# Chapter 16
# Capability Support for Entrepreneurial Ventures


**Sergio España, Hasan Koç, Marcela Ruiz, and Óscar Pastor**

**Abstract** The chapter presents the use of capability design for start-ups and entrepreneurial ventures. Newly started companies typically need to sharpen their business idea. The use of capability thinking in some pilot cases turned out to be a useful and beneficial approach. As a result, we distilled Capability-Driven Development and tuned it for start-up design, resulting in the LightCDD method. The method has evolved as we have applied it and learned from that experience. The chapter presents an updated version of the method, illustrating its results. It also discusses its perceived benefits and drawbacks. All in all, the results so far have shown that LightCDD helps in reducing the ambiguity of business plans and in identifying what contextual factors could affect the value proposition or the performance of the start-up.

## 1 Introduction

Entrepreneurship and innovation are perceived to be a key factor in economic development [1]. Entrepreneurs usually have an active desire to change the status quo and are willing to take risks to make such change happen [2]. And the risks are indeed high. The start-up survival rates after 5 years range from 40% to 60%, depending on the study (e.g. [3]). And the prospects are even worse for innovative business ideas [4]. One of the reasons for failure most frequently acknowledged in post-mortem reports is the lack of viability of the business model [5, 6]. This refers to the initial business ideas lacking realism (typically due to not having investigated enough the actual needs of consumers), and failing to envision contextual constraints

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(due to not having studied how the needs change over time or what contextual factors could affect the performance of the enterprise, product, or service). LightCDD is intended for business ideas related to information and communication technology (ICT) products, which are also affected by the above-mentioned phenomena.

The lack of viability of business ideas should be a concern of the enterprise modelling community, since start-ups are a form of enterprise and they can benefit from the appropriate analysis and modelling methods. We have contributed LightCDD, a modelling method that allows an integral view of the start-up and supports different business perspectives, such as the needs of the entrepreneurs and end users, the processes to be followed to fulfil the needs, and the contextual factors influencing the processes [7]. Preliminary applications of LightCDD show its usefulness and have allowed us to further improve the guidelines and the method documentation [8]. This chapter reports on the current status of the method and is structured as follows. First, we discuss the research methodology, as well as the evolution timeline of LightCDD. Then we present the LightCDD method using the Process Deliverable Diagram method engineering technique [9]. We briefly illustrate the application of the method. Finally, we conclude the chapter with a discussion of its strengths and weaknesses and the outline of future works.

## 2 Evolution of LightCDD

We have followed design science principles in order to develop LightCDD. According to Wieringa [10], researchers can apply an engineering cycle to design a method and a research cycle to validate it. The cycles can be iterated and also nested in order to incrementally improve the method. To see the details of the research methodology, see [8]. So far, we have issued two versions of LightCDD, as depicted in Fig. 16.1, that is, an initial version (v1) and an intermediate version (v1.5). In this chapter, we issue another stable version (v2).

LightCDD requires understanding the fundamentals of Capability-Driven Development. However, we have distilled the method to facilitate its adoption. We have tested the LightCDD method in entrepreneurial ventures, typically consisting of

