

Driving Simulator at RIOH

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Director of RSRC MOT. China



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Introduction of RSRC

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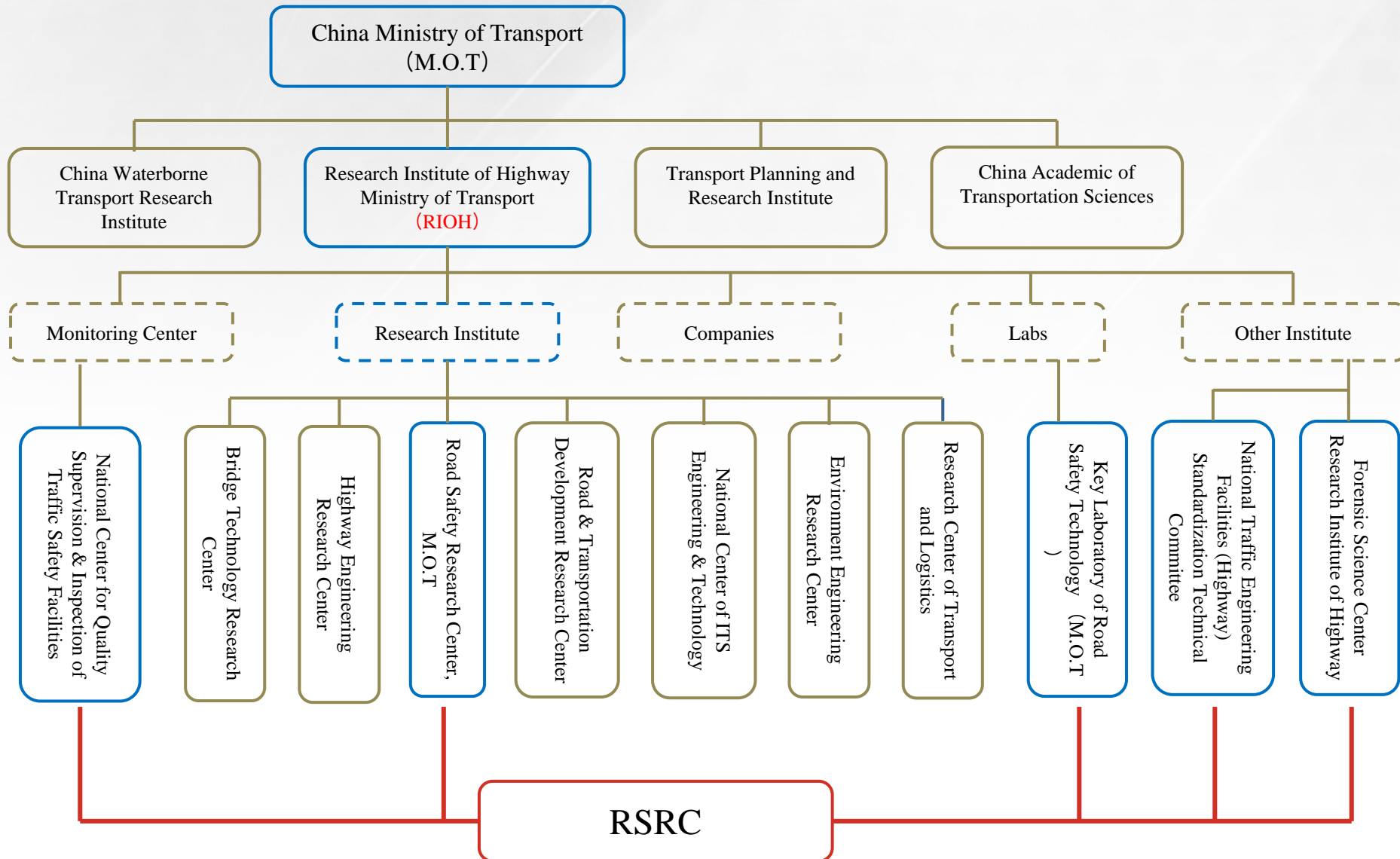
Driving simulators of RIOH

03

Research of our Driving Simulator



01 Introduction of RSRC



Introduction of RSRC

History

1973

交通工程设计研究室

Traffic Engineering
Design and Research Division

The first research and consultation agency for Traffic Engineering & Traffic Safety Engineering in China



2003

交通工程部

Department of Traffic Engineering

An integrity traffic engineering and traffic safety R&D organization with 6 platforms.

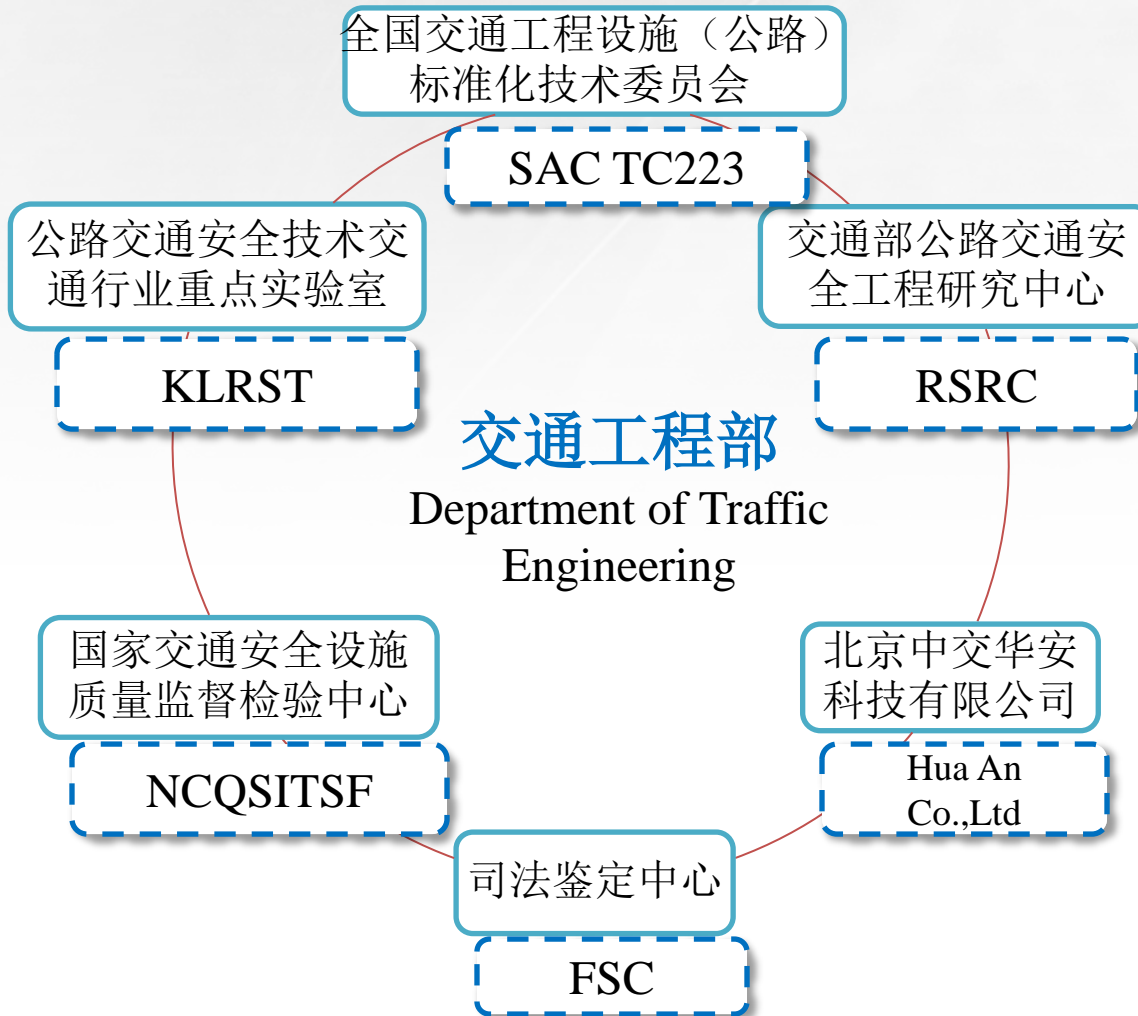
Introduction of RSRC

the 6 platforms

RSRC	<ul style="list-style-type: none">• 交通运输部公路交通安全工程研究中心• Road Safety Research Center of MOT
NCQSITSF	<ul style="list-style-type: none">• 国家交通安全设施质量监督检验中心• National Center for Quality Supervision & Inspection of Traffic Safety Facilities
SAC TC223	<ul style="list-style-type: none">• 全国交通工程设施（公路）标准化技术委员会• National Traffic Engineering Facilities (Highway) Standardization Technical Committee
FSC	<ul style="list-style-type: none">• 司法鉴定中心• Road Traffic Forensic Science Center
Hua An	<ul style="list-style-type: none">• 北京中交华安科技有限公司• Beijing Zhongjiao Hua'an Science & Technology Co., Ltd.
KLRST	<ul style="list-style-type: none">• 公路交通安全技术交通行业重点实验室• Key Laboratory of Road Safety Technology, MoT

