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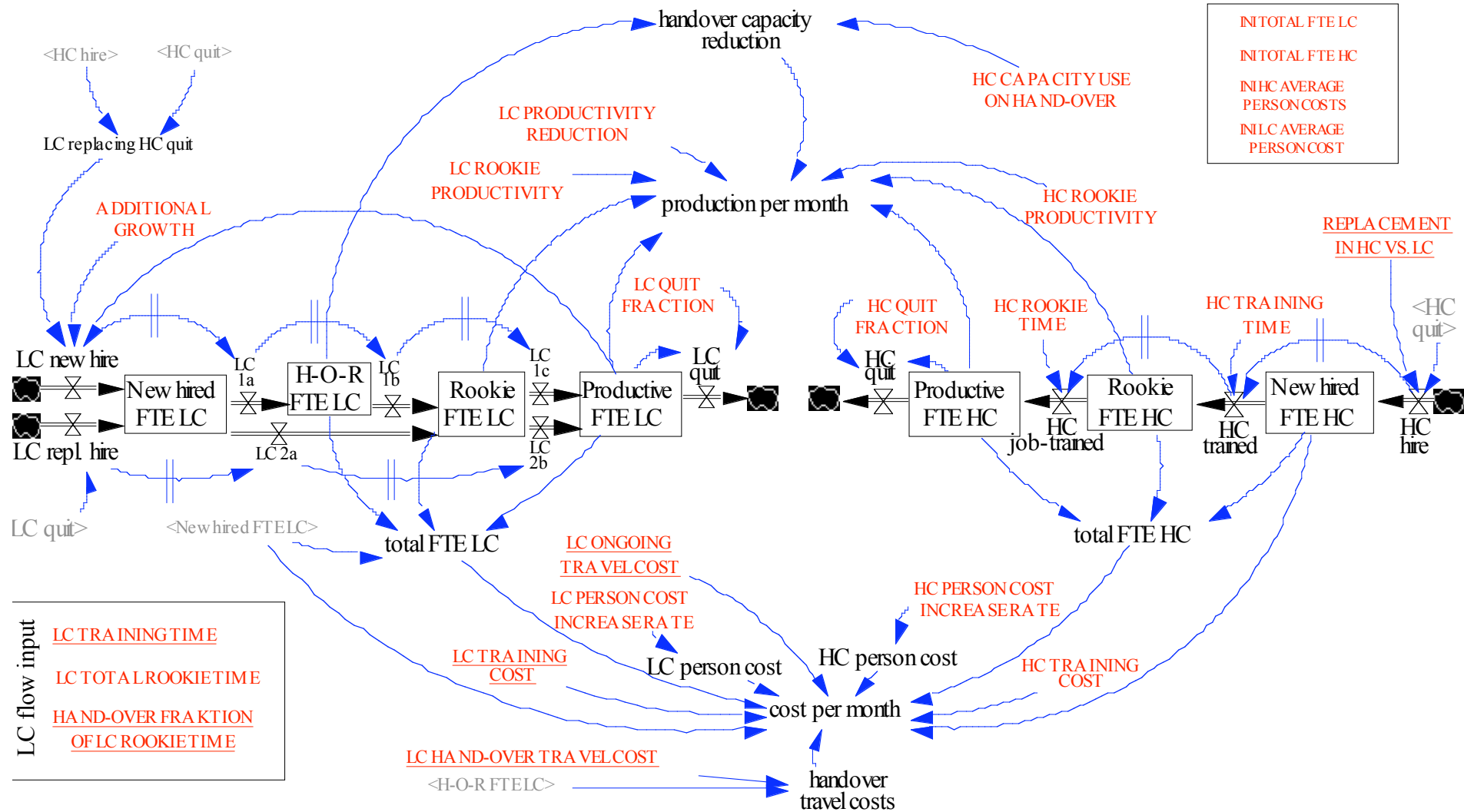
# ***Supporting Material***

