



SMART STATIONS IN SMART CITIES

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Security and big data: How to catch a train pyromaniac?

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Session 1b. Security and privacy

UNDER THE HIGH PATRONAGE OF



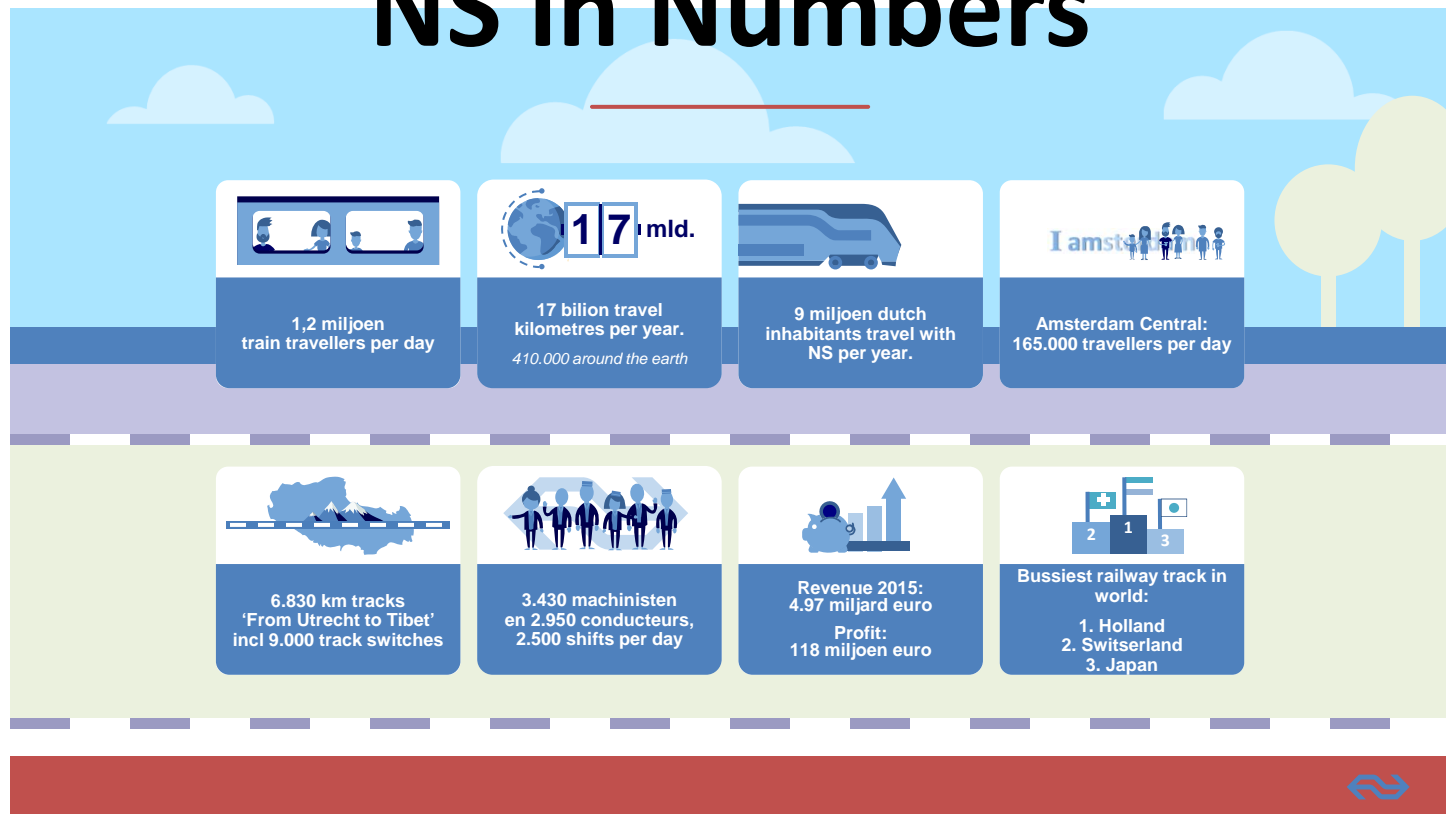
ORGANISERS



1. PROGRAM

- ❖ Introduction
- ❖ The Netherlands Railways (NS) in short
- ❖ Case: The Train Pyromaniac
- ❖ Plan of action
- ❖ Big data analysis
- ❖ Privacy
- ❖ Research process
- ❖ Smart measures in smart stations
- ❖ Conclusions
- ❖ Questions?

NS in Numbers



3. CASE: THE TRAIN PYROMANIAC

- ❖ Arson attacks: Probability of a pyromaniac in trains;
- ❖ Major effect on logistics and security;
- ❖ 15 registered incidents between Dec. '16 and March '17;
- ❖ Estimated damage: 7.000.000 euros;
- ❖ Public unrest and media coverage;
- ❖ Fires started in toiletroom.

