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Master's Thesis No.

Intention-centric Modeling of Organizations

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Abstract

Every organization thrives to achieve its intentions, these intentions can be in level of the organization like technical intentions that focus to satisfy technical level requirements, management intentions that focus to satisfy the management level requirements, and financial intentions to achieve financial level requirements. Intentions play critical role in many organizations because they motivate organizations towards the overall development. Therefore supporting and automating organizational intentions and associated components are absolute necessary for any organization. Current technologies and literature focus on diverse components like activity, strategy, artifact and capability but no or little focus on **Intention**, which is the starting gate to reach the trailing gates like activity, strategy and capability.

This Master thesis aims at providing means to design and realize the Intention-centric organizational modeling. We propose a motivating scenario to help the reader in easily acquiring the concepts and usability of developed web editor. The purpose of the web editor is to view/update existing intentions, strategies, capabilities and informal process instances and to add new data of type intentions, strategies, capabilities and informal process instances.

Key words: Intentions, Capabilities, Strategies, Informal Process Instances and Informal Process Models

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1 Introduction

This work is structured in the following way:

Outline

The remainder of the document is organized into following chapters

Chapter 2 – Motivating Scenario: In this chapter a motivating scenario has been taken which helps reader in realizing the Organizational Modeling throughout the document.

Chapter 3 – Fundamentals of Organizational Modeling: In this chapter previous work carried in organizations to model the goals has been discussed.

Chapter 4 – Requirements: Detailed requirements based on scientific facts and introduction about some properties of the organizations.

Chapter 5 – Intention-centric Organizational Modeling: In this chapter basics of Organizational Modeling has been discussed and notations used to realize the Organization Modeling has been discussed.

Chapter 6 – Design: In this chapter, proposed design is discussed.

Chapter 7 – Realization of Intention-centric Organizational Modeling: This chapter concentrates on detailed system architecture and also presents the experimental results.

Chapter 8 – Validation and Evaluation: Comparison of the Intention-centric Modeling of Organizations approach with the other approaches.

Chapter 9 – Conclusion and Future Work: Summaries the results of this thesis work and draws conclusion.

1.1 Motivation

1.2 Problem Definition

1.3 Contributions and Outline

1.4 Research Objectives

Research Objective	Description
RO. 1	*Intentions are traceble in the different levels of the organizational hierarchy.*
RO. 2	*Linking intentions with capabilities and at the with resources enable us a cost estimation for each intention. Cost is estimated in a recursive manner.*
RO. 3	*Validity of an organizational intentions is achieveable when the intentions can be refined by defining sub-intentions, which can then be defined recursively as independent informal processes.*
RO. 4	*As each member of the organization aware of the higher level and lower level intentions. He can engage for these explicit intentions.*
RO. 5	*Different members of an organization participate to create organizational intentions, as a result intentions are shaped based on all members but directed by the executives.*
RO. 6	*Intention-specific solutions can be extracted as abstract re-usable entities, organizational strategy patterns and can be re-used in muliple context definitions.*

2 Motivating Scenario

In order to realize the Organizational Modeling below motivating scenario has been taken and realized using the developed UI editor. This scenario also helps in testing the UI editor along with realizing the Organizational Notations. The motivating scenario has been chosen based on the advice provided in works ..... The figure of this example was taken from the context of manufacturing sector. The abstract intention of the organization is to increase the quarterly revenue and number of unit sales. In order to achieve this intention through Organizational Modeling Approach, as a first step we need to break the abstract intention into several strategies like : 1. Increasing the revenue through expanding the market sales. 2. Through improving the excellence of the product which in turn brings back old and new customers. and 3. Through increasing the advertisement which helps in customer knowing about the product.

3 Fundamentals of Organizational Modeling

3.1 Literature Review

4 Requirements

4.1 Requirements Analysis

4.2 Requirements Supporting Organizational Modeling

Organizational intention transparency (R1): A intention can be broken down into definitive actionable components, or sub-intentions, upon which individual resources can act. When these lower level sub-intentions are made achievable for individual resources, they can be combined to provide successful execution of higher level intention. Different organizational members can observe lower level and higher level intentions in their organizations. intentions are traceable in the different levels of the organizational hierarchy. This kind of transparency within an organization reduces inefficiencies in intention execution, and is a key factor in attracting and retaining high performers in the labor market [MHL+07].Requirement R1 has to be satisfied in the modeling time of the process itself as the framing of intentions, sub-intentions, strategies are done during the modeling time .

