



DESTinationRAIL Terminology

Authors

Natalia Papathanasiou, Dr. Claudio Martani*, Dr. Nam Le Thanh, Prof. Dr. Bryan T. Adey, Zaharah Allah Bukhsh, Dr. Irina Stipanovic, Dr. Timo Hartmann

*Corresponding author: Claudio Martani, martani@ibi.baug.ethz.ch

Date: 11/02/2016

Dissemination level: (PU, PP, RE, CO): PU

This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 636285



This project is funded by
the European Union



Table1: Terminology for DESTINATIONRAIL

N	Term	Definition	Source	Category	Used by
1	abutment	end support of a bridge	BS 6100	civil engineering	TRL - ETHZ
2	acceptable/ tolerable risk	level of risk under a defined threshold.	Highways England	risk management	TRL - ETHZ
3	acceptance value	value of defect that can be left after the execution of maintenance. It is related to the acceptable risk.	ETHZ	railway maintenance management	TRL - ETHZ
4	ageing	change with time of the condition and/or load-bearing characteristics of a structure or an element of one	EN 13306:2001	civil engineering	TRL - ETHZ
5	arch	a curved structural member or construction that spans an opening or recess, designed to	BS 6100	civil engineering	TRL - ETHZ
6	availability	ability of an infrastructure to be used when required. Or to be in a state to perform a required function under given conditions at a given instant of time or over a given time interval, assuming the required external resources are provided.	BS 6100/ EN 50126, EN 50128 / EN 50129	risk management	TRL - ETHZ
7	axle load	axle load is a critical measure of infrastructure physical capacity and strength: it is the total permitted weight of a loaded rail wagon or a locomotive divided by the number of axles on the piece of rolling stock	RNE (2013)	railway engineering	TRL - ETHZ
8	balise	a transponder that is used as a data point in an intermittent automatic train protection (ATP) system or as reference point for train location in radio-based train control system.	IFEV Glossary of railroad operation and control	railway engineering	TRL - ETHZ
9	ballast	crushed stone, graded in size and of angular shape supporting sleepers vertically and laterally.	BS 6100	railway engineering	TRL - ETHZ
10	ballasted track	track structure that consists of a flat framework made up of rails and sleepers and supported on ballast. The ballast bed rests on a sub-ballast layer which forms the transition layer to the formation ¹ .	Esveld, 2014	railway engineering	ETHZ

¹ It is also called 'classical track' or 'conventional track'.



11	bridge	structure that affords passage to pedestrians, animals, vehicles, and services above obstacles or between two points at a height above ground ²	BS 6100	civil engineering	TRL - ETHZ
12	bridge bearing	component to transfer the load from a structural member subject to movement, on to a fixed support	BS 6100	civil engineering	TRL - ETHZ
13	bearing surface	surface that transmits direct compressive load from one structural member to another	BS 6100	civil engineering	TRL - ETHZ
14	bridge cap	top of a bridge pier or bridge abutment on which bridge bearings are seated	BS 6100	civil engineering	TRL - ETHZ
15	bridge deck	horizontal surface of a bridge	BS 6100	civil engineering	TRL - ETHZ
16	broadly acceptable risk	level of risk exceeding the acceptable threshold defined of a tolerable amount. The tolerable threshold can possibly be exceeded with appropriate approvals, by triggering some form of response.	Highways England	risk management	TRL - ETHZ
17	buttress	projecting construction built as part of, or against, a wall to resist lateral thrust. It can be also found as abutment.	BS 6100	civil engineering	TRL - ETHZ
18	cant	height by which a high rail exceeds a low rail to counteract centrifugal and other forces	BS 6100	railway engineering	TRL - ETHZ
19	capacity of a railway line	maximum number of trains that may be operated through a line.	IFEV Glossary of railroad operation and control	Railway engineering	TRL - ETHZ
20	causal analysis	analysis of chains of events and estimation of the conditional probabilities of an event to be causal of an other	EN 50129	risk management	TRL - ETHZ
21	concrete slab	construction made of concrete, horizontal or nearly horizontal, of large area relative to its thickness.	BS 6100	civil engineering	TRL - ETHZ
22	condition	current state or current functioning of a structure and / or its components. It is usually assessed based on the condition rating related to the deterioration level.	RWS (2014)	civil engineering	TRL - ETHZ

² Bridges generally divided in components. I.e.: Superstructure - that part of the structure which is supported by the piers and abutments; Substructure - the wing walls and the piers, towers and abutments that support the superstructure; Foundation - that part of the substructure in direct contact with, and transmitting load to, the ground.



