Technical solution for LC

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Outline

- LC requirements
- Available technologies
- Technical solution
- Conclusions

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WP2 - Task 2.2

➢ T 2.2 Objective:

To propose a generic modular level crossing system and consider new technical solutions and possible improvements to the existing ones, relevant to the safety at level crossings, with a particular focus on obstacle detection.

➢ Technology in the Level Crossing Safety applications

- Signaling: lights, high visibility notices
- Barriers: automatic barriers/half-barriers locally/remotely monitored
- Sensor systems

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LC requirements

- Various technologies for the equipment of level crossings have been assessed regarding their suitability to improve the safety at level crossings.

  - To get a safe but also cost optimised solution for level crossing safety equipment

  - To suggest a solution taking into account both the equipment and the operational costs reduction.

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LC requirements

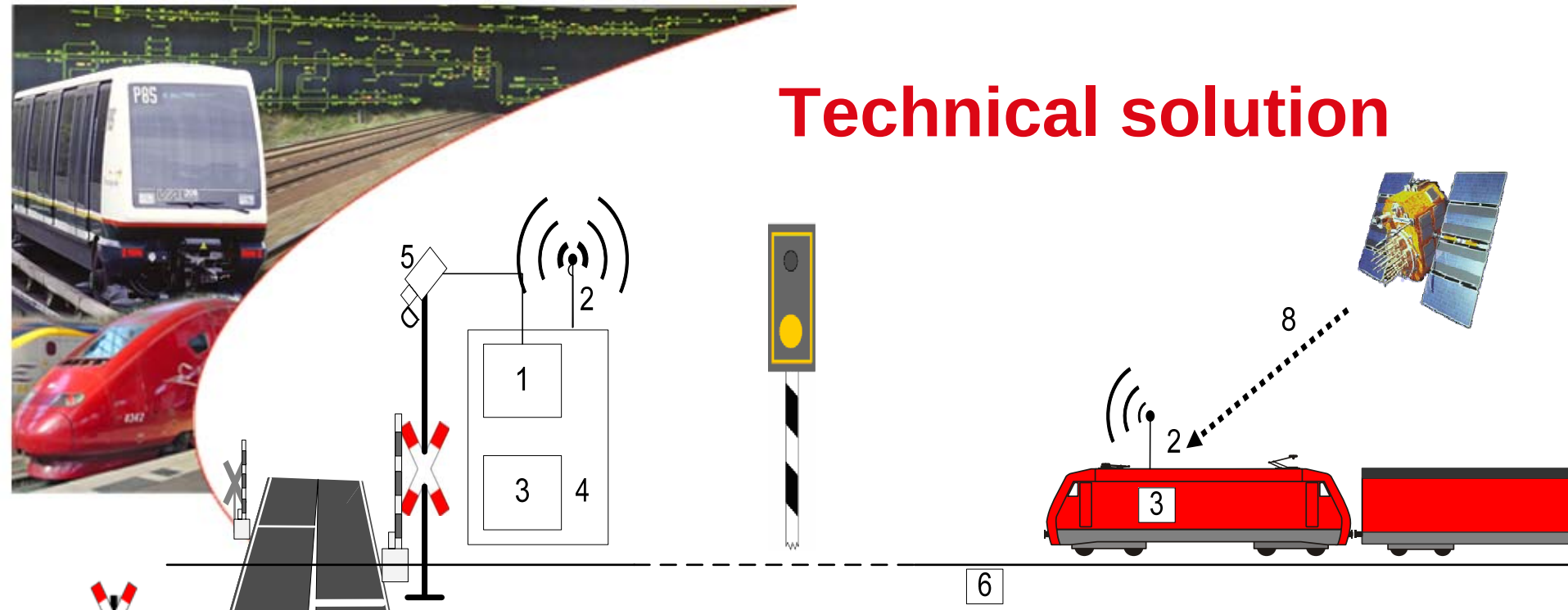
The operational requirements:

- available and reliable during operation;
- decrease waiting time for road traffic users;
- decrease the severity of accident (reduce speed)

