Transities, techniek, sociale context en veiligheid

William Huskisson's onfortuinlijk einde en het effect op veiligheid

Ingenieurs…

WAT

Gebeurde er op 15 september 1830?

(het was niet de Beagle die bij Galapagos aankwam)

(en ook niet de dag dat Huygens het slingeruurwerk uitvond)

Opening

OF

THE LIVERPOOL AND MANCHESTER

RAILWAY,

WEDNESDAY, 15TH SEPTEMBER, 1830.

CHAS. LAWRENCE, CHAIRMAN.

THE BEARER OF THIS TICKET IS ENTITLED TO SEAT No. 1.

NORTH STAR'S TRAIN.

YELLOW FLAG.

ENTD

Agenda:
Een historische excursie…

- historische transitie waar we veel van kunnen (willen?) leren
- Een impressie geven van de onmetelijkheid van die transitie
- Politieke achtergronden en drijfveren
  - De dood van 1 man
  - De ontwikkeling van veiligheidsdenken in die tijd
  - En wat ons dat kan leren over moderne transities
  - (maar wel even vanuit een Engels perspectief)

Coen van Gulijk

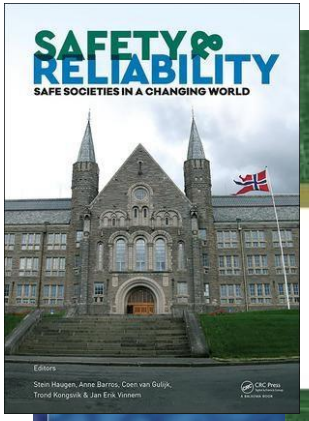
UNIVERSITY OF TWENTE.

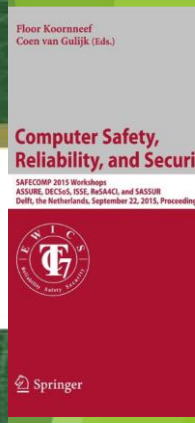
TNO

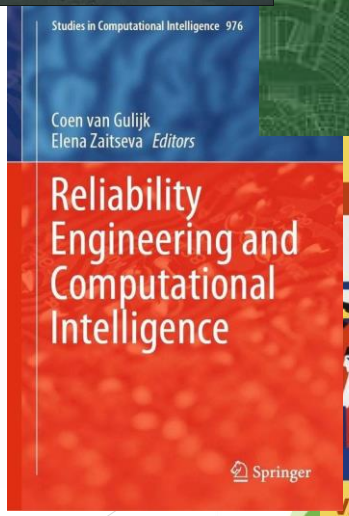
TU Delft

TNO

University HUDDERSFIELD







Safety in the modern age

Safe interactions with intelligent agents

(of which the human is only one)

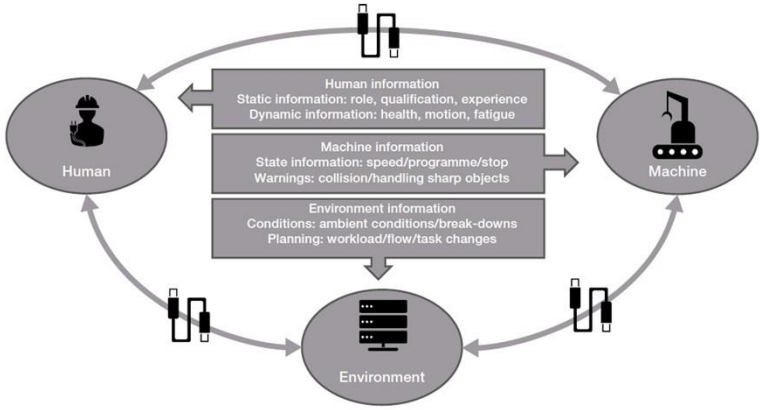


Figure 3-1 | Tripartite system for safety in the future

- human-centred technology
- Inter-AI rules and protocols
- messages: languages & content
- AI safety assurance & precautions

15 september 1830: een belangrijke transitie op het spoor

- 1e Industriële revolutie
- Sociale onrust & oorlog
- Sleuteltechnologie in Top-sector

(wat is er eigenlijk veranderd…?)

- Nabijheid van Tragedie en Euforie
- Bezinning en Veiligheid

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NORTH STAR'S TRAIN.

YELLOW FLAG.

ENTD

Manchester & Liverpool Railway

- 33 miles(65 km)
- ‘Beauty made engineers sigh’
- Vlakke route
- Van Prince’sDocknaar Manchester
- en…

Maar ook

- Duur: totale kosten £400,000 (4,000 aandelen van £100)
- Competitie met kanalen (landeigenaren in het parlement)
- Wilde vogels (m.n. pheasants & red grouse) worden vergifigd (?)
- Koeien stoppen met grazen & kippen stoppen met leggen en paarden sterven uit
- Toestemming van het parlement nodig

https://www.railwaymuseum.org.uk/objects-and-stories/stephensons-rocket-rainhill-and-rise-locomotive

Om te beginnen:
Personen vervoer per spoor was niet nieuw

In 1515 vermeld Cardinaal Lang over een houten spoor met een rijtuig wat met een touw naar het kasteel Hohensalzburg wordt getrokken.

Mogelijk al gebouwd in het jaar dat Columbus overzees reisde

(en die bestaat nog steeds: het oudste bestaande spoor?)

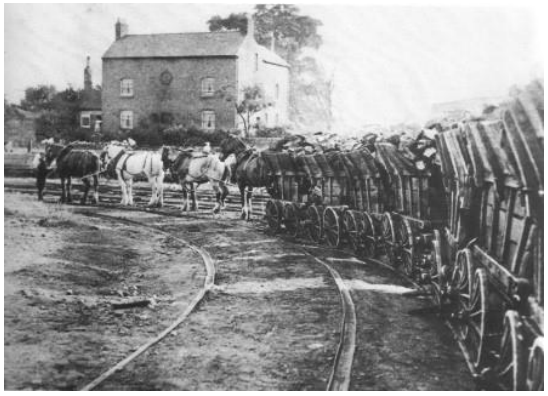
https://en.wikipedia.org/wiki/Reisszug

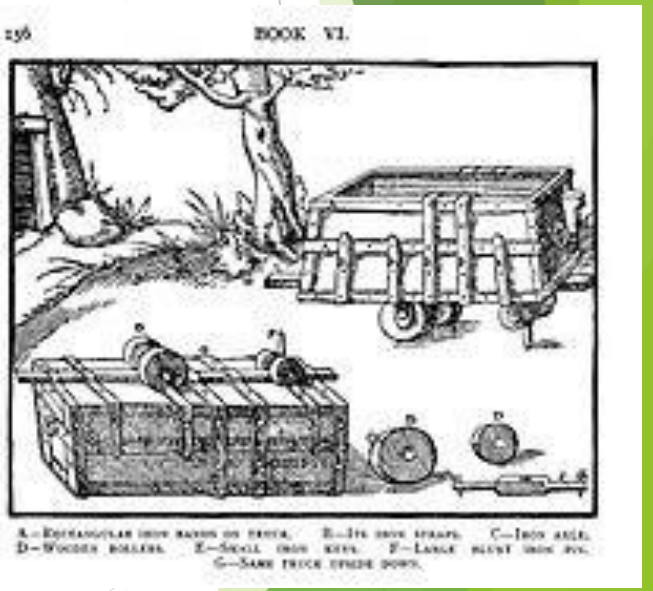
Geleid transport veel toegepast in mijnen

1565 De Re Metallica (Agricola)

Enkele geleider; wielen op de grond

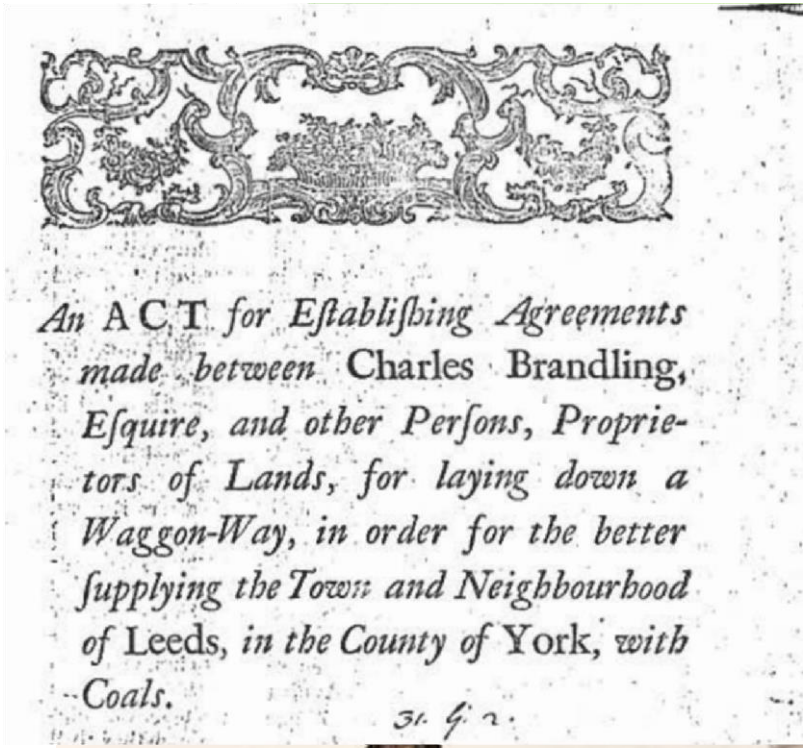
https://en.wikipedia.org/ wiki/Wagonway





Innovatie in Middleton (UK)

- 2 km spoor dat over eigendomsgrenzen ging
- 1799 worden Houten geleiders met ijzer vervangen
- 1835 terug naar paardenwagons
- De éérste spoor wet (parliamentary act) om te voorkomen dat mensen het recht tot overpad zouden terugtrekken (1758)



An ACT for Eſtabliſhing Agreements made between Charles Brandling, Eſquire, and other Perſons, Proprietors of Lands, for laying down a Waggon-Way, in order for the better ſupplying the Town and Neighbourhood of Leeds, in the County of York, with Coals.