Introduction of RSRC

Organizations



标委会：技术法规的制修订与宣贯机构

SAC TC223: Technical regulation & standardization

安全中心和重点实验室：理论与应用技术研究机构

RSRC&KLRST: R&D

国检中心：实验与检验机构

NCQSITSF: Test&Experiment

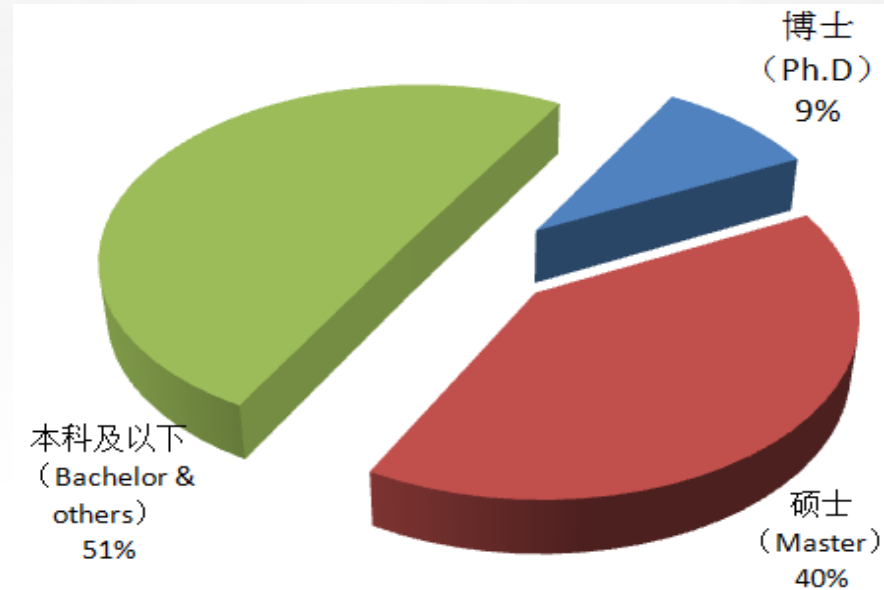
司法鉴定中心与华安公司：技术应用——安全评价与交通事故司法鉴定

FSC & Hua An: Technology application, traffic safety audit and crash forensic

Introduction of RSRC

Human resource

- 150 professional staff
- About 50% of staff have post graduated degree
- About 40% of staff are senior researchers or engineers
- Including professional field of traffic engineering, safety engineering, vehicle engineering, highway engineering, structure, economics and psychology



Introduction of RSRC

主要研发工作（Traffic safety R&D Activities）

- 重点研究领域（Key Research Field）
 1. 道路交通安全保障技术
Road traffic safety enhancement technology
 2. 道路交通安全设施及新材料
Road traffic safety facility and materials
 3. 道路线形与通行能力研究
Road alignment and traffic capacity research
 4. 道路气象与路网运行技术
Road weather and network operation technology

Introduction of RSRC

主平台：
交通运输部公路交通试验场

The main platform:
Proving Ground of Highway Traffic, MOT



- 占地2.4平方公里
2.4 square kilometers around.
- 投资3亿多
Investment: more than 0.3 billion RMB
- 试验能力覆盖全部交通工程专业领域
Wide range of tests and experiments on traffic engineering.

Introduction of RSRC

Our activities



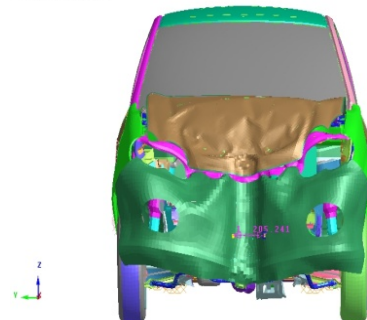
www.r

Introduction of RSRC

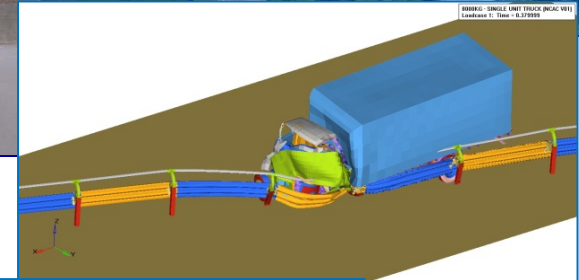
Our performance



m1-3port-022-460-zhong-dai-lin



1814250217



00000 - SINGLE UNIT TRUCK (RUC 191)
Loadcase 1: Time = 0.17000



P006

02 Driving Simulators of RIOH

RIOH DS1



RIOH DS3

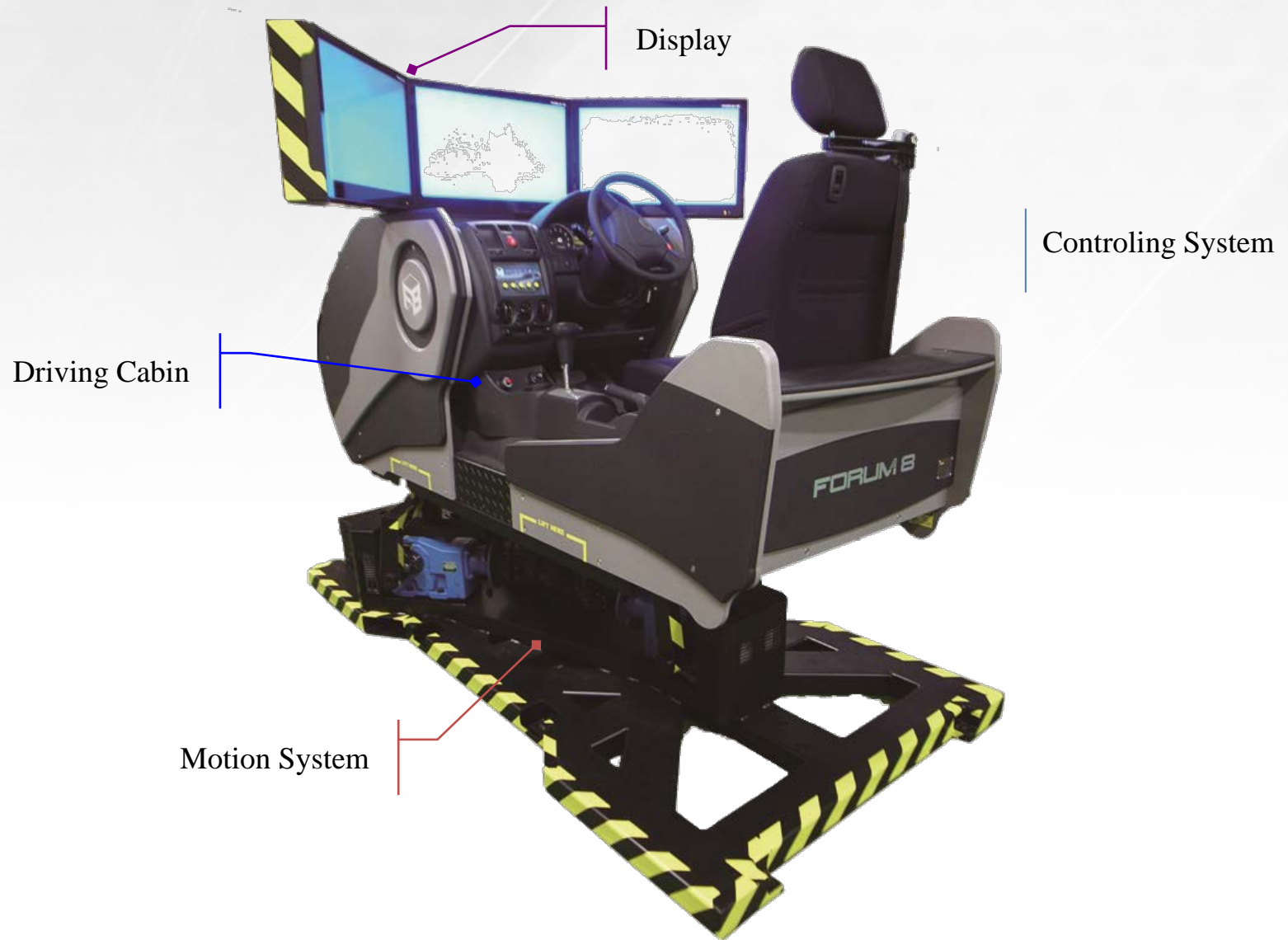


RIOH DS2

DS1



DS2



DS3



History

2007

2007.10 Proposal of building the Driving simulator
Key Laboratory of Road Safety Ministry of Communications PRC

2008

2008.10 Finished the Survey of Driving Simulators used around the world
2008.11 Beginning of the building of the Driving simulator

