

# SAFETY MANAGEMENT OF LIGHT RAIL IN IRELAND – APPLYING THE EUROPEAN SMS APPROACH

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## SUMMARY

The Railway Safety Commission (RSC), shortly to be renamed the Commission for Railway Regulation (CRR), is the competent authority for regulation of the railway sector in Ireland. The RSC, having had a largely positive experience applying the European Safety Management System (SMS) approach within the heavy rail sector, made the decision to implement a similar system for the Dublin light rail system. This paper describes the methods taken to develop SMS guidance for light rail systems and the RSC's experience of implementation.

The authors describe their experience in developing the certification guidance, outlining challenges encountered and the solutions used to overcome them. The approach used to move from a static safety case to a dynamic SMS are stated, outlining experience gained both from a certification standpoint and that of the ongoing supervision and enforcement function. Areas of further work are discussed, outlining what issues they address. Finally, it was concluded that the SMS approach provided the sector with a consistent, reliable and effective means of regulation.

## INTRODUCTION

### Commission for Railway Regulation

The Railway Safety Commission (RSC), shortly to be renamed the Commission for Railway Regulation (CRR), is the competent authority for regulation of the railway sector in Ireland. The railway sector in Ireland is relatively small compared to most of our European neighbours. The Irish railway sector is comprised of 1683km of heavy rail, eight heritage railway operations and approximately 37km of light rail.

### Mission and Vision

The RSC is committed to advancing railway safety, ensuring fair access to the Iarnród Éireann network, and monitoring the performance and sustainability of heavy rail infrastructure in Ireland.

The RSC vision is railways that safely deliver, and the policy is to engage with all railway sector participants in a consistent, informed, and professional manner. The objectives are:

- **Safety:** that railway activities throughout the State are conducted with primary regard to safety;

- **Compliance:** that railway organisations comply with national and European legal requirements;
- **Open Access:** that access to the railway network is provided in a fair and transparent manner; and
- **Performance and Sustainability:** that Infrastructure Manager(s) deliver sustainable railway network capacity and economic value for the State.

## **BACKGROUND**

Under Ireland's Railway Safety Act, 2005, light railways previously received safety certification on the basis of a Safety Case. The RSC, having had a largely positive experience applying the European SMS approach, identified an opportunity to adopt a similar approach to the light rail sector in Ireland.

### **Light Rail in Ireland**

Currently there is one light railway network in Ireland, the Luas. The Luas is a tram network in Dublin, comprised of two lines of approximately 37km of track, a fleet of 66 trams and carries approximately 30 million passengers per annum.

The Green line is 16.5 km long and runs from St Stephen's Green to Brides Glen. The Green line is predominantly on dedicated right of way with only 5% as an on street tramway with segregated running. The Red line is 20.5 km long, running from Tallaght and Saggart to Connolly Station and The Point. The Red line presents two branches, one at Busáras and one at Belgard interchange. In comparison with the Green line, 60% of the Red line is on a dedicated right of way, not shared by vehicular traffic, with the remainder is an on street tramway which is predominantly segregated. The line has a significant number of 'at grade' crossings, with a total of forty one signalled junctions (33 in 2004). The line runs through city streets for a distance of approx. 5.5 km. The fleet consists of 40 trams type 401 and 26 trams type 402.

In 2014 there were almost four million tram-kilometres and 32.4 million passenger journeys were made on the system, this is an increase of 6% from 2013 (30.5 million). The system has a good safety record, with no passenger fatalities recorded. Incidents of note include:

- A collision on the system between a tram and bus that resulted in several serious injuries;
- Tram collision with a member of the public causing a fatality;
- A collision with a rubbish truck that resulted in minor injuries.

The Luas has a distributed management architecture in so far as all of the assets are owned by a government agency, namely the Railway Procurement Agency (RPA). The RPA select the maintenance contractors for the rolling stock and infrastructure, the management of these contracts is then novated to an operating company. The operating company is chosen through an open tender competition. Additionally the operators must work closely with government, business and residential groups to develop and optimise the service as per agreement with managing agency.



