

Rights and Intentions in Value Modeling

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Abstract In order to manage increasingly complex business and IT environments, organizations need effective instruments for representing and understanding this complexity. Essential among these instruments are enterprise models, i.e. computational representations of the structure, processes, information, resources, and intentions of organizations. One important class of enterprise models are value models, which focus on the business motivations and intentions behind business processes and describe them in terms of high level notions like actors, resources, and value exchanges. The essence of these value exchanges is often taken to be an ownership transfer. However, some value exchanges cannot be analyzed in this way, e.g. the use of a service does not influence ownership. The goal of this chapter is to offer an analysis of the notion of value exchanges, based on Hohfeld's classification of rights, and to propose notation and practical modeling guidelines that make use of this analysis.

1 Introduction

In order to manage increasingly complex business and IT environments, organizations need effective instruments for understanding their internal operations and strategies as well as their external interactions. Essential among these instruments are enterprise models, i.e. computational representations of the structure, processes, information, resources, and intentions of organizations. Enterprise models may be created on varying levels of abstraction depending on their purpose. A high level of abstraction can be achieved in different ways, e.g. by focusing on essential communicative acts [2] rather than specific message exchanges, by investigating commitments and obligations [11] rather than the way these are fulfilled, or by

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focusing on the business motivation behind processes. Models on this high level of abstraction are known as business models or value models [13].

Value models have a special characteristic in that they are formulated declaratively without taking into account the order of activities or other forms of activity dependencies. A value model focuses on high level and business oriented objects like resources, actors, and value exchanges. It describes business interaction in terms of intentions and goals, which is a perspective that has been used also in other areas of the information systems field [14, 16]. In contrast, a process model typically includes procedural and technical details including messages and activities as well as control and data flow. The high abstraction level of value models makes them appropriate for representing business cases in a compact and easily understandable way.

A basic notion in value models is that of value exchange, meaning that something of value is transferred between two actors. The essence of this exchange is often taken to be an ownership transfer, i.e. ownership rights on a resource are transferred from one actor to another. However, some value exchanges cannot be analyzed in this way, e.g. the use of a service does not influence ownership. Furthermore, many value exchanges are accompanied by changes of physical states, such as location, which are unrelated to ownership relationships. Thus, addressing only ownership transfers in value modeling will result in impoverished models that exclude important aspects of value exchange and creation. Therefore, there is a need for a detailed analysis of the meaning of value exchanges that will help in the design of rich value models that include not only ownership transfers but also other forms of value exchange and creation. The goal of this chapter is to offer an analysis of the notion of value exchanges but also to propose a notation that makes use of this analysis as well as guidelines supporting the design of value models.

The chapter is structured as follows. Section 2 gives an overview of related research, in particular value modeling and Hohfeld's classification of rights. Section 3 analyses the notion of value exchanges by describing their context and construction in the form of a conceptual model. Based on this analysis, Sect. 4 proposes an extension of the e3value modeling notation and guidelines for designing value models. Section 5 concludes the chapter with a summary of its contributions and suggestions for further work.

2 Related Work

This section introduces two of the main ontologies for value modeling, REA and e3value, as well as Hohfeld's classification of rights, which is used for analyzing basic notions in value modeling.

2.1 The REA Ontology

The REA (Resource-Event-Actor) ontology was formulated originally in [11] and developed further in a series of papers, e.g. [5]. Its conceptual origins can be seen

as a reaction to traditional business accounting where the needs are to manage businesses through a technique called double-entry bookkeeping. This technique records every business transaction as a double entry (a credit and a debit) in a balanced ledger.

The core concepts in the REA ontology are resources, events, and actors. The intuition behind the ontology is that every business transaction can be described as events where two actors exchange resources. To get a resource an agent has to give up some other resource. For example, in a purchase a buying agent has to give up money to receive some goods. The amount of money available to the agent is decreased, while the amount of goods is increased. There are two events taking place here: one where the amount of money is decreased and another where the amount of goods is increased. This correspondence of events is called a duality. A corresponding change of availability of resources takes place at the seller’s side. Here the amount of money is increased while the amount of goods is decreased.

2.2 The e3value Ontology

The e3value ontology [6, 7] aims at describing exchanges of value objects between business actors. It also supports profitability analysis of the business model created. The basic concepts in e3value are actors, value objects, value ports, value interfaces, value activities and value exchanges, see Fig. 1. An actor is an economically independent entity. An actor is often, but not necessarily, a legal entity, e.g., enterprises and end-consumers. A value object is something that is of economic value for at least one actor, for example a car, Internet access, or a stream of music. (We will sometimes use “resource” as a synonym for “value object”.) A value port is used by an actor to provide or receive value objects to or from other actors. A value port has a direction, in (e.g., receive goods) or out (e.g., make a payment) indicating whether a value object flows into or out of the actor. A value interface consists of in and out ports that belong to the same actor. Value interfaces are used to model economic reciprocity. A value exchange is a pair of value ports of opposite directions belonging to different actors. It represents one or more potential trades of value objects between these value ports. A value activity is an operation that could be carried out in an economically profitable way for at least one actor.

