Value Co-creation Ontology—A Service-dominant Logic Perspective

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Abstract. Marketing research apprises scholars in different disciplines of a paradigmatic reorientation from a traditional goods-dominant (G-D) to a service-dominant (S-D) logic. S-D logic re-conceptualizes the notion of economic exchange. The cornerstone of this reorientation is the concept of *value co-creation*—a collaborative process of reciprocal value creation among various actors. Owing to S-D logic's significance, information systems (IS) research discusses its prospective implications on core elements of the IS knowledge base. However, an equivocal understanding of value co-creation's foundations, semantics, and use emphasizes its underlying theoretical ambiguity in IS and marketing research. Through employing *Methontology*, a well-structured methodology to build ontologies, we develop a value co-creation ontology for IS from an S-D logic perspective. The developed ontology not only offers a multidisciplinary glossary of value co-creation's constituent concepts, but also thoroughly depicts their relationships. The resultant ontology represents a first step toward reflecting S-D logic in IS analysis and design.

Keywords: Value Co-creation, Service-dominant Logic, Ontology, Information Systems Analysis and Design.

1 Introduction

The notion of economic exchange has been notably affected by the paradigm of service-dominant (S-D) logic. Seminal studies [1–3] shed light on the emergence of a paradigm shift from a goods-dominant (G-D) logic to S-D logic. Central to S-D logic is the proposition that all social and economic actors are co-creators of value—that is, *resources* do not have value per se; rather value is created *jointly* with other actors when resources are used [1, 2]. This moves the locus of value creation from *exchange* to *use* [2]. This *usage* determination—as opposed to an *exchange* determination of G-D logic—emphasizes that value unfolds only as soon as actors initiate a *value co-creation* process in that they *start* using goods (products or services) and reciprocally integrate resources with goods providers during usage time [4–7]. Therefore, in S-D logic, value is determined by the quality of a *value-in-use* experience and not just by the quality of goods' *value-in-exchange* [8, 9]. For instance, in the airline industry, jet turbine manufacturers used to follow G-D logic by selling turbines to airlines. However, since

airlines do not create value by owning turbines, but rather by the realization of airtime, manufacturers nowadays sell airtime to airlines instead of jet turbines [e.g., 10–12].

The information systems (IS) community has started investigating IS phenomena from an S-D logic and value co-creation perspective [e.g., 12–14]. Consequently, the implications of S-D logic and its core concept of value co-creation for IS are discussed in prevalent IS literature [15]. Against this backdrop, we argue that, since S-D logic fundamentally re-conceptualizes economic exchange [5, 16], this paradigmatic reorientation requires to rethink management of business and economic exchange. This, in turn, requires to rethink the way business is analyzed, designed, and managed—and, consequently, the way IS for business support are analyzed and designed.

To this end, we offer a *value co-creation ontology*—comprising constituent concepts of value co-creation and their inherent relationships—as one of the first steps toward reflecting S-D logic and value co-creation in IS analysis and design (ISAD). In this study, ontology refers to an artifact, constituted by a specific set of concepts and their inherent relations used to describe a certain reality [17]. However, the surge in academic and practical interest in value co-creation highlights an equivocal understanding of its conceptual boundaries and its real-world implications. McColl-Kennedy et al. [18], for instance, developed a catalogue of 27 different definitions of value co-creation, emphasizing underlying theoretical, semantic, and terminological ambiguity. The same holds true for constituent concepts of value co-creation from the lens of S-D logic such as the term service that has been defined in many different ways [19]. To wit, a multidisciplinary reference vocabulary in the form of an unambiguous value co-creation lexicon is not available. This lack—hindering the grounding of IS on value co-creation—has been raised not only in IS literature [20], but also in marketing research as the reference discipline of S-D logic [21, 22]. As such, the purpose of this study is (i) to develop an unambiguous and multidisciplinary *value co-creation glossary* of its constituent concepts; and (ii) to eventually derive an *ontology of value co-creation* comprising its constituent concepts and their relationships.

