THE NSSR ROAD SAFETY/SUPPORT PROGRAMME

FITNESS OF A RAILWAY CROSSING

Road Safety / Support is a mainline National Safety and Social Responsibility

DASHBOARDING ROAD SAFETY / SUPPORT

BY

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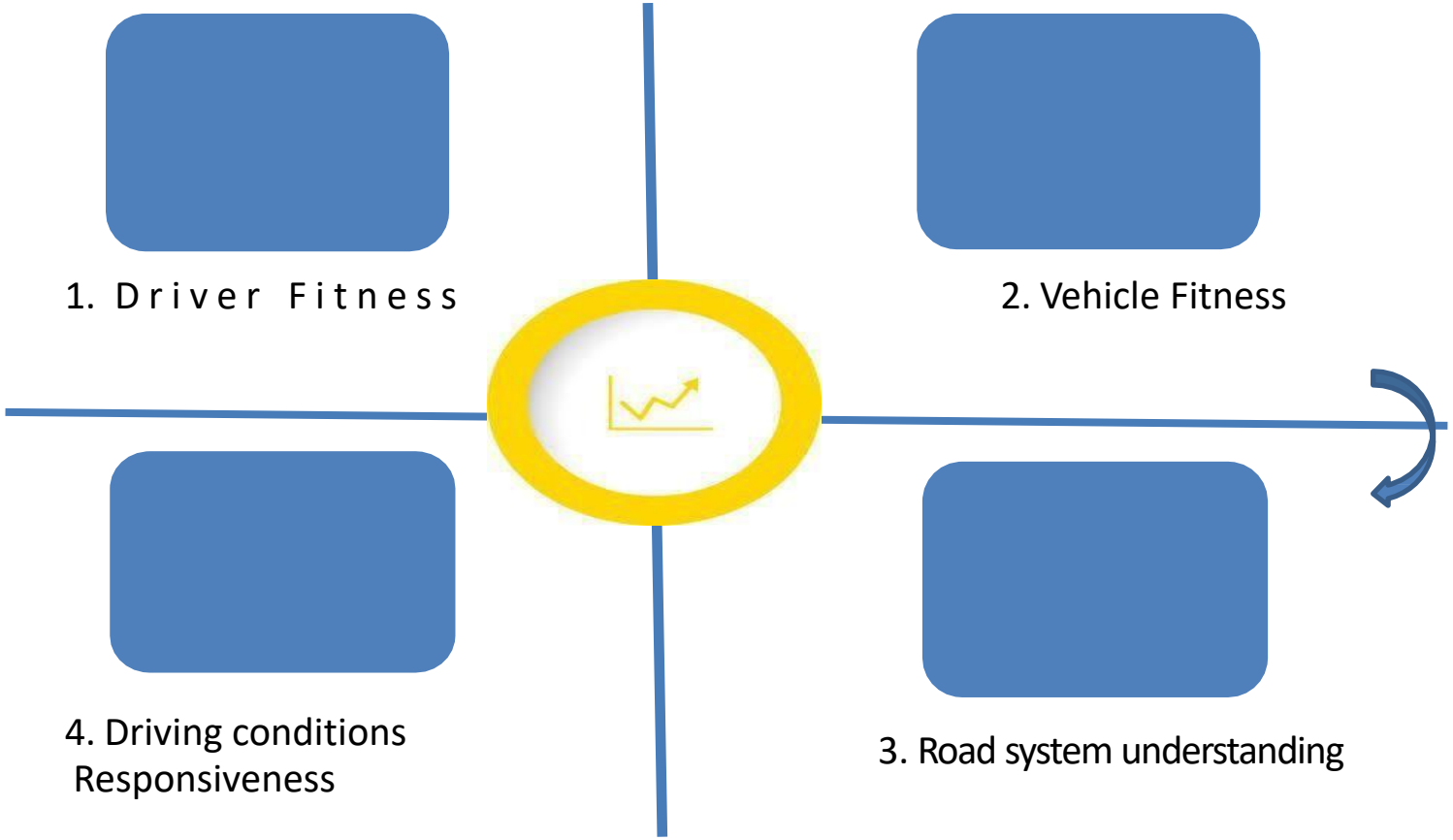
Dashboarding Road Safety/Support

- **AOEC finds that safety while commuting on road, depends upon the automobile manufacturer's quality assurance, driver fitness, vehicle fitness, driving conditions dimensioning, and road system responsiveness, where driving conditions n**eed us as commuters/road-system-infrastructure stakeholders to fine focus and design capability for improved road safety.

