

Advanced topics in assessing economic sustainability



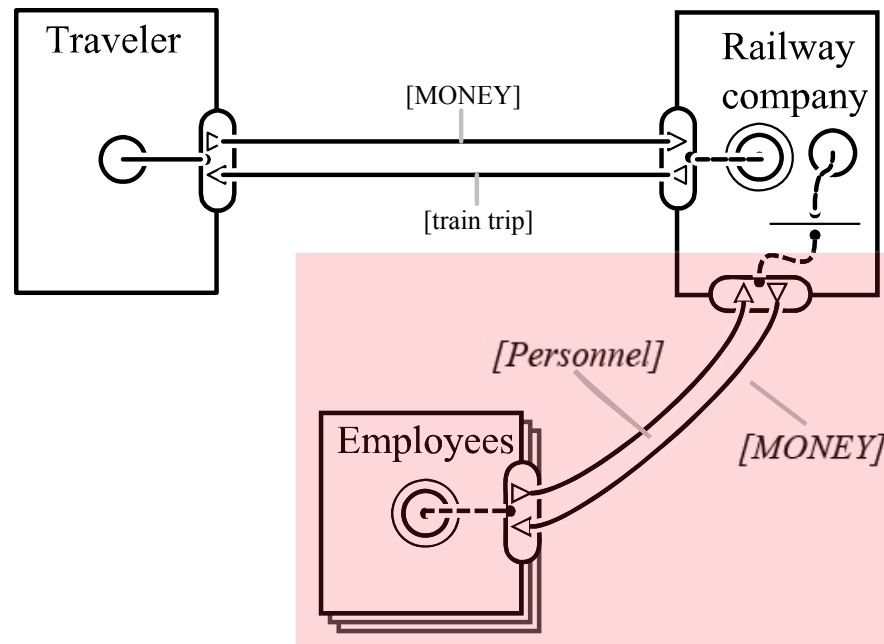
Jaap Gordijn
(gordijn@cs.vu.nl)

Take home message:

- Actors may have various kind of expenses (fixed, variable) that influence sustainability
- Value activities can also be assessed for sustainability
- Partnerships can also be assessed for sustainability
- Sometimes a value transfers can happen more than once in a value transaction.
- Actors may use different interest rates to address different risk profiles or costs of capital.

Expenses

- Expenses usually show up as a cash-out value transfer, from one actor to another actor.
- Sometimes, it is convenient to show the expense, but not the actor obtaining the cash-out flow.



Expenses cont'd

- The EXPENSES formula represents financial effects that stem from considering other perspectives:
 - Business processes (e.g. personnel)
 - Information systems (IT expenses)