The remainder of this paper is structured as follows. Section 2 presents the theoretical background of S-D logic and value co-creation in marketing research and reviews the presence of S-D logic and value co-creation in IS and ontology research. Section 3 explicates the employed research methodology and its stages. Section 4 presents the resulting ontology. Section 5 discusses the ontology and concludes.

2   Theoretical Background and Research Motivation

Since this study aims to develop an ontology of value co-creation from an S-D logic perspective, we first provide an overview of S-D logic and value co-creation from their root discipline of marketing research. We then review the presence of S-D logic and value co-creation in both IS and ontology literature to motivate and position our study.

S-D Logic and Value Co-creation in Marketing Research. The cumulative effort of bringing S-D logic to the forefront of marketing research has resulted in its core concept of value co-creation [4, 7, 23]—that is, "the processes and activities that underlie resource integration and incorporate different actor roles in the service

ecosystem" [15, p. 162]. The basic conceptualization of value co-creation is pivotal for S-D logic in that it integrates all the related concepts and their relations. The process of value co-creation thus integrates S-D logic's core concepts namely, actor, resource, service, institutional arrangement, and service ecosystem [3]. In also explicating their relationships, value co-creation holds that actors integrate resources through service exchange which is configured by institutional arrangements through which service ecosystems endogenously emerge [3, p. 3]. S-D logic finds its root in marketing research, where it gained momentum since its inception by the landmark study of Vargo and Lusch [1]. To develop a comprehensive conceptual foundation, Vargo and Lusch proposed—and further made amendments on [e.g., 2, 3]—a set of foundational premises for S-D logic to distinguish it from G-D logic.

S-D Logic and Value Co-creation in IS Research. S-D logic and its core concept of value co-creation have been influential in theorizing IS phenomena [14]. Extant IS research promotes and employs the notion of S-D logic and value co-creation through four streams. While the first stream offers an *early introduction* to S-D logic and value co-creation [e.g., 16, 24], the second stream introduces and examines *service innovation* [e.g., 12, 15]. In the third stream of research, *realization and practical implications of S-D logic and value co-creation* are illustrated [e.g., 25, 26]. Finally, since S-D logic offers new, distinctive philosophical assumptions about economic exchange, the fourth stream of research promotes *S-D logic and value co-creation as a theoretical lens* to study various IS phenomena. This lens has been dominantly applied for studying co-creation of IT value [e.g., 27].

S-D Logic and Value Co-creation in Ontology Research. Extant research uses the notion of *ontology* as a pragmatic approach to structure and codify knowledge about the concepts, relationships, and axioms/constraints pertaining to a domain (i.e., value co-creation) [28]. As such, extant IS research refers to the use of ontologies in ISAD as *ontology-driven IS* in which an explicit ontology plays a central role in analyzing and designing all of the system aspects and components [17, 29]. There are few studies aiming at one or a few fragmented aspects of value co-creation in ontology development endeavors. Nevertheless, no such work on a value co-creation ontology from an S-D logic perspective is available. We thus argue that the shift to S-D logic requires to eventually account for the central role of value co-creation in IS analysis and design by means of a value co-creation ontology. The latter would support the development of methods and techniques for business analysis from a value co-creation perspective and, thereby, enable the analysis and design of IS that support such business context. Therefore, in line with current applications in IS research, we posit that S-D logic's conceptual foundations with its unifying core concept of value co-creation provide a sound theoretical basis to offer a complementary view on ontology for IS. A sound ontology of value co-creation is fundamental in facilitating ontology-driven IS [17, 30], which eventually fosters the realization of value co-creation through its reflection in the design of new IS. The latter thereby lays emphasis on the role of IS in materializing S-D logic.

