

# ***Rail Human Factor Training***

**Adaptation of Crew Resource  
Management and Line Oriented  
Training to Enhance Modern  
Railway Safety**

**Presented by : Tak Sum Tsang**

# ***Crew Resource Management***

CRM training is the approach used with aviation to tackle issues of teamwork amongst flight crew of the three C's

- Concern
- Cooperation
- Communications

CRM help the crew to learn to interact and communicate and work effectively as a team.

**Crew Resource Management-Awareness, Cockpit Efficiency & Safety by Brian McAllister 1997**

# ***Justification for using CRM***

The working relationships between train crew and flight crew are very similar. They are working as a team but they never have face-to-face contacts or interaction with one other.

The author believes the three days indoor CRM training and outdoor team building exercises could encourage the crew members getting to know each other to attain “familiarity” goal.

# ***Objectives of using CRM:***

- To adopt human factor training through CRM and LOT for train drivers, traffic controllers and station controllers
- To optimize training resources
- To improve efficiency of people working in railway
- To minimize/eliminate the potential of human error
- To improve reliability of people working in a system



# ***Background***

- Despite the continuous changes and improvement in safety standards and technology, the occasional accident is still inevitable;
- More than 70% of accidents were caused by human factor errors;
- CRM and LOT can improve the state of human performance for safety critical tasks
- Most of the human errors can be mitigated by human factor training



# ***Content of CRM training***

**Train Crew annual refresher training**

**Conventional refresher training (Old)**

Day 1 Rail systems refresher training

Day 2 Rule and Procedures refresher training

Day 3 Line training by standalone simulator (Cabsim or Opsim)

**CRM Training (New)**

Day 1 Rail systems + rule & procedures training by VAT and DSS

Day 2 Outdoor team building workshop (The outdoor team building workshop was sponsored by KCRC in a recreation club with the participation of the Director of Transport, Director of Human Resource and the CEO)

Day 3 CRM training and assessment by using integrated training facilities (ITF)



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# ***Justification for CRM training***

Fatal lesson learned from aviation and railway industries

In 1980, the Saudi Arabian Flight 163 cabin crew could not find the correct procedure to handle an onboard fire incident. All 301 people died of smoke inhalation after landing.

In 1991, 185 people were injured in the collision of two UK passenger trains in a 6.5 km-long under water tunnel. Due to communication errors, no rescuers were sent to the incident site until two hours later.

# ***Justification for using accident cases from other high risk domains***

- Even the best pilots can make catastrophic mistake
- A safety management system is never enough if practiced mechanically, it required an effective safety culture to flourish
- CRM is more important than ever in fully automated railway because of the demanding efficiency-driven railway operating environment and the need for more co-ordination, communication and clear cut task sharing and conflict avoidance.



# ***CRM and LOT Features***

- Computer-based simulators (Cabsim & Opsim)
- Computer-based training (CBT) workstations
- Integrated training facilities (ITF)
- Video-aided training (VAT) workstations
- Decision support system (DSS)



# ***New Features for CRM***

Video-aided training consists of photos, slides and video clips components can form a knowledge portal to support train operations and maintenance functions.

Decision support system (DSS) support train crew in incident handling and quick decision making.



# ***Line Oriented Training (LOT)***

- LOT training in the old days was carried out yearly. Almost like teaching old dogs old tricks.
- Now it is an actual train operation scenario designed to test the skill of the whole crew. The instructor does not intervene or mark the performance.



# ***LOT by cab simulator***

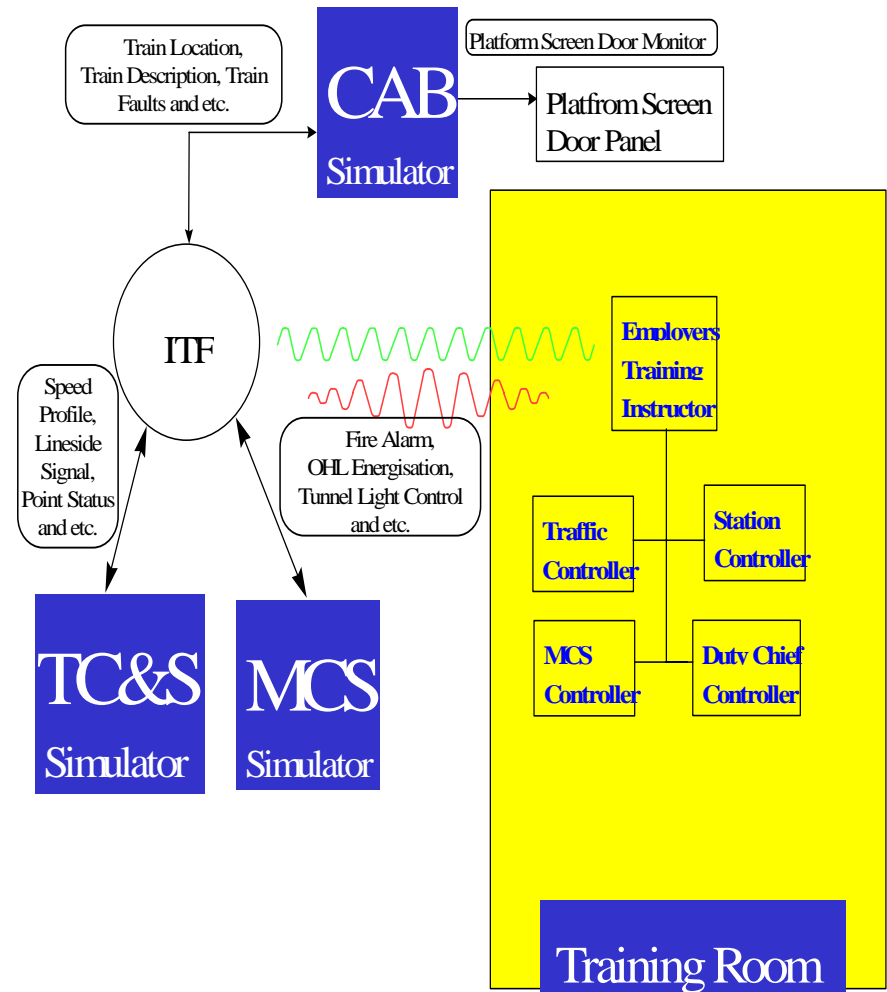


# ***Cab Simulators and Training Instructor Console***

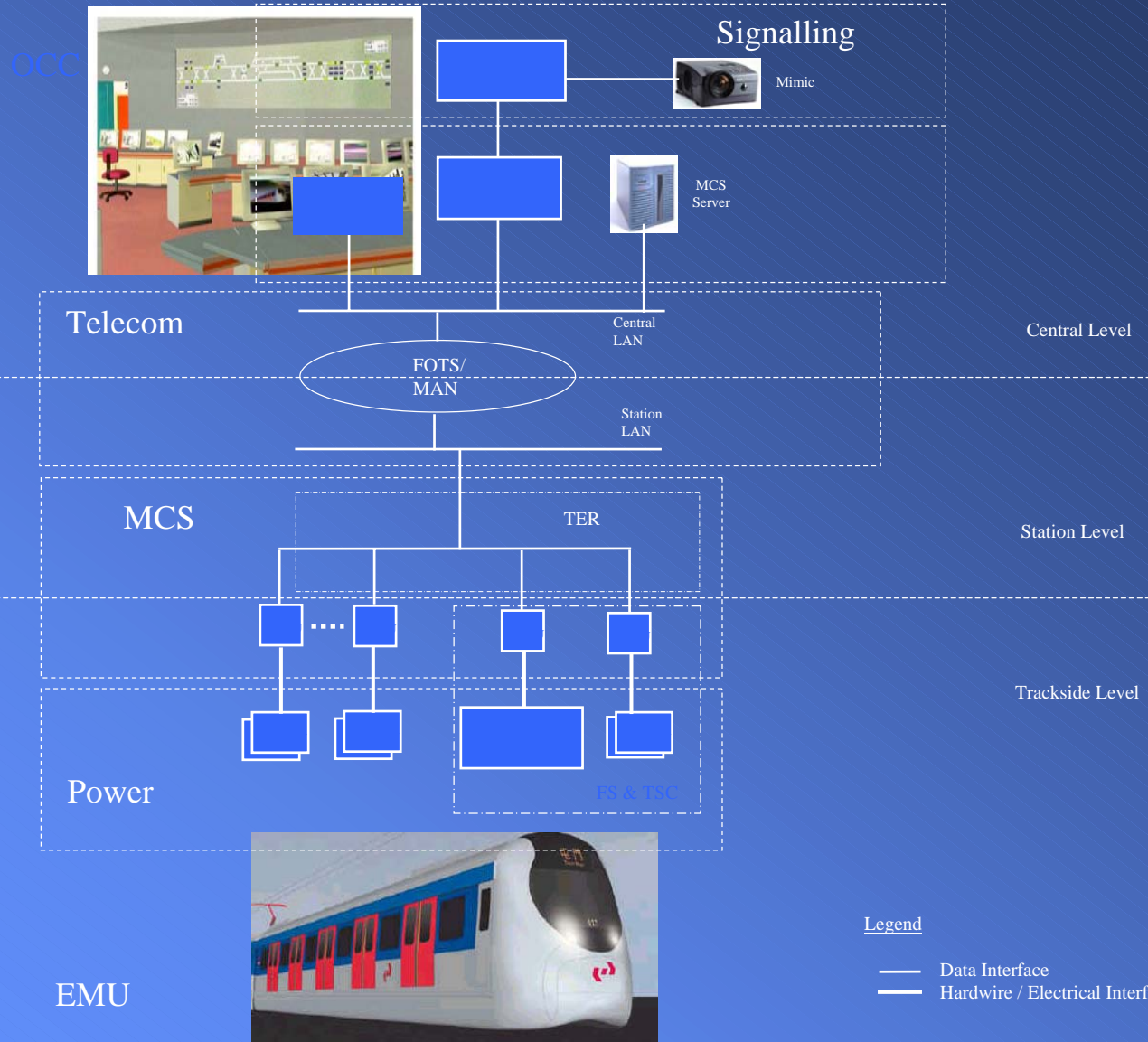
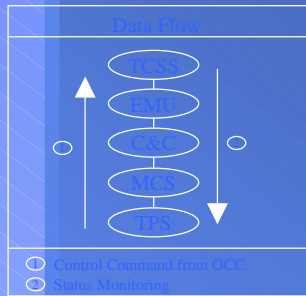