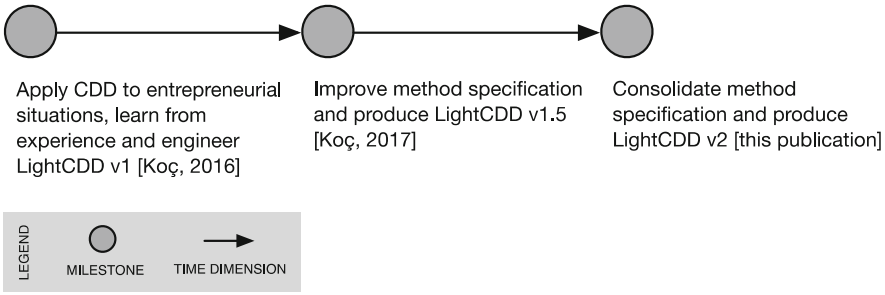


**Fig. 16.1** Timeline of the development of LightCDD

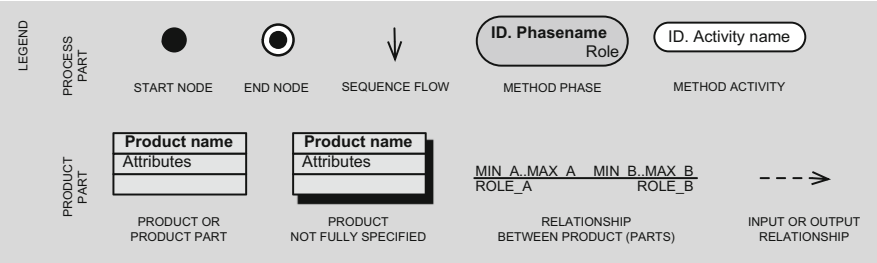


**Fig. 16.2** The notation we use for the Process-Deliverable Diagram technique

start-ups that are defining and validating their business model. In this publication, we consolidate the method specification by improving the diagrams that depict the method activities and products. To this end, we use the Process-Deliverable Diagram (PDD) technique [9]. A PDD specifies the process part of the method as a UML activity diagram and the product part as a UML class diagram. The Class Diagram notation is extended with syntactic sugar to denote products that are not fully specified in a given diagram. Additionally, for the cardinalities and relationship roles of class diagrams, we follow the conventions of the OO-Method and the Integranova model-driven technology [11]. The notation we use for PDD is shown in Fig. 16.2.

The next section explains the method and illustrates its application with examples drawn from a real case. Amongst other practical experiences, we applied LightCDD to a start-up called Let's Get Better, which offered a health coaching application (see [7] for more details).

## 3 Specification of the LightCDD Method

### *3.1 Method Purpose*

LightCDD is intended to define a business model that is context aware and contingent to changes in the behaviour of customers or in environmental factors. One should apply the method with the following purposes in mind:

- Apply enterprise modelling techniques to further develop a business idea.
- Make a capability-based assessment of a business idea, that is, assess the extent to which the idea is viable in dynamic environments and identify potential gaps.
- Create detailed documentation of the activities required to implement a business idea as well as their contextual adaptation to changing situations.
- Elicit the start-up team objectives in the form of SMARTly (Specific, Measurable, Accepted, Realistic, and Time-framed) expressed goals to investigate the end user and market needs.

## 3.2 Overall Method Structure

LightCDD consists of three phases, namely, (1) *prepare the project*, (2) *analyse the start-up business model*, and (3) *design the capability model*. Figure 16.3 depicts the three phases, their inputs and outputs. The first phase checks whether the method is applicable and helps the user to understand the main concepts and benefits of LightCDD. If the method indeed fits the entrepreneurial venture, then we can proceed with the subsequent phases. The second phase analyses the business model as conceived by the start-up team. The third phase designs context-aware enterprise models that can implement the business idea. If the method user is competent in conceptual modelling, she can apply the second and third phases in parallel (note that this is not expressed in the diagram). In the following, we describe each phase in greater detail.

**1. Prepare the Project**
The purpose of this phase is to introduce the method user to CDD (i.e. the enterprise modelling techniques suggested by the method) and to assess the extent to which the