Figure 1: LUAS Map (Luas.ie 2015)

### The European System in Ireland

Article 4 of Directive 2004/49/EC (the Railway Safety Directive) stipulates that the Railway Undertakings (RU) and Infrastructure Managers (IM) shall be made responsible for safe operation and, to fulfil this responsibility, it requires that they establish a Safety Management System (SMS). The RU provide transport of goods and/or passengers by rail on the rail system and manage rolling stock. The IM is the organisation that is responsible for establishing and maintaining railway infrastructure on the rail system. In Ireland, both are considered to be “Railway Organisations”, as defined by the Railway Safety Act 2005 (Section 39). This requires such organisations to implement a safety management system and prepare a document describing the components of such safety management system.

The SMS implemented by the RUs and IMs must be assessed by the RSC using the specific regulations for assessing the conformity with the requirements for obtaining safety authorisations as referred to in Article 6(3)(b) of the Railway Safety Directive. These specific regulations are known as the Common Safety Method for Conformity Assessment (CSM CA), are defined in Regulation (EU) No 1158/2010/EU for RU and Regulation (EU) No 1169/2010/EU for IM.

### NOTATION

CRR	Commission for Railway Regulation
CSM	Common Safety Method
ERA	European Railway Agency

IM	Infrastructure Manager
LRO	Light Rail Organisation
RPA	Railway Procurement Agency
RSC	Railway Safety Commission
RU	Railway Undertaking
SMS	Safety Management System

## **APPROACH**

### **Developing the Guideline**

In 2013 RSC made the decision to apply the European SMS approach to light rail systems in Ireland. A legal requirement for an SMS existed, however no further specific information was available for light rail systems. In order to address this a guideline was developed.

The guideline was modelled on *Application guide for SMS - 1: A system approach*, which was developed by the European Railway Agency (ERA). As there is no legal requirement for separation of the RU and IM in light rail the guideline had to be adapted to address this difference. The term Light Rail Organisation (LRO) was introduced to account for this gap in terminology.

An LRO means an organisation responsible for the management, operation and safety of a light rail system; this also includes the management and control of maintenance of the light rail infrastructure and rolling stock. It is a requirement under the Railway Safety Act, 2005 (Section 39) that railway organisations “shall implement a safety management system and shall prepare a document describing the components of such safety management system.”

The main adaptation required for the guideline related to the legal requirements and references to the CSMs in the ERA document as these were not directly applicable to the LRO. Additionally, as the LRO is to some degree a combination of RU and IM functions there were areas of duplication within the ERA guideline when applied to light rail. Some areas which were removed as they were not applicable included criteria relating to compliance with network specific rules and co-operation between operators on the infrastructure.

### **Minimising Disruption**

The decision to require an SMS for light rail operations coincided with the retendering of the LUAS operating contract. The first step to implementing this requirement was to consult with the RPA and inform them of the proposed requirement. This allowed for the requirement of an SMS to be a tender condition, and minimise disruption for the operator. The RSC briefed each bidder on the requirement and issued the guideline on the website. The RSC did not advise on the bidding process, selection criteria or award.



*Figure 2: LUAS tram (BFK.ie 2015)*

### **Safety Certification of the Operator**

In autumn of 2014, the RPA awarded the contract for operating the Dublin Light Rail system to Transdev, who had operated the service during the lifetime of the previous contract. The implementation of the new contract by Transdev required changes to the management structure. The specialist Safety Management position was retained, and work began quickly to establish the new safety management team.

The process began by making contact with the successful applicant. The RSC met with their senior management and briefed them on the certification process for the SMS. It was agreed that it was important to have regular progress meetings and reviews.

During the certification process there were a number of challenging areas to overcome. Although the operator was familiar with the RSC's supervision activities including audits, inspections and incident investigation, they had no previous experience of the RSC's SMS certification process. Due to the arrangement whereby the operator must manage maintenance contracts which are novated to them, there were some challenges to address the requirements with regards to the maintenance and the management of contractors. As it was the operator's first experience of the SMS certification process, determining the required availability of staff for the development of the SMS was difficult. This became evident as the development of a number of new documents rather than the adaptation of existing documents, contained within the previous Safety Case, was further understood.

