

Unbiased RSI survey processing

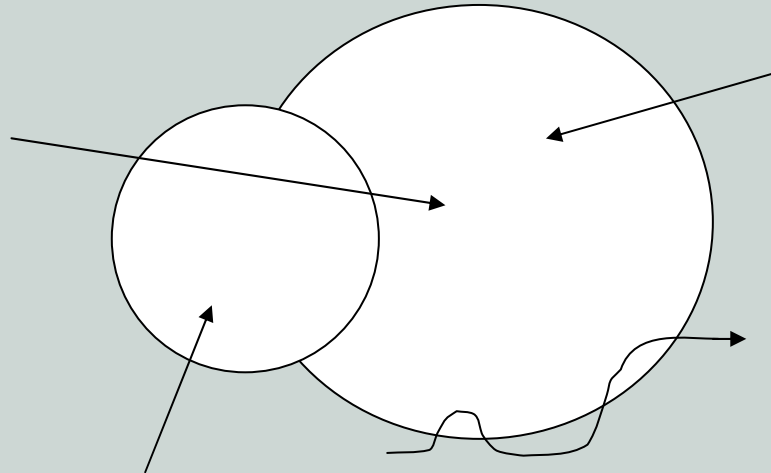
A case study using OmniTRANS

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- ◆ Current state of the art uses the DfT's variance weighting methodology.
- ◆ This is intended to take into account double counting from multiple screenline crossings (trips which wiggle across RSI screenlines).
- ◆ This is implemented via the PDC/DfT ERICA software. It was initially developed for the ERTM/ SERTM models to hold the extensive London RSIs.

- ◆ The method adjusts trips on an aggregate matrix basis according to the volumes crossing defined sectors to adjust for double counting
- ◆ Experience has shown that the method results in various anomalies including negative trips being produced.



Disaggregate Methodology

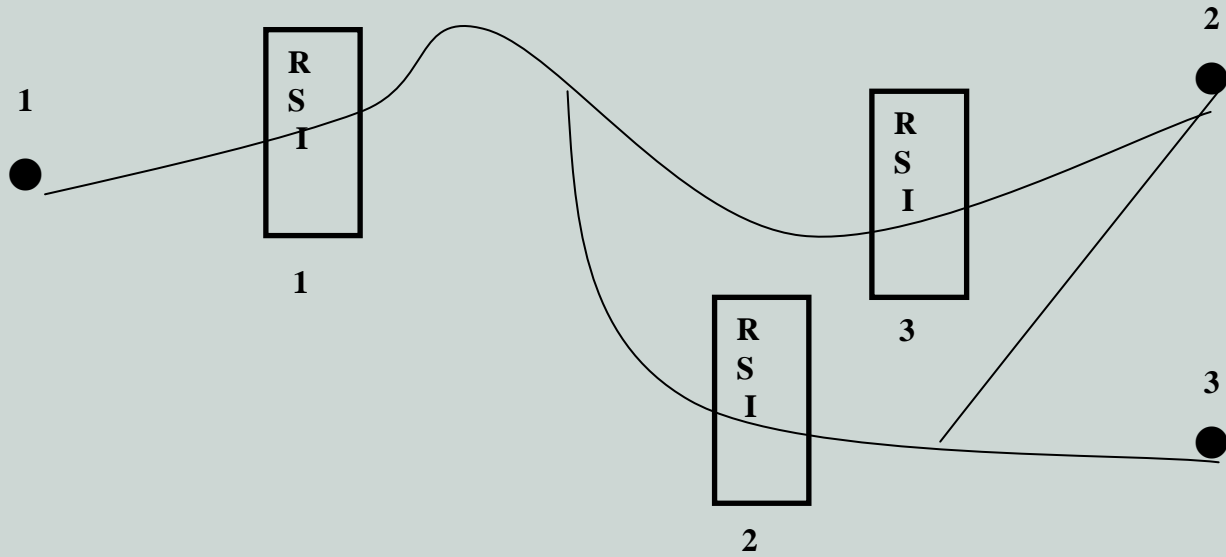
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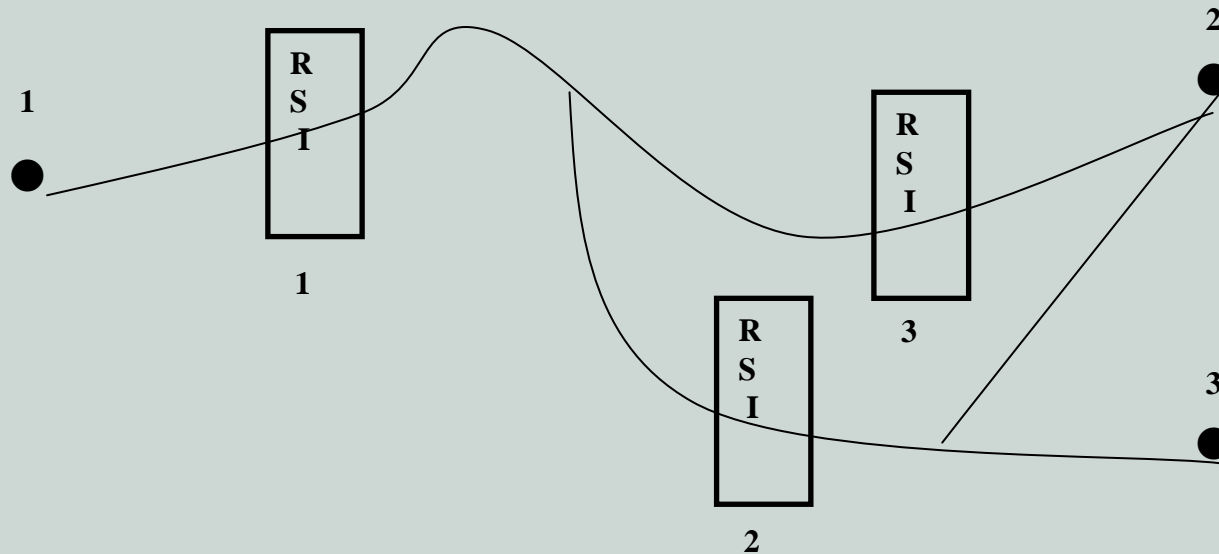
Making Surrey a better place

