Executable Business Modeling for Ecosystems with *E[3]value*

White paper

TVE
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31st August 2024

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1 Executable ecosystem business models

To implement a new business idea, we need a network of partners who collaborate to deliver the value proposition, supply goods and services, provide training, help, support, and maintenance, and provide other complementary services.

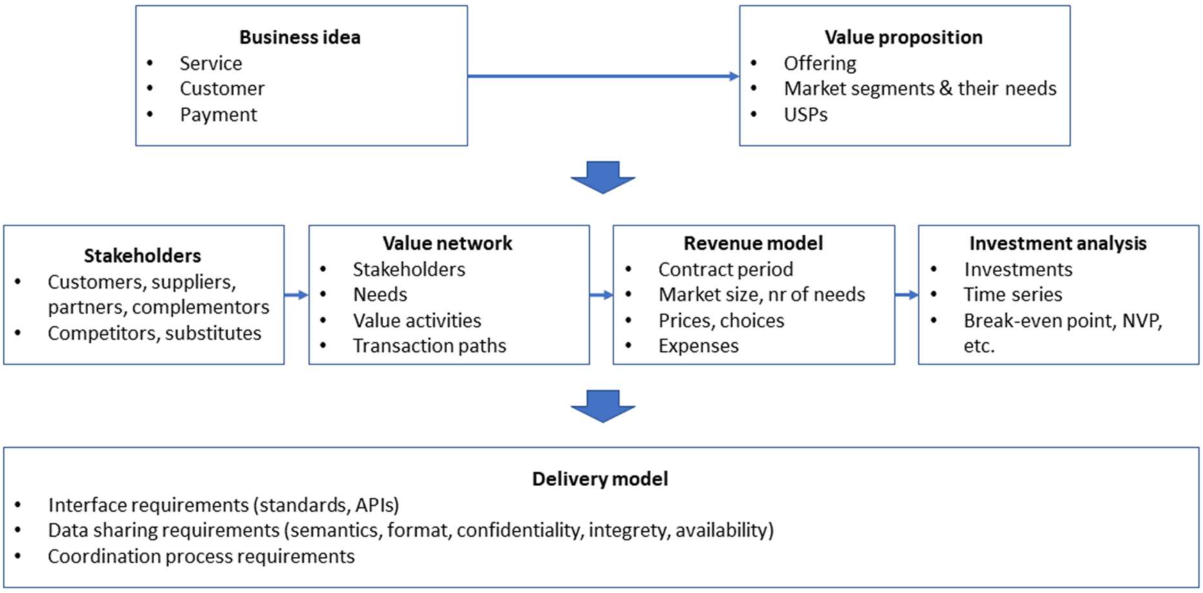
Creating a network of companies is risky, and each participant needs a business case for this.

In this white paper we present a method for business case development for value networks, supported by software that can be used by all partners to reach agreement about services to be provided, and by any partner in the network to compute their revenue potential, as well as to estimate break-even points, payback periods and discounted net present value of an investment.

As shown in the following diagram, the method consists of three steps:

1. Specify the **value proposition** of the network.
2. Design the value network, generate **revenue scenarios,** and analyze the investment. Iterate until a satisfactory business model has been found.
3. Map the selected business model to an **operating model** of the network.

At any point in the process, you can revisit earlier tasks. The following diagram starts from creating a business idea but in any task after this, you can revisit earlier tasks.



We illustrate this with a toy example.

2 Business idea to value proposition

2.1 Business idea

A business idea is a short statement that describes the product and/or service offered, for whom it is offered, and how the offer generates revenue.

Business travel by train: Business idea
The business idea is to offer train travel for business travelers including taxi service at both ends. Both the train and each of the taxi trip and the food must generate positive net revenue.

2.2 Value proposition

A **value proposition** for a business idea consists of

- One or more offerings,
- Customers segments for each of the offerings, including what they need this offering for,
- Unique Selling Points (USPs) that distinguish this offering from that of the competition.

There may be some iteration with formulating the business idea to get the business idea and value proposition right.

One value proposition may consist of several offerings. When doing the revenue computations below, we should also decide which offerings are sold as a **bundle.**

Business travel by train: Value proposition
1. Offering: train trip bundled with business services and catering on board and taxi services at each end of the trip. 2. Customer: business travelers 3. USPs: Door-to-door transport, no queues at either end to board a taxi, high-speed Wi-Fi on board of the train, secluded rooms for online and hybrid meetings.