Driving conditions dimensioning

JOURNEY/TRIP Route, Railway crossings on-route, Road Surface, Distance, Drive time, and Correlation for Responsiveness, Safety and Reliability



COMMUTING AND 5R(S)

Relate

Respond

Reduce Risk

Reciprocal Driving insights

TMS Resilience for route designed RADIUS and CIZ

CIZ : CRITICAL INTERACTION ZONE IN A JOURNEY/TRIP

Dashboarding Road Safety/Support

- AOEC finds that instrumentally, Dashboarding Road Safety / Support (DRSS) projects must
- define a TMS workflow for accentuating
- 1. Driver Fitness
- 2. Vehicle Fitness
- 3. Road system understanding
- 4. Alpha Assistance
- 5. 5R(s) SMART(ness) for a safer journey

CRITICAL INTERACTION DETERMINERS

ROAD SURAFCE COVERINGS, LIGHT / SHADE ISSUES, CURVES, MEANDERS, INCLINES, BOTTLENECKS, CLOSE PROXIMITY REGIONS, FITNESS OF RAILWAY CROSSINGS

SMART(ness) :

SPECIFIC CRITICAL INTERACTION FOR MEETING NEED WITH APPLICABLE INSIGHT RESPONSE AND TEMPERAMENT

Dashboards

EXPERT SYSTEM

SPHERE OF CONTROL, FOCUS, CAPABILITY AND INGENUITY

TIME MOTION SCALE / POINT SLOPE INTERCEPTION

Handbooks/Guides/Planners

Dashboarding Road Safety/Support

CRITICAL INTERACTIONS

EXPECTED LICENSE, PROBABLE INCIDENCE/HAZARD/ RISK/RULE COMPLIANCE, RAILWAY CROSSING DISCIPLINE, PRECISE DRIVING, ENDURANCE DRIVING, INTERCEPTING CURVES, MANEUVERING OPTIONS, RESPONSE, RAPID RESPONSE, UNDERSTANDING SERVICE ANYWHERE ANYHOW ASSISYANCE, EMERGENCY RESPONSE / SPECIFIC NEEDS

Dashboarding Road Safety/Support

- DRSS SMART(ness) for a journey/trip and virtual POINT SLOPE INTERCEPTION can make it simpler to identify the tangible correlation between driving conditions dimensioning of a route/road system/road with a DRSS Workflow to help and improve safer commuting

- This DRSS Workflow plus NSSR RS programme teamwork can
- Record-or-review,
- Relate,
- Reduce risk,
- Reciprocate response and
- Design Resilience for any journey/trip and its dimensions like the
- road surface,
- distance,
- drive time,
- commute reliably factors, where there is universal or brand specific service centre-assessable part-lifetime mitigation, condition monitoring, traceable fault tolerance/preventive and corrective action, where this DRSS Workflow development can help a NSSR participant define/use a NSSR RS index for a journey/trip/TMS radius, where the index can be simply (1), (2), (3), (4) or combinations of them

The NSSR project recommends the use of different assistants to help commuters improve their experience