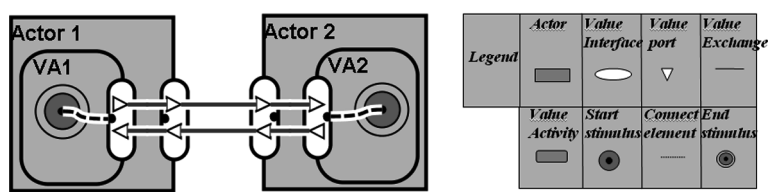


Fig. 1 Basic e3value concepts

2.3 Hohfeld's Classification of Rights

A central component in any value exchange is the transfer and creation of rights. The rights being created can be of different kinds, and it is easy to confuse what rights can mean and how they can be distinguished. In order to clarify the role of rights in value exchanges we will make use of the work of W. N. Hohfeld [8, 9], who proposed a classification identifying four broad categories of rights: claims, privileges, powers, and immunities.

- One actor has a *claim* on another actor if the other actor is required to act in a certain way for the benefit of the first actor, typically by carrying out some action. Conversely, the second actor is said to have a duty to the first actor. An example is a person who has a claim on another person to pay an amount of money, implying that the other person has a duty to pay the amount. Claims always exist within a social structure that is able to monitor and enforce them.
- An actor has a *privilege* on an action if she is free to carry out that action without any interference from a social structure. Some examples of privileges are free speech, free movement, and free choice of marriage partner, which mean that a person is able to talk, move, and choose a marriage partner without interference from the state. Another example is that a person owning some goods has privileges to use the goods in various ways.
- A *power* is the ability of an actor to create or modify a relationship. An example is that a person owning a piece of land has the power to sell it to someone else, thereby creating a new ownership relationship for that piece of land.
- *Immunity* is about restricting the power of an actor in creating formal relationships for other actors. For example, a native people can have an immunity for state legislation concerning their property rights, meaning that the state does not have the power to legislate laws that modify the existing property rights of members of the native people.

Most relationships consist of a combination of several of these rights. For example, if you own a car it means that you have privileges on using it and you also have the power to lend the car or sell it, i.e. creating new ownerships involving other actors.

3 Value Context Model

In this section, we introduce a conceptual model that provides a context for the basic notions of value models. This value context model will include actors carrying out value exchanges and the social structures that form the background of the exchanges. Furthermore, the model will represent how actions carried out by actors can be combined into joint actions that communicate intentions and may result in creating and modifying social relationships. These relationships will be

defined in terms of the rights they include. Based on these notions, value exchanges will be modeled as a combination of actions that modify social relationships as well as physical states. The starting point of the model is the OASIS [12] Reference Foundation Architecture for Service Oriented Architecture, which aims at providing a common language for understanding SOA as well as addressing issues involved in constructing, using and owning an SOA-based system. We have chosen this architecture as a basis, since it provides an established foundation for many of the concepts needed to analyze the meaning of value models.

3.1 Actors and Social Structures

3.1.1 Actor

An *actor* is an entity, human, non-human or organization of entities, that is capable of action (taken from [12], Sect. 3.1.1).

The main characteristic of an actor is its ability to take action, which means that an actor can be a human, an organization or even a computational agent. It is not required that an actor be responsible for its actions, as this only pertains to legal entities. Actors, as almost all concepts in the value context model, may exist on a knowledge level as well as on an operational level. According to [4] the operational level models concrete, tangible individuals in a domain, while the knowledge level models information structures that characterize categories of individuals on the operational level. The value context model hence distinguishes between actor types (categories of actors like lawyer, barrister, and teacher) and actors (specific and often tangible concepts like a concrete person).

Actors may be associated to each other through relationships. A relationship may occur spontaneously between two or more humans, as in a friendship. However, many relationships can only occur and exist within the context of some pre-existing social structure. For example, a marriage can only exist within some legal system of a state, and a job position is only meaningful in the context of some organization. In this way, social structures provide a frame or context within which relationships can exist and be meaningful. A relationship typically has different meanings in different social structures, for example a marriage may impose different rights and obligations on the involved actors depending on the social structure in which it exists. Examples of social structures are a company, an association, an NGO, a country, and an international organization.

3.1.2 Social Structure

A *social structure* is a relationship created by a set of actors with the purpose of governing some of their existing and future relationships. A social structure embodies some of the cultural aspects that characterize the relationships and actions among a group of actors (partially based on [12], Sect. 3.2).