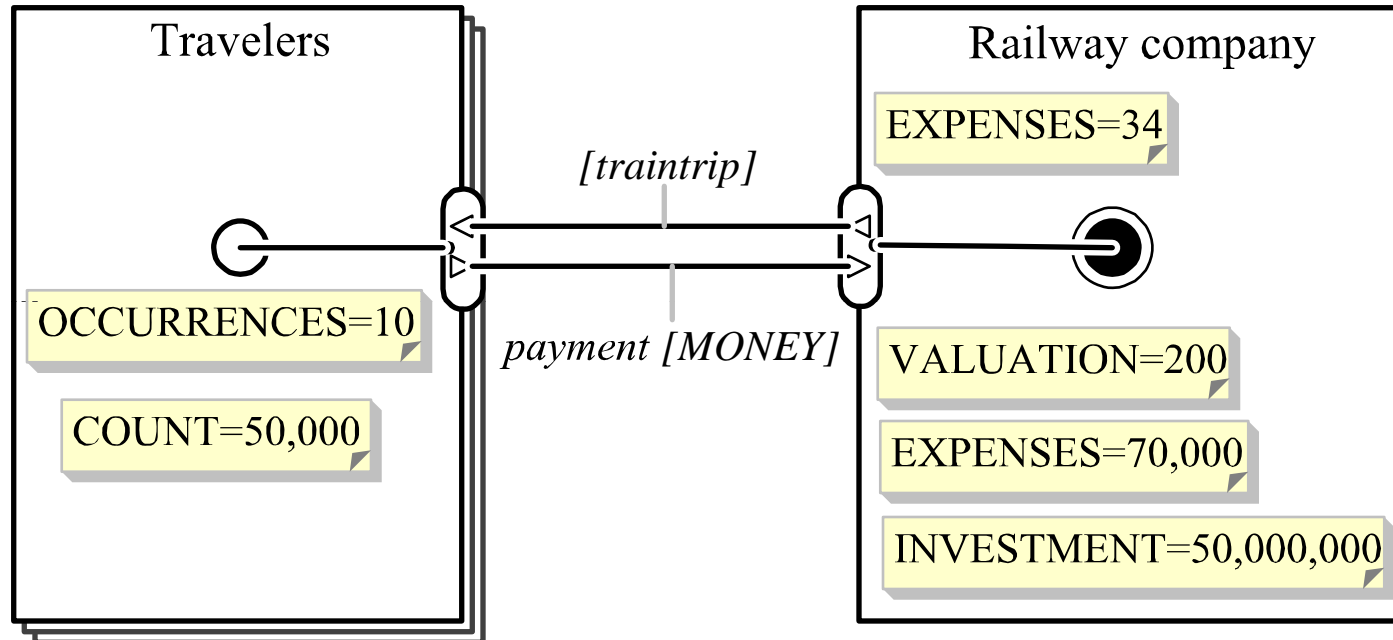
Expenses cont'd

Kinds of expenses

- Fixed expenses
 - Occur only once per value model (period)
 - Assigned to actors, market segments, or value activities
- Investments
 - A special case of fixed expense, but only once per time series
- Variable expenses
 - Occur multiple times per value model, depending on the transaction volume (the occurrences)
 - Assigned to value ports

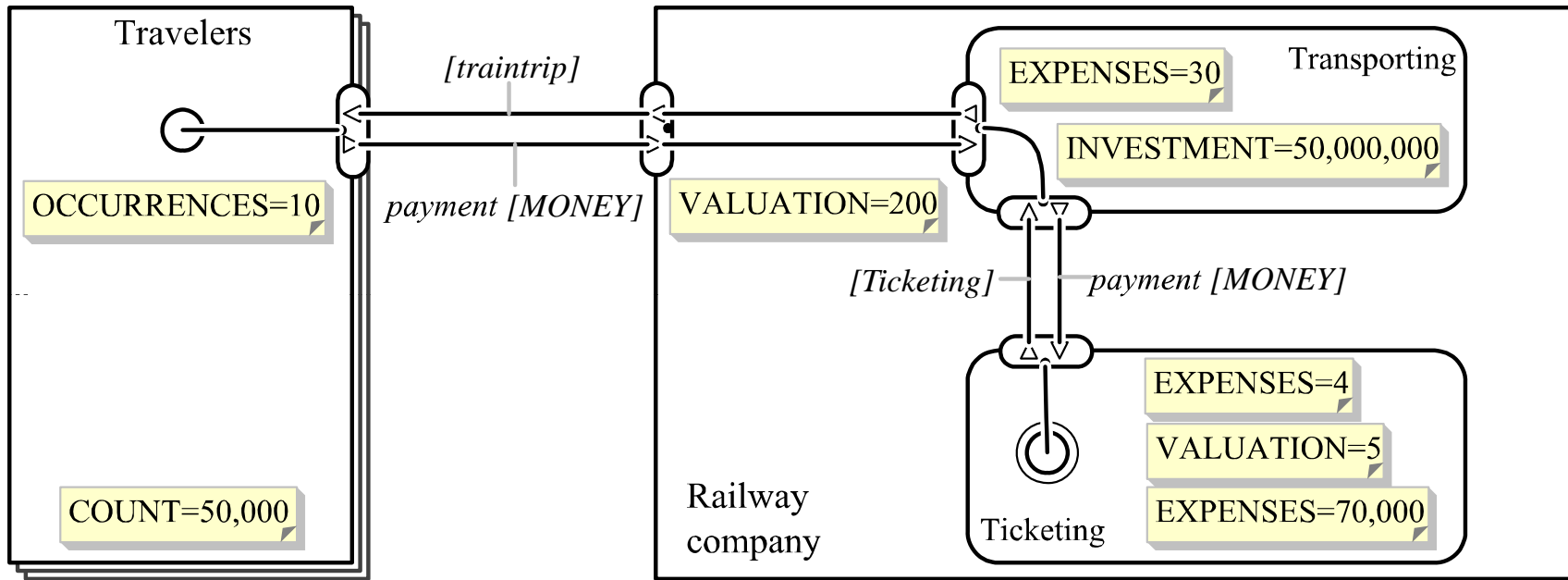
Expenses cont'd

Example



Interface	Port	Transfer	Occurrences	Valuation	Value	Total
train-trip,MONEY			500 K		83 M	
	out: traintrip	(all transfers)	500 K	0.00	0.00	
	out: traintrip	(EXPENSES)	500 K	34.00	-17 M	
	in: MONEY	MONEY	500 K	200.00	100 M	
INVESTMENT					50 M	
EXPENSES					70 K	
total for actor						32.930 M 6