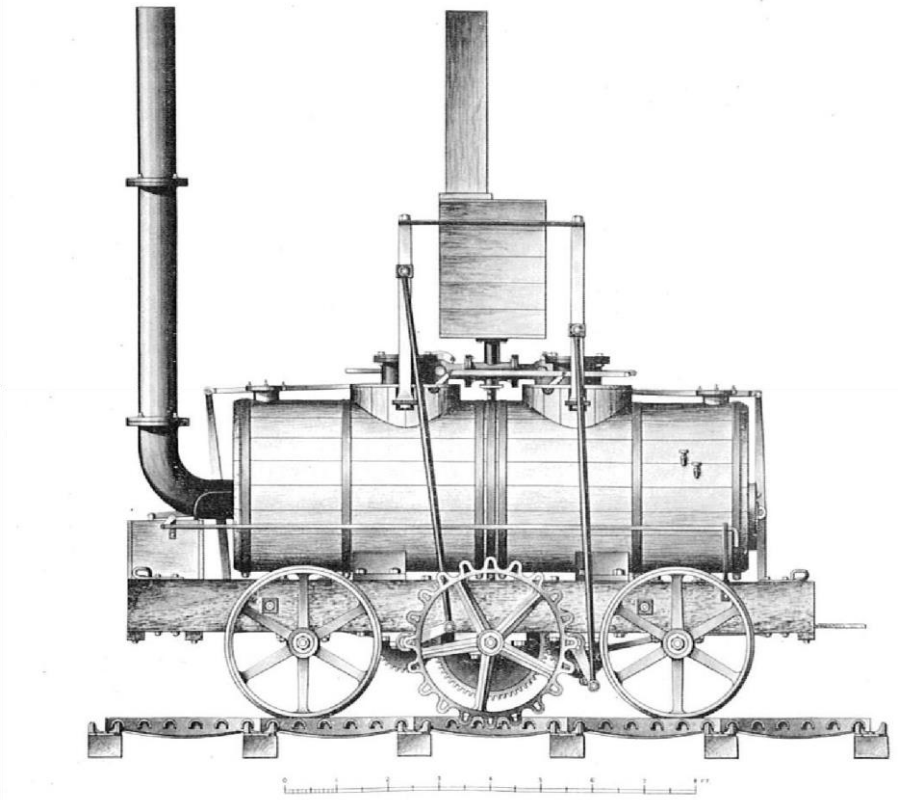
- 1812 éérste (van drie) operationele commerciële stoomlocomotieven

https://www.railwaysarchive.co.uk/documents/HMG_ActMiddle1758.pdf

https://en.wikipedia.org/wiki/Middleton_Railway

Stoom in Middleton: Salamanca: vroege stoomlocomotief

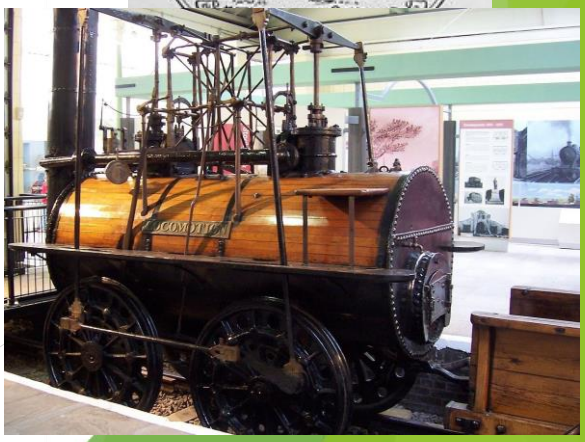
- Trok tot 140 ton kolen
- Tandwielaandrijving
- Explodeerde in 1818: boiler explosie (omdat de veiligheidsklep onklaar was gemaakt): 1 dode.



- Eérste machinist: James Hewitt
- Eérste commerciële langspoorlocomotief
- Eérste dode door locomotief: John Bruce, 13 jaar rende langs het spoor

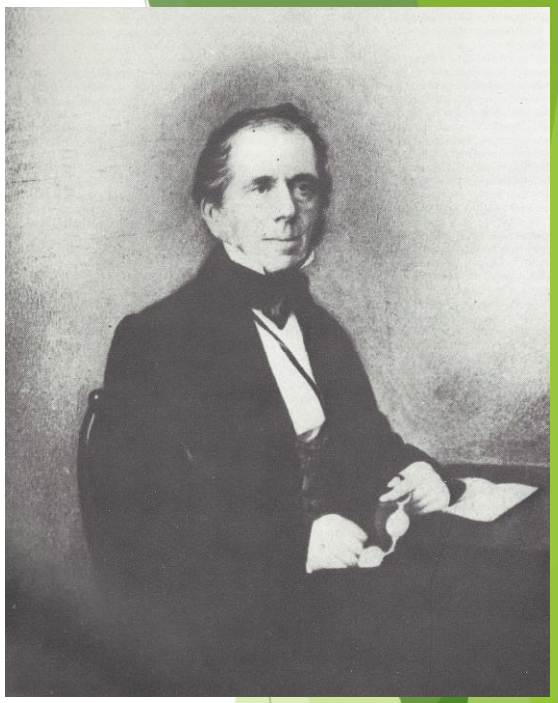
Innovatie in Stockton (UK)

- Weer een ACT nodig, duurde bijna 10 jaar!
- Volledig ijzeren spoor
- Normale operatie bestond uit locomotieven, stoomlieren en paarden



https://en.wikipedia.org/wiki/Stockton_and_Darlington_Railway

- Robert Stephenson was de Engineer (die toen al 2 stoomtreinen had gemaakt voor een mijn (o.a. de Bluecher).
- Op 27 sept 1825 neemt de Locomotion voor het eerst betalende passagiers mee (over een afstand van 14 km)
- 10,000 bezoekers ontvingen de trein



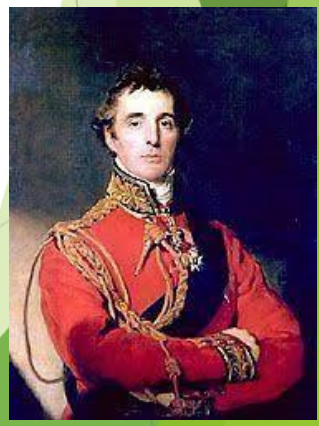
Innovatie in Liverpool & Manchester

- Langste spoorlijn ooit (56 km)
- Duurste spoorlijn ooit
- Verbond 2 grote industriële steden
- Maar liefst 8 revolutionaire locomotieven

- Geen paarden of stationaire lieren
- Over zachte grond en vele bruggen
- Aparte vracht en passagiers treinen

https://en.wikipedia.org/wiki/Henry_Booth

Intussen in Westminster: een confrontatie tussen conservatief en progressief



- Huskisson: progressief
- Activistische MP voor industriestad Liverpool
- Voorstander van industrialisatie en spoor (tegen armoede)
- Tegenstander van Corn-laws (die landeigenaren beschermden)
- Werd in een dispuut over kiesdistricten uit de regering gezet

- The Duke of Wellington: (ultra)conservatief
- Was populaire superster van Waterloo, maar impopulaire PM
- Wou aristocratische politieke structuur behouden
- Was voorstander van nationaal protectionisme
- Was tegen verbreding kiesrechten en vreesde revolutie

En er was veel om over oneens te zijn

- Kolonialisering
- Industriële revolutie

- Staatkundige revoluties in Europa
- Napoleon was net verslagen
- In Engeland: Corn laws
- In Engeland: stemrecht
- En: diepe politieke verdeling met:
- Huskisson als protagonist voor vooruitgang (binnen Tories)
  - Wellington als ultraconservatieve Tory

Toch kwam de L&M Railway Bill

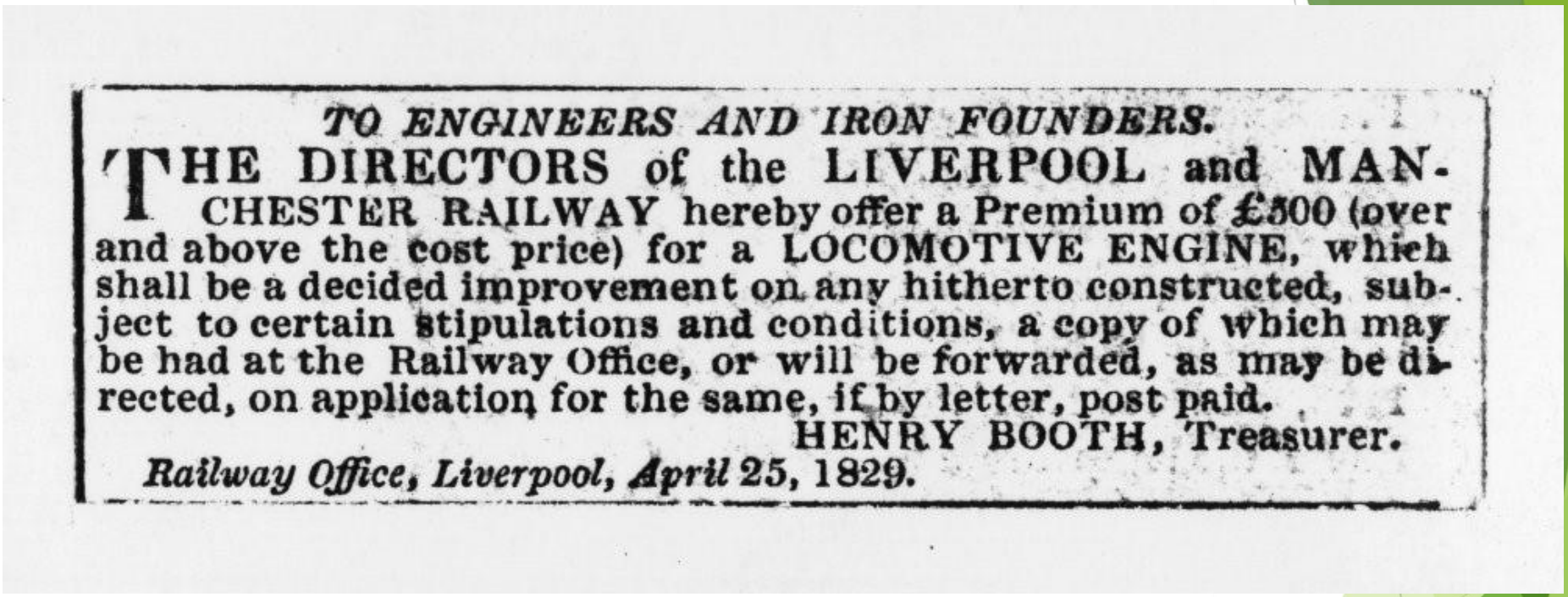
- Start in oktober 1824

https://en.wikipedia.org/wiki/Peterloo_Massacre

- Huskisson zat niet in het sportcomité (hij was aandeelhouder L&M) maar in de kamer voorstander
- Earl of Derby & Earl of Wilton (ultra's) waren tegenstander

(en eigenaren van kanalen bij Manchester)

- 83 sessies in tien weken
- Aangenomen in 1825



TO ENGINEERS AND IRON FOUNDERS.

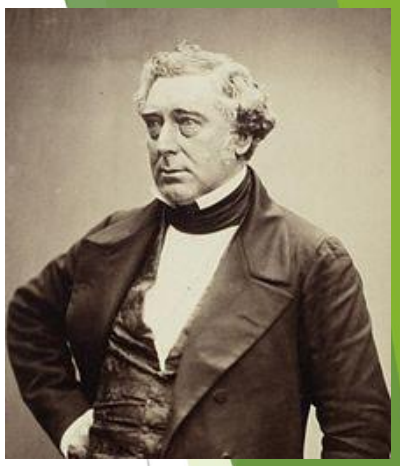
THE DIRECTORS of the LIVERPOOL and MANCHESTER RAILWAY hereby offer a Premium of £500 (over and above the cost price) for a LOCOMOTIVE ENGINE, which shall be a decided improvement on any hitherto constructed, subject to certain stipulations and conditions, a copy of which may be had at the Railway Office, or will be forwarded, as may be directed, on application for the same, if by letter, post paid.

HENRY BOOTH, Treasurer.

