# **A Semantic Web Ontology for the Digital Moai: Modeling Social-Financial Support Networks**

## **Introduction**

### **Purpose and Motivation**

This report details the design of a formal, extensible ontology for the "Digital Moai," a modern, digitally-enabled representation of the traditional Okinawan social support network. The Okinawan Moai, a small, tight-knit group of friends committed to supporting one another for life, is a significant cultural institution recognized as a key factor in the remarkable longevity and well-being of the Okinawan people.1 These groups serve as a powerful model for fostering deep community, reducing the physiological and psychological burdens of stress, and providing holistic, multi-faceted support across social, emotional, and financial domains.4

A primary motivation for this work is to apply this powerful social model to a particularly vulnerable population: young adults who are "aging out" of foster care or orphanages. Each year, thousands of young people transition to independence without the consistent support of a family, facing overwhelming challenges that put them at high risk for homelessness, unemployment, mental health issues, and profound loneliness.6 This sudden and unsupported transition can lead to social withdrawal, a condition known in Japan as

*hikikomori*, where individuals become recluses.9 The Digital Moai is envisioned as a direct intervention to combat this isolation by creating intentional, supportive "chosen families" for these young adults.6

The resulting ontology aims to provide the semantic backbone for a new generation of applications in digital health, financial technology (fintech), and community-building platforms. By translating the rich, nuanced socio-cultural construct of the Moai into a formal, machine-readable format, these applications can digitally foster the same sense of security, belonging, and mutual obligation that has benefited Okinawans for centuries, specifically tailored to the needs of care-experienced youth.6

### **Methodology**

The approach undertaken to develop the Digital Moai ontology is a multi-stage, systematic process grounded in both socio-cultural research and established principles of ontology engineering. The methodology comprises four distinct phases:

1. A deep socio-cultural analysis of the traditional Okinawan Moai, deconstructing its core principles, social structures, and relational dynamics to establish the real-world phenomena the ontology must accurately represent. This analysis is augmented by research into the specific challenges faced by youth aging out of the care system.
2. A critical survey of existing, relevant Semantic Web ontologies and W3C standards, evaluating their capacity to model the identified phenomena. This includes vocabularies for people and groups, commercial and professional services, and financial and legal entities.
3. The synthesis of these findings into a modular, extensible ontology design. This involves a strategy of reusing and extending established vocabularies where appropriate and defining new classes and properties only where necessary to capture the unique essence of the Moai and its supportive functions.
4. A practical demonstration of the proposed model through a detailed case study, illustrating its application in a real-world scenario using the Resource Description Framework (RDF) in Turtle syntax.

### **Structure of the Report**

This report is structured to logically guide the reader from the conceptual foundations of the Moai to the technical specification of its digital counterpart. Section 1 provides a comprehensive analysis of the traditional Moai and the specific challenges of its target user group. Section 2 surveys the landscape of existing semantic vocabularies relevant to this task. Section 3 details the proposed model for the Moai as a group entity, including its capacity to consume external services and achieve legal personhood. Section 4 addresses the complex challenge of representing the unique interpersonal dynamics within a Moai. Section 5 introduces new ontological components for modeling supportive activities and life challenges. Section 6 provides the formal specification of the new core ontology. Section 7 provides a practical implementation example. Finally, the report concludes with a summary of contributions and directions for future work.

## **Section 1: The Ontological Foundations of the Moai: A Socio-Cultural Analysis**

To create a meaningful and accurate ontology, it is imperative to first develop a deep understanding of the real-world entity being modeled. This section deconstructs the traditional Okinawan Moai into its fundamental components, moving beyond surface-level descriptions to identify the core principles, structures, and functions that define it. These elements, combined with an analysis of the specific needs of its intended users, form the requirements that the Digital Moai ontology must satisfy.

### **1.1 The Core Principles: A Web of Interlocking Values**

The Moai is not merely a social club; it is a profound social institution built upon a set of deeply ingrained values that shape the interactions and expectations of its members.

#### **Lifelong Commitment**

A defining characteristic of the Moai is the profound, long-term commitment its members make to one another. Traditionally, these groups were formed among young children who made a "commitment to each other for life".3 This creates a "lifelong circle of friends" that functions as a second family, providing support well into old age, with some Moai lasting over 90 years.1 This enduring bond distinguishes the Moai relationship from casual friendships and necessitates an ontological model capable of representing a durable, long-term commitment that is far more significant than the simple, often transient,

foaf:knows relationship.13 The relationship is characterized by a "deeper level of commitment and mutual obligation than typical friendships".14

#### **Mutual Support (Yuimaru)**

The primary function of a Moai is to provide comprehensive, mutual support. This support is intentionally multi-faceted, encompassing social, emotional, financial, health, and spiritual interests.2 The Moai acts as a crucial "safety net" for its members, providing a buffer against life's inevitable challenges.1 Members know that if they fall ill, lose a spouse, or face financial hardship, "someone will step in and help".3 This powerful sense of security is underpinned by the Okinawan cultural concept of

*yuimaru*, which signifies a spirit of mutual social obligation and cooperation.3 The support is not a one-way street; each member understands that "her friends count on her as much as she counts on her friends".3

#### **Trust and Reciprocity**

Implicit trust is the bedrock of the Moai relationship. It is described as arguably the "most critical component".14 This trust allows members to be vulnerable, to share personal struggles with work or relationships, and to seek advice without fear of judgment.14 This deep trust is built upon a foundational principle of reciprocity. The relationship is not a transactional, tit-for-tat system but rather a balanced "give-and-take" rooted in a deep-seated understanding that mutual aid will flow in all directions as needed over the course of a lifetime.14

#### **Shared Purpose (Ikigai)**

The very name *Moai* translates to "meeting for a common purpose".2 This shared purpose provides the group with its cohesive identity and reason for being. This concept is often linked to the broader Japanese philosophy of

*ikigai*, which translates to a "reason for being" or a "reason to wake up every morning".1 Having a strong sense of

*ikigai* infuses daily life with meaning and purpose. Within this context, the Moai functions as a "sounding board," a supportive group that helps its members find and live a life aligned with their purpose.19 This shared purpose can be explicit, such as a group formed around a hobby or professional interest, or implicit, such as the shared goal of mutual well-being and longevity.

### **1.2 Social Structure and Composition**

The structure of a Moai, while flexible, follows certain patterns that contribute to its effectiveness.

