# INSTITUTIONAL GRAMMAR 2.0 QUICK REFERENCE

This quick reference provides an overview of key features of IG 2.0 as detailed in the IG 2.0 Codebook.

## Institutional Grammar 2.0

The Institutional Grammar 2.0 (IG 2.0) specifies an integrated syntax for capturing information represented in regulative and constitutive institutional statements. The IG 2.0 allows for the operationalization of the syntax at three levels of expressiveness. It is specifically motivated by the three overarching objectives:

- presents an ontologically consistent syntax that is tailored to capturing institutional information relating to regulation of behavior and parameterization of systems
- fostering comprehensive and reliable structural and semantic representation of institutional statements
- enhancing versatility of the IG across disciplines, methods, and techniques.

## Institutional Statement

In the Institutional Grammar, the focal unit of analysis is an institutional statement. An institutional statement describes expected actions for actors within the presence or absence of particular constraints, or parameterizes features of an institutional system. An institutional statement takes one of two general functional forms: regulative and constitutive.

### Regulative Statements

Describe actions linked to specific actors within certain contextual parameters. Composed of some/all of the following components with the corresponding syntactic labels:

| | |
|---|---|
| **Attributes** | Actor that carries out or is expected to carry out the action of the statement |
| **Aim** | Action associated with actor |
| **Context** | Statement context capturing conditions for instantiation and qualification of statement execution |
| **Object** | Receiver of action, or affected by action |
| **Deontic** | Prescriptive operator that describes how strongly an action is compelled or restrained |
| **Or else** | Consequence of violating action specified in the aim |

Organic farmers must comply with organic farming regulations immediately following certification or else face revocation of organic certification.

### Constitutive Statements

Constitute or otherwise parameterize features of a system. Composed of some or all of the following components with the corresponding syntactic labels:

| | |
|---|---|
| **Constituted Entity** | Entity defined, modified or otherwise characterized in the institutional statement |
| **Constitutive Function** | Expression that functionally characterizes constituted entity (with or without reference to properties) |
| **Context** | Statement context capturing conditions for applicability and qualification of function |
| **Constituting Properties** | Properties linked to entity as mediated by the constitutive function |
| **Modal** | Operator signaling necessity or (im-)possibility of the systemic parameterization specified in the constitutive function |
| **Or else** | Consequence of violating constitutive function |

Starting January 1, the Department of Agriculture is the certifying authority or else the organic program cannot be administered.

# Syntactic Components

Listed here are syntactic components of regulative and constitutive statements. Some of these are necessary and some are sufficient, and all components may be explicitly or implicitly represented in institutional design.

## Regulative Statements

### Attributes

An actor (individual or corporate) that carries out, or is expected to/to not carry out, the action (i.e., Aim) of the statement. The Attribute may also contain descriptors of the actor.

### Aim

The goal or action of the statement assigned to the statement Attribute.

### Context

The context instantiates settings in which the focal action of a statement applies, or qualifies the action indicated in an institutional statement. The former type of Context is referred to as an "Activation Condition." The latter type of Context is referred to as an "Execution Constraint." Both can occur in a given institutional statement, including multiples of either type. Where no explicit Activation Condition is specified, the context clause is by default "under all conditions". Where no explicit Execution Constraints are specified, the context clause is by default "no constraints".

### Object

The inanimate or animate part of an institutional statement that is the receiver of the action captured in the Aim. Objects can be of direct or indirect nature. Indirect objects are objects that are affected or targeted by the application of the Aim to direct objects. Objects can both be real-world entities, or abstract ones (e.g., beliefs, concepts).

### Deontic

A prescriptive operator that defines to what extent the action of an institutional statement is compelled, restrained, or discretionary.

### Or else

An incentivizing provision associated with the action indicated in a particular institutional statement that is represented in a nested institutional statement.

## Constitutive Statements

### Constituted Entity

The entity being constituted, reconstituted, modified or otherwise directly affected within an institutional statement.

### Constitutive Function

An action that constitutes a Constituted Entity, or reflects the functional relationship between Constituted Entity and Constituting Properties.

### Context

The context instantiates settings in which the statement applies, or qualifies the function indicated in an institutional statement. The former type of Context is referred to as an "Activation Condition." The latter type of Context is referred to as an "Execution Constraint." Both can occur in a given institutional statement, including multiples of either type. Where no explicit Activation Condition is specified, the context clause is by default "under all conditions". Where no explicit Execution Constraints are specified, the context clause is by default "no constraints".