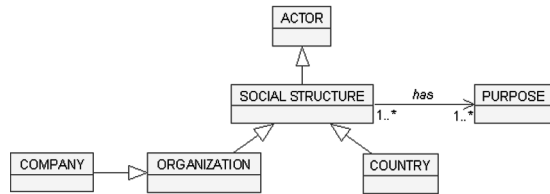
Social structures are set up by humans in order to fulfill some purpose, typically to provide value for their environments. For example, the purpose of a school is to educate people, and the purpose of a car manufacturer is to provide actors with cars. A special feature that distinguishes social structures from other kinds of relationships is that they can be actors themselves. The actors who are members of the social structure can be said to have constructed a higher level actor, which is capable of performing its own actions.

3.1.3 Purpose

The *purpose* of a social structure is the value it is intended to provide to its environment (partially based on [12], Sect. 3.2).

Figure 2 summarizes the relationships between actors, social structures, and purposes; it also shows some examples of social structures.

Fig. 2 Actors and social structures



3.2 Actions

3.2.1 Action

An *action* is intentionally carried out by one actor and gives rise to a state change (partially based on [12], Sect. 3.1.2.1).

A distinguishing feature of an action is that it is always carried out with an intention to achieve some effect. Events are similar to actions as they also result in effects, but they happen accidentally or as a result of natural causes, e.g. medical side effects and earthquakes.

In order to achieve a desired effect, it is often required that several actors together carry out a number of actions. One example could be a number of workers that together assemble a vehicle. Another example is a person speaking to another person who listens to what is said. Only when both the speaker has made his statement and the listener has heard and understood it, there will be an effect.

3.2.2 Joint Action

A *joint action* is a coordinated set of actions involving the efforts of two or more actors (taken from [12], Sect. 3.1.2.2).

3.2.3 Communicative Action

A *communicative action* is a joint action in which an actor communicates with one or more other actors (taken from [12], Sect. 3.1.3).

A communicative action is a joint action where information is conveyed from the speaker to the listener. It consists of one speaking action, where the speaker states some content, and a listening action, where the listener acquires and understands the content. While some communicative actions are carried out only with the purpose of transferring information from the speaker to the hearer, many communicative actions also have additional purposes, as analyzed in speech act theory, [15]. Some communicative actions are meant as requests for the listener to carry out some action, while others are meant as promises by the speaker to carry out something. In fact, some communicative acts may on the surface appear as pure assertions by the speaker, while they actually carry another purpose such as a request. For example, if someone states “it is cold in this room”, it may look like a straight-forward assertion but is actually a request for the listener to close the open window in the room.

Some communicative actions may ultimately give rise to changes within a social structure through modifying the relationships between actors in that structure or their perceptions of the world. An example could be an employee placing a purchase request to the purchasing department in a company. This request is a communicative action but it will also result in an obligation for the purchasing department to fulfill the request of the employee (given that certain conditions are fulfilled). Thus, the employee’s request changes the relationships in the enterprise. In order to clarify the effects of communicative actions we introduce the notion of social action.

3.2.4 Social Action

A *social action* is a joint action that gives rise to social relationships (partially based on [12], Sect. 3.3).

In the next section we will discuss social relationships in more detail, but intuitively they consist of a number of components, including rights, obligations, prohibitions, permissions, and expectations of behavior patterns. In this chapter, we will focus on the formal aspects of social relationships, in particular rights. Communicative actions and social actions are related as a communicative action may count as a social action under certain circumstances. This means that when two actors carry out a communicative action, they thereby also carry out a social action. For example, when an employee places a purchase request to a purchasing department, the two actors carry out a communicative action where the employee informs the purchasing department about her need and asks the department to fulfill it. Under certain circumstances (the employee is correctly authorized, the cost of the request is within budget, etc.) this communicative act will also count as a social act that gives rise to an obligation for the purchasing department to fulfill the request (a social relationship). In this way, an action in one system can count as an action in another system – changing the states of communicating actors can count as changes within a social structure.

3.2.5 Counts As

Counts as is a relationship between two logical systems in which an action, event or concept in one system can be understood as another action, event or concept in another system (taken from [12], Sect. 3.1.4).

Figure 3 summarizes the relationships between actors, actions, joint actions, communicative actions, social actions, and social relationships. In Sect. 3.3 the concept “Counts as” is further modeled and analyzed in the context of how relationships come into being and get their meaning within social structures.

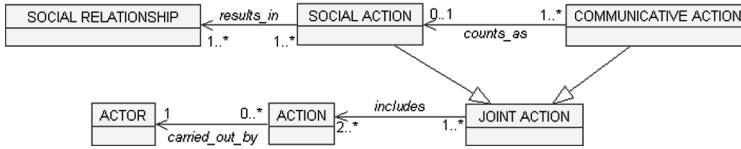


Fig. 3 Actions and social relationships

3.3 Social Relationships

3.3.1 Social Relationship

A *social relationship* is an association between two or more actors, each of whom plays a role in the relationship, that is defined in terms of the rights the actors have in relation to each other.