Railway Office, Liverpool, April 25, 1829.

https://www.railwaymuseum.org.uk/objects-and-stories/stephensons-rocket-rainhill-and-rise-locomotive

De Rocket



- Stephenson’s grootste prestatie als ingenieur
- Innovaties bleven 150 jaar relevant (150 jaar??)
- Bracht alle cutting-edge kennis samen in 1 machine.
- Enkele aandrijf as
  - Buis-boiler configuratie (25 pijpen)
  - Blast-pipe
  - Cylinders niet meer verticaal
  - Aparte (dubbelwandige) vuurkorf
  - (maar helaas geen rem)

https://collection.sciencemuseumgroup.org.uk/objects/co8084947/stephensons-rocket-steam-locomotive

Opening

OF

THE LIVERPOOL AND MANCHESTER

RAILWAY,

WEDNESDAY, 15TH SEPTEMBER, 1830.

CHAS. LAWRENCE, CHAIRMAN.

THE BEARER OF THIS TICKET IS ENTITLED TO SEAT No. .

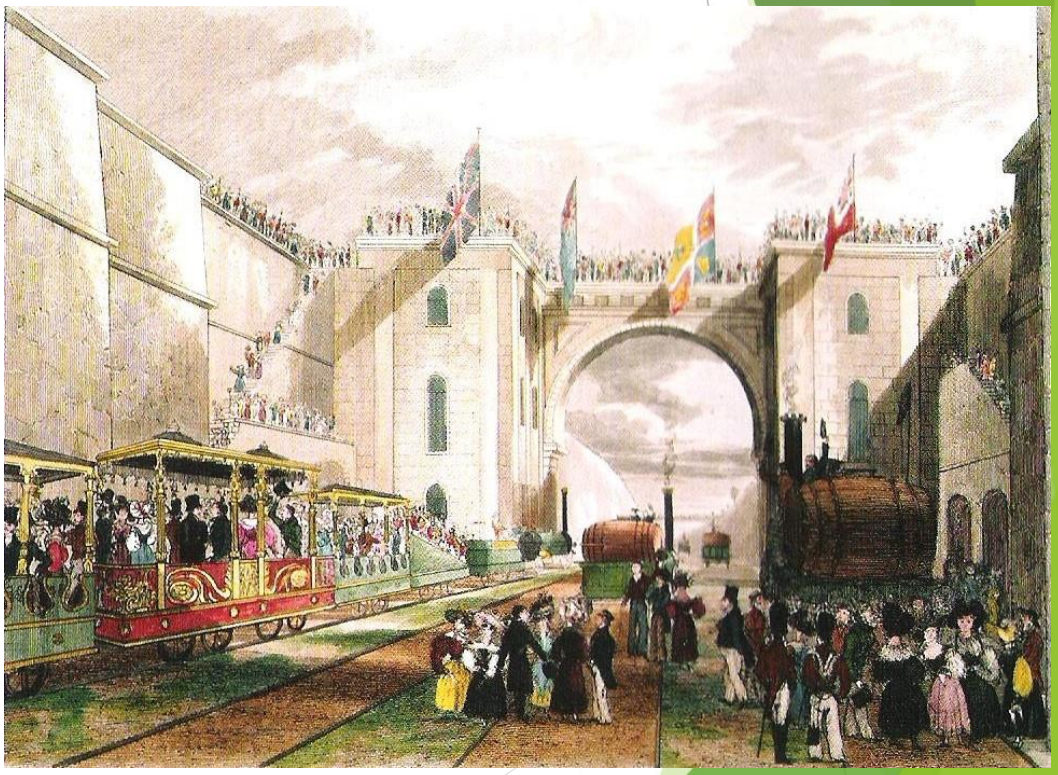
NORTH STAR'S TRAIN.

YELLOW FLAG.

ENTD

Nationaal feest

Charles and Harriet Arbuthnot, Joseph Sandars, Charles Blacker Vignoles, **the Stephensons**, Charles Lawrence, Viscount Melbourne, **Sir Robert Peel**, Charles Babbage, Viscount Grey, the Russian Ambassador Count Potocki, the Austrian Ambassador, **Prince Esterhazy**, the **United States Consul** Francis B Ogden, Edward John Littleton MP, General Gascoyne MP, Sir George Drinkwater (the Mayor of Liverpool), Lord Monson, Lord Clive, Lord Grosvenor, Lord Talbot, Lord Harrowby, the Earl of Brecknock, the Earl of Winton, the Earl and Countess of Wilton, the High Bailiff of Birmingham, the Vicar of Eccles, Dr Brandreth, Dr Southey, **William and Emily**



https://en.wikipedia.org/wiki/Opening_of_the_Liverpool_and_Manchester_Railway

Huskisson, and finally the **Duke of Wellington a**nd cortege.

Nationaal feest

- 1 trein op 1 spoor (locomotief *Northumbrian*) met Wellington & Huskisson en hoogste hoogwaardigheidsbeklederS
- 7 locomotieven op andere spoor (*Phoenix* met donkergroen zijde versiering, *North Star's* geel, *Rocket* licht blauw, *Dart* paars, *Comet* rood, *Arrow* rose en *Meteor* bruin
- Samen vertrekken uit Liverpool naar Manchester
- Was eerst droog maar begon te regenen

1e passagier trein-trein botsing ooit

- Bij Parr, 21 km buiten Liverpool loopt een as bij een wagon van de *Phoenix* van het spoor
- De snelheid neemt af door frictie maar er is geen verdere schade, de trein stopt.
- De volgende trein kan niet op tijd remmen
- Iedereen werd gevraagd zich schrap te zetten, het was een luide knal maar er was geen significante schade
- Botsing tegen de achterkant tegen de *Phoenix* aan
- De as van de *Phoenix* werd weer op het spoor gezet en de reis ging door.

Aanloop van de aanrijding

- Wellington's trein was wat vertraagd door alle mensen op en om het spoor en kwam als 3e aan in Parkside. Daar moest de trein water innemen.
- Dat duurde even en daarom stapten er 50 mensen uit (Huskisson, Prins Esterhazy, Charles Arbuthnot etc); omdat het regende bleven ze op het spoor staan.
- Huskisson wou met Wellington praten: Wellington's regering was erg impopulair geworden en misschien wilde hij de progressieve Huskisson wel weer opnemen in de regering.

- Huskisson zag Wellington in de hoek van zijn rijtuig zitten en liep met gestrekte hand op hem af; Wellington stak zijn hand terug en schudde zijn hand; alsof hij klaar stond om een deal te maken.

Station Parkside

https://www.amusingplanet.com/2022/01/williamhuskisson-railways-first-victim.html

Aan de kant!

- De *Rocket* kwam aan op tweede spoor.
- Huskisson, Holmes en prins Esterhazy waren laatste op spoor
- Locke, de machinist van de Rocket had geen rem
- De trap naar de deur was onhandige opklaptrap
- Holmes en Esterhazy waren op tijd weer in de trein
- Huskisson klampt zich vast aan de stilstaande trein
- Hij hield zich vast aan een deur en die klapte open

- Huskisson draaide aan de deur voor de Rocket, hij viel en de trein reed over zijn heup.

https://www.6things.online/2021-03-30/william-huskissonwas-a-british-politician-and-former/


ROCKET
1829

Afwikkeling

- Huskisson's been was bijna geamputeerd bij de heup
- Hij werd door Stevenson met spoed naar Manchester gereden in het rijtuig van Wellington: daarbij werd het wereldsnelheidsrecord verbroken: 64 km/h
- Bij een kerk in Eccles overwogen de artsen in de trein het been te amputeren maar dachten niet dat het zou lukken
- s'avonds om 9 uur overleed Huskisson in het bijzijn van zijn vrouw

THE LIVERPOOL COURIER.

SEPTEMBER 2

FUNERAL OF MR. HUSKISSON.

The mournful business of Friday last completed the sorrowful duty which it has fallen to the lot of our townsmen to perform, with respect to their late deeply-regretted representative. The gentlemen who undertook the task of conducting the preliminary proceedings, and arranging the concerns of the funeral, had judiciously made preparations for giving a sufficient degree of importance to the ceremony to accord with the sentiments of the public, and the measure of respect which they conceived to be due upon the occasion, and at the same time to comply, as far as possible, with the request of Mrs. Huskisson, that every appearance of ostentation might be totally discarded. In adherence, also, to the particular desire of that lady, the remains of her deceased husband were placed in a suitable apartment of the Town-hall, but without undergoing the formality of lying in state. If this had been permitted, we are assured that there is scarcely an individual who would not eagerly have embraced the opportunity of seeing the funeral honours which were paid to him who had been so generally known and so deservedly beloved and respected in life.

The universal feeling of regret which pervaded all classes of the community naturally led the Committee to expect that a great multitude of spectators would be collected along the course of the procession, as well as at the place where the sad march was to terminate; and they accordingly took the early precaution of railing off the entire line, from the Exchange to the Cemetery, in order to prevent the pressure of the crowd impeding the progress of the funeral train. As some inaccurate statements have been made with regard to the length to which this railing extended, the extremes of the different accounts being at least one mile asunder, we have calculated the exact measurement, which is 1,332 yards, and the width between eight and nine.

... secure order and comfort amongst those who ... Cemetery, the Committee ...

... part of the ceremony having been finished, the body was again taken out, and the persons who accompanied it proceeded to the place of interment.

The following is the order of the procession on entering the Cemetery:

The Rev. Jonathan Brooks, M.A., Rector of Liverpool.
The Rev. Thomas Blackburne, M.A., Vicar of Eccles.
Dr. Brandreth.

PALL-BEARERS.	PALL-BEARERS.
Charles Lawrence, Esq.	John Gladstone, Esq.
John Doherty, Esq., M.P.	J. E. Denison, Esq.
Wilson Patten, Esq., M.P.	Sir John Tobin,
Hon. E. G. Stanley, M.P.	Sir S. Canning, G.C.B.,
Lord Stanley, M.P.	Lord Sandon,
Earl Gower,	The Mayor of Liverpool.

CHIEF-MOURNERS.

Captain Huskisson, R.N., General Huskisson,
Lord Colville, Viscou...
E. J. Littleton, Esq., M.P. ...
William Wainewright, Esq. Mr. ...

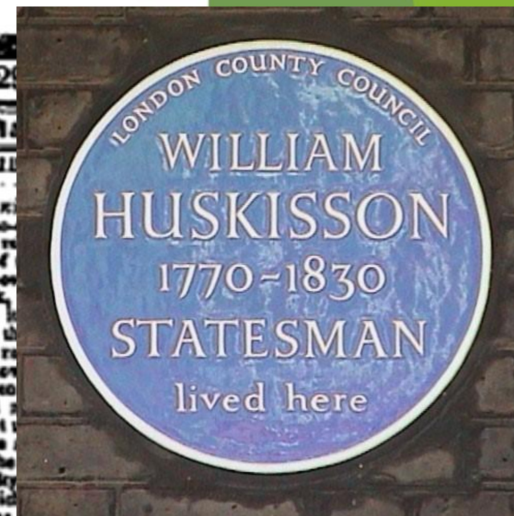
The scene around was now beautiful ... scene: the whole number of individuals ... plied with tickets had arrived, and haste... of the best situations they could find; ... heights on every side were covered wit... part of them ladies,—and nearly every pe... All was hush and motionless; and ... numbers which stood around scarcely ...

Wednesday's Ma...

LONDON, MONDAY, SEPTEM...

(FROM OUR CORRESPONDENT.)