2009

2009.12 Driving Simulator Function Design
RIOH & FORUM8 & INNO work together

2010

2010.10 New Function added
Redesign

2011

2011.05 Components sending to China

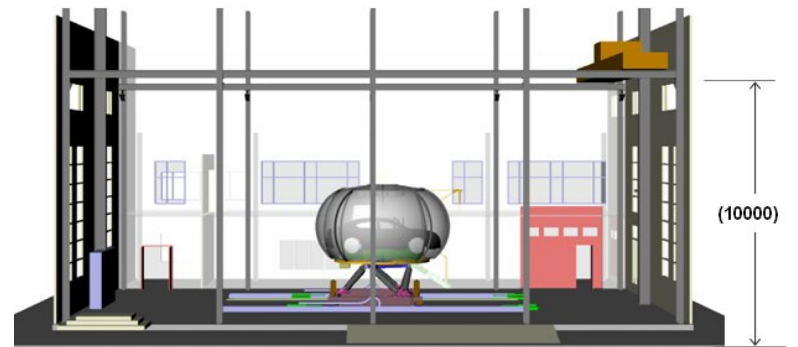
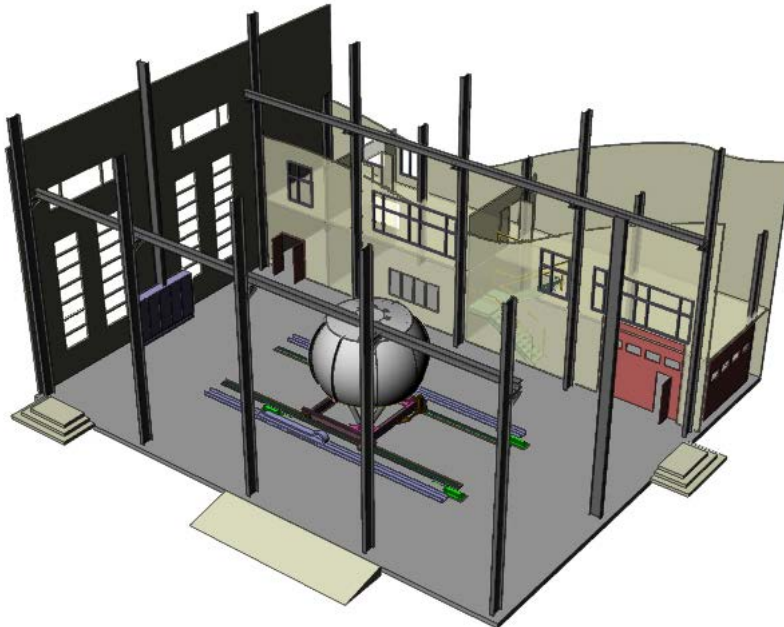
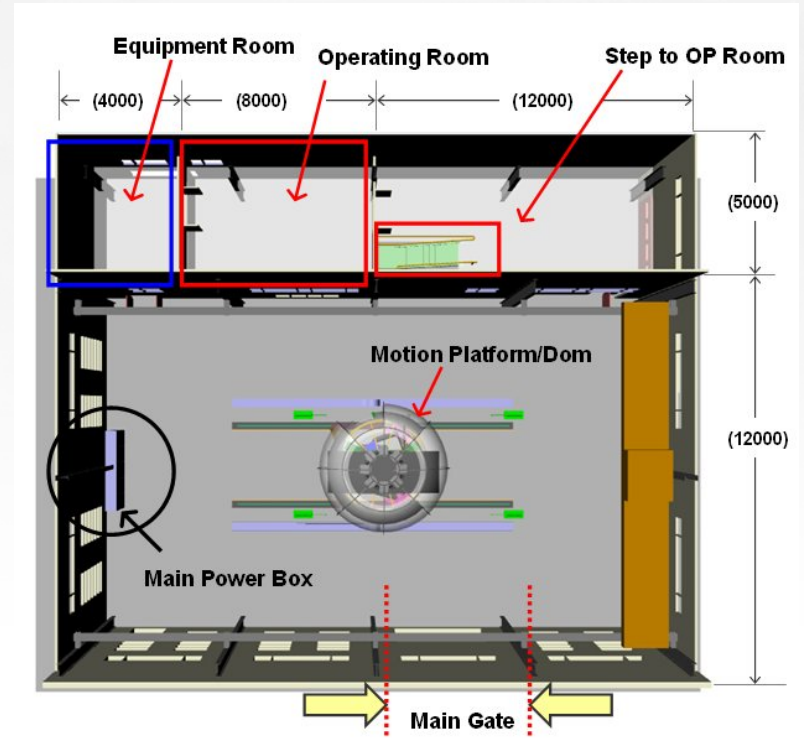
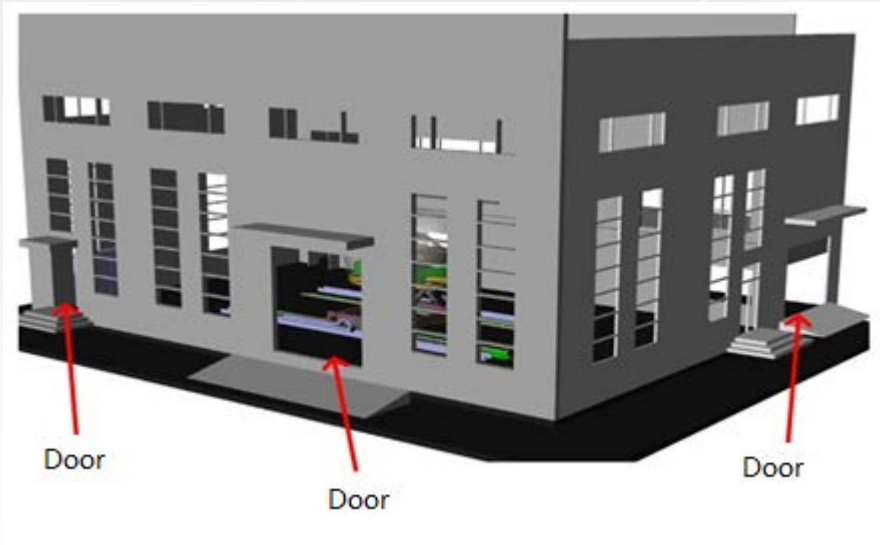
2012