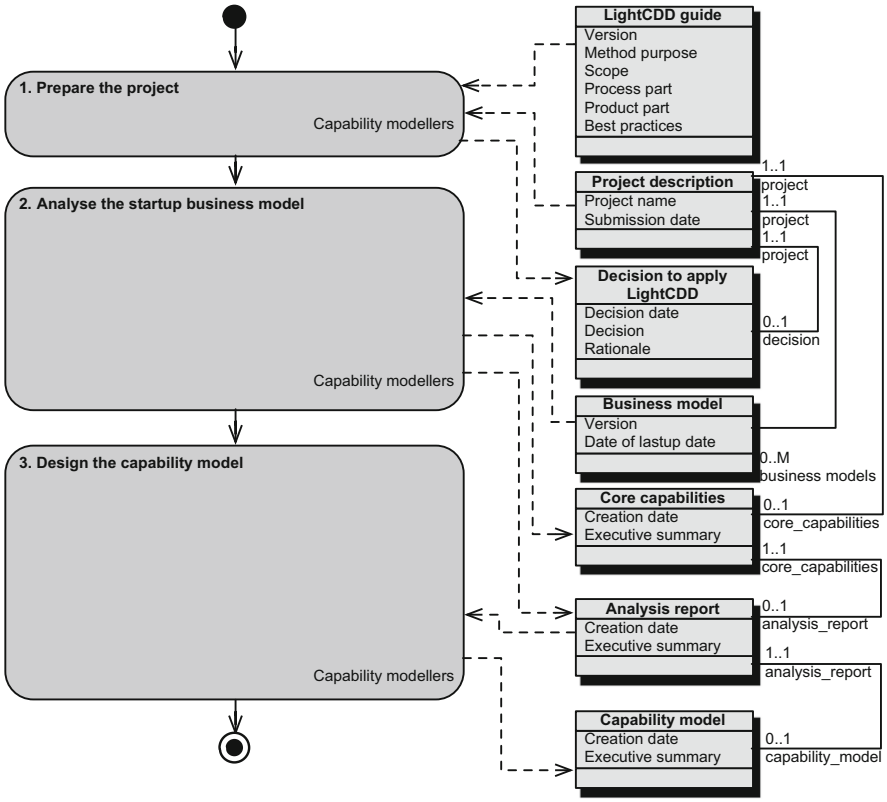


**Fig. 16.3** Overall structure of LightCDD

method is applicable to the entrepreneurial project at hand. Figure 16.4 depicts the project preparation phase, by showing the activities within this phase and providing additional details on the products involved.

A crucial input for this phase is the LightCDD guide, which provides knowledge about the method. Table 16.1 contains the main concepts of the method. The definitions are based on [12], but we have adapted them to better reflect entrepreneurial ventures.

To kick off the capability-based design of a start-up (see activity 1.1), the capability modellers need to meet the start-up founders, which will result in a record

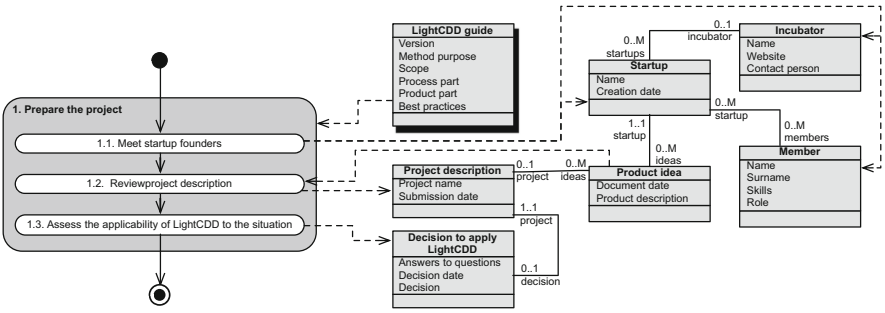


**Fig. 16.4** Details of the project preparation phase

**Table 16.1** Main concepts of LightCDD

| Concept | Definition |
|---|---|
| Capability | Ability and capacity that enables start-ups to achieve entrepreneurial *Goals* under changing environments. The capabilities enable delivering the value proposition of the start-up |
| Goal | Desired state of affairs that has to be attained in order to deliver actual value to customers. *Goal*s should ideally be expressed in measurable terms so that *Key Performance Indicators* (*KPI*s) can be defined |
| Problem | A gap between the current and a desirable state as perceived by customers or the start-up team |
| Process | Series of actions that are performed in order to deliver value to the customers. A *Process* supports *Goal*s, requires certain input and produces output (which can have a physical or informational nature), and usually consumes resources |
| KPI | Key Performance Indicators measure the achievement of *Goal*s and typically set a target value |
| Context element | Conceptualisation of factors that affect the design of the business and the provision of the value proposition. Managing context elements is crucial to deliver the expected Capabilities and thus fulfil entrepreneurial Goals |
| Context element range | Permitted values for a specific *Context Element* |
| Measurable property | Attribute of a *Context Element* that enables measuring its value |
| Context set | A container for *Context Element*s that are relevant for the design and delivery of a specific *Capability*. This container includes defined value ranges of a context element and is related to the *Capability* |

of the start-up team and its incubator setting, if any. Then, the project description is reviewed (activity 1.2). This may require additional interaction with the start-up team, such as an unstructured interview to understand the product ideas better. According to our experience, most ICT-related start-ups focus on developing a single product, but it is possible that their business plan entails more than one product. Finally, the capability modellers need to assess the extent to which a capability-based approach is suitable for the entrepreneurial venture (activity 1.3). We recommend applying LightCDD when all the following statements hold true (the statements are inspired by CDD principles [13]):

- The start-up considers different target customer groups or markets segments or there are variations in the execution of business ideas depending on scenarios or environmental factors.
- The business idea consists of or requires an ICT product.
- No proprietary development methodology has been used yet to support the ICT product development life cycle.

