Developing a European Approach to the Initial Training of Motorcyclists

TREN-SUB-2003-S07.30333

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Executive Summary

The Developing a European Approach to the Initial Training of Motorcyclists Project,TREN-SUB-2003-S07.30333, known as the Initial Rider Training Project, has considered the widely acknowledged problems of pre-licence rider training in Europe being widely variable in quality and or availability.

The IRT Project has addressed one of the main problems affecting the quality of initial rider training, namely the concentration on machine control skills to the detriment of hazard awareness and rider attitude and behaviour. The relationship between newly qualified rider overconfidence, failing to recognise hazards and take risks and pre licence training that has overly focussed on machine control skills, has been recognised for a long time. Notwithstanding this the IRT Supervisory Board are unaware of any previous serious or structured endeavours to develop a pre-licence training programme that even attempts, let alone achieves a balance between machine control and hazard awareness.

This, we believe, the IRT Project has successfully done. Working with acknowledged experts covering a wide range of motorcycling, academic and road safety interests, the resulting IRT model European initial rider training programme can deliver machine controls skills in the context of their relevance to the hazardous environment of today's roads, with an understanding of the rider having a primary responsibility for his or her own safety. The IRT Supervisory Board are sure that the IRT model European programme will offer a real improvement to much of the pre licence training presently available to riders within the European Union.

The modular structure and pedagogical approach of the IRT model European initial rider training programme can also offer a real improvement to the availability of initial rider training. Whilst it has been primarily developed to be used in a training environment where the rider is paying for the services of the instructor, in can also be utilised in a range more informal training situations. It will offer real assistance to the family member or friend, or the motorcycle club or safety organisation, seeking to impart good, safe riding skills, often in circumstances where professional training is not available or is of poor quality.

In support of these main aims the IRT Project has considered the very exciting and innovative area of e-Coaching and the contribution that it could make to improving initial rider training, particularly in the context of exposing riders to virtual hazardous situations without putting them in any way at risk. The work undertaken by the IRT Supervisory Board has concluded that an e-Coaching approach as envisaged within this Final Technical Implementation Report and the

report of the Hypermedia Unit of Tampere University of Technology, does have the potential to make a major contribution to the safety of riders of motorcycles and scooters. The IRT Supervisory Board believes that it is particularly important that their work on this question is followed up and see the European Commission as possible being the only institution able to so do.

Riding a motorcycle or scooter offers freedom and flexibility for many people. It is fun and can be exciting. It has to be recognised however that the rider is vulnerable and even if the rider is not at fault, as is the case in the majority of accidents, without the benefits of the range of passive safety measure available to drivers they are more likely to be hurt.

The IRT model European initial rider training programme in its present Theoretical, Machine control and Traffic interface three element form, offers to the new rider the best chance of meeting the challenges and recognising and managing the hazards that will be met. The addition of a fourth e-Coaching element could further and significantly improve the situation.

The conclusion and recommendations of the IRT Project are in no way seeking to advance any vested interests. Their intent is only to make future riders of motorcycles and scooters better trained and safer.

Introduction

The general objective of the Developing a European Approach to the Initial Training of Motorcyclists project (hereinafter referred to as the Initial Rider Training Project or the IRT Project) is to improve the often poor and sometimes non-existent training that rider of a powered two-wheeler receives prior to obtaining an A category licence.

To meet this general objective the IRT Project undertook to consider and to deliver conclusions and recommendations to the European Commission in four distinct areas:

1: The essential elements of a model European initial rider training programme.

2: How a model European initial rider training programme can be utilised in different demographic and economic circumstances.

3: The potential of e-Learning (hereinafter referred to as e-Coaching) to support initial rider training and how virtual training approaches could be developed.

4: The development of the essential elements into a comprehensive, cohesive and cost-effective European initial rider training initiative.

In considering this Final Technical Implementation Report it should be understood that the IRT Project has not just been a research project. Importantly it has also been the means of developing practical and effective arrangements to better train motorcycle and scooter riders. Giving to them not only the ability to pass a test and gain an A category licence, but also to obtain the range of skills and knowledge essential to ride safely and responsibly on the roads of the European Union in the 21st Century. These include hazard awareness and attitude and behaviour, considerations that are often only touched on, even completely ignored, in many existing initial rider training problems.

Managing the IRT Project

A Supervisory Board was established and has met four times. It met in Brussels on the 18th and 19th January and the 22nd and 23rd March and in Paris on the 3rd and 4th October, 2005 and again in Brussels on the 5th March 2007.

Members of the IRT Supervisory Board, in alphabetical order:

Dr. Hans-Yngve Berg, driver education specialist, Vägverket, Sweden.

Jacques Compagne, Secretary General of the Association des Constructeurs Européens de Motocycles (ACEM), Belgium

Achilles Damen, public prosecutor and chairman of the Fédération Internationale de Motocyclisme (FIM) Commission for Mobility, Transport, Road Safety and Public Policy, The Netherlands.

Aline Delhaye, General Secretary of the Federation of European Motorcyclists' Associations (FEMA), Belgium

Professor Erik Duval, Catholic University of Leuven, head of the research unit on hypermedia and databases and President of the Ariadne Foundation, Belgium.

Dr. Marie-Axelle Granié, head of research in the psychology of development, Institut National de Recherche sur les Transports et leur Sécurité, France.

Ian Lee, General Manager of the British Motorcyclists Federation's Rider Training Scheme, United Kingdom.

Brane Legan, Police Officer, International safety riding and driving instructor, responsible for rider and driver training at Slovenian Police Academy, chief instructor for safety, riding and driving at the Automobile and Motorcycle Association of Slovenia.

Marc O'Loideoin, Senior Instructor Star Rider Training Scheme, Ireland.

Antonio Perlot, Public Affairs Manager of the Association des Constructeurs Européens de Motocycles (ACEM), and former General Secretary of FEMA, Belgium.

Dr. Pekka Ranta, Senior Researcher, Hypermedia Unit, Tampere University of Technology, Finland

Roger Renoy, head of the National Police rider and driver training academy, Belgium

Filip Sergeys, responsible for training and simulation, Honda Europe, Belgium

Peter Smirz, Vice- President of Internationaler Verbaund für Verkehrserziehung (IVV) and Director of a leading rider and driver training school, Austria.

During the period of the IRT Project there were changes in the membership of the Supervisory Board. Due to the conflicting academic commitments Professor Eric Duval was unable to attend and Mr. Ian Lee had to submit his resignation due to ill health. Dr. Pekka Ranta and Mr. Marc O'Loideoin became members of the Supervisory Board. At The request of ACEM Mr. Filip Sergeys and at the request of FEMA Ms. Aline Delhaye also became full members of the Supervisory Board. Mr. Antonio Perlot, who moved from FEMA to join ACEM, remained a full member.

In addition to the above permanent members the following persons have also participated in meetings of the Supervisory Board:

> Robin Cummins, former Chief Driving Examiner, Driving Standards Agency, United Kingdom

> Duarte Forjaz, rider education, Federaçao Nacional de Motociclismo, Portugal.

> Silvio Manicardi, Senior Manager, Honda Europe Motorcycles, Italy.

> Trevor Wedge, Chief Driving Examiner, Driving Standards Agency, United Kingdom.

At the first meeting of the IRT Supervisory Board it was agreed to establish two specialist groups of experts.

The first is the Instructors' working group (initially called the Machine control working group) comprising of Ian Lee, Brane Legan, Marc O'Loideoin, Roger Renoy and Peter Smirz, together with the Project Co-ordinator. It has met four times. The first meeting was in Brussels on the 22nd March and the second in Vienna on the 28th and 29th June 2005 when they were joined by Gerhard Malzer, Vice President of the Austrian riding and driving instructors' association. The third meeting took place in Ljubljana from the 5th to the 7th June 2006 and the fourth meeting took place in Brussels on the 4th March 2007. Minutes of the Supervisory Board meetings are contained as appendix 4 to this report.

The second specialist expert group, the e-Coaching working group, comprised of Erik Duval, Marie-Axelle Granié, Ian Lee, Silvio Manicardi, Pekka Ranta, Trevor Wedge and the Project Co-ordinator. However as e-Coaching was considered to be such an important subject it has been dealt with by the full Supervisory Board. Following Dr. Ranta's presentation to the Paris Supervisory Board meeting and in the light of his expertise and the practical experience of the Hypermedia Unit at Tampere University of Technology, the Board agreed to ask him to undertake an evaluation of the potential of e-Coaching in initial rider training. When the report was concluded it was also considered at a full Supervisory Board meeting and, therefore, it was not necessary for the e-Coaching working group to meet separately.