Organizational intention resource-based cost estimation. (R2):Linking intentions with capabilities and with resources enable us a cost estimation for each intention. Cost is estimated in a recursive manner. To incorporate the cost estimation of intentions, we have to understand the recursive structure of the intentions associated with capabilities.Since intentions are defined hierarchically, they can contain and extend intentions. Here strategy represents a means for achieving the intention. Further on, the cost of a strategy can be analyzed using the costs of derived intentions, and so on. Including resources cost in intention cost calculation is important. The recursion is stopped when the intention derivation process reaches the operational level. At the moment a intention is achieved, some resources should be allocated to maintain the desired state (intention maintenance costs)[MBH+10]. Allocation of resources is mainly done at the operational level, Requirement R2 has to be satisfied in the run time of the process.

Organizational intention achievability estimation. (R3): The sub-intentions are projections of their super intentions, and satisfaction of the sub-intentions ensures satisfaction of the super intentions. Hence validity of an organizational intention is

achievable when the intentions can be refined by defining sub-intentions, which can then be defined recursively as independent informal processes. Lower-level requirements can be validated against higher-level intentions, thus enabling validation of strategic alignment of higher level intentions. The objectives of business strategy are found in the highest levels of the intention model.[BCV06].Requirement R3 has to be satisfied during the modeling time of the process as intention achieveability estimations are done before starting the execution of the intention.

Intention oriented working style (R4): As each member of the organization is aware of the higher level and lower level intentions and he can engage for these explicit intentions. intention orientation is the degree to which a person or organization focuses on tasks and the end results of those tasks. Strong intention orientation advocates a focus on the ends that the tasks are made for instead of the tasks themselves and how those ends will affect either the person or the entire company. Those with strong intention orientation will be able to accurately judge the effects of reaching the intention as well as the ability to fulfill that particular intention with current resources and skills [Lac]. The distinction between explicit knowledge of each sub intentions should not be seen as a division but rather as a continuum which aligns towards achieving the higher level intention . Thought Requirement R4 itself has sub-requirement of R1, R4 has to be done at the run time which makes it distinct from the Requirement 1.

Social organizational modeling. (R5): Different members of an organization participate to create organizational intentions, as a result intentions are shaped based on all members but directed by the executives. The social extension of a business process can be regarded as a process optimization phase, where the organization seeks efficiency by extending the reach of a business process to a broader class of stakeholders[BFV12].Requirement R5 would be done at the run time as the input from different members of the organization provided during the process execution.

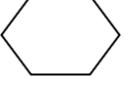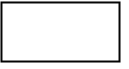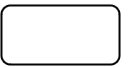| Requirements	Requirement Satisfaction Phase	Pre-requisites
Requirement 1 (R1)	Modeling phase	1. Main intention can be refinable into sub-intentions. 2. Organizational members can view the intentions at different levels.
Requirement 2 (R2)	Deployment phase	1. intention cost estimation that includes all recursive sub-intentions and resources. 2. Cost estimation including the strategy.
Requirement 3 (R3)	Modeling phase	1. Each sub-intention should be achievable and valid.
Requirement 4 (R4)	Deployment phase	1. Satisfaction of R1. 2. Understanding of the intentions and how they can be reached.
Requirement 5 (R5)	Modeling phase	1. Satisfaction of R1. 2. The output of intention is based on the inputs provided by different members of the organization.

Table 4.1: Sub Requirements
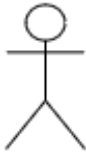
5 Intention-centric Organizational Modeling

5.1 Overview of Modeling Process

The Organizational Modeling element notation has been selected as per the guidelines mentioned in the paper by Moody [Moo09]. Also by observing the fact that business process modelers are already well-known with the present process modeling notations such as Business Process Modeling Notation 2.0 (BPMN) [Gro11] and ArchiMate notation [Gro13], the shape depiction of organizational model elements are designed similar to those existing process notations.

