



TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM

- ระบบการเรียนรู้การบริหารและควบคุมระบบการเดินรถไฟ -

*Presented by Asst.Prof.Dr. Vanvisa Chutchavong
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The 5th Rail Industry Symposium and Exhibition
Bringing the Thai Railway Industry into the International Mainstream

RESEARCH PROJECT ADVISORS

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



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RESEARCH PROJECT TEAM

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



**Asst.Prof.Dr.Vanvisa
Chutchavong**

Head of Research Project

Research Area :

- Railway Signaling
- Information System
- Communications System



**Asst.Prof.Mayuree
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Researcher

Research Area :

- Database System
- Computer Network
- Information System



**Thanavit
Anuwongpinit**

Researcher

Research Area :

- Communications System
- Railway Communications
- Railway Signaling



**Somsin
Thongkrait**

Researcher

Research Area :

- Railway Operation and Control
- Embedded System
- Algorithm Design

Teaching Platform of Operation and Control for Railway System

- Background
- Overview
- System Details and Features
- Outputs / Outcomes
- Activities and Schedule
- QA / Suggestions

Background

High-Speed Train Projects

North: BKK-Chaing Mai

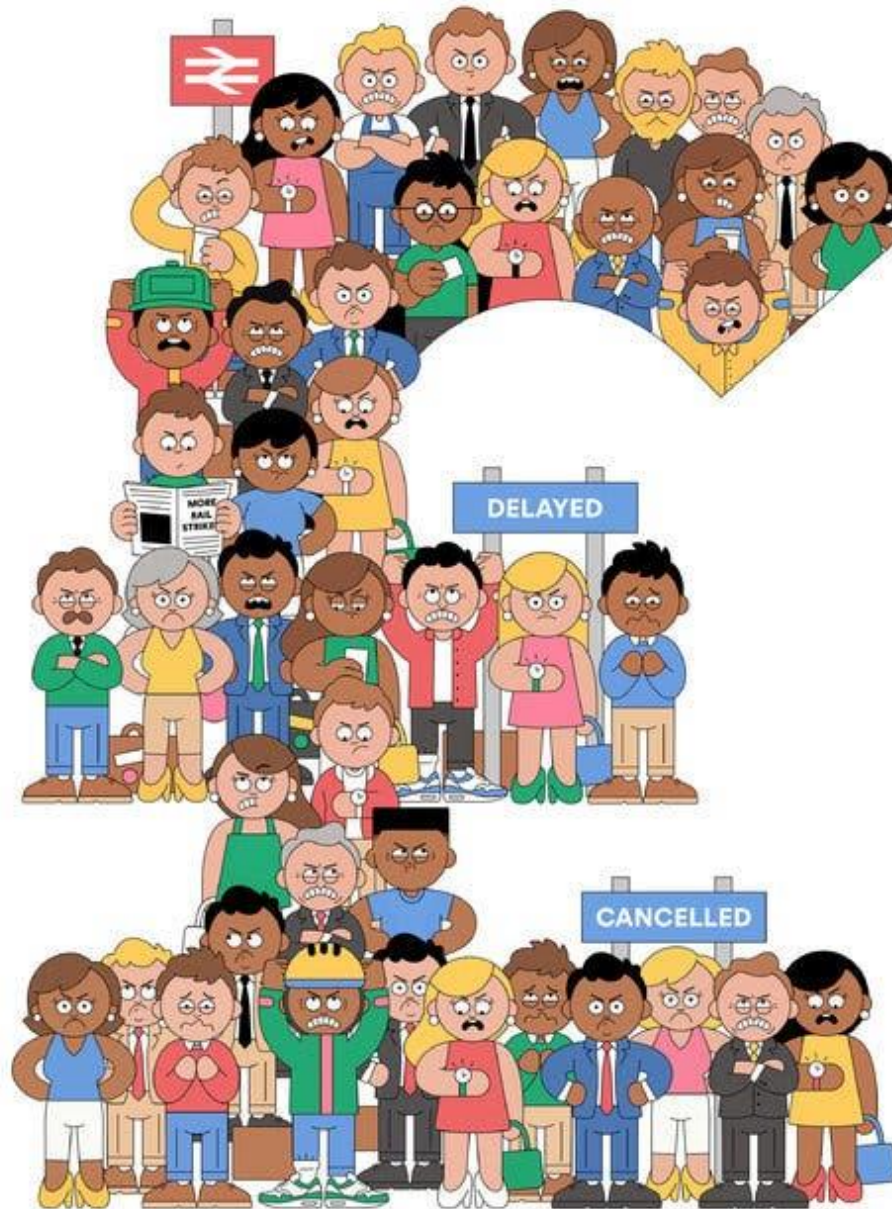
South: BKK-Hua-Hin-Padang Besar

N-E: BKK-Nakornratchasima-Nongkai

East: BKK-Rayong



Lacking of Hi-Speed Rail Skilled-Worker



TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



KMITL



สวทช.
NSTDA



Project Purposes

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



วัตถุประสงค์
โครงการ



Design and develop software for simulation of high-speed railway operation management and control like as CCR



Design and develop software for high-speed railway service planning, timetabling and EMU utilization systems.



Design and develop high-speed train models (Bangkok – Nakhonratchasima line) and software for virtual simulation of railway signaling system.