The position of IRT Project Co-ordinator, having been circulated within the member organisations of ACEM, FEMA and FIM, was offered to and accepted by FEMA Assistant General Secretary Robert Tomlins. His experience, particularly with managing projects such as *Rider Training, the Views and the Needs of the Rider* in 1996 and the *Young Rider of the Year* and the *Young Rider of the Millennium Year* in 1999 and 2000, was seen as appropriate experience and qualification to manage the IRT Project.

Considerations, conclusions and recommendations

As previously stated the IRT Project undertook to consider and to deliver conclusions and recommendations to the European Commission in four distinct areas related to the initial or pre-licence training of riders. This Final report will address each area in turn, covering the considerations that were given to them and the conclusions that were reached. It will then make recommendations in the light of the considerations and conclusions. Hereinafter the areas will be referred to as the deliverables.

Deliverable 1 - essential elements for initial rider training

The IRT Project was required to identify the essential elements of a model European initial rider training programme, Deliverable 1. However at the commencement of the IRT Project the then official responsible within the Directorate-General for Transport and Energy (D-G Tren), Mr. Herald Ruyters, indicated that the Commission would appreciate receiving more than just a list of the essential elements. He said that what they would hope to receive the essential elements in a developed, explanatory form.

Accordingly the IRT Supervisory Board agreed to develop the essential elements into a comprehensive training programme. This decision has required the Supervisory Board to take onboard a number of additional considerations that were not envisaged when the proposal for the IRT Project was submitted to and approved by D-G Tren.

A structure and a modular approach

As a consequence it was recognised by the Board that there was a need to develop a structure for the model European initial rider training programme and to also develop a format and style for the presentation of the elements and aspects of it. When the Supervisory Board met in Paris in October 2005 they considered and approved such a structure, which had been developed by the Project Co-ordinator in consultation with the members of the Supervisory Board and the Instructors' working group.

This structure (see figures 1 and 2) has four elements: Theoretical; Machine control; Traffic interface and e-Coaching. Within each of these elements the essential aspects have been identified. The first three form the basis for a model European initial rider training programme. The Supervisory Board believes that as such they would be a comprehensive, cohesive and cost-effective European initial rider training initiative. Importantly all the elements address the important issues of hazard awareness and avoidance and rider attitude and behaviour.

Development of the fourth element, e-Coaching, will be dependent on the acceptance of the conclusions reached by the IRT Supervisory Board and the acceptance of the recommendations contained in Deliverable 3 of this Final Technical Implementation Report by the European Commission.

In the course of the development of the structure, the IRT Supervisory Board considered the advantages of a modular approach. This seemed to them to be particularly interesting in the context of the progressive access approach to powered two-wheeler licensing contained within the Second and Third European Driving Licences Directives.

Accordingly, and as can be seen in figure 1, the various aspects of the elements that are appropriate to the training needs for a particular A sub-category licence are identified. Applied in the most logical form, this modular approach would allow a rider with a lower sub-category of licence, say A1, wishing to obtain an A2 or A licence, to only have to be trained on the additional aspects that had not been covered in the A1 training programme.

	Theoretical	Machine control	Traffic interface
AM	1a, 2a, 3, 4a, 4b, 6a, 7, 8	1a, 2, 3a, 3d, 4, 5	1a, 2, 4a, 4b
A1	1a, 2a, 3, 4a, 4b, 5, 6a, 6b, 7, 8	1b, 2, 3b, 3c, 4, 5, 6a, 6b	1b, 2, 3a, 3b, 4a, 4b, 5, 6
A1/B	3, 4a, 4b, 5, 6a	1b, 2, 3b, 3c, 4, 5, 6a, 6b	1b, 3a, 3b, 4b
A2	1a, 1b, 2a, 2b, 3, 4a, 4b, 5, 6a, 6b, 7, 8	1b, 1c, 2, 3b, 3c, 3d, 4, 5, 6a, 6b	1b, 2, 3a, 3b, 4a, 4b, 5, 6, 7, 8, 9
A	1a, 1b, 2a, 2b, 3, 4a, 4b, 5, 6a, 6b, 7, 8	1b, 1c, 2, 3b, 3c, 3d, 4, 5, 6a, 6b	1b, 2, 3a, 3b, 4a, 4b, 5, 6, 7, 8, 9

Theoretical

1 Road regulations
 a: general rules and regulations
 b: motorway rules and regulations
2 Signs and markings
 a: general signs and markings
 b: motorway signs and markings
3 Machine dynamics
4 Hazard awareness
 a: other road users
 b: environment and infrastructure
5 Helmets and appropriate clothing
6 Social responsibilities
 a: noise
 b: first aid and accidents
7 Impairment
8 Attitude and behaviour

Machine control

1 Machine familiarity
 a: automatic controls
 b: manual controls
 c: advanced braking systems
2 First movements
3 Gears, brakes and direction
 a: automatic gears
 b: manual gears
 c: separate braking systems
 d: advanced braking systems
4 Steering and counter-steering
5 Low speed manoeuvring
6 Hazard management
 a: swerving
 b: emergency braking

Traffic interface

1 Positioning
 a: slower than traffic
 b: at traffic speed
2 Distance
3 Curves and bends
 a: right hand
 b: left hand
4 Anticipation
 a: other road users
 b: environment and infrastructure
5 Junctions
6 Overtaking
7 Motorways
8 Group riding
9 Journey planning

1a, 1b, 2a, 2b, 3, 4a, 4b, 5, 7, 8	4, 5, 6a, 6b	1a, 1b, 2, 3a, 3b, 4a, 4b, 5, 6, 7, 8, 9

e-Coaching   *Virtual no-risk exposure to hazards and consequences of attitude and behaviour*

The Initia L Rider Training Project

Figure 1: the initial structure matrix of the IRT model European programme showing the relevance of its modular based approach to a progressive licensing system

As the proposal for the Third European Driving Licence Directive progressed through the legislative process it became apparent to the Supervisory Board that its definition of progressive licensing would be a very limited one. In its final form the training requirements specified in Annexe 6 to the Directive appear to ignore a rider's previous training and experience. Nonetheless the IRT Supervisory Board are hopeful that a review of Annexe 6 could result in the logic of the IRT Project's modular approach being reflected in future European legislative requirements.

The IRT Supervisory Board recognised however that if the IRT model European initial rider training programme continued to refer to different licence categories and show their training requirements, it would cause confusion. Accordingly they agreed to revise the matrix as shown in figure 2.

In so doing the Supervisory board wish to stress that the IRT model European initial rider training programme remains modular in its structure and as such it would also allow for additional programmes, to meet specific circumstances or needs, to be easily developed. For example a programme for riders who were returning to motorcycling after a long period of not riding a powered two-wheeler could be constructed from the elements and aspects of the IRT model European programme.

Theoretical	Machine control	Traffic interface
1 Road regulations	1 Machine familiarity	1 Positioning in traffic
2 Signs and markings	2 First movements	2 Distance and speed
3 Machine dynamics	3 Gears, brakes and direction	3 Curves and bends
4 Hazard awareness	4 Steering and counter-steering	4 Junctions
5 Helmets and appropriate clothing	5 Low speed manoeuvring	5 Overtaking
6 Social responsibilities	6 Hazard management	6 Motorways
7 Impairment		7 Anticipation
8 Attitude and behaviour		8 Riding together
		9 Journey planning

e-Coaching   *Virtual no-risk exposure to hazards and consequences of attitude and behaviour*
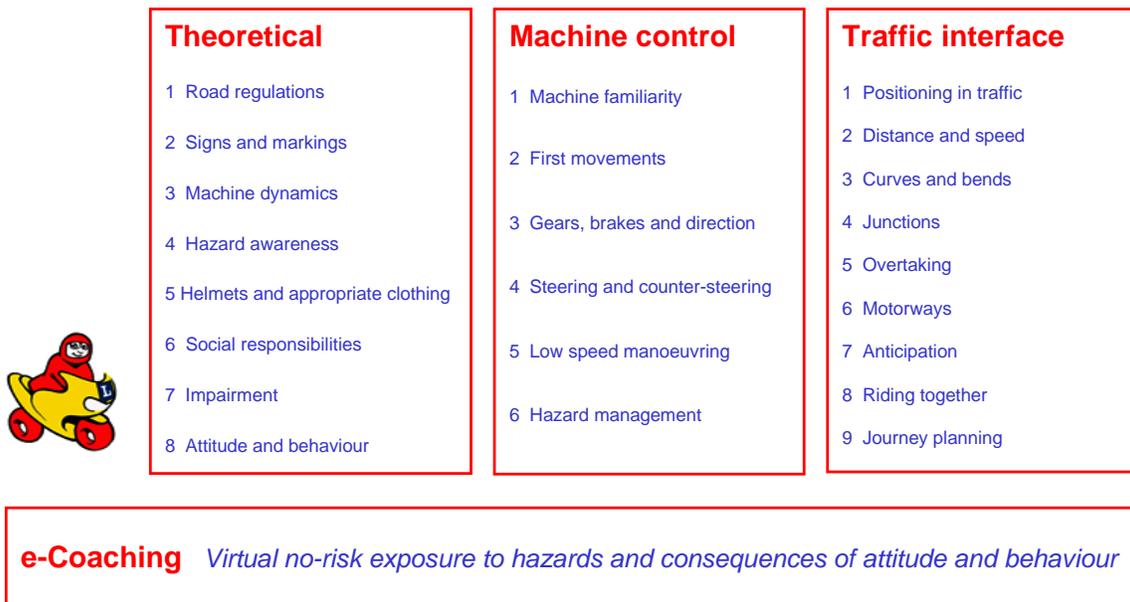
Figure 2: the revised structure matrix of the IRT model European programme