Usually, a business idea can be elaborated in several different value propositions. Each value proposition may be elaborated in the following steps. Usually, after solution filtering, only one is selected to elaborate. If the below elaboration shows that the proposition does not have an attractive business case, we can go back and select another one.

3 Value proposition to value network

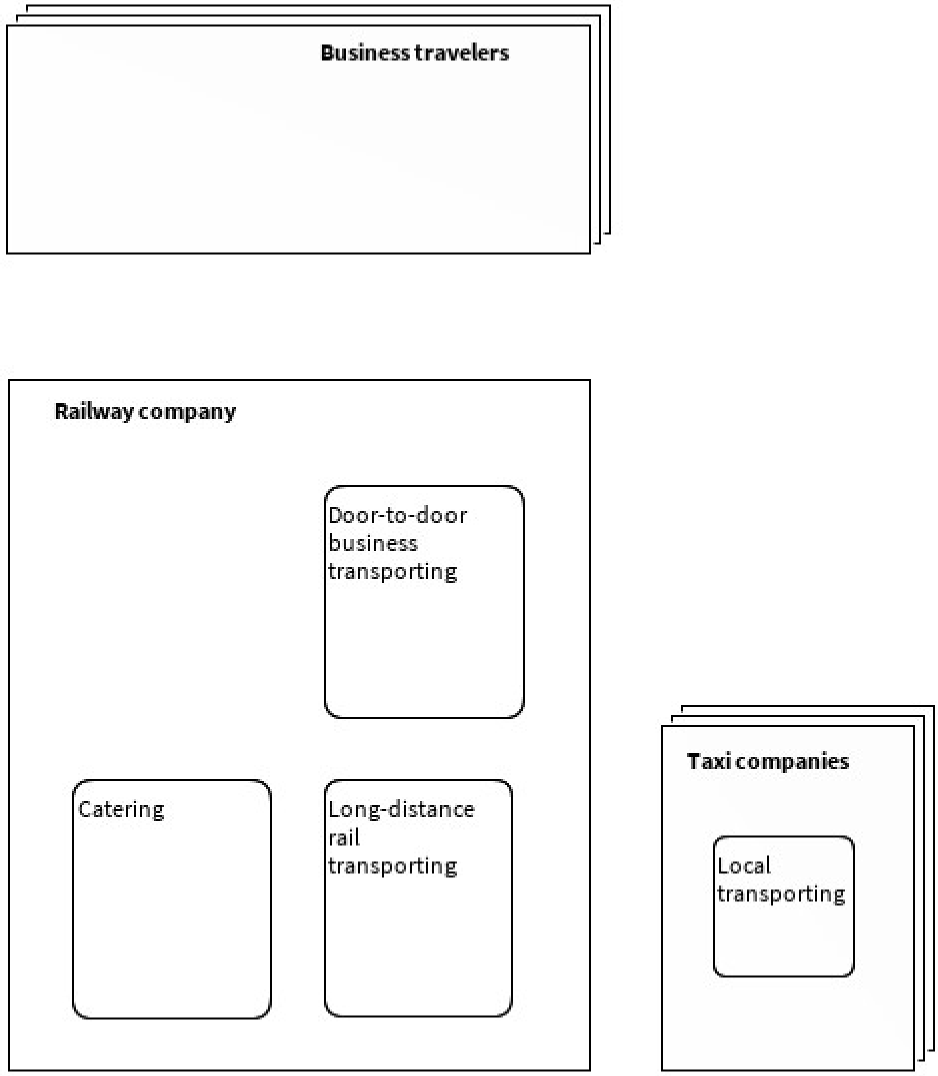
3.1 Stakeholders

For each value proposition, we need a network of stakeholders to deliver the offer. Make a list of these stakeholder, and what they contribute to the ecosystem.

- Which stakeholders are needed to deliver the offer? Include *customers, suppliers, other partners*, and also *competitors* and *substitutes.* Also consider *complementors,* entities that offer a product or service that complements the one under consideration.
- For each stakeholder, what does it **contribute** to the ecosystem? What value does it offer to the ecosystem? Each stakeholder except the end consumer has at least one **value activity** by which it offers value to its customers. (The opposite question, what value the ecosystem has for the stakeholder, will be answered later when we do revenue estimations.)
- Value activities are assumed to be profitable. This assumption remains a hypothesis until it has generated positive revenue in the real world. The revenue assessments that we will do below are a first test of this hypothesis.