3   Methodology

To systematically develop a value co-creation ontology, we opt for *Methontology*, a step-by-step and well-structured methodology to build ontologies [31]. *Methontology* has been frequently used in different disciplines such as artificial intelligence, computer science, IS, and law [e.g., 32, 33] to guide ontology development in various domains. As shown in Figure 1, while stages I to IV of *Methontology* are within the scope of the paper at hand, stages V and VI are out of scope owing to our primary focus on synthesizing concepts and relations entailing the concept of value co-creation. Table 1 summarizes *Methontology*'s stages.
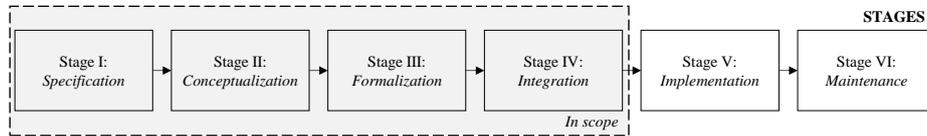

Figure 1. Stages of *Methontology* for Ontology Development [adapted from 31]

Table 1. The Applied Stages of *Methontology* in our Ontology Development [28, 31]

Stage	Purpose	Activities
I. Specification	Identification of area and scope	*Scoping:* Defining the ontology's purpose, application scenarios, and morphological analysis; *Cue-N-Anchoring:* Grounding the ontology on foundations of S-D logic
II. Conceptua-lization	Structuration of domain knowledge	*Baselining:* Conducting a systematic literature review to extract main concepts and relations; *Listing:* Developing a glossary of concepts' definitions, explanations, and examples
III. Formalization	Representation of specifiable ontology	*Crisscrossing:* Identifying and representing relationships; *Evaluating:* Verifying the ontology's soundness against theoretical foundations in seminal S-D logic studies
IV. Integration	Reuse of existing ontologies' constituents and documentation	*Reusing:* Integrating relevant components of existing ontologies; *Documenting:* Presenting the developed ontology through UML class diagram

Table 2. The Scope of the Value Co-creation Ontology Based on [28]

Dimension	Scope	Justification	Compared to
Positioning	Computa-tional ontology	Focus on future computational implementation and use in the pursuit of other pragmatic objectives in a specific application *instead of* the purely academic pursuit to know about the nature of reality [17].	Philosophical ontology; Conceptual schema
Domain	Ontology *for* IS	Focus on specifically and expressly designing the ontology as foundation *for* IS analysis and design *instead of* an attempt to capture a comprehensive ontology *of* all the concepts and relationships that are pertinent to understanding and reasoning about the IS universe [28].	Ontology *of* IS
Type	Domain-level	Focus on the specific domain of value co-creation from an S-D logic perspective *instead of* (i) very general concepts that are not specific to any domain (top-level) or (ii) processes/tasks to be accomplished in a specific application (application-level) [28].	Top-level; Application-level
Formality	Semi-formal	Focus on expressing content in a restricted and structured form, representable in an artificial formally defined language (e.g., UML) *instead of* no (informal) or very rigorously specified (mathematical, programmable) definitions, rules, and structures (formal) [34].	Informal; Formal

Specification (Stage I) is concerned with analyzing, explicating, and documenting—in natural language—the ontology's purpose (i.e., problem, intended uses, and users), level of formality (i.e., informal, semi-formal, or formal), area, and scope. Drawing on the ontology's *ex ante* intended purpose and application scenarios, this stage comprises *scoping* and *anchoring* activities. *Scoping* defines the area and scope of the ontology for which we use morphological distinctions offered by Kishore and Sharman [28] (see Table 2). *Anchoring* specifies a set of domain-specific, context-specific, or literature-specific ideas as anchors. The proposed ontology should be adequately grounded in these anchors so that the development effort is both guided and protected from loss of direction (*cue-n-anchor* notion) [28]. To this, we base our ontology of value co-creation on the theoretical foundations of S-D logic. The ontology's specified level of formality, area, and scope are the results of this stage.