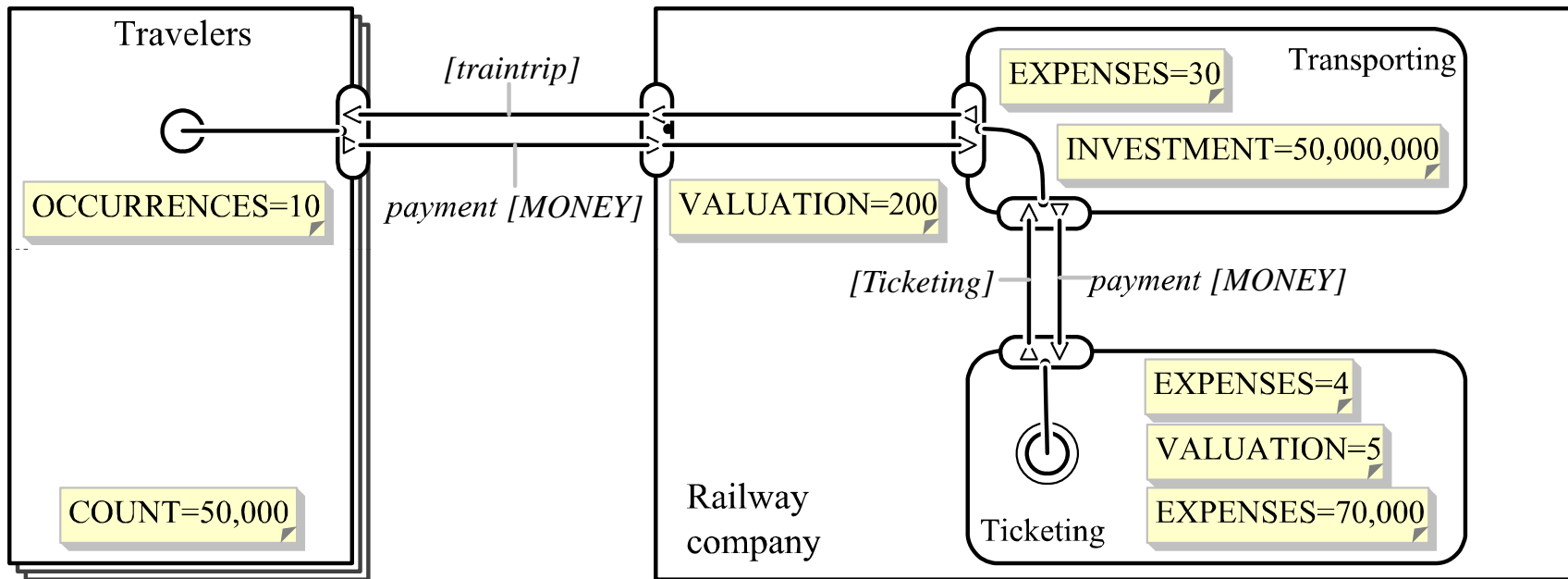
Value flow calculation for value activities: An example



Transporting activity

Interface	Port	Transfer	Occurrences	Valuation	Value	Total
MONEY,traintrip			500 K		85 M	
	in: MONEY	MONEY	500 K	200.00	100 M	
	out: traintrip	(all transfers)	500 K	0.00	0.00	
	out: traintrip	(EXPENSES)	500 K	30.00	-15 M	
Ticketing,MONEY			500 K		-2.5 M	
	in: Ticketing	(all transfers)	500 K	0.00	0.00	
	out: MONEY	MONEY	500 K	5.00	-2.5 M	
INVESTMENT					50 M	7
total for actor						32.5 M