Business travel by train: Stakeholders

- We assume that taxi services are offered by independent companies and that the train company also offers catering. In reality, catering will be supplied by someone else and high-speed Wi-Fi will be supplied by an external company too, but in our toy example we keep it simple.
- The value activities of each stakeholder other than customers is represented by an oval box inside the stakeholder.
- The following diagram assumes that catering as well as train transport are profitable for the railway company. It shows two existing value activities of the train company, Catering and Long-distance rail transporting, and one external value activity, provided by taxi companies, Local transporting.



By including Catering as value activity in the Railway company, we express the assumption that this is a profitable activity for the Railway Company. Our revenue assessments below should show whether this is a realistic assumption. If the activity is not a profit center we may want to outsource it to a catering company.

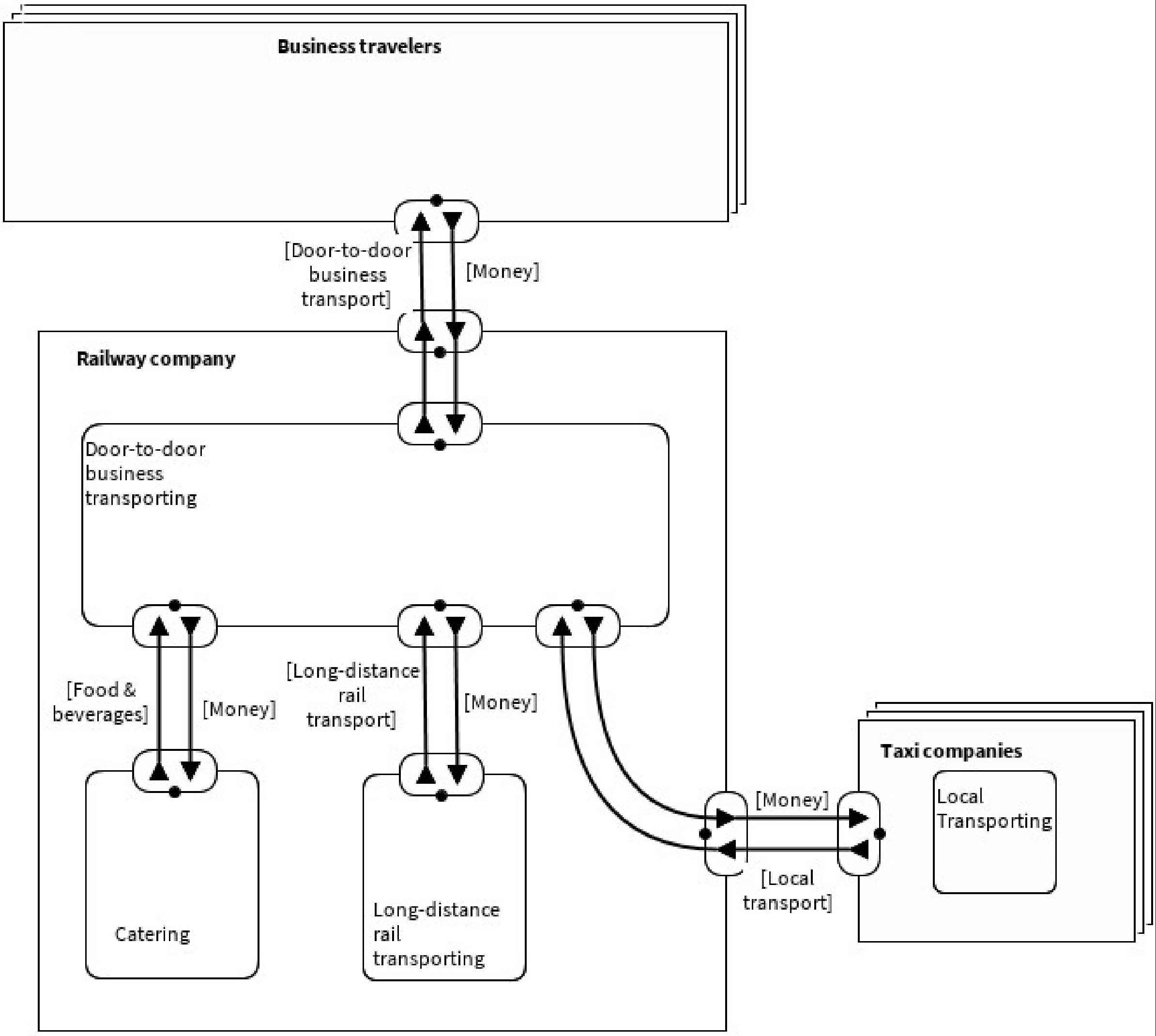
3.2 Transactions

To deliver the value proposition to customers, the participants in the network engage in commercial transactions in which they deliver products or services to each other in exchange for money or some other value object.

