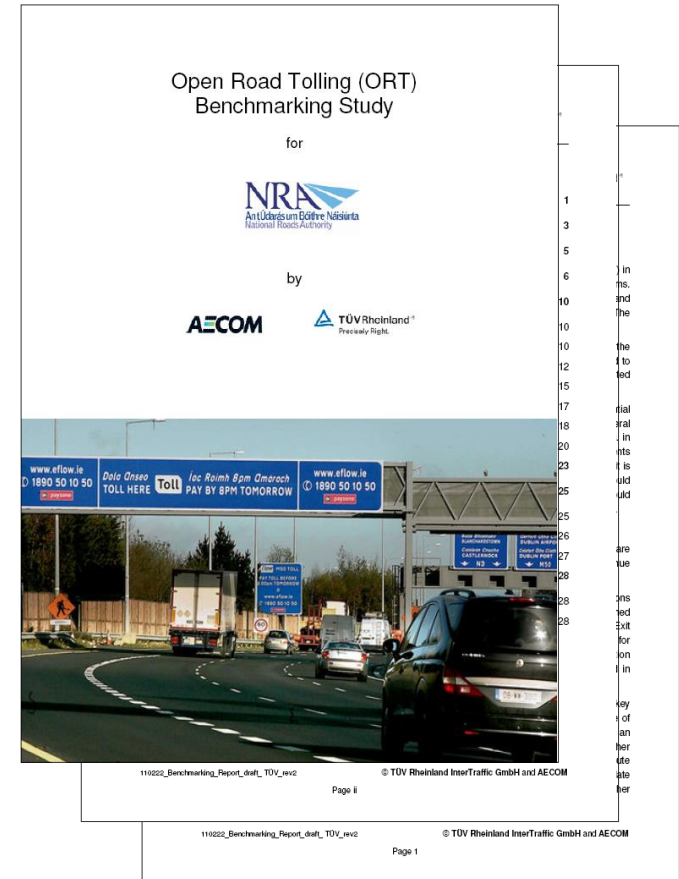


Cost and Performance of AET Schemes An International Comparison

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Background

- Study on behalf of the National Roads Authority (NRA), Republic of Ireland
- Comparison based on data collected by means of a questionnaire and guided interviews in autumn/winter 2010
- Ten operators were contacted, of which four provided comprehensive cooperation:
 - M50 Tolling, Ireland
 - SR 874, Florida, USA
 - 407 ETR, Ontario, Canada
 - 183A Toll, Texas, USA