- ◆ Instead of being processed in isolation from the transport model, the disaggregate method integrates the survey processing with the target model.
- ◆ This ensures that consistent expansion factors are developed and that the correction for double counting is exact with respect to the model used.
- ◆ Only one pass through the method is required, however if additional RSI sites are added then much of the process must be repeated.

The problem



The Assignment



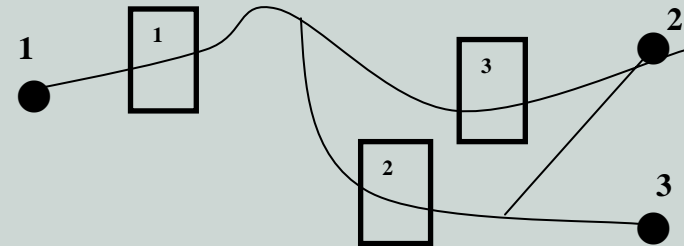
- ◆ Each path generated during the assignment process will only go through RSI sites that are in series with each other (a logical AND). No path will go through sites that are in parallel (a logical OR). The resulting assignment is produced from the superposition of flows along the all such paths generated.

The Screen-line Matrix

- ◆ The paths produced during the assignment can be traced to create a screen-line or selected link matrix.

RSI 1a	1	2	3
1		1	
2			
3			

RSI 1b	1	2	3
1			1
2			
3			



results in the following select link matrix

RSI 1	1	2	3
1		0.5	0.5
2			
3			

The probabilities are constructed from the superposition of flows along trees, and ultimately from the superposition of $[0,1]$ flows relating to individual vehicles.

The Screen-line Matrix

RSI 1	1	2	3
1		0.5	0.5
2			
3			

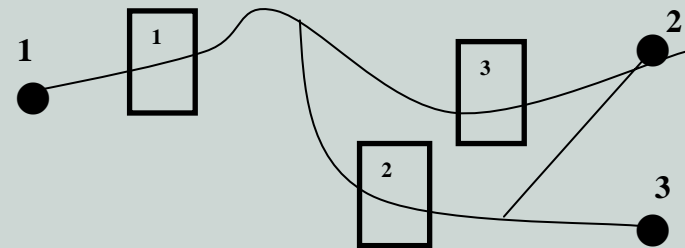
RSI 2	1	2	3
1		0.4	0.6
2			
3			

RSI 3	1	2	3
1		1	
2			
3			

Matrix Totals

Total	1	2	3
1		1.9	1.1
2			
3			

If we were to build a matrix of trips by summing the contribution of traffic from each RSI site we would overestimate the trips by double counting the same trip through more than one site. The Matrix Total over all RSI sites shows the degree of this overestimation.