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***April 2005***

# The model (in it's cleanest view)



# Comments to the model

## Production:

- ◆ Productivity per month = HC productive FTE + (LC productive FTE \* (1- LC productivity reduction))  
+ (# of Rookies\*Rookie productivity) - ( HC capacity reduction)
- ◆ Handover capacity reduction = # Hand-Over-Rookies in LC \* HC capacity use on hand-over
- ◆ Number of productive days in LC higher than in HC, but this equals out with coordination overhead

## Cost side

- ◆ Cost = number of employees (resp. LC/HC) \* fully loaded person cost + on-going travel for LC  
+ training costs for Basic New training (both LC and HC) + travel costs for hand-over activities

## Transfer of tasks

- ◆ HC hire depends on "external replacement rate" (people leaving who must be replaced by externals)
- ◆ LC hire = additional growth \* productive FTE LC  
+ replacements from people quitting in LC  
+ # of people not replaced i HC  
(+ replacements from both LC and HC due to micro-site optimization)
- ◆ Tasks moved to LC enable new and innovative tasks in HC (i.e. does not lower productivity in HC)

# Input Parameters – High Cost Countries

Parameter	Units	Description	Values
INI TOTAL FTE HC	Person	Number of people in total in High Cost counties (new + rookies + experienced by Year end 2004)	The values have been removed, as the company perceive these as confidential
HC QUIT FRACTION	(1/Month)	This is the fraction of people actually quitting HC (internal rotation in the Company not included)	
HC TRAINING TIME	Month	Training time (basic new-hire training)	
HC TRAINING COST	EUR/(Person*Month)	Basic new-hire training costs per person per month	
HC ROOKIE TIME	Month	On-the-job training	
HC ROOKIE PRODUCTIVITY	Dmnl (dimensionless)	Productivity factor for Rookies in HC	
INI HC AVERAGE PERSON COSTS	EUR/(Person*Month)	Total cost (including travel, rent, licenses etc.) allocated to HC FTE by Year-end 2004. Salaries are only XX% of this. The cost will grow with the rate below.	
HC PERSON COST INCREASE RATE	1/Month	Increase rate in HC person cost	

# Input Parameters – Low Cost Countries

Parameter	Units	Description	Values
INI TOTAL FTE LC	Person	Number of people in total in Low Cost counties (new + rookies + experienced by Year-end 2004)	The values have been removed, as the company perceive these as confidential
LC QUIT FRACTION	(1/Month)	Fraction of people leaving LC	
LC TRAINING TIME	Month	Training time (basic new-hire training)	
LC TRAINING COST	EUR/(Person*Month)	Basic new-hire training cost per person per month	
LC TOTAL ROOKIE TIME	Month	On-the-job training. This include the time spend as Rookie FTE LC + as H-O-R FTE LC (Hand-Over-Rookie) Only non-replacements can be H-O-R FTE LC.	
LC ROOKIE PRODUCTIVITY	Dmnl (dimensionless)	Productivity factor for Rookies - but only in the part of the time NOT used to hand-over tasks	
INI LC AVERAGE PERSON COSTS	EUR/(Person*Month)	Total cost (excluding travel) allocated to LCC FTE by Year-end 2004. Salaries are only XX% of this. The cost will grow with the rate below.	
LC PERSON COST INCREASE RATE	1/Month	Increase rate in LC person cost	
LC ONGOING TRAVEL COST	EUR/(Person*Month)	<u>Average</u> Travel + Hotel + Rented car for all LC employees	
LC PRODUCTIVITY REDUCTION	Dmnl (dimensionless)	Productivity reduction due to low <u>average</u> experience (1-2 years in LC vs. 5-10 years in HC)	