Although the process for SMS certification that was applied by the RSC was the same as for other RUs and IMs, this was still a first time application of SMS for light rail. Additionally, it had been almost 10 years since the previous Safety Case had been assessed, and in that time new staff were recruited and changes to operations and infrastructure were frequently applied. The RSC has adopted learning points from the experience and will continue to strive for improvement in the process. In particular, the key document in the process, the criteria matrix, would benefit from further revisions before the commencement of the next certification process. For instance, some of the wording and terminology was not appropriate to a 'line of sight' tram operation.

## **OPERATIONAL EXPERIENCE**

When a new SMS is introduced, time is usually required for the system to 'bed in', for stakeholders to adjust to the various new procedures introduced. The new Light Rail SMS has been operational for some six months at time of writing, which is a relatively small part of the five year span it is planned to operate in. The authors will below present some early learnings from this new system, identifying areas where strengths and weaknesses have been observed. Continuous improvement is an important element of SMS certification, and RSC seeks to apply this in all of its activities.

### **Briefing to Supervision and Enforcement**

The Supervision and Enforcement function of the RSC are mandated to audit, investigate and inspect duty holders. The SMS, along with legislative requirements, are critical tools that enable these processes. It is therefore required that the Supervision function has adequate knowledge of the SMS, and this learning process begins with briefing and handover by the conformity assessment team once the certification process is complete. For the light rail SMS, the Conformity Assessment team briefed Supervision function on the following key points:

- **Content and structure:** The major elements of the how the SMS complies with the legislative requirements were explained.
- **Assessment process:** The assessment team advised colleagues on the process used, the format for certifying the documentation and any difficulties that arose. This included information on the suitability of the guidance document used for the process and areas where it may be further enhanced.
- **Possible weaknesses:** The certified SMS, whilst compliant with requirements, may contain elements that present difficulty for the duty holder. Examples of this may include necessarily complex processes or common implementation of the SMS across multiple sites. These are typically minor in nature and are often overcome in the early stages of SMS operation.

A relatively smooth assessment process enabled a rather straightforward briefing to the Supervision function. Much of the briefing focused on elements that are not required within the SMS for light rail such as common safety target requirements, national rules compliance, train driver licencing and other elements that would be required in conventional rail systems. The team that performed the assessment advised that they remain available for further consultation on the SMS, and give assistance where possible. Whilst all decisions are documented during assessment of the SMS, and available to the supervision function, it is considered good practice to have access to the staff involved in assessment where possible.

### **Experience Gained to Date**

Since the SMS has become live, the supervision function has undertaken several inspections and audits. In general it is clear that the duty holder is still adapting to the requirements of the SMS guideline. This is somewhat expected as many staff employed have been with the duty holder for quite a few years and had been used to the requirements of previous safety management regimes. The RSC has had to be prudent in its regulatory approach, keeping to the fore important principles such as proportionality, prioritisation and consistency.

### *Duty Holder Performance*

Top management in the duty holder continue to educate staff members on the SMS and its importance to their core activities. RSC have observed this process is continuing, with several supervision activities showing progress in this area. Making the documentation available to all staff is an interesting example. Previously, there was little requirement for doing so under safety case legislation, however European SMS legislation requires it be made available. Providing physical and other resources to do this within a busy environment can be challenging. There is also the issue of controlling the document and ensuring current versions of all SMS documentation are maintained. This is further compounded by the duty holder being spread across multiple sites which vary in form and function and thus can impact on how the requirement is fulfilled.

As in many new systems, time is required for the people operating it to understand it at a level where the need for constant reference reduces. It is normal that a learning curve is observed as drivers, signallers and maintainers become more familiar with the system and how it applies to them. At the beginning of an SMS lifecycle it will be necessary to constantly refer to procedural text to ensure compliance with the requirement. This typically reduces over time, but often errors are observed during this initial period. The SMS is designed to accommodate this with many checking functions built in, most importantly the element of monitoring where the duty holder is required to audit and inspect the operation of their system. The RSC regularly reviews and samples this process with the duty holder to ensure it is appropriate to hazards present. Results from internal monitoring are an important indicator on the effectiveness and suitability of the SMS, and should be used to drive change when required.

