

Research Centre

**TERRA**

Geo  
Road  
Rail

# Visualising track geometry deterioration modelling

Mikko Sauni<sup>1</sup>, Heikki Luomala<sup>1</sup>, Pauli Kolisoja<sup>1</sup>

<sup>1</sup>Tampere University, Research Centre Terra, Finland

E-mail: [mikko.sauni@tuni.fi](mailto:mikko.sauni@tuni.fi) Tel: +358 405090 654

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# Background on track geometry deterioration

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# Background on track geometry deterioration

Ballasted tracks deform due to train traffic loads, structure weight, and environmental loads.

Ballasted tracks need to be maintained regularly, which includes track tamping.

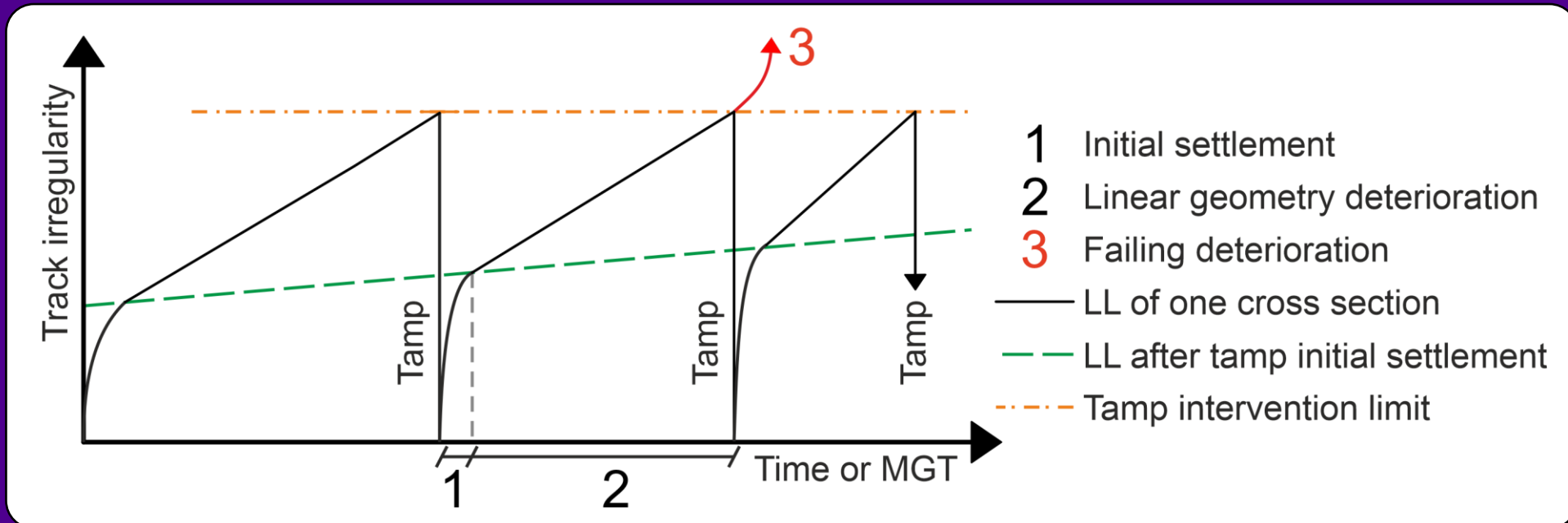
Tracks are regularly inspected with a track inspection car.



# Background on track geometry deterioration

Ballasted track geometry deterioration is not inherently random.

Therefore, track geometry deterioration can be idealised.



