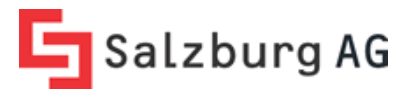




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Trolleybus Benchmarking Vehicles and infrastructure



*Information to UITP
Trolleybus-WG Report of
results*

*Solingen,
14th December, 2006*

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Initial situation and goals

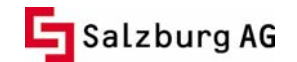
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Trolleybus Benchmarking
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Typically operations is analysed well, vehicles and infrastructure have a lack of information

- Trolleybus-systems **differ** substantially from diesel-bus particularly in **technical matters** with corresponding consequences on running cost and investment
- Therefore, several trolleybus operating companies initiated this benchmarking-project in order to **understand differences in performance** between each other and to look for **improvements**
- The work **focuses** on **vehicles** and **infrastructure**, because there is obviously the biggest **lack of information**
- **Processes, performance** and **services** should be analysed in depth and **related** by the corresponding **efforts** occurring in the individual operating companies
- Of course, individual situation in terms of **technical solutions** and **services provides** is taken into account

Initial situation and goals



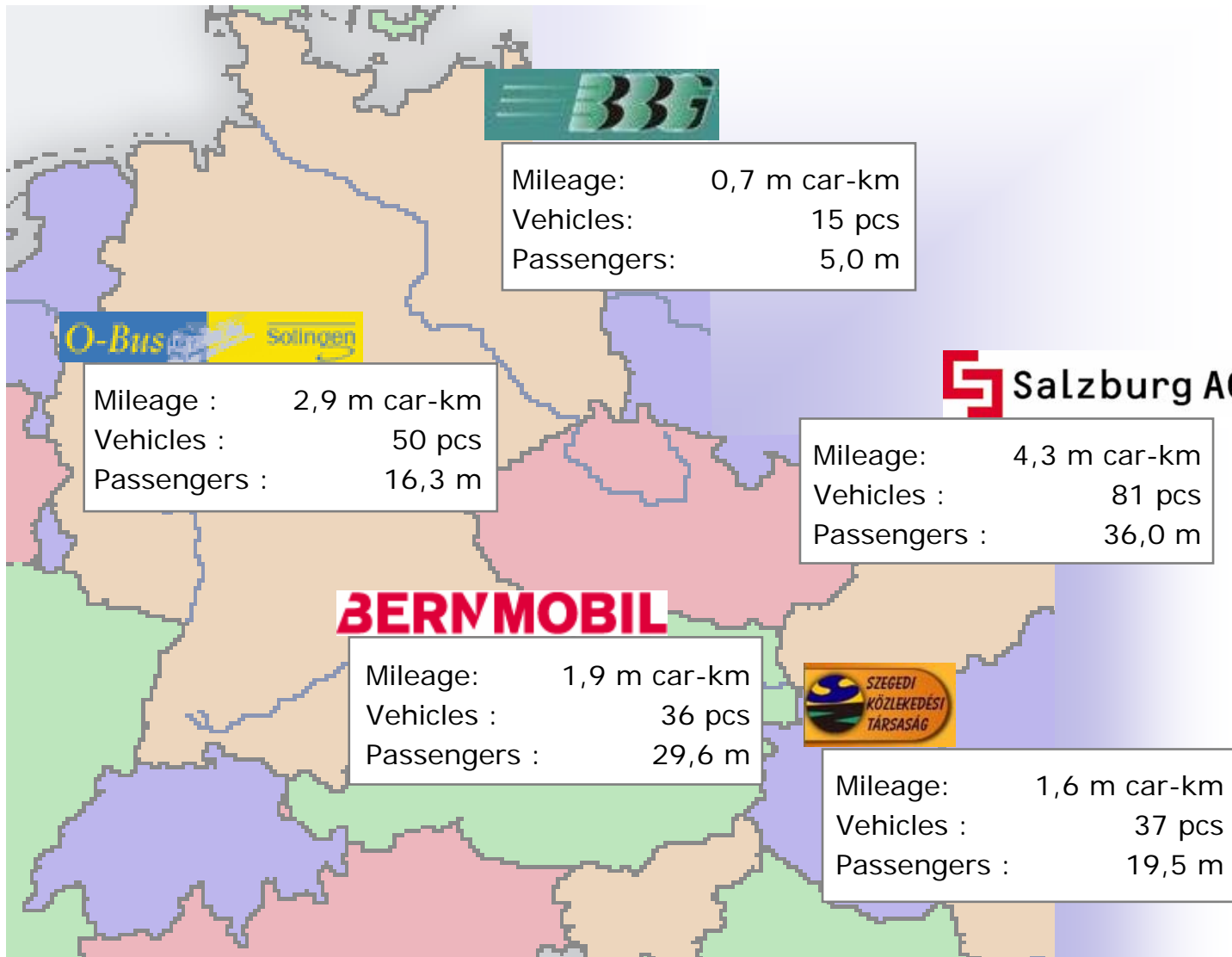
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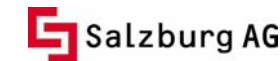
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Companies from 4 different countries united in the pilot project