A social relationship can only exist within the context of a social structure, as it gets its meaning from that structure. For example, a purchase order (a social relationship) is only meaningful within an organization and its surrounding legal environment – if the organization ceases to exist, the purchase order does not have any meaning. Our definition of social relationship can be seen as a specialization of the notion of social fact in [12].

A social relationship involves a number of actors that play different roles in the relationship, for example there are husband and wife roles in a marriage, and buyer and seller roles in a purchase order. A marriage (a social relationship) in one social structure may include two roles: a husband role (male) and a wife role (female) imposing different rights (or equal rights) on the two actors connected through the marriage. In another social structure, a marriage may hold between two partners independently of whether the partners are of different gender or not. Thus, the meaning of a role is dependent on the social structure in which it exists.

3.3.2 Role

A *role* in a social relationship type is a set of rights that an actor playing that role in a relationship has towards the other roles in the relationship (partially based on [12], Sect. 3.2.1).

3.3.3 Right

A *right* is either a claim, a privilege, a power, or an immunity as defined by Hohfeld, see Sect. 2. A privilege or a claim may concern some resource or action, while a power and immunity concern a relationship i.e. power is the right to modify or create a social relationship, while immunity is the right (for an actor) to be excluded from certain social relationships.

An example of these notions is a purchase order (a social relationship) in which the buyer (a role) has a claim (a right) on the supplier (a role) to deliver some product (an action) and the supplier has a claim (a right) on the supplier to pay for the product (an action). Two important types of social relationships are commitments and ownerships.

3.3.4 Commitment

A *commitment* is a relationship between two actors where the rights involved in the relationship primarily consist of a claim, where one actor is obliged to carry out some action for another actor. In other words, one actor is committed to carry out some action for the benefit of another actor.

3.3.5 Ownership

An *ownership* is a social relationship between an actor and a social structure where the rights pertain to some resource. The rights involved in an ownership are primarily privileges (the actor is allowed to carry out certain actions on a resource without any interference from the social structure) and powers (an actor is entitled to create or modify a social relationship). An example is that a person owning a book has the right to read the book and even destroy it but also the right to transfer the ownership to someone else by giving the book away, thereby terminating one social relationship and creating another.

3.3.6 Authority

Authority is the right to act as agent on behalf of an organization or another person (taken from [12], Sect. 3.2.1).

If an actor has the correct authority, some of its actions will count as actions of the organization for which it acts. For example, if an employee at a company writes out a check, it will count as a payment by the company if the employee is correctly authorized.

3.3.7 Resource

A *resource* is any entity of some perceived value that has identity (taken from [12], Sect. 3.3.3). A resource type describes categories of resources.

A similar definition of the term “resource” may be found in REA, see Sect. 2.1 or in the e3value concept of value object, see Sect. 2.2. Examples of resource types are goods, land/real estate, and intellectual property. In some cases relationships can be resources, for instance an invoice (a commitment-relationship between two actors where one actor has to reimburse the other actor) may constitute a resource.

As the meaning and creation of relationships may vary between social structures, we need rules for defining them. In other words, rules model what rights hold for roles and relationships within a given social structure and how these roles and social relationships come into existence in the same social structure. There are three types of rules: meaning rules, derivation rules, and counts as rules.

3.3.8 Meaning Rule

A *meaning rule* defines what rights hold for a certain role in a social relationship relative to a social structure.

To be a king (a role) in Sweden (a social structure) entails certain privileges, claims and powers. A privilege may be to use certain castles (but not to give them away so being king of Sweden does not entail an ownership of the castles). Claims include a yearly allowance from the social structure (Sweden), and the powers encompass the right to appoint and dismiss members of court. To be the king of Great Britain entails considerably more privileges and powers compared to Sweden.

3.3.9 Derivation Rule

A *derivation rule* defines how social relationships and roles come into existence. A derivation rule tells which social relationships a social action gives rise to within a certain social structure.

From a modeling point of view, a derivation rule can be seen as a reification of the “results in” association in Fig. 3, which makes the association relative to a social structure. Similarly, the “counts as” association in Fig. 3 can be reified as in the following definition.

3.3.10 Counts As Rule

A *counts as rule* defines what communicative actions count as social actions relative to a social structure.

Figure 4 summarizes the relationships between social structures, social relationships, the various rights that define a social relationship within a social structure, and the rules that define the creation of social relationships.