# ***Integrated Training Facilities (ITF)***

- Integration of simulators
  - Main Control System Simulator
  - Train Control & Signalling Simulator
  - Cab Simulator
- Provide teamwork exercises
- Focus on major incident handling scenarios



# Remote control and monitoring of power supply system



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# ***Team Building Exercises***



# ***Outdoor Workshop***



# ***CRM Training –OCC/BCC Changeover***



# ***Drill and Exercise***



# ***Drills - Incident Handling***



# ***Measurement of Effectiveness***

- Performance review presented by West Rail Operations Department
- Failure and Delay Statistic
- Internal Customer Service Index (ICSI)

# ***VAT Elements***

VAT composes of three components

- Photo Album
- Slides in Power Point format
- Video Clips



# ***Integrated Training Systems***



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# ***Background***

## ■ Simulators

- Cab simulator
- High cost to upgrade
- Limited integration with external equipment

## ■ Computer Based Training

- Proven approach
- Computer becomes widely use and available
- Self-pace learning
- On-line approach





# ***Cab Simulator***



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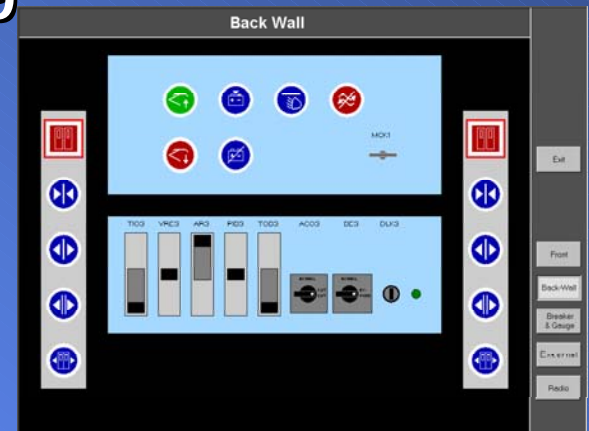
# *Who are the user?*

- Train Operator
- Training Instructor
- Maintenance support



# *Train operator*

- Driving skill training
- Equipment familiarisation
- Corporate Procedure training
- Abnormal Incident handling



# *Training instructor*

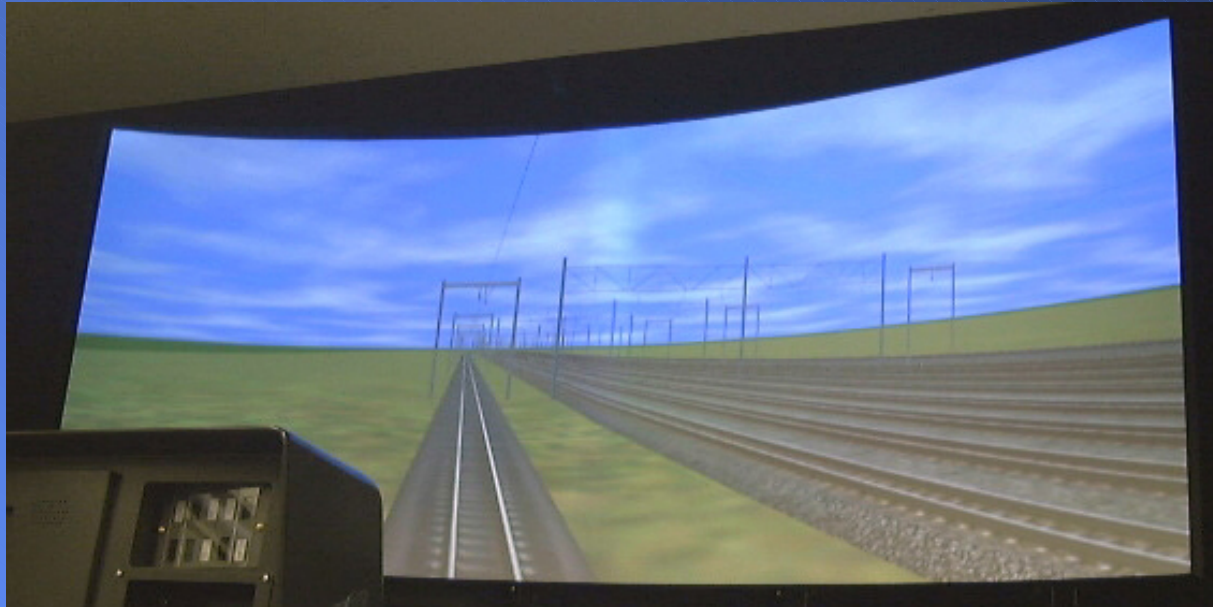
## ■ Online

1. Exercise control & monitoring
2. Insertion of faults or incident
3. Automatic assessment
4. Replay exercises

## ■ Offline

1. Exercise definition
2. Manual assessment after exercise

# *Scope – CGI Front Track View*



- Tunnels, Stations, landscape etc.
- Track-side equipment and overhead line
- Minor features not included

# *Scope - CGI Front View*



NIGHT



DAY + FOG



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# *Scope - Platform View*

- Platform design & platform CCTV camera orientation
- Platform screen door, door indication
- Platform decoration
- Passengers



# *Scope– Cab Replica*

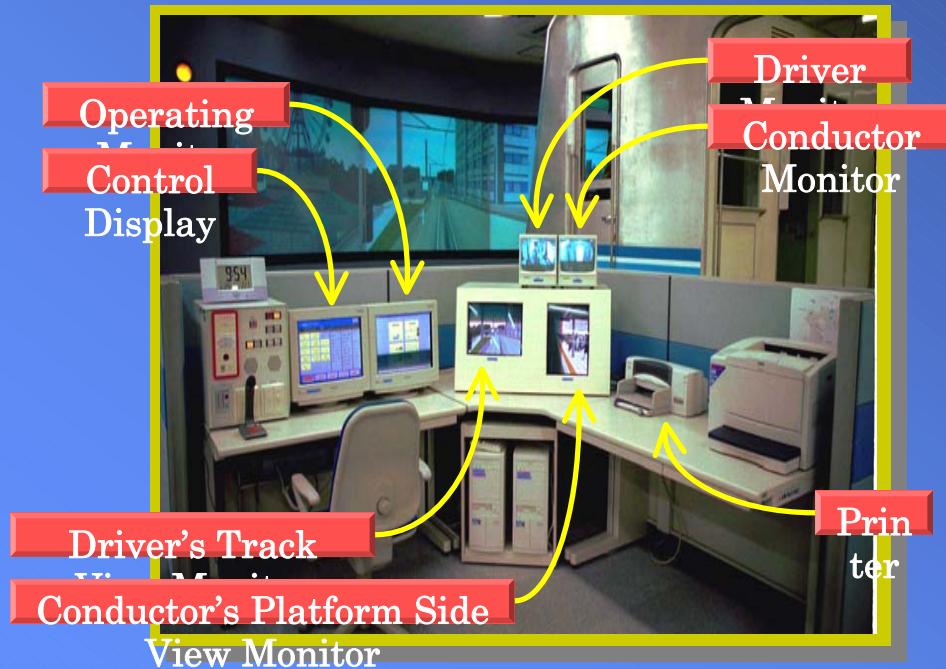
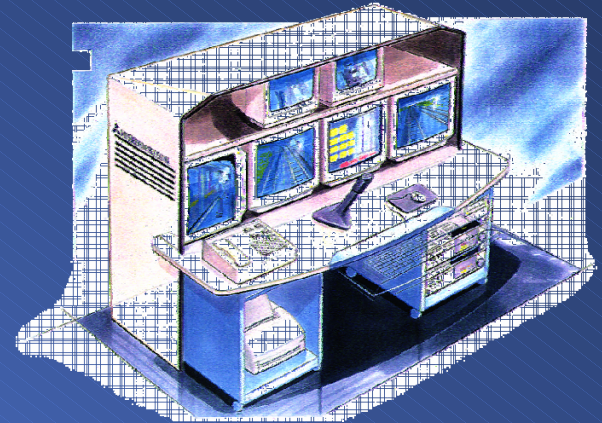