#### **Formation and Size**

Traditionally, Moai were formed organically in childhood, pairing together groups of about five children who would then grow together.3 However, the modern incarnation of the Moai is more flexible. Groups can be formed at any stage of life and are often based on shared interests, workplaces, universities, or simple geographical proximity.14 There is a strong emphasis on group size, with an ideal number of 5-7 members. This size is considered optimal for maintaining group cohesion and preventing the natural tendency of larger groups (8 or more) to splinter into subgroups.16

#### **Operational Dynamics**

The strength of the Moai bond is maintained through regular and frequent interaction. Members typically meet on a consistent schedule, such as weekly or fortnightly, for shared activities.3 These gatherings can be for meals, walks, games, or simply conversation and gossip.3 These regular meetings are the primary mechanism for reinforcing connections, sharing life experiences, and providing the social and emotional support that is central to the Moai's function.15 While traditionally an in-person activity, the concept has adapted to modern life, with virtual Moai that connect online becoming a viable alternative, especially in times of physical distancing.16

### **1.3 The Financial Dimension: From Tanomoshi to Modern Pooling**

The financial component of the Moai is a direct legacy of its historical origins and remains a key aspect of many groups today.

#### **Historical Roots**

The Moai originated hundreds of years ago as a village's financial support system.3 It functioned as a type of rotating savings and credit association (ROSCA), known in Japan as

*tanomoshi* or *mujin*.20 In this system, members would contribute a set sum of money to a common pool at regular intervals. The entire sum would then be given to one member in turn, or to a member facing an urgent need for capital, such as buying land or handling an emergency.20 This system, which has existed since at least the Kamakura period (1185–1333), was built entirely on mutual trust among the participants.20

#### **Modern Financial Practices**

This financial dimension has evolved but persists in many contemporary Moai. It is common for members to make a regular, often monthly, contribution to a group fund.12 These pooled resources serve a dual purpose. They can be used to fund the group's shared social activities, such as dinners, games, or hobbies.12 Critically, these funds also serve as a form of social-financial safety net. When a member experiences financial difficulty, the group can draw upon these funds to provide direct assistance, offering a layer of security that reduces stress and prevents financial instability.3

### **1.4 A Specific Use Case: Supporting Youth Transitioning from Care**

The Digital Moai is specifically designed to support young adults aging out of foster care or orphanages, a group that faces a sudden and often traumatic transition to independence.8 Lacking the safety net of a family, these individuals must navigate a host of emotional, practical, and systemic challenges alone.6 Understanding these specific challenges is critical to designing an ontology that can model meaningful support.

* **Emotional and Mental Health Crises:** The transition is often marked by intense fear, anxiety, and profound loneliness.6 Many care-experienced youth have never seen a functional family or community dynamic, leaving them feeling like "imposters" in adult life.9 Past trauma, neglect, and instability contribute to high rates of depression, anxiety, and PTSD, yet access to mental health resources is often limited.8 Suicidal ideation and a sense of hopelessness are tragically common.24
* **Instability in Housing and Employment:** Without familial support, securing stable housing is a primary hurdle, and a significant percentage of care-leavers experience homelessness within two years of exiting the system.7 This instability is compounded by educational and employment difficulties. Many struggle to finish high school, lack job skills, and face discrimination from employers who are reluctant to trust someone without a family background.8
* **Lack of Practical Life Skills and Concrete Supports:** Many young adults leaving care lack basic life skills that are often learned within a family, such as household management, cooking, and financial literacy.27 They also lack concrete goods like identification documents (birth certificates, social security cards), which are essential for accessing services, as well as basic household items.28
* **Absence of a Permanent Support Network:** The most fundamental challenge is the lack of a permanent, supportive network.8 Relationships with social workers and foster carers end, leaving the young person feeling abandoned and isolated.23 They need stable, trusting relationships with adults and peers who can provide guidance, mentorship, and a sense of belonging—the very function a Moai is designed to serve.6

The Digital Moai aims to be a direct intervention for these challenges. By creating a purpose-built "chosen family," it provides the consistent social connection, emotional support, and group accountability needed to navigate the transition to adulthood.6 The ontology, therefore, must not only model the Moai structure but also the specific challenges its members face and the supportive activities that can address them.

## **Section 2: A Survey of Semantic Web Vocabularies for Social and Commercial Constructs**

Before proposing a new ontology, it is essential to survey the existing landscape of Semantic Web standards and vocabularies. This critical analysis prevents the reinvention of well-established concepts and provides a solid foundation upon which to build. The strategy for the Digital Moai ontology is one of principled reuse and extension, leveraging the strengths of existing standards while creating new terms only to capture the unique, unrepresented aspects of the Moai.

### **2.1 Modeling People and Groups: FOAF, ORG, and SIOC**

Several established ontologies exist for describing people and the groups they form.

* **FOAF (Friend of a Friend):** The FOAF vocabulary is a cornerstone of the Social Semantic Web, providing the essential building blocks for describing people and their social networks.30 It provides the  
  foaf:Person class, which is the natural choice for representing individual Moai members, and the foaf:Group class, which could serve as a basic container for the Moai.13 The  
  foaf:member property directly supports linking individuals to a group. However, FOAF's primary relationship property, foaf:knows, is explicitly defined as being intentionally vague. It does not imply friendship, endorsement, or even a reciprocated relationship, making it fundamentally inadequate for modeling the deep, binding commitment central to the Moai.13
* **ORG (The Organization Ontology):** The W3C Organization Ontology offers a more formal and structured approach to modeling groups than FOAF. Its core class, org:Organization, is defined as a collection of people organized together with a common purpose, capable of acting as a single agent.32 This definition aligns remarkably well with the Moai, which is a "meeting for a common purpose" 2 and can engage in collective action, such as pooling financial resources.3 Properties like  
  org:hasMember and org:purpose are directly applicable to the Moai's structure and its connection to *ikigai*. Crucially, the ORG ontology was designed to be extensible, encouraging domain-specific specializations 32, which perfectly suits the goal of defining  
  moai:Moai as a specific type of organization.
* **SIOC (Semantically-Interlinked Online Communities):** The SIOC ontology provides a rich and detailed vocabulary for describing online communities, including concepts like sioc:Community, sioc:UserAccount, roles (sioc:Role), and various types of content and interactions.33 Its strength lies in its focus on the artifacts of  
  *online* communication, such as forums, blogs, and posts.35 While this makes it an excellent candidate for modeling the specific activities of a  
  *virtual* Moai that communicates online 17, its core concepts are too closely tied to digital platforms to serve as the foundational model for the Moai itself, which is a social construct that transcends any particular communication medium.