23	consequence	outcome of an event directly or indirectly affecting objectives	ISO GUIDE 73	risk management	TRL
	consequence	result of an event	ETHZ	risk management	ETHZ
24	consequence analysis	analysis of chains of events and estimation of the conditional probabilities of a consequential event to occur given the causal	EN 50129	risk management	TRL - ETHZ
25	construction technique	a technique/process/method by which a physical structure is constructed.	DESTINATION RAIL proposal	civil engineering	UT - ETHZ
26	corrosion	a chemical process by which the metal is oxidized	TRL	civil engineering	TRL - ETHZ
27	corrugation	short pitch corrugation: short-wave (3-8 cm wavelength and 0.1-0.4 mm depth) defect on the rail surface. Corrugations occur mainly in places where the vehicles move in sinusoidal form (straight track or curves with large radius).	Lichtberger, 2005 & Profillidis, 2014	railway engineering	ETHZ
28	critical component	element or component of the system that is critical to the functional integrity of the system	RWS (2014)	civil engineering	ETHZ
29	criticality	eventual magnitude of an event (i.e.: a component's failure)	UT	civil engineering	UT - ETHZ
30	crossing	an intersection of two tracks at grade with no change of course.	ETHZ and TRL	railway engineering	TRL - ETHZ
31	cutting	void resulting from bulk excavation of material	BS 6100	civil engineering	TRL - ETHZ
32	dead load	weight of the structure and any permanent load fixed thereon. The dead load is initially assumed and checked after design is completed.	Design Steel Structure	railway engineering	TRL - ETHZ
33	decision Support Tool (DST)	computerized tool that will help IMs in decision making process in the context of dealing with a number of previously identified and ranked risk.	DESTINATION RAIL proposal	DESTRAIL	UT - ETHZ
34	deep rotation landslide	deep-seated rotation of a mass of soil along a curved slip surface.	BS 6100	civil engineering	TRL - ETHZ
35	degradation	= deterioration	ETHZ	civil engineering	ETHZ
36	deterioration	process with which infrastructure loses its ability to provide the LOS it was designed for. It can be also found as degradation.	ETHZ	civil engineering	ETHZ
37	deterioration rate	speed of the process with which infrastructure loses its ability to provide a specific LOS.	ETHZ	civil engineering	ETHZ
38	drainage	system of drains and ancillary	ETHZ	civil	TRL -



	system	responsible to remove surplus of water from the infrastructure		engineering	ETHZ
39	earth fall/ landslide	detachment of soil from a slope along a surface on which little or no shear displacement takes place. According to Varnes (1996) landslide is a downslope movement of soil or rock mass occurring dominantly on the surface of rupture or on relatively thin zones of intense shear strain.	Varnes, 1996	civil engineering	ETHZ
40	electrification System	system that provides the traction power to the railway through an overhead trolley wire or with conductor rail	ETHZ	railway engineering	TRL - ETHZ
41	engineering structure	part of the railway infrastructure that provides with overpasses and underpasses the railway line (e.g. bridge, tunnel).	ETHZ	civil engineering	TRL - ETHZ
		structure designed according to established methods and standards meant to carry loads (e.g. bridges, tunnels).	NGI	civil engineering	NGI
42	exceptional maintenance	interventions that are not part of the planned and scheduled maintenance	ETHZ	railway maintenance management	TRL - ETHZ
43	exposure	extent to which an organization and/or stakeholder is subject to an event	ISO GUIDE 73	risk management	TRL - ETHZ
44	event	occurrence or change of a particular set of circumstances ³	ISO GUIDE 74	risk management	ETHZ
45	failure	inability of an asset to provide an adequate level of service	ETHZ	civil engineering	TRL - ETHZ
46	fastening system	set of parts and materials that ensure the rail-sleeper connection.	Profillidis, 2014	railway engineering	TRL - ETHZ
47	fault	abnormal condition or defect of an element ⁴ .	BS 6100	risk management	TRL - ETHZ

³ An event can be one or more occurrences, and can have several causes. An event can sometimes be referred to as an “incident” or “accident”.