- Identical real cab equipment
- Identical equipment behavior



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# *Scope – Trainer's console*



INSTRUCTOR'S CONSOLE



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# ***Current Technology***

- Powerful computer
  - Multimedia capable
  - Video / Audio / Animation / Graphics
- LAN / Internet / Intranet / Extranet
- Establish powerful learning environment



# ***Training in West Rail***

- New Railway
- New System / Sub-system
- New Operation and Maintenance Staff
- Staff training is crucial
- Training starts from Testing & Commissioning stage
- Unavailability of system / equipment for training
- Refresher / Upgrade training after opening



# ***Integrated Training Systems***

consists of Integrated Training  
Facilities (ITF) and Computer Based  
Training (CBT) System



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# ***Integrated Training Facilities (ITF)***

- Integration of simulators
  - Main Control System Simulator
  - Train Control & Signalling Simulator
  - Cab Simulator
- Provide teamwork exercises
- Focus on major incident handling scenarios

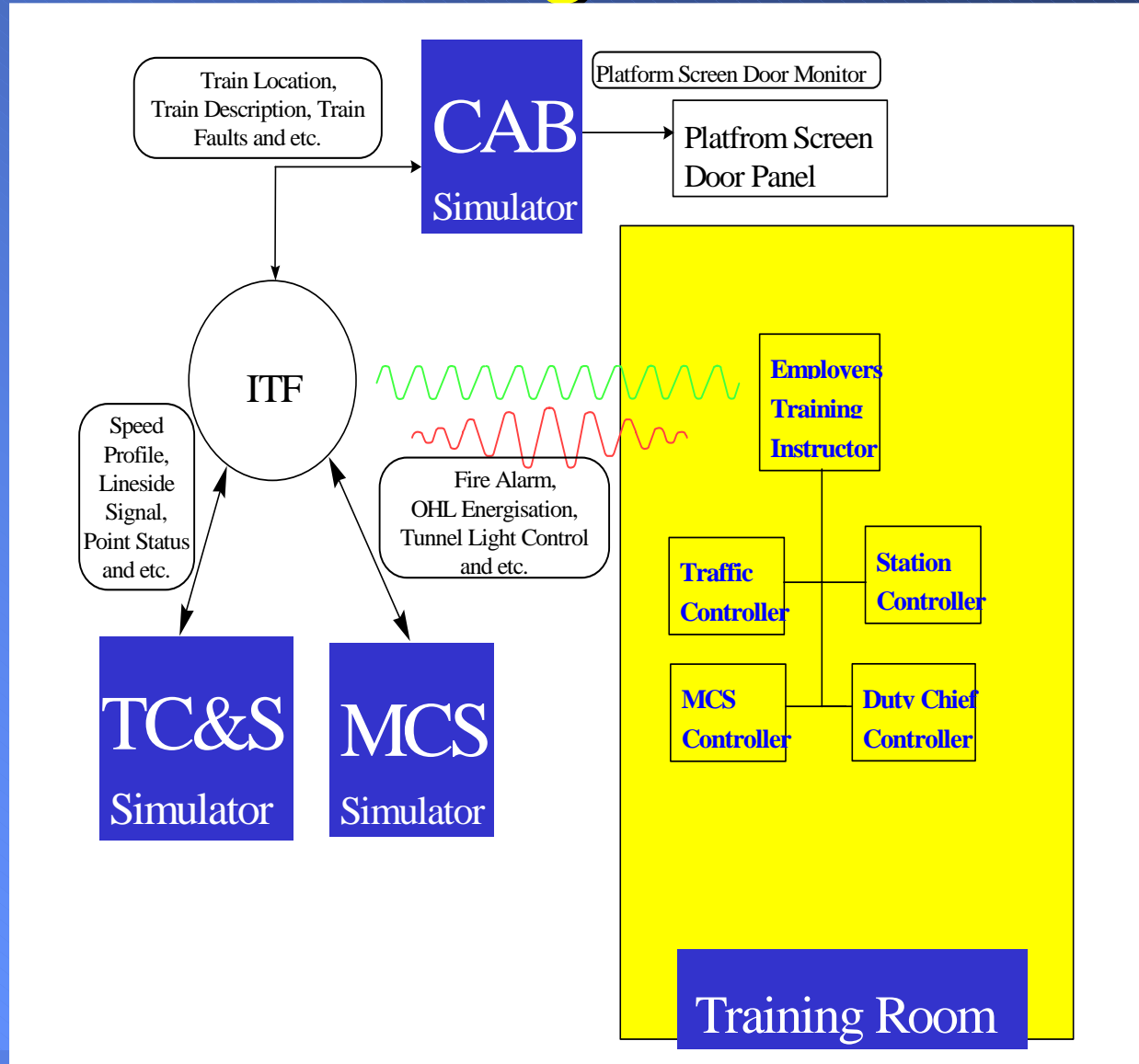


# ***Integrated Training Facilities (ITF)***

- Team training mode
  - 10 training scenarios
  - focus on communication & teamwork skill
- Trainer console
  - overall control and execution of training scenarios
  - control the data communication flows among the functional simulators.

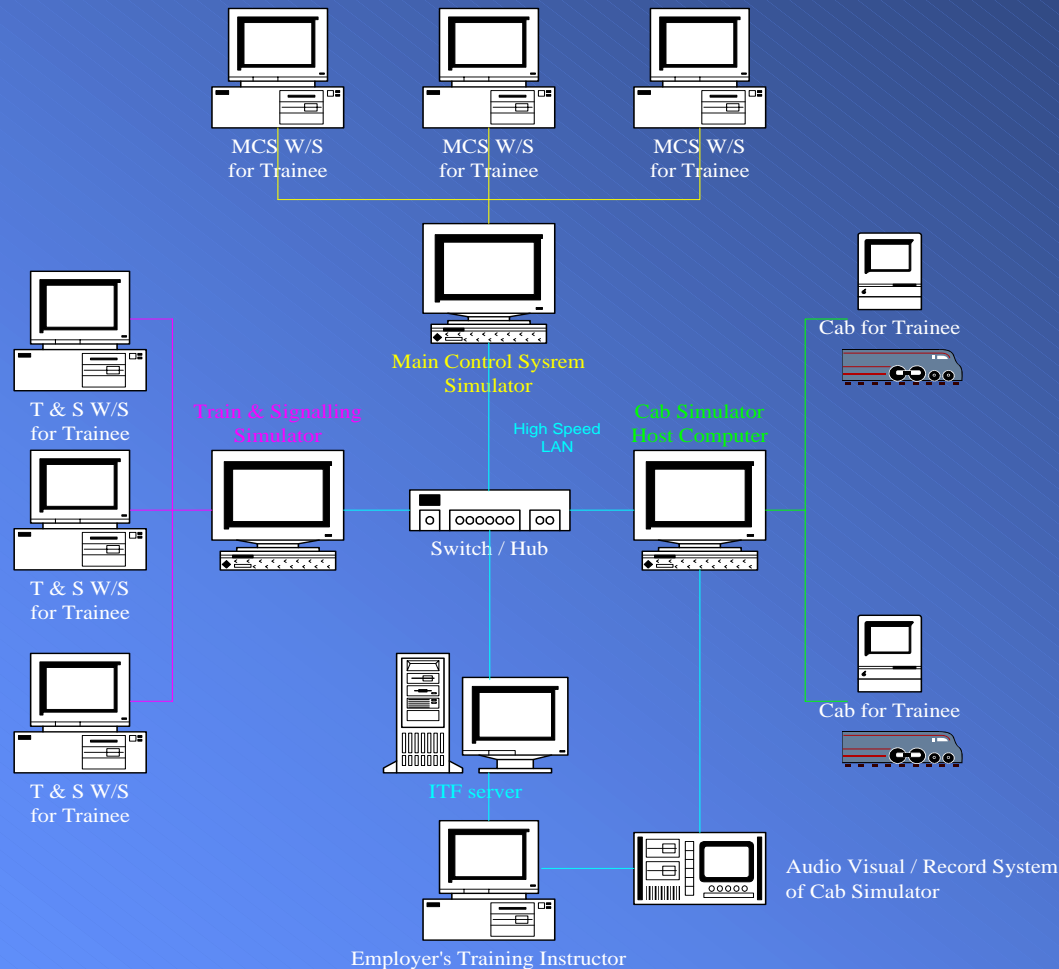


# ITF Data Flow Diagram



# General System Configuration of ITF

- Connect by a Local Area Network (LAN)
- 100Mbps data transmission speed
- Communication protocol based on TCP/IP