### **2.2 Modeling Services and Commerce: GoodRelations**

While the internal dynamics of a Moai are primarily social, a Moai can and often does interact with external commercial entities. The GoodRelations ontology is the de facto standard for describing e-commerce on the Semantic Web, providing a vocabulary for products, services, offers, prices, and business entities.37 It is not suitable for modeling the internal structure of the Moai, but it is perfectly suited for modeling the Moai's role as a

*customer* consuming external services, such as professional financial advice or legal assistance for incorporation. Key constructs like gr:BusinessEntity (to represent a service provider, such as a bank or law firm), gr:Offering (to describe the service being offered, like a joint bank account or legal representation), and gr:hasPriceSpecification (to detail any associated fees) allow for a precise description of the commercial transaction.37 The

moai:Moai entity, modeled as an org:Organization, can be positioned as the customer that seeks or accepts the gr:Offering.

### **2.3 Modeling Financial and Legal Entities: FIBO (Financial Industry Business Ontology)**

When a Moai's activities extend into the formal financial or legal sphere, such as opening a shared bank account or formally incorporating as a non-profit, a more specialized and robust vocabulary is required. The Financial Industry Business Ontology (FIBO), developed by the Enterprise Data Management (EDM) Council, provides a standardized, industry-vetted ontology for financial and legal concepts.40 FIBO's modular architecture is one of its key strengths, allowing for the selective import of relevant components without adopting the entire, massive ontology.40

For the Digital Moai model, several FIBO modules are particularly relevant:

* **FIBO-FBC (Financial Business and Commerce):** This module provides the specific concepts for financial products. The class fibo-fbc-fi-acc:BankAccount is the precise entity that a Moai would open.44
* **FIBO-BE (Business Entities):** This module is crucial for modeling the Moai's potential legal status. It defines concepts for legal entities, formal organizations, and their identifiers. Notably, it includes the class fibo-be-le-fbo:NotForProfitOrganization, which directly supports the modeling of a Moai that has formally incorporated.
* **FIBO-FND (Foundations):** Foundational modules like fibo-fnd-law-cor (Legal Core) provide abstract concepts such as Law and Jurisdiction, which are necessary to describe the legal context of an incorporated Moai.

The primary challenge with FIBO is its complexity and scale.45 The proposed approach is not to build the Moai ontology

*within* FIBO, but rather to enable alignment. A Digital Moai application could import both the moai: ontology and the relevant FIBO modules, creating explicit mappings between concepts.

### **2.4 Modeling Abstract Social Dynamics: Trust and Commitment Ontologies**

Standard ontologies like FOAF and ORG lack the expressive power to represent the deep, abstract social bonds of trust and commitment that define a Moai. To model these, it is necessary to look at patterns from research ontologies.

* **Trust Ontology:** Research into the formal modeling of trust reveals a consensus that trust is a complex phenomenon, not a simple binary relationship.48 A proposed Reference Ontology of Trust models it as a complex mental state of a  
  Trustor agent, composed of specific beliefs about a Trustee's capabilities, intentions, and vulnerabilities.50 This confirms the modeling decision that such complex social concepts are best handled with a more descriptive, reified structure rather than a simple predicate.
* **Commitment Ontology:** The commitment-based reference ontology for services, UFO-S, provides a powerful and directly applicable pattern.52 In this model, a  
  ServiceAgreement is a relator (a reified relationship) composed of specific Commitments and Claims held by the participating parties. The commitment is a first-class entity, founded by an event (e.g., signing a contract), which can then be described with its own properties. This pattern, grounded in philosophical social ontology 55, is ideal for representing the  
  moai:MutualSupportCommitment as an explicit agreement entered into by the Moai's members.

### **2.5 Modeling Legal Agreements and Incorporation**

Formally incorporating a Moai as a non-profit organization involves interactions with legal frameworks and service providers. While a comprehensive legal ontology is a vast undertaking, several existing vocabularies provide the necessary components for this specific task. Projects like FOLIO are working towards broad interoperability for legal data standards. For the Digital Moai, a pragmatic approach is to leverage the legal components already integrated within FIBO. This ensures consistency with the financial modeling and provides a robust, industry-vetted foundation for representing legal personhood, jurisdiction, and governing documents. This approach avoids the complexity of aligning with multiple, potentially conflicting, specialized legal ontologies while still capturing the essential semantics of incorporation.

The following table summarizes the analysis of these foundational vocabularies and their designated role in the final Digital Moai ontology.

| Ontology | Key Classes/Properties | Strengths for Moai Model | Weaknesses/Gaps for Moai Model | Final Role in moai: Ontology |
| --- | --- | --- | --- | --- |
| **FOAF** | foaf:Person, foaf:Group, foaf:member, foaf:knows | Provides the standard, universally recognized class for representing people (foaf:Person). 13 | The foaf:knows property is explicitly vague and insufficient for modeling the deep commitment of a Moai. foaf:Group is less structured than org:Organization. 13 | **Foundation:** foaf:Person will be used to represent all Moai members. The moai: ontology will owl:imports FOAF. |
| **ORG** | org:Organization, org:hasMember, org:purpose, org:Role | org:Organization perfectly models a group with a shared purpose that can act as an agent. org:purpose maps directly to the Moai's shared goal. Designed for extension. 32 | Lacks properties for the specific interpersonal dynamics (trust, reciprocity, deep commitment) of a Moai. | **Core Structure:** moai:Moai will be a subclass of org:Organization, inheriting its structural properties. The moai: ontology will owl:imports ORG. |
| **SIOC** | sioc:Community, sioc:UserAccount, sioc:Post, sioc:has\_reply | Provides rich vocabulary for modeling online interactions, discussions, and community-generated content. 35 | Overly focused on digital artifacts (forums, blogs). Not suitable for the core Moai model, which is medium-agnostic. 36 | **Optional Extension:** Can be used in application-level ontologies to model the specific activities of a *virtual* Moai. Not part of the core moai: ontology. |
| **GoodRelations** | gr:BusinessEntity, gr:Offering, gr:hasPriceSpecification | The standard for modeling commercial transactions. Perfectly suited for representing the Moai's consumption of external services (e.g., from a bank or legal firm). 37 | Not applicable to the internal social structure or relationships of the Moai. | **External Interaction Model:** Used to model the relationship between a moai:Moai instance and external service providers. Not imported by the core moai: ontology but used alongside it. |
| **FIBO** | fibo-be-le-fbo:NotForProfitOrganization, fibo-fbc-fi-acc:BankAccount, fibo-be-le-lp:LegalEntity | The industry standard for financial and legal entity concepts. Provides precise definitions for financial products and legal statuses (like non-profit) that a Moai might acquire. | Extremely large and complex. Not suitable for modeling the social aspects of the Moai. 45 | **External Product & Legal Model:** Used to model the specific financial products or legal statuses a Moai might acquire. Not imported by the core moai: ontology but aligned with it in applications. |

## **Section 3: Modeling the Moai as a Social-Formal Entity**

This section details the proposed core ontological structure for the Moai group itself. The design is based on the analysis from the preceding sections, establishing the Moai as a distinct type of social organization that bridges the gap between informal social circles and formal entities capable of collective action.