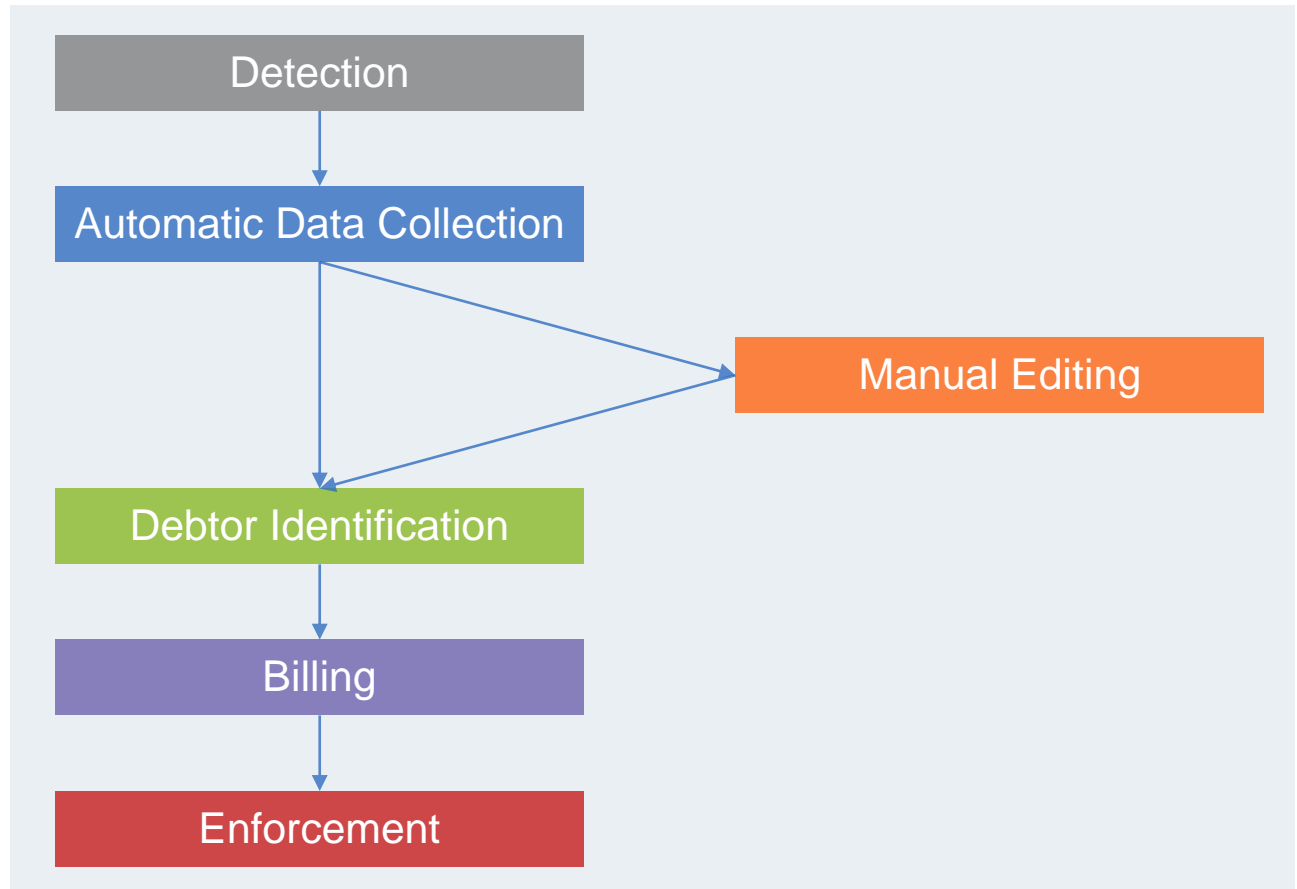
Project Characteristics

	M50	SR 874	407 ETR	183A Toll
Operator	BetEire Flow	MDX	407 ETR	CTRMA
Form of organisation	Private	Public	Private	Public
System category	AET per section	AET per section	Entry/Exit	AET per section
Tag / Sticker	Tag	Tag	Tag	Sticker
DSRC Technology (P/A)	5.8 GHz (P)	915 MHz (P)	915 MHz (A)	915 MHz (P)
Issuing of own Tags?	Yes	No	Yes	No
Video Tolling (VT)	Registered + unregistered VT	Registered + unregistered VT	Registration mandatory	Unregistered VT only
Tolling Points (unidirect.)	2	6	198	6
Operated lanes	8	22	300*	16
Number of kilometres	3	11	108	19
Transactions per month	3,228,215	7,109,974	9,820,207*	1,868,914
Usage Split (Tag / Video)	60% / 40%	75% / 25%	80% / 20%	80% / 20%
Start of AET operation	2008	2010	1996	2007

* Entry and Exit recordings, therefore trip equals two transactions.

Analysis of the technical system performance

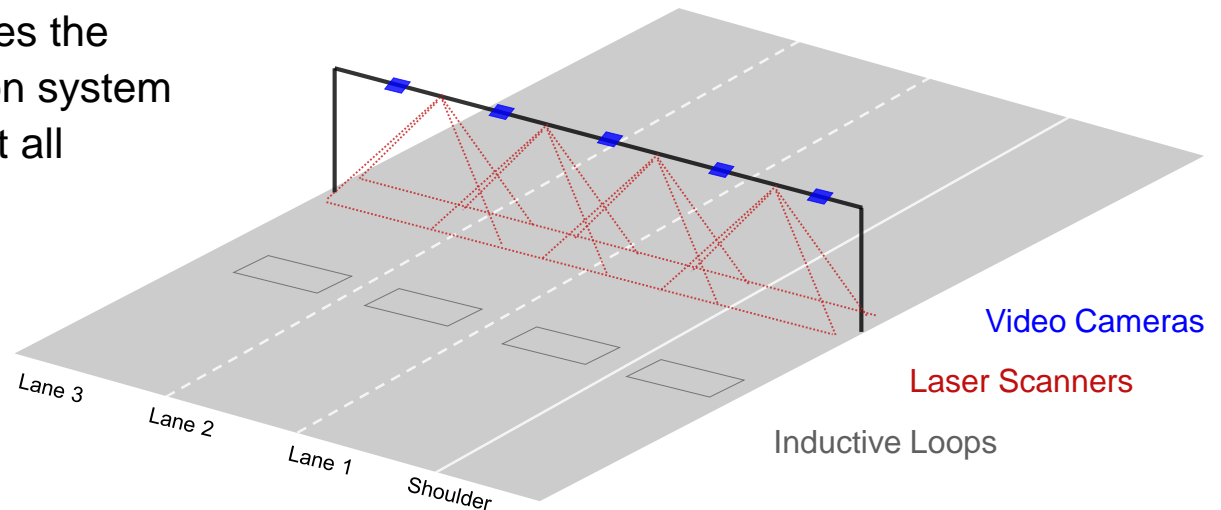
- Tracking the performance through the systems under investigation
- Identification of potential weak spots