Dashboarding Road Safety/Support

- **(1) NRRS-I1:=** where this workflow will need to address History of interaction & **Foreseeable needs** and 5R(s)
- **(2) NRRS- I2:** = this workflow will need to address **Critical Interaction Zone** needs and 5R(s)
- **(3) NRRS- I3:** this workflow will need to address **Road/Route dynamics** and 5R(s)
- **(4 NRRS- I4:** this workflow will need to address A**dvanced safetyneeds and 5R(s)**
- (like air quality, unregulated climate intolerance, temperature/humidity, road system or road or terrain safety, with more than an expected driving style for commuting with safety, reliability & timing and with more than programmed gear changes, or braking or drive distribution between the front and rear wheels as expected in 4WD modes)
- The bulletin looks at the different assistants that can help a commuter's 5R(s). The editions that follow will delve into details of each of them to help a commuter/stakeholder ramp up scores in a dashboard

Dashboarding Road Safety/Support

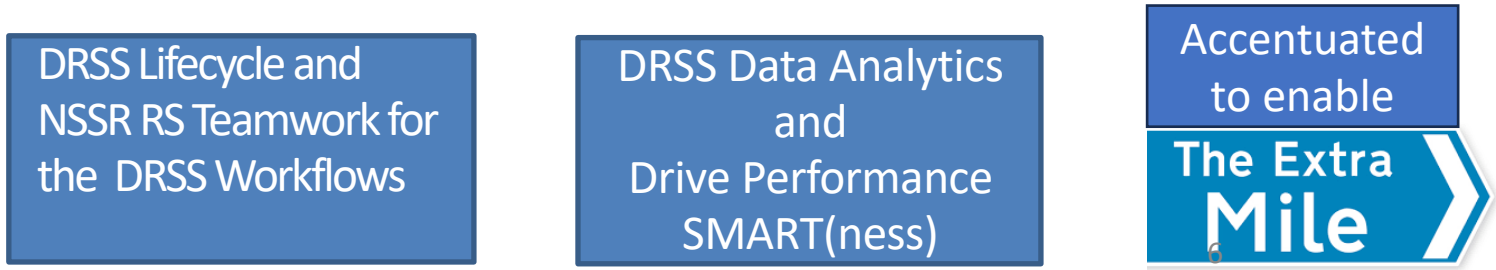
- The DRSS Data Analysis Channel Building for an **automobile manufacturer's quality assurance, driver fitness, vehicle fitness, driving conditions dimensioning, and road system responsiveness** for deteriorating or changing driving conditions dimensioning of the needed SMART(ness for safer commuting will need to

- **1. Improve Sensitization and Awareness for Road Safety**

- **2. Develop issue/feedback/data channelization for safer commuting**

- **3. Provide handbooks/guides/planners for such planning/ incorporation**

- **4. Promote quality for road safety and infrastructure via NSSR guided methodologies like the training programmes/monthly bulletins & quizzes/dashboarding of experience or incidences**



Road safety and Accountability Dashboard for the Year 2026

- ❑ Certificate of Excellence — YES / NO / NOT SATISFACTORY
- ❑ Traffic issues or incidences — YES / NO / NOT SATISFACTORY
- ❑ Compliance with FMVSS standards — YES / NO / NOT SATISFACTORY
- ❑ Onboarding of NSSR Road Safety objectives — YES / NO / NOT SATISFACTORY
- ❑ Upgradability of NSSR Road Infrastructure objectives — YES / NO / NOT SATISFACTORY
- ❑ Traffic Engineering Assets planning — YES / NO / NOT SATISFACTORY
- ❑ Traffic Engineering Defects Liability — YES / NO / NOT SATISFACTORY
- ❑ Improved on-road assistance — YES / NO / NOT SATISFACTORY
- ❑ Cost of Quality /Cost of Poor-Quality Project Assistance — YES / NO / NOT SATISFACTORY
- ❑ Complexity for Road Safety and Accountability — YES / NO / NOT SATISFACTORY

Year:

Road safety and Accountability Dashboard for the Year/Season 1

- ❑ Certificate of Excellence — YES / NO / NOT SATISFACTORY
- ❑ Traffic issues or incidences — YES / NO / NOT SATISFACTORY
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- ❑ Complexity for Road Safety and Accountability — YES / NO / NOT SATISFACTORY

