iRAP Inspection System

Accreditation Specification

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Because every life counts.

FIA FOUNDATION

iRAP
INTERNATIONAL ROAD ASSESSMENT PROGRAMME

ABOUT IRAP

The International Road Assessment Programme (iRAP) is a registered charity dedicated to saving lives by eliminating high risk roads throughout the world. Like many life-saving charities working in the public health arena, we use a robust, evidence-based approach to prevent unnecessary deaths and suffering.

iRAP works in partnership with governments, road authorities, mobility clubs, development banks, NGOs and research organisations to:

- inspect high-risk roads and develop Star Ratings, Risk Maps and Safer Roads Investment Plans
- provide training, technology and support that will build and sustain national, regional and local capability
- track road safety performance so that funding agencies can assess the benefits of their investments.

The programme is the umbrella organisation for EuroRAP, AusRAP, ChinaRAP, KiwiRAP, USRAP, IndiaRAP, BrazilRAP and SARAP. Road Assessment Programmes (RAP) are now active in more than 100 countries throughout Europe, Asia Pacific, the Americas and Africa.

iRAP is financially supported by the FIA Foundation for the Automobile and Society. Projects receive support from the Global Road Safety Facility, mobility clubs, regional development banks and donors. Our partners, charities, the motor industry and institutions such as the European Commission also support RAPs in the developed world and encourage the transfer of research and technology to iRAP. In addition, many individuals donate their time and expertise to support iRAP.

For more information

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To find out more about the programme, visit www.irap.org.
You can also subscribe to 'WrapUp', the iRAP e-newsletter, by signing up on the website homepage.

iRAP Inspection System Accreditation Specification Version 4.0 (English)

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1 INTRODUCTION

iRAP was established to help tackle the devastating social and economic cost of road crashes. Without intervention, the annual number of road deaths worldwide is projected to increase to some 2.4 million by 2030. The majority of these will occur in low-income and middle-income countries, which already suffer nine out of ten of the world's road deaths. Almost half of those killed will be vulnerable road users – motorcyclists, bicyclists and pedestrians.

Large as the problem is, making roads safe is by no means an insurmountable challenge. The requisite research, technology and expertise to save lives already exists. Road safety engineering makes a direct contribution to the reduction of road death and injury. Well-designed intersections, safe roadsides and appropriate road cross-sections can significantly decrease the risk of motorised vehicle crashes occurring and the severity of crashes that do occur. Sidewalks, pedestrian crossings and bicycle paths can substantially cut the risk that pedestrians and bicyclists will be killed or injured by avoiding the need for them to mix with motorised vehicles. Motorcycle lanes can minimise the risk of death and injury for motorcyclists.

By building on the work of Road Assessment Programmes (RAP) in high-income countries (EuroRAP, AusRAP, USRAP and KiwiRAP) and with the expertise of leading road safety research organisations worldwide, including ARRB Group (Australia), TRL (United Kingdom), MRI Global (United States) and MIROS (Malaysia), iRAP has developed four globally-consistent protocols to assess and improve the safety of roads.

The iRAP Protocols

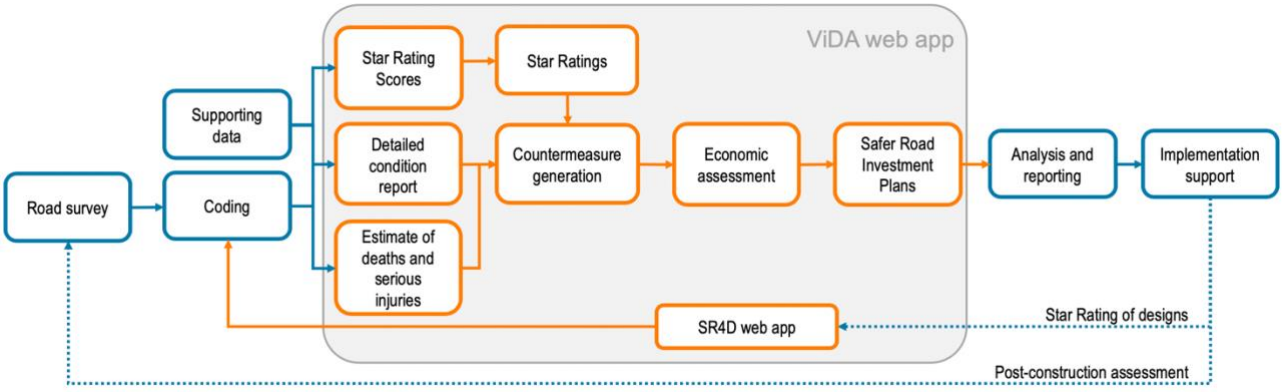
1. **Risk maps** use detailed crash data to illustrate the actual number of deaths and injuries on a road network.
2. **Star Ratings** provide a simple and objective measure of the level of safety provided by a road's design.
3. **Safer Roads Investment Plans (SRIP)** draw on approximately 90 proven road improvement options to generate affordable and economically sound infrastructure options for saving lives.
4. **Performance Tracking** enables the use of Star Ratings and Risk Maps to track road safety performance and establish policy positions.