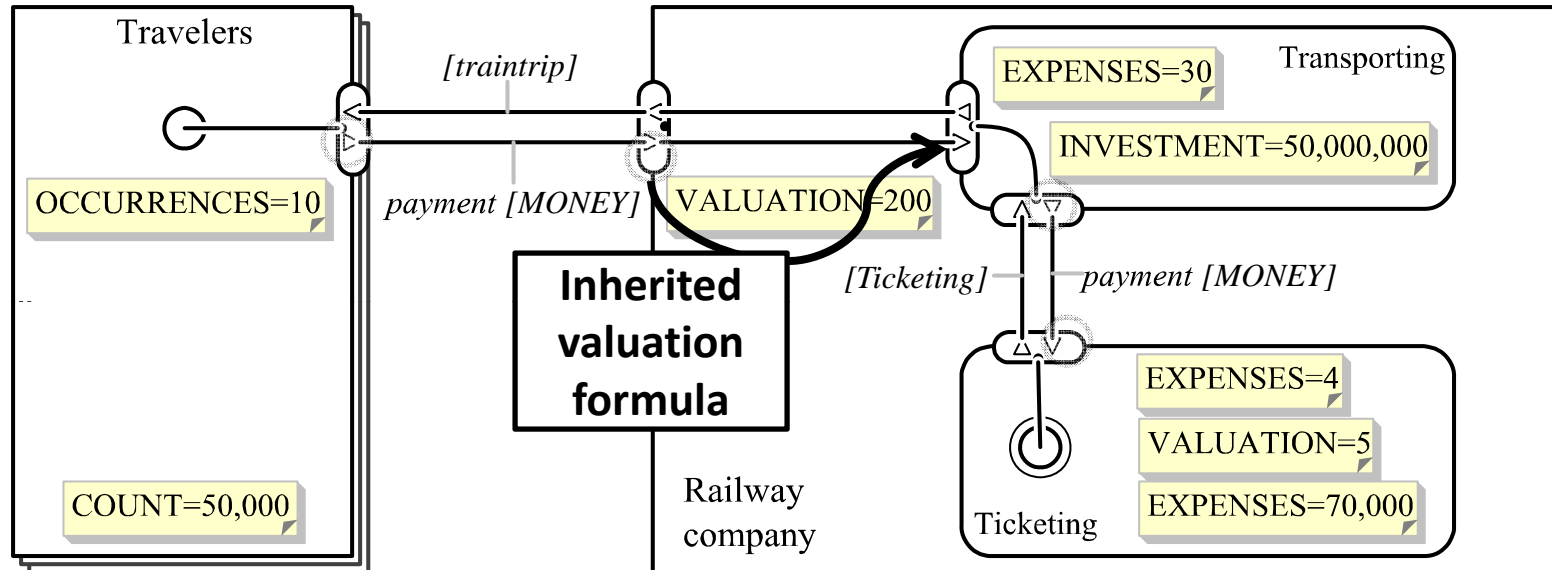
Value flow calculation for value activities: An example, cont'd



Ticketing activity

Interface	Port	Transfer	Occurrences	Valuation	Value	Total
Ticketing, MONEY			500 K		500 K	
	out: Ticketing	(all transfers)	500 K	0.00	0.00	
	out: Ticketing	(EXPENSES)	500 K	4.00	-2 M	
	in: MONEY	MONEY	500 K	5.00	2.5 M	
EXPENSES					70 K	
total for actor						430 K

Value flow calculation for value activities: Valuation formula?



- Valuation formulas are only expressed on root-ports
 - Root ports \approx value ports, connected by a value transfer, and having opposite(in/out) directions
- Valuation formulas for ports connected to root-ports (via transfers) are inherited from the root-ports

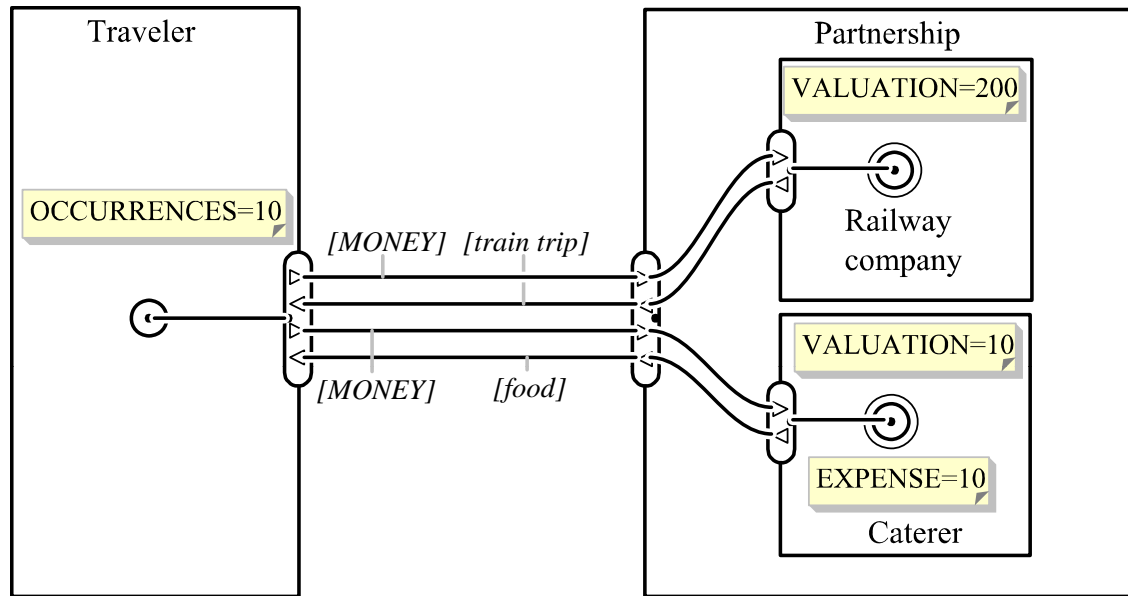
Value flow calculation for value activities: Consolidation in the actor's net value sheet