The output of this phase is a report containing the decision and its rationale. Table 16.2 shows an example of a report, which has the structure of our suggested template.

If the outcome of the decision-making is positive, then the modellers can proceed with phases 2 and 3. Otherwise, the start-up is advised to proceed with conventional business modelling and planning methods.

**2. Analyse the Start-Up Business Model**

The analysis phase is also participatory. We strongly recommend involving the stakeholders actively in the elicitation and modelling tasks (e.g. as described in [14]). Figure 16.5 shows the detailed activities of this phase.

**Table 16.2** Example of the *Decision to apply LightCDD* report

| Decision to apply LightCDD | |
|---|---|
| *Project* | Let's Get Better |
| *Date* | 5 September 2016 |
| *Questions* | |
| Do you plan to offer the same business for different target groups and markets? | Yes. The platform will be available in both website and app. Moreover, different options for monthly subscriptions are envisioned |
| Are there variations in the execution of business ideas or certain situations for various application scenarios? | Yes. We envision variations in the implementation of our business idea. For instance, based on the subscription type, our customers will have access to coaches with varying experience levels |
| Is your business idea closely related to digitalisation and delivers ICT-based solutions? | Yes. Let's Get Better is an online platform which takes advantage of digital technology |
| Have you used a proprietary development methodology that supports your system development life cycle thoroughly? | No. We have not used any methodology to support our development life cycle |
| *Decision to apply LightCDD* | Yes |

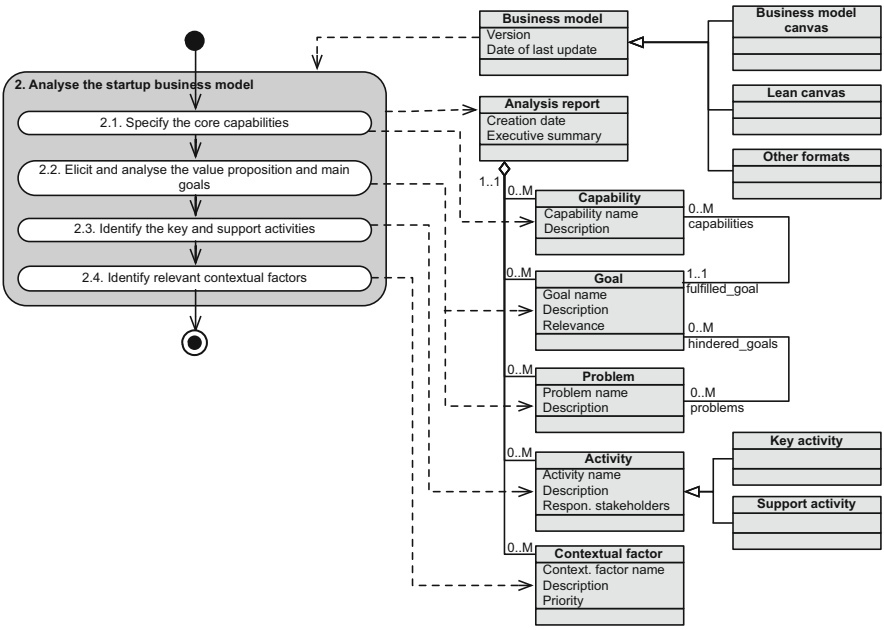


**Fig. 16.5** Details of the analysis phase

The business model serves as input for the whole phase, but since such artefacts are typically concise, further explanations from the start-up team are required throughout the activities. It is common in incubator settings to come across business models described as a business model canvas [15] or a lean canvas [16]. Some social enterprise start-ups might provide a strongly sustainable business model canvas [17], a triple-layered business model canvas [18], or a social lean canvas [19]. At the end of the day, any textual or graphical specification of the value proposition, customer segments, and other important elements of the business idea serve our purposes as well, for instance, using the Board of Innovation's business model kit [20]. For the sake of simplicity, in the following we just refer to the most common templates, that is, the business model canvas and the lean canvas.

After reviewing the business model, the modellers should be able to grasp the one or several value propositions underlying the business idea of the start-up. We will consider them as the capabilities that the enterprise wants to deliver. Therefore, for each value proposition, the modellers define one capability (see Table 16.3 for a capability example).