The Factor Matrix

Factor 1	1	2	3
1		0.263	0.455
2			
3			

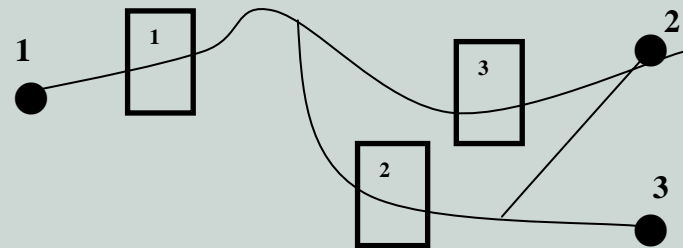
Factor 2	1	2	3
1		0.211	0.545
2			
3			

Factor 3	1	2	3
1		0.526	0.000
2			
3			

Matrix Totals

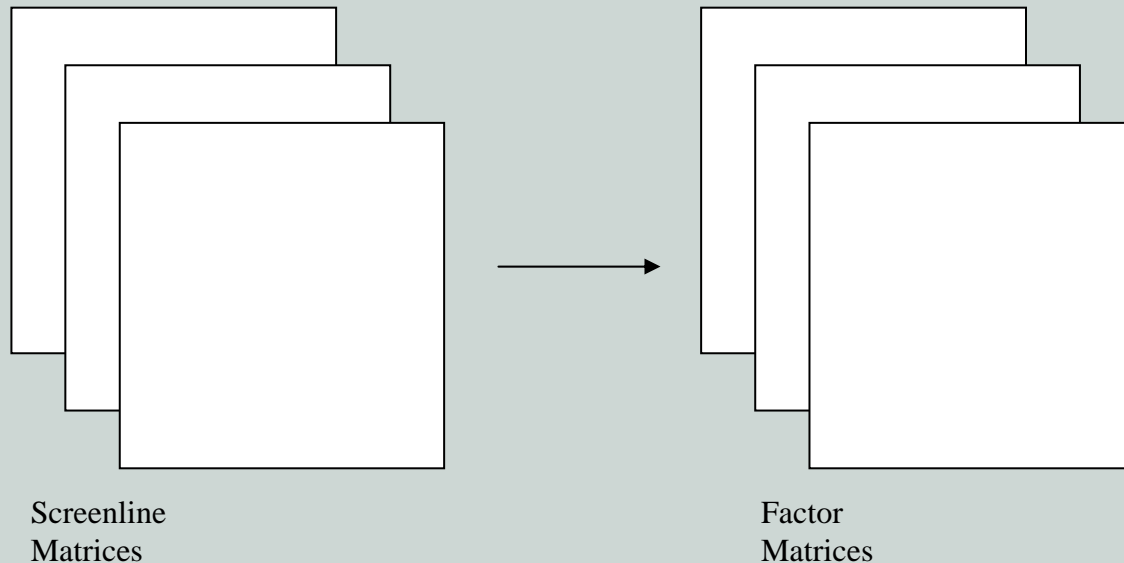
Total	1	2	3
1		1.000	1.000
2			
3			

We derive a set of factors showing the proportional contribution from each RSI site to the Total.



The Factor Matrix

We derive a set of factors showing the proportional contribution from each RSI site to the Total.



There is one factor matrix for each RSI site.
The matrix provides OD specific bias correction factors.



Factor Matrix storage

Info | Data | Jobs Selected Link Matrix - 2005_ME12: [1,1,10,1,42,1][164,1]

Selected Link [1,1,10,1,42,1] = ALL, Hway, AM, All, FactorsXRSI, Iteration1 164, 1