Season: Summer / Spring/ Monsoon/ Winter

Road safety and Accountability Dashboard for the Year/Season 2

- ❑ Certificate of Excellence — YES / NO / NOT SATISFACTORY
- ❑ Traffic issues or incidences — YES / NO / NOT SATISFACTORY
- ❑ Compliance with FMVSS standards — YES / NO / NOT SATISFACTORY
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- ❑ Traffic Engineering Assets planning — YES / NO / NOT SATISFACTORY
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- ❑ Improved on-road assistance — YES / NO / NOT SATISFACTORY
- ❑ Cost of Quality /Cost of Poor-Quality Project Assistance — YES / NO / NOT SATISFACTORY
- ❑ Complexity for Road Safety and Accountability — YES / NO / NOT SATISFACTORY

Season: Summer / Spring/ Monsoon/ Winter

Road safety and Accountability Dashboard for the Year/Season 3

- ❑ Certificate of Excellence — YES / NO / NOT SATISFACTORY
- ❑ Traffic issues or incidences — YES / NO / NOT SATISFACTORY
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- ❑ Complexity for Road Safety and Accountability — YES / NO / NOT SATISFACTORY

Season: Summer / Spring/ Monsoon/ Winter

Road safety and Accountability Dashboard for the Year/Season 4

- ❑ Certificate of Excellence — YES / NO / NOT SATISFACTORY
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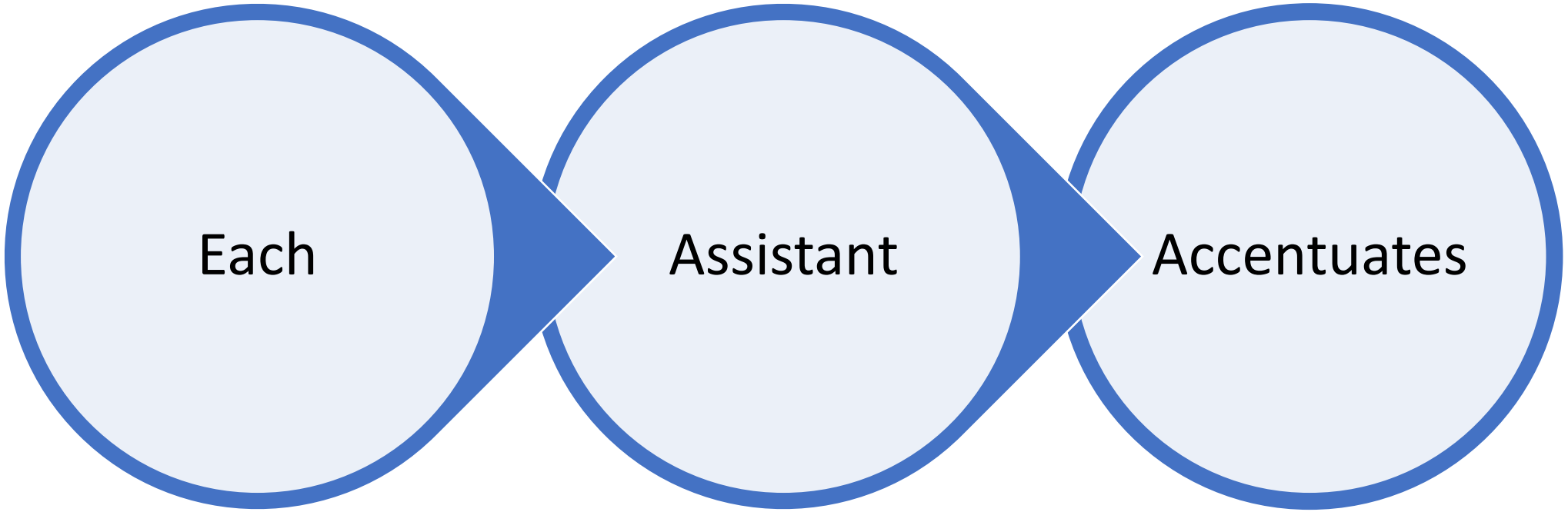
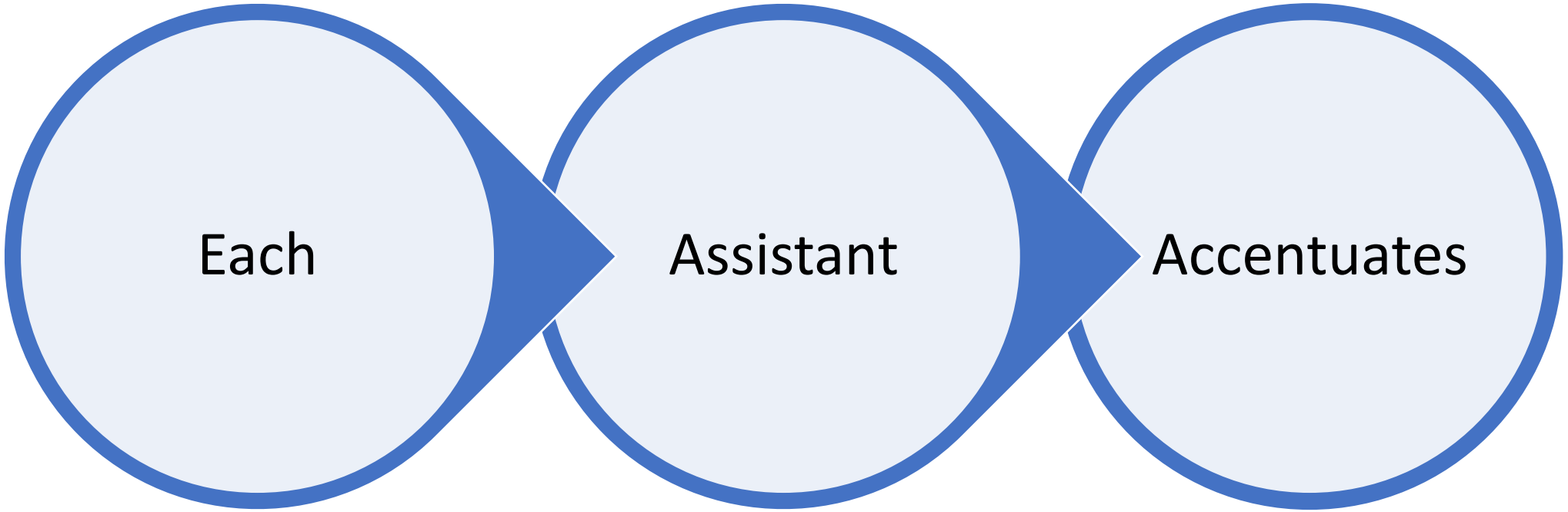
Season: Summer / Spring/ Monsoon/ Winter

DRSS Assistants - RAILWAY CROSSING FITNESS AND ROAD SAFETY



TMS - RAILWAY CROSSING FITNESS & SAFETY Assistants



TMS-Railway Crossing Fitness and Assisting data

Railway Crossing Fitness Identification and Configuration Details

- **Route/Road System/Road:**
  NSSR RS index: **NRRS-I1/ NRRS-I2/ NRRS-I3/ NRRS-I4**
- **Railway Crossing Fitness (RCF) Edition: Regular/ AI Powered**
- **RCF Channel Building Id: DRSS Analysis/Accentuation Channel**
- **Time of the year/season:**

- **Railway Crossing highlight: With Safety systems (Manned) / With inadequate Safety Systems (Manned) / Without Safety systems (Unmanned)/ Without Manned Gateman duties 24/7**
- **Railway Crossing traffic congestion issues:**