The Theoretical element

The Supervisory Board recognised that the theoretical training received by riders varied. Often it required only the need to recognise road signs and markings and know the basic traffic regulations, often without even an explanation of why they are necessary. Rarely did it go beyond and address a range of important issues on which the trainee, hereinafter referred to as the rider, should at least have a basic knowledge and understanding.

Accordingly seven theoretical aspects were identified: Road regulations; Road signs and markings; Machine mechanics and dynamics; Helmets and appropriate clothing; Social responsibilities; Impairment; Hazard awareness; and Attitude and behaviour. It was agreed that the approach of the IRT Theoretical element should be to introduce the rider to the IRT model European initial rider training programme and as such should be addressed before commencing the Machine control element and its aspects.

Social responsibilities

**Theoretical element
aspect 6**

This aspect introduces the future rider to the need to show due consideration and care for others

First aid and accidents

The prospective rider should understand that a basic knowledge of first aid knowledge can literally be life saving and that he or she should have, or obtain, this knowledge before learning to ride.

In the event of coming upon an injured motorcyclist the future rider should never attempt to remove the injured rider's helmet, unless properly trained to do so, or move the injured person unless they are in a life-threatening situation. The emergency services should be informed as early possible.

Upsetting the neighbours

The future rider should appreciate that excessive noise from motorcycles and scooters is widely recognised as being one of the most annoying sources of noise.

Whilst many riders like the noise their machine makes they should always ensure that they ride in a manner that limits its social impact and in no circumstances should they modify their silencer to make more noise or fit an illegal system.

Angry neighbours will support anti-motorcycling legislation.

Consideration for other road users

Before beginning the experience of learning to ride a motorcycle or scooter, a prospective rider should understand that in today's traffic, no one can ride on, drive on, or cross the road, in isolation.

A rider should always behave in a responsible way, taking into account the needs and likely behaviour of other road users and should appreciate that his or her actions will consequently affect their safety and, of course, his or her own safety.

Pedestrians will require particular care on the part of the future rider. Someone wanting to cross a road may not see a motorcycle or scooter or be able to accurately judge its approaching speed or intention. This particularly applies to the elderly and to children, who can have other, to them more important things on their mind, such as getting home in time for their favourite television programme or retrieving a ball.

Cyclists also require care and the future rider should understand that whilst they share the road and also have two wheels, their difference in speed and consequent handling characteristics are considerable.

The characteristics of vehicles with four or more wheels will also need to be appreciated by a prospective rider. Large commercial vehicles often have limited vision and a rider should avoid getting into a position where they cannot be easily seen by the driver. Car drivers, with the advantages of anti-lock braking systems and traction control, may not appreciate that a wet road will have a greater limiting effect on the handling characteristic of a motorcycle.

When it goes wrong

The future rider should understand that not only they will suffer the consequences of a road traffic accident. Whether it is their fault or the fault of another road user. For a mother or husband, learning that a son or wife has been involved in an accident can be devastating experience.

A motorcycle or scooter does not have the benefits of airbags and seatbelts. This the future rider should appreciate with the consequent need to ride in a manner that will avoid the consequences of when it goes wrong.

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Figure 3: the Social responsibilities aspect of the IRT Theoretical element

In so broadening the scope of the theoretical training it was agreed that its approach, with the exception of the Road regulations and Signs and markings, should be introductory with just the necessary basic information which would then form a foundation and be subsequently developed within the Machine control and Traffic interface elements. An example of this approach can be seen in figure 3 and the complete Theoretical element is contained in appendix 1 to this Final Technical Implementation Report.

It was agreed that as the National arrangements for theoretical training and testing of the rider's knowledge of road regulations and signs and markings would determine the requirements on these aspects. Accordingly the National arrangements should be referred to within the IRT Theoretical element and then explained in the context of the reasons for their existence and the help and information they contain can give to riders.

This approach, the IRT Supervisory Board believe, will lead to riders undertaking and completing their training with a greater respect for and preparedness to comply with the rules and regulations of the road.

The Machine control element, aspect overviews and instructors' notes

At their initial meeting the Instructors' working group concentrated on identifying the aspects within the machine control element. These being in order of sequence: Machine familiarity; First movements; Gears, brakes and direction: Steering and counter steering; Low speed manoeuvring; and Hazard management.

These aspects were then developed in detail and the approach, with emphasis being given to the hazard awareness and attitude and behaviour, and the exercises that were required for each aspect were agreed. Between the first and second meetings the details of the definitions and the supporting exercises were developed and refined by the Project Co-ordinator with the assistance of the members of the working group.

When the Instructors working group met in Vienna in June 2005 to test ride the developed exercises, they discussed how their conclusions could be structured and presented. They concluded a "single sheet" approach on which all the main considerations could be presented together, would be of considerable value as it would give a complete picture of the needs and requirements of that aspect.

The main considerations were identified as: what the rider should know before starting to learn the skills and knowledge addressed in an aspect; what the instructor should be aware of and plan for; the particular hazards and the attitude and behaviour associated with the aspect, not only regarding the training exercises but also in the context of riding on public roads; the exercises that should be demonstrated and practised; and the criteria for evaluating the rider's progress before moving on.

At that point in time the Instructors' working group felt that such a "single sheet" approach would need to be supported by the development of an instructor's manual. They recognised that such an undertaking would be beyond the resources of the IRT Project and that it would probably need to be a recommendation in the Final Report to the European Commission as part of Deliverable 4.

The "single sheet" approach was agreed in outline and the Project Co-ordinator undertook to develop it for consideration at the next meeting of the Supervisory Board.

In the course of this work however it became apparent that for the training to be effective the instructor would need more information than could be contained on a "single sheet". Accordingly it was decided that instructors' notes should be developed within the IRT Project.

Steering and counter steering

Machine control element aspect 4

Rider's pre-knowledge

The rider should understand and be competent in the use of the throttle, clutch, gears and brakes and able to move off, accelerate, decelerate, turn and stop safely and smoothly.
The rider should understand the importance of where to look and applying correct visual focus, both in the context of machine control and awareness of other road users.

Instructor's requirements

Review the Instructor's notes
Assess the extent of rider's pre-knowledge
Plan the layout of the exercises
Explain and demonstrate steering and counter steering and their influence on direction changing
Explain the particular importance of visual focus to machine control when changing direction
Emphasise the importance of hazard awareness and rider attitude in the context of the exercises
Continue to assess the rider's attitude

The exercises

Riding in a slalom at speeds from 15 to 50 kilometres an hour

Riding in a circle at 15 to 40 kilometres an hour

Riding in a figure of eight at speeds from 15 to 35 kilometres an hour

Turning through 180 degrees

Hazards, attitude and behaviour

It is important that the rider appreciates that the machine control skills addressed in this Aspect are essential for being able to safely and competently ride a motorcycle on public roads
The rider should begin to understand the dynamics of a motorcycle in the context of how direction can be changed at different speeds

Evaluation

The rider should be able smoothly ride in a slalom, a circle, a figure of eight and a U, at slower speeds, requiring a mixture of steering and leaning to affect change of direction and at higher speeds where direction change is achieved by leaning and counter steering.
The rider should be able to directly induce counter steering through pressure on the handlebar and/or footrests, confidently and competently.
The rider's visual focus should be supporting the control of the machine and enabling the early development of potentially hazardous situations to be seen when later riding on public roads.

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Figure 4: the "single sheet" aspect overview of Machine control element aspect 4, Steering and counter steering

Steering and counter steering

Machine control element aspect 4

Instructor's notes.1

Preparation and planning

Each of the exercises in aspect 4 require setting out on the training ground, using cones and tapes. Whilst the diagrams on the fourth page of these instructor's notes define the ideal arrangements, complying with them will not always be possible due to space limitations. The instructor should therefore plan and adapt the exercises accordingly. If, for example the diameters of the circle or figure of eight need to be reduced then the higher speed should be correspondingly reduced.

