

Forum Train Europe FTE

The European coordination platform of railway undertakings



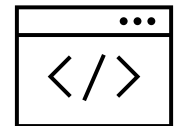
FORUM TRAIN EUROPE

PLANNING TRAINS TO CONNECT EUROPE

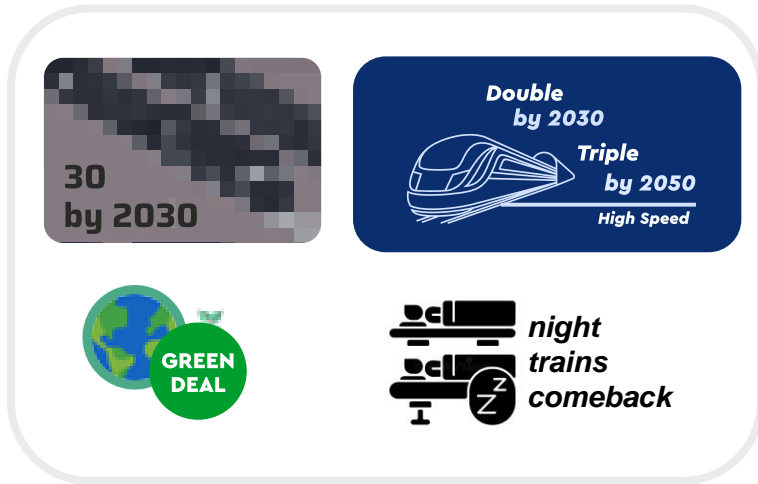
Introduction to the topic:

Allocation Rules (AR)
and socio-economic modelling

supporting document for stakeholders



More information
([FTE website](#))



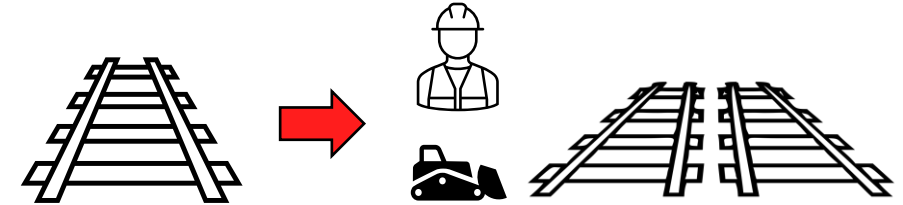
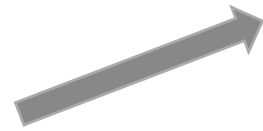
30 by 2030