5.2 Organizational Modeling Notation

Due to the importance of shapes in expressing the information visually , the notations are chosen in such a way that each element of Organizational Modeling differ by shape. A legend has been provided with the modeling notation as per the guidelines mentioned in the article [Moo09]. The same study [Moo09] presents the importance of shapes in playing a primary role to discriminate between different elements. Hence the organizational model notations are represented through individual shapes like rectangle, double circle, elliptic etc.,. The description of each element in the Organizational Model Notation is shown in the Table 5.1.

Element	Definition	Notation
Intention	Intentions are purposeful concrete steps taken to achieve expected outcomes . They reflect the actual intention of an organization.Intentions are defined hierarchically, which can contain and extend intentions.It is depicted by a double circle. The sub-intentions are refined starting from main intention. intentions associated with capabilities are concrete intentions and intentions that are not associated with capabilities are abstract intentions. Abstract intentions are represented by dashed double circle and concrete intentions are depicted by a solid double circle.	◎
Capabilities	Organizational capability is the ability to provide business values like software applications, resources, and potential of the actor to make decisions even in changing situations [SGHZ12]. Capabilites are represented by a elliptical circle. Capability is an ability that should be possessed by an Actor or a Resource that work towards achievement of intention.	⬭
Context	The environment that forms the setting for an event, statement, or idea, and in terms of which it can be fully understood. There are two Contexts: Initial and Final. The Initial Context is the situation which describes the driving forces that trigger the process to start. The Final Context is the expected situation once the process has finished.Both initial and final context are represented by an hexagonal shape except the final context has thick edges than initial context.	⬡
Strategy	A method or plan chosen to bring about a desired future, such as accomplishment of a intention. Strategies are expressed by rectangles with sharp edges. In the conceptual Organizational Modeling, strategies are self-contained and loosely coupled elements.	▭
Resources	The people and tools needed to fulfill the middle objectives or those/that work towards the achievement of intention . Resources are represented by a rounded rectangle. Resources are linked to capabilities and actors.	▢

| Actors | People who participate in the process. Actors are represented by a stick-man and they are linked to resource as actors can be resources. Actors define the strategy and intentions. | |
| Relationship | A relationship is used specify the fixed links between the elements of the model. Relationship between two elements is represented by a single direction line which represents a sequence. | |

Table 5.1: Informal Process Modeling Notation

5.3 Organizational Modeling Notation Example

The concept of Organizational Model Notations can be explained with the following manufacturing scenario. ABC Ltd. is a budding computer technology company which designs, develops, manufactures and sells personal computers, tablets and laptops. The CEO's intention of the quarter is to increase the revenue and number of unit sales. The initial context describes the situation that motivates to start the process. The final context describes the situation that is achieved once the process completed successfully. intentions connect initial context definitions with final context definitions [SBBL14]. The sub-intentions are the intermediate intentions which describes the expected outcome in a measurable form. intentions are reached through strategy implementation which is plan of action designed to meet a intention.

The example scenario ABC Ltd. helps in understanding the organizational modeling i.e., how organization's higher level intention can be achieved by amalgamation of specific, measurable and realistic sub-intentions. . The whole view has been divided into intention view and Strategy view. The *intention View* shown in the Figure5.2 provides only the details of intention and its associated strategies. There can be multiple strategies followed to achieve a intention. The *Strategy View* shown in the Figure5.1 connects big picture of each strategy with individual intentions that has to be carried out. In Organizational Process Modeling, strategies are self-contained and loosely coupled. So that when we extract only the strategies from Organization Process Modeling it would be similar to Informal Process Essential Modeling.