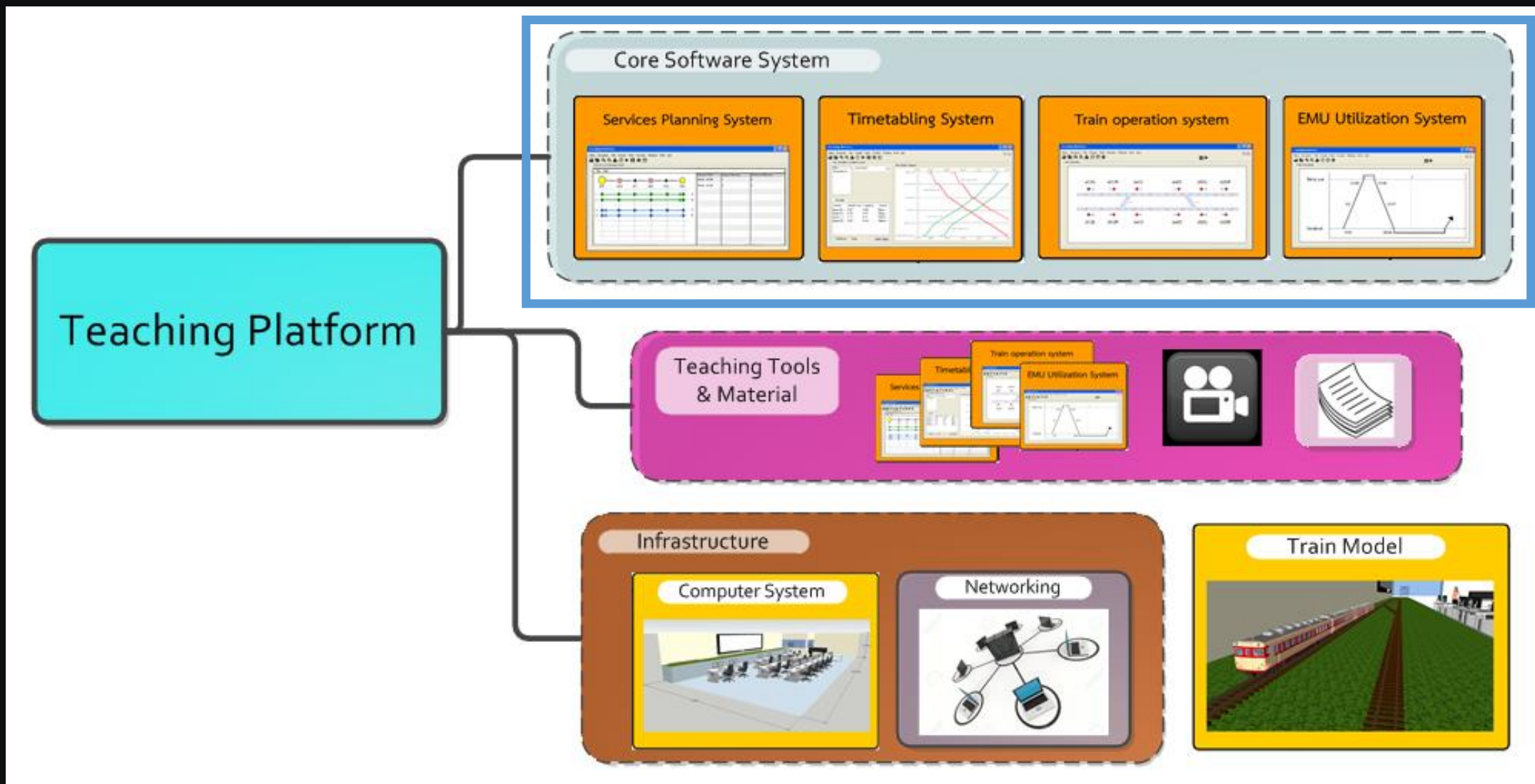


Develop the platform for training about railway signaling, operation management and control for railway