Initial situation and goals

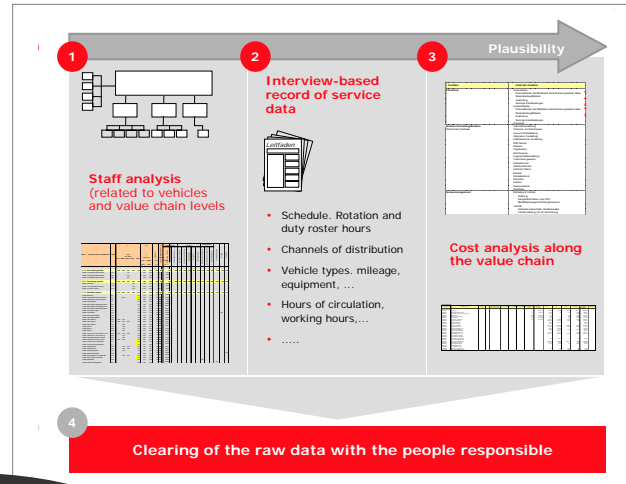
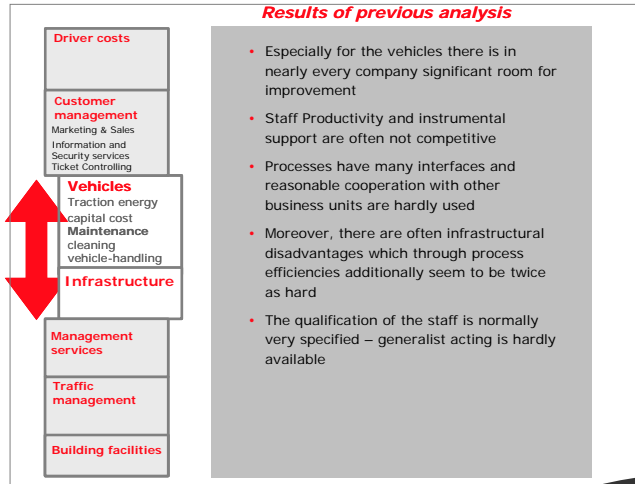