The transactions show which services a stakeholder buys from other entities and which it provides itself. You may want to explore the possibility to move a value activity to other entities. If you do, then additional transactions will be added that buy the service provided by the activity from another entity.

Business travel by train: Transactions

The train company offers business travel including catering and taxi transport as one bundle and buys the taxi transport from local taxi companies. The new value activity Door-to-door business transporting buys what it needs from two other internal value activities, Long-distance train transporting and Catering, and one external value activity, Local transporting. This gives us the following transactions. The traveler pays the railway company for the package, and has no separate transaction with a taxi company.



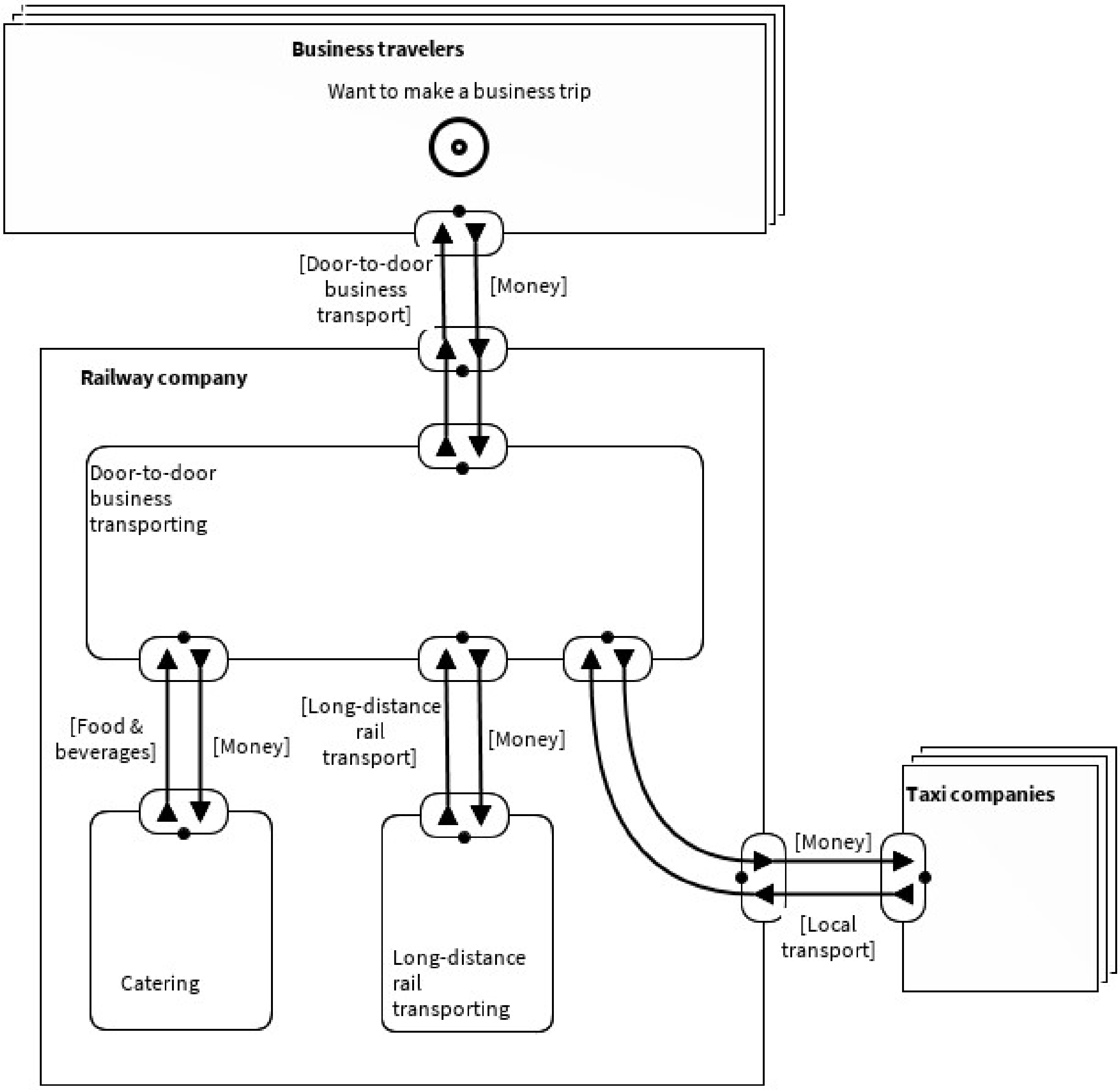
3.3 Needs

