it is exactly the CALM theorem's point. The fact that a party has seen no objection by a time is monotone and safe to state.[19] The institutional fact that no objection exists is not, because a late or partitioned record can falsify it, and the only way to know one has heard from everyone is to coordinate (Hellerstein and Alvaro, 2020). A deadline settles the institutional fact only if the parties have jointly committed to the deadline as the closing rule, so the timestamp presupposes the coordination it was meant to remove. Armstrong's totality facts give the metaphysical parallel: that these are all the facts of a kind is a further fact (Armstrong, 1997, ch. 13).

The CALM theorem does not transfer

The objection. The theorem concerns monotone queries over networks of relational transducers (Ameloot et al., 2013). Applying it to social facts is an analogy.

Reply. The result this paper relies on is proved for its own model, machines over signed records, and checked in Lean 4 (Karna, 2026a,c). The theorem has also been generalized beyond relational transducers, to weaker forms of monotonicity (Ameloot et al., 2015) and to a semantic criterion over specifications (Hellerstein, 2026), and its monotonicity criterion has been applied to organizational tasks (Ju, 2026). The claim is stated conditionally throughout: insofar as an institution's facts are functions of records, the sort applies to them.[20]

This is the social ontology of blockchains again

The objection. The social ontology of blockchains already studies how institutional facts can rest on shared records (Reijers and Coeckelbergh, 2018; Davidson et al., 2018; Suzuki, 2026).

Reply. A blockchain imposes global consensus on every fact. The sort shows that this is unnecessary for monotone facts, which are most of them. Global consensus is one costly way of coordinating for absence facts, and a co-signature among the parties a question names is another, spent only where an absence matters.

[19] In `proofs-v1.1.0` a checkpoint that the party signs alone settles what it saw (`checkpoint_positive`), and no set of records that party alone signed holds a seal of a frame whose closing rule names another party (`checkpoint_not_institutional`).

[20] The theorem, `calm_social` in `proofs-v1.1.0`, carries two conditions. The possible records form a countable set, as records written as finite strings do. Wherever a fact asks for an absence, the absence shows between two sets of records that differ by finitely many.

Institutions are defeasible, and revocation breaks monotonicity

The objection. Legal and institutional statuses are defeasible (Hart, 1949): a license can be revoked and a decision appealed (Prakken and Sartor, 2004). A theory built on monotone records cannot represent them.

Reply. The log stays monotone, and derived statuses such as a valid license or a current dose may not be. Revocation is precisely an absence-dependent status, since a license is valid only if no revocation of it exists. Defeasibility therefore confirms the sort, and a revocation list that is published, signed and dated is the seal that lets a verifier say valid as of that list.[21]

Seals relocate authority without constraining it

The objection. A signature shows who issued a record, and a validator shows that the record met the rules of its kind. Neither detects a decision made in bad faith by someone acting within valid standing. Trust in this design is indexed by its observer, and nothing enforces a verdict on everyone, so the sort moves authority to whoever holds a seal and leaves it unchecked there. A design that spreads records across many hands without governance, dispute resolution or consequences for abuse could then turn out worse than the central systems it means to replace.

Reply. We accept the premise. The thesis concerns the necessity of authority, fact by fact, and leaves open which authority is legitimate. Reijers et al. (2016) put the second question to blockchain governance; this paper puts the first, and a seal does nothing on its own to make its holder just.

The conclusion goes further than the premise allows, for reasons *Who may seal* develops. A charge of abuse comes apart along the lines of the sort: its procedural parts are monotone and anyone holding the records can check them, its parts that ask for an absence need a seal, and its parts about intent need judgment, which the sort locates without performing (*What a charge of abuse asks for*). The objection has the shape of Hart's case against a regime of primary rules alone, and the remedy takes the shape of his: rules of recognition, change and adjudication, written as records and co-signed by the parties they bind (*Secondary rules as anchoring*). Those rules are built by the people they bind, in layers, and the groups that customize them do so by adding; a change that would take something away from a wider layer goes through the legal pathways for adjusting regulation (*Frames in layers*). With such rules in place, the comparison with a central system favors the design of records, since a platform seals in private while every seal here is a signed record that names its signers (*Against the central alternative*).

The concern also has independent support from engineering. Builders of local-first group management met the same problem as duelling administrators who revoke each other concurrently, and concluded that an arbiter outside the merge has to order concurrent revocations, because a Byzantine administrator can otherwise exploit the concurrency (Dougal, 2026). The sort predicts this: revocation asks for an absence, so it needs a sealed order (*What a suspension costs*). An arbiter held by one party would reintroduce the elevated member the objection fears, and an arbiter built as a facade over a quorum of members, decentralized inside and acting through one signature outside, orders the revocations with no member holding that power alone (*Who seals for the sealers*).

What the sort cannot supply is the content of the secondary rules: who sits on a panel, which quorum may suspend an office, how long a suspension takes to reach every reader.

[21] `valid_asks_absence` and `valid_asOf_positive` in `proofs-v1.1.0`, and for a rule kept as records that a later record can repeal, `inForce_asks_absence`.

Those are choices a group makes when it anchors its frame. The paper claims to show where such choices have to be made, and that a design of records can make them in view of everyone they bind.

Conclusion

Social facts kept in records split along the line the CALM theorem draws through programs. Facts whose grounding conditions ask only that records exist can be settled by anyone who holds the records, in any order, and need no authority. Facts that ask for an absence need a seal, a declaration that a set of records counts as complete, and the seal can be made by the parties the question concerns as a joint commitment. Coordination is spent once, at the seal, and the fact then travels as freely as any other.

A seal can be abused like any other power, so the rules that say who may seal have to be records as well: secondary rules co-signed by the people they bind, frames built in layers by consensus and customized by groups through additions that stay monotone, changes of any other kind taken through the legal pathways for adjusting regulation, governing bodies that act through one facade over a quorum, and appeals that end in institutions outside the collaboration. What remains open is the content of those rules: who sits on a panel, what quorum may suspend an office, how long a suspension may take to reach its readers. Those are political choices. The sort shows where they have to be made, and that a design of records can make them in view of everyone they bind.

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