Table 3. Glossary of Value Co-creation's Core Concepts from the S-D Logic Perspective

Concept	Definition/Explanation	Example
Value	In G-D logic, is fundamentally derived and determined in *exchange* (i.e., embedded in a firm's output and captured by price). In S-D logic, value is fundamentally derived and determined in *use* (i.e., the integration and application of resources in a specific context) [35, p. 145]. As such, in S-D logic, there is no value created until goods are used—that is, experience and perception are essential to value determination [1–3].	Dependable jet pro-pulsion at optimal efficiency
Actor	In S-D logic, actors are any social and economic agent with varying sizes (e.g., individual organism, family, firm), who provide input to the value creation processes for the benefit of the other actor [36, 37]. Compared to G-D logic, S-D logic thus posits a "generic actor" [3, p. 3] abstraction that disassociates actors from predesignated roles (e.g., "producers" and "consumers"). As such, the role of actors is to co-create value through resource integration and service provision in a network of other actors [15, 36].	Passenger, jet turbine producer, airline, airport operator
Resource	While in G-D logic resources have historically been viewed as tangible things that humans use for support, often natural resources that are fixed or limited in supply, S-D logic, however, refers to resources as anything an actor can draw on for support [1, 15]. As such, S-D logic underscores that resources comprise not only tangible, natural, and static resources, but also intangible and dynamic functions of human ingenuity and appraisal. Furthermore, they can be internal to actors and under their control or external to actors but capable of being drawn on for support [38].	Turbine, fuel, sensor, flying skills, turbine maintenance skills
Service	In S-D logic, service is the fundamental basis of economic exchange, which refers to "applying specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another actor or the actor itself" [15, p. 158]. While in G-D logic service refers to a unit of output in exchange for another good (e.g., money), in S-D logic service refers to the *processes and activities* of applying specialized competencies for the benefit of and in conjunction with another actor [5, 39].	Airtime
Institutional Arrange-ment	Being central to understanding human systems and social activity in general [3, p. 7], *institutional arrangements* are fundamental in understanding the structure and dynamics of value co-creation. They refer to sets of interrelated humanly devised rules, norms, and beliefs that enable and constrain actors' actions and that make the exchange of service in their respective ecosystem predictable and meaningful (sometimes referred to as *institutional logics*) [3, p. 7].	Federal Aviation rules, regulation, guidelines
Service Ecosystem	G-D logic underscores a dyadic process of *value exchange* in traditional supply chains (i.e., neoclassical industrial perspective). S-D logic posits a collaborative process of *value co-creation* in service ecosystems (i.e., network-centric perspective). A service ecosystem is "a relatively self-contained, self-adjusting system of mostly loosely coupled social and economic (resource integrating) actors connected by shared institutional logics and mutual value creation through service exchange" [15, p. 162].	Aviation ecosystem

Conceptualization (Stage II) is concerned with structuring the domain knowledge in a conceptual model that describes the problem and its solution in terms of the domain vocabulary. Drawing on the ontology's level of formality, area, and scope (from

specification stage), this stage comprises *baselining* and *listing* activities. While in the *baselining* activity we review relevant literature to uncover all relevant concepts and to eliminate redundancies and ambiguities, we develop a glossary as well as a tentative structure of the ontology in the *listing* activity [28]. We conduct *baselining* by means of a literature review[1], and carry out *listing* through developing a glossary of value co-creation concepts comprising definitions, explanations, and examples of the constituent concepts. The ontology's glossary of concepts and tentative structure are the results of this stage (see Table 3 and Table 4). We provide an example for each of the derived concepts by employing the jet turbine case of shifting from G-D to S-D logic [10–12].