Double by 2030
Triple by 2050
High Speed

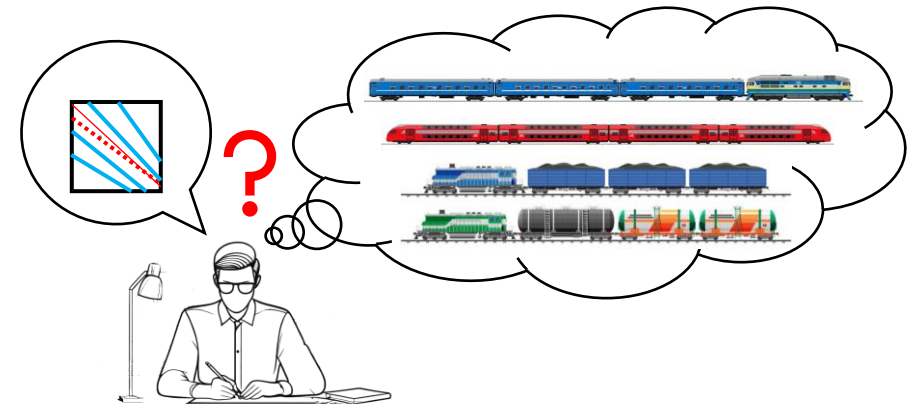
GREEN DEAL

night trains comeback

Capacity is getting scarce

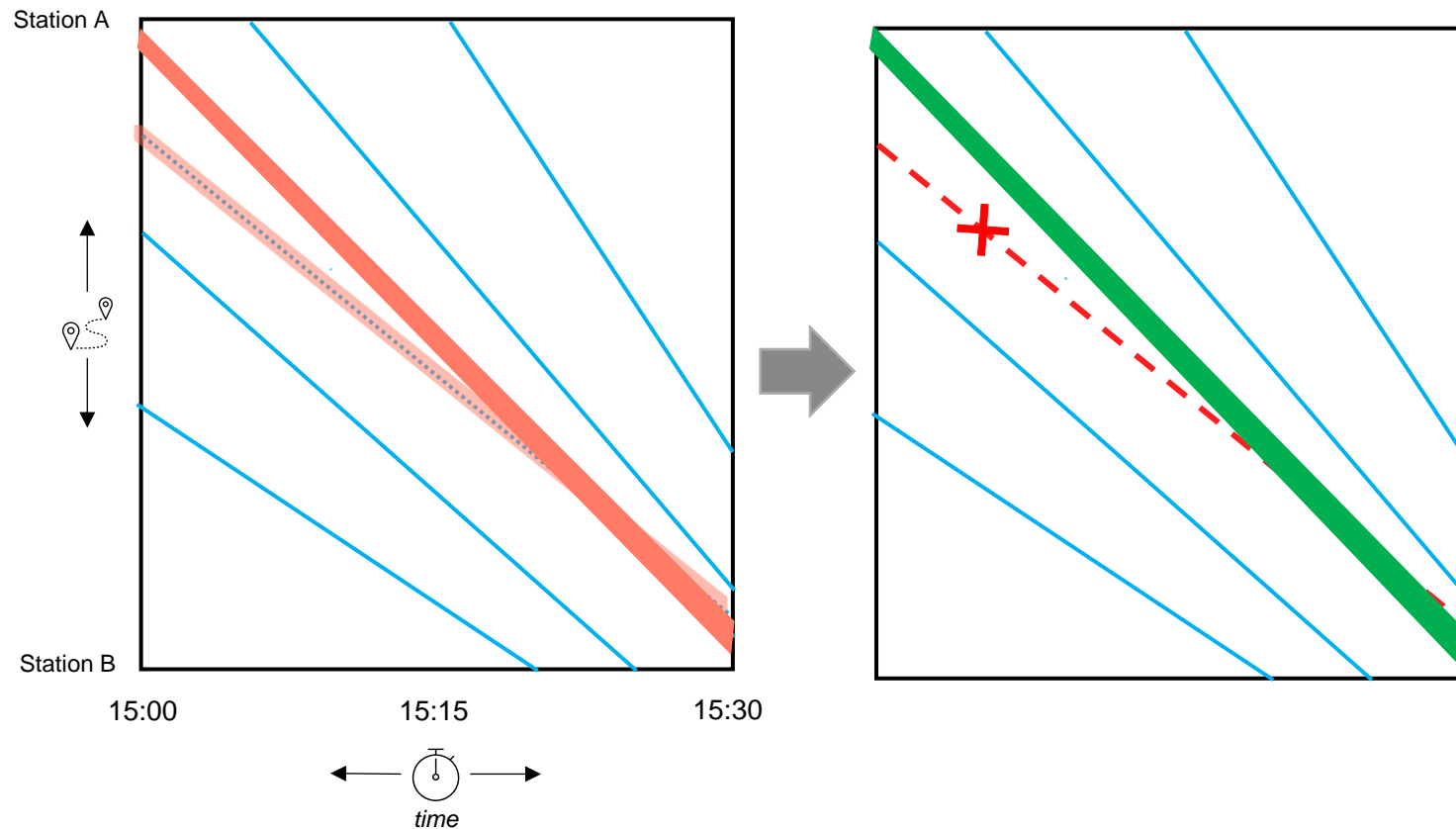


Need for more capacity...