The Strategy view in the Figure5.1 depicts big picture of each strategy. Strategies are associated with both intentions and capabilities. Capabilities are related to intentions
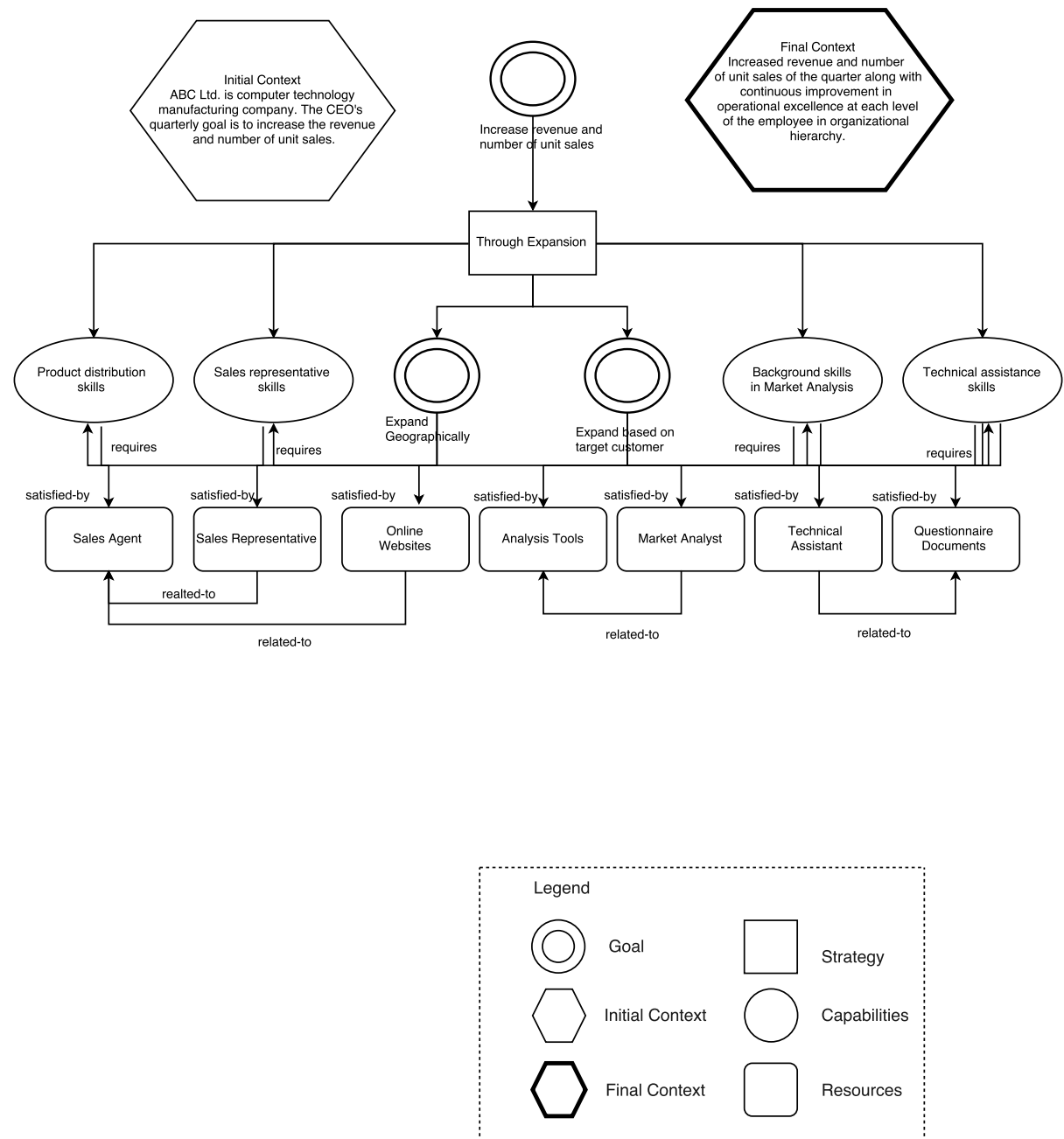
Figure 5.1: Strategy View