4. Approach

- ❖ NS Security analysis shows incident pattern;
- ❖ Cross check with police report;
- ❖ Joint taskforce police, NS, IT, analysts and a private forensic accountancy Company;
- ❖ Big data analysis with 2 groups;
 - ❖ 1 group was formed for data analysis
 - ❖ 1 group was formulating hypotheses regarding possible perpetrator.

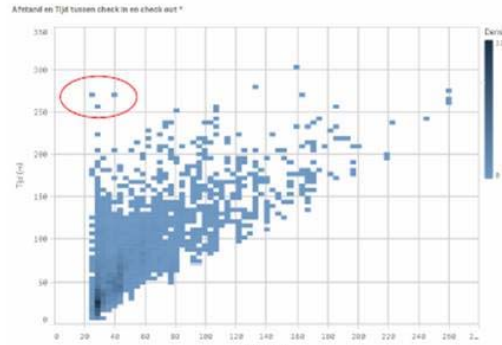
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Kamil, Tawfik T (NSG); 10/10/2017

7. RESEARCH PROCESS (2)



Directe waarnemingen

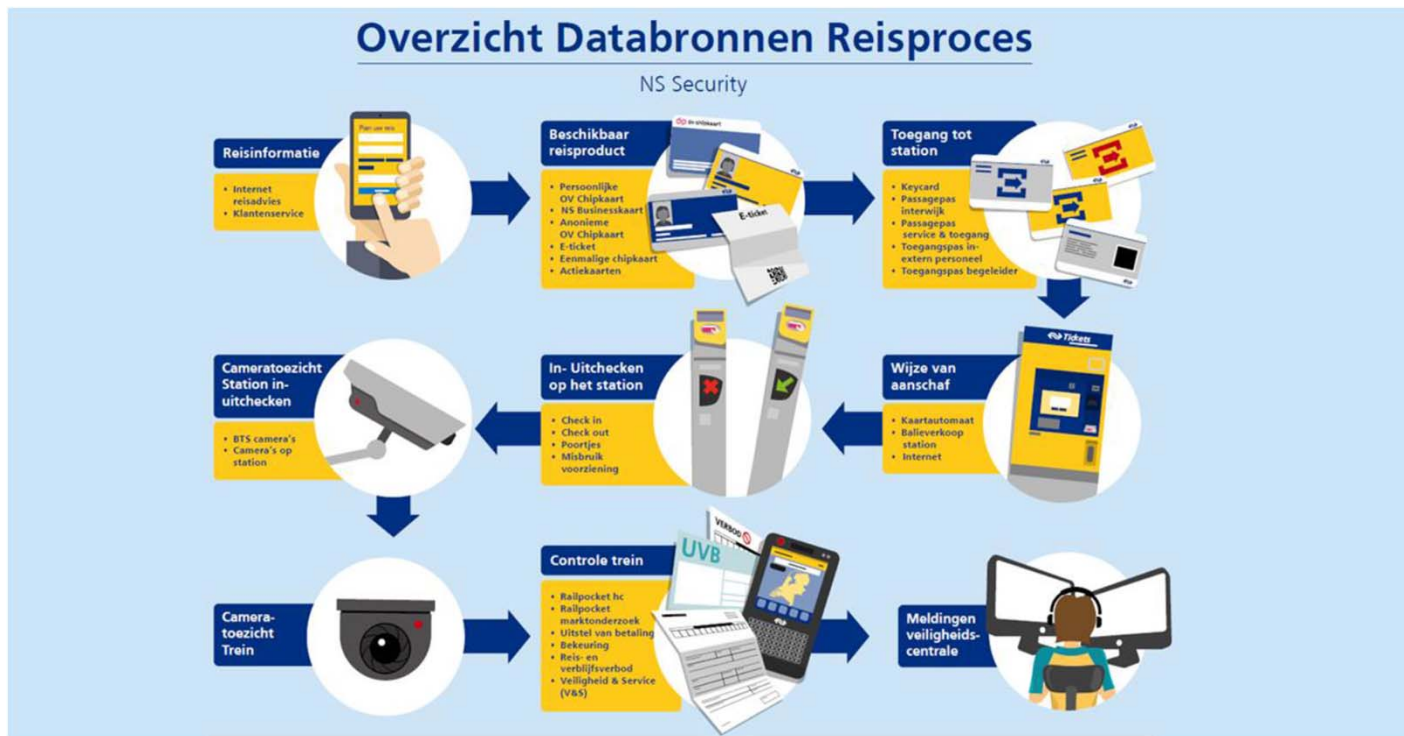
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11	8	23					

Wachttijd	Wachttijd	Wachttijd	Wachttijd	Wachttijd	Wachttijd	Wachttijd	Wachttijd
1407	1412	1417	1422	1427	1432	1437	1442



Security and big data: How to catch a train pyromaniac?

