The exchange of information is crucial to the operation of railways; from the distribution of timetables to the availability of train crew, information must constantly be exchanged in any railway network. This information has, for many years, been stored and transmitted electronically with the precise format of each datasource evolving as the available technologies changed. This slow evolution of the information environment within the rail industry has resulted in a in the existence of a diverse range of systems, with only limited ability to exchange information essential to the day to day operation of the railway. Were the cost of data integration reduced, then further cost reductions would follow as barriers to the adoption of other technologies, such as predictive maintenance and network inspection using in-service vehicles, are removed.

Use of a common format for data interchange is one way to reduce the cost of data integration and enable improved information sharing. Using linked data and ontology to achieve this has many advantages over other less information-rich and more prescriptive formats. One important advantage is that by using a linked data architecture it is possible for anyone, not just a central standards body, to make data available to the industry. For example should a supplier wish to create a datasheet for a new product as linked data then the supplier could simply do so, with no need to wait for a lengthy external approval process. Another key advantage of ontology and linked data over other formats for interchange is that it is possible to exchange not merely data and information, but the very rules which govern procedures within the domain.

The need for data integration has already been studied extensively and has been included in the UK industry's rail technical strategy, however uptake of ontology remains very limited. This thesis considers means of integrating different data sources and describes tools developed to convert datasources from their original, historical, formats to formats which can be integrated using ontologies. Other barriers to an improved take up of ontology are also considered and means to overcome them presented.