operator, student and people.



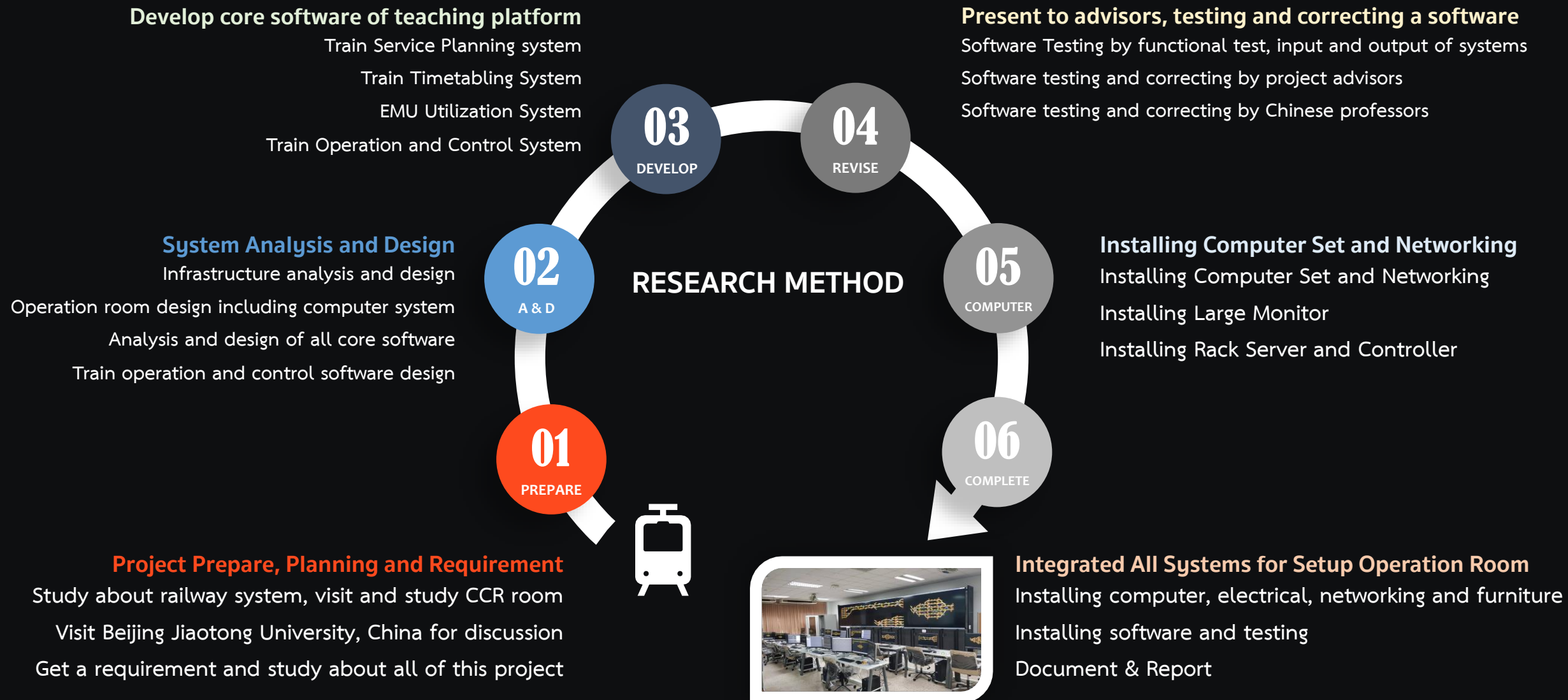
Develop the platform for research about high-speed railway system for researcher.