Where more than one rider is receiving tuition it is important that the instructor(s) ensures that adequate separation is maintained.

Explaining and demonstrating

The instructor should explain to the rider the dynamics of a motorcycle and the changes that occur when it increases in speed. Particular attention should be given to the gyroscopic effect of the wheels at moderate and higher speeds and where and how pressure should be applied to achieve a desired change in direction.

In demonstrating the exercises the instructor should show the control transition from steering, where the handlebars are turned in the direction of the turn, through leaning, where the rider shift bodyweight in the direction of the turn, to counter steering, where the rider puts pressure on the handlebar and/ or footrest opposite to the direction of the turn. The instructor should remember that full counter steering can be achieved at moderate speed and the temptation to show the effect at higher speeds should be avoided as it can be intimidating at this stage of the training.

The importance of where the rider should be looking in these exercises should be stressed by the instructor and be clearly evident when demonstrating.

It is important that he techniques of speed control in the exercises of aspect 4 should be explained and demonstrated. The rider should understand that brakes should only be used while the machine is upright and then when in a turn speed should be adjusted with the throttle and engine braking

It is particularly important that the instructor continues to assess the rider's approach and where the rider's progress or attitude and behaviour gives cause for concern the exercise should be stopped and instructor should address the cause of the problem.

The Exercises

Riding in a slalom

The instructor having demonstrated how the rider should ride the slalom, should ensure that the rider appreciates that the skills addressed are essential for safe machine control in traffic.

Having checked behind, engaged drive, moved off, accelerated in the defined lane to approximately 15 kph, the rider should go between the first and second cones, changing direction on exiting to enable the machine to be directed between the second and third cones, and so on.

The changes in direction should be made with steering and leaning and with any necessary slight variation in speed being controlled by the throttle. The visual focus of the rider should be smoothly and progressively moving from the exit of the cones that are about to be entered, to the entrance to the subsequent pair of cones on exiting the former cones. On exiting between the penultimate and final cones the rider should bring the machine to a smooth stop.

The exercise should be repeated and as the rider gains confidence and competence, on

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Figure 5: a page of the instructor's notes for Machine control element aspect 4, Gears, brakes and direction

In their developed form the "single sheet", hereinafter referred to as the Aspect overview, see figure 4 for an example, and the supporting Instructor's notes, see figure 5 for an example, were considered and approved by the IRT Supervisory Board when they met in Paris in October 2005.

The drafts of the Aspects overviews and Instructors' notes of the IRT Machine control element were further revised at subsequent meetings of the Instructors' working group and the Supervisory Board. One significant change being not to have separate aspects for automatic machines. The final version is contained in appendix 1 to this Final Technical Implementation Report.

The Traffic interface element

When they met in Vienna in June 2005, the Instructors working group gave initial consideration to the aspects of the Traffic interface element which were identified, and subsequently endorsed by the Supervisory Board, as: Positioning in traffic; Distance and speed; Curves and bends; Junctions; Overtaking; Motorways; Anticipation; Riding together; and Journey planning.

When the Instructors' working group met in Ljubljana in June 2006 they spent two days developing and test riding these aspects, both on a training ground with simulated road junctions and on public roads. Again particular attention was given to hazard awareness and avoidance and attitude and behaviour. In the course of the meeting it became apparent that a different presentational approach would be needed.

As the traffic interface aspects considered situations and environments that could not be addressed or experienced in isolation or in sequence, it was agreed not have an aspect overview for each aspect. Consequently it was agreed that three introductory pages, encompassing considerations appropriate to all of the aspects of the Traffic interface element, should be developed.

The first emphasises the riders' primary responsibility for road safety, that machine control skills are only part of what is needed to ride safely, the importance of attitude and behaviour and of hazard awareness; the second covers the instructors' approach to the Traffic interface element; and the third, see figure 6 below, addresses from the both the instructor and the rider's perspective, what is needed before venturing onto public roads.

Before venturing on the road

The rider must

Meet all the legal requirements

Be suitably dressed and have appropriate protective equipment

Be able to competently control the machine

Understand the rules of the road particularly with regard to the traffic and road layout situations to be encountered

Accept and comply with the wishes of the instructor when riding together on public roads

Understand and have practised the arrangements for communicating with the instructor

Appreciate the likely hazards to be encountered in riding the aspect

Appreciate the likely behaviour of other road users and the need to anticipate it

Recognise that it is his or her attitude and behaviour that will largely determine his or her safety

The instructor should

Pre-plan the exercise

Identify a route where the rider will experience the traffic situations covered in the particular aspect

Verify that the rider and his or her machine meet all the legal requirements and are suitably attired

Be confidence that the rider has the necessary machine control skills

Develop the riding patterns for the aspect and the methods for communicating with the rider

Brief the rider thoroughly on the riding patterns and communicating arrangements

Explain to the rider the particular hazards that could be encountered in the course of riding the aspect

Explain the likely behaviour of other road users and give examples of how it can be anticipated

Assess the attitude and likely behaviour of the rider and adjust approach accordingly

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Figure 6: the introductory page of the Traffic interface element covering essential requirements and understanding before venturing onto public roads

Curves and bends
Traffic interface element aspect 3

This aspect consider how a rider should approach and ride through a curve or bend

In the context of this aspect the distinction between a curve and a bend is that a curve would not require a speed reduction of more than 20% and a bend being tighter, requires a greater reduction in speed.

Guidance and advice.1

Preparation and planning

In planning for this aspect the instructor should initially identify a rural or suburban route with a number of separate curves and moderate bends, having a good surface, constant or slight variations in their radii, and with few other features and light traffic.

As the rider's ability and confidence develops, the route can be extended to include curves and bends in sequence, so called S-bends, and curves and bends with significant variation in their radii. The incidence of other road features and the volume of traffic should remain light.

The instructor must recognise that significant demands will be placed on the

rider. Accordingly the rider's ability to manage the demands should be constantly evaluated by the instructor and where necessary the experience should be broken down into more easily manageable units.

The chosen routes should provide the opportunity for the instructor and the rider to stop for advice and evaluation in safety.

Legal and safety requirements

the rider and the machine must comply with all legal requirements and the instructor should ensure that the rider has checked the machine and that his or her helmet and clothing are appropriate.

Preparing and briefing the rider

The instructor must explain that concept of the limit point, which was introduced and applied in aspect 3, is also essential to the safe negotiation of curves and bends.

The rider must however also understand that the correct position to be in on the road and when approaching and passing through a bend, are also essential. The limit point being extended though the correct position widening or lengthening the rider's field of vision.

The importance of the rider's focus constantly moving with the limit point cannot be over emphasised.

Fixating, that is when the rider's attention is drawn to and held by a feature, for example a tree part way around a bend, is a major cause of motorcycle accidents. The rider should never forget the golden rule: *always look where you want to go!*

The instructor should also ensure that the rider understands the limitations on the use of the throttle, clutch and brakes, which are crucial to safely negotiating a curve or bend.

The Experience

Control of the machine

With the instructor having explained and demonstrated the correct practice, the rider should take the lead. Approaching the curve or bend, focussing on the limit point and noting any irregularities in the road surface such as inspection covers, the rider should check behind and slow down so as to enter at a moderate and safe speed. The required braking and gear selection have been undertaken before reaching the bend, the limit point should appear to remain constant from the rider. On entering light throttle input should be used to maintain the speed and the balance of the machine, through to the point where the exit can be seen.

continued

Figure 7: a page of the Traffic interface element covering Curves and bends

Instructors' notes where then developed by the Project Co-ordinator for each aspect which were consistent with and complimentary to the three introductory pages, see example of one page of aspect 3 in figure 7 above. These were revised by the Instructors' working group when they met in Brussels in March 2007 and, together with the three introductory pages, endorsed by the IRT Supervisory Board at its subsequent meeting.

The final version of the Traffic interface element is contained in appendix 1 to this Final Technical Implementation Report.

The role of the instructor and learning by example

In the course of developing both the Machine control and the Traffic interface elements of the model European programme for initial rider training the Instructors' working group has frequently considered the role and the approach of the instructor.

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One issue that has been identified as being of particularly concern has been that of an instructor not being able to practically demonstrate the required techniques of the aspects Machine control element or the necessary practices of the aspects of the Traffic interface element.

The Instructors' working group unanimously agreed that under no circumstances should a rider be instructed by a person who was not an experienced and competent motorcyclist. In the event of the rider paying for his or her training then the instructor should be appropriately trained and suitably qualified.