Then, the modellers need to list the goals that the start-up team expects to fulfil by implementing the business idea (activity 2.2). A discussion with the start-up team is recommended. Both the business model canvas and the lean canvas explicitly specify the value proposition and the customer segments. These constitute a useful trigger to discuss the main goals with the start-up team. The following questions will help the entrepreneurs further identify, structure, and prioritise goals.

**Table 16.3** Example of capability

| Capability | |
|---|---|
| C1. Online and personalised health coaching | Let's Get Better is an online platform that provides users with a health coach in their pocket. The main motivation of the project is that an active and healthy lifestyle is the key to a well-balanced life, but the people struggle adopting healthy habits, since they are busy with their work and social life. As a solution, the platform takes advantage of digital technology and offers personal professional coaching through instant messaging and weekly video calls, progress tracking, and peer-to-peer networks. To further support and encourage users, a social media will allow people to share their story, gain further support, and build common-interest relationships |

**Table 16.4** Example of problems and goals

| *Problems* | |
|---|---|
| P1 | People do not keep their promises related to weight losing |
| P2 | Healthy lifestyle is perceived as luxury |
| P3 | The industrial solutions are not flexible enough for the people that are busy with their work and social life |
| *Goals* | |
| G1 | Let's Get Better helps them to reach a well-balanced happy life |
| G2 | Let's Get Better helps them to keep active in an efficient way |
| G3 | Let's Get Better helps them to eat and drink healthily |
| G4 | Let's Get Better aims to provide 1:1 professional coaching |
| G5 | Let's Get Better aims to provide progress tracking of training activities |
| G6 | Let's Get Better aims to provide coaching support through instant messaging |
| G7 | Let's Get Better aims to provide coaching support through video calls |
| G8 | Let's Get Better aims to provide personalized advice from health professionals |
| G9 | Let's Get Better aims to calculate the user needs, availability, and budget |
| G10 | Let's Get Better aims to match the users and coaches based on their preferences |
| G11 | Let's Get Better aims to let users share experiences amongst them |

- What do you want to achieve or avoid by implementing the business idea? What problems hinder achievement of such goals?
- Which strategy does your start-up follow? Which partners exist and what are the available key resources?
- How is the value proposition distributed?

Additionally, we suggest describing the problems that are preventing the achievement of the goals. The lean canvas explicitly enumerates one to three problems that customers need solved. In other cases, the start-up team can provide insights into these issues. Table 16.4 shows an example of problems and goals. In phase 3, the modellers will use a graphical modelling language to specify these more rigorously.

**Table 16.5** Example of activities

| Activities | |
|---|---|
| A1 | The user registers to the platform and creates a profile with the goals she wants to fulfil. Paying users are walked through additional payment processes |
| A2 | Run the algorithm that matches the user with a coach |
| A3 | The coach and the user agree upon a schedule |
| A4 | The user performs the exercises and receives feedback from the coaches regarding their progress |
| A5 | After each training session, the results are captured in the system. Then, a new iteration begins, in case the goals of the user are not fulfilled |

Then, the modellers focus on the process aspects of the business idea (activity 1.3). The objective is enumerate the most important activities that should be carried out to deliver value to the customers, as well as more operational activities that are required as part of the interaction with the ICT product. The business model canvas explicitly enumerates key activities, so this constitutes a good trigger for discussion, but these are at a very high level, so the operational activities need to be elicited from the start-up team (Table 16.5).

Finally, the modellers analyse the contextual factors influencing the activities (activity 1.4). Contextual factors are not explicitly covered by the canvases, and it indeed becomes the most difficult discussion topic. It is, however, an interesting exercise for the start-up team to brainstorm about factors in the environment that could influence the value of their ICT product or the performance of their enterprise. We suggest investigating the conditions that cause the implementation of the activities in various ways (e.g. a difference in the value proposition in a non-EU market) and eliciting the factors that may influence the execution of the business idea (e.g. regulatory changes). Then enumerate the factors and, if needed, prioritise them depending on their effect on goal fulfilment. Table 16.6 shows an example of contextual factors, conveniently grouped in two categories.

As the modellers progress in this phase, it might be necessary to change previously defined artefacts. For instance, while discussing about goals, a new value proposition could be thought of, or as the contextual factors become clear, some activities can be defined with more detail.

**3. Design the Capability Model**

In this phase, the textual report produced during the analysis phase will be represented graphically. The model can be created by including model elements in a canvas, in the order that is most convenient to the modellers. However, we suggest the ordering depicted in Fig. 16.6.