But also, better use of existing one...
Define better **Allocation Rules...**

Classical approach

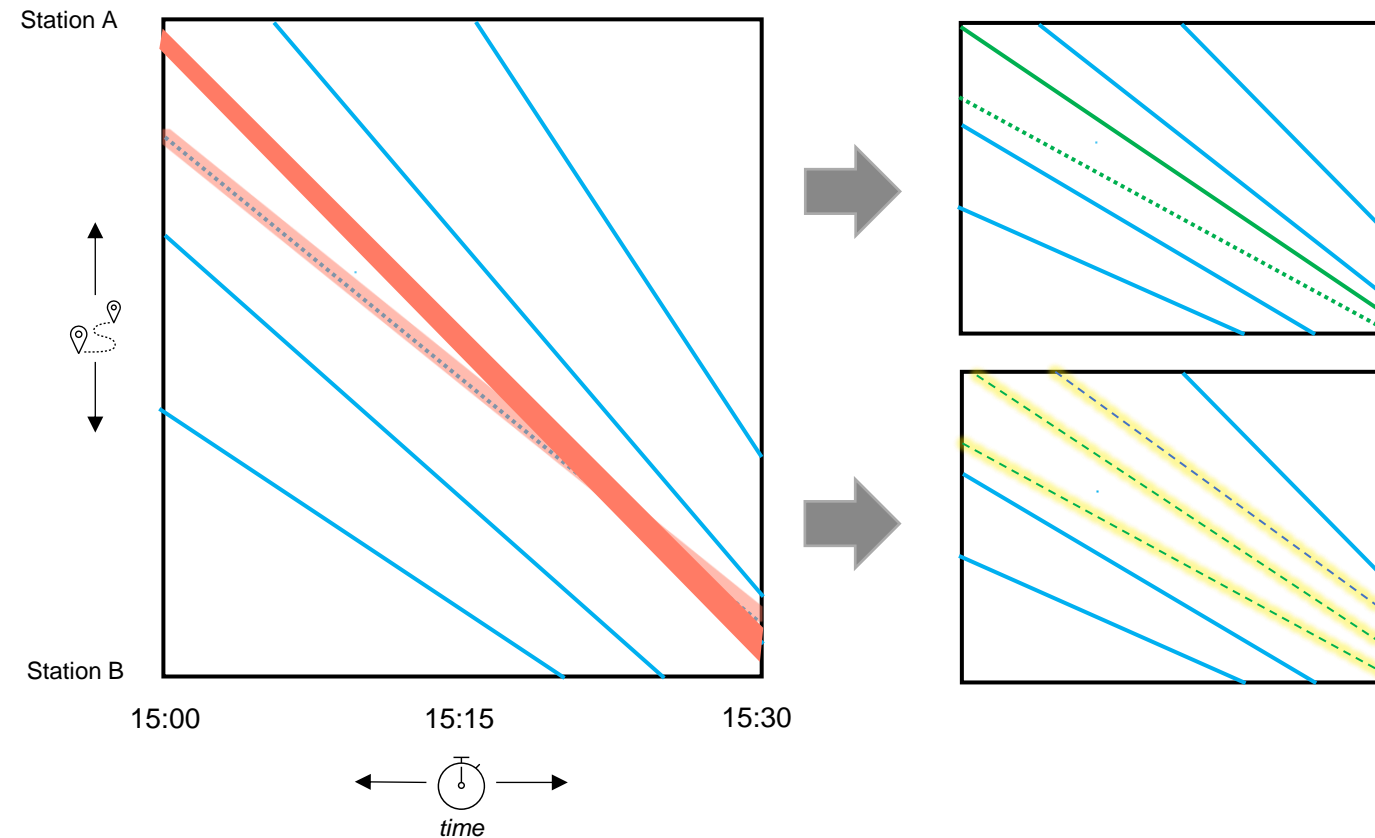


Situation description:

- > Two requests in conflict are compared
- > Priority given based on traffic type / paid TAC*
 - Compromise solution could have been found in coordination dialogue
 - But the expected winner is not motivated for compromises – why should?
 - So, “winner” and “loser”

Can we change it to win-win situation?

Scenario approach



Situation description:

- > Two requests in conflict
- > In “scenario approach” also those who were not originally in conflict are considered.
- > Identify scenarios to make more traffic possible
- > May lead to “win-win-win” result

But how we can value a scenario?



Step sequence

1. Market dialogue

- RUs / IMs may find solutions
(experience show we solve most issues)

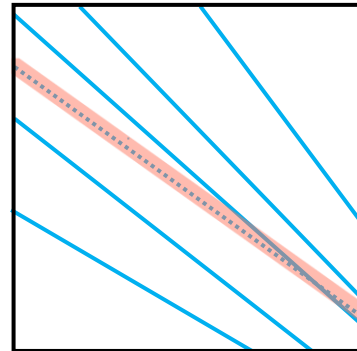
2. RU-IM identification of possible scenarios

- Always more than 1

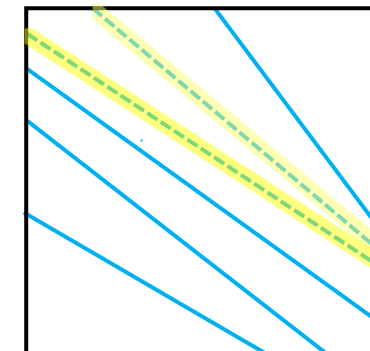
3. Socio-economic valuation

- comparison of scenarios
- No compromise → scenario with “best value”

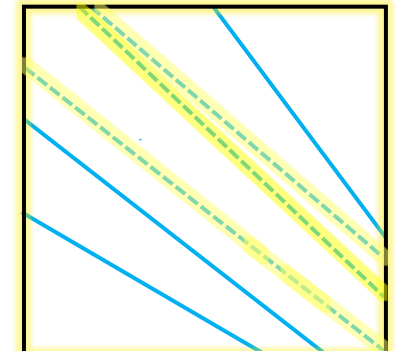
Scenario 1 (classical)