# ***Input parameters that are transfer related***

Parameter	Units	Description	Values
REPLACEMENT IN HC VS. LC	Dmnl (dimensionless)	Factor for how many of HC quit who will be replaced in HC by externals (vs. replaced by colleagues whose tasks are transferred to LC)	The values have been removed, as the company perceive these as confidential
ADDITIONAL GROWTH	Dmnl (dimensionless)	Factor for the ramp-up of productive LC employees (fixed for the first period, then gradually decreasing to being zero after the 36 <sup>th</sup> month)	
HAND-OVER FRAKTION OF LC ROOKIE TIME	Dmnl (dimensionless)	The fraction of LC Rookie time spend on hand-over tasks (with the consequence of zero productivity and significant travel costs). It only influences H-O-R FTE LC, i.e non-replacements	
LC HANDOVER TRAVEL COST	EUR/(Person*Month)	Travel costs related to hand-over, i.e does only effect hand-over fraction of Rookie	
HC CAPACITY USE ON LC TRAINING	Dmnl (dimensionless)	1-on-1 hand-over will result in XX% reduction of the HC employee's productive time (LC employee will have 0 productivity)	
MICRO-SITE OPTIMIZATION	Person/Month	Number of people leaving due to close-down of micro-locations All tasks will be transferred to LC countries	

# Key equations

production per month=

(+Productive FTE HC  
+HC ROOKIE PRODUCTIVITY\*Rookie FTE HC  
- handover capacity reduction  
+((1-LC PRODUCTIVITY REDUCTION)\*Productive FTE LC)  
+LC ROOKIE PRODUCTIVITY\*Rookie FTE LC)  
\*make unit per month  
~ Person/Month

cost per month=

+HC person cost\*total FTE HC  
+New hired FTE HC\*HC TRAINING COST  
+(LC person cost+LC ONGOING TRAVEL COST)\*total FTE LC  
+New hired FTE LC\*LC TRAINING COST  
+handover travel costs  
~ EUR/Month

HC hire=

HC quit\*"REPLACEMENT IN HC VS. LC"  
~ Person/Month  
~

LC new hire=

+(Productive FTE LC\*ADDITIONAL GROWTH)  
+LC replacing HC quit  
+"HC micro-site optim."  
+"LC micro- site optim."  
~ Person/Month  
~ |