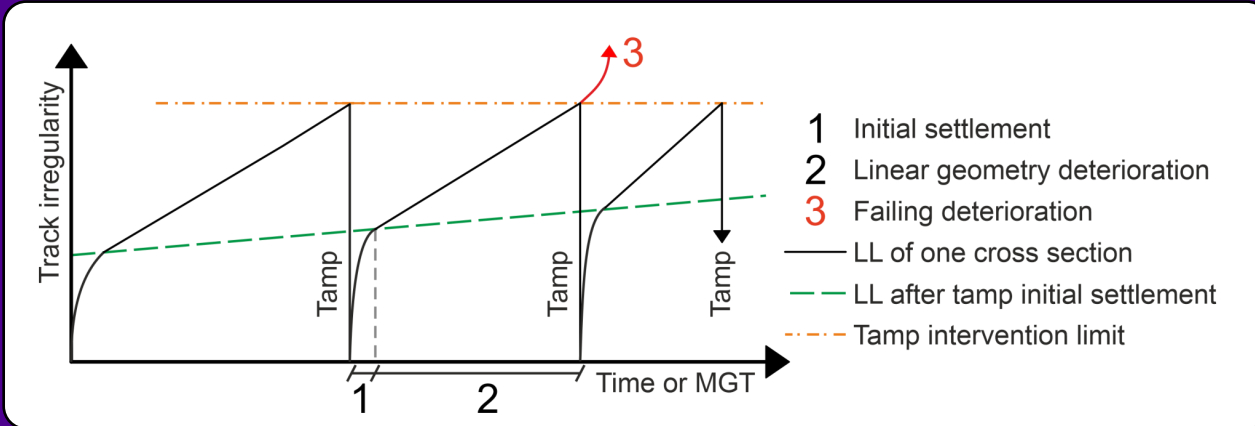
Background on track geometry deterioration