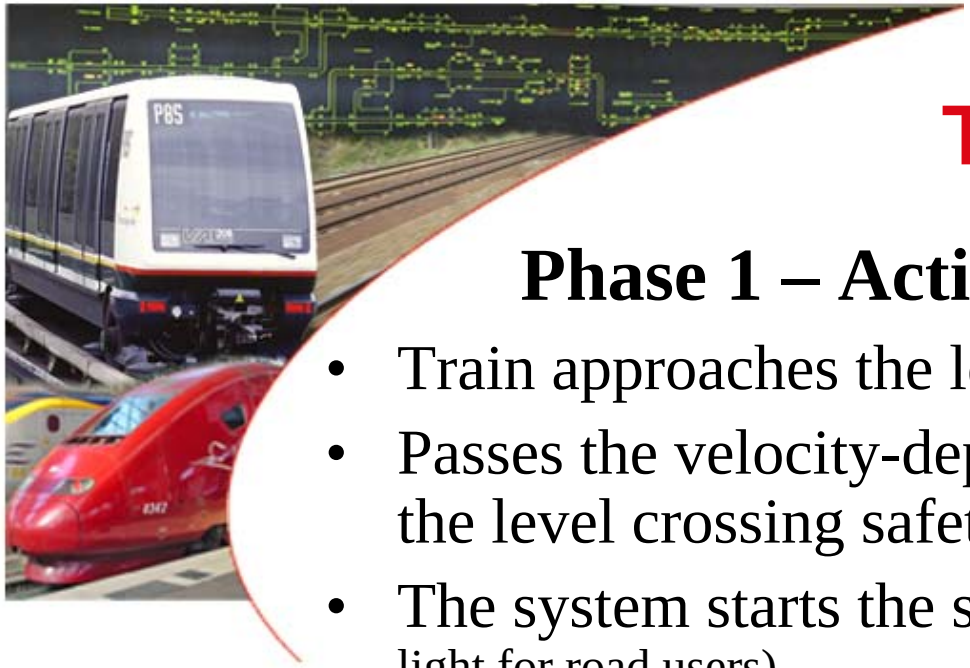
Level crossing safety requirements:

- activate and de-activate the LC according to train localisation
- detect road traffic users at danger zone while train approaches
- warn signaller or train driver if obstacle is in danger zone.

Technical solution



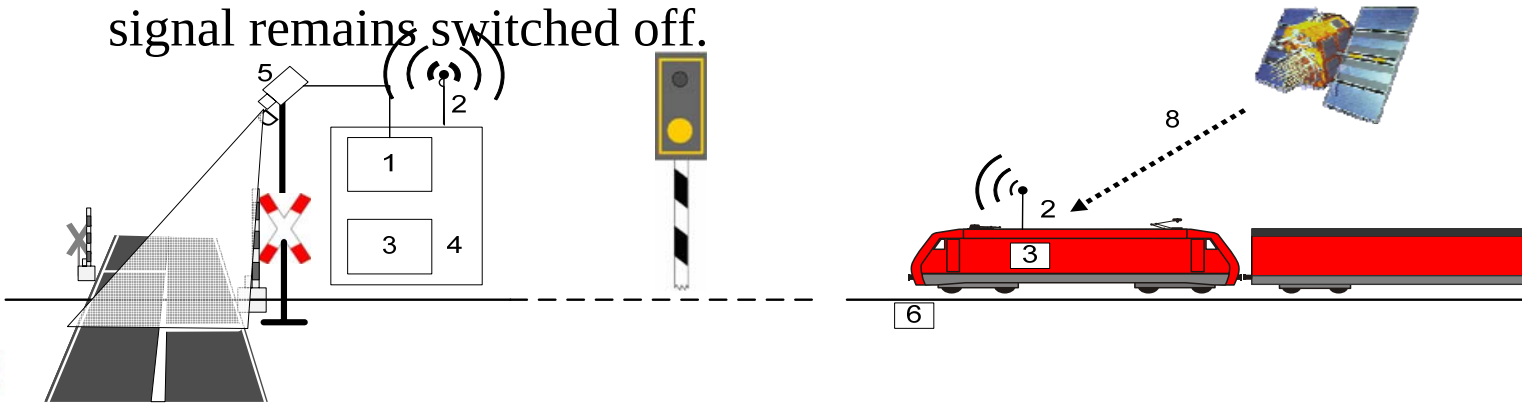
1 Video analysis system (computer / algorithm);
2 Antenna for communication;
3 Communication system (track side, train side);
4 Level crossing safety system;
5 Video sensor (camera) + Laser (dependability);
6 Velocity-depending location of level crossing activation;
7 Surveillance signal (pre-existing);
8 GNSS based train positioning system or other train autonomous positioning system.