⁴ faults can lead to a failure



48	fill	elevation of the natural soil with compacted soil of the natural terrain in order to avoid change in level required for the infrastructure	ETHZ	civil engineering	TRL - ETHZ
49	flooding	intrusion of water on land not intended (or not usually intended) to be covered with or subject to overflows	BS 6100	civil engineering	TRL - ETHZ
50	formation layer	soil layer, which is used when the subsoil material is not of appropriate quality.	Profillidis, 2014	railway engineering	ETHZ
51	formation protective layer	soil layer, which is used to protect formation layer, for example from frost, when the bearing capacity of the formation layer is not sufficient ⁵ .	Lichtberger, 2005	railway engineering	ETHZ - NGI
52	fouling of ballast	filling of voids in the ballast due to the degradation of the ballast aggregates and contamination (for example from dust, oil and soil). This leads to a reduction in the permeability and bearing capacity of the ballast.	ETHZ and TRL	railway engineering	TRL - ETHZ
53	frequency	number of events per defined unit of time.	ISO GUIDE 73	risk management	TRL - ETHZ
54	functional requirement	requirement that defines what a system, or its components, is supposed to deliver. A function is described as a set of inputs, the behaviour, and outputs expected from an element or a system of elements.	ETHZ	risk management	TRL - ETHZ
55	gauge	between the inner sides of the heads of the two rails, measured 14 mm below the rolling surface.	Profillidis, 2014	railway engineering	ETHZ
56	gauge defect	deviation of the real value from the nominal value of track gauge.	Profillidis, 2014	railway engineering	TRL - ETHZ
57	geo-coordinates	set of numbers or letters, or symbols that specify an exact location on the Earth	Wikipedia		ETHZ
58	geometrical track defect	a combination or one of the following defects: longitudinal, transverse, horizontal, gauge and twist defect	ETHZ	railway maintenance management	TRL - ETHZ
59	girder	a large main beam that is fabricated and comprises top and bottom chords and either a solid or open web or webs.	BS 6100	civil engineering	TRL - ETHZ

⁵ Used when it is not possible to supply ballast of sufficient quality and to protect the formation against frost.



60	gradient	ratio of difference in level between two points to the horizontal distance between them.	BS 6100	railway engineering	TRL - ETHZ
61	grinding	procedure through which irregularities at the rail surface, caused by track defects or by train operation, are smoothed.	Profillidis, 2014 & Esveld, 2014	railway engineering	TRL - ETHZ
62	hanging sleeper	sleeper affected by voiding. It can also be found as floating sleeper.	BS 6100	railway engineering	TRL - ETHZ
63	harm	physical injury or damage to the health of people, or damage to property or the environment	ISO73-2009	risk management	TRL - ETHZ
64	hazard	condition with the potential to cause harm	ISO73-2009 RNE (2013) [NOS]	risk management	TRL - ETHZ
65	horizontal defect	deviation between the theoretical and real horizontal position of the track ⁶ .	Profillidis, 2014 & Lichtberger, 2005	railway engineering	TRL - ETHZ
66	hotspot	hotspots are those parts on the railway infrastructure that are vulnerable to failure	DESTINATION RAIL proposal	railway maintenance	UT - ETHZ
67	inacceptable/intolerable risk	level of risk above a defined threshold of an intolerable amount.	Highways England	risk management	TRL - ETHZ
68	infrastructure management system (IMS)	IMS is a data container that will mainly store the data related to individual railway assets and network.	DESTINATION RAIL proposal	railway maintenance	UT - ETHZ
69	infrastructure manager	a person or firm responsible in particular for establishing, managing and maintaining railway infrastructure, including traffic management and control-command and signalling ⁷	DIRECTIVE 2012/34/EU	railway engineering	TRL - ETHZ - NGI
70	intervention	set of activities aiming to maintain, restore or replace an infrastructure or its components ⁸ .	ETHZ	risk management	TRL - ETHZ

⁶ also mentioned as alignment or lateral alignment defect, is it is also mentioned as alignment or lateral alignment defect.