# Computer Based Training (CBT)



BACK



NEXT



MENU



INDEX



GLOSSARY



HELP



EXIT



## Introduction to the Main Control System (MCS)

0% 100%

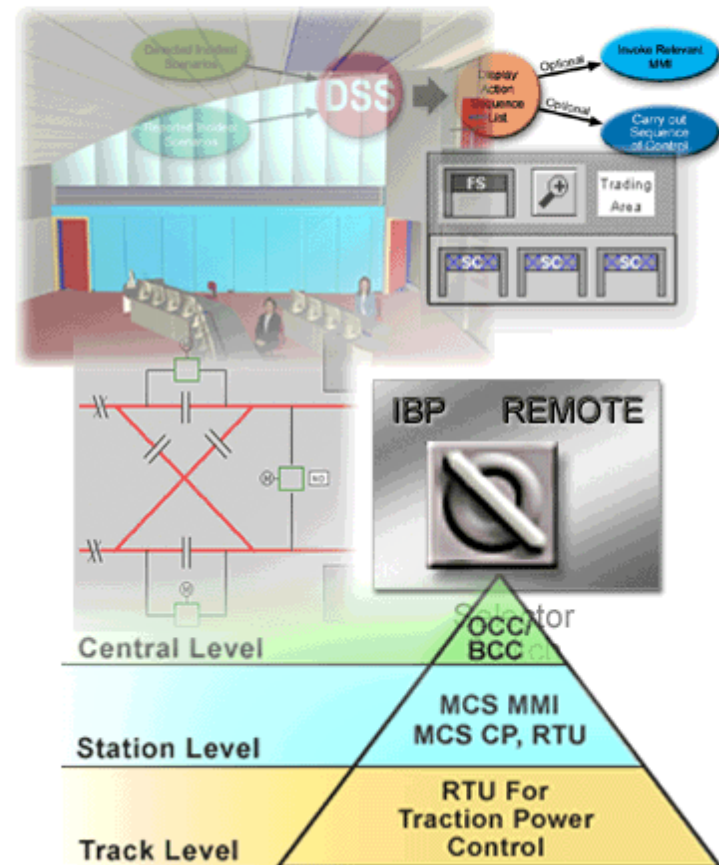
### Main Menu

- Programme Objective
- Overview of the Main Control System (MCS)
- System Configuration
- Operating Principles
- Operational Safety
- Quiz

Click on each subject area for more information.

#### NOTE

It is recommended that you progress sequentially.



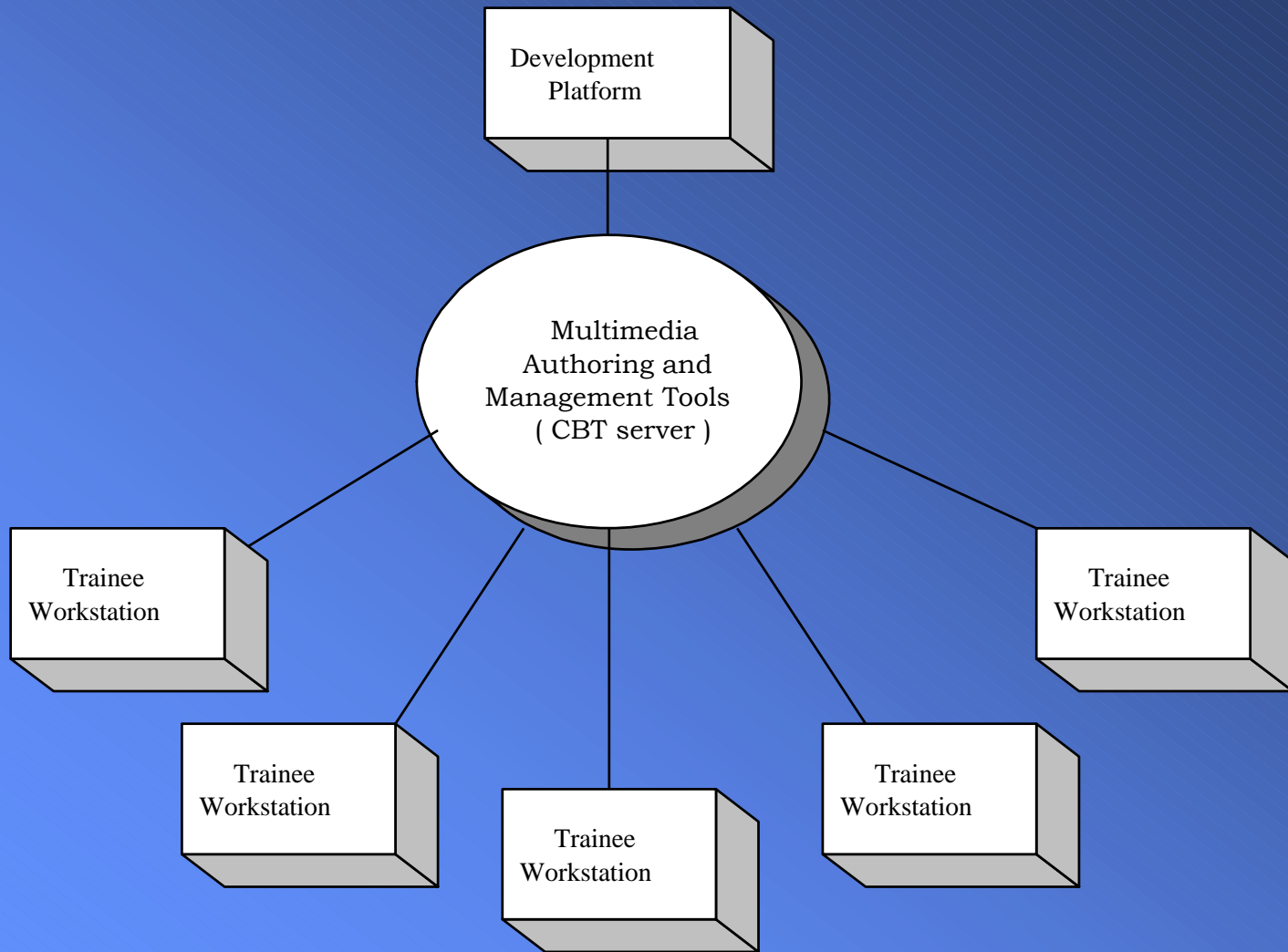
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# ***Computer Based Training (CBT)***

- Cost effective training tool
- Self-paced approach
- Multimedia rich content capable
- Use off-the shelf software to prepare multimedia elements and authoring
- Adopt Instructional Design System approach
- Computer Managed Instruction function



# ***CBT System Diagram***



# ***What is Computer Based Training ?***

- Self learning software package
- Deliver via different media



**CD-ROM**



**Network / Intranet**



**Internet**



# ***What is Computer Based Training ?***

- Multimedia approach incorporates:

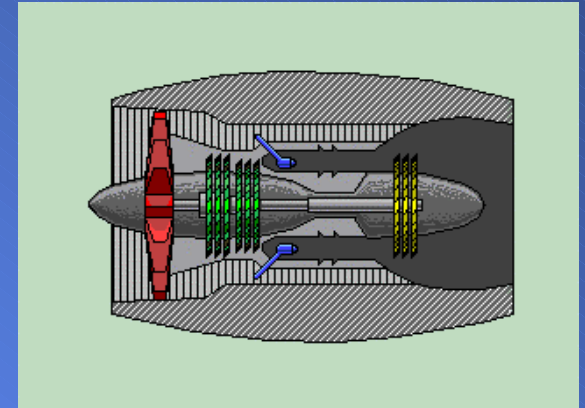
**Graphics**



**Audio**



**T  
E  
X  
T**



**Digital Video**

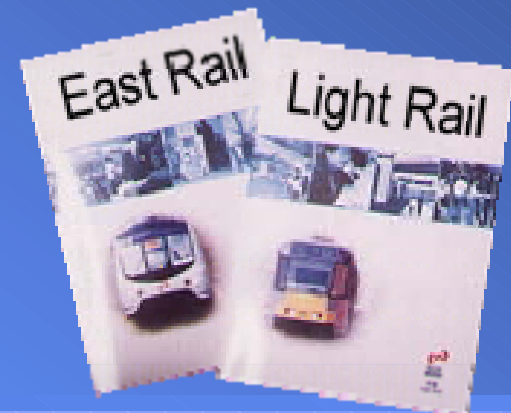
**Animation**



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# ***CBT Applications in KCRC***

- **Corporate Training**
  - 1<sup>st</sup> “Staff Orientation” CBT
  - Commercial Off the Shelf CBT for management training, e.g. Communication Skills Training
  
- **Others:**
  - No implementation yet

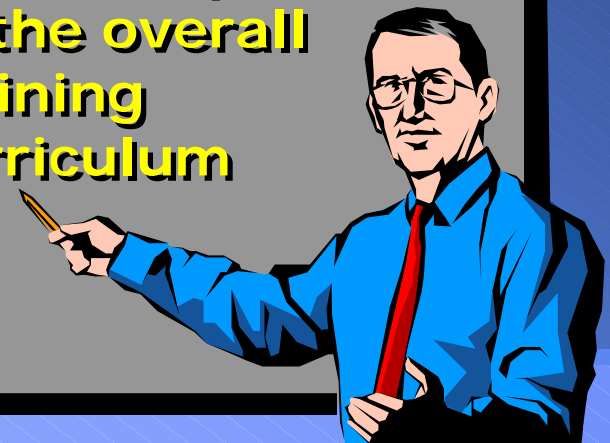


# ***CBT Applications in West Rail***

- “West Rail Overview” CBT
  - First pilot CBT
  - Also serve for PR purpose
- 39 Operation & Maintenance Introductory CBT, e.g.
  - Introduction to Train Control & Signalling System
  - Lifts & Escalators Operation
  - EMU Maintenance



**CBT form part  
of the overall  
training  
curriculum**



# ***Organizational Benefits***

- Cost-effective training approach :
  - Require less no. of trainer
  - Require less time to train
  - Maintain high and consistent training standard
  - Provide Just In Time / ad-hoc training
  - Inexpensive and flexible in delivery



# ***Trainee Benefits***

- Trainees with different profiles :
  - study at their own pace
  - select their own topics
  - finish CBT within optimal time
  - learn more and faster
  - use CBT in training room, work place or even at home

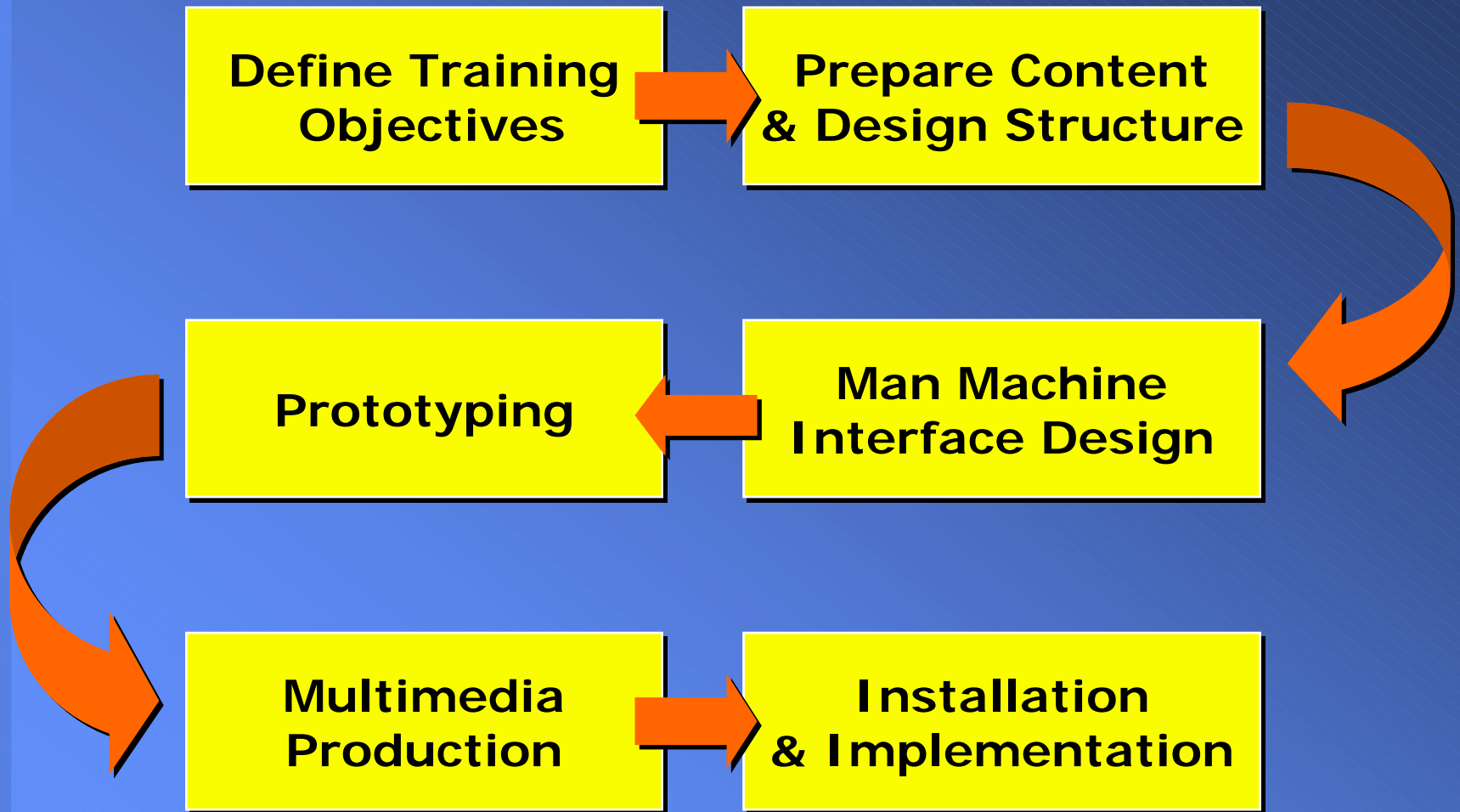


# ***Trainee Benefits***

- Trainees with different profiles :
  - study at their own pace
  - select their own topics
  - finish CBT within optimal time
  - learn more and faster
  - use CBT in training room, work place or even at home



# ***CBT Production Process***



## About the Programme

In this 30 minute programme, you will explore the history of KCR, the characteristics of the West Rail system, and how the railway is operated.

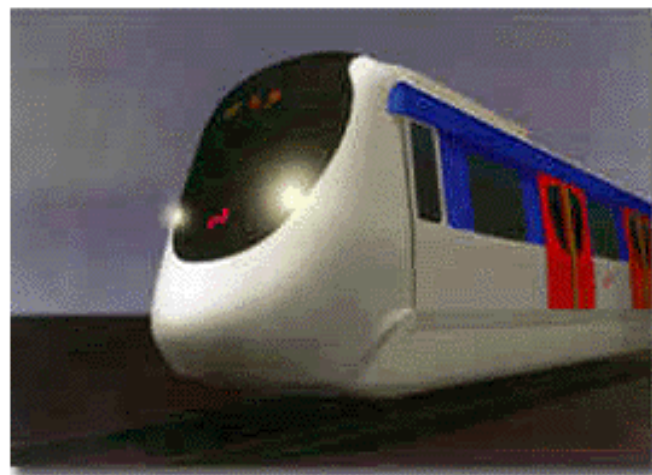
Click on 'Help' if you need any instructions during the programme.



## About the Programme

In this 30 minute programme, you will explore the history of KCR, the characteristics of the West Rail system, and how the railway is operated.

Click on 'Help' if you need any instructions during the programme.