The accounts from Brussels received to-... dictory, that they are far from having re... anxiety which is felt about the result of ... Dutch troops. The facts considered as mo... are, that the army under Prince Frederick, ... clamation of the 21st, did not commence ... sels from Vilvorde until seven o'clock in ... 23d; that they met with so determined a re... did not possess themselves of the upper to... afternoon of that day; and that they then ... upon the people with grape shot, and ... slaughter of them. Accounts subsequent ... to eleven o'clock on Friday morning, are ... received at Antwerp, to the effect, that the... become masters of all the gates of the city... inferred, in the letters from Antwerp, which ... afternoon of Friday; that the contest was ... fact there appear to be some doubts, and still more of the inference from it, even admitting it to be true. No intelligence ...



http://www.edgehillstation.co.uk/resources/huskisson-memorial-without-train/

Het feest was een fiasco

- Wellington, impopulair in de industriële stad Manchester, werd belaagd en moest in zijn wagon blijven voor zijn eigen veiligheid
- Het was gaan stormen en alle festiviteiten werden afgelast
- Het werd donker en de treinen hadden geen verlichting voor de weg terug (die om die reden heel lang duurde)
- Een festief diner, waar grootse investeringen moesten worden besproken, was een fiasco

- Wellington heeft nooit meer in een trein gezeten… (nouja 1 keer nog)

Maar de transitie was een feit (en een weergaloos succes!)

- In de eerste 6 maanden werden 188,726 passagiers en 35,800 ton goederen vervoerd: er werd 65,600 pond verdiend
- Na een jaar-en-een week bijna 500,000 passagiers.
- In 1840 lag er 2,857 km spoor
- In 1850 6,200km en waren er 272 spoorwegondernemingen

Liverpool and Manchester
RAIL-WAY.

TIME OF DEPARTURE
BOTH
From Liverpool & Manchester.

FIRST CLASS, Fare 5s.	SECOND CLASS, Fare 3s. 6d.
Seven o'Clock Morning.	*Eight o'Clock Morning.*
Ten „ *Do.*	*Half-past Two Afternoon.*
One „ *Afternoon.*	
Half-past Four Do.	

*** For the convenience of Merchants and others, the First Class evening train of Carriages does not leave Manchester on *Tuesdays* and *Saturdays until Half-past Five o'Clock.*

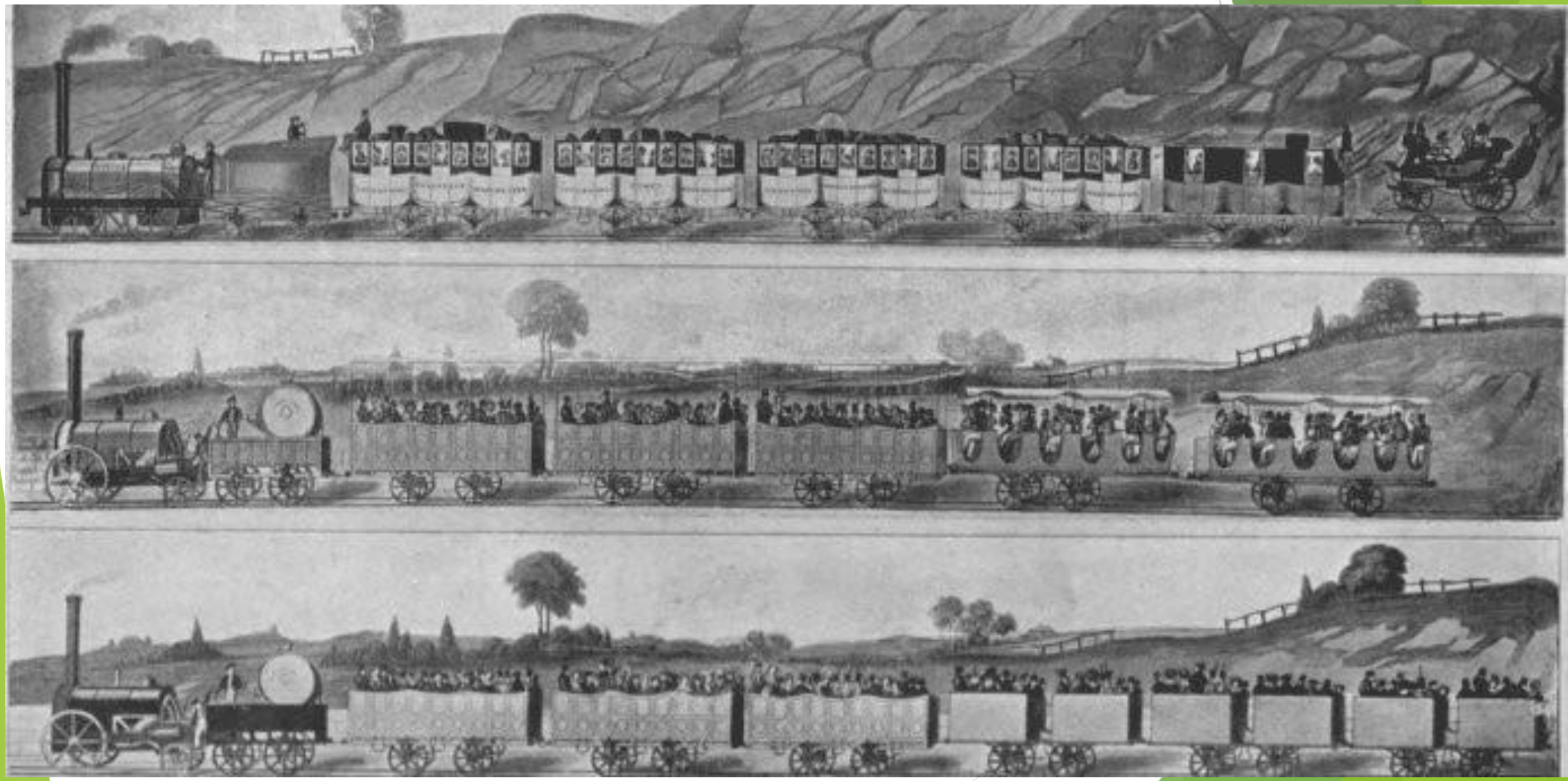
The journey is usually accomplished by the First Class Carriages under two hours.

In addition to the above trains it is intended shortly to add three or four more departures daily.

The Company have commenced carrying GOODS of all kinds on the Rail-way.

January, 1831.

https://victorianweb.org/art/architecture/liverpool/20.html



Before 1830 the Philadelphia (UK) boiler explosion 1815, a boiler explosion of "Brunton's Mechanical Traveller" on a plateway had killed 16 people, mainly sightseers.

Date	Killed	Injured	Type	Details
15 September 1830	1	0	Collision with person on track	Parkside: William Huskisson was fatally wounded at the opening of the Liverpool and Manchester Railway when he was hit by Stephenson's *Rocket*.[3][4][5] Huskisson is often reported as the first railway fatality, including in ordinarily reliable sources.[6] This is untrue; at least two people were killed on the Liverpool and Manchester Railway before it opened to the public.[7] The earliest recorded fatality caused by a steam locomotive was an unnamed woman, described as "a blind American beggar", fatally injured by a train on the Stockton and Darlington Railway on 5 March 1827.[8]
26 March 1831	0	1	Attempted boarding of a moving train	Manchester, Liverpool and Manchester Railway: Man named Burn, a guard of the company, being drunk, tried to jump aboard a train as it was passing at full speed but fell onto the tracks and his legs were run over, "... crushing them in so dreadful a manner as to render amputation immediately necessary." The reports make the point that the accident was entirely his own fault, "He got upon the train without the knowledge of the superintendent, and it was not known that he had made the attempt until his mangled body was seen lying upon the ground."[9][10]
26 March 1831	1	0	Collision with person on track	Manchester, Liverpool and Manchester Railway: Man named Lawrence, an employee of the company, was walking along the line, when he suddenly fell down over the tracks and a passing train ran him over, nearly severing him in two. An inquest returned a verdict of "accidental death".[9][10]
26 March 1831	1		Debris on track	Waverton Lane, near Liverpool, Liverpool and Manchester Railway: Locomotive "Phoenix" struck a plank of wood lying across the tracks (having been carelessly discarded by some workmen who were repairing the embankment). A lad named Wright, an assistant on the locomotive, was thrown onto the track and the wheels of several of the coaches passed over his head, killing him instantly. An inquest returned a verdict of "accidental death".[9][10]
April 1831			Signalling error	Newton Junction: PC Bates of the Liverpool and Manchester railway police force caused an accident when he failed to change a set of points when asleep at his post; fined £3 by magistrates (equivalent to £280 in 2020).
4 May 1833			Level crossing collision	Bagworth: Collision with farmer's cart on level crossing, led to the implementation of the locomotive whistle.[11]
3 December 1836	3		Derailment due to signalling error	Wetheral train accident: Train on the Newcastle and Carlisle Railway wrongly diverted into a siding at Wetheral, a near Carlisle, Cumbria. The train derailed and crushed three people to death.
12 July 1839	2		Collision with people on the track	Whiston, Lancashire: Jane Yates and her daughter Lydia Saunders were hit by a train while they were walking down the line[12]

https://en.wikipedia.org/wiki/List_of_rail_accidents_in_the_United_Kingdom

Dan onstaat ook veiligheidsdenken

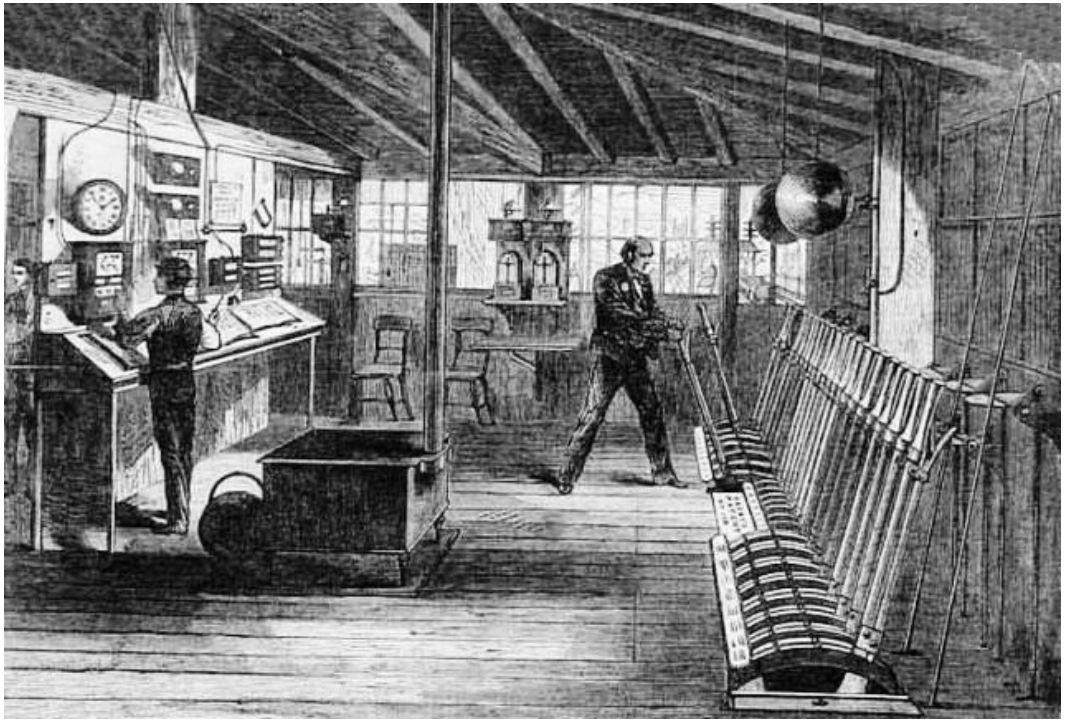
- Na een jaar of 10 waren de meester risico's wel bekend
- En werd het veiligheidsdenken ontwikkeld
- Technisch
- Organisatorisch
- Menselijk

Wat betekende dat voor veiligheid?