General process steps of AET schemes

Detection

- No operator reported of any (significant) discrepancy between the number of toll events (passages at one toll point) and toll transactions (toll events being detected by the system):
 - Detection of toll events is apparently not an issue for tolling operators
 - All systems under investigation apparently provide a trustworthy level of automatic detection of toll events
- Audit process that ensures the quality of the toll detection system apparently not in place at all schemes

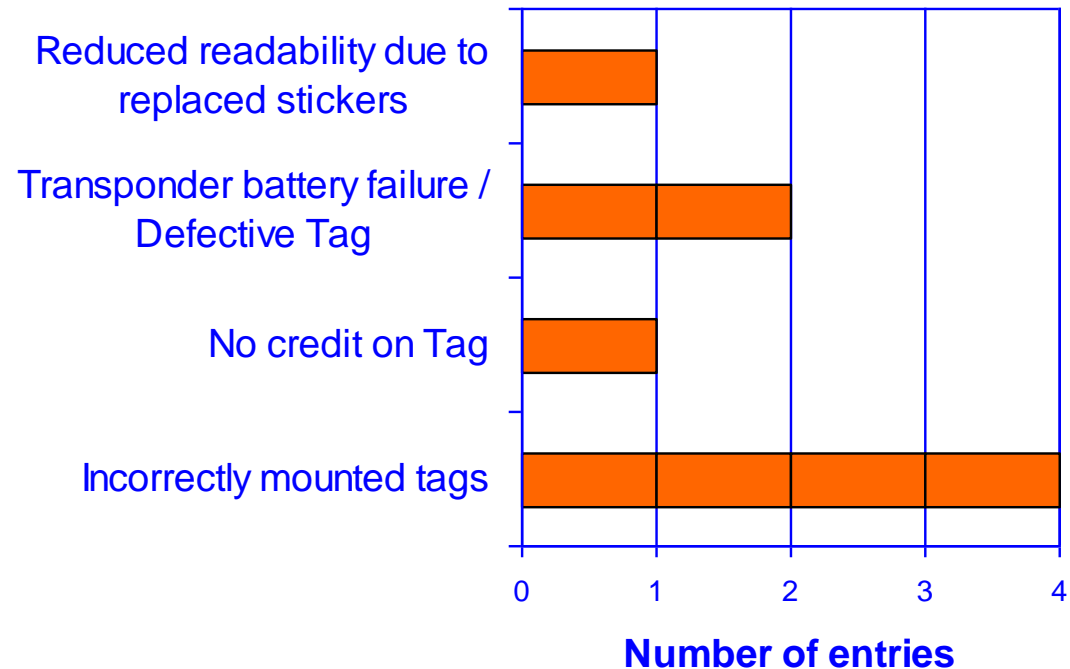


Technology Options for Vehicle Detection

Tag Reading

- Number of miss-reads generally well below 1%
- For correctly mounted and functioning Tags a service level of 99.9% and higher appears to be a realistic, market standard service level
- Quality of Tag communication to a large extent depends on the compliance of the customers with the instructions on how to mount and use the Tags