### Constituting Properties

Constituting properties specify properties linked to entity as mediated by the constitutive function.

### Modal

Operator signaling necessity or (im-)possibility of the systemic parameterization specified in the constitutive function

### Or else

A consequential provision associated with the non-fulfilment of the constitutive function of a particular institutional statement that is represented in a nested institutional statement. Consequences can be existential in kind (e.g., not bringing about a constituted entity).

Necessary Components

Sufficient Components

# Nesting Principles

The IG 2.0 accommodates two types of nesting of institutional statements to characterize logical relations between two or more institutional statements.

### Horizontal Nesting

Describes a logical combination of two or more statements to capture institutional content comprehensively.

Allows for the representation of multiple institutional statements that convey co-occurring or alternative actions.

Combinations are captured with logical operators signaling co-occurrence (AND), inclusive disjunction (AND/OR) or exclusive disjunction (XOR).

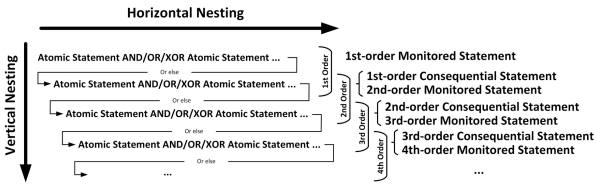
Utilizes parentheses to signal precedence of respective statement combinations.

### Vertical Nesting

Describes a relationship of two or more statements, in which the leading statement (monitored statement) describes an action that is regulated by a second statement nested in the Or else component (consequential statement).

Allows for the representation of multiple institutional statements that convey coupled actions that follow from one another in the form of a consequential relationship.

Utilizes parentheses to signal precedence of the respective statements.




The combination of both nesting approaches affords the representation of complex institutional arrangements, both in terms of institutional content (horizontal nesting) and enforcement characterization (vertical nesting).

### Horizontal Nesting Example

Organic farmers must either comply with organic farming standards and accommodate regular reviews of their practices, or organic farmers must seek special permission from inspector for alternative compliance assessment mechanisms.

*("Organic farmers must comply with organic farming standards" AND "Organic farmers must accommodate regular reviews of their practices") XOR ("Organic farmers must seek special permission from inspector for alternative compliance assessment mechanisms").*

Organic farmers must annually acknowledge and comply with organic farming standards.

*"Organic farmers must acknowledge and (AND) comply with organic farming standards"*

### Vertical Nesting Example

Organic farmers must comply with organic farming regulations, or else certifiers must revoke the organic farming certification.

*("Organic farmers must comply with organic farming regulations", OR ELSE "Certifiers must revoke the organic farming certification."*

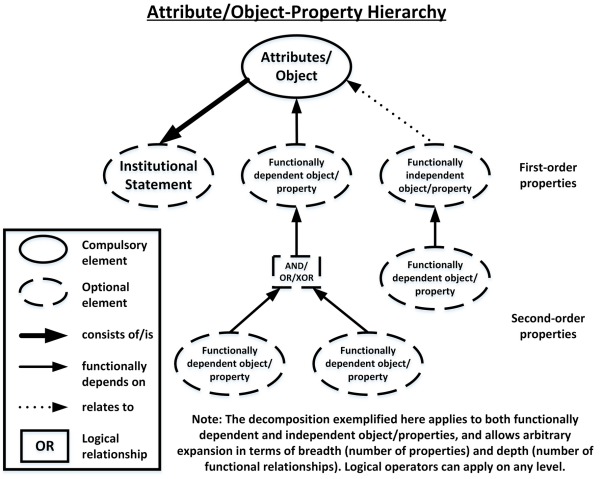
### Multi-level Nesting Example

Organic farmers must comply with organic farming regulations and accommodate regular review of their practices, or else certifiers must suspend or revoke the organic farming certification, or else the USDA may revoke certifier's accreditation.