Firstly, the modellers model the capabilities defined in the analysis phase (activity 3.1). Then, they include objectives and problems that should be solved by implementing the business idea (activity 3.2). Then, the modellers can define Key Performance Indicators to the goals (activity 3.3). This is followed by the definition

**Table 16.6** Example of contextual factors

| Contextual factors | | |
|---|---|---|
| User profile | To create successful matchings, the algorithm requires the user profile as an input. Here, three important factors determine the service provision and its quality | |
| | CF1. Type of the user | The service provision changes depending on the user type, thus the system has to determine whether the user pays for the service or not |
| | CF2. The aspects to be improved | Before allocating a coach to a user, the app should take into consideration the aspects (fitness, diet, etc.) which a user aims to improve |
| | CF3. The symptoms | If the user is not certain about the aspect she wants to be, she can select from a list of symptoms, e.g. anxiety, stress, or depression |
| Coach profile | To enhance the preciseness, the matching algorithm should assess the current context of the coaches | |
| | CF4. Coach availability | In which times of the day is the respective coach available? |
| | CF5. Coach experience | What is the experience level of coaches? (e.g. recently qualified, practising for 5+ years) |

of the business process models (activity 3.4). A process is comprised of activities, as identified in the analysis phase. We suggest using the Business Process Model and Notation (BPMN) [21]. Then the contextual factors are modelled. To this end, the modellers define context elements (i.e. entities representing the contextual factors), measureable properties (i.e. how the context elements are measured), and context element ranges (i.e. valid ranges for the context elements, which can be numeric or discrete enumerations). As a capability requires one and only one context set, create a context set per capability and group its related context element ranges with this set. In case more than one capability has been defined, different ranges for a given context element can be defined within different context sets. The elements of the capability model are interrelated, as shown in the metamodel in Fig. 16.6. We have simplified the metamodel for the sake of brevity; for more details on the CDD metamodel, see Chap. 6.

The output of the design phase is a capability model including the business process models, goal models, and context models; this represents the business idea in a holistic way. The notation is shown in Fig. 16.7. We provide notation stencils for Microsoft Visio (Windows) and OmniGraffle (macOS), which can be downloaded from: http://bit.ly/2jpRaOC. If the modellers have advanced skills on capability modelling, they can also use the Capability Design Tool contributed by the CaaS project. An example of capability model is shown in Fig. 16.8.

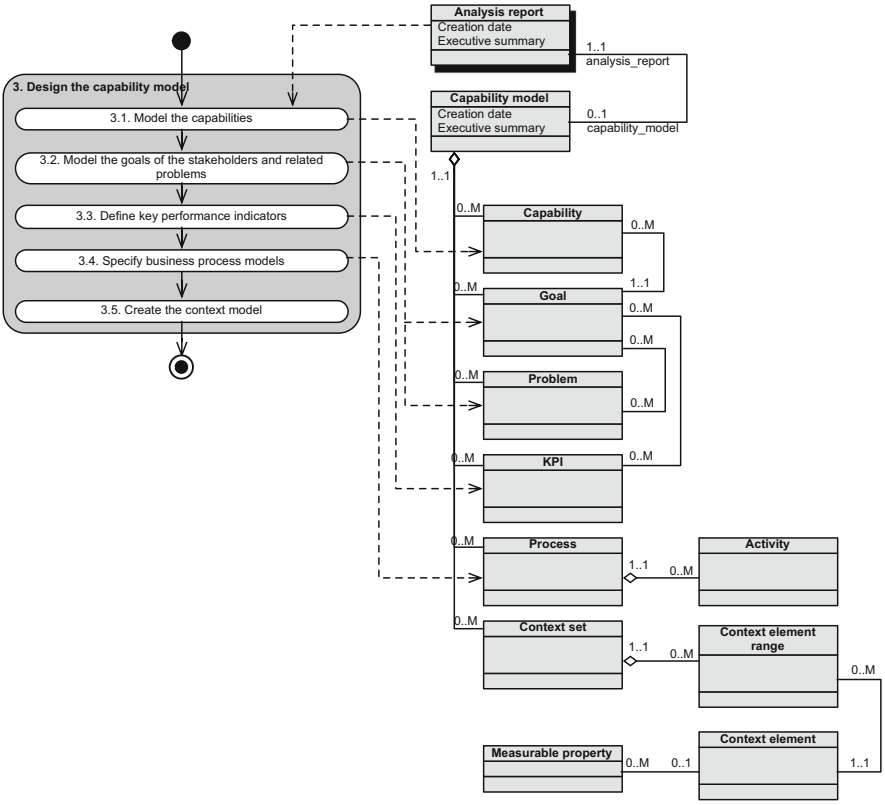


**Fig. 16.6** Details of the design phase

## 4 Discussion and Further Work

This chapter has presented LightCDD, a capability-based method to design ICT-related start-ups. When we applied it to help start-ups define their enterprises, both we and the entrepreneurs agreed on the following benefits:

- The specification of the business idea becomes more precise and less ambiguous.
  - The resulting textual reports and graphical models are found to improve the comprehensibility of the idea and facilitate communicating it to third parties, such as potential partners or investors.
  - Before applying the LightCDD, the entrepreneurs had often disregarded the details of their ICT product workflow. After the application of the LightCDD, the process model becomes detailed and more operational, facilitating the implementation of the business idea.
- Analysing the problems of the end user as well as the goals of the entrepreneurs contributes to a better assessment of the viability of the business idea.

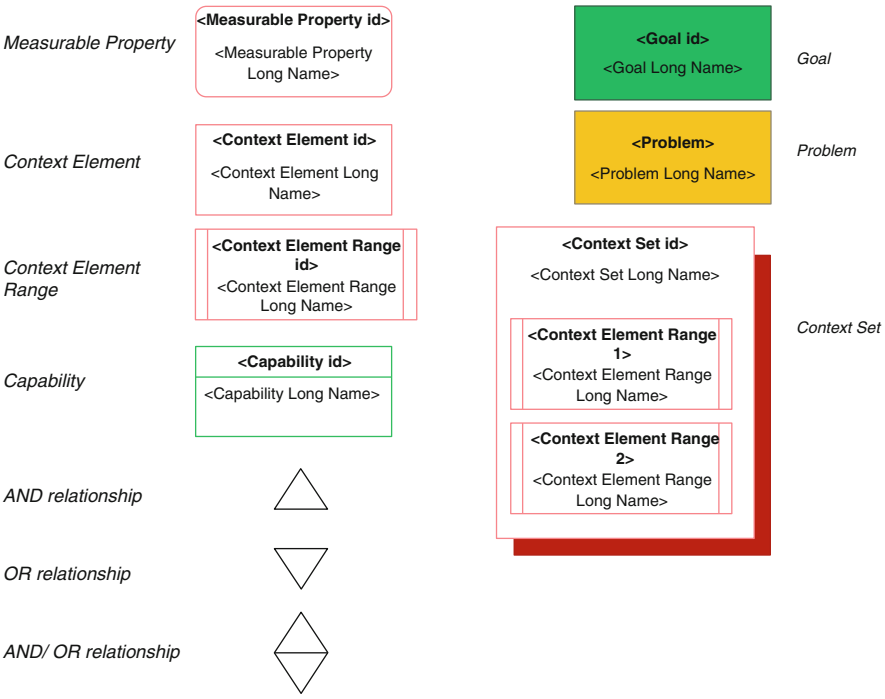


**Fig. 16.7** The LightCDD notation according to [8], published under the Creative Commons Attribution licence. © The authors

  - Before applying LightCDD, the entrepreneurs often did not properly document the problems of their customers and how their business idea would solve these. At most, they had some draft of this is the lean canvas. Thus, they did not examine the end user needs in detail. After applying the LightCDD, the problems and goals became clearer, which can positively influence the ICT product adoption.

- LightCDD forces the consideration of the contextual factors and how they affect the business processes.
  - Forcing the start-up team to think thoroughly on the implementation of the idea and on contextual factors that could affect the value proposition or the enterprise performance becomes a reality check. This could reduce the lack of realism of the business idea and increase the chances of success.
  - End-user needs are subject to change and start-ups need to anticipate such changes to increase their chances of survival. Applying LightCDD facilitates identifying factors that can influence those changes.

We are aware that the method is subject to some limitations.