Now we must be explicit about the customer need to be satisfied by the network. This can be surprisingly hard, because it forces us to be explicit who has the need(s) we are trying to meet, and to give a name to that need.

Business travel by train: Customer needs

In our toy example, the location of the need is clear: Business travelers have a need to be met by the network. There are different interpretations of what the need is: Making a business trip? Making a business trip with the possibility to work in a secluded space? To make a business trip with reduced Greenhouse Gas emissions? The outcome of this discussion may make us return to the value proposition to refine it.

The following diagram keeps it simple, and we identify the traveler’s need as to make a business trip.



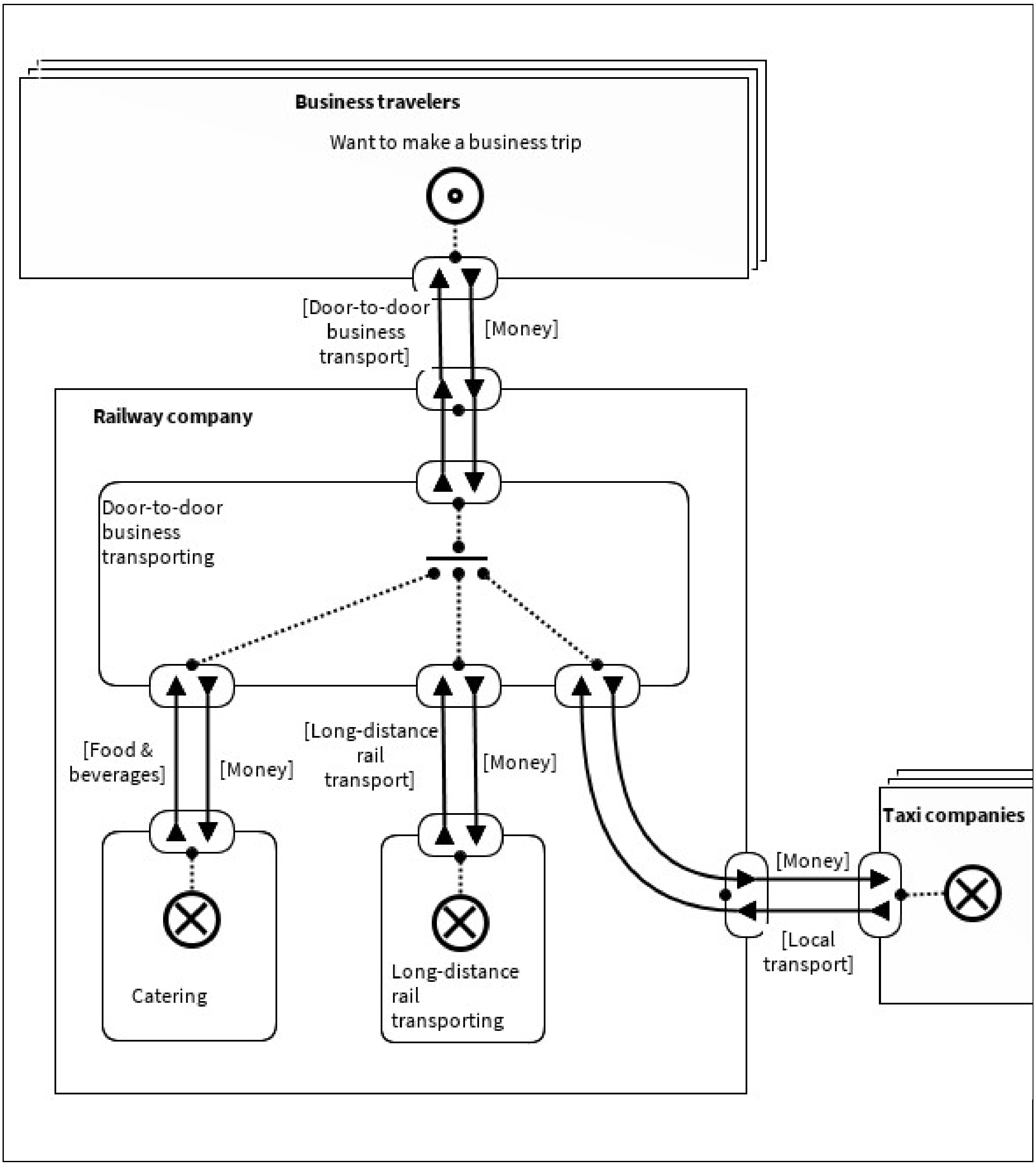
Since the local taxi companies offer one service only, and this service is already named by the Local Transport value transfer, we omit the Local Transporting value activity from the diagram for simplicity.