and resources. As each intention needs certain capability to successfully execute the intention they both are connected using the verb "*requires*". Resources are the potential holder of the capability i.e., to satisfy a capability we need resources. The capability and its associated resources are linked using the verb "*satisfied-by*".
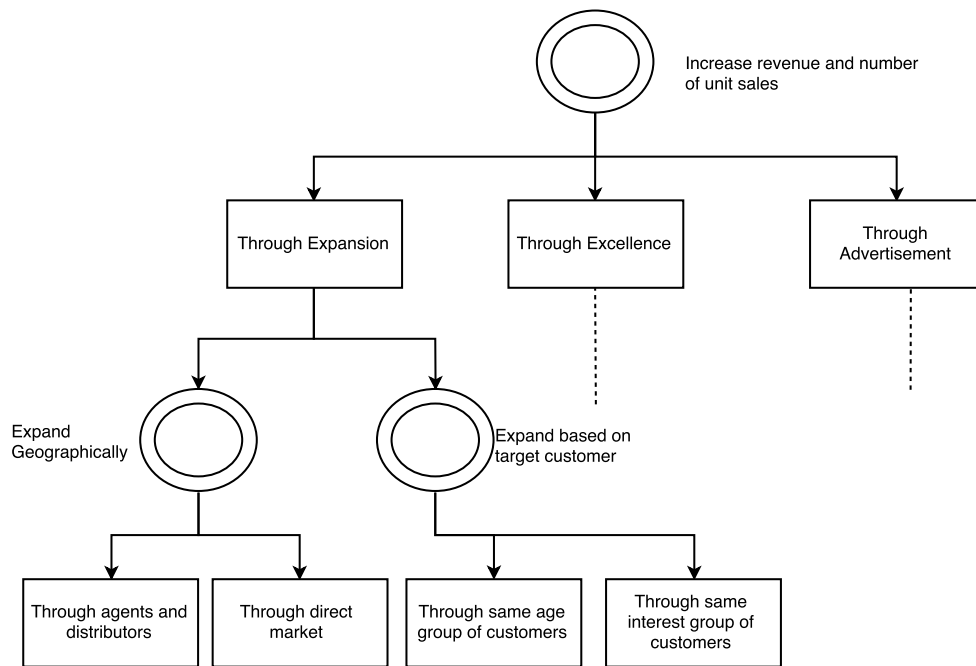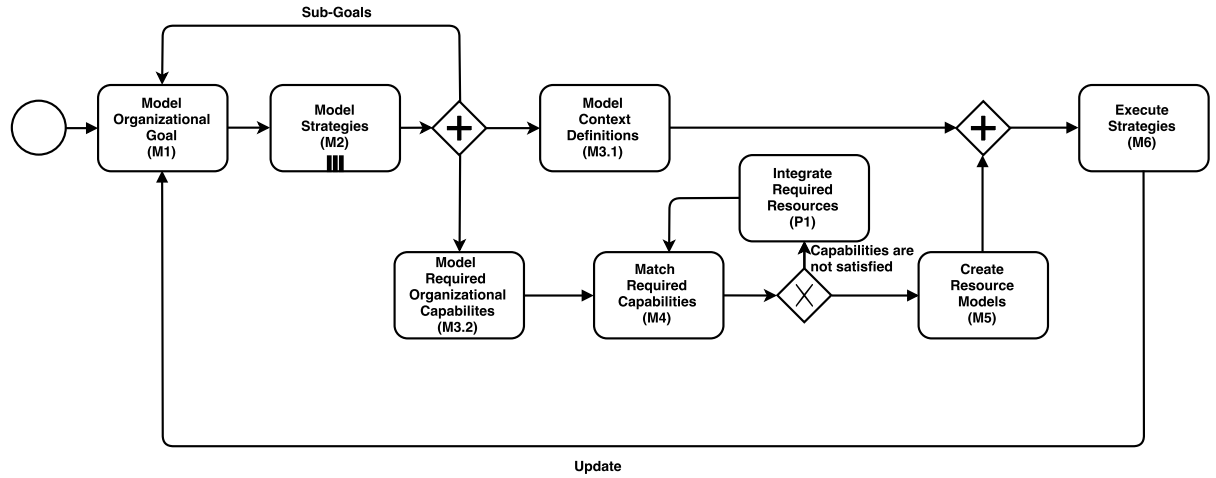
Figure 5.2: intention View

Figure 5.3: Process Modeling Diagram

5.4 Organizational Modeling Process Representation

Organizational Process Modeling depicted inFigure 5.3 captures required organizational capabilities that are satisfied by resource models to enable the achievement of organizational intentions in certain context definitions through a strategy. It is a top-down approach, i.e., first intentions are defined and then sub-intentions are defined by refining main intention. intentions connect initial context definitions with final context definitions through a strategy. To understand the definition of Organizational Process Modeling we need to interpret the Organizational Process Modeling Representation shown in Figure5.3.