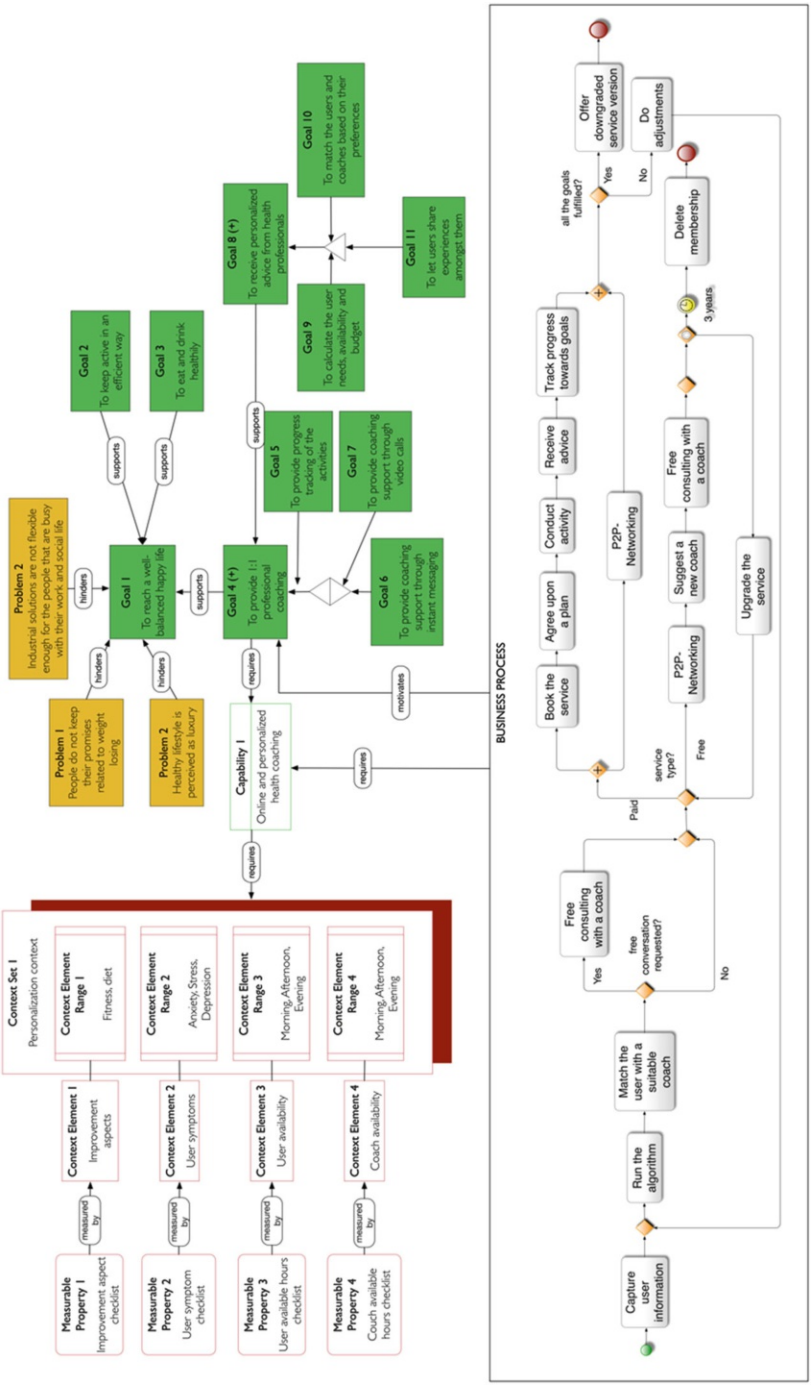


**Fig. 16.8** Capability model example according to [8], published under the Creative Commons Attribution licence. © The authors

- Despite our efforts to simplify CDD for its applicability in entrepreneurial ventures, LightCDD prescribes a modelling language that might be too technical for many entrepreneurs. This can be solved by assisting them or providing consultancy services, but we still intend to provide a method that can be easily adopted by any entrepreneur. This will require further field studies and the corresponding reengineering of LightCDD.
- Aspects such as revenue models, customer channels, key resources, and skills needed to succeed in the venture are not addressed by LightCDD. Some entrepreneurs find it difficult to combine traditional business modelling (e.g. the business model canvas) with LightCDD. Additional guidelines will be necessary to address this issue.

Overall, so far, the results are promising. We are aware that further investigation is needed in order to generalise the validity of the method as well as to make it more situational, that is, to structure it in such a way that method users are able to adapt to the contingencies of the project. It remains unclear whether LightCDD is useful for start-ups offering a product that is not an ICT product or service (e.g. a catering company). We are involved in incubation programmes and plan to further apply and evolve our method. We firmly believe that any contribution to improving the success rate of start-ups is valuable. LightCDD is our two cents!

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