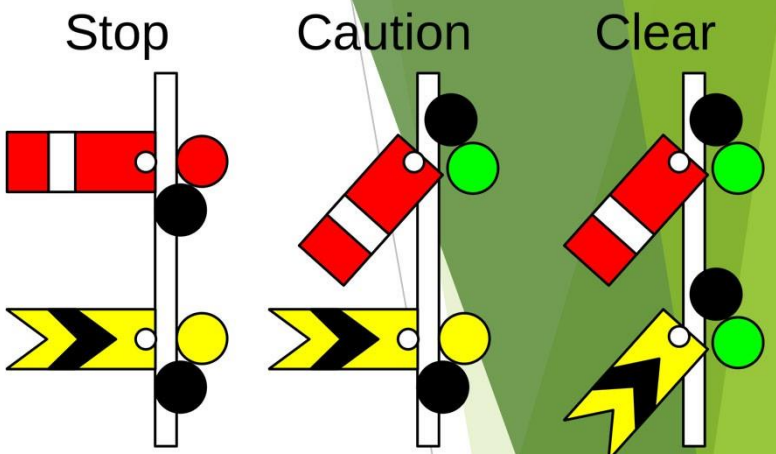
Technische aspecten van veiligheid:

- Stephenson liet binnen een jaar remmen bouwen op treinen
- Zware (goederen) treinen kregen een pilot (een losse locomotief)
- 1832: hand- en vlagsignalen van gestrande treinen; daarna ook het tijdsinterval systeem met ‘Policemen’ of ‘Bobbies’
- 1833: stoomfluit (na botsing met kar op het spoor)
- 1841: telegraaf maakt semafoor signaal mogelijk
- 1860: meerdere wissels in seinhuis (en wissels op afstand)

(natuurlijk ook ontwikkeling van locomitieven)

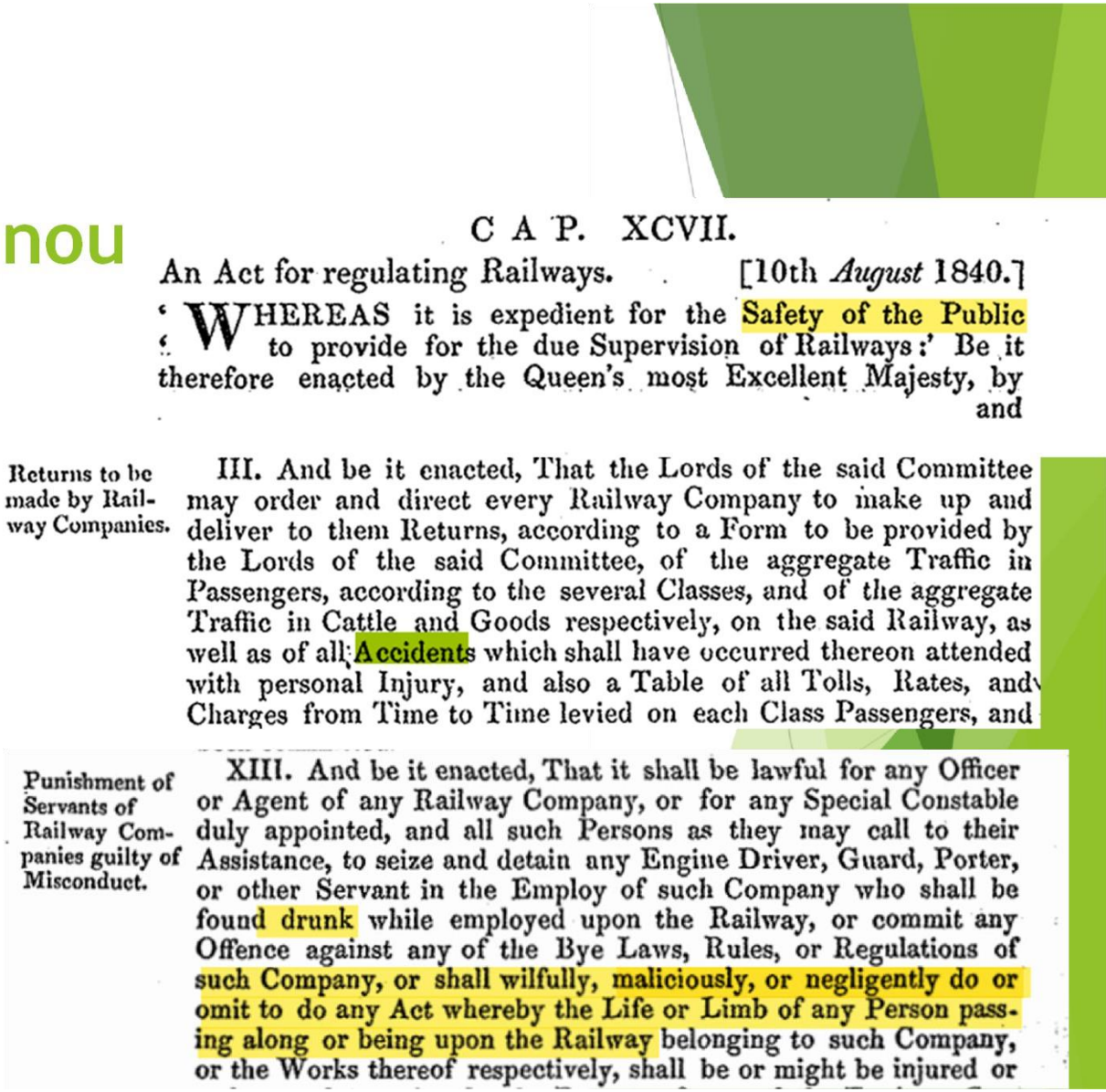


https://distantwriting.co.uk/railwaysignaltelegaphy.html



10 jaar later: Organisatorische aspecten veiligheid (nou ja, juridisch)

- 1840 Railway Regulation Act
- Veiligheid voorop (in eerste zin)
- Ongevallen melden
- Dronkenschap
- Opzettelijk schade
- Onopzettelijk schade
- inspectiedienst



CAP. XCVII.

An Act for regulating Railways. [10th *August* 1840.]

'WHEREAS it is expedient for the Safety of the Public to provide for the due Supervision of Railways:' Be it therefore enacted by the Queen's most Excellent Majesty, by and

Returns to be made by Railway Companies.

III. And be it enacted, That the Lords of the said Committee may order and direct every Railway Company to make up and deliver to them Returns, according to a Form to be provided by the Lords of the said Committee, of the aggregate Traffic in Passengers, according to the several Classes, and of the aggregate Traffic in Cattle and Goods respectively, on the said Railway, as well as of all Accidents which shall have occurred thereon attended with personal Injury, and also a Table of all Tolls, Rates, and Charges from Time to Time levied on each Class Passengers, and

Punishment of Servants of Railway Companies guilty of Misconduct.

XIII. And be it enacted, That it shall be lawful for any Officer or Agent of any Railway Company, or for any Special Constable duly appointed, and all such Persons as they may call to their Assistance, to seize and detain any Engine Driver, Guard, Porter, or other Servant in the Employ of such Company who shall be found drunk while employed upon the Railway, or commit any Offence against any of the Bye Laws, Rules, or Regulations of such Company, or shall wilfully, maliciously, or negligently do or omit to do any Act whereby the Life or Limb of any Person passing along or being upon the Railway belonging to such Company, or the Works thereof respectively, shall be or might be injured or

https://www.orr.gov.uk/about/who-we-are/board

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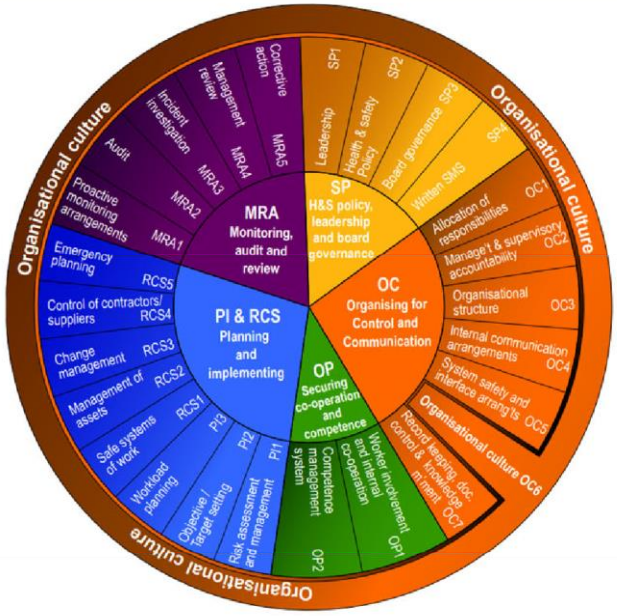
- Register of interests
- Board meeting minutes

The board

Ian Prosser CBE



Ian is the chief inspector of railways and director, railway safety, board.

He is responsible for the work of the Railway Safety Directorate, which strives to ensure dutyholders in the railway industry manage health and safety risks effectively and thus comply with their statutory duties.

The Secretary of State appointed him to the board with effect from 26 September 2008. Ian was educated at Imperial College where he attained a first class honours degree in chemical engineering,

https://www.orr.gov.uk

Menselijke aspecten van veiligheid?

- Je mag niet dronken zijn
- Je mag niet slapen tijdens werk
- Je kunt worden vervolgd bij nalatigheid of opzet
- Er is een mate van competentie vereist (maar niet omschreven)
- Vanaf 1889: technische middelen moeten door competent personeel onderhouden worden

Toen ging de industrie groeien

- En werd leren over veiligheid moeilijker (en kostbaarder)