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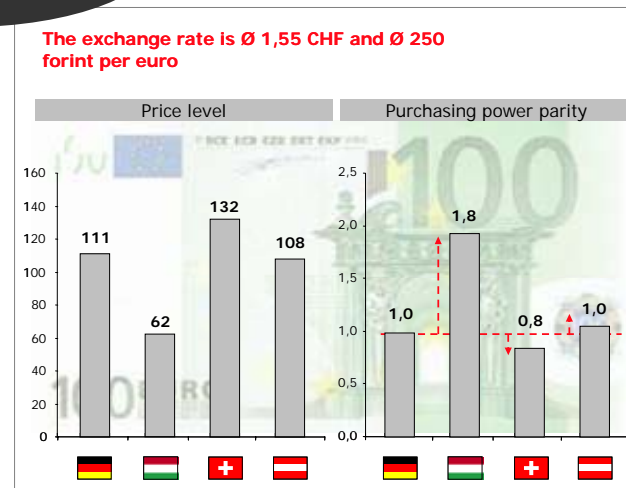
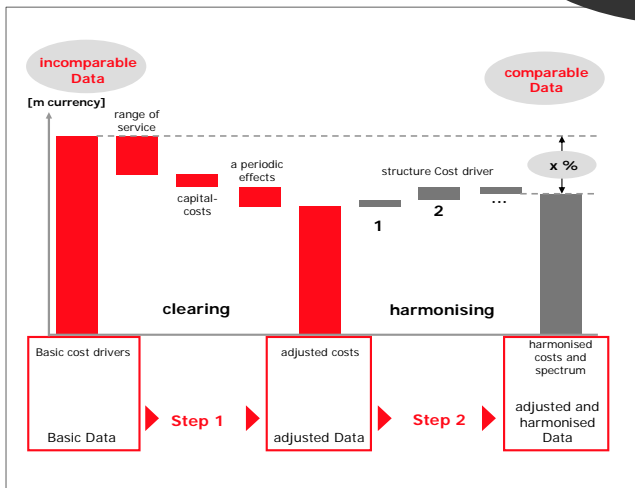
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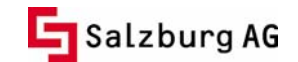
Comparability of the companies is assured with a proven methodology



Methodology



Methodology



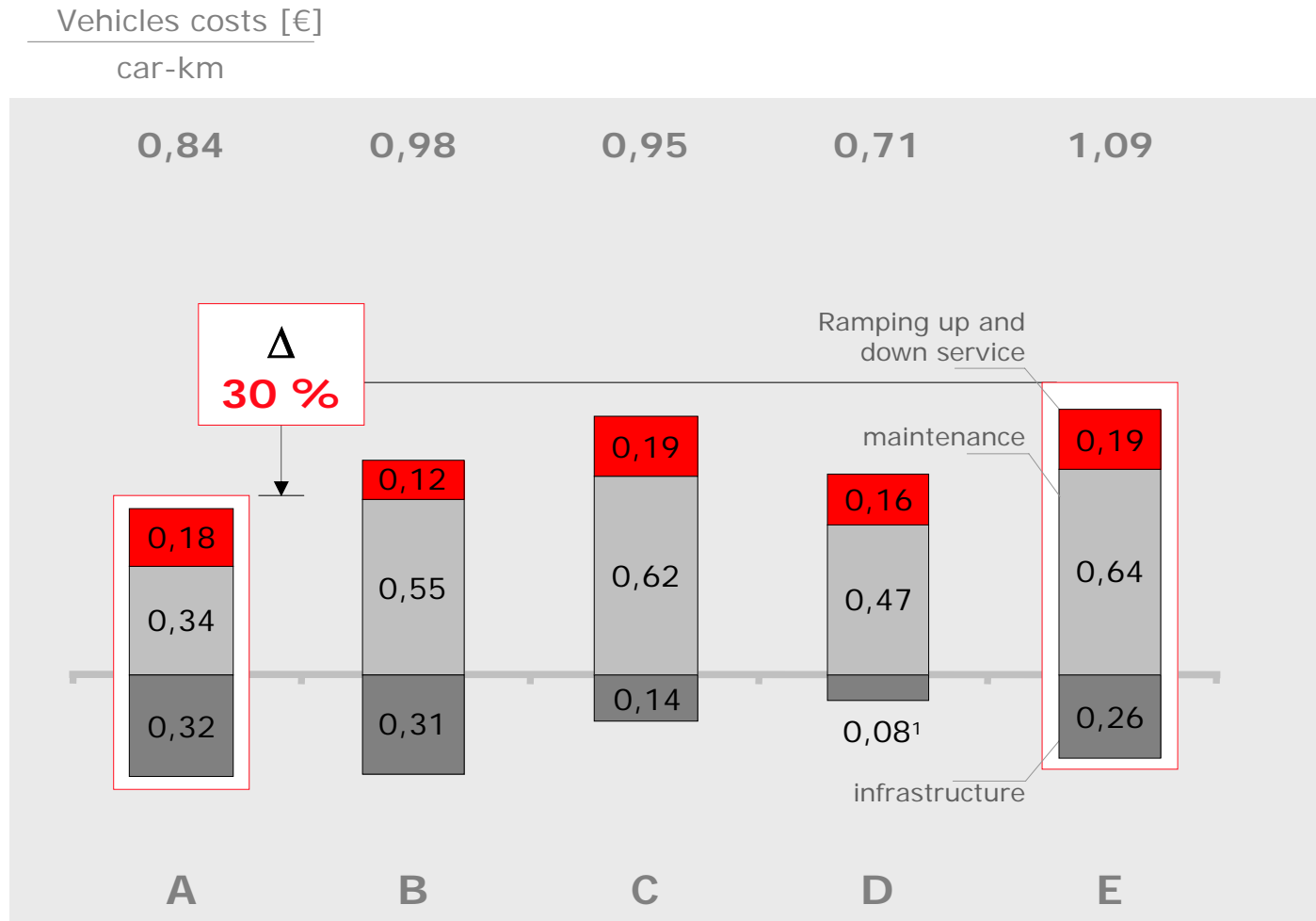
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Looking at the 30%-delta, costs for vehicles seem to have big room for improvement