TMS-Railway Crossing Fitness and Assisting data

- **Nature of fitness level (by trip history / by observation+):**
- **Structural & Design Standards: Safe/Unsafe/Not aware**
- **Track Components: Safe/Unsafe/Not aware**
- **Surface level for crossing: Safe/Unsafe/Not aware**
- Clearances for crossing: **Safe/Unsafe/Not aware**
- Warning devices for crossing: **Safe/Unsafe/Not aware**
- **Current / Estimated condition or history:**
- Dysfunction evident/Safety standards not regularly incorporated/Unfit for new route or unregulated driving/ Unfit for night time driving/ Unfit for traffic movement in peak hours
- **Flagging of hazards/ risks/issues/special needs:** Yes/No/Not aware

TMS-Railway Crossing Fitness and Assisting data

- **Estimated Physical Components Safety level (with mention of gates or barriers, timing schedule boards as or if most possible, timing details boards for gateman duties, traffic condition norms/driving discipline boards, emergency response or immediate action boards, last inspected and maintained notice boards):**

TMS-Railway Crossing Fitness and Assisting data

- **Estimated Functional Safety level (with mention of warning systems for commuters and the gateman, recommendation of field level clothing for commuters, equipping of field level clothing and gear for gateman like visible at night or in foggy conditions uniform/jackets, red/amber/green combo or tri-color torches, flags, hand signal lamps, communication devices):**

TMS-Railway Crossing Fitness and Assisting data

- **Estimated Road surface type and level for road (with mention of relevant sleepers/relevant bearing plates/if and only if important rail joints within crossing area):**

- **Estimated Critical interaction details (like angle of crossing that should be mostly at right angles or not less than 45 degrees):**

TMS-Railway Crossing Fitness and Assisting data

- **(CIZ) Estimated Critical Interaction Zone details (with mention of load capacities for vehicle movement with or without goods, relevant driver fitness, relevant vehicle fitness, relevant connecting road system fitness)**

- **Nature of performance / response expected:**

TMS-Railway Crossing Fitness and Assisting data

- **Safety level OK/Clearances from current NSSR RS index:**
- **Safety level Overheads/Failures by current NSSR RS index:**
- Safety levels with **next possible repair/replacement/ maintenance** by current NSSR RS index.

TMS-Railway Crossing Fitness and Assisting data

- **TMS Channel Building - Sampling, Inspection or Maintenance schedule (tabulation):**
- **Log date/time:** **Log Id:**
- **Carried out by:**
- **Details of work carried out (as relevant to the case)**
- **(a-1) Visual and Safety inspection**
- **Details:**

TMS-Railway Crossing Fitness and Assisting data

- **TMS Channel Building- Inspection or Maintenance schedule (tabulation):**

- (a-2) Physical Parts / Systems Assessment (as per CIZ and related conditions)
- Details:

TMS-Railway Crossing Fitness and Assisting data

- **(a-3) Sectional Permanent Way Inspector and Assistant Engineer Review and Safety comments (as applicable)**
- **[Details:**

TMS-Railway Crossing Fitness and Assisting data

- **(b) Comfort level / Safety level specific Preventive maintenance details (as applicable)**

TMS-Railway Crossing Fitness and Assisting data

- **(c) Comfort level / Safety level specific Corrective maintenance details (as applicable)**

TMS-Railway Crossing Fitness and Assisting data

- **(d-1) Gateman duty/Warning system/Inspection & Maintenance experience 5R(s)**

TMS-Railway Crossing Fitness and Assisting data

- **(d-2) Railway Crossing Fitness & Safety Compliance 5R(s)?**

TMS-Railway Crossing Fitness and Assisting data

- **(d-4) TMS Channel Building / Incidence management ck details (as applicable)**
- **Details:**