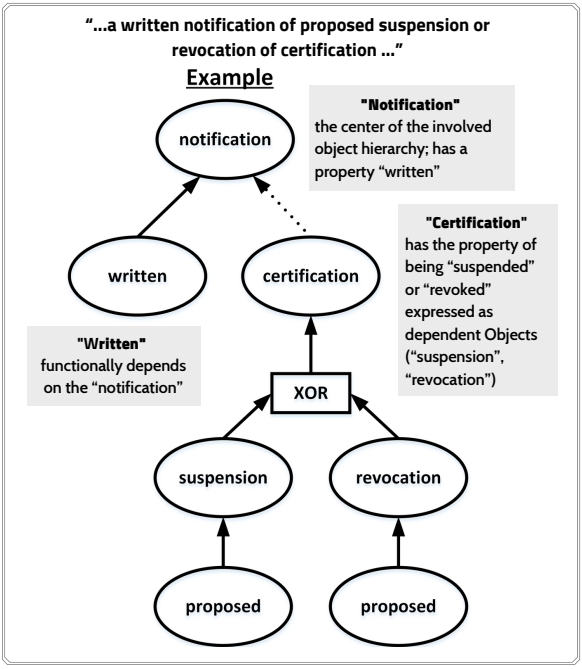
*("Organic farmers must comply with organic farming regulations" AND "Organic farmers must accommodate regular review of their practices"), OR ELSE ("Certifiers must suspend or revoke (XOR) the organic farming certification"), OR ELSE "USDA may revoke certifier's accreditation".*

# Object-Property Hierarchy

IG 2.0 relies on the conceptual representation of the Object-Property Hierarchy. As shown in the figure, statements can reflect a hierarchy of objects and properties of objects centered around a focal component reflecting objects or other kinds of entities that essentially captures component dependencies of different kinds, specifically functional or non-functional dependencies.




Logical operators signal the relationship amongst different objects and/or properties, as shown in the following example.




Interpretational note: "Writtenness" alone does not make sense with an object it refers to, the existence of a certification does not rely on the notification (i.e., it is functionally independent), and has a self-contained property hierarchy (suspended, revoked, proposed). Certification shares the property of being "proposed" in the first place.

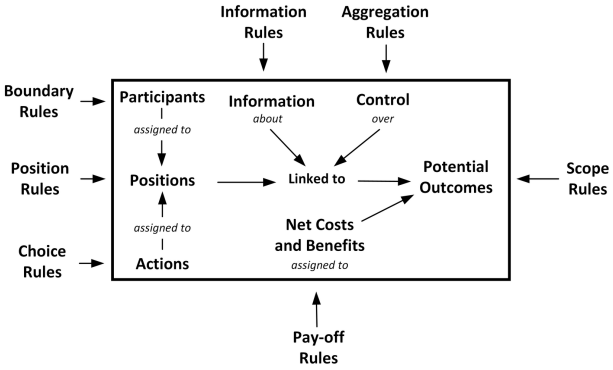
## The Action Situation

Defined as an institutionally governed setting in which two or more actors interact, in relation to which specific outcomes emerge.

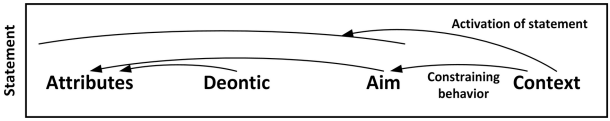
The action situation describes the setting in which institutional statements operate, and in the case of regulative statements, specifically the mapping between actors, actions, outcomes and the associated payoffs.

Action situations are governed by a configuration of seven types of rules that can correspond to institutional statements, and be regulative or constitutive in kind.

| | Rules specify ... |
|---|---|
| **Position Rules** | positions that actors can occupy within an action situation |
| **Boundary Rules** | eligibility criteria for occupying those positions |
| **Choice Rules** | operational actions linked to actors occupying certain positions |
| **Scope Rules** | intended goals or situational outcomes |
| **Information Rules** | channels of information flow |
| **Aggregation Rules** | guidance on collective decision making |
| **Pay-off Rules** | incentives tied to particular actions |




Some statements contain clauses that reflect the conditions for the instantiation of the particular statements, typically as actions within an existing action situation (activation conditions). Alternatively, statements contain context clauses that simply qualify action execution within an existing action situation by specifying corresponding constraints (execution constraints).