# Track geometry deterioration modelling

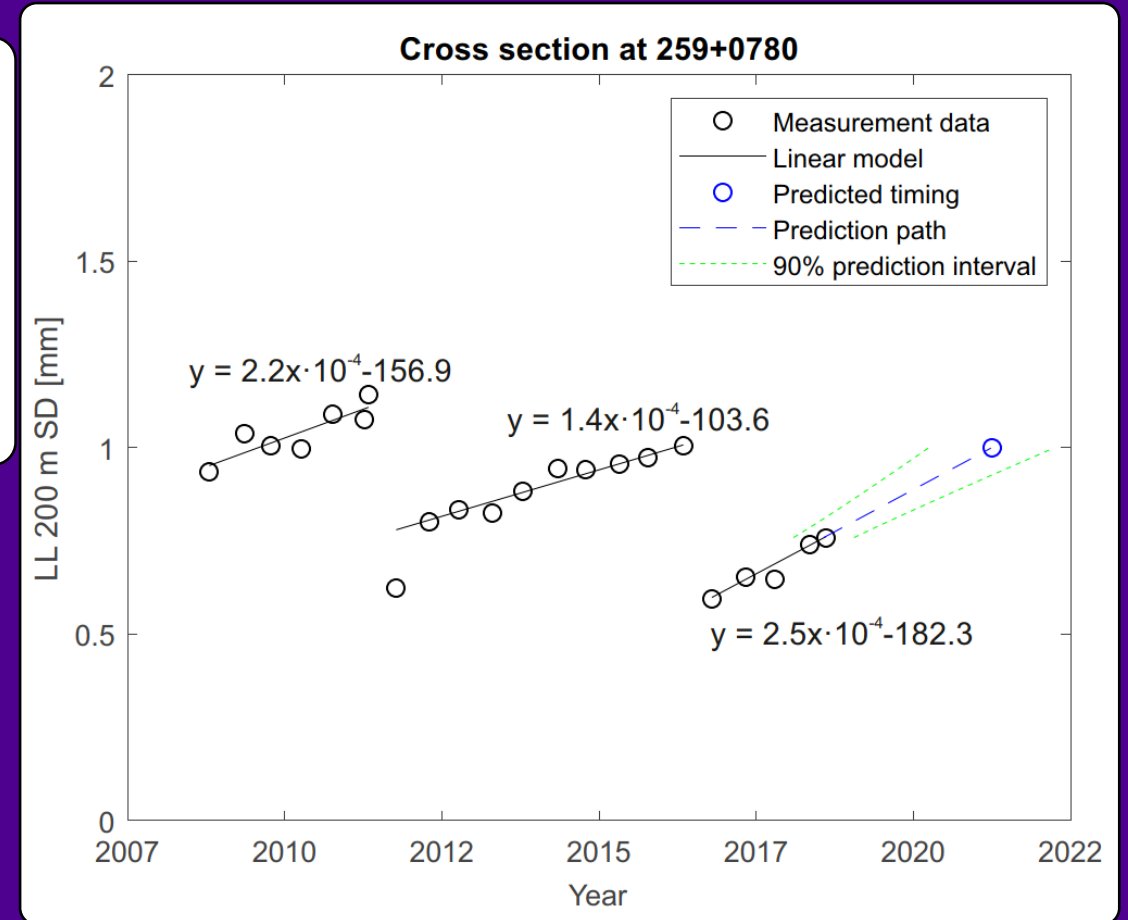
Visualising modelling results

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# Track geometry deterioration modelling