- The financial effects (expenses, investments) of a value activity are consolidated in the value flow sheet of the performing actor:

Interface	Port	Transfer	Occurrences	Valuation	Value	Total
MONEY,traintrip			500 K		100 M	
	in: MONEY	MONEY	500 K	200.00	100 M	
	out: traintrip	(all transfers)	500 K	0.00	0.00	
INVESTMENT					50 M	
EXPENSES					17.07 M	
total for actor						32.93 M

Railway company, with consolidated financial effects of performing value activities

Value flow calculation for partnerships



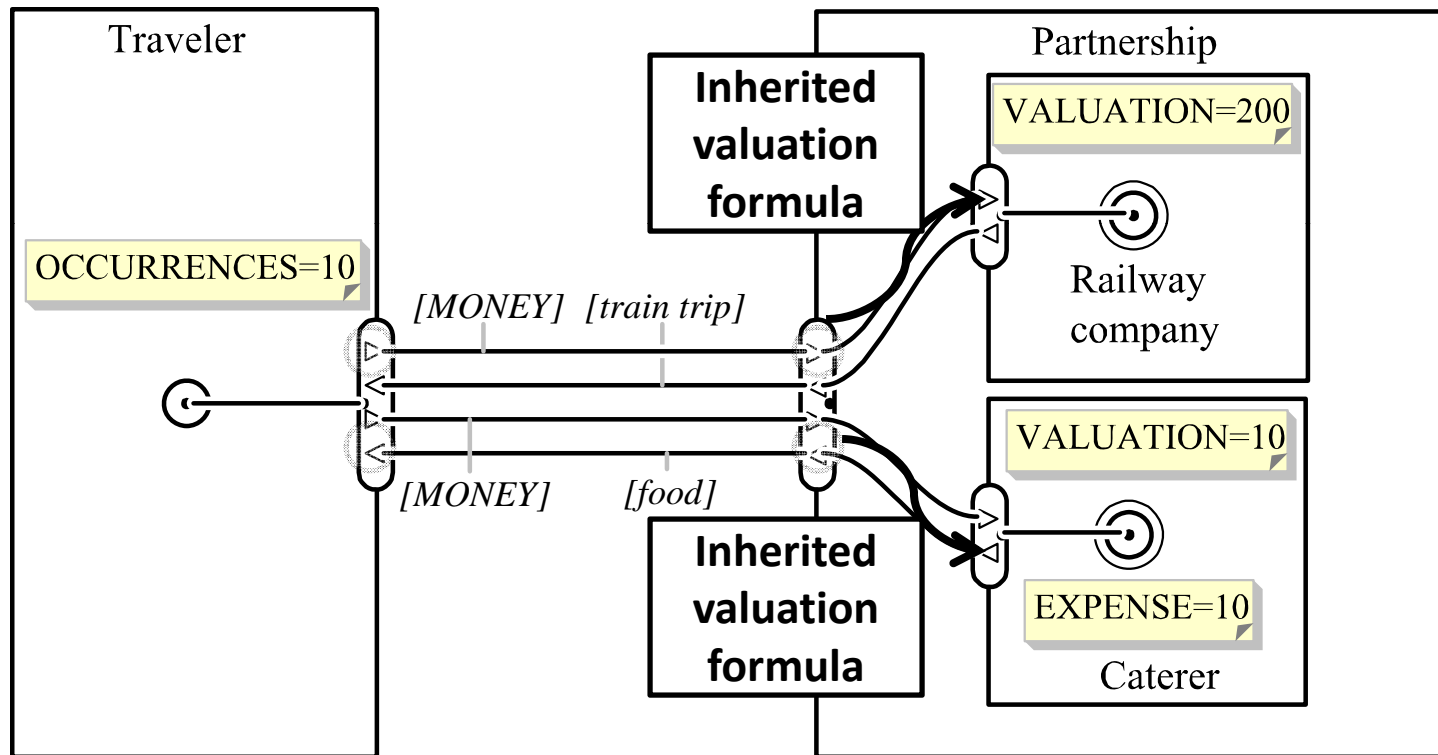
Interface	Port	Transfer	Occurrences	Valuation	Value	Total
MONEY,MONEY,train trip,food			10		2100	
	in: MONEY	MONEY	10	10	100	
	in: MONEY	MONEY	10	200	2000	
	out: train trip	(all transfers)	10	0	0	
	out: food	(all transfers)	10	0	0	
total for actor						2100