Where on road training is being given the importance of the instructor also being on a motorcycle or scooter was seen as being crucial by the Instructors' working group. It was unanimously agreed that practice that exists in a number of European Union countries, where the instructor accompanies in a car a rider on a motorcycle or scooter when training on public roads, is an extremely bad one. Such an arrangement, it is firmly believed, does not allow even a competent instructor to demonstrate important skills and practices, such as for example, positioning and distance and anticipation.

Accordingly when the Instructors' working group met in Brussels in March 2007 they agreed to relay their concerns to the IRT Supervisory Board. At the subsequent meeting of the Supervisory Board the members unanimously agreed with the views of the Instructors' working groups and decided to make an appropriate recommendation to the European Commission within the Final Technical Implementation Report.

Deliverable 1, Recommendation 1

The Supervisory Board of the IRT Project recommend the Theoretical, Machine control and Traffic interface elements of the IRT model European initial rider training programme as a basis for developing a practical and effective approach to giving the riders of motorcycles and scooters the skills and knowledge required to obtain a licence for a powered two-wheeler.

The Supervisory Board believe that the approach to and the scope of the aspects of the three elements of the IRT model programme would make a significant improvement to the safety of riders so trained with a corresponding reduction in the frequency and severity of the accidents they are likely to experience.

Accordingly the IRT Supervisory Board believe that the European Commission should use the IRT model European initial rider training programme as a basis for assessing the quality of existing national rider pre licence training arrangements and influencing the development of effective arrangements where they are found to be lacking or non-existent.

Deliverable 1, Recommendation 2

The Supervisory Board of the IRT Project recognise that the competence of the instructor is an essential requirement for any rider or driver training programme and welcomes the stated intention of Directorate-General for Energy and Transport of the European Commission (D-G Tren) to address this matter within a proposal for a Fourth European Driving Licence Directive.

The IRT Supervisory Board believe that the practice of an instructor teaching a rider or riders from a car is a particularly bad one and accordingly recommends to D-G Tren that they should do all they can to discourage this practice and should certainly seek to eliminate it within any proposals they make to improve instructor competence within an envisaged fourth European driving licence directive.

Deliverable 2 - Utilising a model European initial rider training programme in different social and economic circumstances

In their development of the IRT model European initial rider training programme the Supervisory Board have kept in mind the need to develop a structure and approach that can be utilised in various demographic and economic circumstances.

These considerations are recognised in the modular structure (figure 2). The IRT Supervisory Board believe that the IRT structure, together with the aspect presentation of the Theoretical element (figure 3), the aspect overviews and instructors' notes of the Machine control element (figures 4 and 5), will be relevant and valuable across the range of varying national approaches to initial rider training that exist, and in some Member States effectively do not exist, within the European Union.

Helping in the most basic of circumstances

The IRT Supervisory Board believe that where there are no commercial initial rider training facilities readily available or affordable, and if a rider receives any instruction at all it will usually come from a family member or friend, the IRT model programme will be of great assistance.

By following the IRT model programme the family member or friend, who should be an experienced and competent motorcyclist, will be able to approach the range of skills and knowledge needing to be acquired by the rider, in a structured and logical way.

The aspects of the Theoretical element will give knowledge and provide at least an understanding of the breadth of the considerations that will need to be addressed. The Aspect overviews of the Machine control element identify what is needed to master the controls of the motorcycle or scooter, and the Instructors' notes offer further, more detailed advice to the family member or friend, and to the rider, on how the skills and knowledge can be imparted and acquired. The Instructors' notes of the Traffic interface element will give similarly detailed practical advice and guidance when the rider is competent in managing the controls of his or her machine and is ready to begin the experience of acquiring the skills and knowledge necessary to be able to ride on public roads.

In following each of the three elements and their aspects the family member or friend should become a better instructor and the rider a more knowledgeable and skilled, and therefore a safer rider. The IRT Supervisory Board believes that this will result in a considerable improvement on the current situation.

Whilst the practice is in no way recommended by the IRT Supervisory Board, they do also believe that the IRT model programme could be of assistance in circumstances where the rider is self taught or relies on the assistance of a similarly untrained or inexperienced person. Whilst the members of the IRT Supervisory Board believe that these practices should be discouraged they recognise that they do occur in some countries in the European Union, and that they are likely to continue to so do in the foreseeable future.

Supporting voluntary training initiatives

The IRT model programme will also be extremely valuable where commercial initial rider training does not exist or is not readily available, and rather than leaving it to a family member or friend, a local motorcycle club or road safety organisation has taken on, or is prepared to take on, the responsibility for initial rider training.

Such arrangements are sometimes limited by the fact that the members of the motorcycle club or road safety organisation have themselves not been well trained, if trained at all. Whilst their motivation cannot be questioned and their riding experience will be valuable, it can result in mistakes and bad practice being perpetrated.

In these circumstances the IRT model programme will provide a ready made, structured and comprehensive programme. In addition to providing the syllabus the IRT programme's approach also defines the requirements for and the responsibilities and approach of the instructors and could also be used as a basis for training the instructors themselves.

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Assisting the development of limited commercial operations

Where commercial training facilities do exist but, as it is the case in a number of European Union Member States, they operate in an ineffective or unstructured way, often without a syllabus and/or qualified instructors, the IRT Supervisory Board believe that the IRT model programme will also be of great assistance. It will offer a comprehensive programme that can be applied in total, at minimal or no cost.

The instructor's requirements in the Aspect overviews and Instructor's notes of the Machine control element and the Instructors' notes of the Traffic interface element will also be particularly valuable in addressing the limitations of professional instructors in these situations. They effectively define the skills and knowledge that an instructor should have and, as such, would be a suitable basis for developing a training programme for the instructors.

A benchmark for the developed commercial training operations

The IRT Supervisory Board have recognised that in circumstances where the national initial rider training arrangements are developed, with structured syllabi and qualified instructors and where they are generally accepted as being effective, the IRT model programme will be limited in its application.

It will however be of value as a benchmark against which the existing national arrangements can be evaluated. It also would have a more general value as a source of information that can be referred to when national training arrangements are being reviewed. The emphasis within the IRT model programme on hazard awareness, anticipation and attitude and behaviour are key considerations when the comparisons are being made with developed professional rider training arrangements.

Deliverable 2, Recommendation

The IRT Supervisory Board believe that the IRT model programme, with its modular approach, elements and aspects, their overviews and Instructor's notes, will be of real value across the wide range of differing social and economic initial rider training arrangements.

The IRT Supervisory Board accordingly recommend that these differing circumstances and arrangements should be more clearly acknowledged within the rider training policies and strategies of the European Commission and that D-G Tren should accept the IRT model training programme as a basis for improving pre-licence rider training within the member States of the European Union.

Deliverable 3 - e-Coaching and no risk exposure to hazards

In the course of developing the Theoretical, Machine control and Traffic interface elements the IRT Supervisory Board and the Instructors' working group gave consideration on a number of occasions to the issues of hazard awareness and avoidance and to rider attitude and behaviour, which they believe had not be sufficiently addressed within many existing initial rider training programmes.

This was to some extent understandable in that initial rider training has tended to focus on machine control skills. An instructor is unlikely to willingly put him or herself, or the trainee, or the machine being used, at risk by demonstrating, or requiring the rider to attempt, practices that are inherently risky, with the possibility of things going wrong and injuries to people and/or damage to equipment occurring. This understandable reticence appears to extend in some instances, to even talking to the trainee about hazardous situations.

The IRT Supervisory Board believe that the Theoretical, Machine control and Traffic interface elements of the IRT model programme will to an appreciable extent address these shortcomings, in that they contain significant hazard awareness and attitude and behaviour emphasis. They also believe that the braking and swerving requirements of national A category licence tests, introduced within the review of the second European driving licence directive, are increasing the attention given to hazard awareness and avoidance in initial training programmes.

It was against this background and with these understandings that the IRT Supervisory Board undertook the requirement contained in TREN-SUB-2003-S07.30333 to evaluate the potential of e-Coaching to support initial rider training and how virtual training approaches could be developed.

Reaching an initial view

The IRT Supervisory Board began by looking at existing experience and recent developments. They recognised that realistic simulations could virtually present and thereby help a rider and indeed, an instructor, to understand both the theoretical and practical dimensions of initial rider training. They also recognised that an interactive games-based approach, using either personal computers or specialised games terminals, could provide a means of exposing riders to hazards and the consequences of incorrect attitudes and behaviour in a no-risk virtual environment.

Through the participation of Mr. Filip Sergeys and Mr. Silvio Manicardi, two senior representatives of Honda Motorcycles Europe, the latest example of the rider simulator being developed by Honda, the Honda Trainer was made available for members of the Supervisory Board when they met in January 2005.