Since the introduction of the SMS, there have been several changes within the duty holder including a new Managing Director, new Operational Performance Director and a modified organisational structure. There have also been changes in the government agency with responsibility for the Dublin Light Rail System. It is believed that such changes can affect the implementation of SMSs as new structures and management invariably have different styles and priorities when applying the SMS. The SMS in operation has been seen to be adaptable to this change, with several facilities available to manage and assess these changes, and measure the impact on the safety of light rail operation. Again, the RSC typically samples the application of change management processes periodically.

It has also been evident that the duty holder has access to many information resources on best practice when operating the SMS. Many industry organisations such as UNIFE, UIC and the ERA provide extensive guidance on the various elements of the SMS. This is a resource that could not be provided for a small railway system.

### *Return on Experience for the RSC*

The SMS has been in operation for a relatively short time span, yet several benefits are clear to RSC. Firstly, this approach allows for consistency in many elements of how the duty holder is regulated, further enabling reliable and effective regulation. The processes stipulated by European legislation are well understood, and guidance is extensive in this area. The RSC can apply its systems for supervision, as laid down in the Common Safety Method (CSM) for Supervision, to the light rail operator. Adoption of various statistical resources for measuring risk and performance could also be applied.

The SMS is also highlighting areas where RSC supervision needs to be focused through comparative analysis with other similar SMSs. For instance, the RSC has the ability to analyse leading indicators (e.g. audit outcomes)

across several duty holders and determine the effectiveness of the various systems. This in turn will assist the RSC in targeting its resources should a duty holder have difficulty. Previously, several duty holders operated different types of management systems, which made it problematic to compare safety performance or establish baseline indicators.

The RSC develops a supervision plan each year, which allocates resources to planned activities. Planning such resources against the various duty holders with different approaches to safety management often proved to be less than concise, with much difficulty found in estimating the resource required to audit a specific topic. Having a common safety management approach has allowed for audit and inspection against the common criteria, using legislation available to the RSC and duty holder.

It has become evident that there is further work required to alter the RSC's engagement with the duty holder following SMS introduction. The new SMS makes many requirements on a duty holder that take time fully implement, and as such this influences the engagement by the RSC. As the SMS matures, and its implementation becomes more established, different approaches may be possible when assessing duty holder performance. The RSC considers it important to take a fair and reasonable approach in this instance to achieve the best long term results for all stakeholders in the light rail system.

## **FURTHER WORK**

The SMS approach has already proved a successful one for the RSC and other light rail stakeholders. However, further improvement can be still be achieved by some incremental changes.

### **Novelty of SMS for the Duty Holder**

Prior to certification, the RSC should seek to enhance the knowledge of the duty holder in operation of the European SMS. It would be beneficial to all involved for the duty holder to be fully informed of their legal requirements and how they may comply with them. The novelty of SMS operation may be a barrier this, and consideration may be given to further enhancing guidance to include a process for ensuring this objective is fulfilled.

### **Establishing Arrangements between RU/IM**

The management architecture of non-conventional rail systems may be different to that of the standard RU and IM approach seen in EU legislation. Careful consideration is required at certification stage as to the allocation of responsibilities with regard to Operations, Rolling Stock and Infrastructure. The entities that control these sub-systems should have an appropriate system by which they can logically and safely control and execute related tasks. Appropriate guidance should be available to the duty holder in this regard.

## **CONCLUSION**

The introduction of the requirement of a SMS for light rail has given the RSC a standardised approach to safety regulation of the railway sector in the State. It has allowed the RSC, a small National Safety Authority, a more effective and efficient process of assessing the Safety Management of all railway organisations under its remit. The associated systems of supervision and enforcement have been aligned along common processes already in



place within this function. In applying the European SMS approach to light rail, heavy rail and heritage rail a consistent approach to railway safety in the State has been achieved.

## REFERENCES

RSC-G-028-A Guideline for the Development of an SMS for Light Rail –  
[www.rsc.ie/publications/rscguidelines.html](http://www.rsc.ie/publications/rscguidelines.html)

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