PROJECT OVERVIEW



RESEARCH METHODOLOGY

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM





System Analysis & Design : Infrastructure

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM

Railway Line Prototype of the system

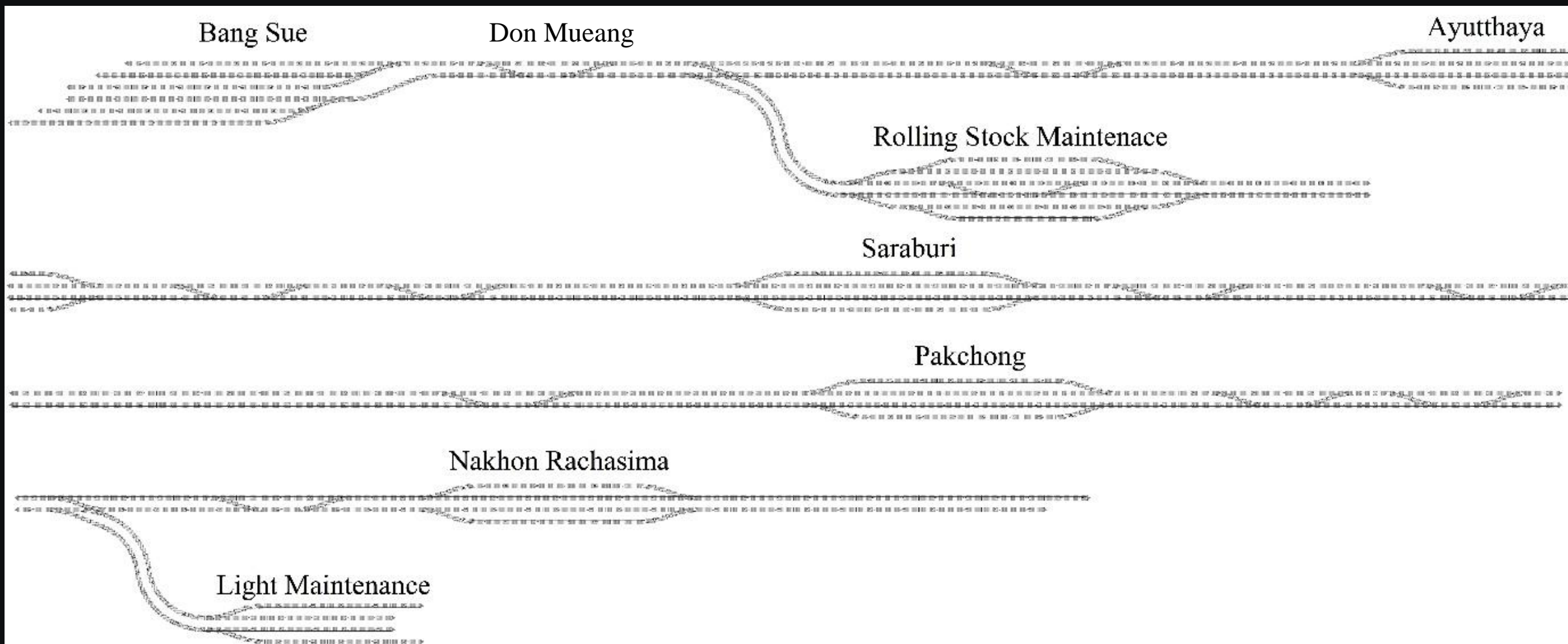
Infrastructure Layout

- High-Speed Train : Bangkok to Nakhonratchasima