The Organizational Process Modeling start with modeling of organizational intention (M1). Once the intention has been modeled, the second step is to model the strategies which can be a multi-instance strategy model(M2). The next step is to model the context definitions (M3.1), required organizational capabilities (M3.2) and refining the sub-intentions from main intention in parallel. Once the required capabilities(M4) are matched by required resources(P1), modeling of resources(M5) can be done. Based on created resource models (M5) and modeled context definitions(M3.1), strategies can be executed. The organizational intentions would be iteratively updated supported to strategy execution.
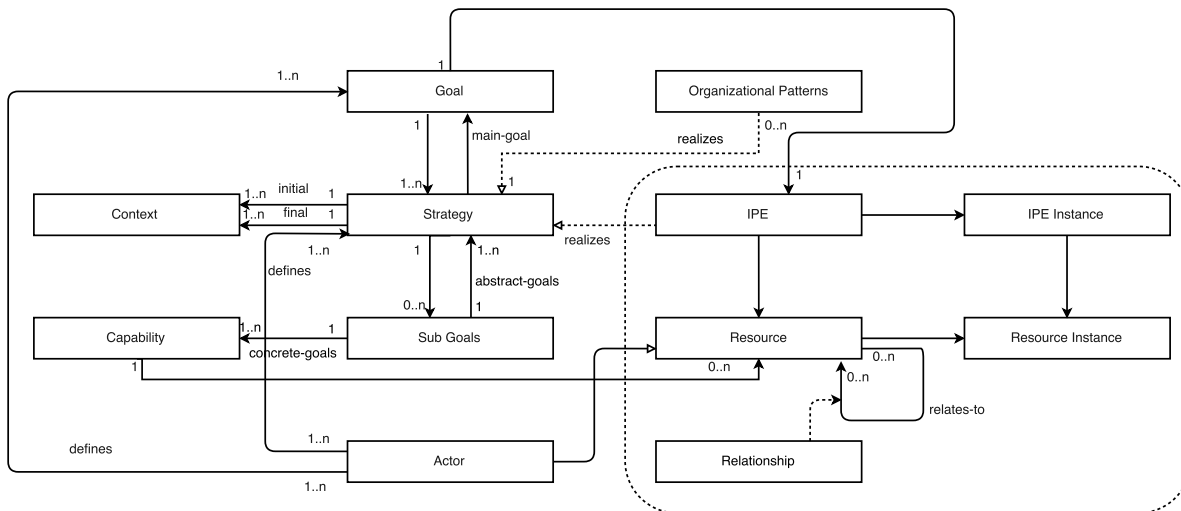
Figure 5.4: Organizational Modelling Meta-Model

5.5 Organizational Modeling Entity Representation

The conceptual entity model of intentions is shown in the 5.4. This model shows that top level intention is refined into sub-intentions. A intention can be achieved through a strategy which is a plan of action designed to meet a intention. It also describes a set of interrelated resources which work together to achieve a collective intention. As reported by Sungur et al. [SBBL14], the concept of IPE provides an agent-based approach i.e., human performers are considered as agents who execute the processes autonomously. Based on the approach [SBBL14] we provide a intention-oriented approach based on intentions.

Organizational Process Modeling has *Resources* which are used to achieve the intentions. Organizational Process Modeling is Resource-centric approach as they support processes by providing required resources and thrives to successfully execute the processes by using qualified autonomous agents, i.e., actors under certain *context definitions*. Resources can be anything like people, IT tools, data that are used to accomplish the objectives.Emerging intentions can result in the requirement of new capabilities, i.e., resources. A more specific type of resource is the type *Actor*, which typically refers to human performers who autonomously and collaboratively conclude an organizational process using other available Organizational Process Modeling Resources.Actors work towards the intentions defined in the process. Resource models are optional to make precise definitions of resources needed.

In Sungur et al [SBBL14] work, the concept of *Informal Process Support Model* IPSM has been introduced which is to make use of existing knowledge of human performers.