### **3.1 The moai:Moai Class: A Social Organization**

To formally represent the Moai, a new class, moai:Moai, is proposed. This class will serve as the central concept for any Moai instance. A critical design decision is to define this class as a subclass of org:Organization from the W3C Organization Ontology.

moai:Moai rdfs:subClassOf org:Organization.

This inheritance is not merely a matter of convenience; it endows the moai:Moai class with a rich set of properties and a formal semantic grounding that is highly consistent with the nature of a Moai as described in the socio-cultural analysis. By being a subclass of org:Organization, a moai:Moai instance inherits the following characteristics:

* It is a foaf:Agent, meaning it can be the author of content, the owner of an account, or the actor in a transaction.31
* It is a collection of people, linked via the org:hasMember property.32
* It has a org:purpose, providing a direct and standardized way to link the Moai to its shared goal or *ikigai*.18
* It can be decomposed into sub-units or have formal roles, and it can engage in relationships with other organizations.32

This model formally establishes the Moai as more than just an informal collection of friends; it is an organized entity with a distinct identity and purpose.

### **3.2 Representing Membership and Roles**

The individuals who constitute a Moai will be represented as instances of foaf:Person. The primary link between these individuals and the Moai will be the org:hasMember property, inherited from org:Organization.

While org:hasMember provides the basic link, the ORG ontology offers a more nuanced way to describe the membership relationship through the org:Role and org:hasMembership classes. To capture the specific context of being a Moai member, a new role class is proposed:

moai:MoaiMemberRole rdfs:subClassOf org:Role.

This allows for the creation of a membership instance that connects a foaf:Person to a moai:Moai via a specific moai:MoaiMemberRole. This pattern is useful for attaching properties that are specific to the membership itself, rather than to the person or the group. For example, one could attach a membership start date, or define specific sub-roles like moai:TreasurerRole for a Moai with a formal financial structure, a role implied by the practice of collecting and managing pooled funds.21

### **3.3 The Moai as a Collective Agent: Consuming Services and Achieving Legal Personhood**

A key capability of the Moai is its capacity for collective action, from pooling finances to formally incorporating as a legal entity. The ontological model must support this evolution. By defining moai:Moai as a subclass of org:Organization, the Moai itself becomes an agent that can interact with other business entities, consume professional services, and acquire a formal legal status.

#### **Consuming External Services**

The interaction with third-party service providers is modeled using a clean, modular pattern that integrates the moai: ontology with established vocabularies for commerce and finance. This process involves:

1. **The Service Offering (GoodRelations):** A service provider, such as a law firm or financial institution, is modeled as a gr:BusinessEntity. This entity makes a gr:Offering for a professional service (e.g., legal incorporation services, group financial planning). The moai:Moai instance, acting as a single customer, can be linked to this offering using properties like gr:seeks or by being the subject of a transaction that accepts the offer.37
2. **The Resulting Artifact (FIBO):** The outcome of consuming the service is often a formal artifact. For a financial service, this could be a fibo-fbc-fi-acc:BankAccount.44 For a legal service, this could be the establishment of the Moai as a formal legal entity.
3. **Ownership and Connection:** The newly created artifact is then linked back to the Moai. A bank account fibo-fbc-fi-fi:isHeldBy the moai:Moai instance. This modular approach elegantly separates concerns: GoodRelations describes the *act of commerce*, FIBO describes the *financial or legal artifact*, and the moai: ontology describes the *social entity* that is the customer.

#### **Achieving Legal Personhood through Incorporation**

To empower a Moai to act as a single entity in more formal contexts, the ontology must model the pathway to legal incorporation. This allows the group to, for example, enter into contracts, open official accounts, and apply for grants as a recognized non-profit. The model supports this by allowing a moai:Moai instance to be further classified using FIBO's robust legal entity framework:

* An incorporated Moai can be asserted as an instance of fibo-be-le-fbo:NotForProfitOrganization.
* This classification implies that the Moai is also a fibo-be-le-lp:LegalEntity, defined as an entity that can enter into contracts, and a fibo-be-le-lp:LegalPerson, which has the capacity to incur liability.
* This formal status can be detailed with properties from FIBO, such as linking the Moai to its official fibo-be-le-lei:LegalEntityIdentifier (LEI), its fibo-be-le-fbo:hasRegisteredAddress, and the fibo-fnd-law-jur:Jurisdiction under which it is incorporated.

This extension provides a clear ontological path for a Moai to evolve from an informal support circle into a formally recognized non-profit organization, enhancing its ability to provide robust, long-term support for its members.

## **Section 4: Representing the Rich Relational Dynamics of the Moai**

This section addresses the most challenging and central aspect of the user query: modeling the deep, nuanced interpersonal bonds that are the hallmark of a Moai. Standard social networking properties like foaf:knows are insufficient for this task. The proposed solution involves a more expressive and semantically precise approach based on the reification of the commitment relationship, drawing inspiration from research in commitment-based and relational ontologies.

### **4.1 Reifying the Commitment Bond**

As established in the initial analysis, the commitment within a Moai is not merely a property of a relationship but is a central, intentional construct in itself.14 To capture this, the commitment is reified—that is, it is modeled as a class rather than a simple property. A new class,

moai:MutualSupportCommitment, is introduced to represent this core bond.

moai:MutualSupportCommitment rdfs:subClassOf owl:Thing.

An instance of this class represents the entire complex of trust, reciprocity, and mutual obligation that exists between two or more members of a Moai. This commitment is understood to be founded by the social act of forming or joining the Moai. By modeling the commitment as a first-class object, it can be described with its own set of properties, providing the necessary richness to capture its multifaceted nature. This aligns with the philosophical concept of ontological commitment, where the ontology explicitly posits the existence of this social fact.56

The key properties of this reified commitment are:

* moai:hasParticipant (domain: moai:MutualSupportCommitment, range: foaf:Person): This property links the commitment instance to each of the members who are party to it.
* moai:commitmentScope (range: skos:Concept): This property specifies the nature or domain of the support promised within the commitment. This allows for fine-grained descriptions, using concepts from a controlled vocabulary to represent the different facets of support, such as 'Financial', 'Emotional', 'Health', or 'Spiritual', as identified in the research.2
* moai:commitmentStartDate (range: xsd:date): This property captures the temporal aspect of the commitment, recording the date on which it was formed.