- 6 Stations / Distance 252 Kilometers
 - Bangkok – Don Mueang (13 km)
 - Don Mueang – Ayutthaya (47 km)
 - Ayutthaya – Saraburi (54 km)
 - Saraburi – Pak Chong (67 km)
 - Pak Chong - Nakhonratchasima (78 km)



System Analysis & Design : Infrastructure

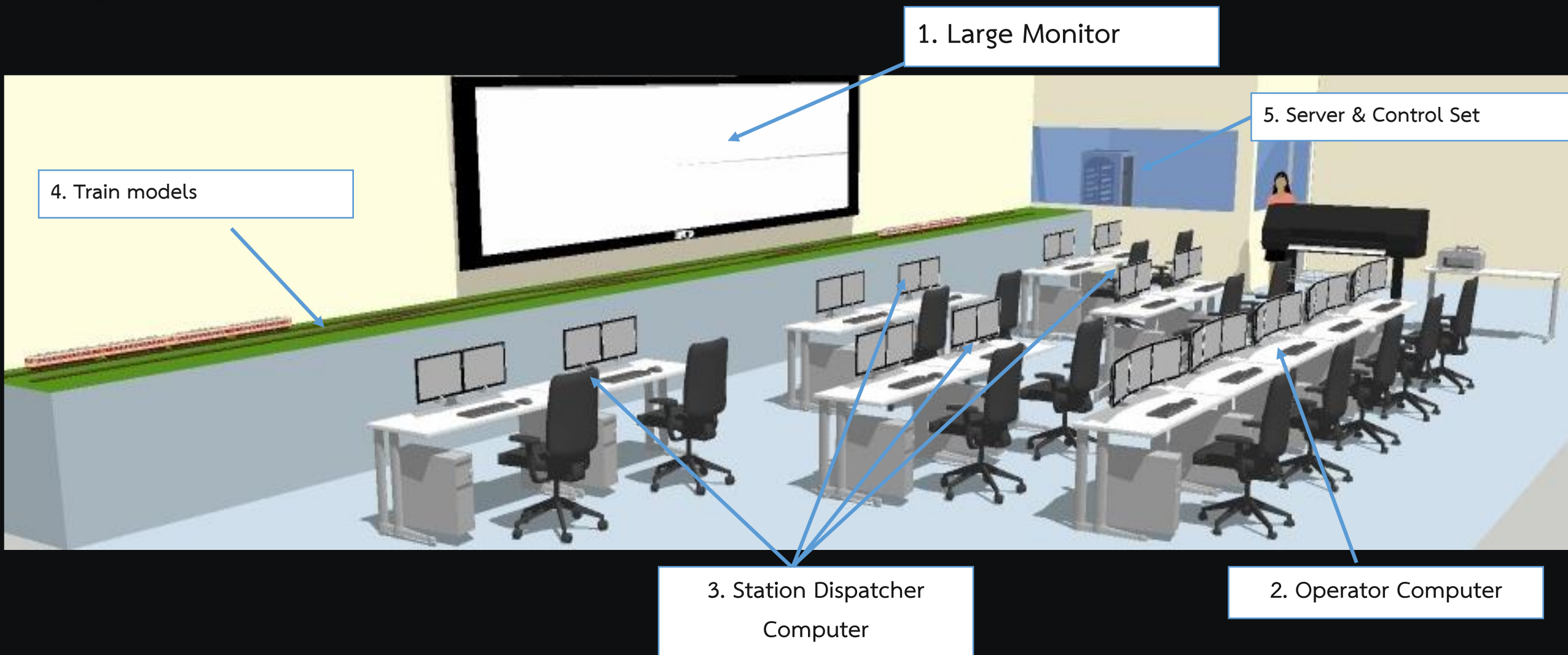
TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM





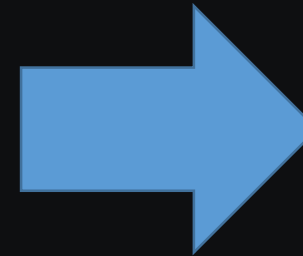
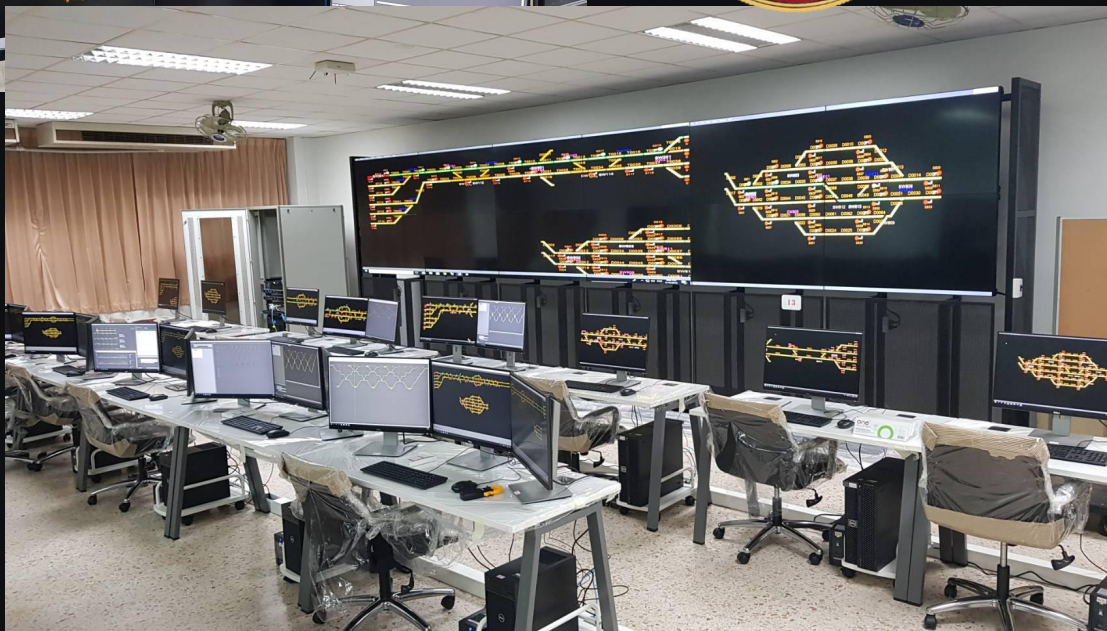
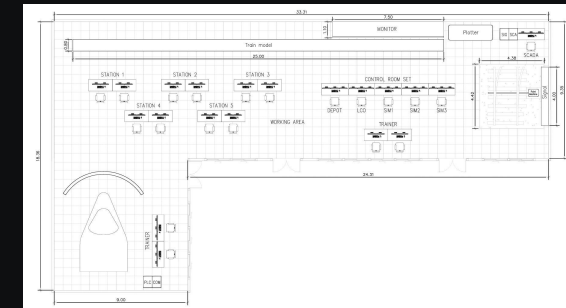
System Analysis & Design : Operation Room