Here the initial creator of the model is experienced human performers. Based on their experience, they add relevant resources of an informal process. Each of the resources has inter relationships among the resources themselves. The models are generated at runtime based on the interactions and activities of corresponding human performers.

An informal process targets for accomplishment of a intention. The intentions can be refined by defining sub-intentions, which can be defined recursively as independent informal processes. The intention-based approach enables describing processes declaratively, i.e., without describing *how* the intention is achieved, and providing only information about *what* is achieved. Thus, to avoid predefined business logic in the representations of informal processes.

Each informal process starts from an initial context, i.e., *IPE Context* and aims to achieve a intention. After accomplishing the intention, there is a resulting context called as final context. Each Resource can be related to another Resource in the context of an informal process using predefined or custom *Relationships*.

6 Design

6.1 System Architecture

7 Realization of Intention-centric Organizational Modeling

This chapter discusses about how Intention-centric organizational modeling realized as an user interface editor. This also explains the realization of requirements described in Chapter 4. In the first section, we will first discuss the overview of basic concepts and then specify the design components required for the realization of this editor. The next section discusses about how the entity views in particular are realized. The last section covers in detail how individual requirement has been realized through the web editor.

7.1 Basic Concepts

The basic concepts section provides an overview about the architectural details like design patterns and frameworks of the developed web editor.

7.1.1 MVC Architecture

The architecture of the UI editor is based on the **Model-View-Control (MVC)** design pattern. The MVC paradigm allows to separate business logic from the code that controls presentation and event handling [Ora].Each entity view in the web page is made up of combination of at least on Model and View, and one or more Controls. The individual files which acts an Model, View and Controller has been shown in the Figure 7.1

- **Model** artifact stores the required data structure for web-editor. In the developed model artifact, the four main types of data stored inside the artifact are intentions, strategies, capabilities and informal process instances.

- **View** artifact contains HTML elements and HTML constructs that describe the way of displaying the data from Model to the user.
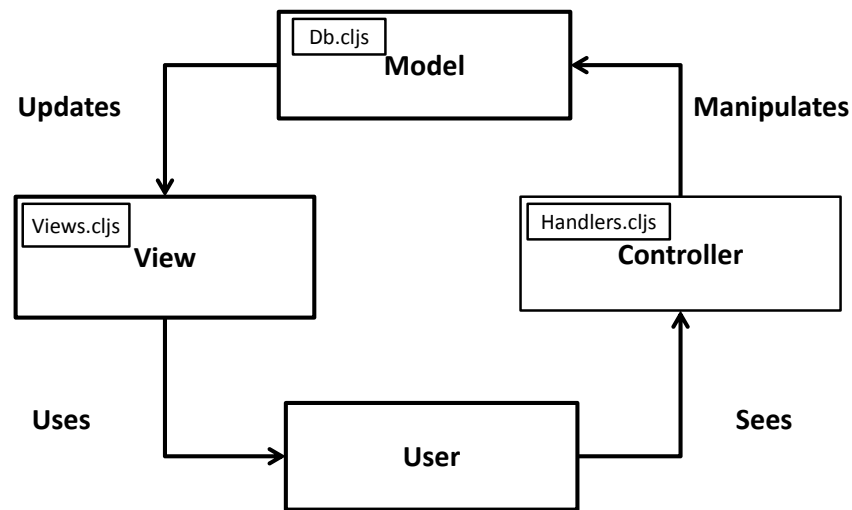
Figure 7.1: Relationship between developed web editor artifacts and MVC architecture components

- **Control** artifact contains the handler functions which can only change the model. Even the initial values of the model are put inside the control.

Example: Component using MVC Pattern

The Figure 7.1 below shows the simplifed version of how the components interact with each other using the Model-View-Control (MVC) pattern, for the functionality adding new entity data. This functionality is same for all the types intentions, strategies, capabilities and informal proceess instances and below is the detailed explanation of each interaction.