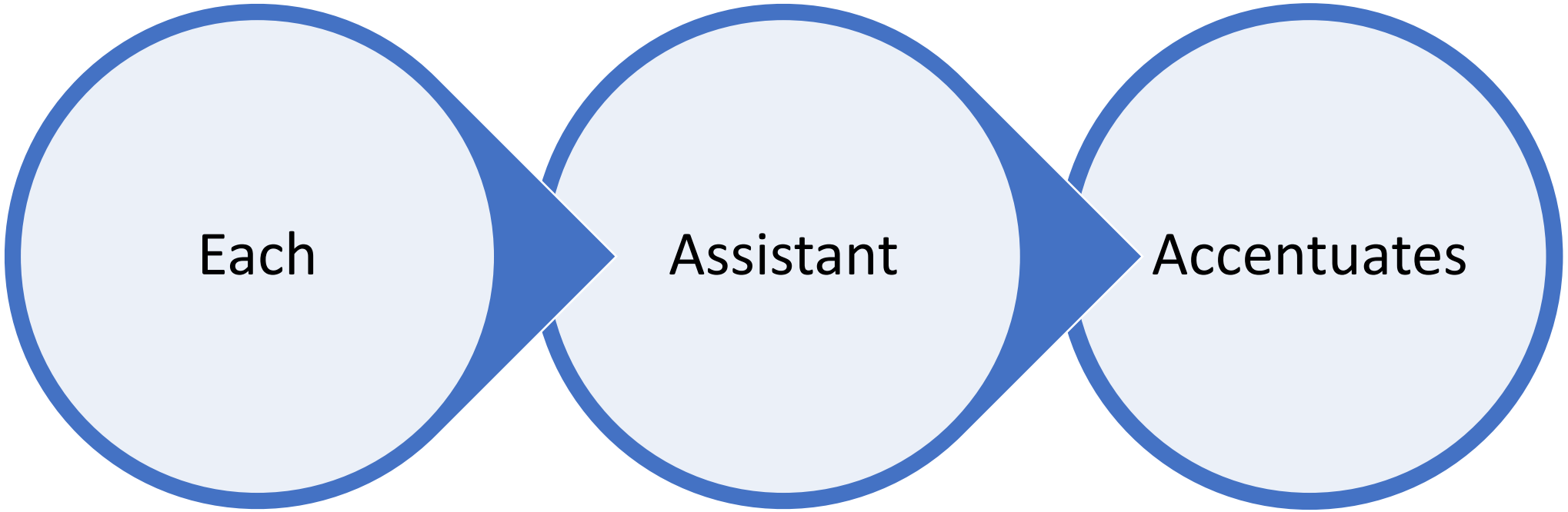
TMS-Railway Crossing Fitness and Assisting data

- **(e) Delay/Breakdown, Crossing experience or comfort, or safety, or performance issue-mitigation details (as applicable)**
- **Details:**

TMS-Railway Crossing Fitness and Assisting data

- **(f) Safety advisory (as relevant to the case):**
- **(a) Dos**
- **(b) Donts**

TMS-Guiding-system NSSR RS Video Assistants



TMS-Guiding-system – NSSR RS VIDEO ASSISTANT

- The proposed video assistance can be based on 3 fundamental stages, that is
- 1. Process
- 2. Diagnose
- 3. Classify
- **The Process stage of the solution**
- **1. Process (being sampled)**
- The Process stage will enable a DRSS/NSSR RS master and REALTIME DRSS/NSSR RS candidate video to be played in 2 different panes to check quality or eligibility, or played and captured as (snapshot) frames, where the frames are stored in specific master and candidate folders for these frames to be later reviewed, diagnosed and classified
- The code for comparing images of a candidate video image with a master video image has been tested using the sift implementation available in cv2

TMS-Guiding-system – NSSR RS VIDEO ASSISTANT

The Diagnose stage of the solution

2. Diagnose (to be sampled)

The Diagnose stage will use a DRSS/NSSR RS master folder and REALTIME DRSS/ NSSR RS candidate folder of master and candidate video (snapshot) frames.

On the selecting of a master video frame, it will be used for training, diagnosis and associated comparisons.