Harmonised comparison*



Example for results



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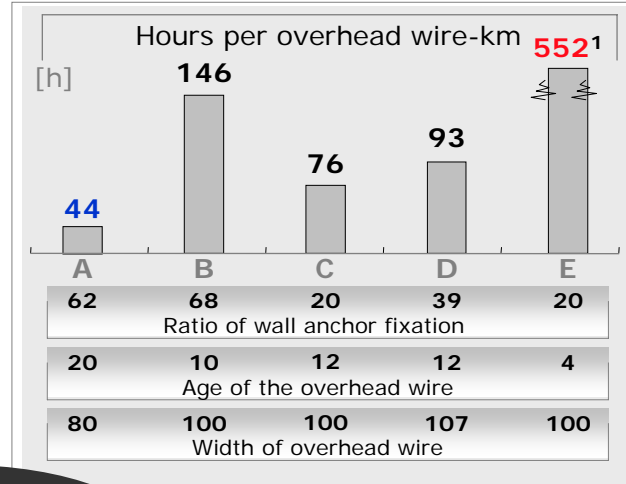
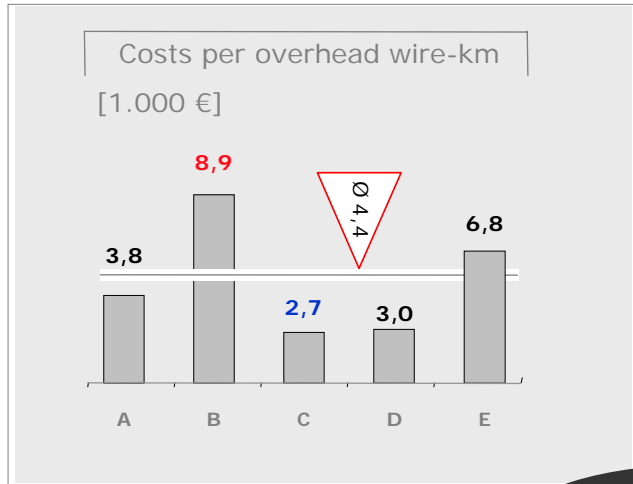
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Infrastructure costs [€]
Car-km