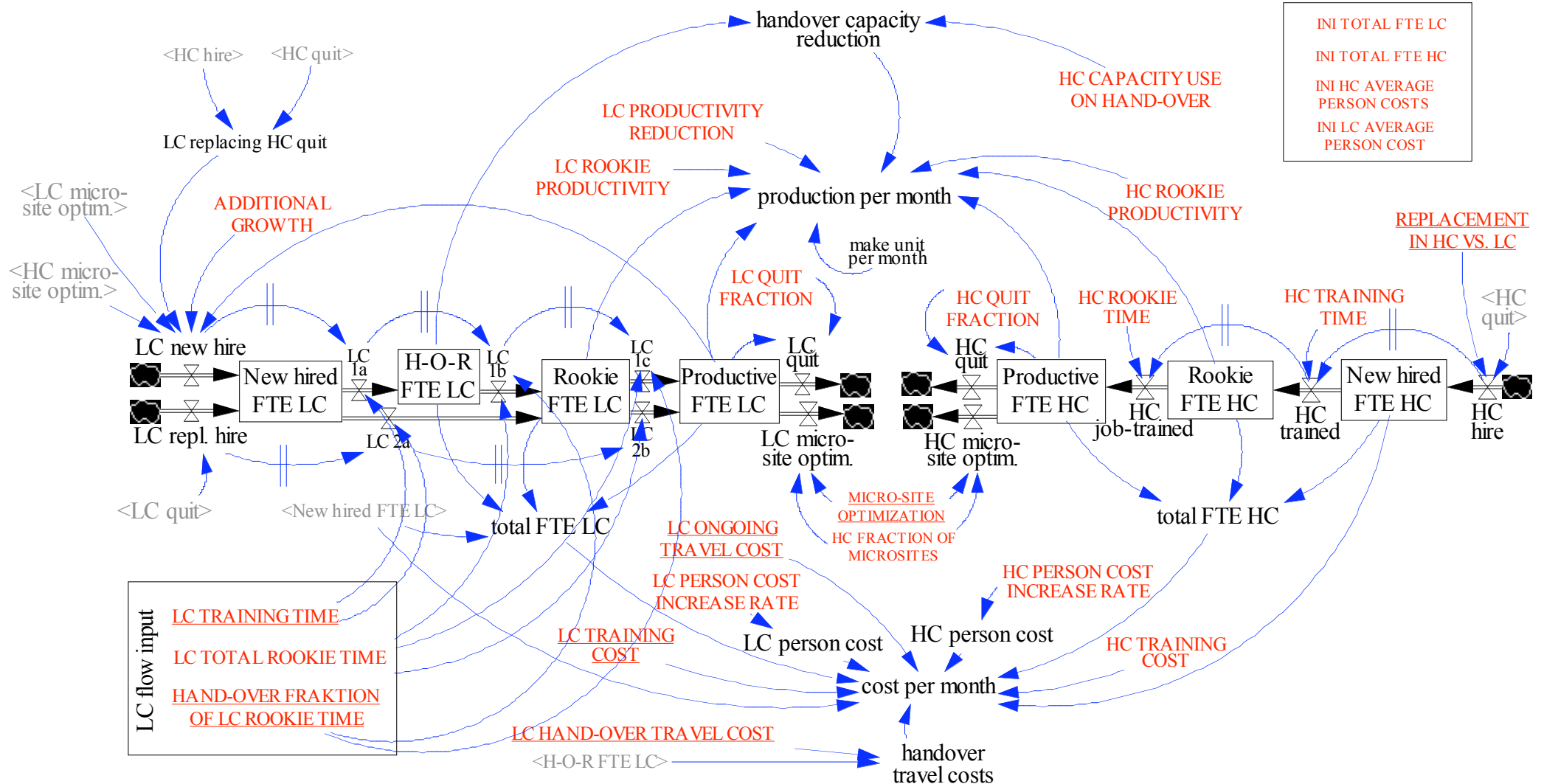
# Initializing the stocks

Initializing the stocks in equilibrium gives the following initial values (both LC and HC):

- The three equilibrium equations:
  - (1):  $\text{INI total FTE} = \text{Productive FTE} + \text{New hire FTE} + \text{Rookie FTE}$
  - (2):  $\text{Productive FTE} * \text{QUIT FRACTION} * (\text{TRAINING TIME} + \text{ROOKIE TIME}) = \text{New hire FTE} + \text{Rookie FTE}$
  - (3):  $\text{New Hire FTE} = (\text{TRAINING TIME} / (\text{TRAINING TIME} + \text{ROOKIE TIME})) * (\text{New hire FTE} + \text{Rookie FTE})$
  
- gives when *New hire FTE + Rookie FTE* from equation (2) is entered into equation (1):
  - $\Leftrightarrow \text{INI total FTE} = \text{Productive FTE} + \text{Productive FTE} * \text{QUIT FRACTION} * (\text{TRAINING TIME} + \text{ROOKIE TIME})$
  - $\Leftrightarrow \text{Productive FTE} = \text{INI total FTE} / (1 + (\text{TRAINING TIME} + \text{ROOKIE TIME}) * \text{QUIT FRACTION})$
  
- and also, when the result of *Productive FTE* from equation (2) is entered to equation (1):
  - $\text{INI total FTE} = ((\text{New hire FTE} + \text{Rookie FTE}) / \text{QUIT FRACTION} * (\text{TRAINING TIME} + \text{ROOKIE TIME})) + \text{New hire FTE} + \text{Rookie FTE}$
  - $\Leftrightarrow \text{INI total FTE} = (\text{New hire FTE} + \text{Rookie FTE}) * (1 + (1 / \text{QUIT FRACTION} * (\text{TRAINING TIME} + \text{ROOKIE TIME})))$
  - $\Leftrightarrow (\text{New hire FTE} + \text{Rookie FTE}) = \text{INI total FTE} / (1 + (1 / \text{QUIT FRACTION} * (\text{TRAINING TIME} + \text{ROOKIE TIME})))$
- And the initial values of each of New hire FTE and Rookie FTE are then found by the equation (3)
  
- (and further is the stock of LC H-O-R Rookies initialized with 0)

