Sotera
Risk Solutions

DEVELOPING A ASSET UPGRADE ASSESSMENT TOOL FOR IRISH RAIL

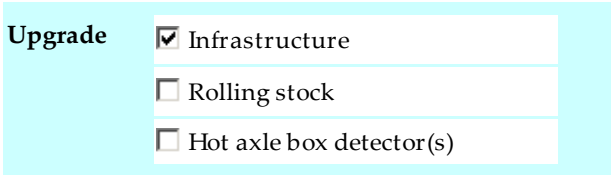
INTRODUCTION

Sotera has developed a safety risk model on behalf of Irish Rail. The key objective of the model was to help develop a sound and defensible investment strategy for the railway, based upon a detailed and comprehensive assessment of the risk together with cost-benefit analysis. Sotera developed an assessment tool which allows assessment of the safety benefit of upgrading assets, either singly or en masse.

This paper provides a case study of using the Tool to assess the safety benefit of performing asset upgrades.

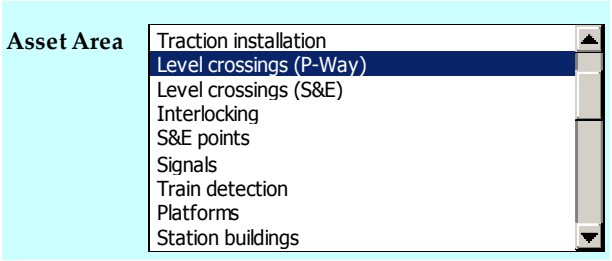
SELECT ASSET TYPE

The first step is to choose the asset type, firstly between three high level types.



Hot axle box detectors (HABDs), whilst infrastructure assets, are a special case because they affect the safety performance of areas of the railway other than their immediate location.

Further options are then available, for example for infrastructure there are 30 different asset types.

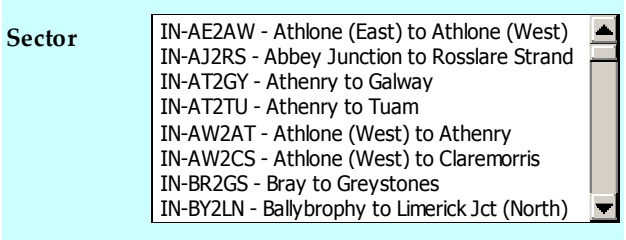


SELECT SECTOR

The Irish Rail network has been subdivided into Sectors, each of which is a length of railway between two junctions or a junction and a turn around point.

For infrastructure assets it is necessary to choose the Sector of interest.

This is not necessary for rolling stock or HABDs where asset upgrades will impact more than one Sector



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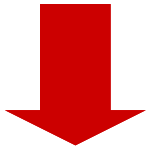
MODIFYING ASSET RATINGS

The Irish Rail Risk Model describes assets by their location (Sector and mileage), length for linear assets, and by their design, condition and deterioration ratings which detail how well individual assets control specific hazards (as an example slam doors would have an asset design rating of 4, whereas plug or sliding doors would have a better rating of 1 or 2, when the hazards concerned are associated with passengers falling from train doors between stations or at a station on the wrong side.)

The Tool retrieves the asset ratings within the database, and allows the user to change asset ratings, or indeed to add or delete assets (which is particularly useful for level crossings, as a common upgrade is to close a crossing, or to change it to an alternative crossing such as a bridge). An additional option for level crossing assets is to allow a change from one level crossing type to another (eg, crossing XG159 could be upgraded from an OP type crossing to a gated crossing, and the ratings improved from 4,4,4 to say 2,1,1.

Serial Number	Description	Type	Sector	Design	Condition	Deterioration
XG151	Athenry Stn. (CCTV)	CCTV	IN-AT2GY	1	1	1
XG152	Castleambert. (CX)	Gated	IN-AT2GY	1	1	1
XG159	Sullivans(U)	OP	IN-AT2GY	4	4	4
XG161	Healy's (LB)	LB	IN-AT2GY	1	1	1
XG162	Frenchfort (LB)	LB	IN-AT2GY	1	1	1



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XG161	Healy's (LB)	LB	IN-AT2GY	1	1	1
XG162	Frenchfort (LB)	LB	IN-AT2GY	1	1	1

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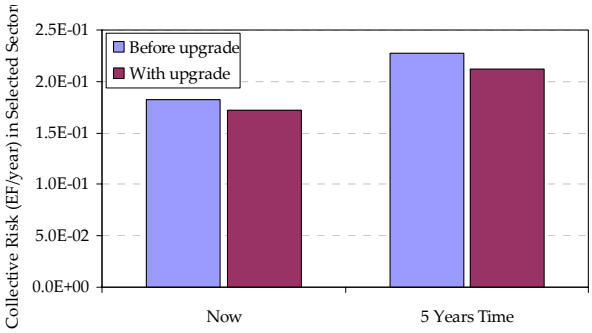
RESULTS

The Tool then calculates the safety benefits within the Sector that this upgrade would bring. The chart right shows the collective risk reduction for two different time frames: now (assuming the upgrade could be introduced this year), and five year's time.



These figures are also presented numerically, for example:

	Collective Risk (EF/year) in Selected Sector(s) This Year			
	Total	Train accidents	Movement accidents	Non-movement accidents
Before upgrade	**1.8E-01**	3.7E-02	5.9E-02	8.7E-02
With upgrade	**1.7E-01**	2.7E-02	5.9E-02	8.7E-02
Benefit from upgrade	**1.1E-02**	1.0E-02	5.5E-04	0.0E+00
Percentage benefit	**5.9%**	27.7%	0.9%	0.0%

Individual risk values are also calculated to allow comparison with tolerability criteria or targets.

	Individual Risk of Equivalent Fatality		% of Tolerability Criterion	
	Now	5 Years Time	Now	5 Years Time
Before upgrade	4.8E-05	6.0E-05	19%	24%
With upgrade	4.8E-05	6.0E-05	19%	24%
Benefit from upgrade	2.0E-07	2.7E-07		

BENEFITS

The Tool can be used for cost benefit analysis and hence to determine what asset upgrades might be required to reduce the risk as low as reasonably practicable (ALARP). It can also be use to optimise expenditure for example to target where a budgeted amount of expenditure should be directed. This includes comparison of capital expenditure (which tends to improve asset design, condition and deterioration ratings) and maintenance expenditure (which tends to impact only condition and deterioration ratings, but would normally be able to address a wider number of assets).

For more information on safety assessment tools please contact David Harris:
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