Scenario 2



Scenario 3

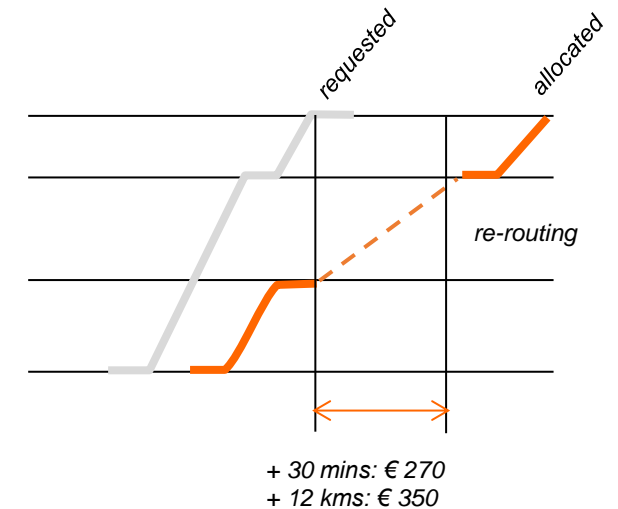
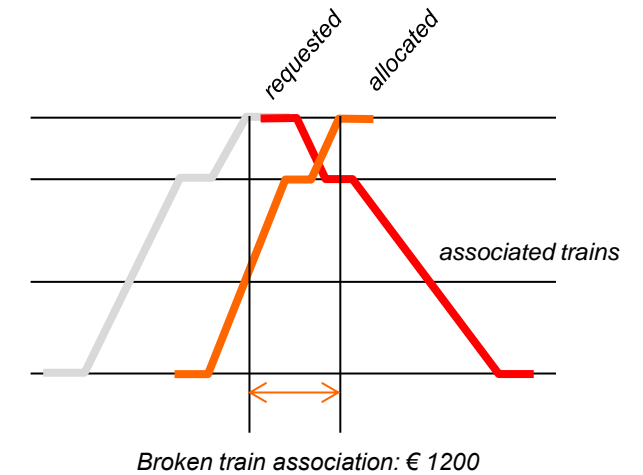
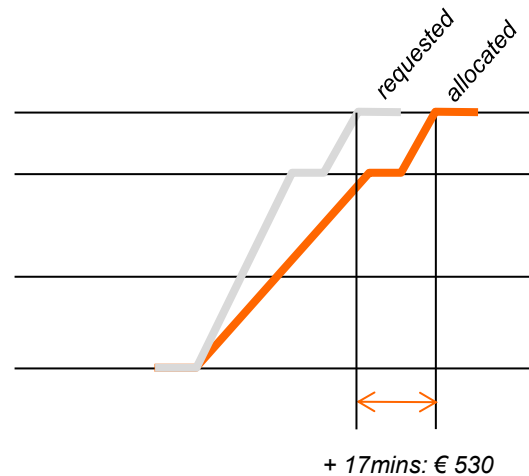
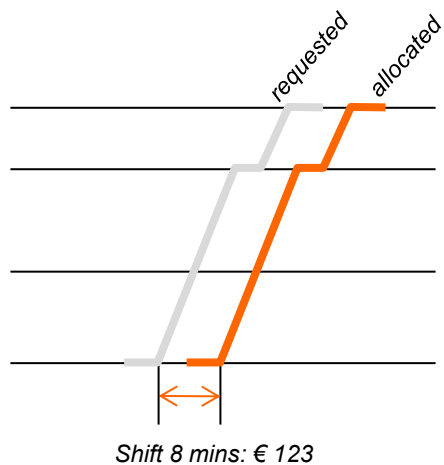


Path excluded	1	0	0
Value («RU cost»)	- 3.500 EUR	0 EUR	0 EUR
Paths displaced	0	2	3
Value («RU cost»)	0	- 1.350 EUR	- 780 EUR
Total loss	- 3.500 EUR	- 1.350 EUR	- 780 EUR



Items of Socio-economic valuation

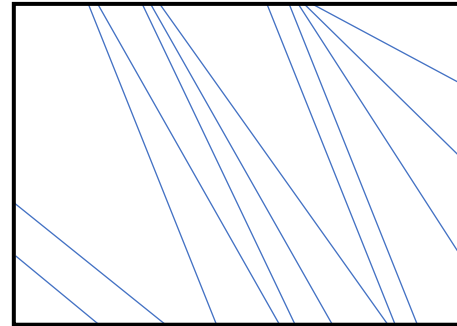
- > Standardised costs/values per train category
- > Negative “virtual” cost counted per:
 - Excluded path
 - Displaced path (per min)
 - Prolonged travel time (per min)
 - Extra train-km (re-routing per km)
 - Broken association: relations between trains)
 - (turnarounds, wagon/passenger/train staff transfers)



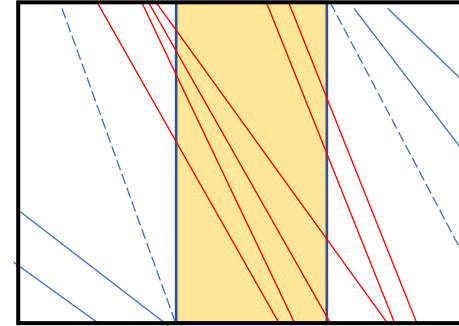
TCR Timing Evaluation (paths only)