If a candidate video frame does not comply with the conformity of the benchmarked master video frame, then the candidate frame will be copied into the C-Frames-not-ok sub folder for further deep learning/classification

If a candidate video frame does comply with the conformity of a benchmarked master video frame, then the candidate frame will be copied into the C-Frames-ok sub folder under K-Nearest Neighbour distance pretexts

- **The Classify stage of the solution**
- **3. Classify (to be sampled)**
- The candidate video and candidate video frames that are not conformant in comparison with the benchmark master video and master video frames, will be specifically used for deep learning of the issues seen or for classification that permits in-sync problem resolution.
- The feature of deep learning will evolve with the scope of the project/solution
- AOEC is also reviewing the use of an AI Powered Dashcam to help formalize the video assistance solution

TMS-Guiding-system – AI powered VIDEO ASSISTANT

reviewing

- **Railway Crossing Fitness and Road Safety Relevance**

TMS-Guiding-system – AI powered VIDEO ASSISTANT

reviewing

■ ADAS

Lane departure warning (LDW)
Forward collision warning (FCW)
Headway monitoring warning (HMW)

Forward collision warning (FCW)

Lane departure warning (LDW)

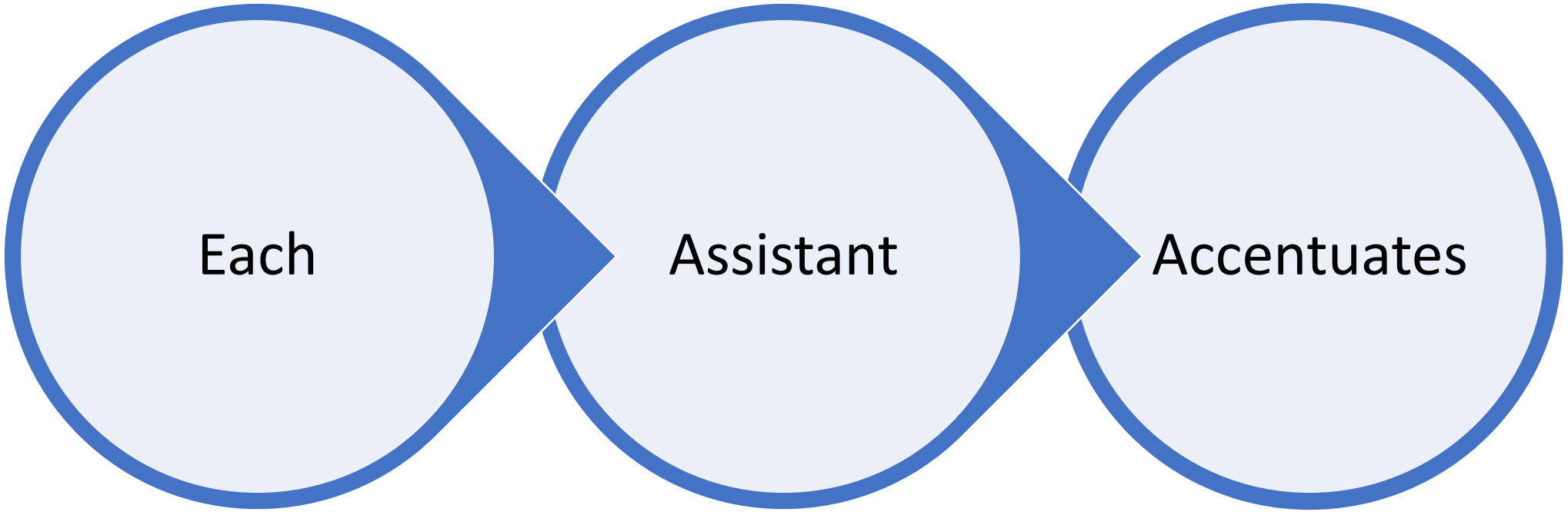
Headway monitoring warning (HMW)

■ DMS

Notes for Railway Crossing Fitness and Road Safety

Field book pertinence

DRSS Assistants – RAILWAY CROSSING FITNESS AND ROAD SAFETY



Quiz

DRSS Assistants – RAILWAY CROSSING FITNESS AND ROAD SAFETY