3.4 Business logic

We now connect the transactions to show which transactions are performed to meet the customer need. This may include and-or logic to show which transactions are performed jointly and which are performed optionally. The result is called a transaction path, which connects the customer need to all transactions that need to be performed to meet the need, including their and-or logic. See the *E³value* User Guide available at www.thevalueengineers.nl for the structure of dependency paths.

We also need to decide where to stop including the transactions that are performed when meeting a customer need. In general, we include only the transactions of entities in which economic survival and well-being we are interested, and we stop with entities whose survival and well-being we take for granted.

Business travel by train: Business Logic.
The new value activity of the Railway company, Door-to-door business transporting, buys the services it needs from two internal and one external value activity. This is shown by the and-split in the Door-to-door business transporting value activity. Every time it delivers this service, it pays the two internal and the one external value activity for the services they deliver.


Business travelers
Want to make a business trip
[Door-to-door business transport]
[Money]
Railway company
Door-to-door business transporting
[Food & beverages]
[Money]
[Long-distance rail transport]
[Money]
Catering
Long-distance rail transporting
Taxi companies
[Money]
[Local transport]

4 Revenue assessment

To assess potential revenue, we make a number of assumptions:

1. Size of market segments
2. Number of needs
3. Prices (all money transfers)
4. Choice distributions
5. Variable expenses (the cost of performing a transaction)
6. Fixed expenses in the contract period.

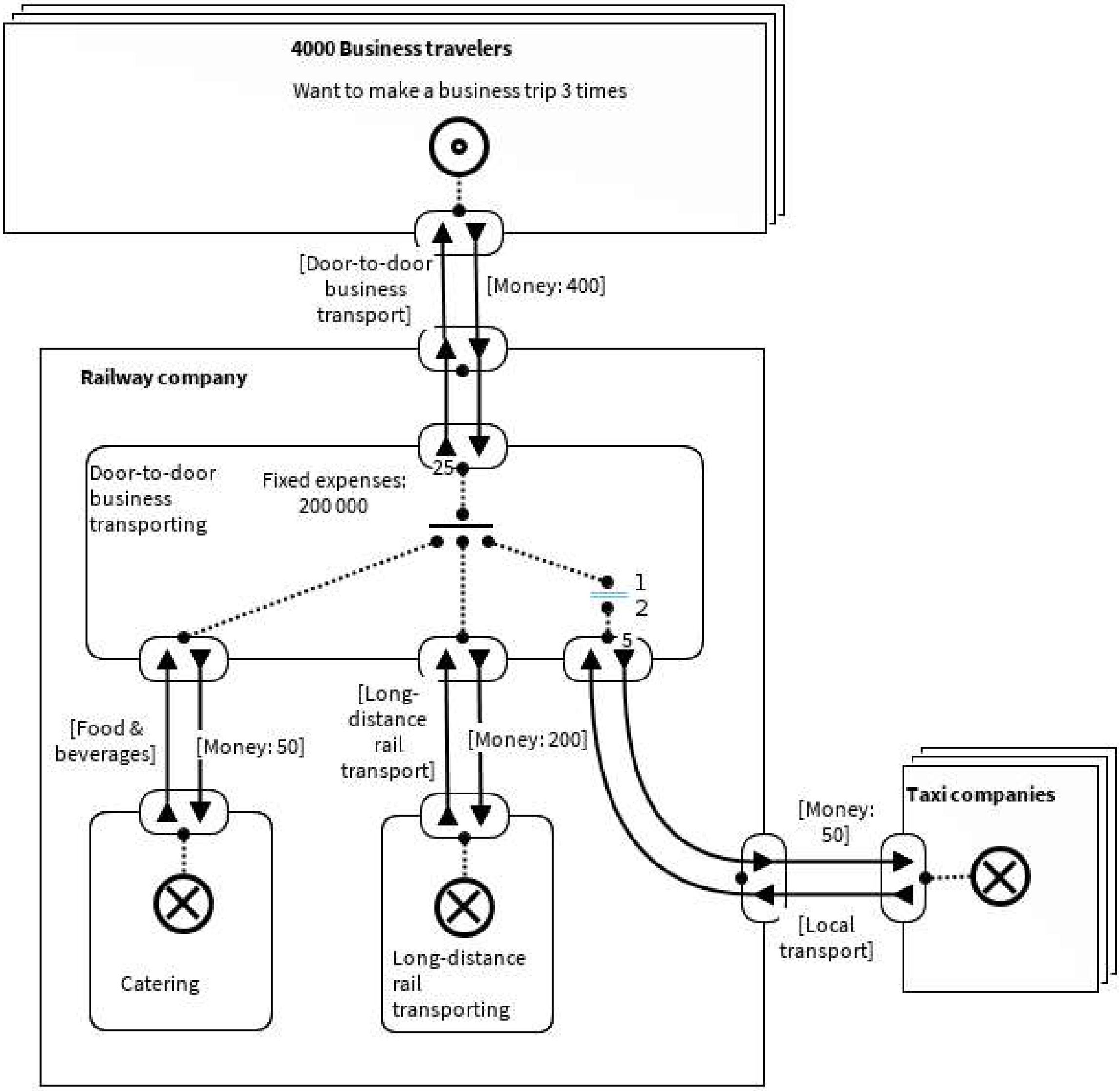
To quantify these numbers we need to decide on the period of time that we are considering, called a **contract period.** If the contract period is one month, there will be less needs and probably a smaller market segments than when the contract period is one year or 10 years.