3.4 Value Exchanges

The notion of value exchange in value models means that something of value is transferred from one actor to another. This exchange often includes a change of ownership, but as the analysis above shows there are also other kinds of right

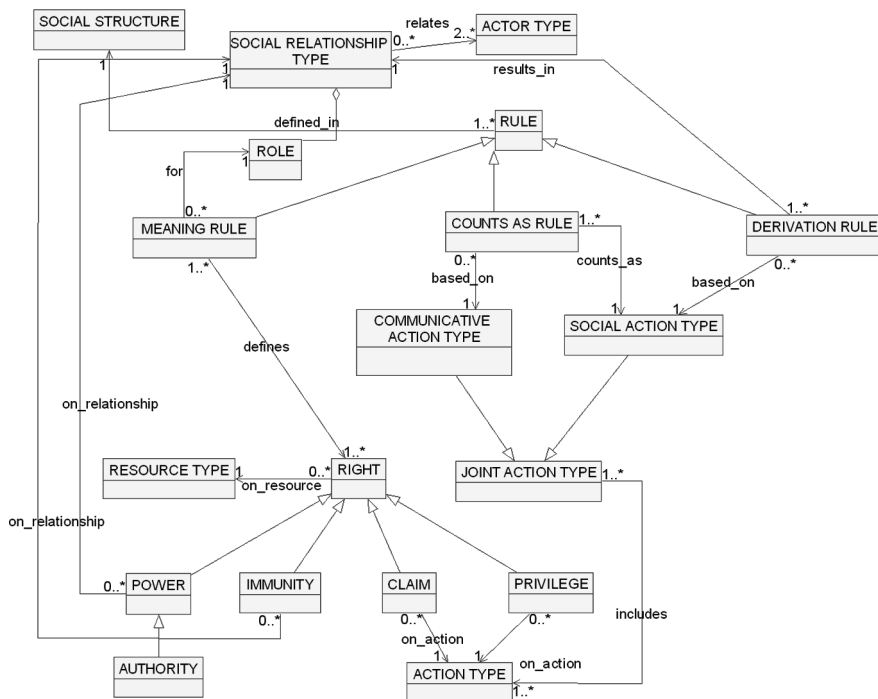


Fig. 4 Social relationships – meaning and creation

combinations that may be created. Furthermore, a value exchange may include actions that are not about creating social relationships, such as the physical transportation of goods.

We suggest that a value exchange is to include three components: social relationship creation, custody provision, and evidence provision. The first component is about the rights an actor gets on some resource. If an actor gets a privilege on a resource, it means that the actor is entitled to use that resource in some way. If she gets a power on the resource, it means that she can create social relationships concerning the resource. For example, in a value exchange where a person borrows a car, she will get some privileges on it, meaning that she can drive it, park it, etc. If she buys the car, she will get the same privileges but also powers on the car, allowing her to lend it to other people or sell it.

The second component of a value exchange is about the custody of the resource [1, 10]. An actor has the custody of a resource if she has immediate charge and control of it, which typically implies physical access. If an actor has the custody of a resource, this does not mean she has rights on it. For example, a distributor may have the custody of some goods, but he is not allowed to use the goods. In a value transfer, there is typically a provisioning of custody to the recipient through which she gets access to the resource. An example is transporting some goods to the recipient.

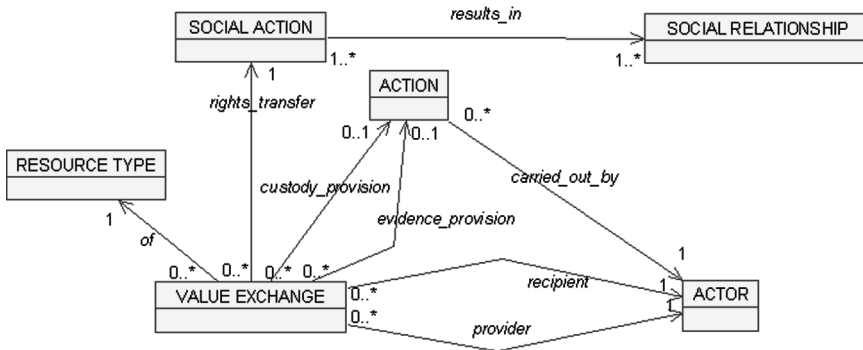


Fig. 5 Value exchanges

The third component of a value exchange is the evidence document [1]. A transfer may include some evidence document that certifies that the buyer has certain rights on a resource. Typical examples of evidence documents are movie tickets that certify that their owner has the right to watch a movie or hotel vouchers that make the owner of the voucher eligible for accommodation at the hotel that issued the voucher. In some cases it is sufficient to be the bearer of an evidence document to use the rights it refers to, but in other cases these rights only hold for a specific person stated in the document.