⁷ the functions of the Infrastructure Manager on a network may be allocated to different bodies or firms

⁸ Interventions can be either preventive (performed before the occurrence of an undesired event to reduce its probability), protective (performed before the occurrence of an undesired event to reduce its eventual consequences), or corrective (to restore the infrastructure after the event).



71	intervention analysis	generation of possible interventions	ETHZ	risk management	ETHZ
72	intervention prioritization	ranking the proposed or possible intervention	UT	risk management	UT - ETHZ
73	karst	landscape underlain by limestone which has been eroded by dissolution, producing ridges, towers, fissures, sinkholes and other characteristic landforms.	ETHZ	civil engineering	ETHZ
74	landslide	large scale slip or flow slide	TRL - BS 6100	civil engineering	TRL - ETHZ
75	lateral buckling	geometrical failure caused when during high temperatures ballast material is not able to provide sufficient lateral confinement to maintain the track stability.	SMARTRAIL, 2014	railway engineering	UT - ETHZ
76	level crossing	any level intersection between the railway and a passage, as recognised by the infrastructure manager and open to public or private users. Passages between platforms within stations are excluded, as well as passages over tracks for the sole use of employees.	Recommendations to revise Annex 1 to Directive 2004/49	railway engineering	TRL - ETHZ
77	level of service (LOS)	extend to which the performances of an infrastructure guarantee its expected requirements (both technical and functional).	ETHZ	risk management	ETHZ
78	likelihood	probability.	ETHZ	risk management	TRL - ETHZ
79	lineside refuge	recess in the wall of a tunnel or at the side of a track for safety of staff.	BS 6100	civil engineering	TRL - ETHZ
80	liquefaction	process when a saturated or partially saturated soil substantially loses strength and stiffness in response to an applied stress.	Wikipedia	civil engineering	ETHZ
81	live load of bridges	bridge design standards specify the design loads, which are meant to reflect the worst loading that can be caused on the bridge by traffic, permitted and expected to pass over it.	Design Steel Structure	railway engineering	ETHZ
		traffic load specified by standards, and used in bridge design.	NGI	railway engineering	NGI
82	longitudinal defect	deviation between the theoretical and real value of the track elevation (vertical direction).	Profillidis, 2014 & Lichtberger, 2005	railway engineering	TRL - ETHZ



83	maintainability	ability of a component or construction to be retained in a state in which it can perform its required functions or to be restored to such a state when a fault occurs.	BS 6100	risk management	TRL - ETHZ
84	mitigation	process of selection and execution of interventions to reduce the potential consequences of a particular event.	ETHZ and TRL	risk management	TRL - ETHZ
85	monitoring	continual checking, supervising, critically observing or determining the status in order to identify change from the performance level required or expected ⁹ .	ISO GUIDE 73	risk management	TRL - ETHZ
86	objective probability	probability that an event will occur based on an analysis in which each measure is based on a recorded observation, rather than a subjective estimate.	ETHZ - TRL	risk management	TRL - ETHZ
87	objective risk	estimate of the risk obtained using theoretical arguments or adequate statistical data or from quantified risk analysis methods (QRA, PRA).	ETHZ	risk management	ETHZ
88	obsolescence	inadequate LOS of an infrastructure due to a change of either the level, or the type of requirements it's expected to provide	ETHZ	risk management	ETHZ
89	overloading	loading above the design level.	ETHZ	civil engineering	ETHZ
90	overturning	stability failure that occurs when an object inclines compared to its design position.	ETHZ	civil engineering	ETHZ
91	parapet	construction that bounds an elevated surface such as a bridge, or embankment.	BS 6100	civil engineering	TRL - ETHZ
92	pedestal	bridge shoe.	ETHZ	civil engineering	ETHZ
93	pier	intermediate support of a bridge.	BS 6100	civil engineering	TRL - ETHZ
94	preventive interventions	interventions that are executed before an inadequate LOS is reached.	ETHZ	railway maintenance management	ETHZ

⁹ Monitoring can be applied to a risk management framework, risk management process, risk or control. We would suggest different definition: continuous observing of a certain parameter / indicator which is related to the infrastructure performance