1. User clicks the tab **Add New** in the web editor.

2. View, in response to the user click displays the UI component for entering the new entity data details.

3. User enters the required basic details for adding new entity data and clicks save button.

4. View dispatches the data to Control, which can only modify the Model.
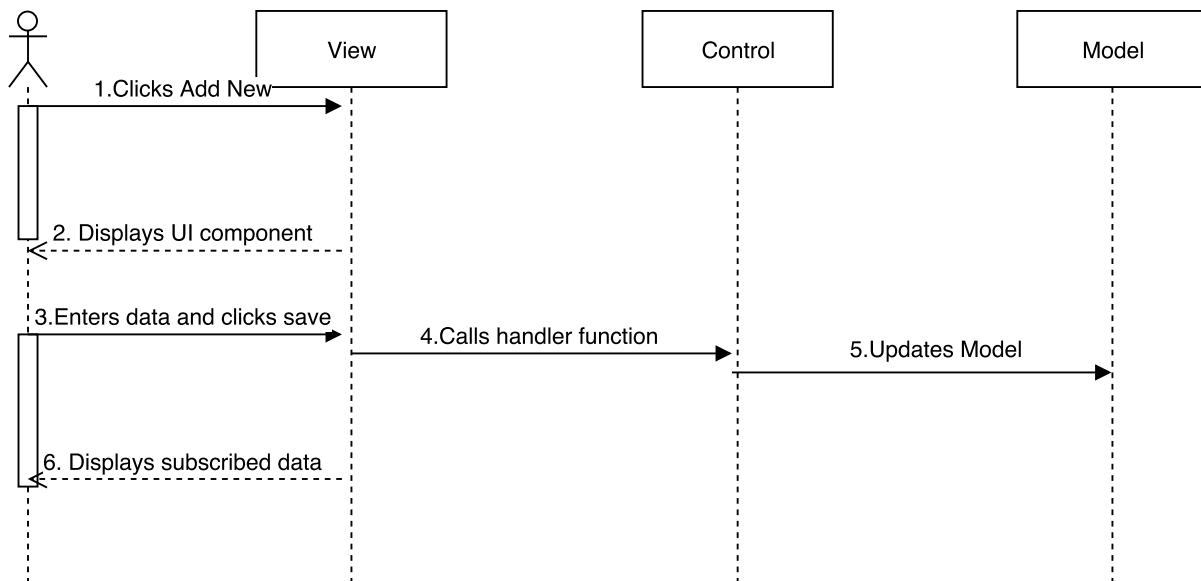
Figure 7.2: MVC Pattern of adding new entity

5. Control inserts/updates data into the model.

6. View displays the updated model as it has been subscribed to the model.
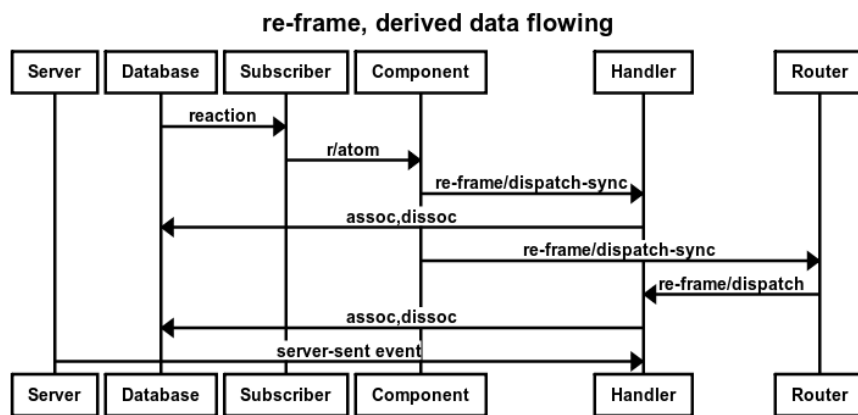
7.1.2 Flux Architecture

[Fac16]

7.1.3 Using Reagent Framework

[Git]

7.2 Specifications

7.3 Realization of Entity Views

7.4 Realization of Requirements

re-frame, derived data flowing

Figure 7.3: Reframe, derived data flowing
[ytal16]

8 Validation and Evaluation

8.1 Validation of Components

9 Conclusion and Future Work

Hier bitte einen kurzen Durchgang durch die Arbeit.

Future Work

...und anschließend einen Ausblick yfgfdgdf [WCL+05]

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