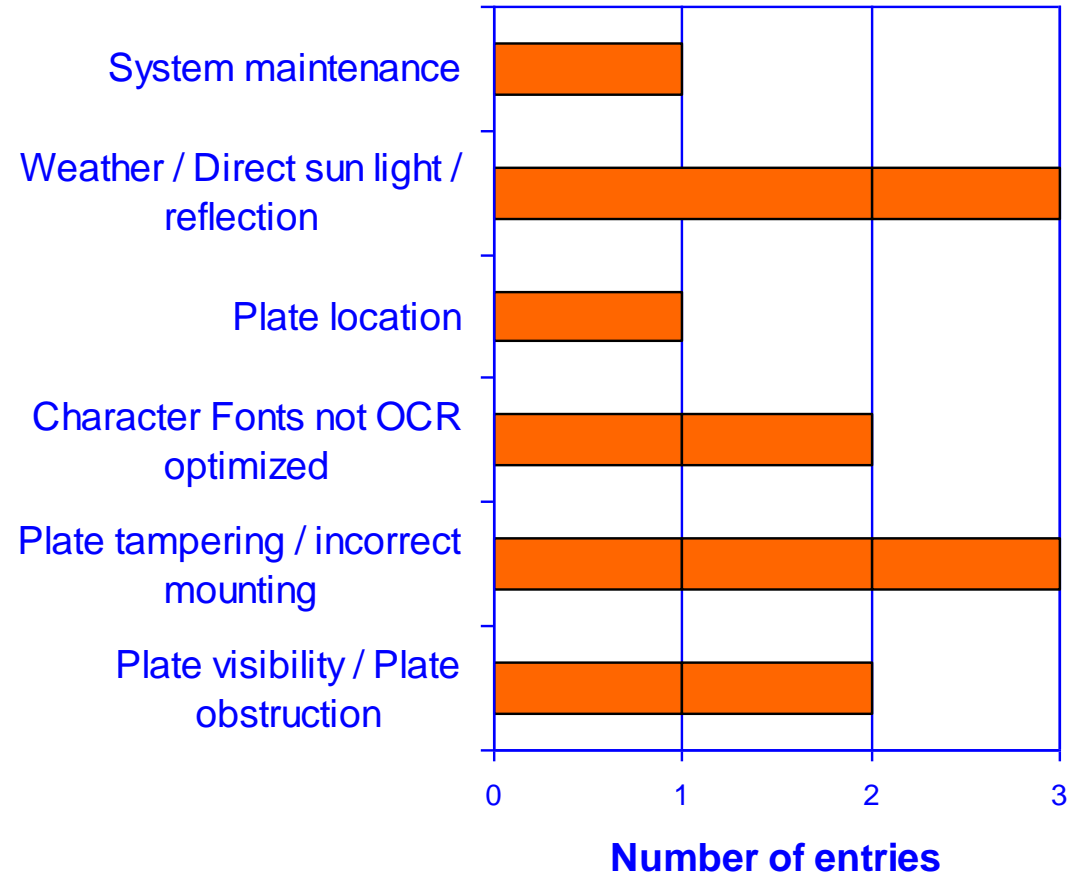
Tag Reading – Top 3 Issues



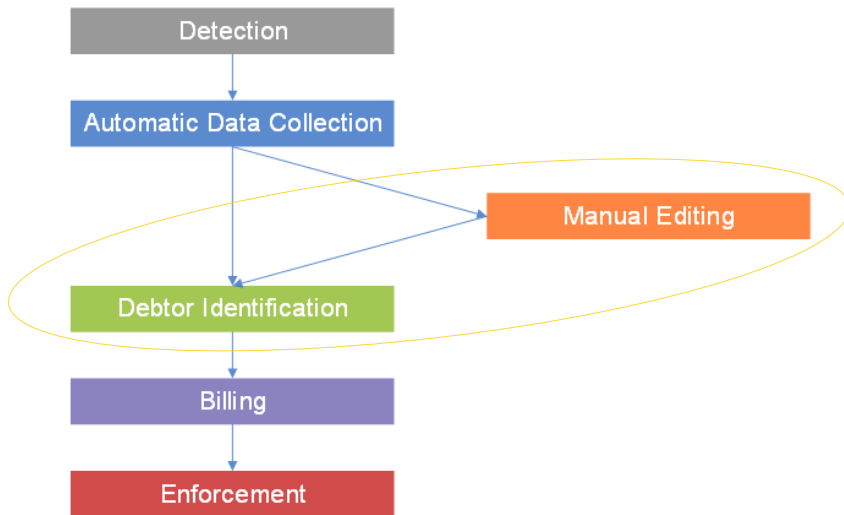
Automatic Number Plate Recognition (ANPR)

- ANPR performance related to the policy of the operator (requirement of double blind tests, level of confidence acceptable for the operator etc.):
 - 90% under test conditions
 - 60 to 70% under real traffic conditions
- Plate tampering and incorrect mounting key issue for operators
- Other Issues:
 - Environmental impacts
 - Plate obstruction
 - Character fonts on license plates

ANPR – Top 3 Issues



Manual Editing and Debtor Identification



Manual Editing

- Assignment of a license plate to a transaction: success rates in the range of 95% are observed
- Up to 6,500 images reviewed per day and FTE