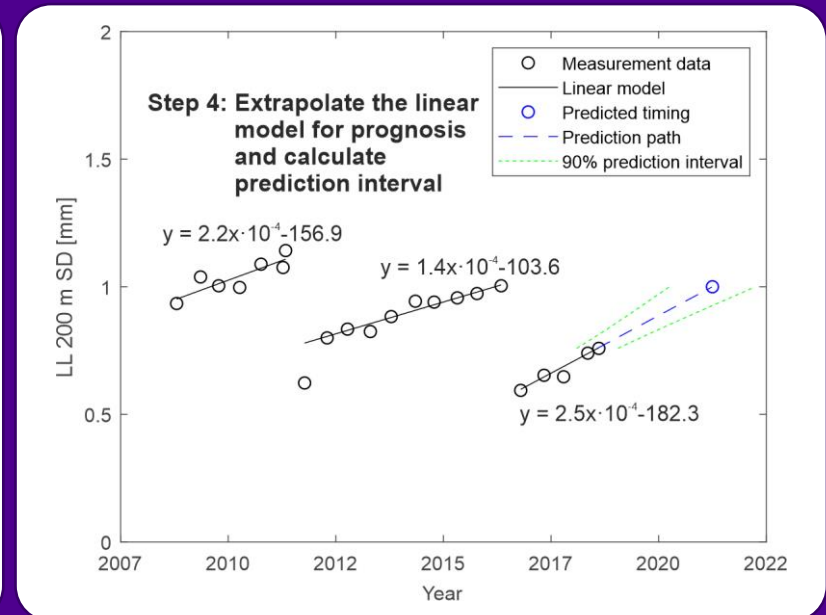
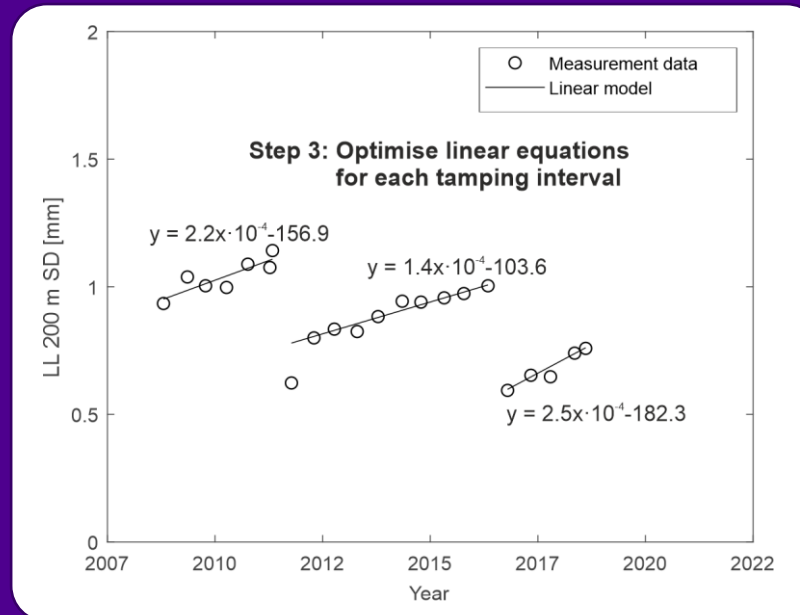
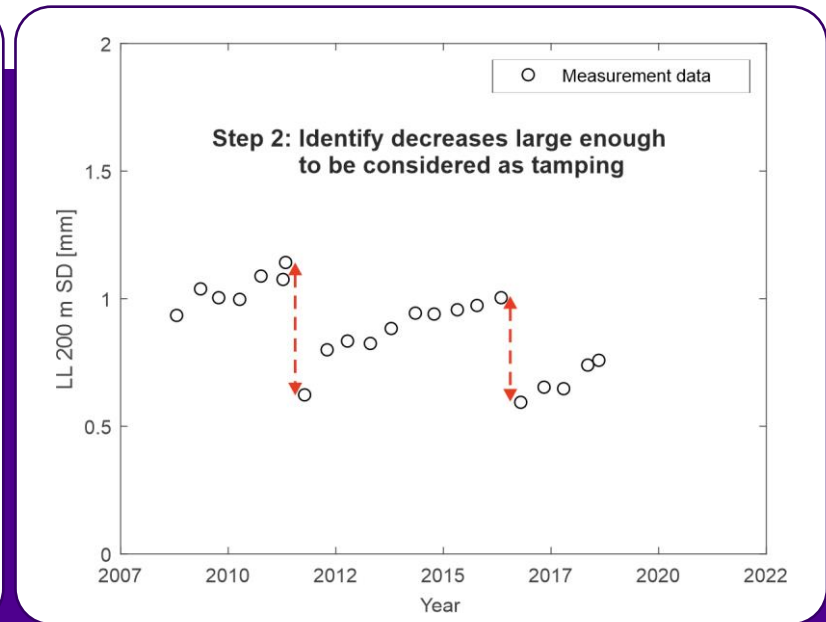
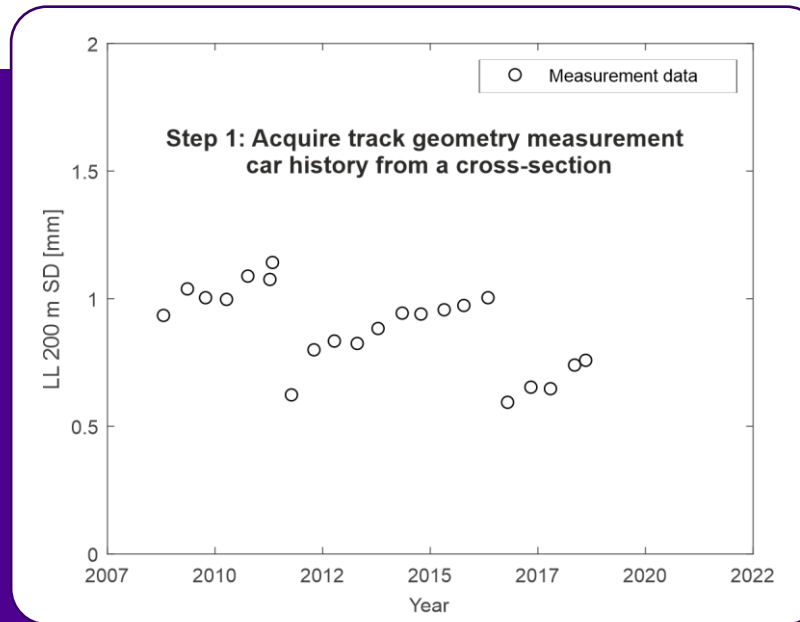
Theoretical deterioration behaviour



Actual deterioration behaviour

# Track geometry deterioration modelling

Track geometry deterioration can be modelled using historical data from track inspection car measurements.