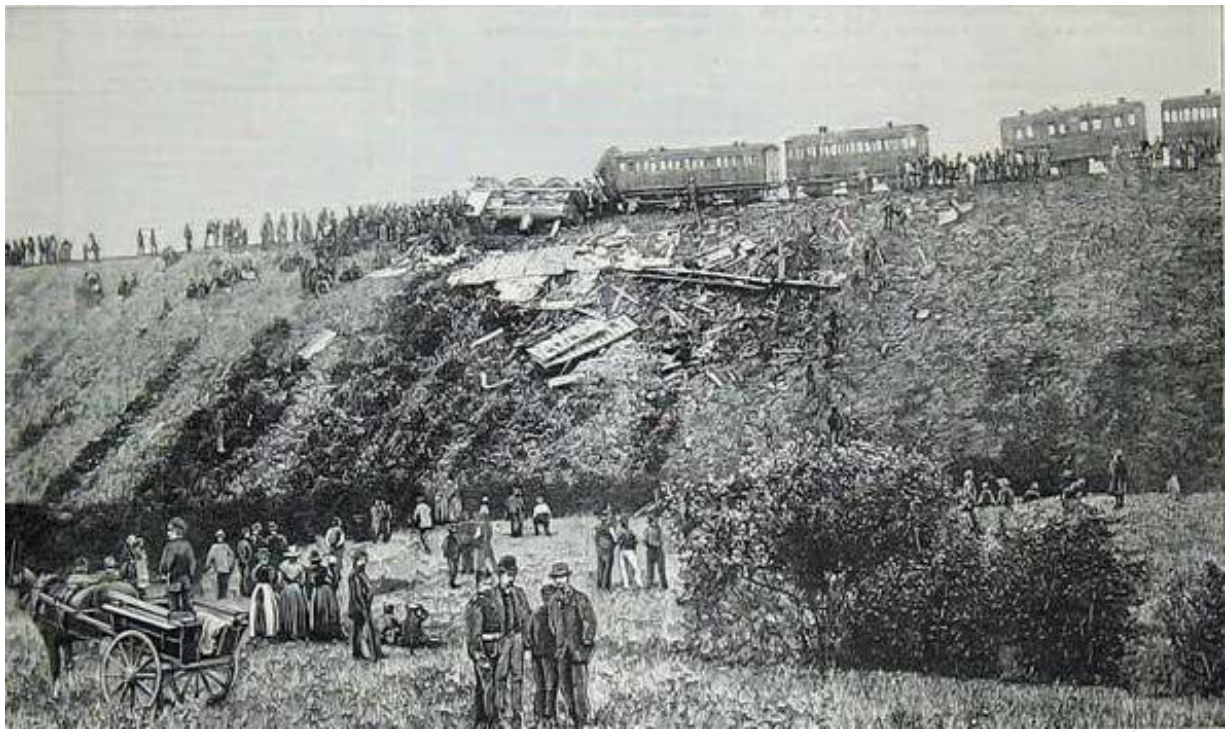
https://en.wikipedia.org/wiki/List_of_rail_accidents_in_the_United_Kingdom#1830%E2%80%931922:_Pre-grouping

30 August 1886	0	3		Mangotsfield: A goods train was shunting onto the mainline and hit the side of a passing excursion train, causing significant damage to the guard's van and head injuries to the guard.[96]
1 September 1886	0	20		Penistone: Engine hit train too hard when backing onto it to couple up
16 September 1887	25	94		Hexthorpe rail accident: Express ran into stationary race train.[97]
8 February 1888	1	11		Hoylake, Cheshire: Collision between trains going in opposite directions.[98]
30 March 1889	1	many		Penistone (Huddersfield Junction): Passenger train engine broke axle and derailed on points. Then a mail train collided slightly with fallen engine.
8 June 1889	0	0		Staines, Surrey. Goods train reverses into passenger train at low speed due to signalling errors.[99]
12 June 1889	80	260		Armagh rail disaster: Runaway coaches collided with following train.[100]
4 March 1890	4			Carlisle, Cumberland: Brakes misapplied.[101]
10 November 1890	10			Norton Fitzwarren rail crash (1890): two trains collided due to signaller and train crew errors.
1 May 1891	0	1		Norwood Junction crash: Cast-iron under-bridge broke under an express train.
27 May 1892	2	68		Derby Junction rail crash: two passenger trains collided at Derby Junction in Birmingham.
9 June 1892	5			Esholt Junction rail crash: two trains collide at junction, caused by unsafe procedures and a signal obscured by vegetation.
2 November 1892	10	43		Thirsk rail crash (1892): Rear-end collision, mistake by signalman, tired due to acute family crisis.
12 August 1893	13			Llantrisant rail accident: Train down an embankment.
15 May 1894		5		Reading, Berkshire: Slip coach collided with passenger train[102]
22 December 1894	14			Chelford rail accident: Wind blew a truck into path of express.
10 November 1895	1	6		St. Neots Derailment 1895: Broken rail.
6 April 1896	1			Snowdon Mountain Railway: Runaway on hill derailed.
15 August 1896	1			Preston: Excessive speed on curve.[103]
9 February 1897	12			Menheniot: Reconstruction of Coldrennick Viaduct: workman's platform fell.
11 June 1897	11			Welshampton rail accident, Shropshire: Derailment.
1 September 1897	1	31		Tooths Bank, near Heathfield, Sussex: Excessive speed caused derailment[104]

Tay Bridge 1897 (75?): Metaalmoeheid

https://en.wikipedia.org/wiki/Tay_Bridge_disaster

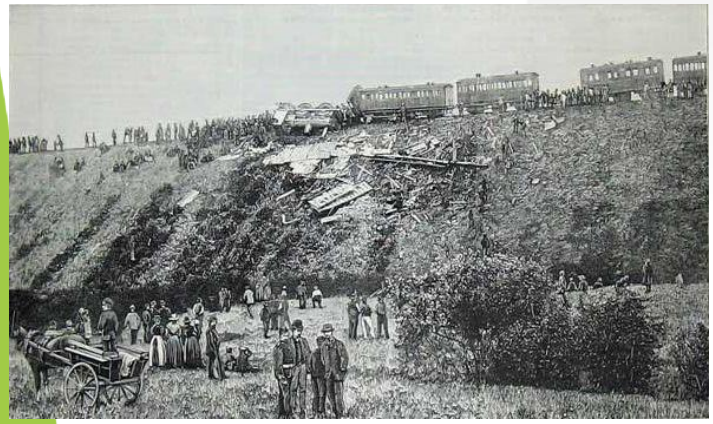
Amargh 1889 (80): remsystemen & procedures



https://en.wikipedia.org/wiki/Armagh_rail_disaster

Quinteshill 1915 (226): veiligheid materieel

https://en.wikipedia.org/wiki/Quintinshill_rail_disaster



Title: Year: Number: Type: All UK Legislation (excluding originating from the EU) Search

Advanced Search

Regulation of Railways Act 1889

UK Public General Acts ▸ 1889 c. 57 ▸ Section 1

Table of Contents | Content | More Resources

Previous: Introduction | Next: Provision | Plain View | Print Options

What Version

- Latest available (Revised)
- Original (As enacted)

Opening Options

More Resources

Status: This is the original version (as it was originally enacted).

1 Power to order certain provisions to be made for public safety

(1) The Board of Trade may from time to time order a railway company to do, within a time limited by the order, and subject to any exceptions or modifications allowed by the order, any of the following things:

(a) To adopt the block system on all or any of their railways open for the public conveyance of passengers ;

(b) To provide for the interlocking of points and signals on or in connexion with all or any of such railways;

(c) To provide for and use on all their trains carrying passengers continuous brakes complying with the following requirements, namely:

(i) The brake must be instantaneous in action, and capable of being applied by the engine-driver and guards;

(ii) The brake must be self-applying in the event of any failure in the continuity of its action;

(iii) The brake must be capable of being applied to every vehicle of the train, whether carrying passengers or not;

(iv) The brake must be in regular use in daily working;

(v) The materials of the brake must be of a durable character, and easily maintained and kept in order.

In making any order under this section the Board of Trade shall have regard to the nature and extent of the traffic on the railway, and shall, before making any such order, hear any company or person whom the Board of Trade may consider entitled to be heard.

Previous: Introduction | Next: Provision

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Slotfase?

- Treinen zijn niet meer de ‘golden opportunity van weleer’
- Er is veel overheidsfinanciering nodig (en wederom politieke wil)
- En veel meer regulering (wie betaalt bepaalt)

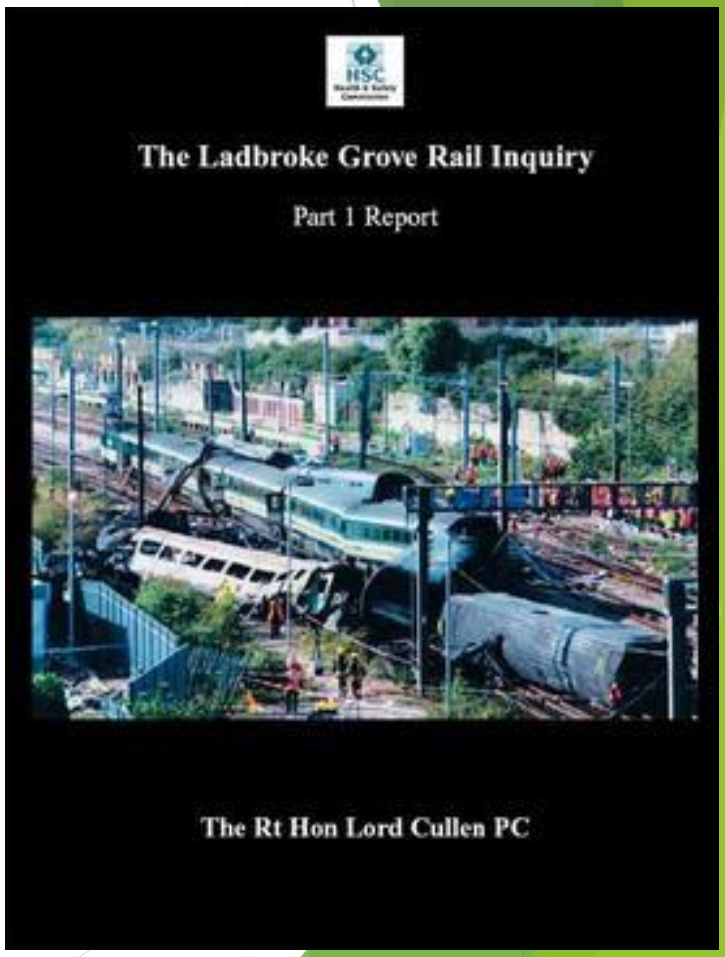
Date	Killed	Injured	Type	Details
31 January 1995	1	30		Ais Gill rail crash (1995): Train hit landslide, oncoming train hit wreckage.[322][323]
11 July 1995	0	5		Largs, North Ayrshire: Brake failure led to high-speed collision at terminus station.[324]
10 November 1995	0	1		Royal Oak tube station: Collision.[325]
8 March 1996	1	22		Stafford rail crash (1996), Staffordshire: axle box failure, train derailed across other tracks, mail train hit wreckage.[326]
8 August 1996	1	69		Watford rail crash, West Coast Main Line, Watford: Signal passed at danger, head-on collision with empty stock.[327][328]
4 February 1997	0	4		Bexley derailment, London: Derailment due to overloaded train and poor track maintenance.[329]
6 March 1997	0	6		Newton Abbot, Devon: Derailment due to bearing failure.[330]
19 September 1997	6	150		Southall rail crash, Great Western Main Line, Southall: Signal passed at danger, collided with freight train crossing path. Driver inattention and faulty Automatic Warning System equipment.[331][332]
18 June 1998	0	9		Sandy, Bedfordshire: Wheel failure caused by metal fatigue. East Coast mainline express derailed south of the station at approximately 100 mph (161 km/h) and came to a halt 400 metres north of the station.[333]
8 January 1999	0	4		Spa Road Junction rail crash, London: Train passed signal at danger, converging collision, driver error.[334]
23 June 1999	0	31		Winsford rail crash (1999), Cheshire: Train passed red signal; rear-end collision.[335]
5 October 1999	31	523		Ladbroke Grove rail crash Great Western Main Line, London: Driver passed signal SN109 at danger; head-on collision and fire; allegations made at subsequent Inquiry[336] that signal SN109 was hard to see.[337][338]
17 October 2000	4	70+		Hatfield rail crash East Coast Main Line, Hertfordshire: Derailment caused by broken rail; restaurant coach hit overhead lines (catenary) stanchion.[339]
1 November 2000	0	1		Lawrence Hill, Bristol: Driver injured due to incorrect brake operation an empty mail train passed 2 red lights and hit the back of a loaded coal train.[340]
28 February 2001	10	82 serious		Great Heck Rail Crash East Coast Main Line, near Selby, North Yorkshire: Driver of Land Rover fell asleep and ran down embankment onto track where it was hit by passenger train and a freight train.[341]
28 February 2002	1	14		Nocton railway disaster, Lincolnshire: 1 killed in van, 14 injured on train after van crashed through wall and fell onto track.
10 May 2002	7	76		Potters Bar rail accident, East Coast Main Line, Hertfordshire: Undetected points fault derailed train, coaches rolled coming to rest on platforms.[342][343]
24 November 2002	0	31		Southall East: Broken fishplate caused HST coach to derail, throwing ballast through windows.[344]
7 July 2003	3	5		Near Pershore, Worcestershire: Minibus carrying farm workers struck by Hereford-to- London-Paddington train on a farm level crossing. Lineside telephone to contact signaller not used. Network Rail had visited site 2 months earlier and reminded farmer of safety obligations.[345]
3 August 2003	1	0		Burmarsh Road, Romney, Hythe & Dymchurch Railway: Train driver killed, car on level crossing.[346]
15 February 2004	4	3		Tebay rail accident West Coast Main Line, Cumbria: Runaway work trolley due to faulty brakes; ran down railway trackworkers.[347][348]