Partnership

Caterer

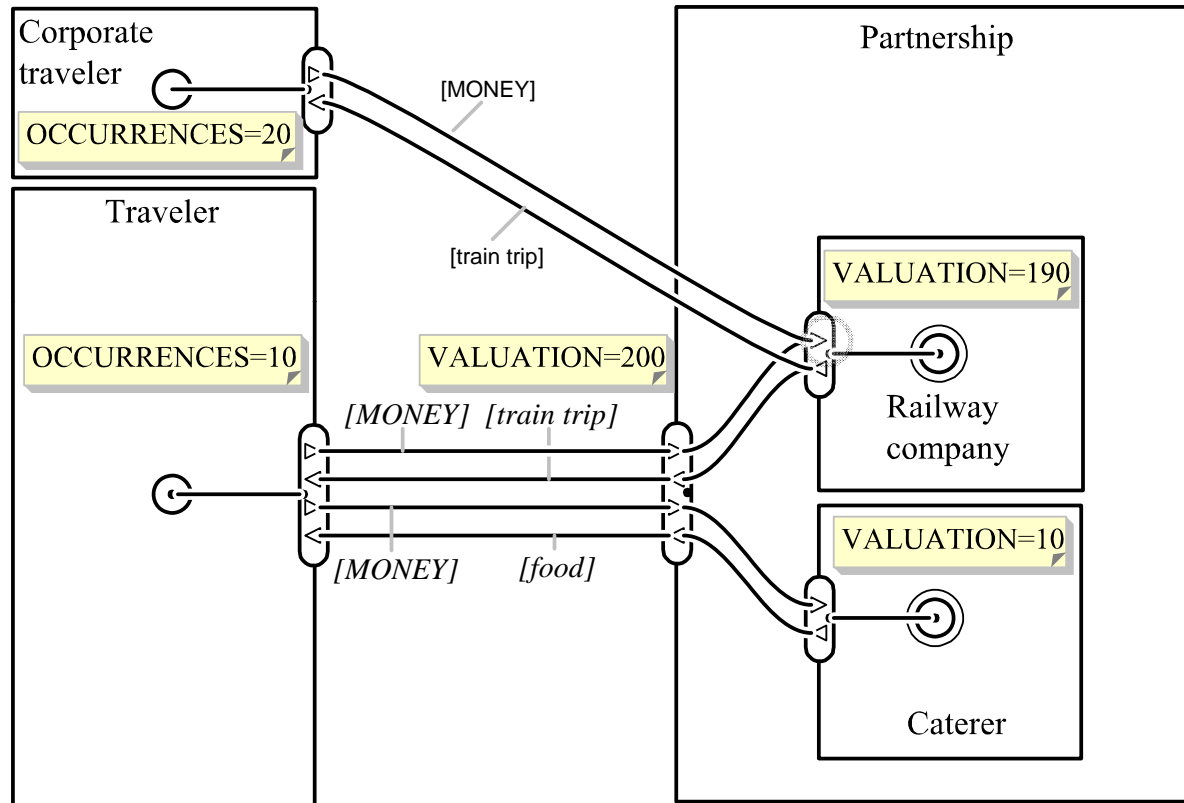
Interface	Port	Transfer	Occurrences	Valuation	Value	Total
MONEY,food			10		50	
	in: MONEY	MONEY	10	10	100	
	out: food	(all transfers)	10	0	0	
	out: food	(EXPENSES)	10	5	-50	
total for actor						50