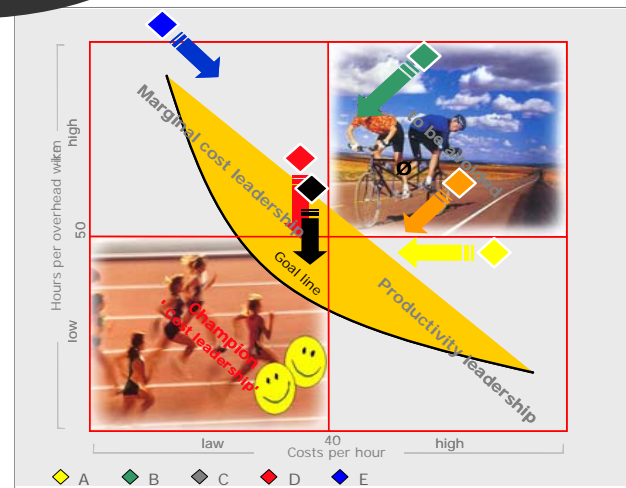
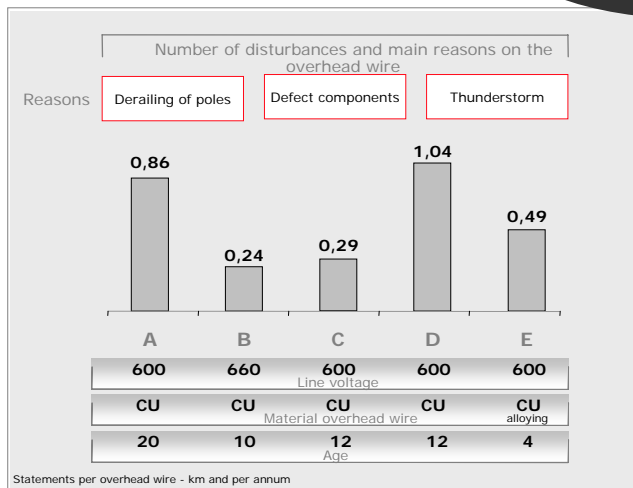
* after method to ensure comparability between the operators, mainly due to their different circumstances

¹ value is not comparable. Transformer substations of company D are in the possession of the city

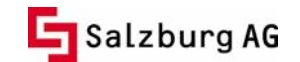
There are major differences in the costs and productivity, but the goal is clearly defined



Detailed results



Example for results

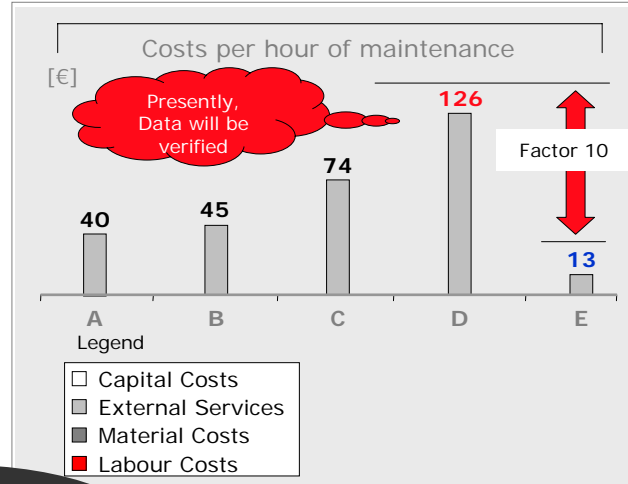
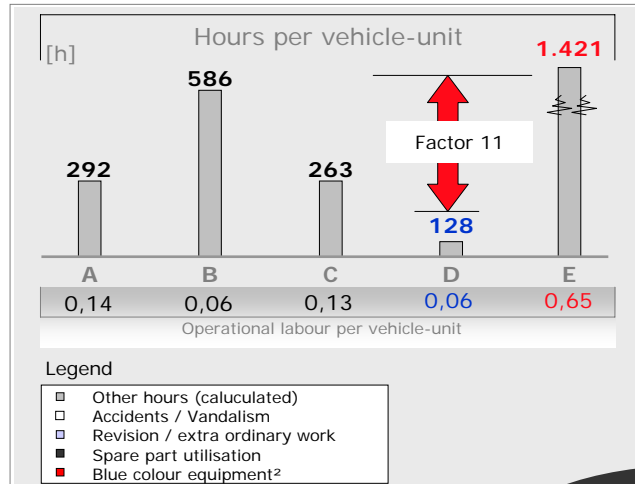


