System train paths as the key to efficient infrastructure usage for on-track competition in ITF-regimes

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Problem Statement | Cost Evaluation | System Train Path | Application | Conclusion

On-Track Competition + Integrated Periodic Timetable (ITF) / Long Term Infrastructure Development = ?

- systematic approach required

Challenge for Infrastructure Managers
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hub spreading critical
Relevant investments for ITF:

**Approach 1** 51% according to target timetable 2025+ (rough first estimate)

**Approach 3** 31% considering only ITF-effective measures and relevant proportion of hub-investments - investments due to capacity reasons
Today...  ...the entire network is offered, customers ask for train paths designed due to their specific demand.

Problem...  ...in case of train paths conflicts the Integrated Timetable (ITF) cannot be ensured.

Solution...  ...system train paths are offered. Part of the network is offered as today, however, a conflict with system train paths is not acceptable.

➢ appropriate scheme → system train path (STP)
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Legend:
- average train path
- optimal train path
- regional train path
- lost capacity
- optimal band width
- suboptimal band width

**STP: deltoid shape → enables flexibility**
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Amstetten – St. Pölten

Infrastructure
- distance: 63,5 km
- edge target time: 30 min
- hub in-between: none
- maximum line speed: 200-230 km/h

Riding times
- EMU 1: 21,4 min
- EMU 2: 21,4 min
- train set: 21,7 min

St. Pölten – Vienna

Infrastructure
- distance: 60,6 km
- edge target time: 30 min
- hub in-between: Meidling Bf.
- maximum line speed: 80-250 km/h

Riding times
- EMU 1: 24,0 min
- EMU 2: 25,6 min
- train set: 24,3 min
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**STP: parameters influence shape of deltoid**
Conclusion

System train paths...
...are a scheme to offer the railway undertakings attractive train paths according to the rules of the ITF.

This scheme guarantees...
...an optimal network-wide implementation of the ITF. 
...compliance with the framework of the EU-legislation. 
...the highest possible customer benefit.
Looking forward to a lively discussion!
Backup
<table>
<thead>
<tr>
<th>parameters</th>
<th>timetable</th>
<th>infrastructure</th>
<th>vehicle</th>
</tr>
</thead>
</table>
| hub        | - minimal stopping time  
            - transfer time | - track layout  
            - speed limit of tracks and turnouts | - time of passenger boarding  
            - door size  
            - opening speed of doors  
            - low floor vehicle |
| edge       | - stops in-between  
            - time reserves / timetable stability  
            - capacity | - distance  
            - maximum line speed  
            - unplanned track changes | - maximum speed  
            - acceleration  
            - mass  
            - vehicle length  
            - energy saving |
Conclusion

1.) systematic approach required
2.) hub spreading critical
3.) appropriate scheme → system train path (STP)
4.) STP: deltoid shape → enables flexibility
5.) STP: parameters influence shape of deltoid
System Train Path „Weststrecke“ I
System Train Path „Weststrecke“ II

Zeit-Weg-Diagramm St. Pölten Hbf. - Amstetten

Zeit [min] 5,6 - 6,3 min