Potters' bar 2000: onderhoud & uitbesteding (7)

Hatfield (4): veroudering spoor

https://www.hertfordshiremercury.co.uk/news/hertford shire-news/hatfield-rail-crash-how-devastating-4620580

Ladbroke grove 1999 (31): veroudering/bezuiniging/EL



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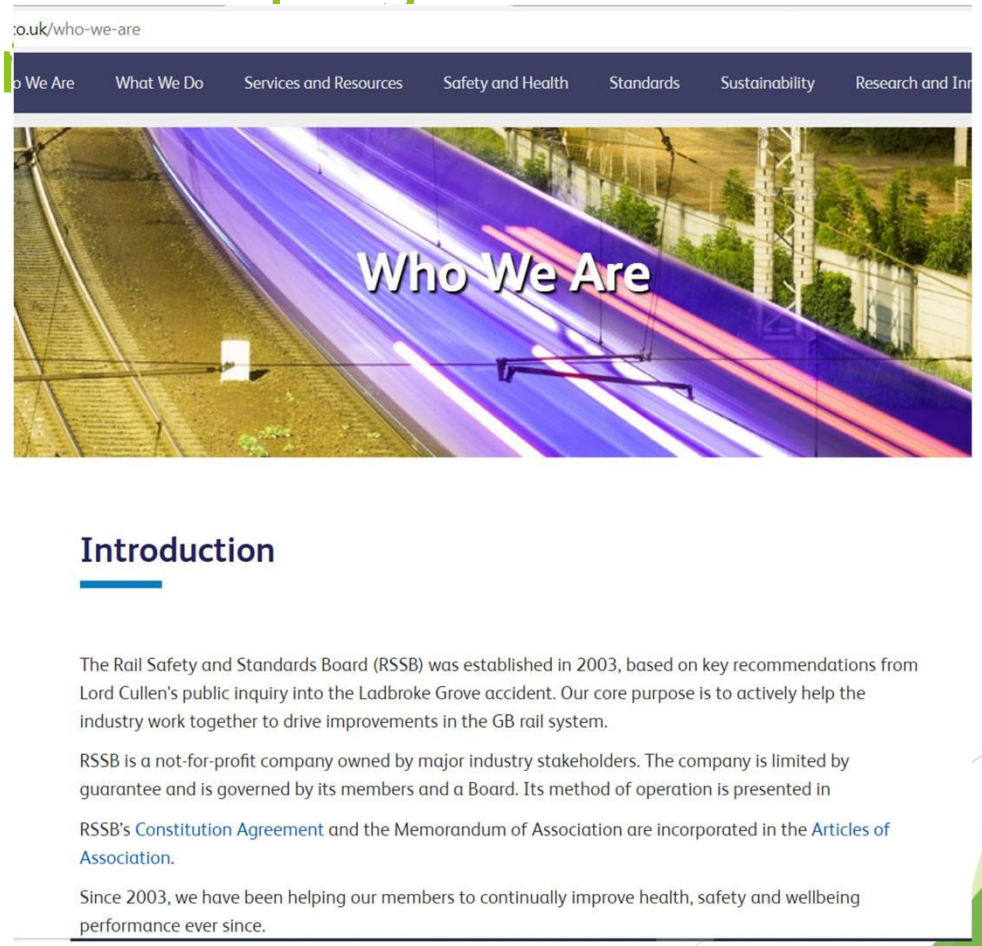
Verregaande aanscherping veiligheidseisen



tps://www.rssb.co.uk/who-we-are

https://en.wikipedia.org/wiki/List_of_rail_accidents_in_the_United_Kingdom

8 May 2019	0	0		Victoria Station, London: A Southern Class 377 electric multiple unit collided with the buffer stop.[374]
3 July 2019	2	0		Margam, South Wales: Two railway workers were killed after being struck by a Great Western Railway train near Port Talbot Parkway.[375] Following confusion about duties, staff worked without a lookout.[376]
13 November 2019	0	0		Leeds: An HST Intercity 125 and a Hitachi Class 800 Azuma London North Eastern Railway hit each other near Neville Hill, East Leeds, damaging both trains.[377][378][379]
28 January 2020	0	0		Eastleigh Derailment: A freight train derailed after leaving Eastleigh, blocking the line between Southampton Central and Basingstoke. No-one was hurt but the derailment caused major disruption to local train services.[380]
9 March 2020	0	0		A freight waggon containing cement dust from Hanson cement in Clitheroe Lancashire ran through two open level crossings before being derailed by a trap point preventing it accessing the main line [381]
23 March 2020	0	0		Bromsgrove Derailment: a DB Cargo UK Class 66 derailed after it hit buffers at the end of a siding about 500 yards (460 m) away from Bromsgrove Station, the locomotive was then hit by a Crosscountry Class 170 operating the 21:05 Cardiff Central-to-Birmingham New street, no injuries were sustained during the incident, however both trains were damaged.
12 August 2020	3	6		Stonehaven derailment: an Abellio ScotRail Inter7City HST operating the 06:38 Aberdeen-to-Glasgow Queen Street derailed at Carmont, near Stonehaven following a landslip.[382]
26 August 2020	0	0		Llangennech derailment: a freight train carrying diesel derailed and caught fire at around 23:20 BST. About 100 people living within 800m of the fire were evacuated from their homes. No injuries or fatalities were reported.[383]
22 October 2020	0	0		Bognor Regis railway station, West Sussex: A Southern Class 313 electric multiple unit was derailed at the station due to a signalman's error.[384]
13 March 2021	0	12		Kirkby train crash, Merseyside: A Merseyrail Class 507 overran the buffers at Kirkby Station and derailed. 12 People suffered minor injuries.[385]
12 October 2021	0	2		Enfield Town railway station, London: A London Overground Class 710 overran the buffers at Enfield Town Station and derailed. 2 People suffered minor injuries.[386]
31 October 2021	0	17		Fisherton Tunnel, Salisbury: A South Western Railway service collided with a Great Western service in Fisherton Tunnel on its approach to Salisbury station. Train was unable to stop at signal due to leaves on the line and crashed into a second train.[387]
1 February 2022	1	0		Worthing, West Sussex: a train traveling at approximately 33 mph (53 km/h) passed a stationary train that was waiting in a siding, around 300 metres to the west of West Worthing station. As it did so, it struck and fatally injured the driver of the stationary train, who had previously exited the train's cab and descended to track level.[388]

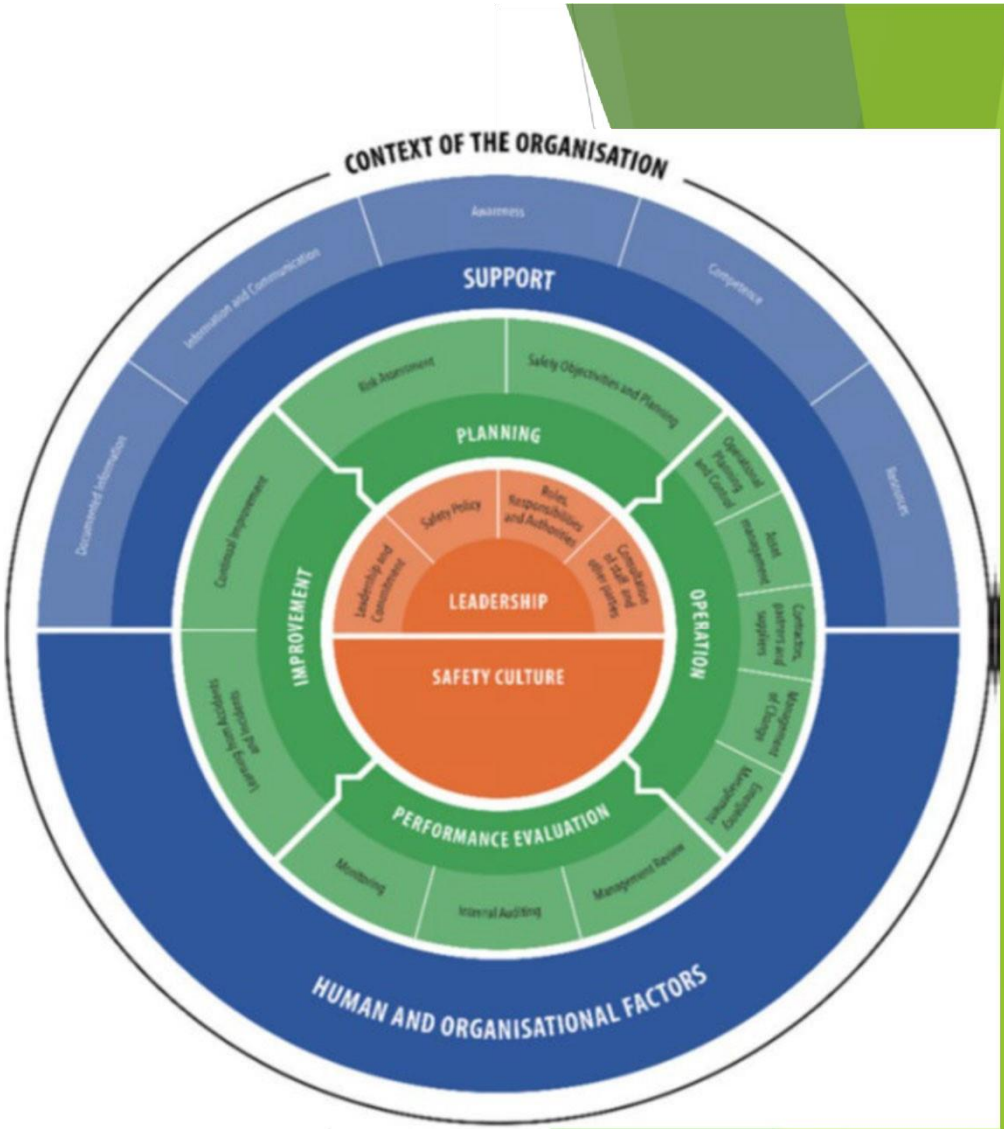
London Underground [edit]

See also: List of London Underground accidents

Despite its age and high usage, train related accidents which have involved passenger fatalities are exceptionally rare. The last major fatal collision was the Moorgate tube crash in 1975. Derailments in the

EU-Centralisatie

- In de EU: common safety method
- Techniek, Organisatie, Mens
- Plan-Do-Check-Act
- Kwantitatieve Risicoanalyse
- Evidence-based



Guidance for safety certification and supervision”; de toelichting op Verordening 2018/762).