The Honda Trainer is believed to be the only simulator being developed specifically for the riders of powered two-wheelers. It was seen as being a good example of the application of virtual techniques to driver and rider training. It was noted that Honda's believed that their Trainer should always be used with the trainee being under supervision. Their experience being that without supervision the trainee simply sought to crash the machine within the simulation.

The Supervisory Board also recognised that there were a number of developments where simulators were being introduced into commercial and car driver training programmes. Consequently the Project Co-ordinator and Board member Commander Roger Renoy, also acting in his capacity as the head of the Belgian Police national driver and rider training academy, visited a number of companies offering such simulations. The general conclusion reached was that, unlike the Honda Trainer, they were rather limited in scope and not very dynamic, utilising relatively short clips of single situations, with limited interaction between the simulator and the trainee. Even when more dynamic and interactive simulations were considered it was found that they usually required sophisticated and expensive supporting hardware to operate.

The IRT Supervisory Board concluded that because such simulations inevitably required supporting hardware, requiring an investment to be made, they were most likely to be used by commercial rider training schools. Even moderately priced systems, such as the Honda Trainer, it was felt, were beyond the means of an individual learning to ride.

Accordingly the Supervisory Board decided to concentrate its efforts on a low or no cost (to the rider) e-Coaching approach, which could be used with readily available hardware, such as a personal computer or a PlayStation® or Xbox® and could be obtained in compact disc form from a motorcycle dealer or a licensing authority, or downloaded from the internet.

Whilst the IRT Supervisory Board contained representatives from Honda, who were able to bring a particular expertise arising from their work with the Honda Trainer, the Supervisory Board quickly realised that the depth and breath of e-Coaching required additional expertise. To this end the Project Co-ordinator made contacts with a number of acknowledged experts and as a result Professor Erik Duval from the Catholic University of Leuven and Dr. Pekka Ranta from the Hypermedia Unit of Tampere University, agreed to join the Board.

With this added expertise the IRT Supervisory Board's consideration of e-Coaching made significant progress. At their meeting in Paris in October 2005 they identified four areas of risks and hazards where e-Coaching could assist (see figure 8) and identified distinct groups of riders that could or should be addressed.

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Firstly there were young riders with no traffic experience and secondly young riders with traffic experience. The Board was not sure if young riders with traffic experience on mopeds and scooters should be treated as a separate group. Mature riders with traffic experience were identified. However it was subsequently agreed by the IRT Supervisory Board that there were not enough mature riders without any traffic experience to treat them as a distinct group.

Whilst the risks and hazards to be addressed within initial rider training e-Coaching were identified within the IRT structure (see figure 1) the Supervisory board have also grouped them in four categories, namely: infrastructure; environment; other road users; and attitude and behaviour (see figure 4).

The Supervisory Board also identified four packages of e-Coaching material to support initial rider training. The first package would support the Theoretical element of the IRT structure. It would cover the element's aspects with particular emphasis on hazard perception and attitude and behaviour and it is envisaged that it would be a mix of interactive and non-interactive material.

e-Coaching

bringing a virtual, no-risk exposure to risks and hazards within an initial rider training programme at low or no cost

Defining riders

Young with no traffic experience

Young with scooter experience?

Young with traffic experience

Mature with traffic experience

Mature with traffic and PTW experience?

Defining risks and hazards

Infrastructure

Environment

Other road users

Attitude and behaviour

E-Coaching packages

Theoretical
addresses the aspects of the IRT Theoretical element with particular emphasis on hazard awareness/perception and attitude and behaviour

Demonstrating exercises
video explanations and demonstrations of the aspects and exercises of the IRT Machine control element

Real life simulation
visually real and interactive representations of IRT Traffic interface aspects at normal speeds but higher frequency and increasing extremity, with potential to analyse

Strategic games-based simulation
representations of interactive IRT Traffic interface aspects at increasingly higher speeds, frequency and combinations, requiring strategic decisions, could be mentor role

The Initia **L** Rider Training Project

Figure 8: the Paris conclusions regarding the approach and the scope of e-Coaching support for the IRT model programme

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A second package would be non-interactive. Consisting of filmed demonstrations of the exercises in the Machine control element and the aspects of the Traffic interface element, it would give good and bad examples and enable it to be seen how they should be ridden and how they could be adapted when available training areas were limited in size or shape.

Two distinct inter-active simulation packages were then identified as the IRT Supervisory Board recognised that the age of a person could have a bearing on their ability to operate and benefit from such interactive programmes requiring interface dexterity and a high level of computer literacy. At the turn of the Century a number of acknowledged experts identified the age of 35 as being the watershed between what has been called the "video games generation" and the older pre-video games generation (Marc Prensky: *Digital Game-based Learning*, McGraw-Hill, 2001).

The first of them, effectively a third package overall, would be an interactive and visually real simulation. With it the rider could virtually experience real traffic interface situations, at normal speeds, but with increasing frequency and extremity. Such a simulation could be developed with a virtual mentor whose role would be to advise before and/or analyse after the situations that the rider would be required to negotiate. It was believed that such an approach would assist in a number of ways.

It would enable riders in initial rider training programme to develop their understanding of the training they were receiving and to appreciate the importance of a range of considerations, such as speed and braking distances, road positioning, where they should be looking and the behaviour of other road users. It would also be of particular value to the riders of the pre-video games generation.

The final package was seen to be a strategic game-based simulation. The IRT Supervisory Board must stress that they were definitely not attracted to rally or police car chase scenarios, where the objective is to go as fast as possible and crashing into other vehicles can be to the player's advantage, They did however see considerable potential in merging a dynamic riding scenario with the approach of video games such as The Sims®, where the player is required to take strategic decisions, the consequences of which can have life-long implications.

Such an approach would allow the rider to virtually manage interactive traffic interface situations, by both cognition and reaction and by strategic decision. They could experience increases in speed, frequency and difficulty, giving in effect game levels. As they develop the rider would be called upon to manage

more complex, combined situations requiring strategic decisions to be made, such situations having been influenced in turn by earlier strategic decisions. As with the third package it was seen that such an approach would befit from there being a virtual mentor.

The IRT Supervisory Board concluded that if such a package were to be developed it would not only be able to present traffic education in a format that is almost instinctively understood by most "games generation" individuals wanting to obtain an A category licence. Importantly it could also offer an opportunity to reach young scooter or moped riders, who are often completely outside of the scope of rider education, even in countries where rider education programmes are established and widely available.

Working with the Hypermedia Unit at Tampere

With this position reached the IRT Supervisory Board asked Board member Dr. Pekka Ranta if he would be prepared to evaluate the feasibility of such an approach and to assess the likely costs. This he agreed to consider in the light of consultations with his colleagues at the Hypermedia Unit of the Tampere University of Technology in Finland.

There then followed meetings between the Project Coordinator and Dr. Ranta in Brussels and with Professor Seppo Polijolainen in Tampere. These led to Dr. Ranta agreeing to undertake the evaluation, a task for which he was able to enlist the support of his colleagues at the Hypermedia Unit.

Further meetings were then held with Dr. Ranta and two of his research colleagues, Mr. Antti Maki and Mr. Mikka Huikkola, together with the Project Coordinator and two IRT Supervisory Board members, Commander Roger Renoy and Mr. Marc O'Loideoin.

These meetings resulted in one significant change to the position agreed by the Supervisory Board at their meeting in Paris. It was that the recognised distinction between the video games generation and the older pre-video games generation could be accommodated within a games orientated simulation which had levels of complexity. This would mean that two distinct packages would not be required as a pre-games generation virtual rider, who would most likely have some level of computer literacy, could manage the lower levels and develop sufficient interface competence as he or she progressed. This change was subsequently endorsed by the IRT Supervisory Board.

To further assist Dr. Ranta and his colleagues in their work, a range of issues were considered at the meetings. The following paragraphs give an indication of the scope and detail of the issues considered.

Particular attention was given to the dynamics of a powered two-wheeler, how they could be mathematically modelled and how the performance of the rider could be monitored and evaluated. Consideration was given to how a levels-based approach, where increasing competency would result in the virtual rider moving on to situations of greater complexity and frequency, could work.

A range of traffic situations, increasing in complexity and duration were identified, and how they could be mathematically modelled in relation to the relative speed, position, distance and reaction points of the virtual rider were considered. The variables, such as speed, position, visual focus, were also discussed as were the controls for influencing them and the visual presentation to the virtual rider. An example of how it could look can be seen in figure 9.