95	probability	likelihood or degree of belief of an event occurring over a specified period of time	ETHZ - TRL	risk management	TRL - ETHZ
96	rail	steel section to guide vehicles.	BS 6100	railway engineering	TRL - ETHZ
97	rail defect	internal discontinuity of the rail , which gives rise to rail fatigue, or rail alterations of a mechanical nature occurring under the influence of passing trains.	Profillidis, 2014	railway engineering	TRL - ETHZ
98	rail pad	resilient layer between a running rail and its support.	BS 6100	railway engineering	TRL - ETHZ
99	railway platform	elevated structure for entraining and detraining passengers and goods.	BS 6100	railway engineering	TRL - ETHZ
100	railway substructure	it consists of the formation layer, the frost protective layer and the subsoil, bears the distributed traffic loads from the superstructure. It is also mentioned as subgrade.	Profillidis, 2014	railway engineering	TRL - ETHZ
101	railway superstructure	it consists of the rails, the sleepers and the track bed (ballast/slab and subballast/concrete bearing plate and foundation), supports and distributes the traffic loads.	Profillidis, 2014	railway engineering	ETHZ
102	reliability	ability of an object to provide the adequate level of service under given conditions and over a given period of time.	ETHZ - TRL	risk management	TRL - ETHZ
103	residual risk	risk remaining after risk treatment.	ISO GUIDE 73	risk management	TRL - ETHZ
104	restoration	bringing an item back to its original appearance or state	BS 6100		TRL - ETHZ
105	restoration rate	speed of the process with which infrastructure regain its ability to provide an adequate LOS	Esveld, 2014	civil engineering	ETHZ
106	retaining wall	a wall that provides lateral support to the ground or that resists pressure from a mass of other material.	BS 6100	civil engineering	TRL - ETHZ
107	revetment	construction that comprises one or more layers of material to protect a slope against erosion.	BS 6100	civil engineering	TRL - ETHZ
108	rip-rap	bank protection formed of large uncoursed stones, broken rock or precast concrete units placed in random fashion.	BS 6100	civil engineering	TRL - ETHZ
109	risk	product of the probability of occurrence of an event and its consequences within defined spatio-temporal boundaries	ETHZ	risk management	TRL - ETHZ
110	risk acceptance	informed decision to take a particular risk	ISO73:2009	risk management	TRL - ETHZ



111	risk analysis	process to comprehend the nature of risk and to determine the level of risk ¹⁰ .	ISO73:2009	risk management	TRL - ETHZ
112	risk assessment	overall process of risk identification, risk analysis and risk evaluation that lead to risk treatment	ISO73:2009	risk management	TRL - ETHZ
113	risk avoidance	informed decision not to be involved in, or to withdraw from an activity in order not to be exposed to a particular risk.	ISO GUIDE 73	risk management	TRL - ETHZ
114	risk criteria	terms of reference by which the significance of risk is evaluated.	ISO73:2009	risk management	TRL - ETHZ
115	risk description	structured statement of risk usually containing four element: sources, events, causes and consequences	ISO73:2009	risk management	TRL - ETHZ
116	risk estimation	process used to assign values to the probability and consequences of a risk ¹¹ .	ISO73:2009	risk management	TRL - ETHZ
117	risk evaluation	process of comparing the results of risk analysis with risk criteria to determine whether the risk and/or its magnitude is acceptable or tolerable	ISO73:2009	risk management	TRL - ETHZ
118	risk financing	form of risk treatment involving contingent arrangements for the provision of funds to meet or modify the financial consequences should they occur	ISO73:2009	risk management	TRL - ETHZ
119	risk management	coordinated activities to direct and control infrastructures with regard to risk	ETHZ	risk management	ETHZ
120	risk optimisation	process to determine the interventions to be executed to find the optimum between reducing negative risks an increasing positive risks	ETHZ	risk management	ETHZ
121	risk ranking	interventions prioritization to allocate limited resources for reducing a set of defined risks (either through prevention or through protection)	ETHZ	risk management	TRL - ETHZ
122	risk rating	= risk ranking	ETHZ	risk management	TRL - ETHZ
123	risk reduction	process of selection and execution of interventions to reduce risks. It's a	ETHZ	risk management	ETHZ

¹⁰ Risk analysis includes risk estimation and provides the basis for risk evaluation and decisions about risk treatment.