### **4.2 Modeling Reciprocity and Mutual Support**

A significant advantage of reifying the commitment is that it provides an elegant solution to the challenge of modeling reciprocity in OWL. Standard approaches to modeling reciprocal relationships face limitations. Using a symmetric property (owl:SymmetricProperty) is too simplistic, as it cannot be described further. Using a pair of inverse properties (e.g., moai:isCommittedTo and its inverse moai:isCommittedBy) creates a simple binary link but still fails to capture the shared nature of the commitment itself. Furthermore, many taxonomy management systems struggle with complex inverse relationships, where a single property might need different reciprocals depending on the context.57

The reification pattern bypasses these issues. The reciprocity of the Moai bond is not encoded in a property but is inherent in the definition and instantiation of the moai:MutualSupportCommitment class. A single instance of this class represents the shared, mutual agreement. All participating members are linked to this *same* instance via the moai:hasParticipant property.

The mutuality can be formally enforced with an OWL axiom on the moai:MutualSupportCommitment class, stating that any instance must be connected to a minimum of two participants:

moai:MutualSupportCommitment rdfs:subClassOf.

This axiom ensures that a commitment instance cannot exist with only one participant, making the relationship inherently mutual and collective. This approach is more robust, extensible, and semantically precise than simple property-based models and aligns with the principles of commitment-based ontologies, where the agreement itself is the central entity 52, and with relational ontology, which posits that relationships are the fundamental building blocks of social reality.58

### **4.3 Capturing Trust and Shared Goals (Ikigai)**

The reified commitment class also provides a natural anchor point for describing other abstract dynamics of the Moai relationship.

* **Trust:** While developing a complete, formal ontology of trust is a complex task in itself 50, the  
  moai:MutualSupportCommitment class allows for a pragmatic and useful representation. A property such as moai:hasTrustBasis can be added to the commitment class. The range of this property could be a simple rdfs:Literal for a textual description (e.g., "Based on a lifelong friendship and shared experiences") or, for more structure, a skos:Concept from a controlled vocabulary (e.g., 'Lifelong Acquaintance', 'Shared Professional Ethics'). This captures the foundation of trust upon which the commitment is built.14
* **Shared Goal (Ikigai):** The shared purpose of the Moai is a property of the group as a whole. As established in Section 3, the moai:Moai class, as a subclass of org:Organization, inherits the org:purpose property. To provide greater descriptive power, the range of this property can be an instance of a dedicated class, moai:SharedPurpose. This allows the group's *ikigai* to be described in detail, potentially linking it to specific activities, values, or desired outcomes for its members.14 For youth transitioning from care, this shared purpose can be a powerful anchor, providing a sense of direction and belonging that is often missing.6 The  
  moai:MutualSupportCommitment directly addresses their need for a reliable safety net and a permanent support system.28

## **Section 5: Modeling Activities and Support Mechanisms**

To fulfill the Digital Moai's primary goal of providing tangible support, particularly for care-experienced youth, the ontology must be able to model the group's actions and link them to the specific challenges its members face. This section introduces new ontological components designed to capture the shared activities that strengthen the Moai and the life challenges they are intended to address.

### **5.1 The Role of Shared Activities**

The strength of an Okinawan Moai is forged and maintained through consistent, shared activities.3 These are not merely social gatherings; they are the primary vehicle for delivering mutual support, reinforcing bonds, and fostering well-being.60 Activities can range from simple, regular get-togethers like shared meals or walks, to more structured events.16 For the Digital Moai's target demographic, these activities serve a dual purpose: they combat loneliness and social isolation while also providing opportunities to develop crucial life skills and build confidence.6 For example, a "Walking Moai" is a well-documented practice that combines physical activity with social connection, which has been shown to improve motivation, reduce stress, and lower the risk of depression.29

### **5.2 Modeling moai:Activity**

To represent these crucial interactions, a new core class, moai:Activity, is proposed. This class serves as a parent for various types of group events and interventions.

moai:Activity rdfs:subClassOf owl:Thing.

An instance of moai:Activity represents a specific event or recurring engagement undertaken by the Moai. This class can be specialized to represent the diverse range of Moai interactions. For example:

* moai:SharedSocialActivity: For informal gatherings like shared meals, walks, or games.16 A specific subclass,  
  moai:WalkingMoai, can represent the popular walking group format.60
* moai:SupportiveIntervention: For more structured activities designed to address specific needs, such as a moai:LifeSkillsWorkshop (e.g., for budgeting or cooking) or a moai:GroupTherapySession.27

Key properties for the moai:Activity class would include moai:hasActivityParticipant, moai:activitySchedule (to define frequency), and moai:activityLocation.

### **5.3 Modeling moai:LifeChallenge**

To enable a Digital Moai platform to offer targeted support, the ontology must formally represent the challenges its members face. A new class, moai:LifeChallenge, is introduced for this purpose.

moai:LifeChallenge rdfs:subClassOf skos:Concept.

By making this a subclass of skos:Concept, we can build a controlled vocabulary of the specific, well-documented struggles of youth aging out of care.6 This vocabulary can be used by members to privately identify their needs, allowing the system to suggest relevant support. Examples of

moai:LifeChallenge instances could include:

* ex:SocialIsolation
* ex:HousingInstability
* ex:Unemployment
* ex:FinancialLiteracyGap
* ex:MentalHealthStruggle
* ex:LackOfPracticalSkills

### **5.4 Linking Activities to Challenges**

The true power of this extension lies in connecting activities to the challenges they help mitigate. A new object property, moai:addressesChallenge, is proposed to create this explicit semantic link.

moai:addressesChallenge (domain: moai:Activity, range: moai:LifeChallenge)

This property allows the ontology to capture knowledge such as:

* A moai:WalkingMoai activity addressesChallenge ex:SocialIsolation.
* A moai:LifeSkillsWorkshop on budgeting addressesChallenge ex:FinancialLiteracyGap.
* A group session on resume building addressesChallenge ex:Unemployment.

This creates a robust foundation for a recommendation engine. A user who identifies a need related to ex:FinancialLiteracyGap could be automatically notified of an upcoming workshop. This transforms the Moai from a purely social construct into a proactive, targeted support system, directly addressing the core requirements of its intended users.