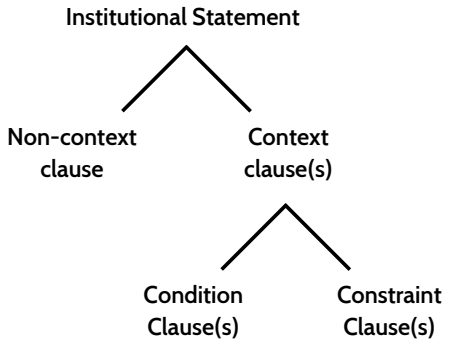
# Activation Condition & Execution Constraint Principles

**Activation Condition**

Context clauses which signal the instantiation of the statement in its entirety

**Execution Constraint**

Context clauses which qualify the action or function




**Activation Condition Example**

Institutional Statement

At 8am, farmers may begin selling their goods in the farmer's market

Non-context clause: farmers may begin selling their goods

Context clause(s): At 8am, in the farmer's market

Condition Clause(s): At 8am

Constraint Clause(s): in the farmer's market

**Execution Constraint Example**

Institutional Statement

At 8am, farmers may begin selling their goods in the farmer's market

Non-context clause: farmers may begin selling their goods

Context clause(s): At 8am, in the farmer's market

Condition Clause(s): At 8am

Constraint Clause(s): in the farmer's market

# Decision Heuristics

Decision heuristics can be employed to aid in the identification of activation conditions and execution constraints. These heuristics are designed to help the analyst determine if a context clause in question is an activation condition or an execution constraint.

### Identifying Activation Conditions

☐ The clause instantiates a discrete setting (constrained temporally, spatially, or otherwise) and/or event that activates the non-condition clauses of the institutional statement (i.e., noncontext clauses along with potential constraint clauses) as a whole.

> ***Upon receiving final notice of non-compliance**, farmers shall cease sale of any product bearing the USDA organic farming label.*
>
> ***Starting January 1**, the Department of Agriculture is the certifying authority.*
>
> ***Upon entry into the house**, visitors must remove shoes.*

### Identifying Activation Conditions in Regulative Statements

☐ The clause instantiates a) a change in attributes linked to a statement's activity or b) a change in attribute role.

> *Between the hours of 6pm and 6am on Mondays, members of neighborhood watch residing in blocks 7-10 will assume night patrol activities.*

☐ The clause instantiates a change of the object(s) linked to the statement's activity.

> *Starting Dec. 15th, inspectors must exclusively use the revised inspection form.*

### Identifying Activation Conditions in Constitutive Statements

☐ The clause instantiates a change in the Entity that is being constituted.

> *In the event that the Board Chair position becomes vacant, the Vice-Chair is the chief executive of the Council.*

☐ The clause instantiates a change in the constituting properties of the entity that is constituted, reconstituted or otherwise affected in the institutional statement.

> *Starting Dec. 15th, organic farming is agricultural production that does not involve the use of synthetic chemicals or genetically modified organisms.*

# Institutional Grammar 2.0 Coding Levels

The IG 2.0 identifies three levels of encoding to provide flexible accommodation of coding necessities based on the complexity of encoded data, as well as the analytical objectives of the coder: IG Core, IG Extended, and IG Logico.

**IG Core**

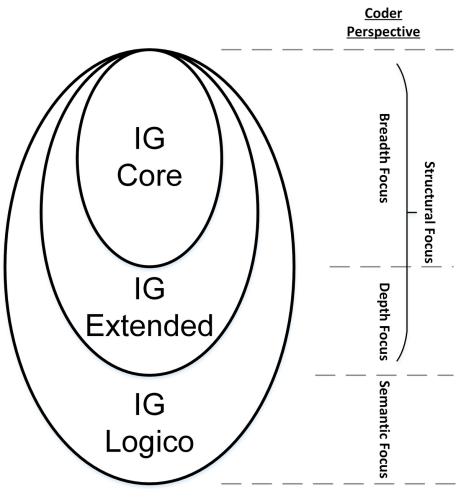
Enables basic structural analysis of institutional statements. Encoding at this level is designed to be human readable and moderately comprehensive in the detail with which syntactic properties of institutional statements are captured.

**IG Extended**

Enables fine-grained structural analysis of institutional data, accommodating computational application to aid in institutional coding and analysis. Encoding at this level is designed to be human readable, moderately computationally tractable, and moderately comprehensive in the detail with which syntactic properties of institutional statements are captured.

**IG Logico**

Designed to support semantic analysis of institutional statements drawing epistemological linkages and focusing computational interpretation of institutional information. Encoding at this level is designed to be moderately human readable, computationally tractable and comprehensive in the detail with which syntactic properties of institutional statements are captured.