Table 4. Glossary of Value Co-creation's Extended Concepts in S-D Logic

	Concept	Definition/Explanation	Example
Value	*Value Proposition*	"Value propositions establish connections and relationships among service systems" [35, p. 148]. Value propositions thus exist only to facilitate the value co-creation process and do not have value per se. Once a service beneficiary (e.g., customer) accepts a value proposition, he is an integrator of the value proposition (offered by service offeror) with his other resources in order to create value. This indicates and focuses on the notion of *value-in-use* [4, 24, 40].	Availability of airtime
	Value-in-exchange	"Value-in-exchange is the negotiated measurement offered and received (e.g., money and value proposition) among exchange partners" [35, p. 150]. As such, value-in-exchange occurs when the offeror offers a value proposition to the beneficiary or a service system offers a value proposition to another service system [1, 2, 35].	Money for airtime availability
	Value-in-use (-context)	"The customer's experiential evaluation of the product or service proposition beyond its functional attributes and in accordance with his/her individual motivation, specialized competences, actions, processes, and performances" [23, p. 293]. Value-in-use (context) indicates the use and co-creation of value proposition in the specific context of a service beneficiary or the specific context of a service system [1, 2, 4, 35].	Aircraft mobility during an actual flight
Actor	*Service Offeror*	Actor that (1) makes offers to other actors so that they cannot deliver value, but only offer value propositions; and (2) "collaboratively creates value following acceptance of value propositions, but cannot create and/or deliver value independently" [2, p. 7]. As such, the service offeror is both value facilitator (creator of value-in-exchange that does not create any value per se) as well as value co-creator (in fulfilment step). The offeror co-creates value during direct engagement and interaction with beneficiary [4, 5, 8, 39].	Jet turbine producer
	Service Beneficiary	Actor that (1) benefits from other actors that supply him with service or resources; and (2) always uniquely and phenomenologically determines value [2, p. 7]. As such, the service beneficiary is the realizer of value, i.e., co-creator of value-in-use to generate value based on the proposed resources from the offeror.	Airline, passenger
	Context	Uncontrollable, exogenous environmental conditions of surrounding social, ecological, and governmental contingencies [35]. For instance, environmental resources such as time, weather, and laws are always integrated in and relied on the value co-creation process. As such, "all actors are connected with other actors and other resources, and these connections provide the *context* for the actors to experience value" [15, p. 159].	Weather, air traffic control, operational issues
Resource	*Operand Resource*	Tangible, static, and passive components of goods or products that an actor acts on to obtain support (i.e., they enable or facilitate) (Vargo and Lusch, 2004). They are "seen as vehicles for service provision, rather than primary to exchange and value creation" [41, p. 374].	Sensor, aircraft, fuel

[1] We include marketing journals that are ranked *(world) leading* (tagged with *) by at least one of the ratings included in the 57th Harzing Journal Quality List (2016). We search in the Business Source Premier database employing the EBSCOhost search engine since S-D logic's inaugural year 2004 [1]. 30 selected papers have the phrases *"service-dominant"*, *"service logic"*, or *"dominant logic"*, on the one hand, and *"co-creat*"* or *"cocreat*"*, on the other hand, in abstract and in the title. In addition, we include studies on and/or using S-D logic that are published in the AIS basket-of-eight journals. This adds another 15 papers, most of which are part of the MISQ special issues on "Service Innovation in the Digital Age" [12] and on "Co-creating IT Value" [27]. The selected 45 papers are coded to identify constituent concepts of value co-creation guided by two recent literature reviews [7, 23] on value co-creation.

Table 4. (*continued*) Glossary of Value Co-creation's Extended Concepts in S-D Logic