## **Section 6: A Proposed Core Ontology for the Digital Moai (moai:)**

This section presents the formal specification of the new, modular moai: ontology. The design is a synthesis of the socio-cultural analysis, the needs of its target users, and the survey of existing vocabularies. It defines a core set of classes and properties intended to be lightweight, extensible, and semantically precise.

### **6.1 Design Principles and Namespace Declaration**

The moai: ontology is designed according to the following principles:

* **Modularity:** The ontology is designed as a minimal core module. It focuses only on the concepts necessary to define the unique characteristics of a Moai. It achieves broader functionality by formally importing foundational ontologies and by being designed for use alongside specialized ontologies in application contexts.
* **Reuse and Extension:** The ontology reuses well-established concepts from standard vocabularies (FOAF, ORG, SKOS) wherever possible, defining new terms only when there is no suitable existing equivalent.
* **Semantic Precision:** The ontology uses OWL 2 DL constructs to provide clear, unambiguous, and machine-readable definitions, enabling logical consistency checking and inference.

The following namespace and prefixes are used in the specification and subsequent examples:

* **Ontology IRI:** http://purl.org/ontology/moai#
* **Preferred Prefix:** moai:
* **Imported/Used Prefixes:**
  + foaf: <http://xmlns.com/foaf/0.1/>
  + org: <http://www.w3.org/ns/org#>
  + skos: <http://www.w3.org/2004/02/skos/core#>
  + fibo-be-le-fbo: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/FormalBusinessOrganizations/>
  + fibo-be-le-lp: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/LegalPersons/>
  + fibo-be-le-lei: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/LEIEntities/>
  + fibo-fbc-fi-acc: <https://spec.edmcouncil.org/fibo/ontology/FBC/FinancialInstruments/Accounts/>
  + fibo-fbc-fi-fi: <https://spec.edmcouncil.org/fibo/ontology/FBC/FinancialInstruments/FinancialInstruments/>
  + gr: <http://purl.org/goodrelations/v1#>
  + xsd: <http://www.w3.org/2001/XMLSchema#>
  + rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
  + rdfs: <http://www.w3.org/2000/01/rdf-schema#>
  + owl: <http://www.w3.org/2002/07/owl#>

### **6.2 Core Classes of the moai: Ontology**

The following table defines the core classes introduced by the moai: ontology.

| Class IRI | rdfs:label | rdfs:subClassOf | rdfs:comment |
| --- | --- | --- | --- |
| moai:Moai | Moai | org:Organization | A social support group, modeled as a formal organization, based on the principles of the traditional Okinawan Moai. It is a long-term, committed group providing mutual support to its members. 2 |
| moai:MoaiMemberRole | Moai Member Role | org:Role | The role played by a person as an active, committed member of a Moai. This role can be used to attach properties specific to the membership itself, such as start date or specific duties. 21 |
| moai:MutualSupportCommitment | Mutual Support Commitment | owl:Thing | A reified representation of the reciprocal, multi-faceted commitment of support between two or more members of a Moai. This commitment is founded on trust and mutual obligation. 14 |
| moai:SharedPurpose | Shared Purpose | owl:Thing | The shared goal, interest, or 'ikigai' that serves as a purpose for a Moai's existence and provides a basis for its activities and cohesion. 2 |
| moai:Activity | Activity | owl:Thing | A shared event, gathering, or intervention undertaken by a Moai to foster connection and provide support. Can be specialized into social activities or structured interventions.60 |
| moai:LifeChallenge | Life Challenge | skos:Concept | A concept from a controlled vocabulary representing a specific challenge or need faced by a Moai member, particularly relevant for youth transitioning from care.6 |

### **6.3 Core Properties of the moai: Ontology**

The following table defines the core properties introduced by the moai: ontology to connect the classes defined above and link them to existing vocabularies.

| Property IRI | rdfs:label | rdfs:domain | rdfs:range | Characteristics | rdfs:comment |
| --- | --- | --- | --- | --- | --- |
| moai:hasMutualSupportCommitment | has mutual support commitment | foaf:Person | moai:MutualSupportCommitment |  | Links a person to a specific mutual support commitment that they are a participant in. |
| moai:hasParticipant | has participant | moai:MutualSupportCommitment | foaf:Person | owl:inverseOf moai:hasMutualSupportCommitment | Links a mutual support commitment to one of its participating members. A commitment must have at least two participants. |
| moai:commitmentScope | commitment scope | moai:MutualSupportCommitment | skos:Concept |  | Specifies the domain of support covered by the commitment, e.g., 'Financial', 'Emotional', 'Health'. 2 |
| moai:commitmentStartDate | commitment start date | moai:MutualSupportCommitment | xsd:date | owl:FunctionalProperty | The date on which the mutual support commitment was established. |
| moai:hasSharedFinancialInstrument | has shared financial instrument | moai:Moai | fibo-fbc-fi-fi:FinancialInstrument |  | Links a Moai as a collective entity to a shared financial product, such as a bank account or investment vehicle. |
| moai:hasSharedPurpose | has shared purpose | moai:Moai | moai:SharedPurpose | rdfs:subPropertyOf org:purpose | Links a Moai to its defined shared purpose or 'ikigai'. This is a sub-property of org:purpose to provide a more specific semantic link. |
| moai:hasActivity | has activity | moai:Moai | moai:Activity |  | Links a Moai to a shared activity it organizes or performs. |
| moai:addressesChallenge | addresses challenge | moai:Activity | moai:LifeChallenge |  | Links a supportive activity to a specific life challenge it is designed to mitigate.6 |
| moai:facesChallenge | faces challenge | foaf:Person | moai:LifeChallenge |  | Links a person to a life challenge they are currently facing. This would likely be used in a private, secure context. |
| moai:consumesService | consumes service | moai:Moai | gr:Offering |  | Links a Moai to an external service offering it consumes or seeks to consume, such as legal or financial services. |
| moai:hasLegalStatus | has legal status | moai:Moai | fibo-be-le-lp:LegalEntity |  | Links a Moai to its formal legal entity representation, typically used after incorporation. |

## **Section 7: Practical Implementation: A Case Study in RDF/Turtle**

To demonstrate how the proposed modular ontology can be applied in practice, this section presents a complete, end-to-end case study. The example will be represented using RDF in the Turtle syntax, which is a human-readable format for linked data.