The value and the role of a mentor was considered at length and it was felt that a well-known and respected personality from motorcycle sport, such as Valentino Rossi or Stefan Evarts, could offer the additional benefit and credibility of showing that riding safely is "cool". It was felt that the mentor should offer pre-level briefings and post-level evaluations and in the event of the virtual rider experiencing particular difficulties, intervene with guidance. In the event of an accident the mentor should analyse the causation factors with the virtual rider and for added realism and impact the debriefings could be set in a hospital ward or a motorcycle repair shop, depending on the severity and likely consequences of the accident.

**Figure 9: an example of what the virtual rider would see
as envisaged within the Tampere report**

Considerable time was also spent on how dangerous behaviour could be dealt with. It was felt that in the event of a virtual rider only wanting to use the experience to "crash and burn", after appropriate warnings he or she would excluded from the programme for a period of time. Similarly a virtual rider who violated traffic rules and regulations could be warned by a virtual traffic enforcement officer, and if the violations continued, excluded from the programme for an appropriate period of time.

With assistance of these meetings the colleagues from Tampere then undertook their evaluation. They considered the pros and cons of an e-Coaching approach and assessed its potential to make a meaningful contribution in initial rider training, particularly in the areas of hazard perception and rider attitude and behaviour. The IRT Supervisory Board's position was developed into a structure with content of sufficient detail to enable such an approach to be more easily and widely understood and appreciated. On the basis of this they then made an initial estimation of the possible costs involved in developing such an approach.

The work took place over a period of five months and a 64 page report, entitled *An evaluation of the potential of e-Coaching for Riders,* P. Ranta, A. Mäki, M. Huikkola, April 2007, was presented to and endorsed by the IRT Supervisory Board. It is contained as appendix 2 to this Final Technical Implementation Report.

The main conclusions of the Tampere Report

That pre-A licence trainee riders in different Member States of the European Union have unequal opportunities for good, affordable and comprehensive training. Existing educational methods have difficulties reaching the large homogenous target group.

That an IRT e-Coaching programme working on the users' existing PCs would be attractive solution for offering equal access to training in hazard perception and correct attitude and behaviour in traffic.

The IRT e-Coaching programme can be seen as particularly attractive training method for trainees from the age of 15 to 40.

The IRT e-Coaching programme would be ideal for training hazard perception and avoidance and correct attitude and behaviour in traffic. With such a programme the trainee could be exposed to hazardous situations without real danger to the trainee or other road users.

Situations that would rarely occur in real life could be easily produced and replayed until the trainee can handle the situation safely. Observing the performance of the trainee and giving feedback would be easier and more illustrative within an IRT e-Coaching programme than it would be in real life.

The way to distribute the software of an IRT e-Coaching programme to the initial rider trainees all around Europe would be via a website. The website would also function as a base of operations for the communal collaboration aspects of the IRT e-Coaching programme.

The IRT e-Coaching programme should consist of two "modes". One being a level-based mode with the trainee completing a series of levels with randomly generated traffic situations of increasing difficulty. The other being an exercise-based mode where the user could select an aspect of riding and the programme would provide exercises containing traffic situations related to this aspect. Before and after every level or exercise a briefing and debriefing would be held.

Sun Microsystem's Java is assessed to be the most suitable implementation technology due to its suitability for web development, cross-platform support, capability to cope with complex projects and the wide range of premade APIs and integrated development environments available. The creation of dynamic models is most efficient with Mathwork's Matlab and Simulink software. JBoss Rules is an appropriate solution for creating the required rule bases.

The cost estimate for an IRT e-Coaching programme, executed as recommended in this document, is €1,512,000. Since the estimation of workload at the earliest stages of software project is extremely difficult, a 50% safety margin is applied for this estimation.

The process of this evaluation leads to a recommendation. It is based solely on theory and previous research of the topic. Therefore it would be crucial to create prototypes and technical tests before the creation of an IRT e-Coaching programme is undertaken. More detailed requirements of an IRT e-Coaching programme would be required in order to accurately evaluate the suitability of the technical choices.

A first version of the Tampere Report was considered in detail by the IRT Supervisory Board at their meeting in March 2007. They accepted the report and agreed with its evaluation that an IRT e-Coaching programme could make a major contribution to initial rider training, particularly in the important areas of hazard awareness and avoidance and rider attitude and behaviour.

It was felt by the members of the Supervisory Board that a number of changes should be made to the terminology used were agreed by the Supervisory Board. These were considered and accepted at a subsequent meeting between Dr. Ranta and the Project Coordinator. In its 1.01 final version, the Tampere Report is appendix 2 to this Final Technical Implementation Report.

The Supervisory Board also considered the first two packages of the IRT e-Coaching position reached at their Paris meeting. They confirmed their support for a Theoretical package and an Exercise demonstration package. They agreed however that they should be progressed through recommendations to the European Commission under Deliverable 4, the development of the essential elements into a comprehensive, cohesive and cost-effective European initial rider training initiative.

Deliverable 3, Recommendation 1

Based on their understanding of motorcycle and scooter riding and the skills and the knowledge needed by a rider, the Supervisory Board of the IRT Project believe that an e-Coaching has considerable potential to make significant improvements to the availability, content and the quality of many of the initial rider training arrangements that currently exist within the European Union.

Accordingly the IRT Supervisory Board recommend to the European Commission that the development an e-Coaching programme should be supported by any and all means available, such as an appropriately structured and funded project, to the European Commission.

Deliverable 3, Recommendation 2

The Supervisory Board of the IRT Project believe that their understanding of the form in which e-Coaching support for initial rider training, as described in this Final Technical Implementation Report and the Tampere Report, the IRT e-Coaching Programme, are credible and defendable.

Accordingly the IRT Supervisory Board recommend the IRT e-coaching programme to the European Commission as the basis for acting upon recommendation 1 to Deliverable 3 above.

Deliverable 3, Recommendation 3

The IRT Supervisory Board believe that the Hypermedia Unit of the Tampere University of Technology in Finland are the most competent and experienced European academic and research institute involved in simulations and related e-learning/e-Coaching activities.

Accordingly the Supervisory Board of the IRT Project believe that the continued involvement of the Hypermedia Unit at Tampere is very important in pursing successfully the objectives of recommendations 1 and 2 of Deliverable 3.

Deliverable 4 - developing a European approach to initial rider training

The Supervisory Board of the IRT Project believe that the major part of Deliverable 4 has been met within the work and recommendations contained in Deliverable 1. The obligation contained in contract TREN-SUB-2003-S07.30333 was for the IRT Project to identify the essential elements of a model European initial rider training programme.

As previously explained (see paragraph 2, page 5), at the request of the then responsible D-G Tren official, the IRT Supervisory Board undertook to not simply list the essential elements but to develop them into an effective working training programme. The IRT model European initial rider training programme, with its three main elements, and the essential aspects within them described in detail, in the form of a manual covering the needs of both the trainee rider and the instructor, being the outcome. (appendix 1).

However the IRT Supervisory Board believe that for the full potential of the IRT model programme to be realised it will be necessary to undertake a range of further supporting measures.

Firstly professional editorial and graphical services are required. Whilst it is felt that the image developed for and used within the IRT model programme is a good one it is recognised that it may benefit from being professionally developed. Microsoft PowerPoint has been used because it gave both a distinct style and a flexibility over the desk stop publishing programmes available. The Supervisory Board believe that it should be reviewed by a professional graphic artist. Similarly the content could benefit from the attention of a professional editor.

The number of languages in which the IRT model European programme would be made available, in the view of the Supervisory Board, needs further consideration. Related to this is the need to ensure that the precise intention and emphasise of the original language version is not diminished. To this end it could be necessary to establish national specialist review groups of experienced riders, instructors, safety experts and industry representatives, with if necessary with the support of translators, to ensure that consistency from one language to another.

How the IRT programme material can be made available will also need further attention. Whilst the Supervisory Board believe it should primarily be available through the internet, the benefits of having copies of the manual available in hard form, possibly on durable laminated cards that would resist the vagaries of the weather and regularly being tucked up motorcycle jackets or tank bags, would need to be evaluated and the outcome acted upon.

The establishment of a permanent IRT website, from which IRT model European programme material and information can be downloaded is seen by the Supervisory Board as being a very necessary facility for promoting and disseminating the IRT model European programme. In acknowledging that its role would increase significantly if and when a fourth e-Coaching element had been developed, the establishment of a permanent IRT website in advance of such a development is seen as being necessary to support the benefits of the IRT model European programme in its three element form, through making it easily and widely available.

The importance of a permanent website supporting the IRT model European programme was particularly recognised by the IRT Supervisory Board within the e-Coaching position reached at their Paris meeting (see figure 8). They concluded that the benefits of the Theoretical element would be significantly enhanced by having a supporting visual e-Coaching package developed. Similarly the Machine control would benefit from having its techniques and exercises able to be seen by both instructor and rider.