	Operant Resource	Intangible, dynamic, and active resources (e.g., human knowledge and skill) that act on other resources to produce effects rather than being operated on (i.e., they initiate or trigger) [1]. They are seen as "the fundamental source of competitive advantage" [2, p. 7].	Flying skills, maintenance skills
Service	*Service Platform*	"A modular structure that consists of tangible and intangible components (resources) and facilitates the interaction of actors and resources (or resource bundles)" [15, p. 166]. As such, actors employ service platforms as a vehicle to facilitate their day-to-day service exchanges and to mutually co-create value.	Jet turbine
Service Ecosystem	*Service System*	"A dynamic value-cocreation configuration of resources, including people, organizations, shared information (language, laws, measures, methods), and technology, all connected internally and externally to other service systems by value propositions" [16, p. 399]. As such, service system is the basic abstraction of service science and S-D logic [16, 42]. In effect, a service ecosystem is a network of different service systems.	Airport operator system, airline system
	Service Exchange	Service systems' simultaneous, reciprocal activities and processes of accessing, adapting, and integrating operan*t* resources to create value for themselves and for other service systems [35]. Service exchange between different service systems is thus the basis for economic exchange and is a learning process towards value co-creation [1, 2, 35]. As such, the crux of the contrast between S-D and G-D logics lies in the basis of exchange. S-D logic focuses on the action of operan*t* resources, whereas G-D logic focuses on the exchange of operan*d* resources [1].	Exchange of airtime service between airline and turbine producer

Table 5. Relationships among Value Co-creation Ontology's Constituent Concepts

Relation	*Association to S-D logic's Foundational Premises (FPs) and Axioms*
R1: Actors *determine* value.	FP10 (AXIOM): Value is always uniquely and phenomenologically determined by the beneficiary. FP7: Actors cannot deliver value but can participate in the creation and offering of value propositions.
R2: Actors *integrate* resources.	FP6 (AXIOM): Value is co-created by multiple actors, always including the beneficiary. FP9 (AXIOM): All social and economic actors are resource integrators.
R3: A service instance *is composed of* at least one operant resource.	FP3: Goods are distribution mechanisms for service provision. FP4: Operant resources are the fundamental source of strategic benefit.
R4: Actors *exchange* service for service.	FP2: Indirect exchange masks the fundamental basis of exchange. FP5: All economies are service economies.
R5: Service *creates* value.	FP1 (AXIOM): Service is the fundamental basis of exchange.
R6: Institutional arrangements *configure* (i.e., enable/constrain) service and exchange.	FP11 (AXIOM): Value co-creation is coordinated through actor-generated institutions and institutional arrangements.
R7: Actors *create* institutional arrangements.	
R8: Institutional arrangements *determine* value.	
R9: Institutional arrangements *govern*/evaluate the emergence of service ecosystems.	
R10: A service ecosystem *is composed of* actors.	FP5: All economies are service economies. FP7 Actors cannot deliver value but can participate in the creation and offering of value propositions.

Formalization (Stage III) is concerned with compiling the specifiable ontology according to the chosen degree of formality from the *specification* stage (i.e., informal, semi-formal, formal). Drawing on the ontology's glossary of concepts and tentative structure (from *conceptualization* stage), this stage encompasses *crisscrossing* and

evaluating activities. *Crisscrossing* structures the baseline glossary into a specifiable ontology comprising all structural constituents required in ontology construction. We execute *crisscrossing* by (i) extracting relationships from S-D logic literature and (ii) representing the extracted relationships. For representation, we use existing labels and notations of prevalent modelling languages as well as further labels that we extract from S-D logic literature (see Figure 2 and Figure 3). *Evaluating* is concerned with testing the emerging structure for soundness after the addition of each single new relationship in a coherent fashion [28]. We *evaluate* ontology's soundness against the outlined eleven foundational premises as well as the five constraints/axioms in [3] (see Table 5).

Integration (Stage IV) is concerned with reusing existing ontology constituents (i.e., concepts, relationships, definitions, constraints/axioms, and attributes) that are already built into other ontologies. Drawing on the specifiable ontology, this stage is made of *reusing* and *documenting* activities. *Reusing* selectively and sequentially integrates existing ontologies into the given ontology and documents the ontology after each integration step [28]. In developing an ontology of value co-creation, we reuse components from existing ontologies that focus on S-D logic and/or value co-creation. *Documenting* represents the developed ontology in a document for communication purposes [31] for which we use a UML class diagram (see Figure 2 and Figure 3). Following these four stages, *implementation (Stage V)* is concerned with codifying the ontology in a formal programming language (e.g., C++, Prolog, Ontolingua), and *maintenance (Stage VI)* is concerned with modifying the ontology's constituents (e.g., definitions) during usage time. Stages V and VI are out of scope. In the next section, we explicate how the realization of the four stages and their activities have yielded the *value co-creation ontology form the perspective of S-D logic*.