Background on track geometry deterioration

Track geometry deterioration modelling

# Visualising modelling results

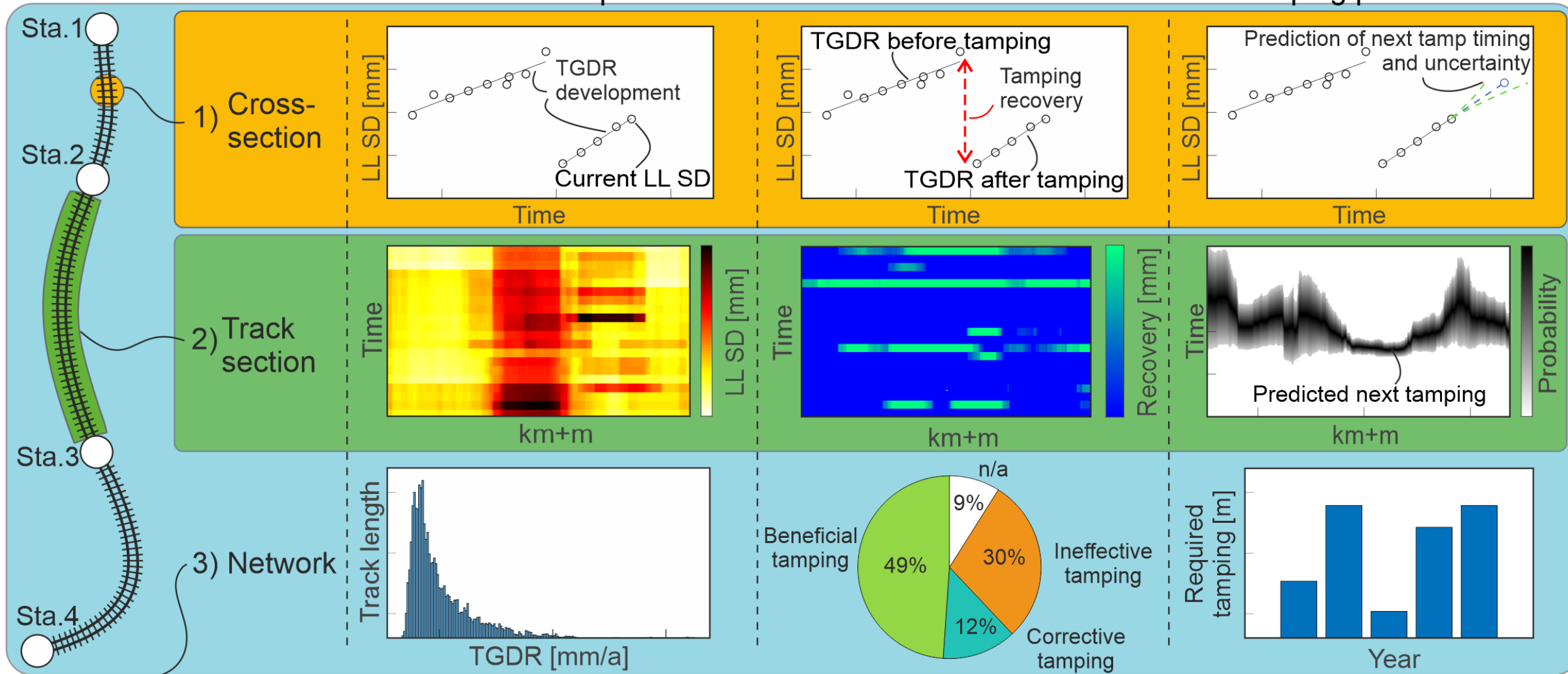
Implementing research into practice

# Visualising modelling results

Deterioration exploration

Maintenance effectiveness

Tamping predictions



Background on track geometry deterioration

Track geometry deterioration modelling

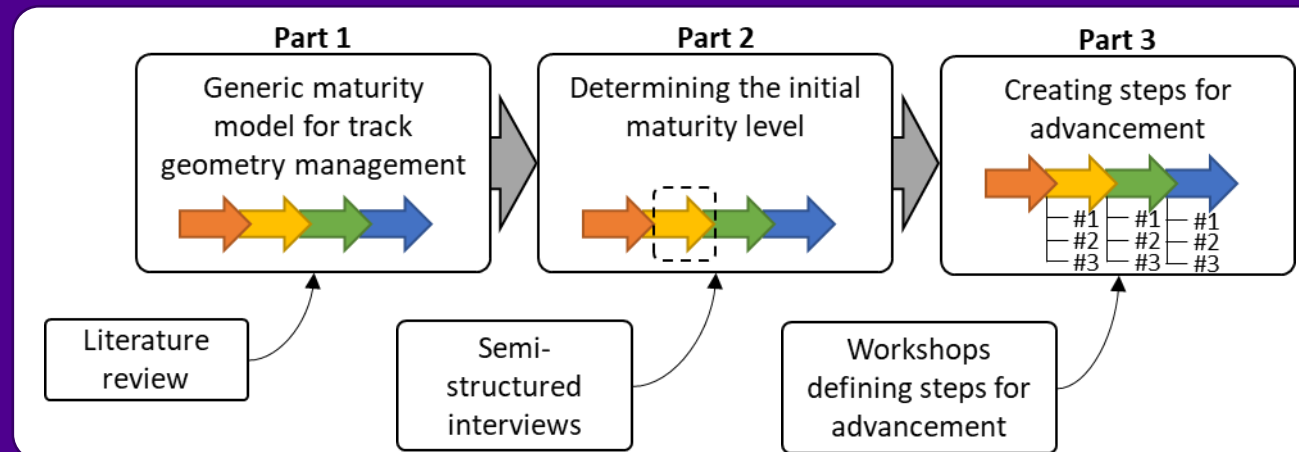
Visualising modelling results