By varying the numbers, you get as feeling for how sensitive revenue is for changes in these parameters.

Business travel by train: revenue assessment

We choose a contract period of one year. The following diagram contains the following assumptions about this year:

1. There are 4000 business travelers this year.
2. On average, each takes 3 business trips with our railway company.
3. The business trip costs 450. To deliver it, the Door-to-door business transporting activity buys Food & beverages for 50, Long-distance rail transport for 200, and two Local transport services for 60 each on average. Note that in this quantitative model we had to specify that each business trip includes two Local transport services, which is expressed by the two parallel bars with a number on each side.
4. Selling one business trip incurs an expense of 25 per transaction with the customer and 5 per transaction with a taxi company.
5. There are no choices in this model.
6. Delivering Food & beverages costs Catering 25 per transaction.
7. Fixed expenses for the Door-to-door business transporting activity are 200K.



This gives us the following spreadsheet for this contract period.

Market segment business travelers	
Nr of business travelers	4000
Nr of needs/business traveler	3
Nr of service deliveries	12.000,00
Gross revenue per service delivery	
Door-to-door business transport	450,00
Variable expenses per service delivery	
Food & beverages	50
Long-distance rail transport	200
Local transport	100
Transaction costs	35
Total variable expenses per service delivery	385
Net revenue per service delivery	65,00
Gross revenue per period	5400000
Total variable expenses per period	4620000
Fixed expenses per period	200000
Total expenses per period	4820000
Net revenue per period	580.000,00
Benefit/cost ratio	1,12

5 Investment analysis

To do an investment analysis, we estimate the desired investment and expenses for period 0, the period that we set up the Door-to-door business transport value activity and don't have any business yet. Next, we repeat the revenue assessment for a number of years, and then compute the net present value of the investment by choosing a discount percentage. The higher the percentage, the more the perceived risk that the numbers in these years will turn out to be much worse than we assumed.

Business travel by train: investment analysis

In the following spreadsheet, investment in year 0 is 1M and fixed costs in this year start at 70K. We then start in the first year with loss-giving assumptions about market size and price and improved the numbers until net revenue is positive. Fixed costs, which include personnel costs, marketing and legal, are 200K from year 1.