Value flow calculation for partnerships cont'd: Root ports



Value flow calculation for partnerships

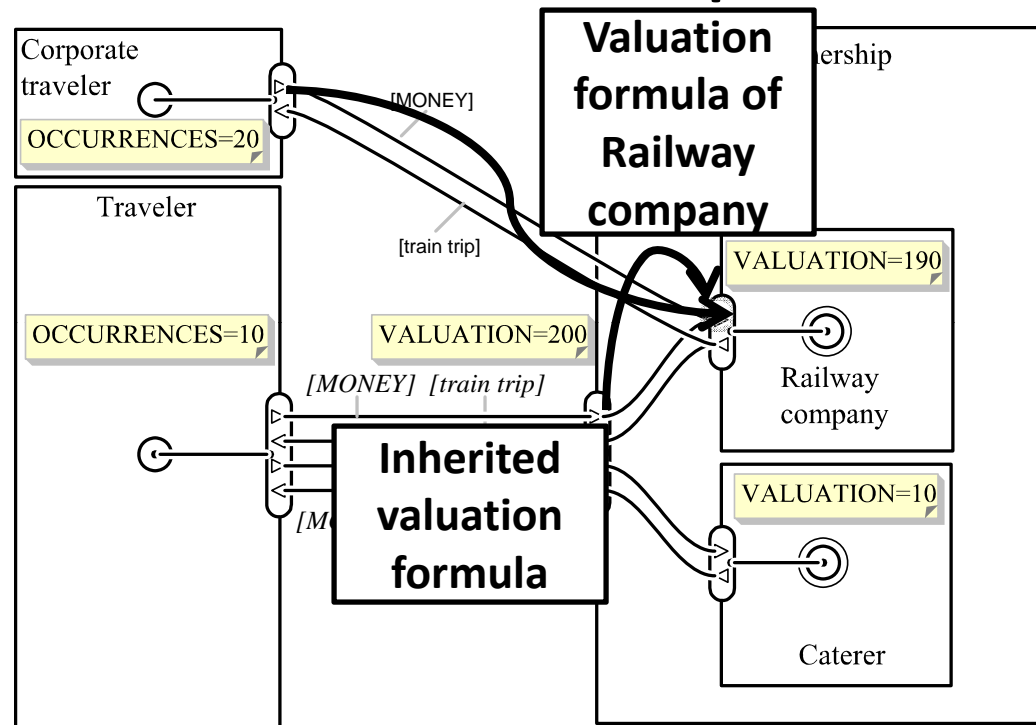
cont'd: Root ports




- Is  a root port?
 - Remember: “Root ports \approx value ports, connected by a value transfer, and having opposite(in/out) directions”