2012.03 Start Building

2013

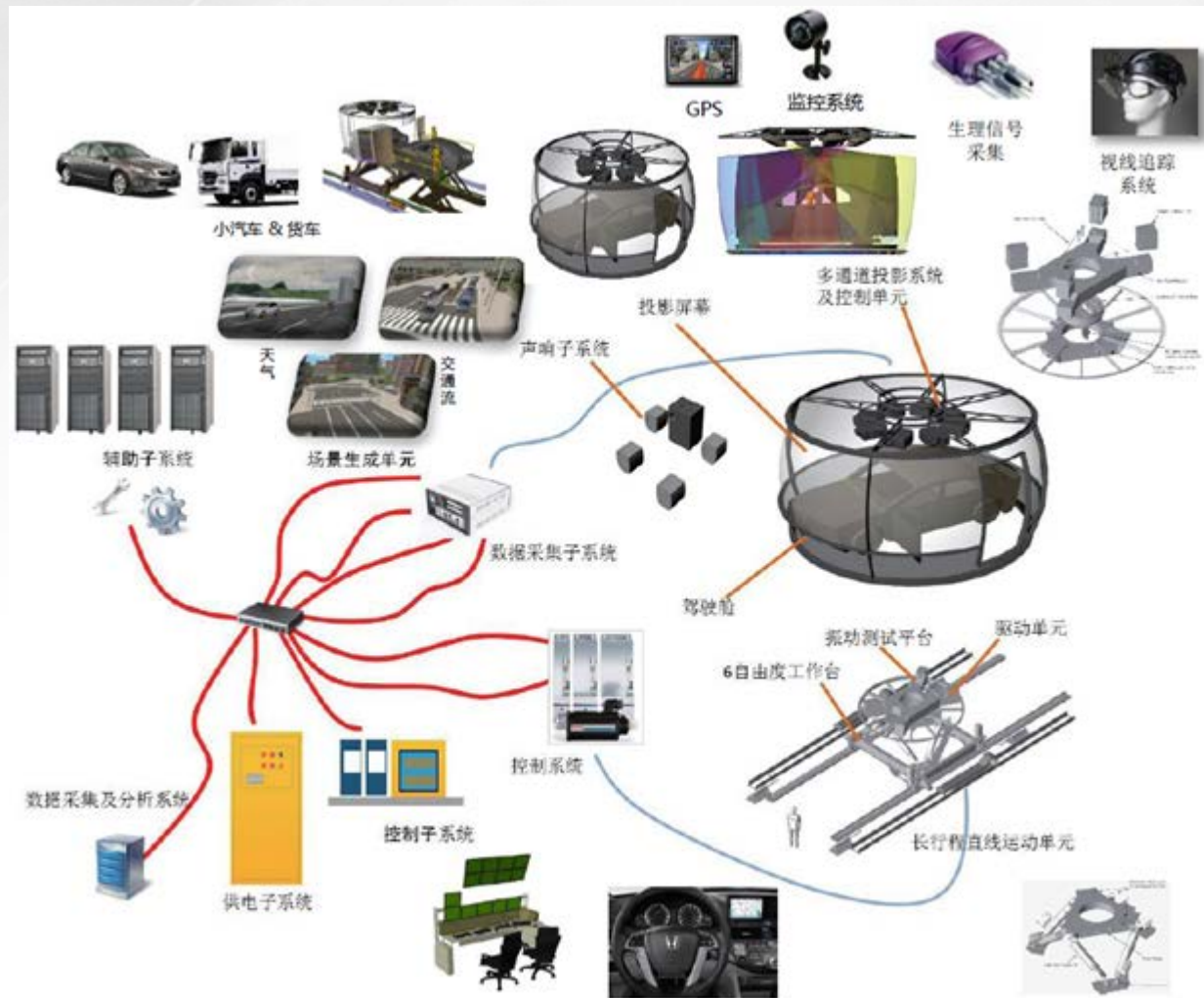
2013.11 Finished and in testing

Building

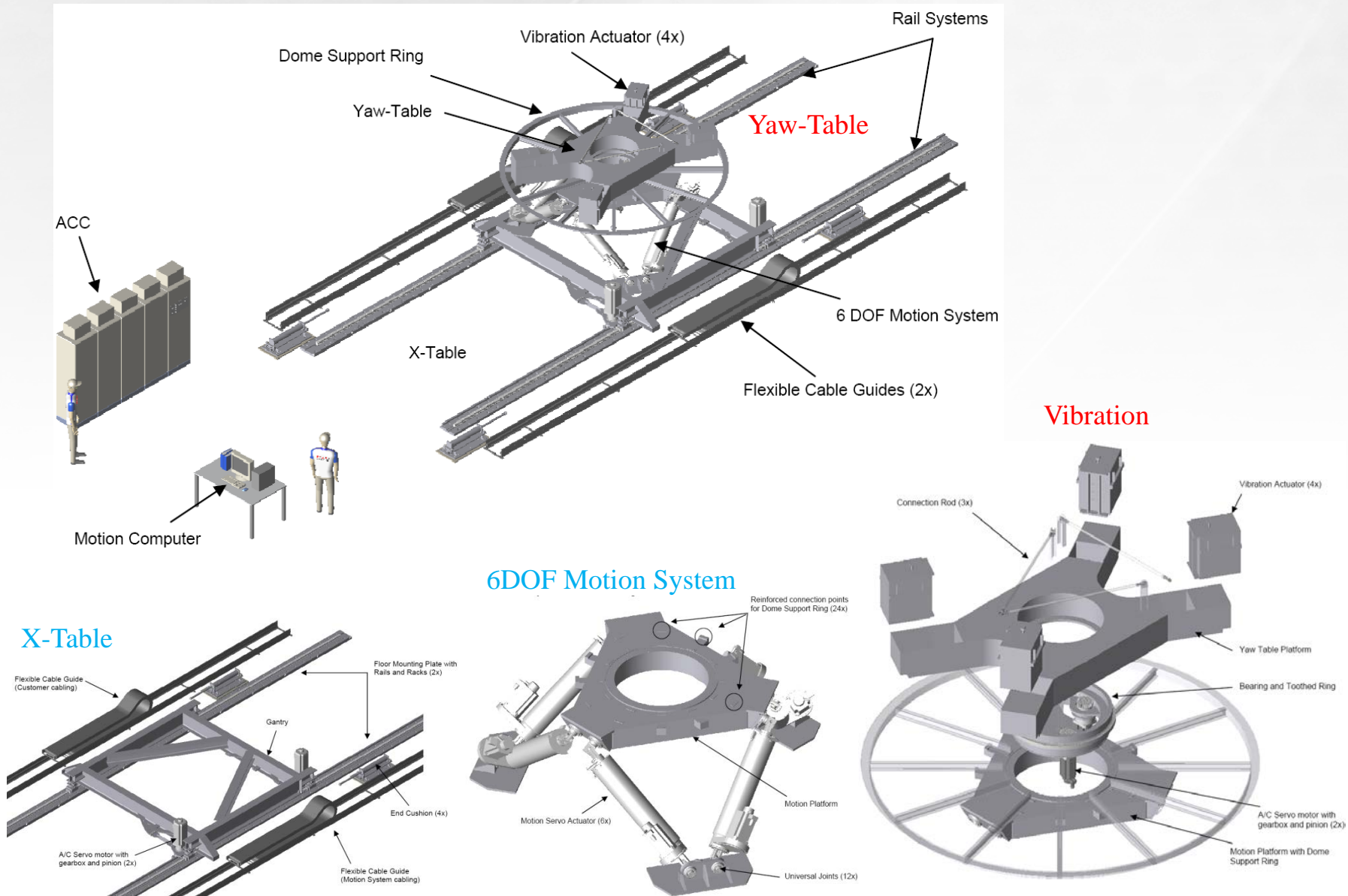


System

- 1 六自由度运动平台
6DOF Motion Platform
- 2 驱动单元
Yaw Table
- 3 振动测试平台
Vibration Test Platform
- 4 多通道投影系统及控制单元
Multi Project System
- 5 投影屏幕
Projection Screen
- 6 长行程直线运动单元
X Axis Table
- 7 声响子系统
Sound Sub System
- 8 驾驶舱
Cabin
- 9 供电子系统
Power Supply System
- 10 控制子系统、辅助子系统
Control Sub System



Motion System

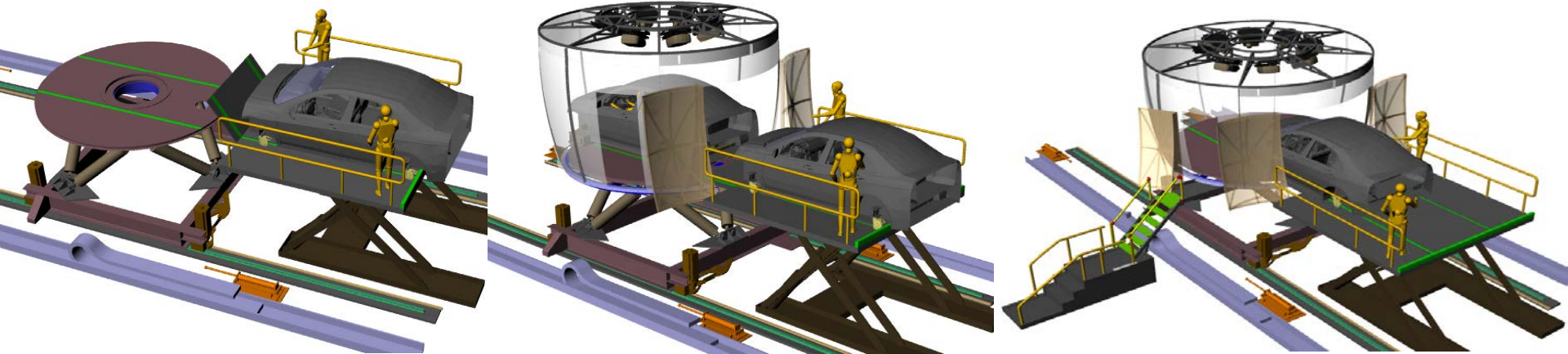
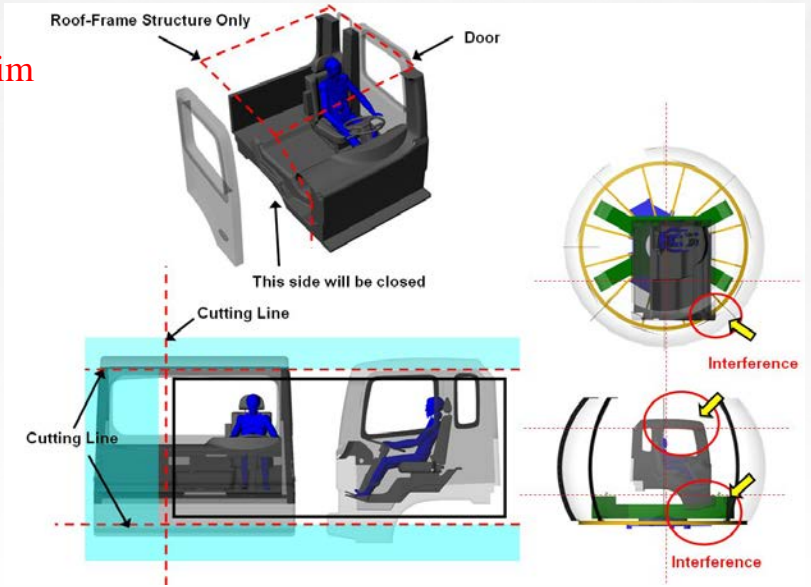