### **7.1 Scenario Definition**

The scenario involves the formation and initial activities of a new Moai specifically for young adults who have recently transitioned from the care system:

* **The Group:** A Moai named "The Walnut Street Walkers" is formed by five friends: Alice, Bob, Carol, David, and Eve, all of whom are care-experienced youth.
* **The Purpose:** Their shared purpose, or *ikigai*, is "promoting daily activity and mutual well-being through regular group walks and social connection."
* **The Commitment:** Upon forming, the members establish a mutual support commitment that covers both 'Health' and 'Social' scopes.
* **The Challenge:** Alice expresses that she is struggling with feelings of loneliness and social isolation, a common challenge for this demographic.6
* **The Activity:** The group establishes a weekly walking Moai, a simple, effective activity to combat isolation and build bonds.29
* **The Financial Action:** To manage expenses for group activities, the Moai, acting as a single entity, approaches the "Community First Bank" to open a shared bank account.
* **The Legal Action:** To apply for community grants and manage their finances more formally, the group decides to incorporate as a non-profit organization. They engage the services of a local law firm.

### **7.2 RDF Graph Representation (Annotated Turtle)**

The following RDF graph, written in Turtle, models the scenario described above. The graph is broken down into logical steps, with annotations explaining each part of the model.

Code snippet

# -- Prefix Declarations --  
# These prefixes are used to abbreviate the full IRIs for readability.  
  
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>.  
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#>.  
@prefix owl: <http://www.w3.org/2002/07/owl#>.  
@prefix xsd: <http://www.w3.org/2001/XMLSchema#>.  
@prefix foaf: <http://xmlns.com/foaf/0.1/>.  
@prefix org: <http://www.w3.org/ns/org#>.  
@prefix gr: <http://purl.org/goodrelations/v1#>.  
@prefix fibo-be-le-fbo: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/FormalBusinessOrganizations/>.  
@prefix fibo-be-le-lp: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/LegalPersons/>.  
@prefix fibo-be-le-lei: <https://spec.edmcouncil.org/fibo/ontology/BE/LegalEntities/LEIEntities/>.  
@prefix fibo-fbc-fi-acc: <https://spec.edmcouncil.org/fibo/ontology/FBC/FinancialInstruments/Accounts/>.  
@prefix fibo-fbc-fi-fi: <https://spec.edmcouncil.org/fibo/ontology/FBC/FinancialInstruments/FinancialInstruments/>.  
@prefix moai: <http://purl.org/ontology/moai#>.  
@prefix ex: <http://example.com/data/>.  
@prefix ex-vocab: <http://example.com/vocab/>.  
  
# -- Step 1: Defining the People (using FOAF) --  
# Each member of the Moai is an instance of foaf:Person.  
  
ex:Alice a foaf:Person;  
 foaf:name "Alice Smith".  
  
ex:Bob a foaf:Person;  
 foaf:name "Bob Johnson".  
  
ex:Carol a foaf:Person;  
 foaf:name "Carol Williams".  
  
ex:David a foaf:Person;  
 foaf:name "David Brown".  
  
ex:Eve a foaf:Person;  
 foaf:name "Eve Jones".  
  
# -- Step 2: Defining the Moai and its Purpose (using ORG and moai:) --  
# The Moai itself is an instance of moai:Moai, which is a subclass of org:Organization.  
# Its members are linked via org:hasMember.  
# The shared purpose is modeled as an instance of moai:SharedPurpose and linked via moai:hasSharedPurpose.  
  
ex:WalnutStreetWalkers a moai:Moai;  
 rdfs:label "The Walnut Street Walkers" ;  
 org:hasMember ex:Alice, ex:Bob, ex:Carol, ex:David, ex:Eve ;  
 moai:hasSharedPurpose ex:WSWPurpose.  
  
ex:WSWPurpose a moai:SharedPurpose;  
 rdfs:label "Promoting daily activity and mutual well-being through regular group walks and social connection.".  
  
# -- Step 3: Defining the Mutual Commitment (using moai:) --  
# The reciprocal bond is reified as a single instance of moai:MutualSupportCommitment.  
# All five members are linked to this single commitment instance as participants.  
# The scope of the commitment is defined using a controlled vocabulary.  
  
ex:WSWCommitment a moai:MutualSupportCommitment;  
 rdfs:label "The mutual support commitment of the Walnut Street Walkers" ;  
 moai:commitmentStartDate "2024-01-15"^^xsd:date ;  
 moai:hasParticipant ex:Alice, ex:Bob, ex:Carol, ex:David, ex:Eve ;  
 moai:commitmentScope ex-vocab:HealthSupport, ex-vocab:SocialSupport.  
  
# Define the concepts for the commitment scope (using SKOS)  
ex-vocab:HealthSupport a skos:Concept;  
 skos:prefLabel "Health Support"@en.  
ex-vocab:SocialSupport a skos:Concept;  
 skos:prefLabel "Social Support"@en.  
  
# Link the individuals back to the commitment for bidirectional querying.  
ex:Alice moai:hasMutualSupportCommitment ex:WSWCommitment.  
ex:Bob moai:hasMutualSupportCommitment ex:WSWCommitment.  
ex:Carol moai:hasMutualSupportCommitment ex:WSWCommitment.  
ex:David moai:hasMutualSupportCommitment ex:WSWCommitment.  
ex:Eve moai:hasMutualSupportCommitment ex:WSWCommitment.  
  
# -- Step 4: Modeling Life Challenges and Supportive Activities --  
# Define a specific life challenge from a controlled vocabulary.  
ex:SocialIsolation a moai:LifeChallenge;  
 skos:prefLabel "Social Isolation and Loneliness"@en.  
  
# Alice identifies that she is facing this challenge.  
ex:Alice moai:facesChallenge ex:SocialIsolation.  
  
# Define a recurring activity for the Moai.  
ex:WeeklyWalk a moai:Activity, moai:SharedSocialActivity;  
 rdfs:label "Weekly Group Walk";  
 moai:activitySchedule "Weekly on Saturdays at 10am".  
  
# Link the activity to the Moai.  
ex:WalnutStreetWalkers moai:hasActivity ex:WeeklyWalk.  
  
# Crucially, link the activity to the challenge it addresses.  
ex:WeeklyWalk moai:addressesChallenge ex:SocialIsolation.  
  
# -- Step 5: Modeling the Financial Service Interaction (using GoodRelations) --  
# The bank is a gr:BusinessEntity that makes an gr:Offering for a bank account service.  
# The Moai, as an org:Organization, is the customer.  
  
ex:CommunityFirstBank a gr:BusinessEntity;  
 gr:legalName "Community First Bank, Inc.".  
  
ex:JointAccountOffering a gr:Offering;  
 rdfs:label "Joint Community Checking Account" ;  
 gr:hasBusinessFunction gr:ProvideService ;  
 gr:offeredBy ex:CommunityFirstBank.  
  