- > Socio-economic modelling as instrument for TCR timing evaluation?
- > Alternative: comparison of standardised compensation to be paid by IMs (see [Commercial Conditions vision](#))

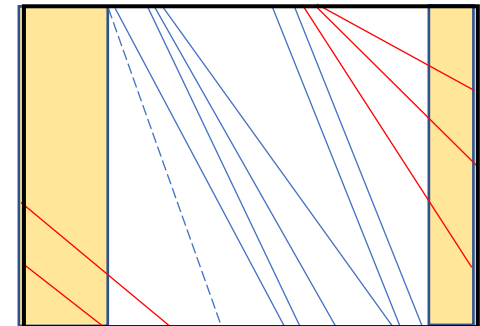
Scheduled TT



Scenario 1 (day)



Scenario 2 (night)



Path excluded

6

3

Value («RU cost»)

12 000 EUR

6 000 EUR

Paths displaced

2

1

Value («RU cost»)

2 000 EUR

1 000 EUR

Total loss

- 14 000 EUR

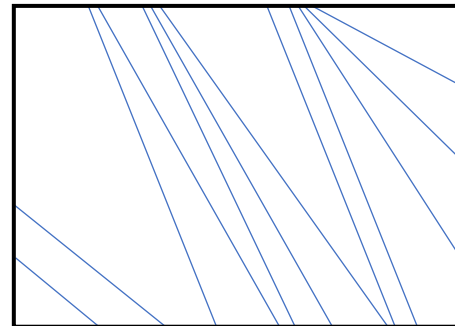
- 7 000 EUR



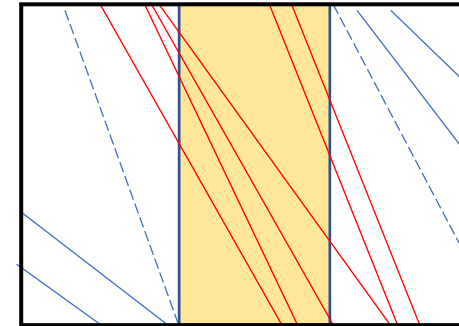
TCR Timing Evaluation (IM and RU costs)

- > Socio-economic modelling as instrument for TCR timing evaluation?
- > **Can TCRs be also considered?**
- > It is **NOT** the **total TCR costs** valuated
- > **ONLY** the “**TCR cost difference**” if executed in less “market-harming” times.
- > The IMs’ extra costs for “TCR repositioning” can be valued against the impact on RUs

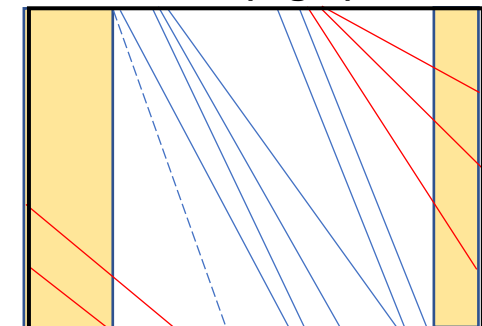
Scheduled TT



Scenario 1 (day)



Scenario 2 (night)



Path excluded	6	3
Value («RU cost»)	12 000 EUR	6 000 EUR
Paths displaced	2	1
Value («RU cost»)	2 000 EUR	1 000 EUR
TCR repositioning		
Value («IM extra cost»)	0	5 000 EUR
Total loss	- 14 000 EUR	-12 000 EUR



Shall RUs provide individual costs and (sensitive) data?



No!

Standardised costs/values are used. They represent the market, not 100% each specific situation.

Shall each case have specific calculation method?



No!

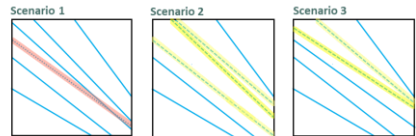
Formula remains the same. The standardised values are identified via expert studies (one-off task).

Would it not be too time consuming?



No!

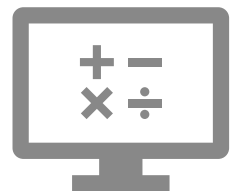
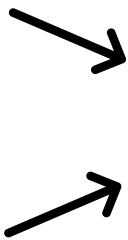
IT solutions for calculation facilitate easy application by IMs / RUs.