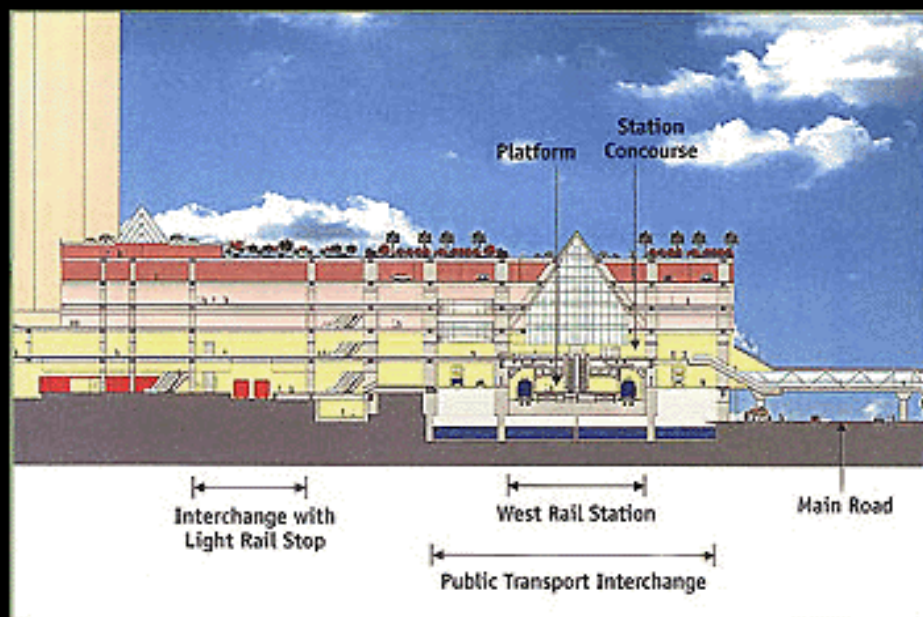


# West Rail Overview

## about the Programme

In this 30 minute programme, you will explore the history of KCR, the characteristics of the West Rail line, and how the railway is operated.

Click on 'Help' if you need any instructions during the programme.



Help



Menu



Glossary



Audio



Back



Next

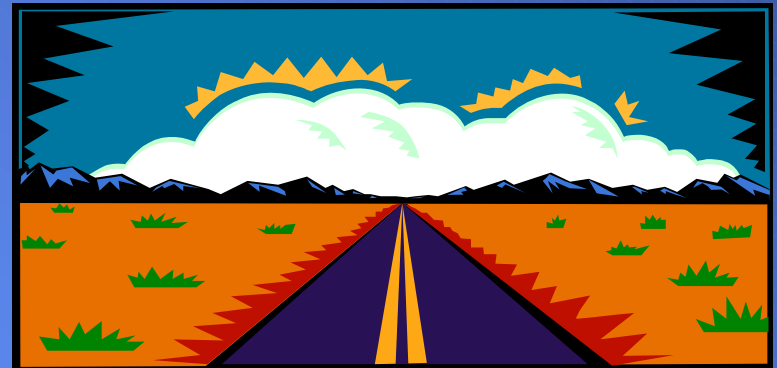


# ***Future***

***Take home CBT***

***Access CBT via Intranet / Internet***

***Create on-line informal learning  
community***



# ***Benefits***

## ■ ITF

- Cost effective way to provide team training on incident scenarios
- Flexibility to add/delete new training scenarios
- Extraordinary degree of “realism” training

## ■ CBT

- Require less time to train
- Provide consistent training to new staff before opening of the railway
- Easily updated for refresher training

# ***Future Plans***

## ■ ITF

- Introduce more training scenarios
- Fine-tune the first 10 scenarios
- Test out Decision Support System used in West Rail

## ■ CBT

- Deliver via corporate Intranet
- Deliver via Internet
- Produce other systems courseware



# ***Conclusions***

- ITF integrates three standalone task based training simulators to provide team training exercises.
- ITF is a relative new and challenging approach used in railway industry.
- CBT development run in parallel with various new system development becomes a big challenge.

# ***Conclusions***

- Training plays an important role in the safe and reliable operation of West Rail.
- ITF and CBT system are envisaged to meet the training target requirements in a quality manner and form an vital part in the overall comprehensive West Rail training system.

# ***Decision Support System (DSS)***



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# ***Decision Support System***

## Decision Support System (DSS)

- Providing a safe environment for all passengers and staff;
- Restoring a service required to provide normal traffic on the railway network with minimum delay

# ***Decision Support System***

Two kinds of Scenarios for DSS:

- Detected Scenarios
- Reported Scenarios



# Detected Scenario

OCC in Control
OCC\_MCS\_Srv01
MCS\_WKS
AOR for Incident Management
10/17/05 09:46:23

Events
All Alarms
Crit. Alarms
Station
TVS
TPS
Evacuate
AOR
System
Logoff
PrtScr
Mute
Help

Detected Scenario

- KSR: Fire at Station
- KSR: Station Power Supply Failure
- KSR: Platform Screen Door Failure
- KSR: Fire at Tai Lam Tunnel
- KSR: Dewirement / Traction Current
- LOP: Fire at Station
- LOP: Station Power Supply Failure
- LOP: Platform Screen Door Failure
- MFE: Fire at Station

Command List

KSR: Fire at Station

**At out break of incident:**

**MCS Controller (TPS) / MCS Controller (TVS) / MCS Controller (TPS + TVS):**

☐ Check with station to confirm the fire alarm

Check with FSD for the despatch of fire engines

☐ Inform Traffic Controller to monitor the train service at the affected Station

**Station Controller:**

Confirm Duty Chief Controller the activation of fire signal.

Check the fire location on the MMI

☐ Confirm AFA panel against MMI the activation of any fire equipment.

☐ Deploy station staff to incident site for investigation & report situation

☐ Deploy station staff to await emergency service at the emergency entrance

**Duty Chief Controller:**

☐ Confirm the arrival of emergency service with station controller

☐ Confirm fire location & extend and arrange trains to non-stop affected station.

**Station Controller:**

Ensure the automatic fire equipment of the affected area are in operations.

☐ Confirm the arrival of emergency service with duty chief controller and report fire location & extend.

☐ Agree action to be taken with FSD Officer in-charge and evacuate passengers if necessary.

**Duty Chief Controller / all station controllers / Building FRC / MCS Controller (TVS) /**  
**MCS Controller (TPS+TVS) / MCS Controller (TPS):**

DSS
Clear

Single Ack	Page Ack	Loop In	Scroll Off		
192986	+/-			TUM_PSD_PLA_002	Platform 2 Trackside Access PED Open Alarm
114092	+/-			NAC_FS_FHP_0001	Fire Hydrant Pump Condition Fault
114278	+			NAC_PEBV_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error

Window: 854
Ack: 559

# Detected Scenario

OCC  
in Control

OCC\_MCS\_SRV01

MCS\_WKS

AOR for Incident Management

10/17/05 09:48:59

Events

All Alarms

Crit. Alarms

Station

TVS

TPS

Evaluate

AOR

System

Logoff

PrntScr

Mute

Help

Detected Scenario

- KSR: Fire at Station
- KSR: Station Power Supply Failure
- KSR: Platform Screen Door Failure
- KSR: Fire at Tai Lam Tunnel
- KSR: Dewirement / Traction Current
- LOP: Fire at Station
- LOP: Station Power Supply Failure
- LOP: Platform Screen Door Failure
- MCS: Fire at Station

Command List

KSR: Fire at Station

**Duty Chief Controller / all station controllers / Building FRC / MCS Controller (TVS) / MCS Controller (TPS+TVS) / MCS Controller (TPS):**  
**Select proper evacuation procedure**

Execute

Passenger Evacuation During Non-Emergency situation(Fire at non-public area)

Execute

Emergency Station Evacuation (Fire at public area)

**Restoration of Train Service**  
**Station Controller:**

☐

Update Duty Chief Controller and Traffic Controller the estimated time of Restoration of Train service

☐

Ensure all persons, equipments and protection means are clear of incident site

☐

Confirm with Duty Chief Controller and Traffic Controller all emergency service have left station & ready for station re-opening.

Execute

Upon completion of station inspection, start "Daily Station Open" Sequence.

**Duty Chief Controller:**

☐

Issue Red Alert Cancellation via FAX system

☐

Issue Paging message to update all officials the estimated time of through train service restoration

☐

Issue FAX message to all stations and FRCs to prepare for restoration of through train service

☐

Inform Traffic Controller to make use of the 1st Available Train to conduct line clear procedures

**All Station Controllers:**

Execute

Prepare for restoration of through train service.