Vehicles

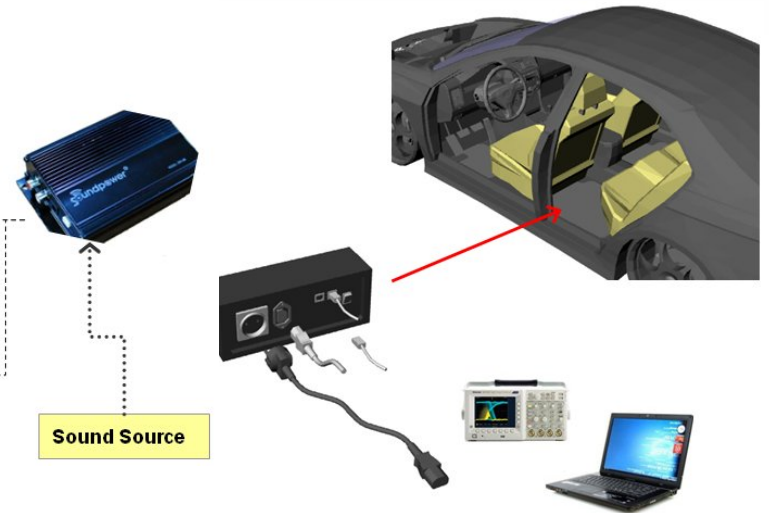
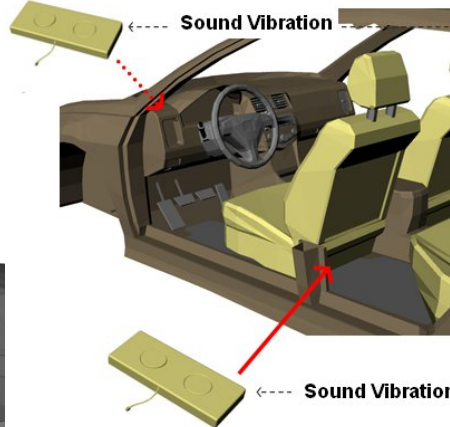
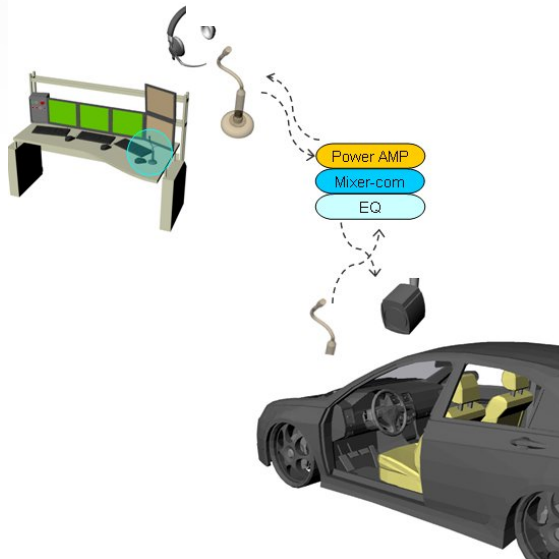
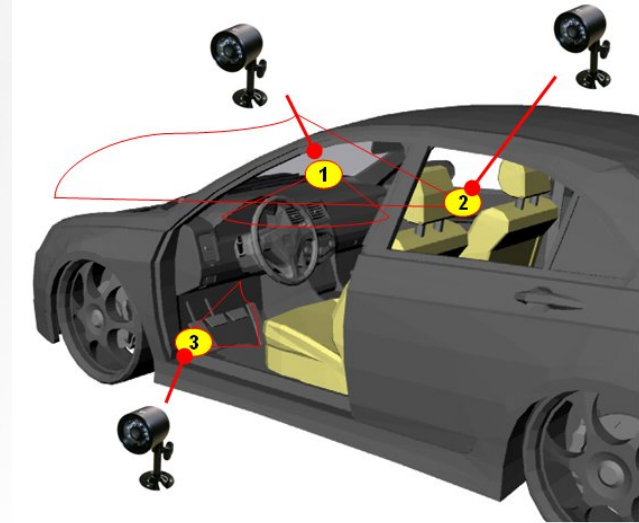
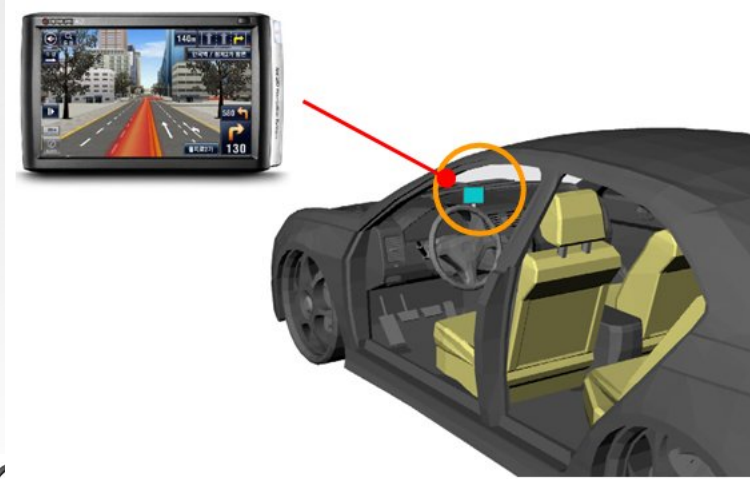
CarSim



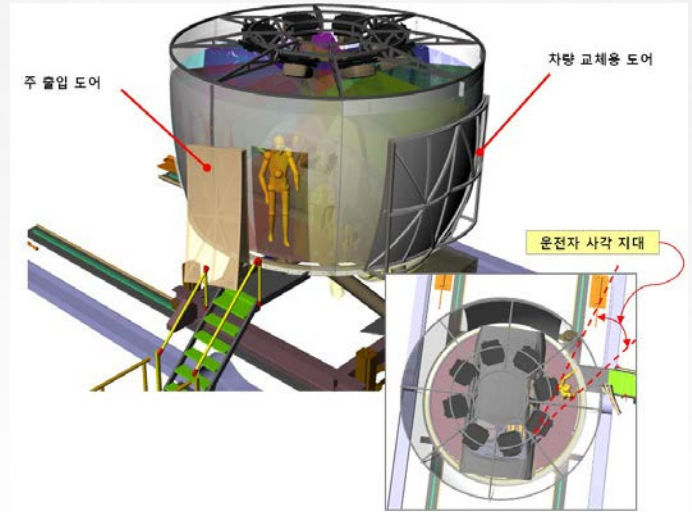
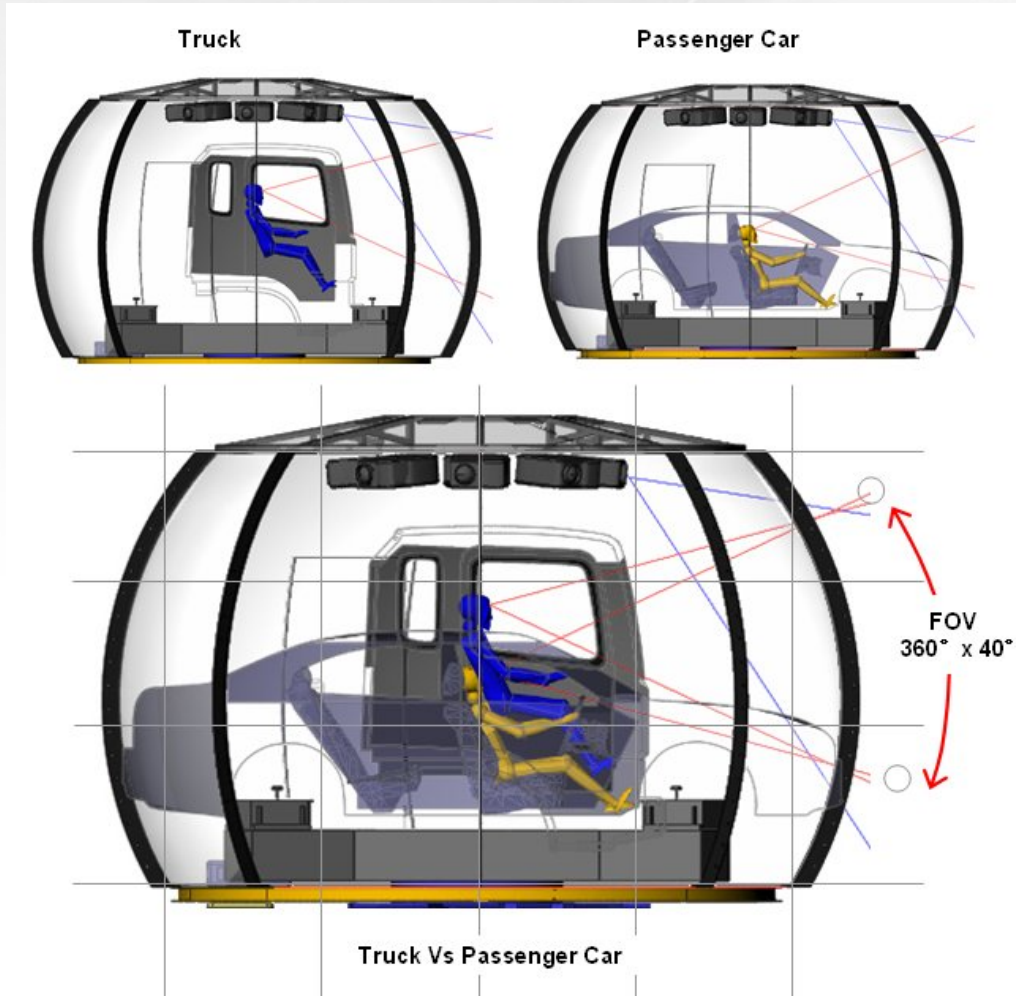
TruckSim