¹¹ Risk estimation can consider cost, benefits, the concerns of stakeholders, and other variables, as appropriate for risk evaluation.



		form of risk treatment		nt	
124	risk transfer	process of shifting the risk associated with one situation from one stakeholder to another ¹² .	ETHZ	risk management	TRL - ETHZ
125	risk treatment	process of selecting an intervention to change risk.	ETHZ	risk management	ETHZ
126	rockfalls	fragment of rock is detached by sliding, toppling, or falling, and falls along a vertical or sub-vertical cliff, proceeds down slope by bouncing and flying along ballistic trajectories or by rolling on talus or debris slopes	ETHZ - Varnes, 1978	civil engineering	ETHZ
127	rolling stock	collective term for the rail fleet; sometimes it is used for one vehicle. It describes all the vehicles that are used on a railway track.	RNE (2013)	railway engineering	ETHZ
128	routine maintenance	group interventions that are part of the intervention plan	ETHZ	railway maintenance management	TRL - ETHZ
129	safety	state of having an acceptable probability of being injured or killed.	ETHZ	risk management	ETHZ
130	safety management	process to ensure to that there is an adequate level of safety ¹³ .	ETHZ	risk management	ETHZ
131	scour	erosion by flowing water	TRL - BS 6100	civil engineering	TRL - ETHZ
132	sea wall	wall parallel to the shore that forms part of sea defence works or coast protection works.	BS 6100	civil engineering	TRL - ETHZ
133	segmentation	process under which the linear infrastructure is divided into segments with as uniform and unique behaviour as possible ¹⁴ .	Jovanovic, 2004	railway maintenance management	ETHZ - NGI
134	sensitivity analysis	study of how uncertainties in the output of a model can be apportioned to different sources of uncertainty in the input data to that model.	ETHZ	risk management	TRL - ETHZ

¹² It's a form of risk treatment.

¹³ It is a particular kind of risk management specifically referring to safety

¹⁴ The essence of segmentation process is to divide the linear assets into sections in such a way as to allow for those sections to have as uniform and as unique behaviour as possible.



135	signalling	system that provides traffic safety and regularity by ensuring the presence of a train at a particular point, at a specific moment and at a given priority while providing the maximum traffic capacity of a particular track per unit time at a particular speed.	Profillidis, 2014	railway engineering	ETHZ
136	sleeper	member providing vertical and lateral support to rails of a railway ¹⁵ .	BS 6100	railway engineering	TRL - ETHZ
137	slope	formation of the soil with an inclination with reference to a vertical plane.	ETHZ	civil engineering	ETHZ
138	soffit (of bridge)	exposed horizontal or sloping under-surface of a bridge	BS 6100	civil engineering	TRL - ETHZ
139	soffit (of sleeper)	underside or base of sleeper	Tzanakakis, 2013	railway engineering	ETHZ
140	softening	phenomenon when the shear resistance or shear stress reduces with continuous development of plastic shear strains ¹⁶ .	ETHZ	civil engineering	TRL - ETHZ
141	spandrel wall	form of retaining wall built on an arch barrel to retain the spandrel filling.	http://sdrclib.uiowa.edu/eng/bridges/WaddellGlossary/gloss.htm	civil engineering	ETHZ
142	speed profile	description of the fixed speed restrictions of a given piece of track and according to the characteristics of the rolling stock. It can be also found as permissible speed.	RNE (2013) and ETHZ	railway engineering	TRL - ETHZ
143	static system of bridges	static system indicates how the superstructure of bridge acts when carrying loads ¹⁷ .	Bridge glossary-2001	railway engineering	ETHZ - NGI
144	stringer	longitudinal member extending from panel to panel of a bridge and supporting the ties or the flooring.	http://sdrclib.uiowa.edu/eng/bridges/WaddellGlossary/gloss.htm	civil engineering	ETHZ
145	subballast	one or more layers of gravel and exceptionally of sand placed immediately below the ballast.	ETHZ	railway engineering	TRL - ETHZ
146	subjective probability	probability determined using intuition and relevant experience.	ETHZ	risk management	ETHZ

¹⁵ ties in North America

¹⁶ It can be also found as strain-softening.