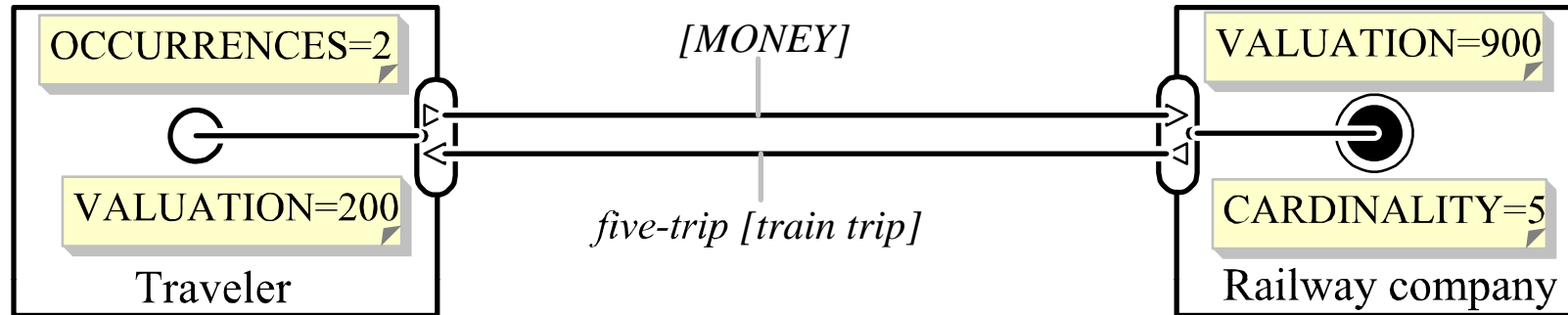
Value flow calculation for partnerships

cont'd: Root ports



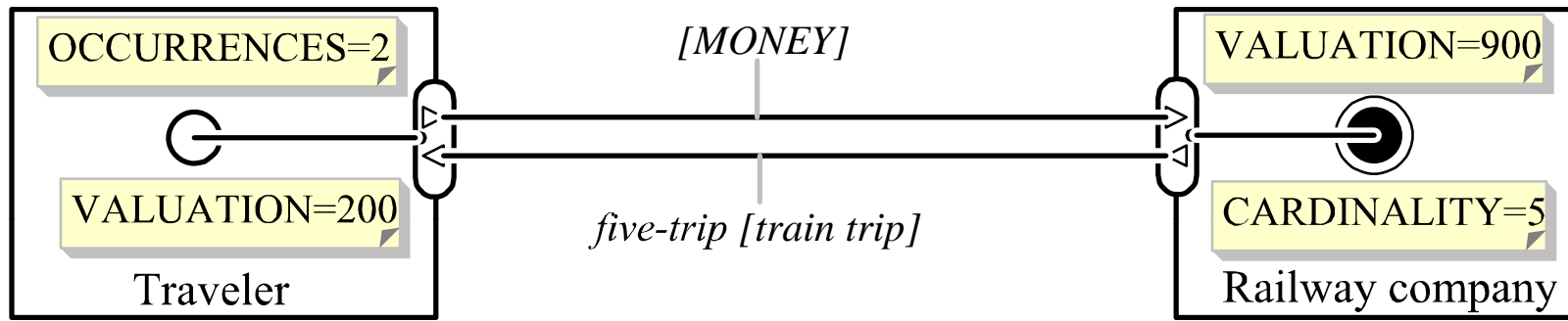
- Is  a root port?
 - Yes (transfer MONEY between Corporate traveler and Railway company connects ports of opposite directions)
 - Valuation formula of Railway company is used
 - No (transfer MONEY between Partnership and Railway company connects ports of equal directions)
 - Valuation formula of Partnership is used

Cardinality of value transfers: N-block pricing



- Five train trips at-once may have a different price than five trips separately
- Value transfers may have a cardinality formula, stating how many products should be transferred.
 - From the value interface seen as one transfer
- The cardinality formula is meaningless for MONEY transfers

Cardinality of value transfers: N-block pricing



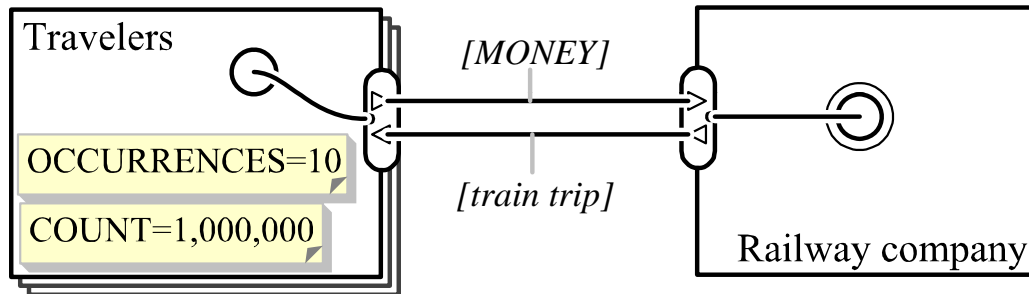
Interface	Port	Transfer	Occurrences	Valuation	Value	Total
MONEY,train trip			2		200	
	out: MONEY	MONEY	2	900	-1.8 K	
	in: train trip	(all transfers)	2	1 K	2 K	
total for actor						200

Formulas

- The valuation and cardinality formulas are specific cases of formulas
- A formula has an identifier and a body
- The body consists of constants and/or functions
 - Currently, *e³value* has a function binding to Excel, e.g. IF(<condition>;<>true expression>;<>false expression>)

Formulas: An example

```
VALUATION=  
IF(  
  e3 {ValueInterface("Railway-traintrip").OCCURRENCES}<1000000.0;  
  200;  
  190)
```



- Navigation functions: A mechanism to retrieve e^3 value concept properties or results of formulas
 - Form: `e3{<navigation expression>.<ontology property>|<formula identifier>}`
 - navigation expression: resolves to an e^3 value concept in a model

Next lecture:
None, you are an e^3 *value* expert right
now if you came this far!

Key points

- Expenses are used to model cash-out flows to other parties. Fixed expenses happen precisely once per time period the value model is made for. An investment happens only once per time series. Variable expenses depend directly on the number of times a port transfers value objects.
- Net value flow sheets can be constructed for value activities. The financial effects of performing value activities are consolidated into the net value sheet of the executing actor. Valuation formulas have to be provided, but only for root ports. These are ports of opposite directions, connected by a value transfer.
- Net value flow sheets can be constructed for partnerships.
- Value transfers can have a CARDINALITY formula. This formula represents that if value interface transfers value objects, a number of value has to be transferred as one.
- The *e³value* ontology contains a formula language. This formula language calculates a value for a specific formula, and uses navigation functions to retrieve outcomes of formulas, as expressed for other model constructs.