☐

Issue PA/PIDS to advise passengers the restoration of through train service

Done

Suspend

Help

DSS


Clear

Single Ack	Page Ack	Loop In	Scroll Off		
55333	+	17/10/2005	09:48:27.045	ARC Link Failure	LOP_MCS_SRV02 - ARC Link Failure
55332	+	17/10/2005	09:48:33.045	ARC Link Failure	LOP_MCS_SRV01 - ARC Link Failure
114278	+/-	17/10/2005	09:48:45.045	NAC_PEBV_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error

Window: 860

Ack: 569

# Detected Scenario



OCC in Control

OCC\_MCS\_SRV01

MCS\_WKS

AOR for Incident Management

10/17/05 09:55:40

Events

All Alarms

Crit. Alarms

Station

TVS

TPS

Evaluate

AOR

System

Logoff

PrtScr

Mute

Help

Detected Scenario

KSR: Fire at Station

KSR: Station Power Supply Failure

KSR: Platform Screen Door Failure

KSR: Fire at Tai Lam Tunnel

KSR: Dewirement / Traction Current

LOP: Fire at Station

LOP: Station Power Supply Failure

LOP: Platform Screen Door Failure

MCC: Fire at Station

Command List

KSR: Fire at Station

service

☐ Ensure all persons, equipments and protection means are clear of incident site
 ☐ Confirm with Duty Chief Controller and Traffic Controller all emergency service have left station & ready for station re-opening.

Execute

Upon completion of station inspection, start "Daily Station Open" Sequence.

Duty Chief Controller:

☐ Issue Red Alert Cancellation via FAX system
 ☐ Issue Paging message to update all officials the estimated time of through train service restoration
 ☐ Issue FAX message to all stations and FRCs to prepare for restoration of through train service
 ☐ Inform Traffic Controller to make use of the 1st Available Train to conduct line clear procedures

All Station Controllers:

Execute

Prepare for restoration of through train service.

☐ Issue PA/PIDS to advise passengers the restoration of through train service

MCS Controller (TPS) / MCS Controller (TPS+TVS):

Execute

Resume to normal any operated isolators upon Duty Chief Controllers Instruction

MCS Controller (TVS) / MCS Controller (TPS+TVS)

Execute

Resume to normal any operated TVS fans upon Duty Chief Controllers Instruction

Duty Chief Controller:

☐ Remind BFRC to arrange staff to carry out follow-up actions during non-traffic hours

Done

Suspend

Help


DSS

Clear

Single Ack	Page Ack	Loop In	Scroll Off		
44824	+	17/10/2005	09:55:21.048	MEF_KFB_TV5_IFD_501B_PWFACT	INFEEDER MCC RM 1 LO Alarm On
114278	+	17/10/2005	09:55:33.048	NAC_PEBB_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error
141938	+	17/10/2005	09:55:41.048	KSR_PSD_PLA_001	Platform 1 Trackside Access PED Open Alarm

Window: 865    Ack: 561

# Report Scenario



OCC in Control

OCC\_MCS\_SRV01

MCS\_WKS

AOR for Incident Management

10/17/05 09:36:03

Events

All Alarms

Crit. Alarms

Station

TVS

TPS

Evaluate

AOR

System

Logoff

PrtScr

Mute

Help

MCS Decision Support System

Detected Scenarios

KSR: Fire at Station  
KSR: Station Power Supply Failure  
KSR: Platform Screen Door Failure  
**KSR: Fire at Tai Lam Tunnel**  
KSR: Dewirement / Traction Current Failure  
LOP: Fire at Station  
LOP: Station Power Supply Failure  
LOP: Platform Screen Door Failure  
**LOP: Platform Screen Door Failure**

Reported Scenarios

Overview

Reported Scenarios for Station TUM

Man under Train  
Train collision (buffer stop, Head-On Collision)  
Fires on Train (Inside Tunnel, Station and Viaduct)  
Derailment (Mainline / Depot)  
Brakes hanging on  
Train Evacuation in case of depot on fire  
Train Divided  
Station Evacuation  
Crowd Control (including MTR / LRT interchange impact)  
Service suspension  
Inclement Weather (Including typhoon procedure and rainstorm warning)  
Detrainment (Tunnel and Viaduct)  
Emergency Bus  
Handling Rail defects  
Earthquake  
Bomb Threat & Unidentified Gas

Close


Help

DSS

Clear


Single Ack	Page Ack	Loop In	Scroll Off		
130524	+			TWWW_ARC_GAT_00035	Gate 035 SAC Communications Status Failed
64794	+/-				TWWW_RTU 18 - Modbus Port 4 slave timeout
114278	+			NAC_PEBV_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error

Window: 865 | Ack: 581



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# Report Scenario



OCC in Control

OCC\_MCS\_Srv01

MCS\_WKS

AOR for Incident Management

10/17/05 09:38:30

Events

All Alarms

Crit. Alarms

Station

TVB

TPB

Evacuate

AOR

System

Logout

Print

Mute

Help

MCS Decision Support System

Detected Scenarios

KSR: Fire at Station

KSR: Station Power Supply Failure

KSR: Platform Screen Door Failure

KSR: Fire at Tai Lam Tunnel

KSR: Dewirement / Traction Current Failure

LOP: Fire at Station

LOP: Station Power Supply Failure

LOP: Platform Screen Door Failure

LOP: Fire at Station

Reported Scenarios

Reported Scenarios for Station TUM

Man under Train

Train collision (buffer stop, Head-On Collision)

Fires on Train (Inside Tunnel, Station and Viaduct)

Derailment (Mainline / Depot)

Brakes hanging on

Train Evacuation in case of depot on fire

Train Divided

Station Evacuation

Crowd Control (including MTR / LRT interchange impact)

Service suspension

Inclement Weather (Including typhoon procedure and rainstorm warning)

Detrainment (Tunnel and Viaduct)

Emergency Bus

Handling Rail defects

Earthquake

Track Thread & Unidentified Cases

Overview

Close Help

Single Ack

Page Ack

Loop In


Scroll Off

Clear

64794	+/-			TWW RTU 18 - Modbus Port 4 slave timeout
192386	+			TUM PSD PLA_002 Platform 2 Trackside Access PED Open Alarm
114278	+			NAC_PEBV_ECS_MOD_00004 Motorized Damper (UPS Batt Rm) Position Error

Window: 867 Ack: 583

# Report Scenario



OCC in Control

OCC\_MCS\_Srv01

MCS\_WKS

AOR for Incident Management

10/17/05 09:39:32

Events

All Alarms

Crit. Alarms

Station

TV8

TP8

Evacuate

AOR

System

Logoff

PrtScr

Mute

Help

Command List

KSR: F

KSR: S

KSR: P

KSR: E

KSR: D

LOP: F

LOP: S

LOP: P

Station Evacuation

At outbreak of incident:

Duty Chief Controller:

☐ Check with station to confirm the nature of station evacuation, emergency or non-emergency situations.
 

Execute

Summon FSD/Metro Police assistance for the despatch of fire engines or police to station concerned if necessary.

☐ Declare major incident if necessary and issue Red alert to Transport department ETCC other transport operators.
 

☐ Appoint mishap officer and page to inform all senior on-call officials and CR on-call officer.
 

Inform Traffic Controller and arrange trains to non-stop the affected station

Station Controller (affected station):

☐ Confirm Duty Chief Controller the nature of incident and the type of evacuation, non-emergency/emergency situation.
 

Execute

In case of fire, check the fire location on the MMI

☐ In case of fire, confirm AFA panel against MMI the activation of any fire equipment.
 

☐ Deploy station staff to incident site for investigation & report situation
 

☐ Deploy station staff to await emergency service at the emergency entrance in case of despatch of any emergency service.
 

Duty Chief Controller:

☐ Confirm the arrival of emergency service with station controller in case of fire alarm activation
 

☐ Confirm fire location & extend and arrange trains to non-stop affected station or introduce

Done

Suspend

Help

Overview

g)

Close


Help

dss

Clear

Single Ack	Page Ack	Loop In	Scroll Off		
130524	+	17/10/2005	09:38:33 038	TWW_ARC_GAT_00035	Gate 035 SAC Communications Status Failed
64794	+/-	17/10/2005	09:39:04 938		TWW_RTU 18 - Modbus Port 4 slave timeout
114278	+	17/10/2005	09:39:29 038	NAC_PEBV_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error

Window: 866 Ack: 580

  
**KCR**  
 九廣鐵路

# Report Scenario

OCC  
in Control
OCC\_MCS\_SRV01
MCS\_WKS
AOR for Incident Management
10/17/05 09:56:40

Events
All Alarms
Crit. Alarms
Station
TVS
TPS
Evacuate
AOR
System
Logoff
PrtScr
Mute
Help

Detected Scenario

KSR: Fire at Station

KSR: Station Power Supply Failure

KSR: Platform Screen Door Failure

KSR: Fire at Tai Lam Tunnel

KSR: Dewirement / Traction Current

LOP: Fire at Station

LOP: Station Power Supply Failure

LOP: Platform Screen Door Failure

MEF: Fire at Station

Command List

Station Evacuation

☐

Deploy station staff to incident site for investigation & report situation

☐

Deploy station staff to await emergency service at the emergency entrance in case of despatch of any emergency service.