	Year 0	Year 1	Year 2	Year 3	year 4	year 5	year 6	Year 7	year 8	year 9
Market segment business travelers										
Nr of business travelers		2000	3000	4000	4000	4000	4000	4000	4000	4000
Nr of needs/business traveler		2	2	3	4	4	4	4	4	4
Nr of service deliveries		4.000,00	6.000,00	12.000,00	16.000,00	16.000,00	16.000,00	16.000,00	16.000,00	16.000,00
Gross revenue per service delivery										
Door-to-door business transport		400,00	400,00	400,00	450,00	450,00	450,00	450,00	450,00	450,00
Variable expenses per service delivery										
Food & beverages		50	50	50	50	50	50	50	50	50
Long-distance rail transport		200	200	200	200	200	200	200	200	200
Local transport		100	100	100	100	100	100	100	100	100
Transaction costs		35	35	35	35	35	35	35	35	35
Total variable expenses/service delivery		385	385	385	385	385	385	385	385	385
Net revenue per service delivery		15,00	15,00	15,00	65,00	65,00	65,00	65,00	65,00	65,00
Gross revenue per period		1600000	2400000	4800000	7200000	7200000	7200000	7200000	7200000	7200000
Total variable expenses per period		1540000	2310000	4620000	6160000	6160000	6160000	6160000	6160000	6160000
Fixed expenses per period		200000	200000	200000	200000	200000	200000	200000	200000	200000
Total expenses per period		1740000	2510000	4820000	6360000	6360000	6360000	6360000	6360000	6360000
Investment	1000000									
Net revenue pe	-1.000.000,00	-140.000,00	-110.000,00	-20.000,00	840.000,00	840.000,00	840.000,00	840.000,00	840.000,00	840.000,00
Benefit/cost ratio		0,92	0,96	1	1,13	1,13	1,13	1,13	1,13	1,13

Against as risk percentage of 7% this gives us an NPV after 9 years of 359 296.

		year 0	year 1	year 2	year 3	year 4	year 5	year 6	year 7	year 8	yea 9
Discount percentage	7,00%	7,00%	7,00%	7,00%	7,00%	7,00%	7,00%	7,00%	7,00%	7,00%	7,00
Revenue		0	1.600.000,00	2.400.000,00	4.800.000,00	7.200.000,00	7.200.000,00	7.200.000,00	7.200.000,00	7.200.000,00	7.200.000,0
Expenses		0,00	1.740.000,00	2.510.000,00	4.820.000,00	6.360.000,00	6.360.000,00	6.360.000,00	6.360.000,00	6.360.000,00	6.360.000,0
Investment		1.000.000,00									
Cash flow		0,00	-140.000,00	-110.000,00	-20.000,00	840.000,00	840.000,00	840.000,00	840.000,00	840.000,00	840.000,0
Discounted cash flow			-130.841,12	-96.078,26	-16.325,96	640.831,98	598.908,39	559.727,47	523.109,78	488.887,65	456.904,3
NPV	3.025.124,27		-130.841,12	-96.078,26	-16.325,96	640.831,98	598.908,39	559.727,47	523.109,78	488.887,65	456.904,3
ROI	303,00%										

Payback period is 4 years.

6 Iterate

Revise the model when the cash flows are not satisfactory. For example, local transport takes a disproportionate bite out of the ticket price. Catering takes a high margin on its services. Fixed expenses are very high and stay at that level. The average number of needs is very low; some businesspeople make a weekly trip to the same destination and would love the possibility to work and have online meetings during the complete trip. The numbers that you end up with should both be realistic and lead to a positive discounted net cash flow for all decision-making actors.

7 Value network to operational model

The e3value model is a source of requirements for the IT infrastructure. Value interfaces become use cases for the software, and value exchanges specify what coordination protocols must achieve. This in turn defines the APIs to be defined by the software, as well as the accessibility of these APIs for other parties in the value network. Value exchanges also clarify what data needs to be exchanges, and what the semantics of this data are.

Business travel by train: Operational model

The user interface to business travelers can be made part of a web interface but there should also be an option of human interaction for negotiating special deals.

The value exchanges between Door-to-door business transporting and Catering and Long-distance rail transporting should take place via a shared database of reservations and trips.

The interface with taxi companies could be defined in external contracts with a few taxi companies who handle local transport for the train company.

8 Bibliography

[1] J. Gordijn en R. Wieringa, E3value User Guide. Designing Your Ecosystem in a Digital World., Available from https://www.thevalueengineers.nl: TVE Press, 2021.