Trolleybus Benchmarking
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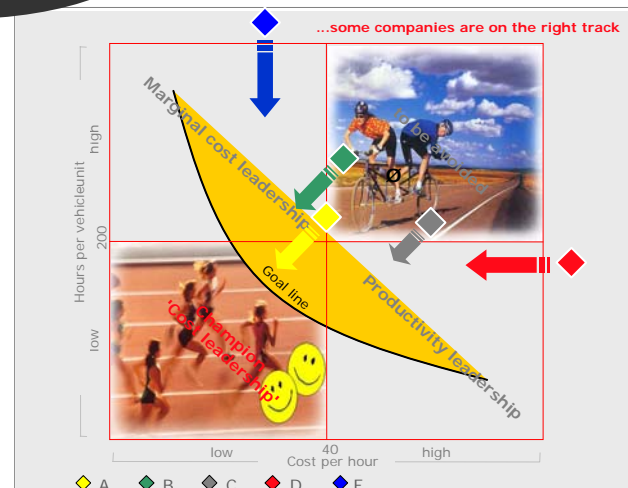
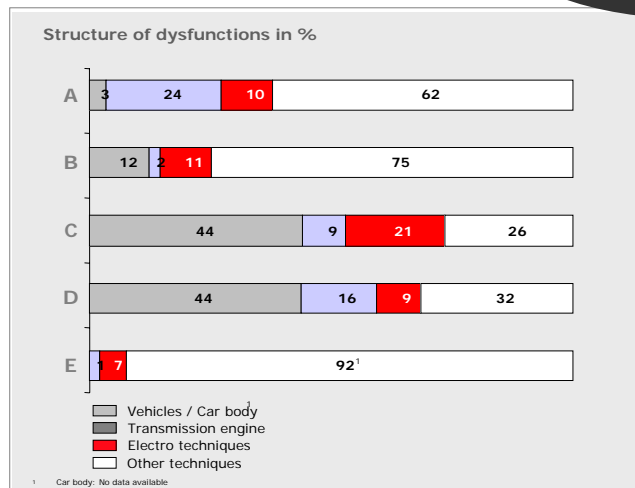
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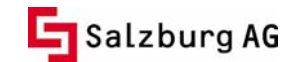
In terms of productivity and costs the analysis sets clear targets for improvement



Detailed results



Example for results



Trolleybus Benchmarking
Vehicles and Infrastructure

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The main fields of action can be derived per operator individually

... further Trolleybus-operators will take part in the benchmarking

| Company | Need for detailed analysis | | | | | |
|---------|----------------------------|-------|------------------|-------|-----------------|-------|
| | Maintenance | | Vehicle-handling | | infra-structure | |
| | Costs | Hours | Costs | Hours | Costs | Hours |
| A | | | | | | |
| B | | | | | | |
| C | | | | | | |
| D | | | | | | |
| E | | | | | | |

Legend:

- Improvement necessary
- Continuous improvement process
- Competitive

Conclusion and summary



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Vehicles and Infrastructure

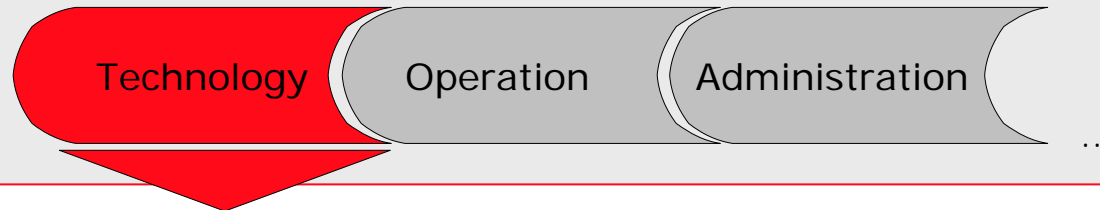
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In-depth analysis and concrete measures can be now systematically evaluated

Phase 1



Deep analysis phase

- Deep process analysis and concrete measures in the area of operational vehicle maintenance, vehicle-handling and infrastructure to improve the situation of the company
- Definition of a specific required process and its comparison with the actual process
- Period for testing – Utilisation of the required process and elimination of emerging barriers
- Analysis of the technical overhead and especially of the technical work preparation process
- Analysis of the materials management process and bounded capital invested in assets
- ...

Further proceeding



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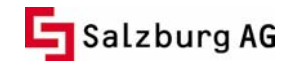
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The enlargement of the circle of participants will lead to an even greater base of knowledge

- Five PTOs have successfully conducted this strategic benchmarking project in the technical areas of their trolley-bus operations
- Other Trolleybus operators have now committed themselves to the second group of participants
- We are also very happy that operators from Russia (Vologdaelektrotrans) and Estonia (Tallinna Trammi- Ja Trollibussikoondise AS) are joining the project as well
- We would be happy if further companies are interested in the rally to become the performance champignon

Further proceeding



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If you have any questions or if you
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