4   Value Co-creation Ontology

Here we report on the value co-creation ontology (see Figure 2 and Figure 3). We developed it by iteratively (i) extracting relationships between value co-creation's concepts and (ii) representing the relationships in UML class diagrams (see Stage III).
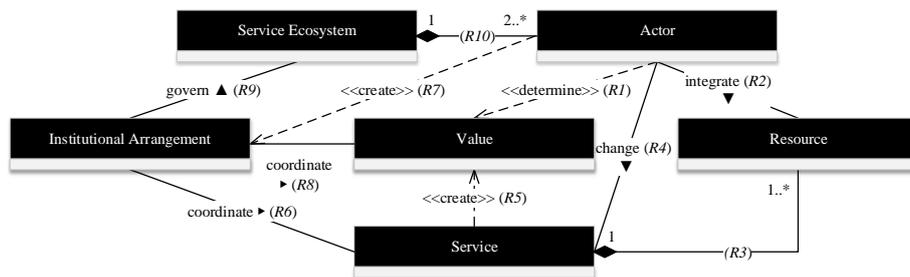

Figure 2. Value Co-creation Ontology for Core Concepts

Drawing on value co-creation ontology's core concepts (see Table 3 and Figure 2), value is always uniquely and phenomenologically determined by the actor being

supplied with a service (*R1*). As such, S-D logic underscores that value occurs through the processes and activities underpinning usage and consumption by an actor who integrates its resources in realizing the value (*R2*). Therefore, a service requires at least one resource (*R3*) and it is exchanged between actors to access, adapt, and integrate resources among themselves for the benefit of another actor or the actor itself (*R4*). An instance of a designed, offered, and exchanged service creates an instance of value once the service is received and used by an actor (*R5*). To enable and constrain exchange of service, each service instance is configured guided by institutional arrangements (*R6*). Notably, rules, norms, beliefs, and their interrelation (e.g., civil law, criminal law) are not nature-given entities; they are rather created by actors (*R7*). Since these institutional arrangements are humanly devised, they also determine value in that they impact an actor's interpretation and determination of what actually is valuable and what is not (*R8*). Actors are then connected by their shared institutional logics and mutual value co-creation, both of which govern and evaluate the emergence of the nested and overlapping service ecosystems (*R9*). As such, institutional arrangements are key in fostering cooperative and coordinated behavior among actors. Eventually, service ecosystems are composed of at least two loosely coupled actors (*R10*). Building on the ontology's extended concepts (see Table 4), Figure 3 further represents all concepts (both core and extended) and their relationships. Table 5 specifies the relationships among the ontology's constituent concepts.
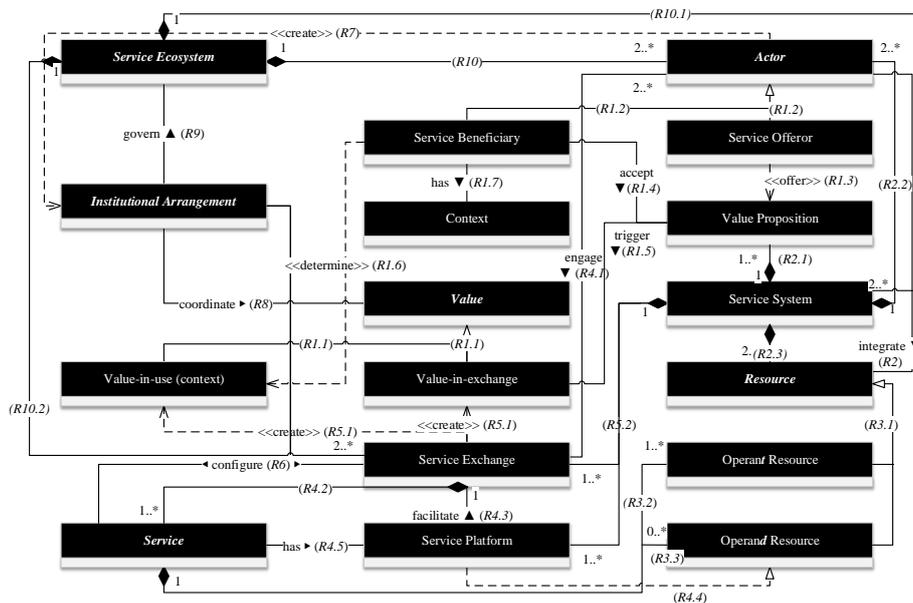