¹⁷ The load is adjusted by using static and moveable bearings



147	subsoil	in the case of track laid along a cut, is the onsite soil and in the case of track laid on an fill, is composed of soil transported to the site	Profillidis, 2014	railway engineering	ETHZ
148	switch	assembly of rails and other components for diverting vehicles from one track to another.	BS 6100	railway engineering	TRL - ETHZ
149	system	a bounded group of interrelated, interdependent or interacting elements forming an entity that achieves a defined objective in its environment through interaction of its parts.	ETHZ	risk management	ETHZ
150	tamping	operation whereby track defects are rectified through lifting of the track and compaction of the ballast under the sleepers with tamping blades .	Profillidis, 2014	railway engineering	ETHZ
151	technical requirement	technical requirement pertains to the technical level of function that a given element is expected to provide, in terms of: safety, performance, reliability, availability management costs and environmental impact.	UNI 8290-2	railway engineering	ETHZ
152	tonnage	cumulative traffic load for a specific time period.	ETHZ	railway engineering	TRL - ETHZ
153	tower	long, slender structure either isolated or forming part of a building.	BS 6100	civil engineering	TRL - ETHZ
154	track	assembly of rails, fastenings and support, for passage of vehicles.	BS 6100	railway engineering	TRL - ETHZ
155	track circuit	an electrical device, using the rails as an electrical circuit, to detect the absence of a train or vehicle.	RSSB	railway engineering	TRL - ETHZ
156	track gauge	between the inner sides of the heads of the two rails, measured 14 mm below the rolling surface.	Profillidis, 2014	railway engineering	TRL - ETHZ
157	track gauge defect	deviation between the theoretical and real value of the track gauge.	Profillidis, 2014	railway engineering	TRL - ETHZ
158	track recording vehicle/car	on-track vehicle equipped to measure and record track geometry.	BS 6100	railway engineering	TRL - ETHZ
159	track twist defect	variation of the transverse defect per unit length of track. It is also mentioned as defect of the cross level direction.	Profillidis, 2014 & Lichtberger, 2005	railway engineering	TRL - ETHZ
160	track zone	vertical profile (level) of a track section.	ETHZ	railway engineering	ETHZ
161	trackside	part of a system (ex. signalling) that it is installed close to the track	ETHZ	railway engineering	TRL - ETHZ
162	traction power supply system	system which provides the necessary traction power for the movement of the locomotive by using electric power.	ETHZ	railway engineering	ETHZ



163	traffic control	system, rules and infrastructure that govern the traffic regularity of the railway line and network.	ETHZ	railway engineering	ETHZ
164	transition zone (track)	track sections between bridges, tunnels, artificial and earth structures, including sections between ballast and non-ballast permanent way (slab track).	SMARTRAIL, 2014	railway engineering	TRL - ETHZ
165	translational slide	movement of a shallow mass of soil in a plane roughly parallel to the slope due to a weakness on the plane.	TRL - BS 6100	civil engineering	TRL - ETHZ
166	transverse defect	deviation between the theoretical and real value of cant. For rectilinear parts of the layout, where the curvature is zero, the transverse defect is the difference of elevation between the inner and the outer rail.	Profillidis, 2014	railway engineering	TRL - ETHZ
167	trigger	an event or multiple events, that cause another event or events to occur.	ETHZ	risk management	ETHZ
168	tunnel	horizontal or sloping underground enclosed way of some length.	BS 6100	civil engineering	TRL - ETHZ
169	undergo risk	uninformed (by contrast with risk acceptance) risk assumption	ETHZ	risk management	ETHZ
170	vault	a curved structure designed only for taking compression if it is made of stones or masonry.	Bridge glossary-2001	civil engineering	TRL - ETHZ
171	vulnerability	risk related to a particular scenario	ETHZ	risk management	ETHZ
172	walkway	construction that provides elevated lateral access for pedestrians	BS 6100	civil engineering	TRL - ETHZ
173	weld (rail)	the join of the ends of two adjacent rails by heating the surfaces to the point of melting with a blowpipe, electric arc, or other means, and uniting them by pressing, hammering, etc.	ETHZ	railway engineering	TRL - ETHZ
174	wing wall	wall that extends a bridge abutment to retain the side slope of fill.	BS 6100	civil engineering	TRL - ETHZ