5. BIG DATA ANALYSIS (1)



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5. BIG DATA ANALYSIS (2)

Traject	Nummer	Datum incident	Treinnummer				
Dordrecht - Amsterdam	1	vrijdag 2 december 2016	2222				
	VIRM IV		<table border="1"> <tr> <th>Ddr</th> <th>Asd</th> </tr> <tr> <td>08.50</td> <td>10.17</td> </tr> </table>	Ddr	Asd	08.50	10.17
Ddr	Asd						
08.50	10.17						

Reisinformatie <ul style="list-style-type: none"> ✓ Internet reisadvies ✗ Internet reisadvies mobiel Klantenservice Geld terug bij vertraging Wifi op station Wifi op trein 	Beschikbaar reisproduct <ul style="list-style-type: none"> ✓ Persoonlijke OV Chipkaart ✗ NS Businesskaart Anonieme OV Chipkaart E-tickets Enmalige chipkaart Actiekaarten Toegang tot station <ul style="list-style-type: none"> Keycard Passagepas Service & Toegang Passagepas interwijk Toegangspas in- extern personeel Toegangspas Begeleider 	Wijze van aanschaf <ul style="list-style-type: none"> ✓ Kaartverkoopautomat Chipkaart transactie Contant ✗ Balie verkoop station Internet 	Inchecken op station <ul style="list-style-type: none"> ✓ Check in ✗ Poortjes Misbruik voorziening Uitchecken op station <ul style="list-style-type: none"> Check out Poortjes Misbruik voorziening 	Cameratoezicht station check in <ul style="list-style-type: none"> ✓ BTS camera's ✗ Camera's op station Cameratoezicht station check out <ul style="list-style-type: none"> BTS camera's Camera's op station 	Controle trein <ul style="list-style-type: none"> ✓ Railpocket hoofdconductor Railpocket passagierende hc ✗ Railpocket Veiligheid en Service Railpocket marktonderzoek Lijst van Betaling Bekeuring 	personeelnummer <ul style="list-style-type: none"> _____ _____ _____ _____ 	Meldingen veiligheidscentrale <ul style="list-style-type: none"> _____ ✓ _____ ✗ _____ _____
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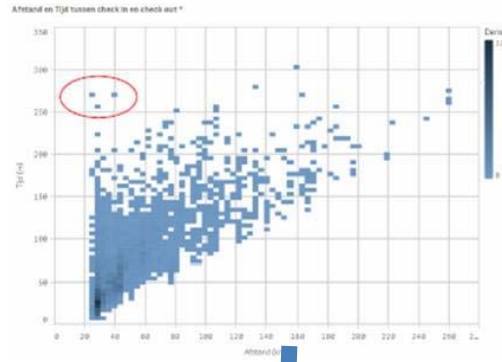
6. PRIVACY

- ❖ Joint Task force privacy constraints:
- ❖ Due to investigation by a private company privacy laws and regulations were applicable:
 - ❖ No personal information was allowed to be investigated.
 - ❖ Traveldata from train tickets were analyzed by chipnumber inside the card.
 - ❖ All steps were documented and approved by a police officer (leading organisation).

7. RESEARCH PROCESS (1)

- ❖ Linking used train tickets to fires
- ❖ Excluding cards staff/ employees
- ❖ Cooperation with police
- ❖ Use of CCTV
- ❖ March 10th: Pyromaniac arrested red-handed

7. RESEARCH PROCESS (2)



Directe waarnemingen

Uitslag	Verrekening	Wettelijk	Verrekening	Probleemstelling	Wettelijk
11	8	23			

Uitslag	Verrekening	Wettelijk	Verrekening	Probleemstelling	Wettelijk
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11	8	23			



Security and big data: How to arrest a pyromaniac in trains?

8. SMART MEASURES IN SMART STATIONS

- ❖ Controlled access by gates;
- ❖ Control by train conductor with electronic measures;
- ❖ CCTV on controlled access;
- ❖ Timetable of trains;
- ❖ Security Operations Centre (SOC) for documentation.

9. CONCLUSIONS & LESSONS LEARNED

- ❖ Combine all information to get the overall picture;
- ❖ Cooperation with police is of vital importance;
- ❖ Cooperation with private forensic accountancy company/big data expert is recommended;
- ❖ It's possible to achieve results in very short notice (total 3,5 weeks);
- ❖ We learned and experienced how to build smart stations with smart security measures!



THANK YOU
GRACIAS

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