Technical solution

Phase 1 – Activation of level crossing

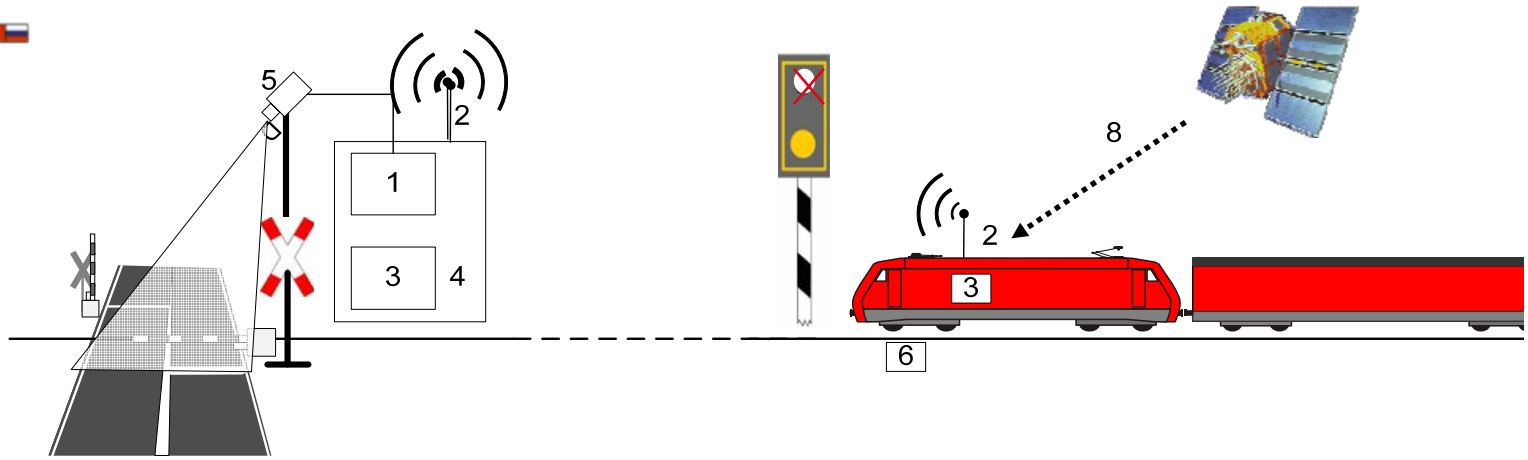
- Train approaches the level crossing
- Passes the velocity-depending location for activation of the level crossing safety system
- The system starts the securing of the level crossing (Red light for road users)
- No obstacles in the danger zone: the system closes the barriers white flashing light is switched on, after the barriers have been closed
- Obstacle in the danger zone: the white light of the surveillance signal remains switched off.



Technical solution

Phase 2 – Train approaches surveillance signal

- Video system still gives the information
- Obstacle entering the danger zone:
  - the white light gets switched off → train driver has to stop and follow the local rules for fall back operation