# Implementing research into practice

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The implementation of track geometry deterioration analytics (TGDA) into railway asset management was researched in three parts:

- 1) Adapt a maturity model for advancing TGDA.
- 2) Investigate railway asset managers' maturity level in TGDA.
- 3) Provide a tangible framework with which railway asset managers can advance their maturity in TGDA.

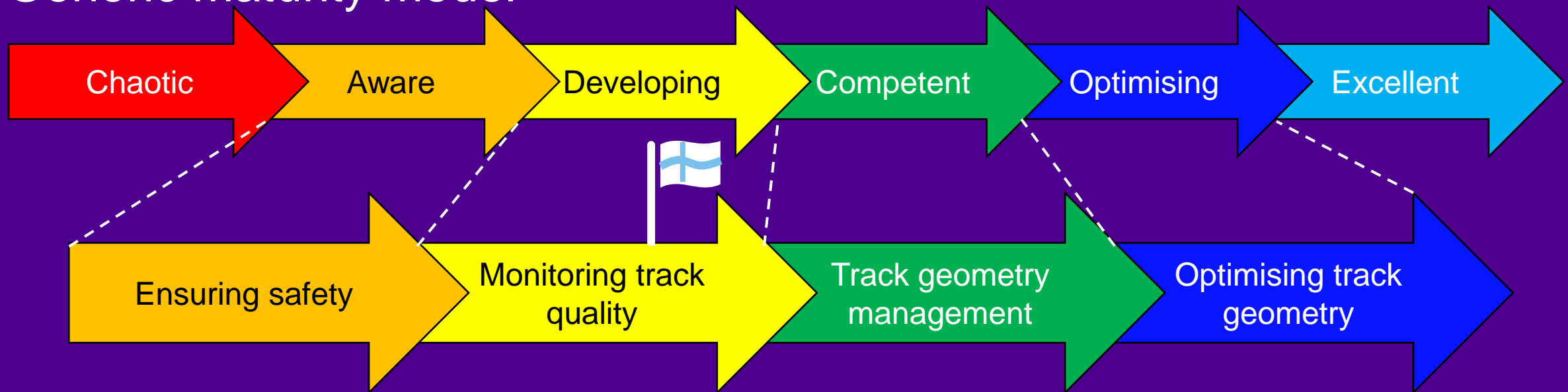




# Implementing research into practice

Maturity models were chosen as the theoretical approach for designing the implementation.