Verdere specialisatie: software, melding automatisch lezen

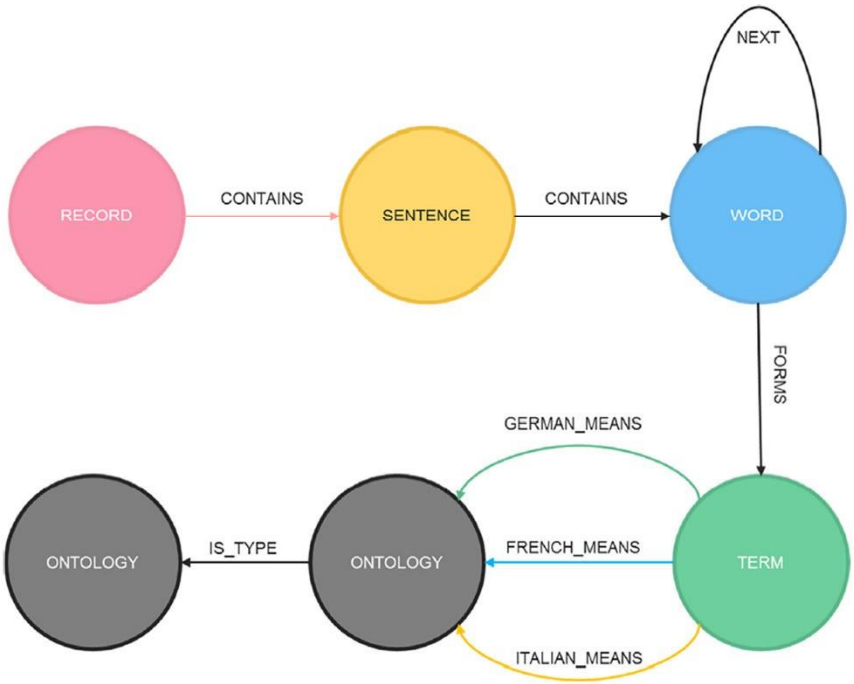


Fig. 3. Overall structure of the graph database.

Safety Science 118 (2019) 288–297

Contents lists available at ScienceDirect

Safety Science

journal homepage: www.elsevier.com/locate/safety

Extracting safety information from multi-lingual accident reports using an ontology-based approach

Peter Hughes*, Ryan Robinson, Miguel Figueres-Esteban, Coen van Gulijk

University of Huddersfield, Queensgate, Huddersfield HD1 3DH, United Kingdom

ABSTRACT

This paper describes an approach to extract meaning from multi-lingual free-text safety incident reports. A sample of 5065 safety incident reports from the Swiss Federal Office of Transport were used in the study. Each report was written in either German, French or Italian natural language. An interactive learning approach between a human and computer software was undertaken to identify key terms in the text that are relevant to discovering meaning. A multi-lingual ontology was created to join meaningful semantic patterns and identify specific classes of safety incident on the railway, including injuries occurring whilst passengers were boarding or alighting from vehicles, falling down stairs, struck by closing doors, or struck by objects such as suitcases. A graph database was used to query the text records via the ontology and identify reports of incidents in each class, regardless of the language used in the report. Fluent speakers of each language – German, French and Italian – reviewed the results to confirm true positive results and detect false positives. The performance of the process varied across languages and incident types, however the overall true positive rate was determined by the fluent speakers to be 98.5%.

17 January 2020

Prorail: koploper digitaal VMS op spoor

https://www.dnv.com/cases/prorail-5401

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SYNERGI LIFE FOR DUTCH RAIL SAFETY

Customer story – ProRail

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Wat leert ons dat over moderne energietransities?

- Technologieontwikkeling stopt nooit
- Er zijn vanuit veiligheidsperspectief fasen in de ontwikkeling van de transitie
- Veiligheid is medebepalend voor acceptatie en succes
- De maturiteit van veiligheid kan worden versneld met ongevallen

Fasen van ontwikkeling (voorstel)

- Pre-exploitative fase: technologisch entrepreneurs en visionairs werken naar de introductie toe (dromers, knutselaars en filantropen en ook durfkapitaal)
- Opstartfase: introductie en exponentiele groei (cowboytime; durfkapitaal en iedereen die denkt snel geld te kunnen verdienen)
- Groeifase (tot en met verzadiging): winstgevendheid evident maar winsten lopen terug (voor professionals en gespecialiseerde financiers)
- Slotfase: (extreme expertise, activistisch (roof)kapitalisme & overheidsfinanciering)

Pre-exploitatiefase

- Technologisch entrepreneurs & visionairs
- Technologische doorbraken zijn basis voor economische use-case
- Veel discussie en speculatie in de beginfase
- Succes use-case mede afhankelijk van brede sociaal/politieke discussie en wereldevents
- Kleinschalige oplossingen en testers leveren (meestal) geen grote veiligheidsproblemen op
- Wetgevers kunnen facilitators zijn voor technologie

Opstartfase

- Introductie en snelle groei
- Turbulente ontwikkeling en exploitatie
- Er wordt VEEL geld verdiend en (daarom?) weinig vragen gesteld
- BOEM is HO
- Het risicospectrum manifesteert zich, frequenties zijn nog onduidelijk
- Overheden faciliteren groei maar stellen kaders op in wetgeving om excessen op te vangen

Groeifase

- Teruglopen van economische viabiliteit
- Ontwikkeling van technologie om winstgevendheid te borgen
- Er zijn onvoldoende sociale verdiensten om alle risico's toe te staan
- 'Bad Actors' worden minder getolereerd en de cowboys gaan door naar de volgende techno-explosie
- Risico's triplet is bekend en risico-denken manifesteert zich

- Wetgeving verfijnt en gaat (negatieve) ervaring vastklinken in juridische kaders en richtlijnen: bedrijven kunnen niet meer ‘zomaar’ starten met operatie.

Slotfase

- Marktverzadiging en competitie op marges
- Optimalisatie om winstmarges te handhaven
- Kan heel erg lang duren
- Alleen (zeer) gespecialiseerde bedrijven kunnen nog opereren in het domein

- Het is nu oude technologie en die MOET veilig zijn (en worden andere technologieën interessanter)
- Verregaande veiligheids-specialisatie nodig
- Zonder bewijs van veilige operatie geen licentie

En dan is er nog Huskisson (of een grote knal)

- Veel slachtoffers in één ongeval is eigenlijk altijd wel een probleem en accelereert veiligheidsdiscussie
- Eén heel belangrijke publieke person eigenlijk ook
- Kunnen showstoppers zijn (en daarom praten we liever niet over incidenten)

- In de opstartfase fase (cowboy fase?) wordt het gemakkelijker opzij gelegd
- Bij groei- en slotfase is het eigenlijk altijd een probleem. Soms helpt dat impopulaire wetten (die eigenlijk toch al gewenst waren) het laatste zetje te geven.

Wat hebben we nu geleerd van Huskisson?

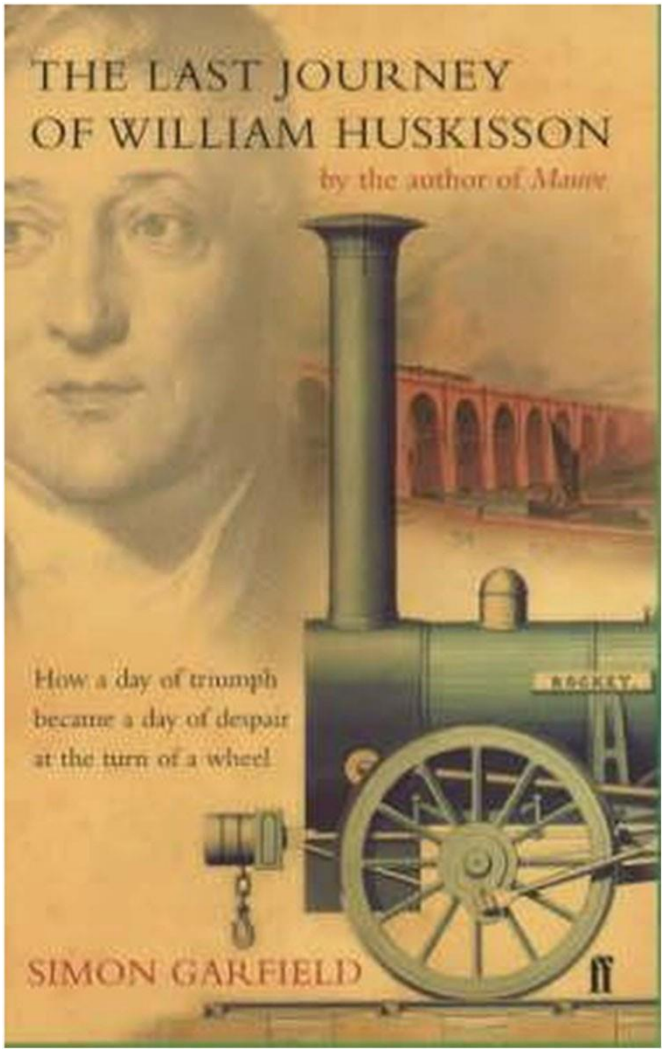
- De introductie van een energie-transitie is moeizaam en langdurig en heeft filantropen en politieke steun
- In de cowboyfase is zéér tolerant, zeker als er veel geld verdiend wordt.

- Transparantie en regulering worden vanuit de politiek (en wetgeving) sterker wanneer er veel schade is
- Er kunnen transitie-in-transities plaatsvinden die het spel vernieuwen maar dat draait (veiligheids)wetgeving niét terug (sterker nog…)
- (veiligheids)Regulering neemt in de regel altijd toe (en dat vaak ook met goede redenen).

En voor veiligheid

- Veiligheid door techniek wordt vaak door de markt/industrie voorgesteld en uitgevoerd (ook zonder regulering maar niet zonder winstoogmerk)

- Organisatorische aspecten van veiligheid worden vaak vanuit overheidsreguleringen afgedwongen (specialisten & inspectie)
- Menselijke aspecten van veiligheid liggen er een beetje tussenin en kunnen zowel gebruikt als misbruikt worden (maar daar heb ik in deze lezing geen materiaal voor getoond).


THE LAST JOURNEY
OF WILLIAM HUSKISSON
by the author of *Mauve*
How a day of triumph
became a day of despair
at the turn of a wheel
ROCKET
SIMON GARFIELD

https://www.bol.com/nl/nl/f/the-lastjourney-of-william-huskisson/30467263/ + veel Wikipedia

+ 5 jaar ‘deep dive’ in UK veiligheid

En voor de discussie

- Waar zitten we nu in ONZE transities?

- Groene energie?
- Digitalisering en AI?
- Ruimtevaart?

- Robots?
- Digitale munteenheden?

(en misschien: waar kunnen we een ‘Huskisson’ verwachten?)

Dank voor uw aandacht

coen.vangulijk@TNO.nl c.vangulijk@hud.ac.uk
c.vangulijk@tudelft.nl

Vragen?