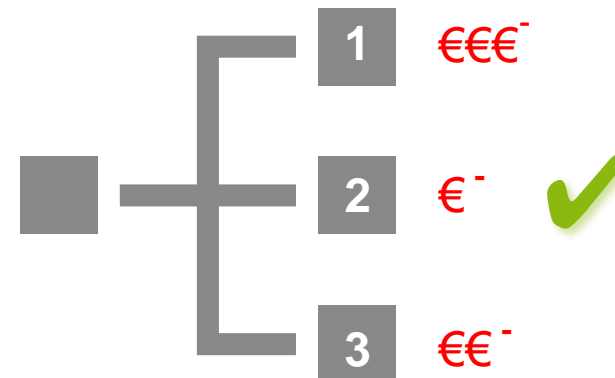
Timetable content



«costs» from the studies



Combine and calculate (simple sums)



Choose **least costly** scenario

Was this somewhere already applied in practice?



Yes!

In Sweden, the socio-economic model for scenarios is used for Annual Timetable conflicts since 2011. Both the RUs and the IM are satisfied with the project / system.

Priority category	Cost parameters for the following effects calculated per train				Parameters for excluding of train path		
	Transport time	Transport distance	Displaced path time	Excluded train path	Benefit limit for train path	Corr. factor basic time	Timing Load
Code	SEK/min	SEK/km	SEK/min	SEK/min	%	%	Code
A	B	C	D	I	J	K	L
GS	269	61	166	-	15 %	2 %	GB201211
GT	233	60	140	-	25 %	2 %	GR401410
GN	153	65	80	-	35 %	2 %	GR401409
GR	204	59	118	-	35 %	2 %	GB200710
GF	81	58	26	-	45 %	2 %	GR401410
GO	61	43	20	-	50 %	2 %	60 km/tim
SP	1 238	104	841	-	15 %	20 %	PX600616
RP	795	104	509	-	15 %	15 %	PX600616
RX	546	86	228	-	15 %	15 %	PX410020
RS	261	30	141	-	20 %	12 %	PX610016
RL	184	32	103	-	30 %	12 %	PX510018
RI	51	24	11	-	40 %	12 %	PY310014

Train category

Costs for prolonged travel time/
displacement per minute, cost per extra
train-km (all in Swedish crowns - SEK)

1.22 Priority categories for train paths – passenger transports

Priority categories must comply with all identification conditions in one (and only one) of the rows (with an unique key) belonging to the Priority Category of interest

Priority category	Identification key	Identification conditions				Type of traffic, description	Example	
		Number of passengers	Time sensitive share	Regional share	Traffic concept: Rapid*			
<p>Note: The text in these two columns are aimed to give an estimation of the signification for each category</p>								
Stor-pendel ¹	SP	SP1	≥ 700	≥ 75 %	≥ 75%	-	High share of time sensitive regional passengers, maximum load factor	Stockholm commuter train, peak periods
Regio-Pendel Regional commuter	RP	RP1	≥ 300	≥ 75 %	≥ 75 %	-	High share of time-sensitive regional passengers, very high load factor	Big cities commuter train, peak periods
		RP2	≥ 300	≥ 75 %	≥ 75 %	-	High share of time-sensitive regional passengers, very high load factor	Very heavy regional relations, peak periods
Regio-max Regional max	RX	RX1	≥ 200	≥ 75 %	≥ 75 %	-	High share of time-sensitive regional passengers, high load factor	Heavy regional relations
		RX2	≥ 75	≥ 75 %	-	Must	High share of time-sensitive passengers, medium high load factor + Rapid transport	Regional express traffic, peak and mid-peak periods
Regio-standard Regional standard	RS	RS1	≥ 75	≥ 75 %	≥ 75 %	-	High share of time-sensitive regional passengers, medium high load factor	Medium-principal regional trains, peak periods
		RS2	≥ 25	≥ 25 %	-	Must	Frequent regional traffic, medium-high share of time-sensitive regional pass low load factor. Rapid transport	Regional express traffic, off-peak periods

Train category

Transparent Identification criteria

Explanation of category

Was this somewhere already applied in practice?



Yes!

In Sweden, the socio-economic model for scenarios is used for Annual Timetable conflicts since 2011. Both the RUs and the IM are satisfied with the project / system.