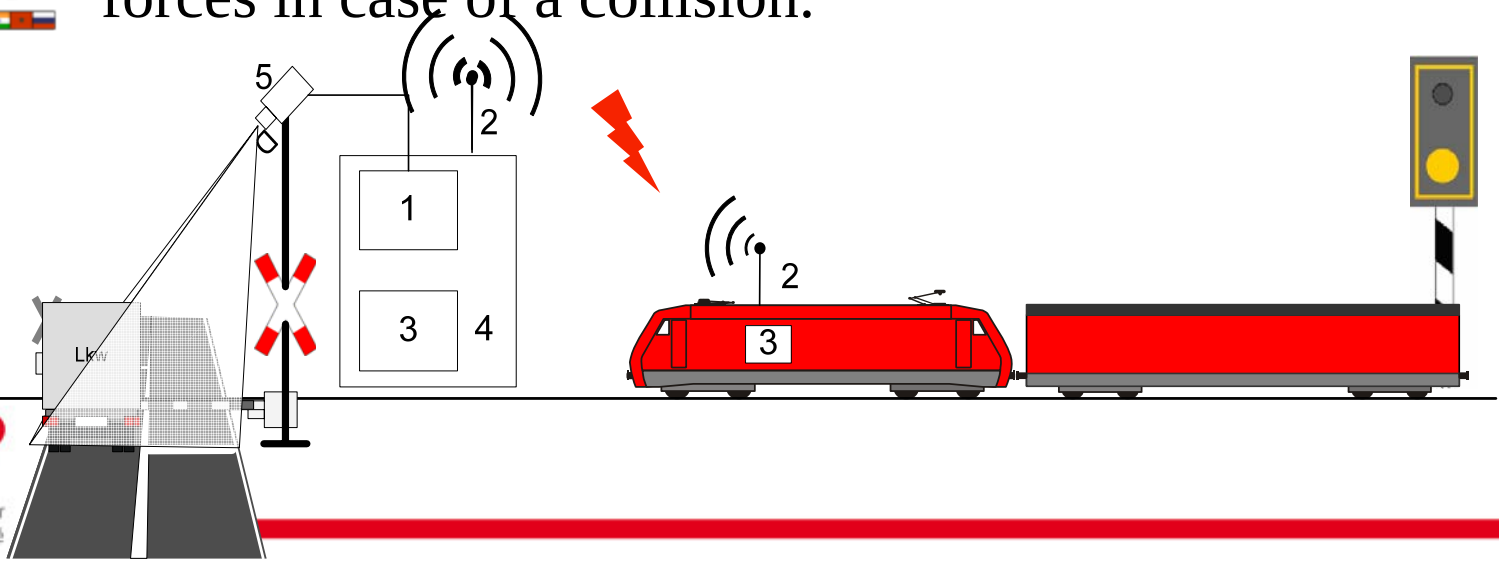


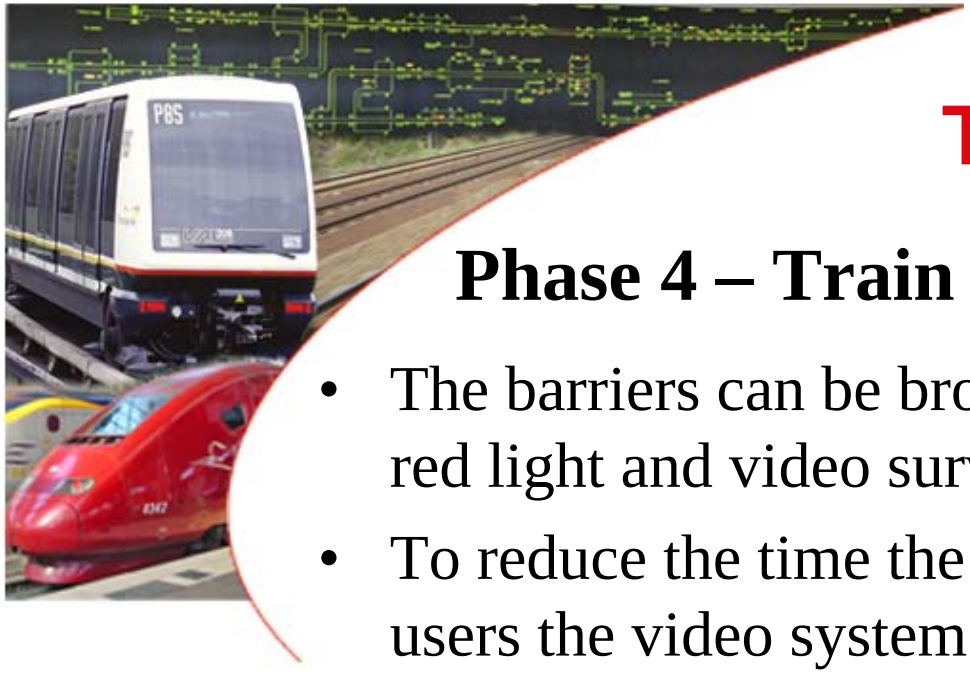
Technical solution

Phase 3 – Train behind surveillance signal

- Video system still gives the information
- Object enters the danger zone: the information is sent via radio communication to the train's on-board unit

The driver gets an audible and visual signal as indicator driver can brake an reduce the speed as much as possible before reaching the level crossing, and hence reduce the forces in case of a collision.