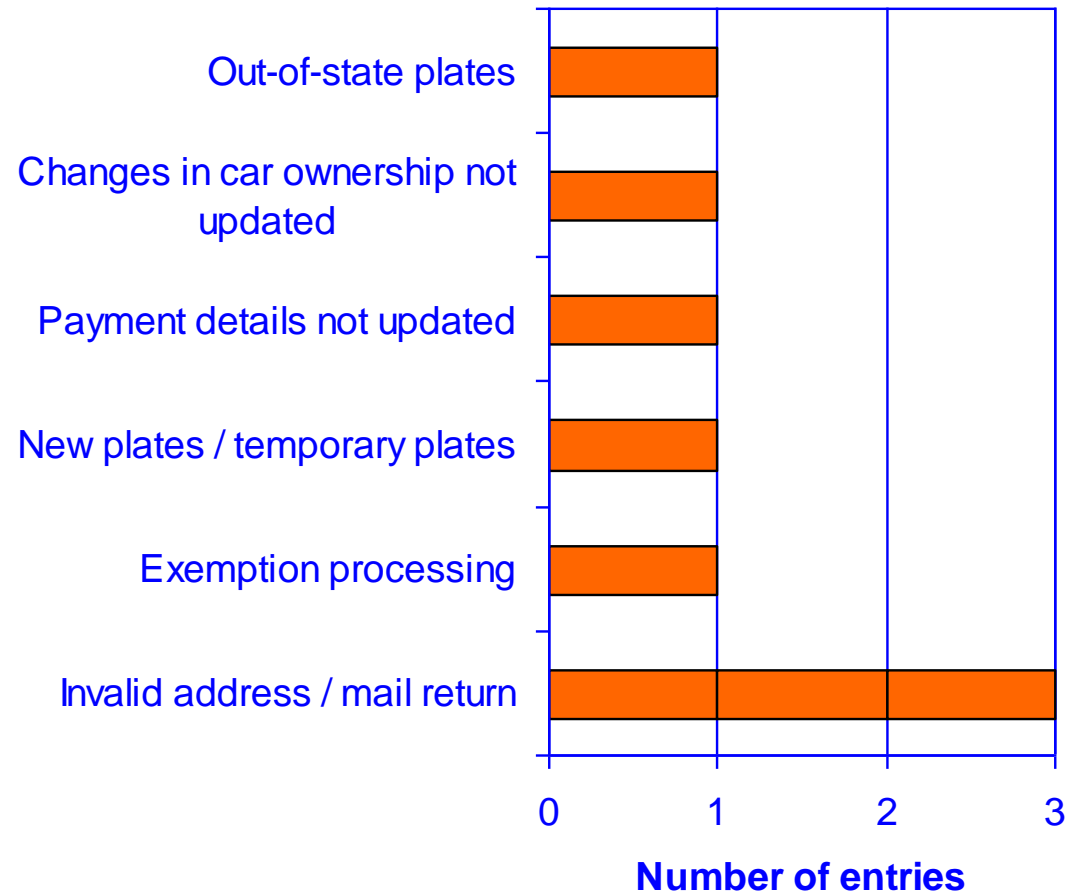
Debtor Identification

- 75 to 97% of users are registered in customer databases
- Only one of the four operators has free access to out-of-state vehicle registration data

Billing Process

- 2 to 3 percent of unbalanced transactions after billing process can be observed
- Unregistered users account for high proportion of this share
- Accuracy of mailing addresses key issue to operators
- Other main issue: exemption processing
- Dispute of bills by customers:
 - Dispute rates generally below 1%
 - Success of disputes varies widely