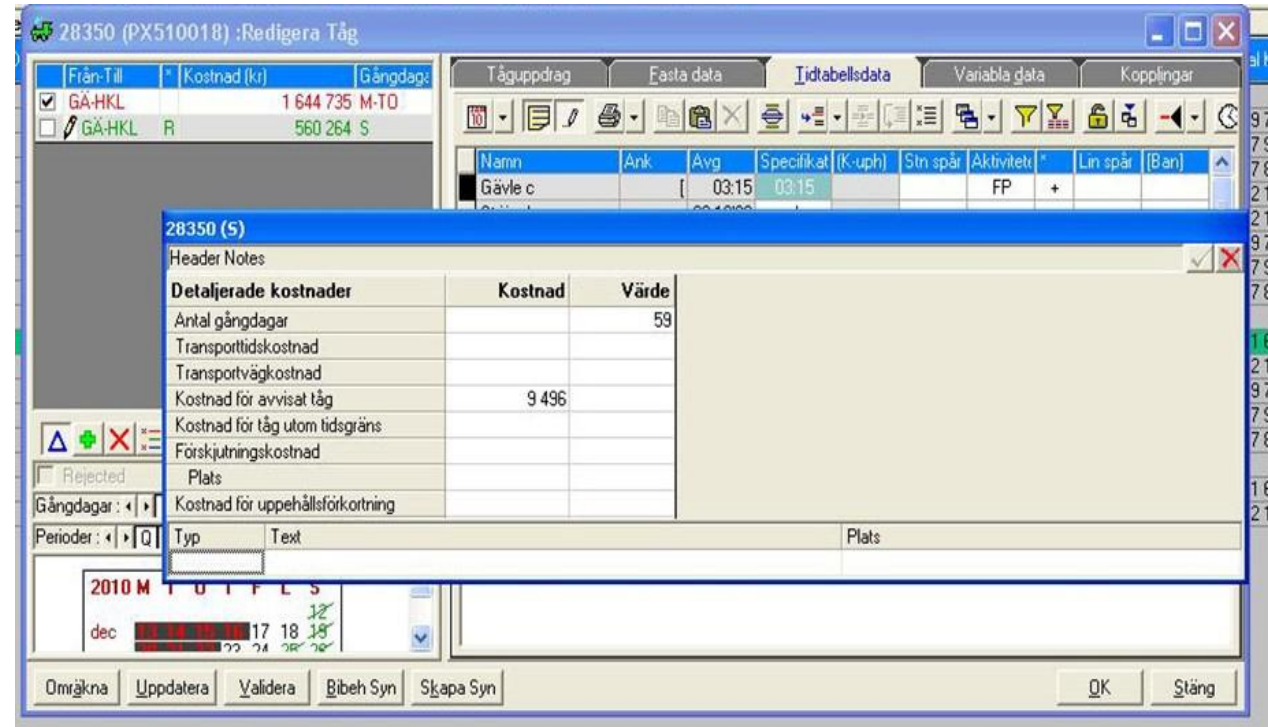
1.31 Cost parameters for associations

Priority category	Marginal costs for the following effect	
	Duration	Interrupted
Code	SEK/min	SEK/association
K	L	M
APX	693	59 300
APH	326	27 900
APS	204	17 400
APL	114	9 770
API	33	2 790
AGX	114	87 400
AGH	68	52 400
AGS	43	32 800

Train category

Costs for extended association

Costs for broken association



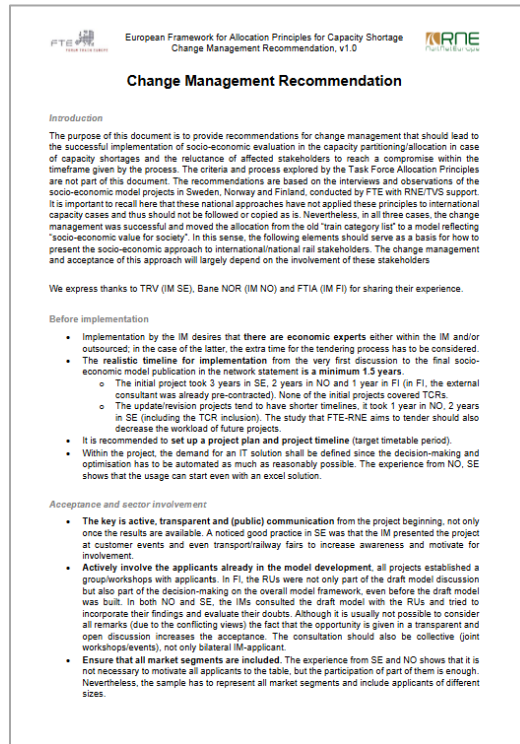
Timetabling construction system, where the socio-economic value is visible right away as a support for the planner.

**It is a significant change!
Change management will be important!**

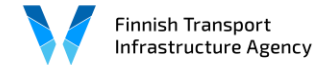
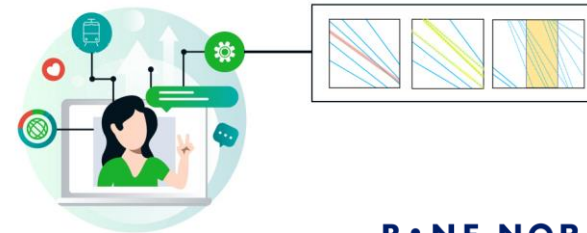


Yes!