Duty Chief Controller:

☐

Confirm the arrival of emergency service with station controller in case of fire alarm activation

☐

Confirm fire location & extend and arrange trains to non-stop affected station or introduce short loop operations & suspend trains running through the affected station.

Station Controller (affected station):

Execute

In case of fire, ensure the automatic fire equipment of the affected area are in operations

☐

Confirm the arrival of emergency service with duty chief controller and report fire location & extend.

☐

Agree action to be taken with FSD Officer in-charge and evacuate passengers if necessary.

Station Controller (all stations), Duty Chief Controller / Building FRC / MCS Controller (TPS) / MCS Controller (TVS) / MCS Controller (TPS+TVS):

Execute

Station Evacuation during Non-Emergency situation

Execute

Emergency Station Evacuation due to Train on Fire at Platform.

Execute

Emergency Station Evacuation due to Train on Fire between Stations

Execute

Emergency Station Evacuation by Train at Platform

Execute

Emergency Station Evacuation due to Station Power Supply Total Failure

Execute

Emergency Station Evacuation via the Track during Non-traffic Hours

Execute

Station Control Room Evacuation

Done

Suspend

Help

Single Ack

Page Ack

Loop In

Scroll Off

DSS

Clear

192386	+/-		TUM_PSD_PLA_002	Platform 2 Trackside Access PED Open Alarm
114278	+		NAC_PEBB_ECS_MOD_00004	Motorized Damper (UPS Batt Rm) Position Error
55038	+		MEF_LIFT_LIFT_L1	Equipment MEF_LIFT_LIFT_L1 Link Failure

Window: 867    Ack: 563

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# ***Decision Support System Modules***

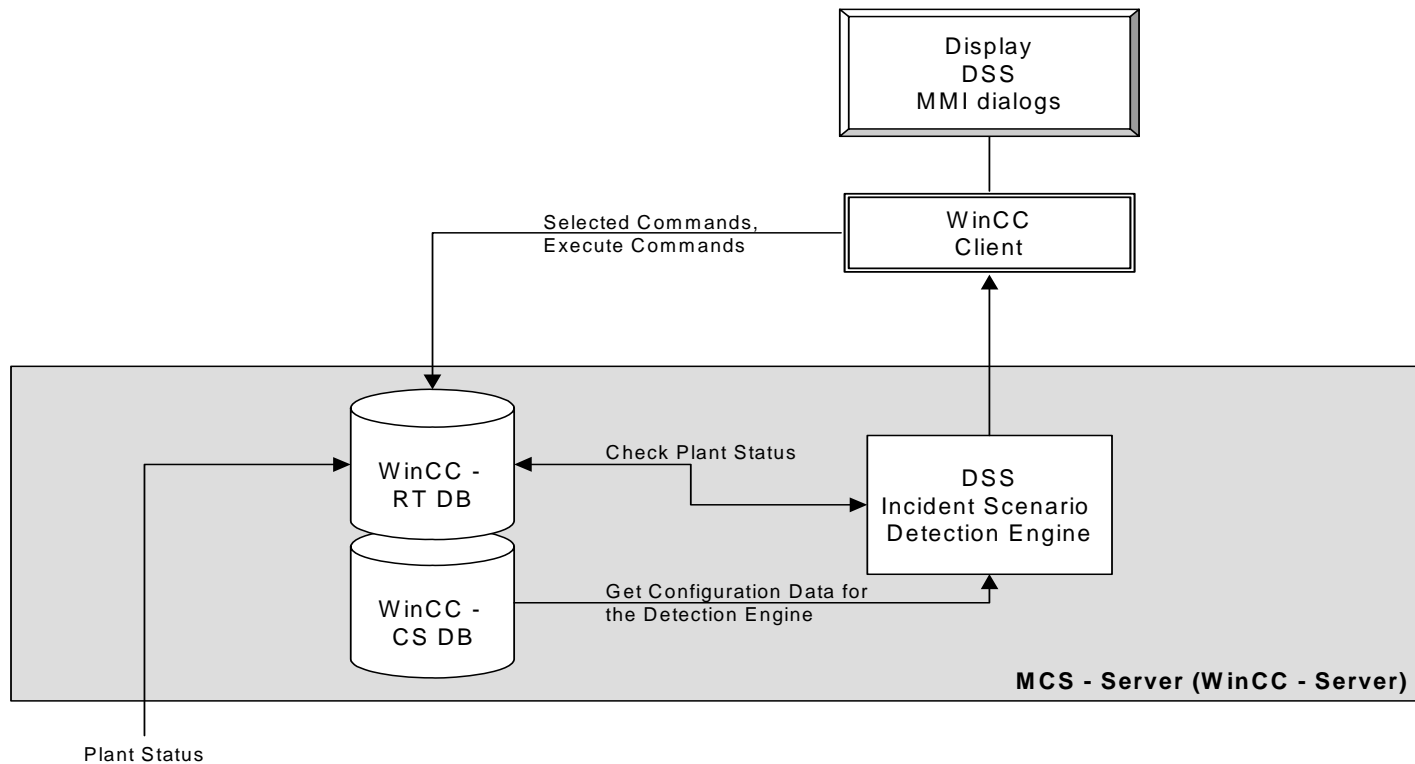
The Decision Support System consists of three main modules:

- Decision Support System – Input Module
- Decision Support System – Configuration Modules
- Decision Support System – Runtime Modules



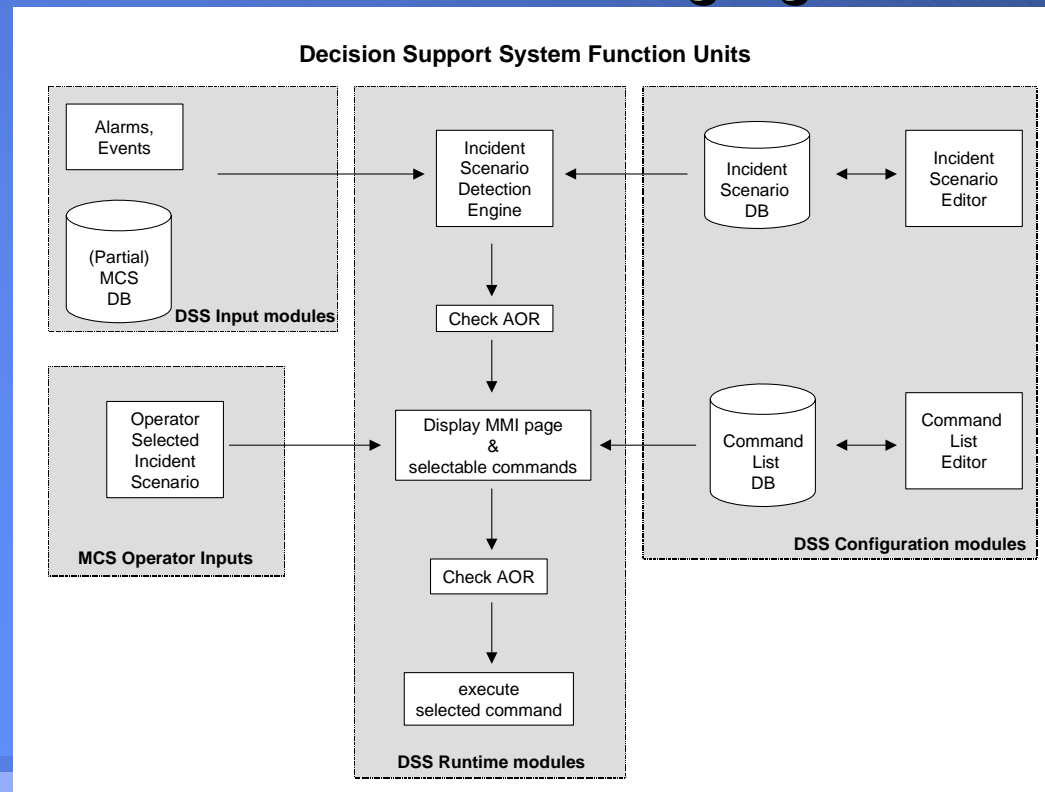
# ***Decision Support System Configuration***

## **Decision Support System Configuration**



# ***Decision Support System Modules***

- Each of those modules consists of several function units, as shown in the following figure



# ***Question & Answer***



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