# The Moai consumes this service.  
ex:WalnutStreetWalkers moai:consumesService ex:JointAccountOffering.  
  
# -- Step 6: Modeling the Financial Product (using FIBO) --  
# The result of the successful service interaction is a financial product.  
# This is modeled as a fibo-fbc-fi-acc:BankAccount.  
# The account is held by the Moai entity itself.  
  
ex:MoaiBankAccount a fibo-fbc-fi-acc:BankAccount;  
 rdfs:label "Walnut Street Walkers Shared Account" ;  
 fibo-fbc-fi-fi:hasAccountHolder ex:WalnutStreetWalkers ;  
 fibo-fbc-fi-acc:hasAccountIdentifier "CFB-987654321".  
  
# We can create a link from the Moai to its shared financial instrument using our new property.  
ex:WalnutStreetWalkers moai:hasSharedFinancialInstrument ex:MoaiBankAccount.  
  
# -- Step 7: Modeling Legal Service Interaction and Incorporation (NEW) --  
# The Moai decides to incorporate as a non-profit. They engage a law firm.  
  
ex:LegalEaglesLLP a gr:BusinessEntity;  
 gr:legalName "Legal Eagles LLP".  
  
ex:IncorporationServiceOffering a gr:Offering;  
 rdfs:label "Non-Profit Incorporation Service";  
 gr:hasBusinessFunction gr:ProvideService;  
 gr:offeredBy ex:LegalEaglesLLP.  
  
# The Moai consumes the legal service.  
ex:WalnutStreetWalkers moai:consumesService ex:IncorporationServiceOffering.  
  
# Upon successful incorporation, the Moai's legal status is updated using FIBO.  
ex:WalnutStreetWalkers a fibo-be-le-fbo:NotForProfitOrganization, fibo-be-le-lp:LegalEntity;  
 moai:hasLegalStatus ex:WalnutStreetWalkers; # The entity is its own legal status representation  
 fibo-be-le-lei:hasIdentifier ex:WSW\_LEI.  
  
# Define the Legal Entity Identifier (LEI) for the newly incorporated Moai.  
ex:WSW\_LEI a fibo-be-le-lei:LegalEntityIdentifier;  
 rdfs:label "LEI for The Walnut Street Walkers";  
 fibo-fnd-rel-rel:isDefinedIn fibo-be-le-lei:ISO17442-CodeSet;  
 lcc-lr:identifies ex:WalnutStreetWalkers.

This practical example illustrates the power of the modular design. Each ontology is used for its intended purpose: FOAF for people, ORG for the group structure, moai: for the unique relational dynamics and supportive functions, GoodRelations for the commercial interaction, and FIBO for the resulting financial and legal artifacts. This separation of concerns creates a clean, robust, and highly expressive model that is true to the real-world phenomena it represents.

## **Conclusion**

### **Summary of Contributions**

This report has presented a comprehensive, formal, and modular ontology designed to represent the Digital Moai. The work addresses a significant gap in existing social ontologies by providing a framework capable of capturing the complex, multi-faceted nature of the traditional Okinawan support network, with a specific focus on applying this model to support youth aging out of the care system. By systematically analyzing the socio-cultural foundations of the Moai and the specific needs of its target users, this report proposes a solution that is both conceptually sound and technically robust.

The primary contributions of this work are:

1. **A Core moai: Ontology:** A new, lightweight ontology (moai:) has been specified, introducing classes and properties to model the core concepts of a Moai, its membership, and its shared purpose.
2. **A Novel Relational Model:** The key innovation is the reification of the mutual support bond into a moai:MutualSupportCommitment class. This pattern provides a semantically rich and computationally tractable method for representing the deep, reciprocal relationships of trust and obligation that define a Moai, overcoming the limitations of simple property-based models.
3. **A Framework for Targeted Support:** The ontology has been extended with novel classes (moai:Activity, moai:LifeChallenge) and properties (moai:addressesChallenge) to explicitly model the link between group activities and the specific life challenges they mitigate. This provides a formal basis for creating proactive, needs-based support systems.
4. **A Modular, Integrated Framework:** The report demonstrates a principled approach to ontology engineering, leveraging and extending established standards like FOAF, ORG, GoodRelations, and FIBO. This modular design allows the ontology to cleanly model the Moai as a hybrid entity that is simultaneously a social group, a formal organization, and an economic actor, including a pathway for legal incorporation as a non-profit entity.

The resulting ontology provides a powerful foundation for developing a new class of applications aimed at fostering genuine community, enhancing well-being, and providing resilient social-financial safety nets in a digital world.

### **Future Work and Extensions**

The moai: ontology presented here is a core framework designed for extensibility. Several promising avenues exist for future work to build upon this foundation:

* **Modeling Conflict and Dissolution:** The current model focuses on the formation and healthy operation of a Moai. Research indicates that conflict resolution is a crucial aspect of maintaining these long-term relationships.14 Future extensions could incorporate concepts from negotiation and argumentation ontologies to model conflict resolution processes. Similarly, modeling the formal dissolution of a Moai or the departure of a member would add to the lifecycle completeness.
* **Differentiated Moai Types:** The Moai is not a monolithic concept. It has adapted to modern life, leading to different forms. The ontology could be extended with specific subclasses of moai:Moai to represent these variations, such as moai:WorkplaceMoai 14,  
  moai:InterestBasedMoai 16, or  
  moai:VirtualMoai.17 Each subclass could have specific properties or constraints relevant to its context.
* **Advanced Governance and Legal Structures:** For Moai that operate as formal legal entities (e.g., a legally incorporated friendly society or a partnership), further integration with FIBO's extensive governance and legal entity modules would be beneficial. This could enable the modeling of detailed structures such as bylaws, voting rights, officer roles, and jurisdictional recognition.
* **Integration with Behavioral Health Ontologies:** To better support the mental health needs of members, the moai:LifeChallenge and moai:SupportiveIntervention classes could be aligned with concepts from established behavioral and mental health ontologies. This would enable greater interoperability with clinical systems and more sophisticated analysis of support efficacy.23
* **Dynamic and Temporal Aspects:** The trust and commitment within a Moai are not static; they evolve over time. While the current model captures the start date of a commitment, future work could employ temporal RDF extensions (like RDF-star or named graphs with temporal metadata) to model the changing strength or scope of commitments and trust levels throughout the Moai's lifespan.

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