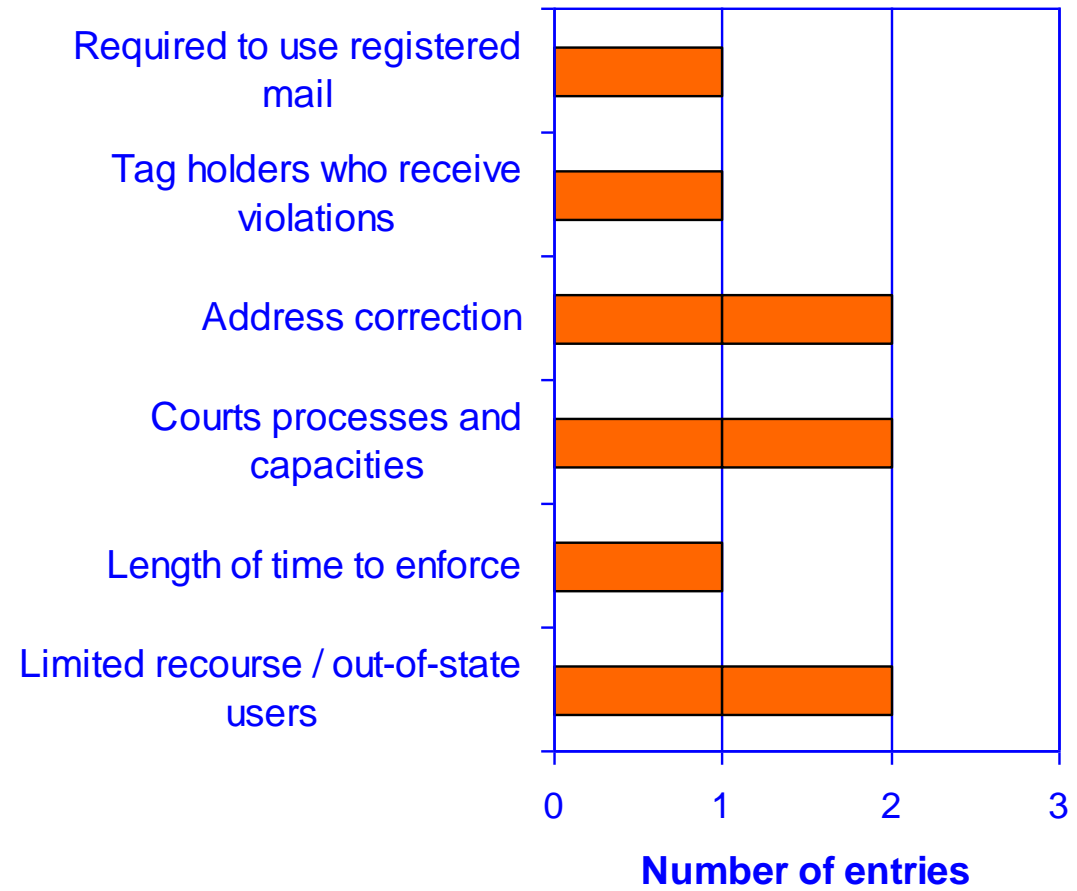
Billing Process – Top 3 Issues



Enforcement

- Strong variation in the rate of transactions recovered through enforcement:
 - Upper limit: >99%
 - Lower limit: <10%
- Legal framework and recourses available to the operator key factor for enforcement process:
 - Court processes and capacities
 - Dealing with out-of-state users

Enforcement Process – Top 3 Issues



Identification of key performance indicators

- Assignment of transactions (automatic or manual) either to a Tag-ID or license plate:
 - Rate of more than 3 percent unbillable transactions can be observed
 - Any unbillable transaction directly related to loss of money
- Rate of balanced transactions after billing process
 - Any reduction helps to cut operating costs
 - Maintaining up-to-date customer database appears to be the main issue
- Rate of transactions recovered through enforcement:
 - Observed variations may to a large extent be controlled by legal framework and recourses available
 - Operator responsible for establishing best possible process under given situation

Recommendations

- Improve detection and automatic data collection systems (e.g. utilisation of rear and front pictures, utilisation of multiple OCR-systems)
- Enhance processes according to quality management standards
- Get people to register
- Arrange for equal and fair treatment of all users

Cost indicators

- Cost information commercially sensitive, thus limited feedback
- Analysis of input received from operators (please note that not all operators provided input for each of the following indicators):
 - Cost per transaction: between €0.05 and €0.30
 - Cost per image review: between €0.02 and €0.05
 - Charge by Tag operator for each Tag transactions: between €0.05 and €0.06
- Estimates based on analysis of public reports for three of the four schemes:
 - Ratio Operating Costs / Toll Revenue: between 20 and 28%
- Comparisons may not be fair as it is difficult to ascertain what is (and what is not) included in operating costs

Summary and Conclusions

- Technical performance:
 - Conclusions should only be drawn within individual process steps
 - Comparisons should always take into consideration the overall framework and constraints of the individual schemes
- Cost indicators:
 - Very little data available for solid benchmarking of operating costs
 - Differences in project scopes and purposes complicate cost comparison

→ **Apparently there are no simple answers!**

But if you go down to the details, it allows you to:

- Assess and enhance certain aspects of existing systems and processes
- Improve the design of future AET schemes

Thank you very much for your attention!



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