It was felt that it could be beneficial to have the package for the Theoretical element interactive to some degree. The machine control element however would not be interactive it would be demonstrative, thereby adding moving pictures to the already available words.

Deliverable 4, Recommendation

The Supervisory Board of the IRT Project believe that the benefits that will be gained from the IRT model European initial rider training programme in its current three element form will be appreciable. With the list of considerations addressed above they are sure that those benefits will increase considerably.

The IRT Supervisory Board are encouraged by the statements of the Directorate-General for Energy and Transport of the European Commission indicating that they see practical measures to improve motorcycle safety as a road safety priority. The Supervisory Board believe that the considerations covered in Deliverable 3 above would, if acted upon, result in a significant improvement in motorcycle pre-licence training thereby avoiding many accidents involving

motorcycles and scooters, reducing the severity of many accidents when they do occur with a considerable reduction in the associated suffering and social costs.

Accordingly the Supervisory Board of the IRT Project recommend that in consultation with FEMA, FIM, ACEM and IVV, the Directorate-General for Energy and Transport of the European Commission initiate and support an IRT dissemination project, the objectives of which would be to:

> Undertake a graphical and editorial review of the IRT model European initial rider training programme;

> Facilitate the translation of the IRT model European initial rider training programme into an agreed number of the official languages of the European Union;

> Develop and produce a range of support materials for the IRT model European programme in appropriate and useable formats;

> Establish a permanent IRT programme website;

> Develop and produce e-Coaching packages to support the Theoretical and Machine control elements of the IRT model European initial rider training programme.

Other areas of consideration

In addition to the four main deliverables, as shown on page one of this Final Technical Implementation Report, the IRT Project undertook to look into two other areas of consideration.

These were to review recent and relevant research into rider and driver education, in terms of its relevance to the IRT Project and to evaluate developments in national initial rider training arrangements.

Review of research into rider and driver education and related matters

To assist in their work, the IRT Project Supervisor and the Supervisory Board have given consideration to research reports and EU funded projects that could be relevant to the objectives of developing a model European initial rider training programme.

These have included the following EU projects: the Advanced Project, the Basic Project, the Motorcycle Accident In-Depth Study (MAIDS) and the Gadget Project. The Merit Project, which is addressing instructor standards and has been running concurrently with the IRT Project has also been monitored.

Of these EU funded projects the Gadget Project and MAIDS were seen by the Supervisory Board as being the most relevant for the IRT Project and consequently their conclusions were closely considered in terms of their value and the means by which they could be recognised within a model European initial rider training programme.

Initially the Board questioned the extent to which the Gadget Project's conclusions could be applied practically. However two publications were found that proved to be particularly helpful in this context. *Driver Competence in a Hierarchical Perspective - Implications for Driver Education,* Paräaho, Keskinen and Hatakka, 2003, and *Driver Training in Norway*, the Norwegian Public Roads Administration, 2005.

To assist in the evaluation of the relevance of the Gadget Project's conclusions the Project Co-ordinator prepared a discussion paper which posed a series of questions regarding the Gadget Matrix's application to the IRT Project's objectives. When the Supervisory Board subsequently agreed the structure for a model European initial rider training programme it can be seen that it had been significantly influenced by the Gadget Matrix (figures 1 and 2).

To assist the Board in their consideration of other research, Dr. Marie-Axelle Granié was asked by the Board to evaluate recently published reports that had specifically addressed motorcycle training and hazard perception. She prepared a paper which was presented to and considered by the second meeting of the IRT Supervisory Board (appendix 3). It evaluated particularly the work done by Elliot et al, *Motorcycle Safety: a scoping study,* TRL Report 581, 2003 and Haworth et al, *Hazard perception by inexperienced motorcyclists*, Monash University report 179, 2000.

At the request of the Supervisory Board, ACEM Secretary General Jacques Compagne undertook to analyse the MAIDS database from the perspective of the aspects of motorcycle accidents identified with the MAIDS Project that could be addressed within a rider training programme. His conclusions were presented to and considered by the IRT Supervisory Board at its third meeting in Paris (appendix 4).

Survey of national initial rider training arrangements

At their initial meeting the Supervisory Board agreed that the objectives of the IRT Project would be assisted by undertaking a survey of certain areas of initial

rider training in 30 European countries. These countries were the now 27 Member States of the European Union, Croatia, Norway, Switzerland and Turkey.

The four international organisations co-operating in the IRT Project, ACEM, FEMA, FIM and IVV, undertook to circulate the survey amongst their national member organisations, an approach having the advantage of ensuring wide coverage and allowing for checks and comparisons.

The questionnaire was prepared by the Project Co-ordinator in conjunction with the Supervisory Board members representing ACEM, FEMA, FIM and IVV. It asked five primary questions and 30 secondary question, 16 of which were in multiple choice, tick box format (appendix 5).

The four primary questions were:

> Is training prior to obtaining an A category licence required by law?
> Is training conducted within a nationally approved syllabus?
> Are training providers regulated?
> Are training facilities available?
> What is the estimated cost of obtaining an A category licence?

43 replies have been received from 25 countries. Of the 15 original EU Members States the only countries that did not respond were Greece and Luxembourg. Amongst the 12 "new" Member States no responses were received from Hungary, Latvia, Lithuania and Romania.

When the Supervisory Board first gave consideration to the responses they were surprised by two things. Firstly was that where more than one response had been received from a country, they often contained conflicting information. Whilst some were expected in response to the questions that required estimations to be made, such as the availability or the cost of training, they were not expected in the factual areas, such as whether training was required by law. The Supervisory Board concluded that the inconsistencies were indicative of disfunctionality in a number of national training arrangements.

Secondly, the Supervisory Board were surprised by the variation in the estimated cost of obtaining an A category licence. Amongst the original 15 Member States it ranged from 400 to 3,600 euro. The range in the new Member States was from 85 to 550 euros and in the five non-EU countries from 270 to 2,200 euros.

Mr. Peter Smirz and Dr. Hans-Yngve Berg questioned whether the total costs of obtaining an A category licence had been distorted by the practice in some countries of trainees obtaining both their A and B category licences at the same time, Austria and Sweden being given as examples. It was agreed that further investigations needed to be made.

These concluded that the practice did occur. However it was difficult to ascertain the extent to which the extra costs had influenced the reported costs as it was not possible to identify the percentage of A licence training that took place together with B licence training. Accordingly a footnote has been added to the summary of the returns which are contained in appendix 6 to this Final Technical Implementation report.

The Initial Rider Training Project website

An Initial Rider Training Project website was established and regularly updated. It has received four major reviews, the last being in February 2006. However in April 2006 the system of the Webmaster experienced a major collapse and despite considerable efforts on the part of FEMA's IT specialists, it has not possible to re-establish it.

In considering this situation at their March 2007 meeting the IRT Supervisory Board accepted that further efforts should not be made to re-establish the IRT Project website. The members of the Supervisory Board then decided that on acceptance of the Final Technical Implementation Report by the European Commission, a new Initial Rider Training Project website should be created by ACEM, FEMA and FIM on the basis of the considerations, conclusions and recommendations of the this Final Technical Implementation Report of the Developing a European Approach to the Initial Training of Motorcyclists Project, herein referred to as the Initial Rider Training Project.

Acknowledgements and thanks

The Supervisory Board of the Initial Rider Training Project wish to place on record their thanks to the many persons and organisations who have contributed to the IRT Project.

Particular thanks go to the members of the Instructors' Working Group without whose skills and highly developed specialist knowledge the work involved in developing the three elements of the IRT model European training programme would have been very difficult if not impossible.

Special thanks also go to Vägverket, the Swedish national road traffic authority. They not only made a significant financial contribution but also facilitated the valuable and wise counsel of Dr. Hans-Yngve Berg.

The specialist knowledge and experience of the Hypermedia Unit of the Tampere University of Technology also deserve special mention. Without their guidance and enthusiasm the IRT Project's objective of evaluating the contribution that e-Coaching could bring to initial rider training, would have been far less focussed and the conclusions far less able to be defended. In this respect the contribution of Dr. Pekka Ranta has been invaluable.

The expertise, enthusiasm and commitment of the senior officials and the member organisations of ACEM, FEMA and FIM have played a major part in the work of the IRT Project, as has IVV, the international instructors' organisation.

Finally the financial and practical support of the Directorate-General for Energy and Transport of the European Commission must be acknowledged with particular thanks going to Dr. Stefan Tostmann, Head of the Road Safety Unit and his colleagues Mr. Harald Ruyters and Mr. Joel Valmain. Their understanding and recognition of the importance of the issues being addressed by the IRT Project are, we believe, reflected in this Final Technical Implementation report.

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