This specification presents requirements for an inspection system to gain iRAP accreditation, which relates to road surveys and coding systems that are used as part of the process of producing Star Ratings and Safer Roads Investment Plans (SRIP). It is one of a number of specifications and guides provided for completing projects, accreditation and results analysis shown below.

- Project Planning Manual (includes the Standard Terms of Reference)
- **Inspection System Accreditation Specification**
- iRAP Survey Manual
- iRAP Coding Manual
- Upload File Specification
- iRAP Star Rating and Investment Plan Manual
- ViDA User Guide
- Star Rating for Designs User Guide (for users of the SR4D web app)

The figure below illustrates the process used to undertake Star Ratings and Safer Roads Investment Plans, which can be used as part of a systematic, proactive approach to road infrastructure risk assessment and renewal based on research about where severe crashes are likely to occur and how they can be prevented.

The iRAP Star Rating and Safer Roads Investment Plan process



1.1 What is an iRAP accredited inspection system?

A system that is iRAP accredited is fully capable of being used in:

1. The performance of survey activities described in *iRAP Survey Manual*.
2. The performance of road attribute coding activities described in the *iRAP Coding Manual*.

1.2 Training and accreditation

iRAP activities require specialist skills and knowledge. iRAP strongly recommends training for people preparing to undertake an iRAP project. Information about the training courses available can be found on the iRAP website, at https://www.irap.org/training.

iRAP also manages an accredited supplier scheme. There are two categories of iRAP accreditation:

1. Activity accreditation. Suppliers that hold activity accreditation have completed training and successfully completed a test and have demonstrated experience. They have also signed the *iRAP Accredited Supplier Code of Conduct*. Activity accreditation is renewed annually based on demonstrated experience and may include refresher training and consideration of client feedback.
2. Inspection system accreditation, which relates to equipment and software used to perform surveys and coding. Inspection systems that are accredited have met the requirements described in this specification, and their manufacturers have signed the *iRAP Accredited Supplier Code of Conduct.* Inspection system accreditation is renewed every three years and may include retesting of the system and consideration of client feedback.

It is beneficial that accredited suppliers and an accredited inspection system are used in iRAP assessments, though it is not mandatory. Information about accreditation can be found on the iRAP website, at https://www.irap.org/accreditation.

If it is decided that accredited suppliers and/or an accredited inspection system will be used in a survey project, the following information on the team members and inspection system should be included in terms of references (TORs) and contracts.

Survey team members

Name	Email address	Role(s) in project	iRAP accreditation number	iRAP accredited since date	iRAP accreditation renewal due date

Inspection system

Inspection system name	Manufacturer	iRAP accreditation number	iRAP accredited since date	iRAP accreditation renewal due date

2 INSPECTION SYSTEM SPECIFICATION

The purpose of an inspection system is to enable:

1. The performance of survey activities described in *iRAP Survey Manual*.
2. The performance of road attribute coding activities described in the *iRAP Coding Manual*.

There are three classes of inspection system accreditation, summarised below.

Inspection system classes

Class	English version, user manual, training and flyer	Location data		Images		Coding
		Accuracy	Drop out	Min. field of view	Min. resolution (pixels)	
A	✓	< +/-10m for at least 90% of images	< 500m continuously	140° forward facing	1280 x 960	Able to code all attributes
B	✓	< +/-5m for at least 90% of images	< 250m continuously	160° forward facing	1280 x 960	Able to code all attributes Able to measure width/distance on screen: o Roadside severity-distance o Paved shoulder o Lane width Able to measure from sensors: o Curvature o Grade
C	✓	< 2.5m for all images	None	160° forward facing and rear facing coverage	1280 x 960	

2.1 Language

1. The system shall have an English language option.

2.2 User manual and training

1. The system shall have a user manual that includes details how to set-up and use all equipment and software. In particular, the manual shall include details on the safe use of the inspection system such as correct mounting of equipment on and in a vehicle.
2. Training shall be available for new users of the system. This can include face-to-face classes and/or online training content.

2.3 Promotion

1. The system shall have a 2-pager flyer that describes the system and capabilities which may be downloaded from the iRAP accreditation webpage. The flyer must be available in English.

2.4 Images

1. The system shall enable images (video or still digital images) to be collected with minimum resolution of 1280 x 960 pixels.
2. The system shall enable images to be collected with a minimum 140-degree field of view (centred on the travel lane). This may be accomplished with either a single camera or with multiple cameras with overlapping fields of view.
3. The system shall enable images to be captured at fixed intervals of 20m or less.