Summarizing, see Fig. 5 (which is drawn on the operational level), a value exchange can be seen as combining three components:

- The *rights* the buyer obtains on the resource, e.g., the ownership of a book;
- The *custody* of the resource, e.g., the delivery of a book to the buyer;
- The *evidence document*, e.g., a receipt that can be used to prove ownership of a book.

While the first component, the rights, is always considered, the last two components are optional. For example, when buying a piece of land, the buyer is typically not given the custody of that resource. Clearly, evidence documents are not always provided and, furthermore, the provision of custody and evidence documents may be so trivial that it is not of interest to make them explicit. In some complex cases, however, a more detailed analysis is called for since modeling only the transfer of ownership in a value exchange is not sufficient to address important aspects of how value is created and exchanged.

4 Designing Rich Value Models

Most languages for value modeling, including e3value, give meaning to value exchanges by focusing on the transfer of ownership. However, as shown in the previous section, there are also other kinds of rights relevant for value exchanges as

well as aspects not related to right transfer and creation. Furthermore, the concept of custody, i.e. what actor has access to a value object, and evidence documents involved in a value exchange, will also be incorporated in the analysis of how value is created in an exchange. In this section, we will discuss how these additional rights and aspects can be taken into account by extending the notation of the e3value language, thereby enabling it to represent richer value models. We will also introduce a number of guidelines assisting a designer in systematically enriching an initial value model that only represents transfers of ownership.

4.1 Notation and Guidelines

In order to represent the meaning of value exchanges, the following notation will be used:

- A value exchange representing the transfer of ownership will be labeled with “O”;
- A value exchange representing the granting of a claim will be labeled with “C”;
- A value exchange representing the granting of a privilege will be labeled with “Pr”;
- A value exchange representing the bestowing of power will be labeled with “Po”;
- A value exchange representing the pleading of a claim will be labeled with “PC”;
- A custody provision from one actor to another will be shown as a dotted arrow;
- An evidence provision from one actor to another will be shown as a dashed arrow.

In order to support a designer in enriching a value model and making it more precise, we suggest a number of guidelines. These aim at clarifying the kinds of rights involved in value exchanges, the consequences of claims, and the provision of custody and evidence documents.

Guideline 1: *Label existing value exchanges according to the rights involved; possibly split value exchanges in order to get a unique labeling.*

A trivial example of applying this guideline is shown in Fig. 6, which shows a customer buying books from a bookstore. In this case, ownership of books and money are transferred to the customer and bookstore, respectively.

Another example is shown in Fig. 7, where a customer buys insurance from an insurance company. In this case, the customer does not get any privileges to carry out certain actions; instead, she gets a (conditional) claim on the insurance company

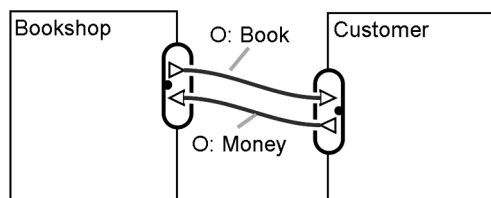


Fig. 6 Bookshop example

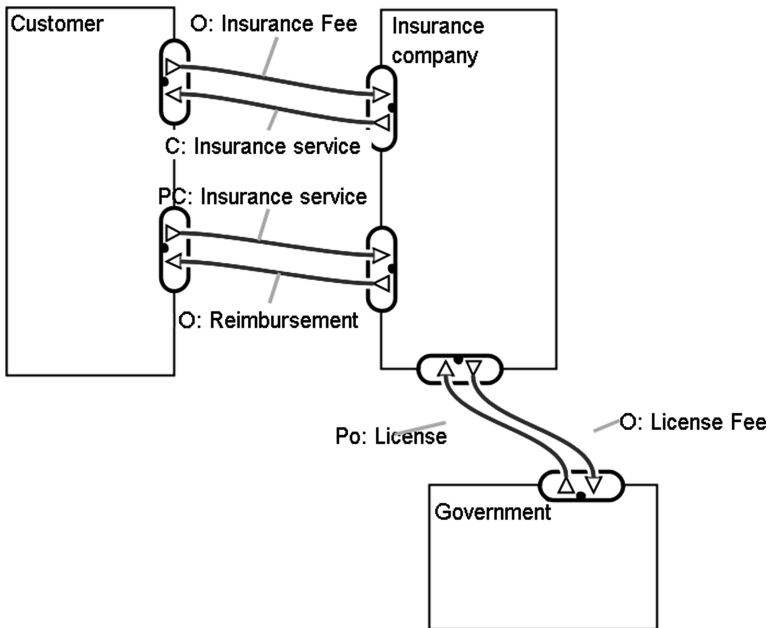


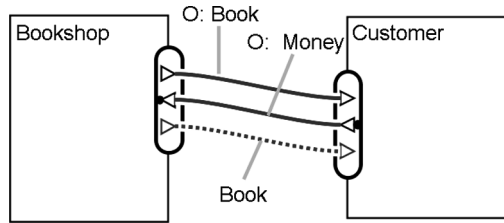
Fig. 7 Insurance example

stating that it is obliged to pay compensation in case of accidents. Thus, the value exchange will be labeled with “C”, not “O”. Furthermore, the diagram shows a value exchange from a financial supervisory authority to the insurance company. The meaning of this exchange is that the authority gives the company a license, a right, to operate in the insurance market, i.e. a power to establish insurance contracts with customers. Thus, the value exchange will be labeled with “Po”, not “O”.