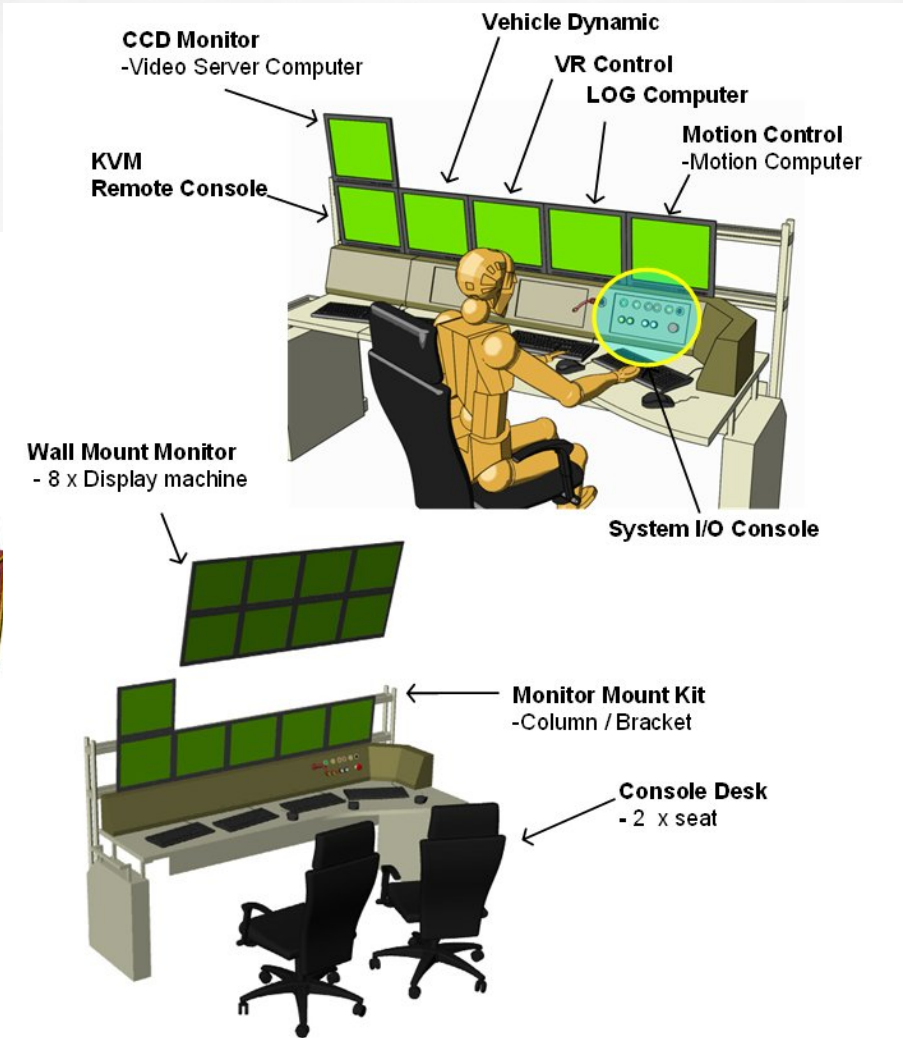
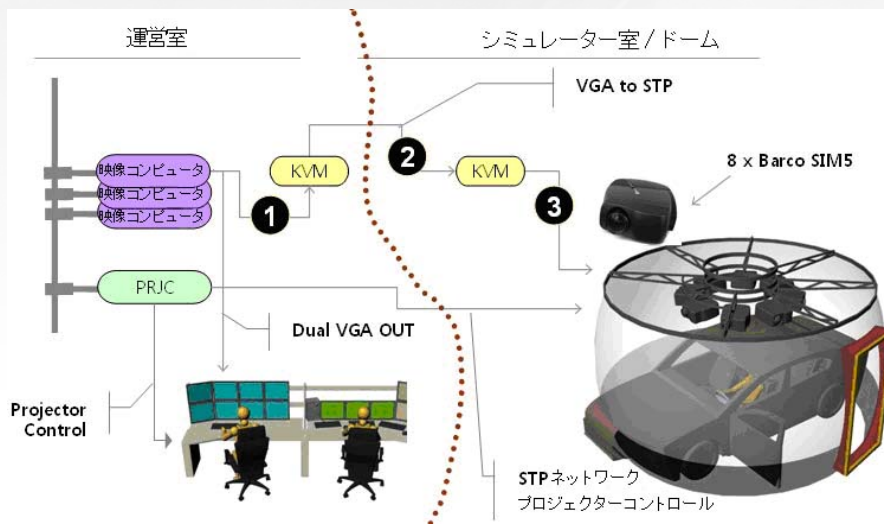
Monitoring system



Display system

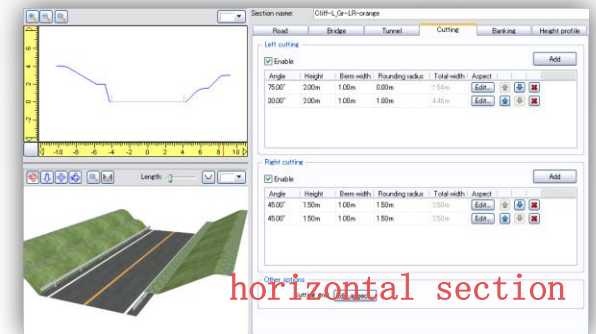
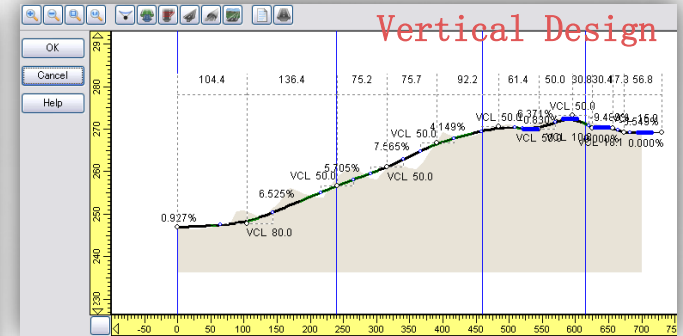
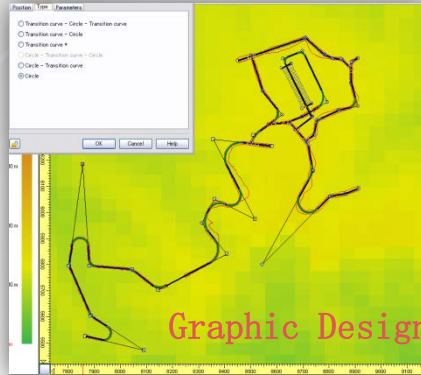
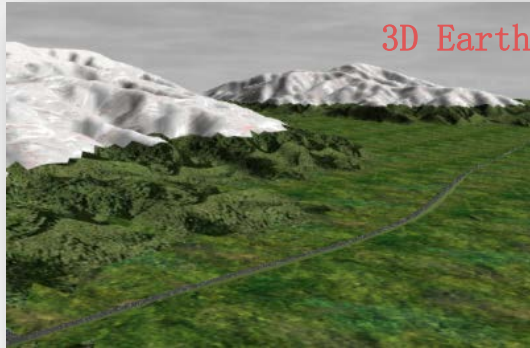


Controlling



Software for Road Design

Based on Uc-winRoad



Software for Environment Design



Cool + snow



Hot + Fog

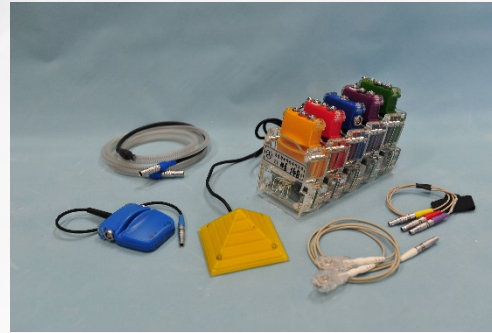


Wind / Rain
/Thunder/Snow/
Fog/ Road
friction

Raining Road



Facility using with the Driving Simulator



The Observer XT - Observer

File Edit View Setup Observe Select Visualize Analyze Export Window Help

1

2

3

4

5

6

7

8

9

Event Time	Subject	Behavior	Comments
12:07:12.224	Boiss	Looking at	
12:07:12.224	Employee	Talking	I would like to ask you something
12:08:18.116	Boiss	Leaving back	
12:08:18.116	Boiss	Together	
12:08:18.116	Employee	Hammering	
12:08:18.116	Employee	Hammering	
12:08:18.800	Employee	Talking	Well, I was wondering
12:08:18.116	Boiss	Upright	Yes?
12:08:18.120	Boiss	Talking	
12:08:18.116	Boiss	Looking at	
12:08:18.116	Boiss	Together	
12:08:18.116	Employee	Upright	
12:08:18.116	Employee	Upright	
12:08:18.116	Boiss	Leaving back	
12:08:18.116	Boiss	Together	
12:08:18.116	Employee	Looking at	

Existing observation, you can edit events or press 'Start Observation' to score additional event

Physiological Data

Time (HH:MM:SS) [Expanded]

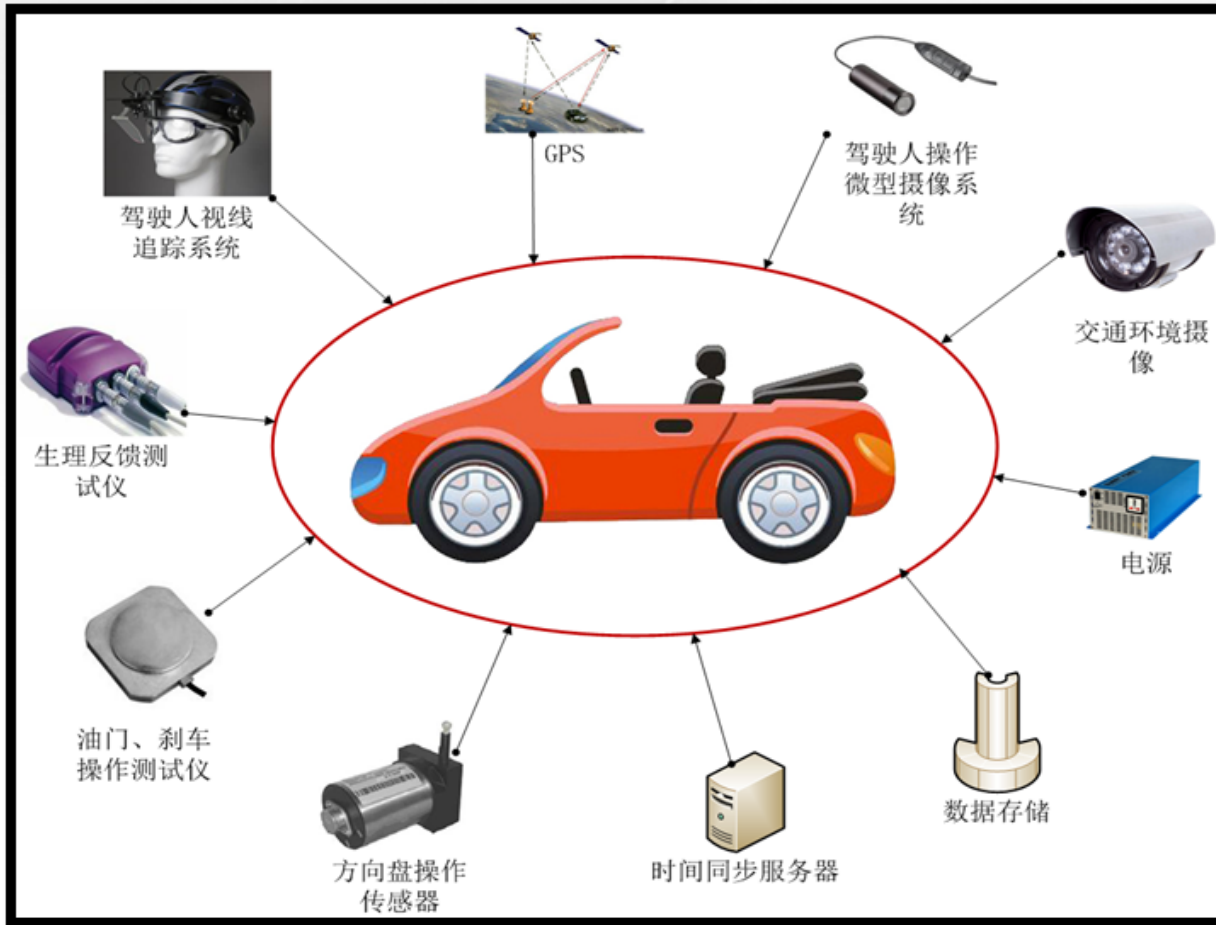
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BPM