Figure 3. Value Co-creation Ontology for Extended Concepts (including **Core Concepts**)[2]

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[2] Relation 4 (R4) (see Figure 2) is not present in Figure 3 due to the inclusion of the *service exchange* concept.

5   Discussion and Conclusion

This study starts with the premise that information systems (IS) analysis and design (ISAD) should account for reorientation from goods-dominant (G-D) to service-dominant (S-D) logic. One of the primary steps toward reflecting S-D logic, and its core concept of value co-creation, in ISAD is to develop an ontology of value co-creation based on S-D logic's theoretical foundations. To this end, this study develops an ontology of value co-creation for IS from an S-D logic perspective. Through employing *Methontology*, we synthesize the evolving S-D logic literature into a glossary of value co-creation's constituent concepts and represent their inherent relationships. We do so in the structure of a computational, semi-formal, and domain-level ontology for IS.

Practitioners are provided with an organizing language to understand, develop, and apply value co-creation. By applying the ontology, they can more clearly define the specific aspects required in facilitating value co-creation. Practitioners might anticipate areas of concerns and take appropriate measures by means of the ontology. Reflecting the ontology can be valuable for organizations that may be motivated to account for and realize S-D logic, but may not be aware of inherent intricacies and managerial actions to cope with. We are hopeful that such organizations would benefit from (1) reflecting on value co-creation's impact on organizations; and from (2) consciously utilizing relevant conceptual knowledge embedded in this work in their ISAD activities.

The study's results draw on, integrate in, and extend current studies in both IS and marketing research. Concerning IS research, our study integrates into both (i) IS studies that emphasize and employ S-D logic and value co-creation in advancing the discipline [e.g., 14, 15, 43]; and (ii) IS research that call for the use of ontologies in ISAD as *ontology-driven IS* [17, 29]. As such, we extend IS research in offering a *value co-creation ontology* aimed at grounding ontology-driven IS on value co-creation. We also demonstrate the consolidation of so far detached *activities* of ontology building for IS [28] in traditional *stages* of ontology development [31]. Concerning marketing research, this study draws on pertinent, seminal studies on value co-creation and S-D logic [e.g., 3] to synthesize and integrate value co-creation's constituents. Following marketing scholar's call for a multidisciplinary reference vocabulary lexicon [2, 24, 44], we extend existing marketing research through synthesizing the diverse body of value co-creation knowledge and providing a systematic representation of its underlying concepts and their relationships.

However, since the world of ontologies is vast and capturing conceptual boundaries and empirical constituents of value co-creation is complex as well, we anchor our approach in S-D logic with its rigorous, yet specific, interpretation and conceptualization of value co-creation. For instance, scholars deem *co-production* a dimension of value co-creation, which is potentially abstracted by, but not explicitly integrated in S-D logic [23]. Moreover, this study does not realize *Methontology*'s stages V and VI—concerned with the ontology's implementation and maintenance—due to our primary focus on specifying and formalizing the ever-growing domain of interest. This calls for future research in using the developed ontology as a basis to its further implementation and refinement. The developed ontology can also inform prospective endeavors in developing a value co-creation modeling language.

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