Guideline 2: *For each value exchange representing the granting of a claim, introduce a pair of value interfaces including a value exchange representing the pleading of the claim.*

A value exchange representing a claim means that one actor has a duty to carry out some action for the benefit of another actor. However, this action is usually not included in the value interfaces containing the claim granting value exchange. Therefore, the meaning of the claim is not represented in the value model. Another pair of value interfaces has to be introduced in order to make its meaning explicit. These interfaces will include one exchange representing the pleading of the claim, i.e. one actor requesting the other actor to fulfill the claim, and another exchange representing the fulfillment of the claim, which thereby specifies the meaning of the claim. It can be noted that pleading a claim is not about transferring or creating rights but about making use of rights that an actor already possesses, and in this respect it is different from other value exchanges. An example of applying guideline 2 is

Fig. 8 Bookshop example with custody



given in Fig. 7, which shows that a customer can file an insurance claim (plead a claim) and receive a reimbursement (ownership of money).

Guideline 3: *For each value exchange of goods, introduce optionally an arrow representing custody provision.*

A simple example of applying this guideline is shown in Fig. 8, which extends Fig. 6, showing that a book is physically transported to the customer, thereby giving her custody of it.

Guideline 4: *For each value exchange, introduce optionally an arrow representing evidence provision.*

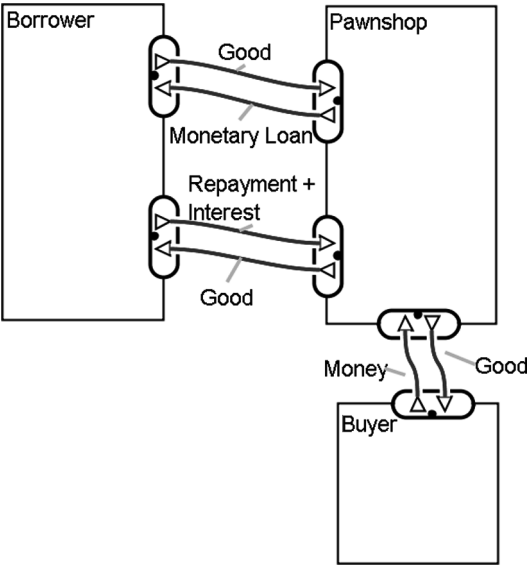
An evidence document should typically be introduced in a value exchange if the rights that it certifies cannot be proven without showing the document. In some cases it is enough to be the bearer of an evidence document to be eligible to access the rights the document refers to, but in some cases these rights are personal and only hold for the person specified in the document. Only in the former case should the evidence document be included in the value model. In the next section an example where evidence documents are used in the model is introduced.

4.2 The Pawnshop Example

The following example illustrates how to analyze and model a business case using the notation and guidelines proposed above. The business case chosen is that of a pawnshop, which lends money to borrowers on a short-term basis accepting goods as collateral. A pawnshop and a borrower can make business according to a number of value exchanges, in Fig. 9 shown in two different pairs of value interfaces. The first one is when the borrower gets a time limited right to use the money and pays an interest; this is the case where the borrower returns the money and gets the collateral back. The second pair of value interfaces models when the borrower gets ownership of the money and the pawnshop gets ownership of goods, i.e. the collateral; this is the case where the borrower does not return the money and the pawnshop takes the collateral. The diagram also shows that the pawnshop may sell goods to buyers.

The value model of Fig. 9 represents the business case of a pawnshop only partially as it focuses on transfers of ownership, e.g. the role of collaterals is not made explicit. In order to arrive at a richer value model showing a more complete picture

Fig. 9 Pawnshop example I



of the business case, we will analyze the value exchanges and extend the model according to the guidelines proposed.