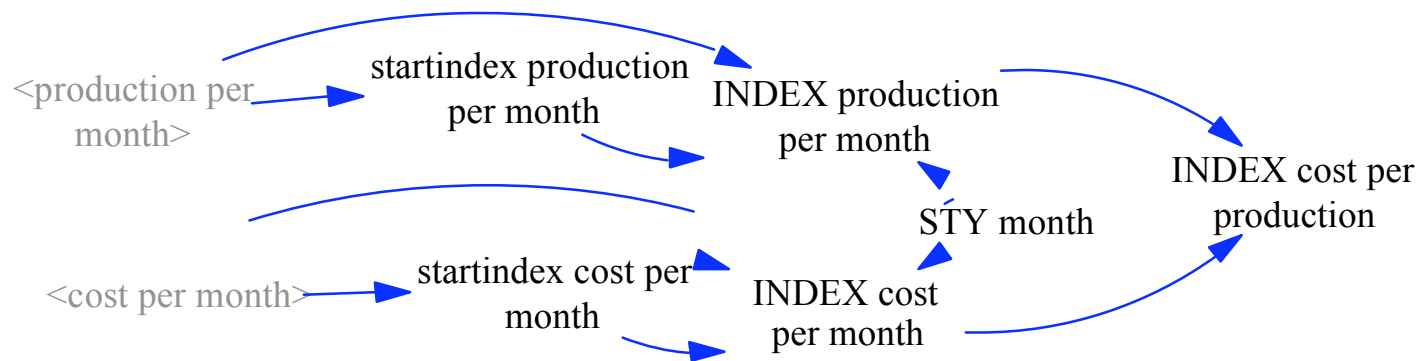


# The model – including micro-site optimization & hidden arrows



# Output values transformed to formats relevant for the workshop discussions (1)

INDEX values of production, cost and cost/production were used when we wanted to discuss trends rather than absolute numbers.



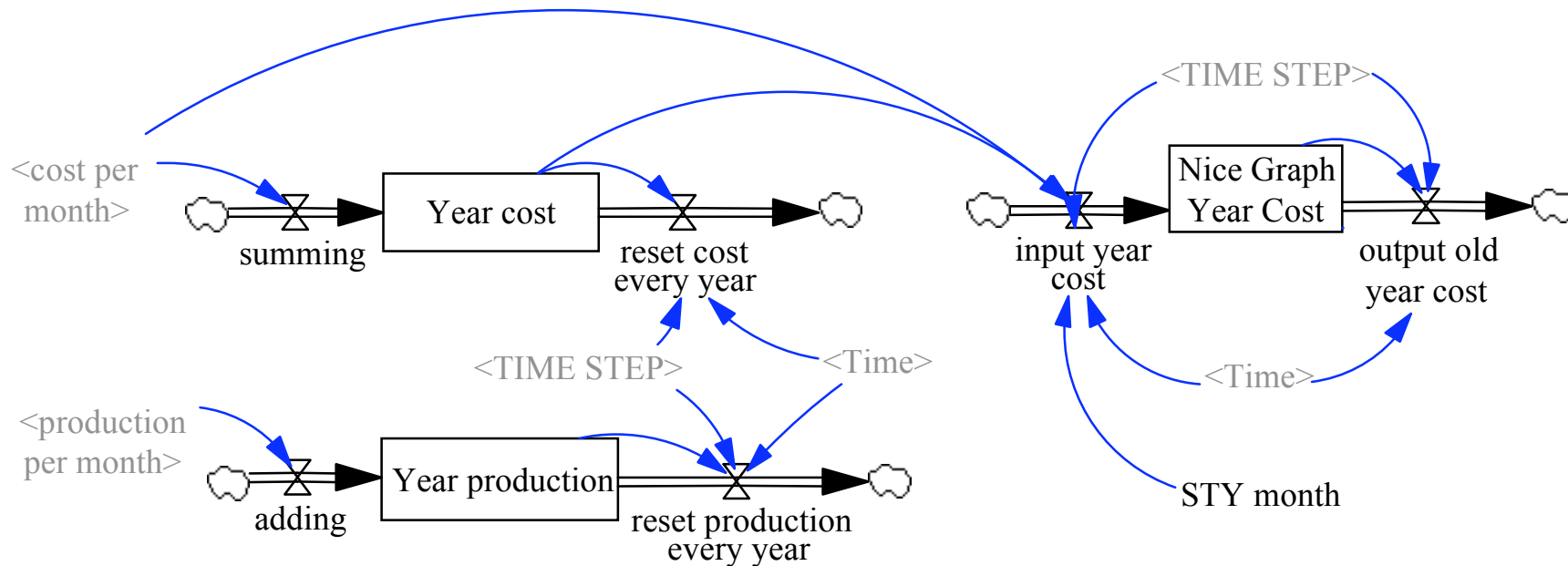
Examples:

$\text{INDEX cost per month} = (\text{cost per month} * \text{STY month}) / \text{startindex cost per month} \sim \text{Dmn}$

$\text{startindex cost per month} = \text{INTEG}(\text{cost per month} - \text{cost per month}, \text{cost per month} * \text{STY month}) \sim \text{EUR}$

$\text{STY month} = 1 \sim \text{Month}$

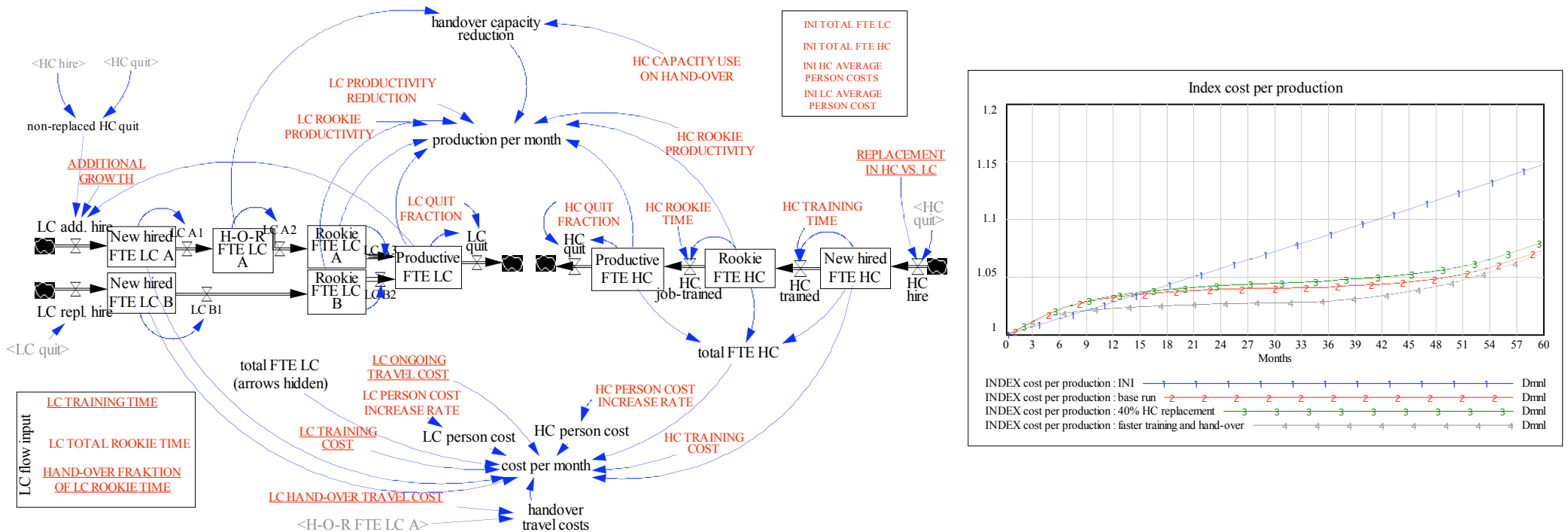
# Output values transformed to formats relevant for the workshop discussions (2)



The two above stocks calculate cost and production on a yearly level.

The stock above takes the yearly cost and make it constant for a few months, to produce a nice bar-graph of the yearly costs.

# The model in a version without "rate-on-rate" modelling



Above is a changed version of the model with out-flow rates modelled based on level-values opposed to inflow-rates, as well as corresponding simulation runs. Some of the stocks had to be split up in two, in order to use this approach. It is interesting to note, that the main trends – and thereby the main model insights – are the same as in the original model, also for year 1, even though the model reflects a new hiring policy with a step input in very beginning of the simulation. (The rate “LC add.hire” is changing from 0 to a relatively high value in time=0).