## Generic maturity model

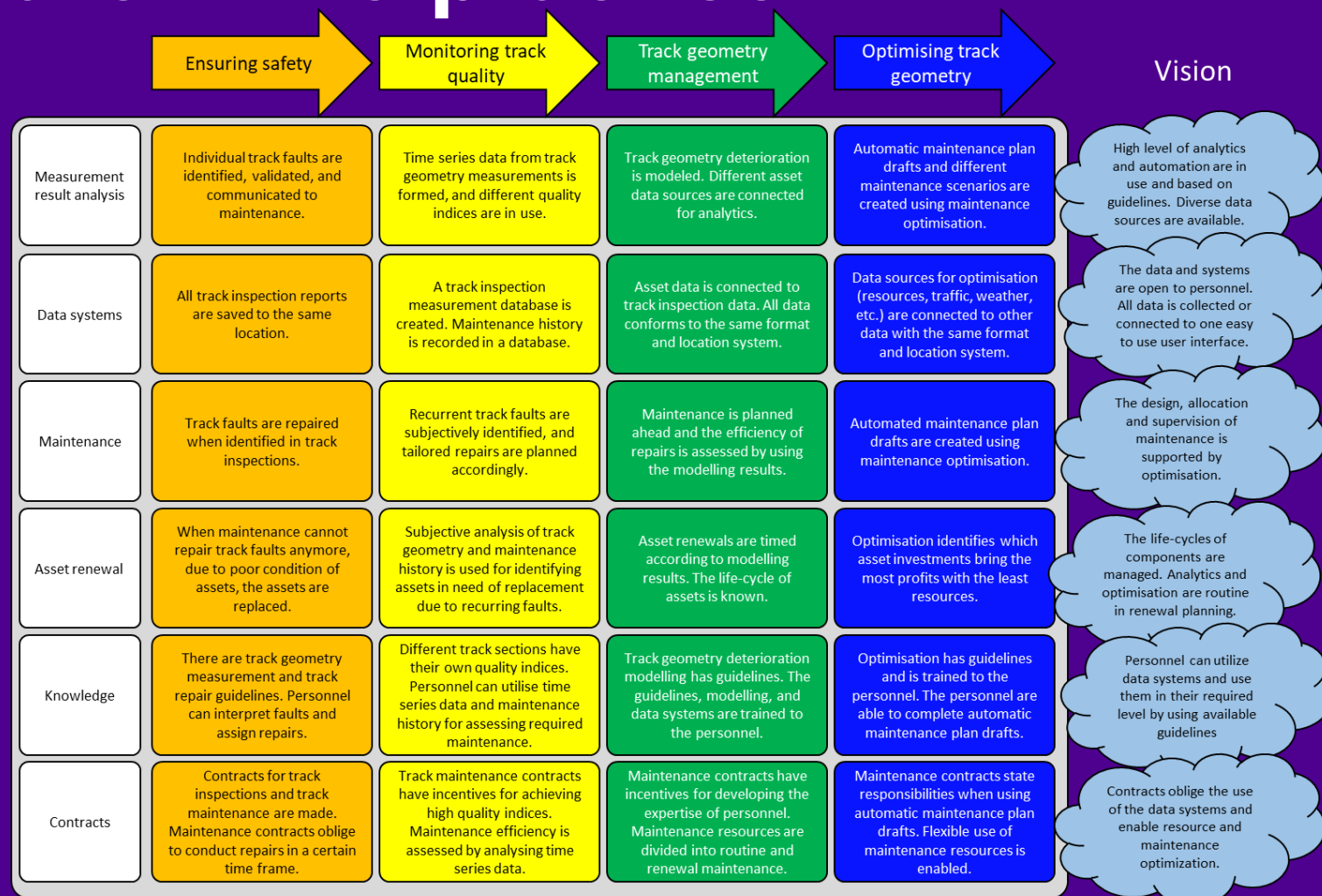


## TGDA specific maturity model

# Implementing research into practice

A framework for advancing track geometry deterioration analytics (TGDA) was developed based on the maturity model in 3 workshops with multiple stakeholders.

The framework included six domain areas, each with their own development paths.