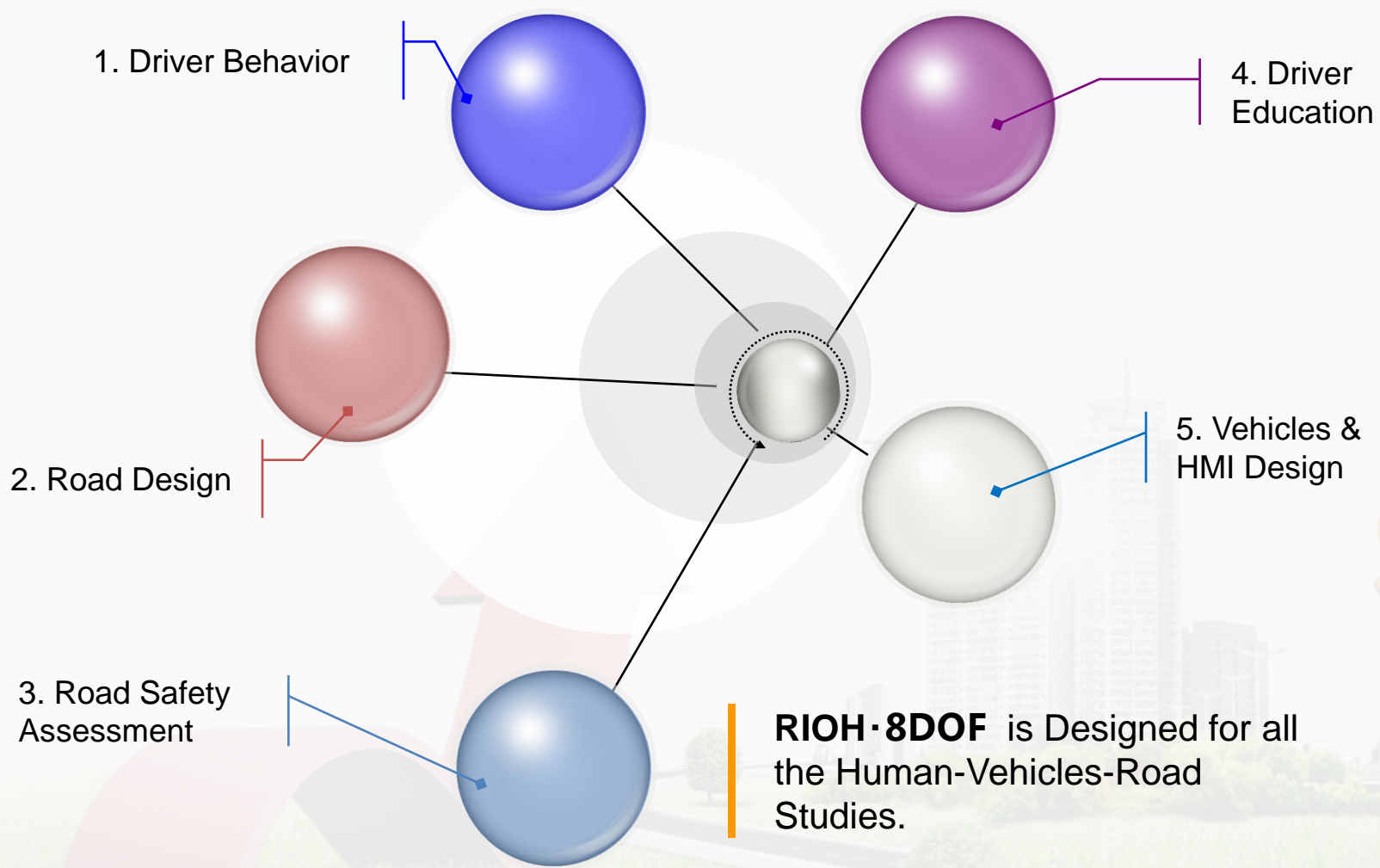
HRV

Independent Variable: Observation Timeline: Playback Control: File Synchronization:

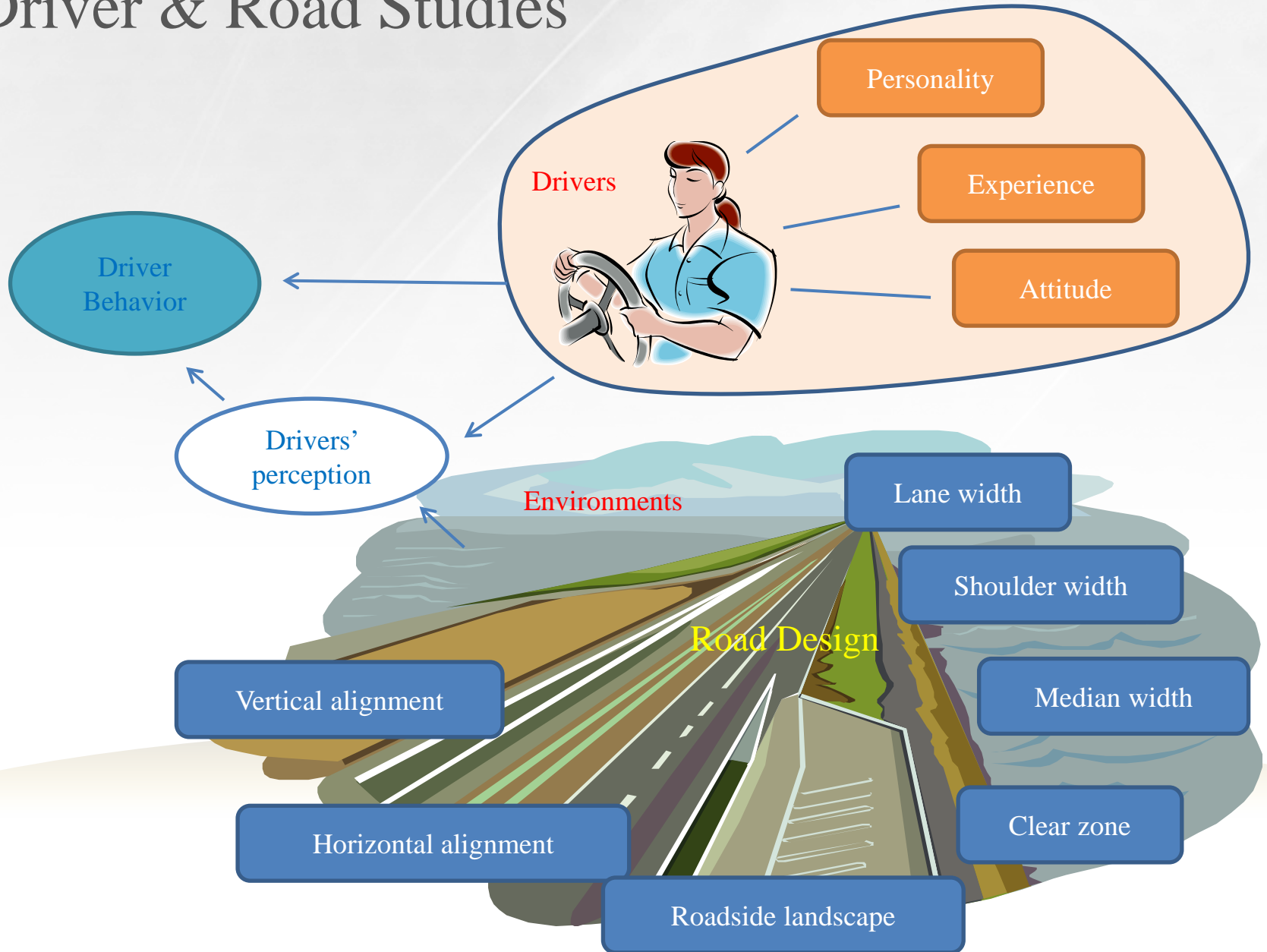
NDS & FOT Research Facility



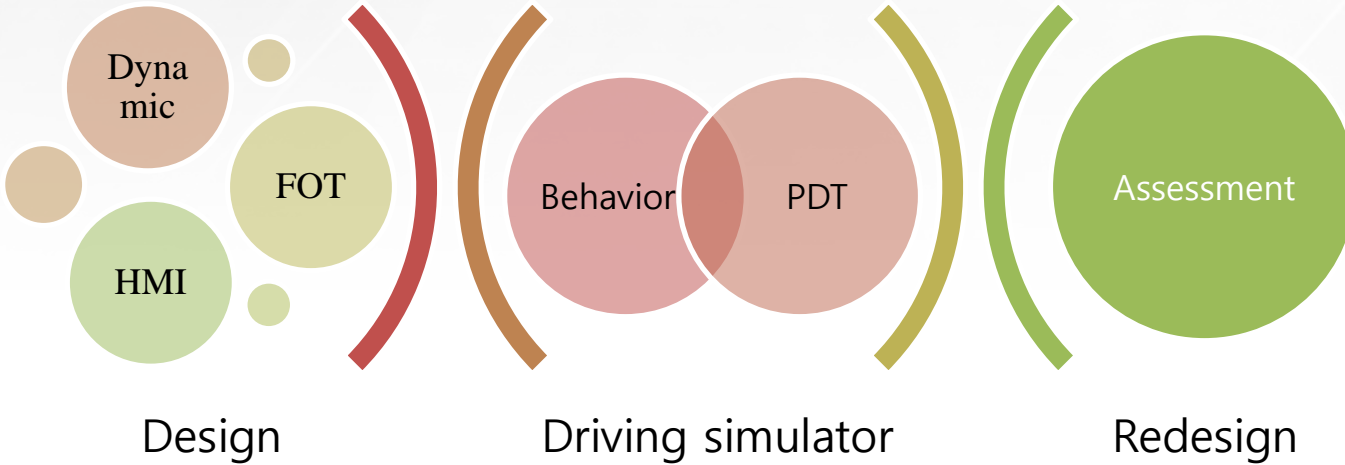
Function of RIOH Driving Simulator



Driver & Road Studies



Vehicle & HMI Design



03 Projects on the Driving Simulator

● Canada-China Joint Research Program Phase I

Relationship Between the Human Factors and Road Safety in Different Environment - Based on the DRT studies.

● Traffic Information Project from the MOT of China

Studies of Drivers' Abnormal Behaviors – Telephone Using, Looking Around and Driving without Hands.

● Canada-China Joint Research Program Phase II

Study on the Monitoring of the Naturalistic Driving Behavior and Protection Methods for the Passengers - Prevention for the Single Vehicle Road Departures Accidents.

● Safety Treatment Research for the HongKong-ZhuHai-Macao Bridge Project

An Important Project which still in building.

Based on the Simulation Technology and Driving Simulator , Give advice to the alignment and facility design.

● Study on the Alignment for Underground Urban Road

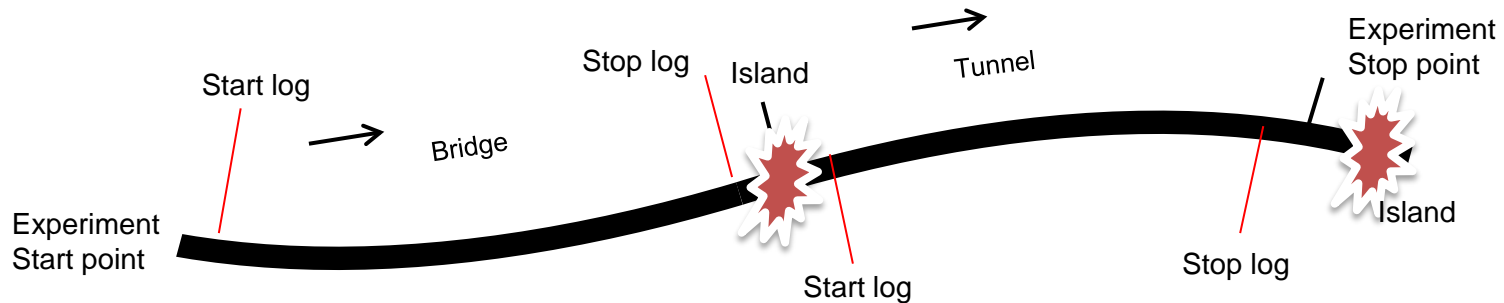
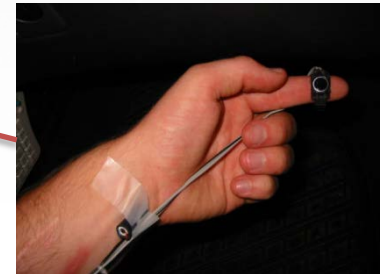
Driver Behavior of Different Horizontal Curves on the Underground Urban Road and the Difference Between Underground Road and On-land Road .

● Safety Treatment and Traffic Organization of Shenzhen Qianhai Underground Road

A Real Road Still in building.

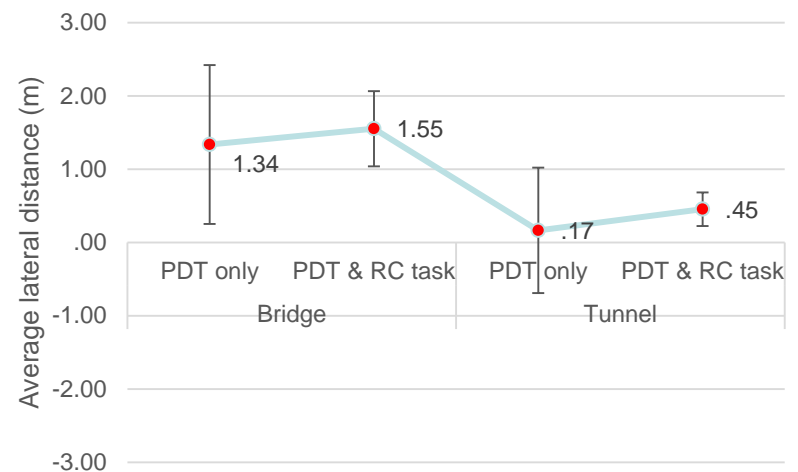
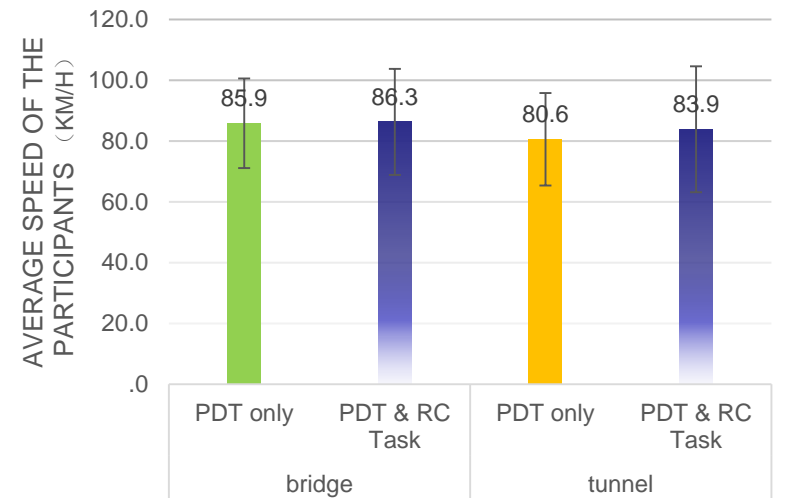
Driver Behavior of This Road Because of Its Complicated Design Alignment and Traffic Organization.

Relationship Between the Human Factors and Road Safety in Different Environment

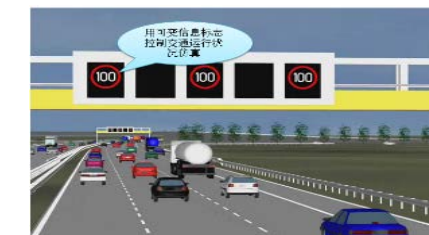
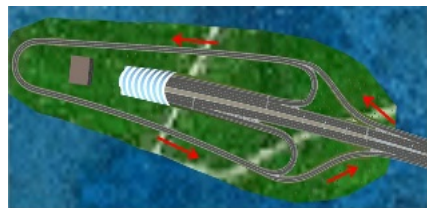


Relationship Between the Human Factors and Road Safety in Different Environment

- Difference between the bridge and tunnel
 - Speed and Changing of Speed : bridge > tunnel.
 - Lateral distance and Changing of direction : bridge > tunnel .
 - DRT accuracy, Response time and Changing response time : no difference.
- Effect of the RC task
 - No effect to the speed both on the Bridge and in the Tunnel, but speed and changing of speed : bridge = tunnel.
 - No effect to the lateral distance and changing of direction both on the Bridge and in the Tunnel.
 - Leading to a decrease of PDT accuracy, a longer DRT and a larger DRT SD both on the Bridge and in the Tunnel, meaning RC task bring troubles for drivers' response to PDT.



Safety Treatment Research for the HongKong-ZhuHai-Macao Bridge Project



Research topics

- Width of the Medial Divider of the Bridge
- Driver Behavior on the Island Roads
- Driver Behavior of Entering and Leaving the Tunnel
- Stability of Driver Speed on the Whole Road
- Effect of other Traffic to the Driver
- The Effect of the Facility
- Driver Behavior when There is Some Accident in the Tunnel or on the Bridge
- Driver Behavior with Different Weather

Safety Treatment and Traffic Organization of Shenzhen QianHai Underground Road

- Does the Design Alignment of this Road Suitable for Drivers.
- Does the Facility of this Road Safe Enough for Drivers.
- How to Increase the Visuality of the Tunnel.





THANK YOU!