2.5 Geo-referencing

1. The system shall enable geo-referencing data to be recorded for each image. This data shall include:
    a. Unique image reference
    b. Road name
    c. Road section
    d. Distance along the road
    e. Section length
    f. Date
    g. Time
    h. Latitude and longitude
2. Latitude and longitude data shall be recorded in decimal degrees using WGS84 projection.
3. Latitude and longitude data shall be recorded with a minimum accuracy of < +/-10m for at least 90% of images and must not 'drop-out' for any more than 500m at a time.

2.6 Coding

1. The system shall be capable of supporting road attribute coding, as described in the *iRAP Coding Manual*.
2. The system shall be capable of simultaneously displaying to the coder an image for a particular location and a coding form. The coding form shall be capable of including all road attributes the *iRAP Coding Manual*, including entry of numeric or alphanumeric data, drop-down menus or attribute buttons, as appropriate.
3. The system shall be capable of displaying images at 100m intervals and have the ability to display the images at 20m or less intervals.
4. The system shall be capable of displaying both the image and coding form in a size large enough for effective use by a coder. This may require display across two monitors to obtain displays of suitable size, clarity and resolution.

5. Where multiple cameras were used to achieve a wide field of view during the survey, the system shall be capable of aligning the separate images on the screen to obtain a continuous view of the roadway and roadside at each location.
6. The system shall be capable of storing coding data for images at 100m intervals. It must be capable of automatically advancing 100m to the next location in a convenient fashion, preferably with a single mouse click or hot key.
7. The system shall allow the coder to easily review coding data for all images at any time with and without making amendments to the coding data.
8. The system shall be capable of automatically incorporating the geo-referencing data collected during the survey, with the associated with image, into the stored coding data (i.e. without the need for the coder to manually rekey the geo-referencing data).
9. The system shall be capable of retaining the values entered in selected fields of the coding form from one 100m segment to the next, so that coders only need to modify coding for those attributes that have changed.
10. The system shall be capable of converting the stored coding data to a .csv file that complies with the *iRAP Coding Manual*.
11. The system shall be able to be shared with others, including the client and others nominated by the client, to allow them to review survey and coding data.

3 CODING-ONLY SYSTEM SPECIFICATION

The purpose of a coding-only system is to enable the performance of coding activities described in the *iRAP Coding Manual*. That is, make use of images collected during a survey.

The system shall comply with above sections 2.1, 2.2, 2.3 and 2.6. Additionally, the user manual shall include details on the types of survey data it is compatible with and instructions on how to prepare survey data for use with the system.

4 IRAP INSPECTION SYSTEM CHECKLIST

Company name:	
Company website:	
Company lead contact:	
Company lead contact email:	
Inspection system name:	
Accreditation reviewer:	
Date:	
10km sample data and software provided for review or renewal?	Yes / No
Inspection system type	Inspection system / Coding-only
Class (if applicable):	

Checklist:

Item	Complies (Yes / No)	Details / Comments
User manual and training		
Language		
User manual		
Training		
Promotion		
Images		
Resolution		
Field of view		
Intervals		
Georeferencing (for each image)		
Unique image number		
Road name		
Road section		
Distance along the road		
Section length		
Date		
Time		
Latitude and longitude in WGS and decimal		

Item	Complies (Yes / No)	Details / Comments
Latitude and longitude minimum accuracy of < +/-10m for at least 90% of images and must not 'drop-out' for any more than 500m at a time.		
Latitude and longitude 'drop-out' no more than 500m at a time.		
Coding		
Simultaneously displays to the coder an image for a particular location and a coding form.		
Coding form includes all road attributes and allows entry of numeric or alphanumeric data, drop-down menus or attribute buttons, as appropriate.		
Displays images at 100m intervals and has ability to view the images at 20m intervals.		
Image and coding form in a size large enough for effective use by a coder.		
System shall be capable of aligning the separate images on the screen to obtain a continuous view of the roadway and roadside at each location.		
Capable of storing coding data for images at 100m intervals.		
Capable of automatically advancing 100m to the next location in a convenient fashion.		
Allows coder to easily review coding data for all images at any time.		
Capable of automatically incorporating the geo-referencing data collected during the survey, and associated with each image, into the stored coding data.		
Capable of retaining the values entered in selected fields of the coding form from one 100m segment to the next.		
Capable of converting the stored coding data to a .csv file that complies with the *Upload File Specification*.		
System able to be shared with others.		

Document version

Version	Update
March 2009	*Star Rating Inspection System Accreditation Specification and Record* created.
December 2011	Document style updated.
January 2013	Specification document upgraded for iRAP Star Rating V3 model.
May 2019	*iRAP Inspection System Accreditation Specification 4.0* released as part of a full update to iRAP specifications, user guides and manuals. The new specification combines information from previous versions of the *Star Rating Inspection System Accreditation Specification and Record* and *Road Survey and Coding Specification.* The new *iRAP Inspection System Accreditation Specification* now includes additional guidance on system requirements, including availability in English and options for training.