The first step in the analysis, according to guideline 1, is to identify the kinds of rights involved in the value exchanges. The value exchange monetary loan means that the borrower gets privileges and power rights on the money but also that there is a duty for the borrower to return the money with an interest fee. In other words, the pawnshop gets a claim on the borrower to pay back the loan, which is made explicit in Fig. 10. According to guideline 3, we are also to introduce optional custody provisions. In this case, the borrower gives custody of some goods to the pawnshop as collateral. There is also a duty for the pawnshop to return the goods to the borrower upon request, i.e. the borrower has a claim on the pawnshop, which is also shown in Fig. 10. Thus, the figure shows a partial value exchange model consisting of value exchanges in which the borrower gets a loan, she leaves a good for collateral, the pawnshop gets a claim on the borrower to pay back the loan, and the borrower gets

Fig. 10 Pawnshop example II

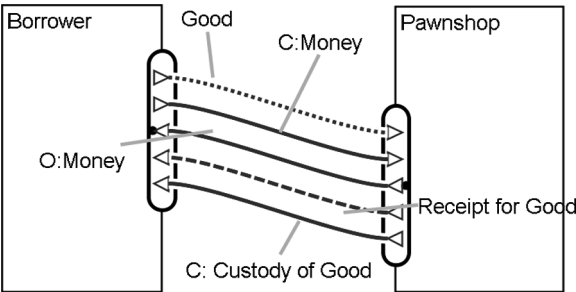
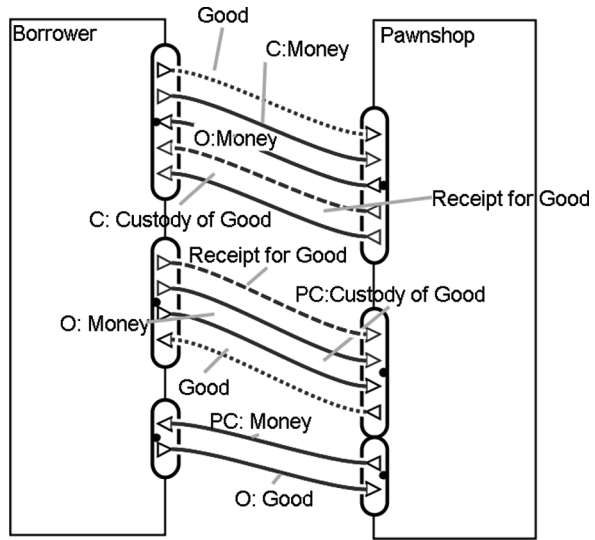


Fig. 11 Pawnshop example III



a claim on the pawnshop to return the good. As proof of having left the good as collateral the borrower furthermore gets a receipt (an evidence document) from the pawnshop, see the dashed arrow of Fig. 10. Notice that in this value model the customer gives up custody of the good and the pawnshop receives the custody, however, it does not get the right to use the good. The pawnshop has in fact an obligation to keep the good safe in case the borrower claims it back. (The part of the diagram in Fig. 9 that also shows that the pawnshop may (re-)sell goods to buyers is omitted in the further analysis in Figs. 10 and 11).

The value model in Fig. 10 needs to be extended according to guideline 2 in order to make explicit the meaning of the claims in the model. The claim of the borrower gives rise to the middle pair of value interfaces in Fig. 11, where the borrower requests her good back (pleading a claim), receives it from the pawnshop (custody transfer) and pays back the loan with an interest (ownership transfer). Similarly, the claim of the pawnshop gives rise to the bottom pair of value interfaces in Fig. 11, where the pawnshop requests its loan to be repaid (pleading a claim) but does not get any money from the borrower and instead takes the ownership of the collateral (ownership transfer). These three value interfaces represent the main logic of the pawnshop business case.

5 Conclusion

Value modeling is an approach for capturing business goals and intentions in the form of value exchanges. Value modeling has many applications and a recent trend is to use value models for defining business services at the enterprise level. In this chapter, we have investigated how to create rich value models that represent the

contents and meanings of value exchanges. The contributions of the chapter are theoretical as well as practical. The main theoretical contribution is an analysis of the notion of value exchange using Hohfeld's classification of rights. Value exchanges are not only about transferring ownerships but can also include the transfer and creation of various other rights such as claims to carry out actions and powers to create new social relationships. Furthermore, value exchanges are typically associated with certain kinds of actions not related to rights, in particular the physical transportation of goods and the provision of evidence documents used to identify the rights holder. The main practical contributions of the chapter are notations and guidelines, based on the theoretical analysis, for designing rich value models that are able to provide detailed and precise representations of the values and relationships in a business case. These representations will help to bridge the gap between informal descriptions of business cases and the specification of the business processes needed to realize them. The rich value models will still be on a declarative level and abstract from process issues like control flow and message formats, but they will be more detailed than value models only addressing ownership transfers. This added detail will be a basis for identifying required business processes and their outcomes though not for designing their procedural form.

A topic for future work is to investigate how the rights created in value exchanges will be affected by the type of resource being exchanged. In particular, the exchange of services needs to be analyzed, as services may be viewed as claims themselves [3]. A related issue is how to identify services based on a value model as discussed in [17]. The analysis and proposed guidelines can also be used as building blocks in a more comprehensive methodology for designing value models.

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