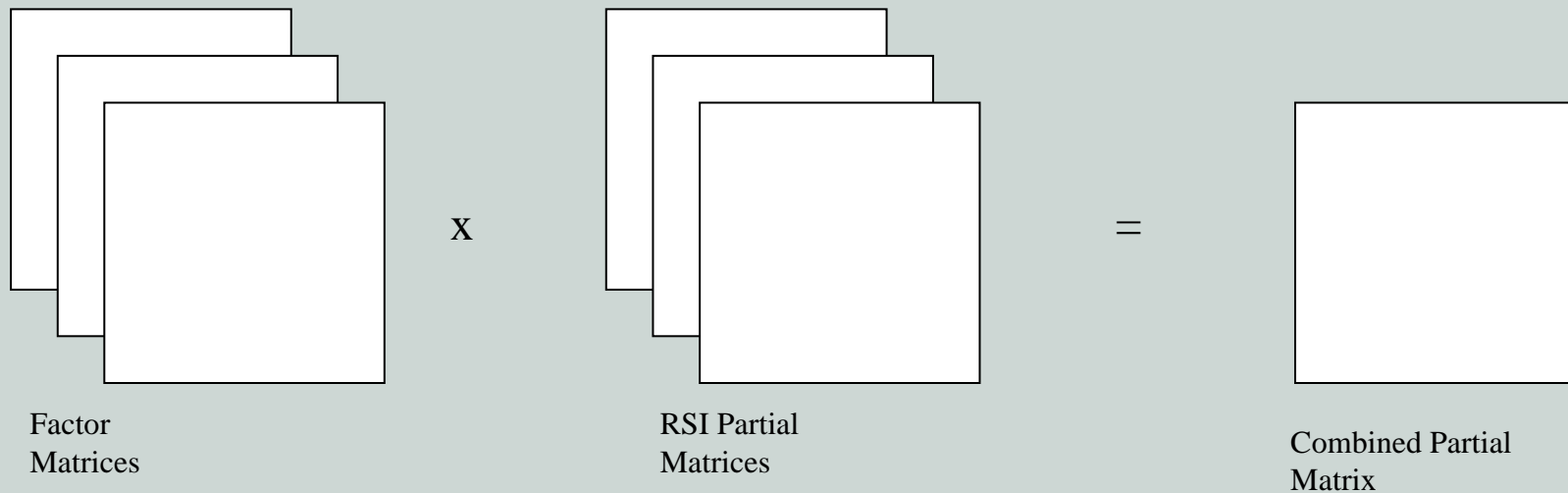
Total: --- Min: --- Max: ---

Centroids	1	2	3	4	5	6	7	
1: Scotland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
2: North We	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
3: Lincolnshi	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
4: Midlands -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
5: Midlands -	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6: Dorset - W	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7: Avon	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8: Devon & C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9: Dorset - W	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10: Bed&Car	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11: Essex - C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12: Kent - Pa	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
13: W Berks	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
14: Bucks - H	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15: Hants - C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16: Hants - S	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
17: I.O.W.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
18: N Wales	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
19: N Wales	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
20: S Wales	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
21: Bed&Car	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22: Bucks - H	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
23: Bucks - H	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	0.500	0.500	384.586

164, 1
963, 1
990, 1 (Fleet Road)
1044, 1 (Turners Hill Road)
1811, 2 (Ashford Road)
1812, 2 (Cadbury Road)
1893, 1 (Reading Road)
2003, 1 (Farnham Road)
2046, 2 (Colnbrook Bypass)
2132, 2 (Clockhouse Lane)
2260, 2 (Newbridge Road)
2320, 2 (Bognor Road)

Partial Matrices

The illustration is for one trip purposes, time of day period and one mode (vehicle type).



Matrix segmentation

A combined partial matrix is produced for each Purpose, period and mode (vehicle class) combination.

Model Purpose categories:

```
ALL = 1; @purposenames[ 1] = '_ALL' # all purposes
HB__ = 10; @purposenames[10] = 'HB__' # aggregate HB purpose
HBEd = 11; @purposenames[11] = 'HBEd'
HBEB = 12; @purposenames[12] = 'HBEB'
HBHo = 13; @purposenames[13] = 'HBHo'
HBPB = 14; @purposenames[14] = 'HBPB'
HBSO = 15; @purposenames[15] = 'HBSO'
HBWk = 16; @purposenames[16] = 'HBWk'
HBES = 17; @purposenames[17] = 'HBES'
NH__ = 20; @purposenames[20] = 'NH__' # aggregate NH purpose
NHEd = 21; @purposenames[21] = 'NHEd'
NHEB = 22; @purposenames[22] = 'NHEB'
NHHo = 23; @purposenames[23] = 'NHHo'
NHPB = 24; @purposenames[24] = 'NHPB'
NHSo = 25; @purposenames[25] = 'NHSo'
NHWk = 26; @purposenames[26] = 'NHWk'
NHES = 27; @purposenames[27] = 'NHES'
```

Matrix segmentation II

A combined partial matrix is produced for each Purpose, period and mode (vehicle class) combination.

Period and vehicle class categories:

```
Day    = 1;  @periodnames[ 1] = 'Day' # 0600-2200 # aggregate period
H6     = 5;  @periodnames[ 5] = 'H6'  # 0600-0700
H7     = 11; @periodnames[11] = 'H7'  # 0700-0800
H8     = 12; @periodnames[12] = 'H8'  # 0800-0900
H9     = 13; @periodnames[13] = 'H9'  # 0900-1000
AM     = 10; @periodnames[10] = 'AM'  # 0700-1000 # aggregate period
IP     = 20; @periodnames[20] = 'IP'  # 1000-1600
PM     = 30; @periodnames[30] = 'PM'  # 1600-1900
Ev     = 40; @periodnames[40] = 'Ev'  # 1900-2200
```

```
Car    = 11; @usernames[11] = 'Car'
LGV    = 12; @usernames[12] = 'LGV'
HGV    = 13; @usernames[13] = 'HGV'
```

```
# LGV aggregated over 1) HB__ purposes, treat as PA
#                       2) NH__ purposes, treat as OD
# HGV aggregated over all purposes
```

There are 223 purpose, period, vehicle type combinations.

Conclusions

- ◆ The disaggregate method is practical to apply.
- ◆ The many screen-line and factor matrices needed can be efficiently stored and referenced using arrays within OmniTRANS.
- ◆ Instead of being processed in isolation from the transport model, the disaggregate method integrates the survey processing with the target model which ensures that consistent expansion factors are developed and that the correction for double counting is exact with respect to the model used.
- ◆ Only one pass through the method is required, however if additional RSI sites are added then much of the process must be repeated.