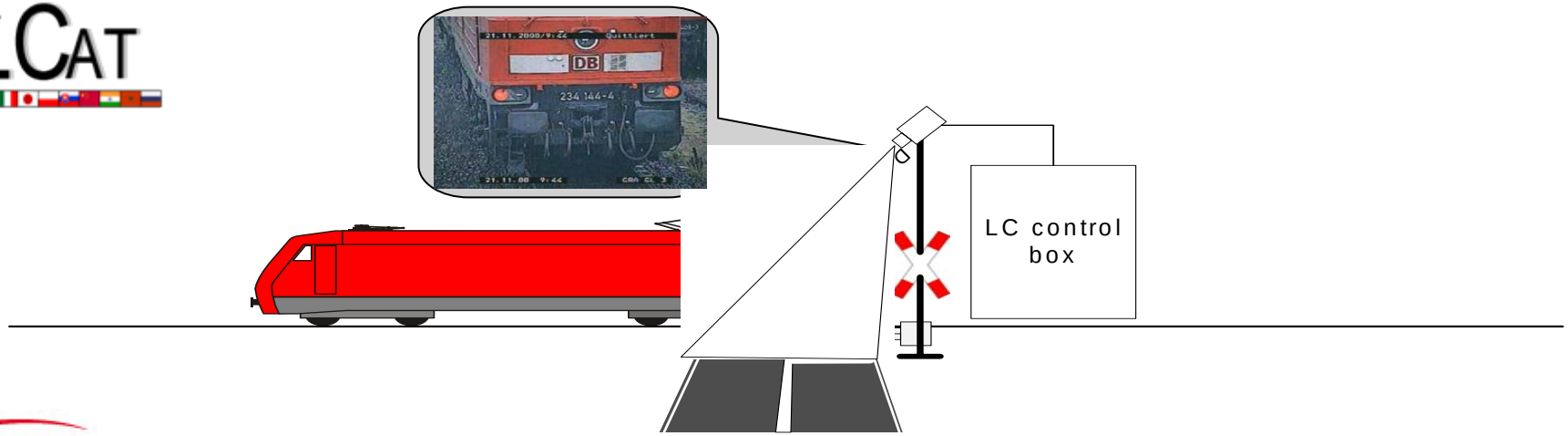


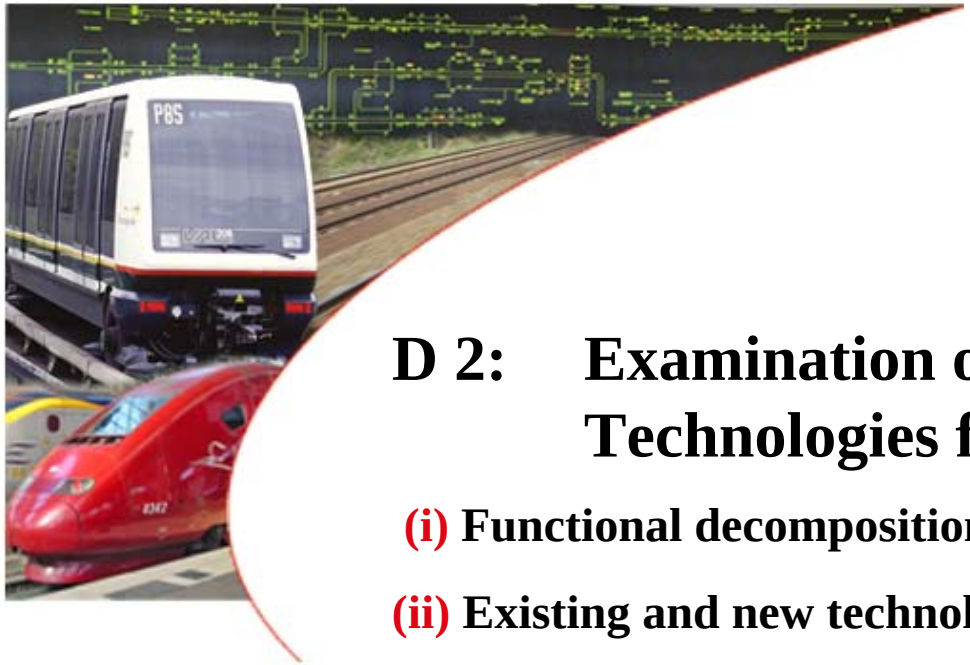


Technical solution

Phase 4 – Train has passed the level crossing

- The barriers can be brought in an upright position and the red light and video surveillance can be switched off
- To reduce the time the level crossing is closed for road users the video system can also be used for the end of train detection at the level crossing





Main results

D 2: Examination of actual and potential Technologies for Level Crossings

(i) Functional decomposition and physical classes of LC

(ii) Existing and new technologies

(iii) Technology case study

(iiii) Promoting Human awareness for improving LC safety

D 12: Recommendations for FP 7 activities

(i) use of advanced technological solutions designed to minimise the impact of the human factor as the main cause of accidents at level crossings

(ii) a joint rail and road sectors strategy to control and reduce risks at level crossings.

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Thank you for your attention

Any question ?

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