Change management recommendations were collected from IMs with socio-economic allocation rules experience



Change management recommendations:
“How to successfully implement socio-economic capacity allocation principles”



Download the document: https://www.forumtraineurope.eu/fileadmin/Allocation_Principles_Change_Management_Recommedantion_v1.0.pdf

Study information

- > FTE/RNE ordered feasibility study (CEF co-funding)
- > **Study** and Excel Model Examples [published](#) Nov 2024, with focus on:
 - Using socio-economic modelling in capacity planning,
 - Using minimum input from RUs (standardised values and categories)
 - Handling of trains crossing borders
 - Meta-analysis of available national and EU average values

RI
SE

Final report – Feasibility study on using Socio-Economic Cost Criteria in Case of Capacity Shortages

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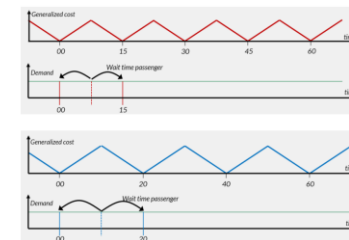
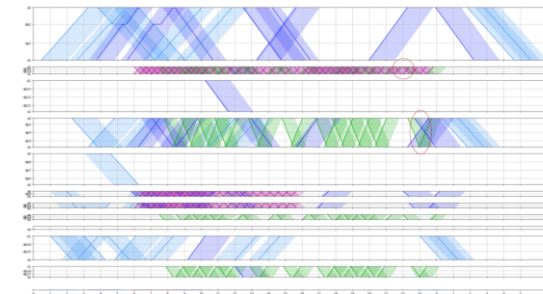


Figure 19. Waiting time for planned arrival at station.



Co-funded by
the European Union

Study information

- > FTE/RNE ordered feasibility study (CEF co-funding)
- > Study and **Excel Model Examples** [published](#) 2024/11

EXPLANATION OF EXAMPLES

	Example Calculation	LDPT	Basic case	Train	Calculation
Priority category					
Country (chosen in sheet 'PT calc')	Country	EU+UK+CH+I	EU+UK+CH+NO		
	VOT €/passenger	15,28 €	15,28 €		15,28 €
Occupancy rate	Occupancy rate		75%	75%	75%
Capacity of train	Capacity	500	L	L	500,00
	Distance, km		475	475	475
Occupancy rate	Speed, nominal, km/h		160	160	160
Capacity of train	Basic Duration, hours		02:58:07	02:58:07	02:58:07
	VOT		17 006 €	17 006 €	17 006 €
	Operational cost duration	535,14 €	1 589 €	1 589 €	1 589 €
	Variable cost duration	1,67 €	1 855 €	1 855 €	1 855 €
Distance travelled (is given by the basic route)	Operational cost distance	2,86 €	1 358 €	1 358 €	1 358 €
	Variable cost distance	0,01 €	1 855 €	1 855 €	1 855 €
	Basic cost		23 662 €	23 662 €	23 662 €
Speed	Number of days		220	220	220
Used to compute running time in this demonstration examples	BASIC COST YEAR		5 205 646 €	5 205 646 €	5 205 646 €
	Displacement cost, duration	11,46 €			
	Prolongation, prognosis			00:10:00	1 044 €
	Displacement, duration			00:05:00	477 €
Number of days in plan period	Prolongation operational cost				193 €
	Total value/day				25 377 €
	TOTAL COST YEAR		5 205 646 €		5 582 862 €
	Margin cost				377 215,60 €

Basic proprieties and valuation without timetable compromises

Valuation after timetable compromises

Prolongation of runtime in example

Displacement of departure time (anchor point)

Marginal cost

Cargo associations

VOT, €/h	Normalized average cargo types, €/ton & hour						
	WLFT	WLFT	BTFT	BTFT	IMFT	IMFT	OWN BT
	0.16	0.16	0.09	0.09	0.28	0.28	0.38

		Association size						
Association price per hour	Train type	WLFT	WLFT	BTFT	BTFT	IMFT	IMFT	OWN BT
	Tons	€/hour						
Association price per hour	40	6.52	6.52	3.48	3.48	11.22	11.22	15.32
	100	16.30	16.30	8.70	8.70	28.05	28.05	38.30
	200	32.60	32.60	17.40	17.40	56.10	56.10	76.60
	400	65.20	65.20	34.80	34.80	112.20	112.20	153.20
	700	114.10	114.10	60.90	60.90	196.35	196.35	268.10
	1200	195.60	195.60	104.40	104.40	336.60	336.60	459.60
Own declaration	4200	684.60	684.60	365.40	365.40	1178.10	1178.10	1608.60
Broken association	Wait time to next departure							
		1:00:00						
		2:00:00						
		4:00:00						
		8:00:00						
		12:00:00						
	18:00:00							
	24:00:00							

Multiply AG20-AG27 with chosen Association price above (and 24 hours)



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