# Symbol Reference for IG Coding Examples

| | Component |
|---|---|
| **A** | *A(Certifier)* |
| **I** | *A(Certifier) I(monitors) Bdir(farmers).* |
| **Bdir** | *A(Certifier) I(administers) Bdir(certifications).* |
| **Bind** | *A(Certifier) I(registers) Bdir(certification) Bind(for organic farmer).* |
| **D** | *A(Certifier) D(must) I(monitor) Bdir(farmers).* |
| **Cac** | Regulative: *Cac(Upon accreditation) A(certifier) D(must) I(monitor) Bdir(farmers).*<br>Constitutive: *Cac(From 1st January onwards), E(Council) M(shall) F(include) P(organic farming representatives) Cex(to review chemical allowances within organic food production standards).* |
| **Cex** | Regulative: *A(Certifier) D(must) I(monitor) Bdir(farmers) Cac(at any time).*<br>Constitutive: *Cac(From 1st January onwards), E(Council) M(shall) F(include) P(organic farming representatives) Cex(to review chemical allowances within organic food production standards).* |
| **E** | *Cac(From 1st January onwards), E(Council) M(shall) F(include) P(organic farming representatives) Cex(to review chemical allowances within organic food production standards).* |
| **M** | *Cac(From 1st January onwards), E(Council) M(shall) F(be responsible) P(for adherence with food production standards).*<br>Alternative example: *Cac(From January 1st onward), there M(shall) F(be) E,p(a) E(National Organic Standards Advisory Council) Cex(within the Department of Agriculture).* |
| **P** | *Cac(From 1st January onwards), E(Council) M(shall) F(include) P(organic farming representatives) Cex(to review chemical allowances within organic food production standards).* |
| **F** | *Cac(From 1st January onwards), E(Council) M(shall) F(include) P(organic farming representatives) Cex(to review chemical allowances within organic food production standards).* |
| | **Attributes, Object, Entity and Property Components** |
| **,P** | *A,p(Certified) A,p(organic) A(farmers) D(must) I(respond) to Bdir,p(authorized) Bdir1(requests) and Bdir2,p(formal) Bdir2(certification requirements).*<br>In this example, *,p* indicates the property relationship with a first-order component (e.g., *A,p()* with *A()*). Where multiple first-order components of the same time exist and properties only relate to specific components, indices are used to signal the corresponding linkage (e.g., *Bdir2,p()* relates to *Bdir2()* only, whereas *Bdir,p()* applies to both *Bdir1()* and *Bdir2()*). |
| | **Logical Operators** |
| **AND, OR, XOR, NOT** | *Certifiers must review applications and [AND] must not [NOT] approve applications by offenders.* |

| | Component | Statement |
|---|---|---|
| **( )** | *Certifier (A) ...*<br>where *A* identifies the certifier as an attribute in a given institutional statement. | *(stmt [AND] stmt); (stmt [AND] (stmt [OR] stmt))*,<br>where stmt represents an institutional statement combined with other institutional statements using logical operators (*AND*, *OR*, *XOR*, and potentially *NOT*). Where individual components are combined, the same applies. |
| **[ ]** | *A[type=animate](Certifier) ...*<br>where *A* identifies the certifier as an attribute in a given institutional statement, and animate is an additional annotation.<br>*They A([farmers]) must comply with the certification regulation ...,*<br>where *A([farmers])* characterizes the inferred actor as component content. | |
| **{ }** | *A(Certifier) I(believes) Bdir{A(farmer) I(violates) Bdir(code of conduct)}*<br>In this example, the Direct Object (*Bdir*) of a given institutional statement is substituted with another institutional state reflecting the state of affairs subject to the belief. Nested expressions can be institutional states and statements. | *stmt1 O{stmt2}*,<br>where *stmt1* represents a monitored statement, and *stmt2* the corresponding consequential statement (linked via the Or else) |