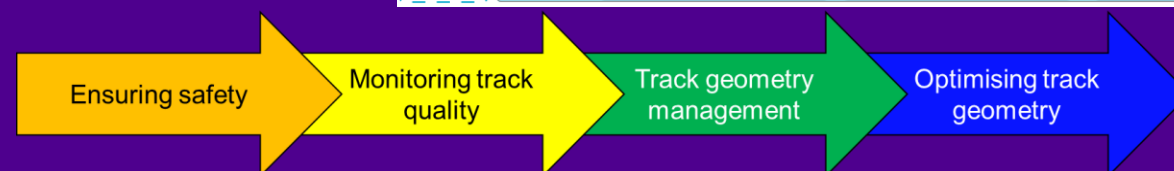
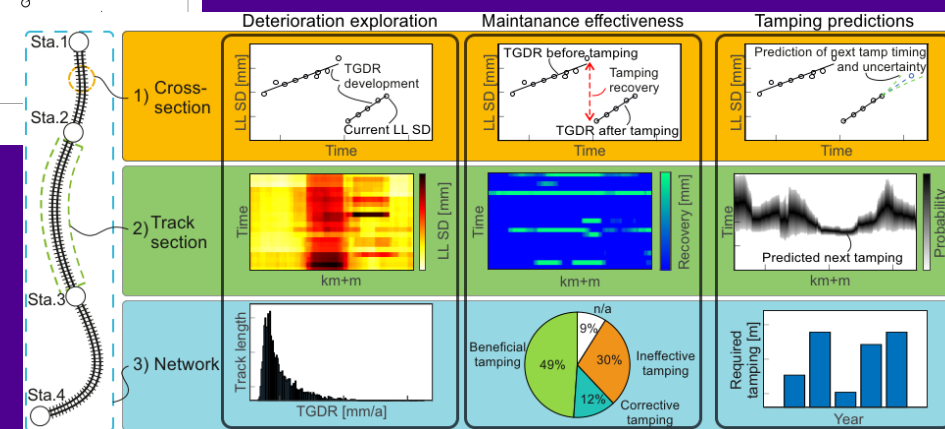
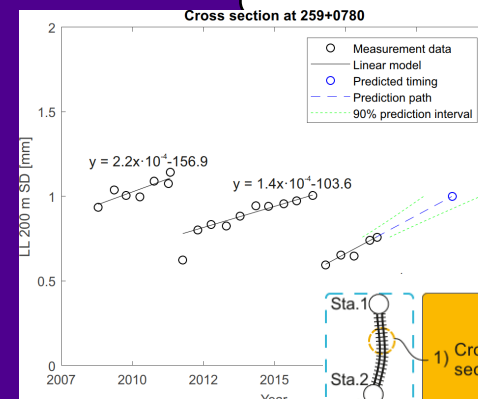
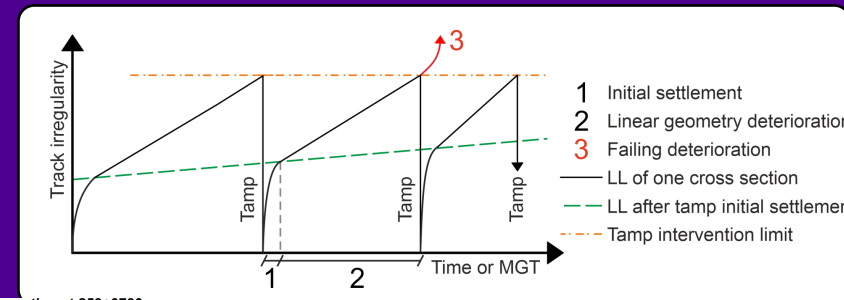
# Recap

## Background on track geometry deterioration

## Track geometry deterioration modelling

## Visualising modelling results

## Implementing research into practice



# Contact persons

Mikko Sauni

Doctoral Researcher  
mikko.sauni@tuni.fi



Heikki Luomala

Project Manager  
heikki.luomala@tuni.fi



Kalle Vaismaa

Industry Professor  
kalle.vaismaa@tuni.fi

