

# Activity Analysis Tool (AAT)

## Instructions and Guidance

### Purpose of the Tool

It is useful to be able to relate workload to activity. This can assist in assessing which activities or scenarios in signalling are more or less demanding than others. The Activity Analysis Tool (AAT) involves observing and recording signaller's activities at certain times. It is most effective when combined with workload scores from the Integrated Workload Scale (IWS) and/or with subject matter expert (SME) commentary. This allows the relationship between workload and activities to be explored and may highlight which combinations of activities or situations are considered to produce high and low levels of effort and demand. The AAT can be applied to capture either:

- a snap shot of the activities being completed by the signaller at a pre set time interval, or
- the type and duration of activities to represent the percentage of time that is occupied by specific activities.

### Using the Tool

The method of capturing activity and duration has been applied both in the field and simulated signalling environments. Human factors experts or operational experts can use this tool, however, SME commentary should only be provided by suitably experienced operational experts.

The AAT can be applied at a particular period during a shift that requires investigation or during a particular scenario e.g. possessions or use of level crossings. The duration of the assessment depends on the period considered necessary to provide a good representation of the situation to be investigated. Experience has suggested a period of one hour as most appropriate in the field.

The AAT is presented as an excel spreadsheet 'Activity Analysis Tool V1.0'. It includes two methods to record activity: Snapshot and Activity Occupancy. The choice of method will be determined from the question that needs to be addressed by the workload assessment and the time available to complete the assessment. The AAT includes spreadsheets which contain:

- Examples of the data gathering record tables and the graphs which are produced as the output (see E.G. worksheets)
- Activity Record forms that can be used to collate data in the field
- Data tables which are generated using the information from the Activity Record forms
- Graphs which are generated from the information in the data tables and form the basis of the output from this tool.

### *Snapshot*

The snapshot method is an efficient approach to sampling the combination of activities that are associated with particular IWS ratings.

Data are collected using a print out of the Snapshot Activity Record sheet to record the activities that the signaller is carrying out at the time the IWS rating is provided. A list of signaller activities has been provided and is designed to standardise how signaller's activities are captured.

Data are then entered directly into Table 1 in the Snapshot Data worksheet. A graph is automatically produced within the 'Snapshot Graph' worksheet. This illustrates the combination of activities, IWS ratings, number of activities and number of trains on panel.

An example of how to input data and the graph produced is provided in the excel worksheet 'E.G. Snapshot'.

## **Activity Occupancy**

The Activity occupancy method is intended to represent the percentage of time occupied by an activity within a specified time period.

Activity Occupancy records the total time each activity occupies during a 5 minute period. Data are collected using a print out of the Activity Occupancy Record sheet. Data can either be collected in 5 minute intervals using the row highlighted in orange or continuously using the Continuous Activity Occupancy row highlighted in blue.

Data entered into the Activity Occupancy Record within the excel worksheet are **automatically** collated in Tables 2 or 3 in the same worksheet. These are presented in either the 'Activity Occupancy Graph' worksheet or 'Continuous Occupancy Graph' worksheet depending on your data collection approach.

## **Using AAT with IWS**

The AAT should be synchronised with the IWS time interval. The time interval that has been adopted for the IWS tool in the field is 5 minutes. This can obviously be reduced but implications of intrusiveness need to be considered.

If you intend to use the IWS software to alert the signaller and/or capture IWS ratings you will need a laptop with the software correctly installed. Alternatively a stopwatch can be used to time the rating intervals and IWS ratings can be recorded either within the Snapshot or Activity Occupancy recording sheet.

When giving instructions to the signaller for obtaining an IWS rating you need to ask them to consider their rating as reflecting the last 5 minute period of work.

For a greater understanding of the IWS Scale read the guidance document IOE/RAIL/03/20 and report IOE/RAIL/06/02/R prior to using it.

## **Data management**

The output of the AAT is graphical. Three graphs can be produced determined by the type of data collected within the Activity Record. Each of the graphs present the activity observed from the signaller with IWS ratings and number of trains active in parallel.

The SME commentary is supplemented onto these graphs once they have been imported into the final report. These comments should be presented as numbered text boxes within the graph that refer to a table attached to elaborate on what each comment refers to.

The graphs provide an illustration of how activity duration, combination and number of trains may contribute to a signaller's perception of workload captured by the IWS rating.

All data should be reported back to Network Rail Ergonomics Team to allow for further analysis and validation of the tool. Contact **emma.lowe@networkrail.co.uk**

## **Limitations**

The use of the AAT in conjunction with other workload tools (ideally IWS) provides a more comprehensive understanding of signaller workload. However, it should be recognised that there is not necessarily or always a direct relationship between actions, events and workload. The AAT cannot account for unobservable events such as mental processing, which may vary independent of the observable actions and events within the job. However, the SME commentary aims to provide some interpretation of the nature of the work being completed by the signaller.

The percentage of time that an activity occupies is useful information to understand the implications of time pressure as a dimension of workload. However, the term activity occupancy is not synonymous with workload as does not highlight how the interference of information processing resources influences the demand experienced from a combination of certain activities.