# Coding Regulative Statements - Examples

| IG Core | IG Extended | IG Logico |
|---|---|---|
| **Attributes** | **Attributes** | **Relation-centric Semantic Annotations** |
| *A,p(Certified) A(farmer) D(must) I(submit) Bdir(an organic systems plan) Cex(annually).* | *A A1,p(certified) A1(farmer) A1,p(Bdir(whose certification) I(is suspended) A(by the Secretary) Cex(under this section)} D(may) Cac(at any time) I(submit) Bdir,p(a recertification request).* | *Cac[When A(Program Manager) I(reveals) Bdir2,p(any) Bdir(noncompliance) (Bdir,p2[ref="policy"](with the Act) [OR] Bdir,p2[ref="section"](regulations in this part)) Cac[ctx=proc]{When [A(program manager) I(performs)] an Bdir(inspection) of an Bind,p1(accredited) Bind(certifying agent)}}, A([Program Manager]) D(shall) I(send) a Bdir,p1(written) Bdir(notification) Bdir,p2(of noncompliance) Bind(to the certifying agent).* |
| **Object** | **Object** | **Cross-component Semantic Annotations** |
| *A,p(Organic) A(certifier) D(must) I(send) Bind(farmer) Bdir(notification of compliance) Cex(within thirty days of inspection).* | *The A(Program Manager) D(shall) I(send) a Bdir,p(written) Bdir(notification) of B1,1,p;B1,2,p(proposed) B1,1(suspension) or B1,2(revocation) of B1(certification) to Bind,p1(certified) Bind,p2(organic) Bind(farmer).* | *Cac[ctx=event]{When A[type=animate;role=experiencer](Program Manager) I(reveals) Bdir,p2(any) Bdir[type=inanimate](noncompliance) (Bdir,p2[ref="policy"](with the Act) [OR] Bdir,p2[ref="section"](regulations in this part)) Cac[ctx=proc]{When [A[type=animate;role=originator](program manager) I(performs)] an Bdir[type=inanimate](inspection) of an Bind,p1(accredited) Bind[type=animate;role=experiencer] (certifying agent)}}, A[type=animate;role=originator]([Program Manager]) D(shall) I(send) a Bdir,p1(written) Bdir[type=inanimate](notification) Bdir,p2(of noncompliance) Bind[type=animate;role=experiencer](to the certifying agent).* |
| **Aim** | **Aim** | **Institutional Function Annotations** |
| *A,p(Organic) A(certifier) D(must) I(send) Bind(farmer) Bdir(notification of compliance).* | See IG Core for example. | *Cac[ctx=event]{When A[type=animate;role=experiencer] (Program Manager) I[func=detect] (reveals) Bdir,p(any) Bdir[type=inanimate](noncompliance) (Bdir,p[ref="policy"](with the Act) [OR] Bdir,p[ref="section"](regulations in this part)) Cac[ctx=proc]{When [A[type=animate;role=originator] (program manager) I[func=monitor] (performs)] an Bdir[type=inanimate] (inspection) of an Bind,p(accredited) Bind[type=animate;role=experiencer] (certifying agent)}}, A[type=animate;role=originator] ([Program Manager]) D(shall) I[func=sanction](send) a Bdir,p(written) Bdir[type=inanimate](notification) Bdir,p(of noncompliance) Bind[type=animate;role=experiencer](to the certifying agent).* |
| **Deontic** | **Deontic** | |
| *A,p(Organic) A(certifier) D(must) I(send) Bind(farmer) Bdir(notification of compliance).* | See IG Core for example | |
| **Context** | **Context** | |
| *Cac(Upon entrance into agreement with organic farmer to serve as his/her certifying agent), A(organic certifier) D(must) I(inspect) Bdir(farmer's operation) Cex(within 60 days).* | *Cac[ctx=proc]{Upon I(entrance) Bdir(into agreement) with A(organic farmer) Cex(to serve as his/her certifying agent)}, A(organic certifier) D(must) I(inspect) Bdir(farmer's operation) Cex[ctx=time](within 60 days).* | |

| IG Core | IG Extended | IG Logico |
| --- | --- | --- |
| **Or else** | **Or else** | |
| Vertical nesting:<br>*A,p(Certified) A,p(organic) A(farmers) D(must not) I(apply) Bdir(synthetic chemicals) Bind(to crops) Cex(at any time) Cac(once organic certification is conferred), or else O{A(certifier) D(will) I(revoke) Bdir(certification) Bind(from farmer)}.*<br><br>Horizontal nesting within vertically-nested statement:<br>*A,p(Certified) A,p(organic) A(farmers) D(must not) I(apply) Bdir(synthetic chemicals) Bind(to crops) Cex(at any time) Cac(once organic certification is conferred), or else (O{A(certifier) D(will) I(revoke) Bdir(certification) Bind(from farmer)} [XOR] O{A(certifier) D(will) I(fine) Bdir(farmer)}).* | See IG Core for example. | |

# Coding Constitutive Statements - Examples

| IG Core | IG Extended | IG Logico |
| --- | --- | --- |
| **Constituted Entity**<br><br>*There is Cex(hereby) F(established) a E,p(public) E(Food Security Advisory Board).* | **Constituted Entity**<br><br>*There is Cex(hereby) F(established) a E,p(standing), E,p(public) E(Food Security Advisory Board).* | **Constitutive Function Annotations**<br><br>*Cac(Starting January 1st), the E(Connecticut Food Policy Council) M(shall) F[confunc=organization](be within) P(the Department of Agriculture).* |
| **Constitutive Function**<br><br>*There is Cex(hereby) F(established) a E,p(public) E(Food Security Advisory Board).* | | |
| **Constituting Properties**<br><br>*The E(Committee) M(shall) F(consist of) a P(President, Secretary, and Treasurer).* | **Constituting Properties**<br><br>*The E(Council) F(consists of) P,p(elected) P(officials) P,p(resident in the electorate).* | |
| **Modal**<br><br>*P(A majority of the members of the Council) M(shall) F(constitute) a E(quorum).* | | |
| **Context**<br><br>*Cac(From 1st of January onward), E(Food Policy Council reporting requirements) F(apply) P,p(for any) P(communication) P,p(between the Council and Regional Council) Cex(in addition to communal provisions).* | **Context**<br><br>*Cac[ctx=prc](Upon the declaration of the Secretary) Cac[ctx=tim](from the 1st of January onward), E(Food Policy Council reporting requirements) F(apply) P,p(for any) P(communication) P,p(between the Council and Regional Council) Cex[ctx=met](in addition to communal provisions).* | |
| **Or else**<br><br>*Cac(In student recruitment plans), E(diversity) M(must) F(mean) P(diversity in race, religion, sexual orientation and gender), or else O{E(plan) F(is) P(void)}* | | |

# Context Taxonomy

The Context Taxonomy captures contextual characterizations with respect to temporal, spatial and various other descriptors that capture institutional context more accurately. More detailed characterizations can be found in the IG 2.0 Codebook.

| | Subtypes | Examples |
|---|---|---|
| **Temporal (tmp):** Conditions/Constraints associated with time - the when | Point in time (tim): References to specific points in time | *"Starting at 10am ..."* |
| | Time frame (tfr): References to time frames | *"between 10am and 5pm"* |
| | Frequency (frq) | *"annually"* |
| **Spatial (spt):** Conditions/Constraints associated with spatial representations - the where | Location (loc): References to specific locations | *"At main street corner ..."* |
| | Direction (dir): References to directions, inclusion of intermediary locations | *"Toward the airport ..."* |
| | Path (pth): References to pathways | *"over the hill"* |
| **Domain (dom):** Conditions/Constraints associated with a specified actvitiy or topical realm | Domain (dom) - References to a specifed topical or activity realm | *"For drinking water, ..."* *"During decision-making, ..."* |
| **State (ste):** Conditions/Constraints associated with state and state modification - the what; potentially external to action situation | State (ste) - References to a specific state | *"when traffic light is red ..."* |
| | State transition (tra) - References to a change in state | *"when traffic light switches from red to green ..."* |
| **Procedural order (prc):** Conditions/Constraints associated with explicit or implied execution order. Operationally, this can include expressions of input into the activity identified in the institutional statement | | *"Following a departmental review, ..."* *"Upon completion of the training ..."* |
| **Method (met):** Conditions/Constraints associated with manners or means by which an action is performed | Manner - Action as method | *"by handshake"* |
| | Instrument - Artefact as method | *"by car"* |
| **Purpose/Function (pur):** Conditions/Constraints describing the purpose or intent of an aim; generally output of action | | *"... for the purpose of maintaining compliance"* |
| **Observed state/event (ste, evt):** Conditions/Constraints describing a change in the environment emanating from the observed actor(s) or environmental effects, including the observation of compliance/non-compliance. | | *"When pollution is detected ..."* *"If individuals' commitment to sustainability is reduced ..."* |

# Constitutive Functions Taxonomy

Constituted entities can be represented in institutional statements in their actual form, or be the institution (e.g., policy) itself. Constitutive function annotations emphasize the specific role a constitutive function entertains with respect to the constituted entity and/or the linkage of constituted entity and constituting properties. The constitutive functions taxonomy provides categories and illustrative examples of terms reflecting functional linkages observed for different constituted entity types.