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



TEACHING PLATFORM LAB

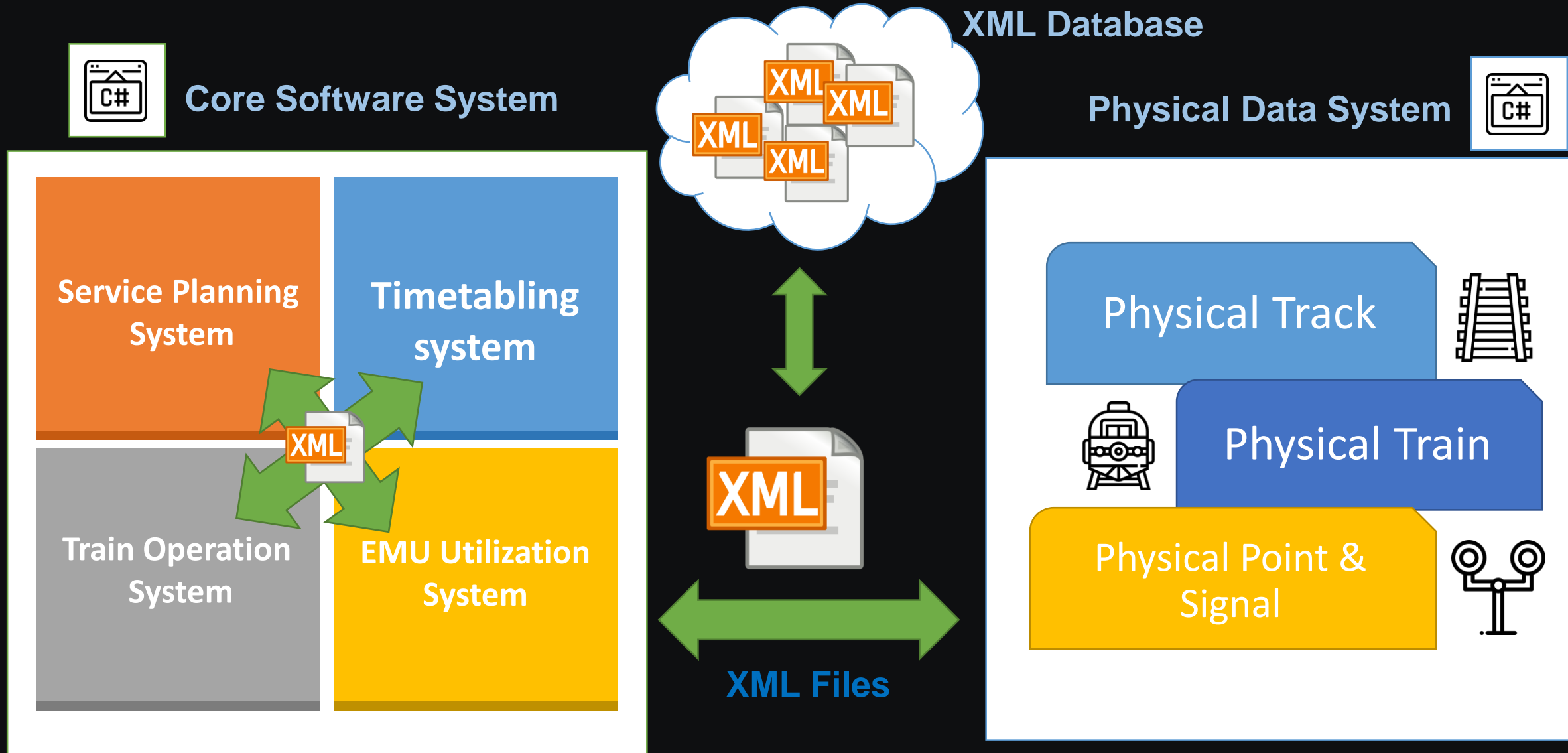
- Develop and research at Faculty of Engineering, KMITL
- Move to SRT Training Center after project completed



After Project Complete



Software Design and Development



SERVICE PLANNING SYSTEM

ระบบวางแผนการให้บริการเดินรถ

MAIN FEATURES

- ✓ Line planning and generate train trip ID for service operating.
- ✓ O-D Passenger demand and supply train service management.
- ✓ Display train service planning with graphics user-interface.
- ✓ Management of ticket price and profit incoming from ticket selling of train service planning.



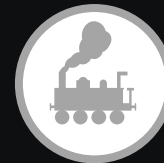
Passenger Demand &
Supply Management



Profit Incoming
Management



Route and Train
Management



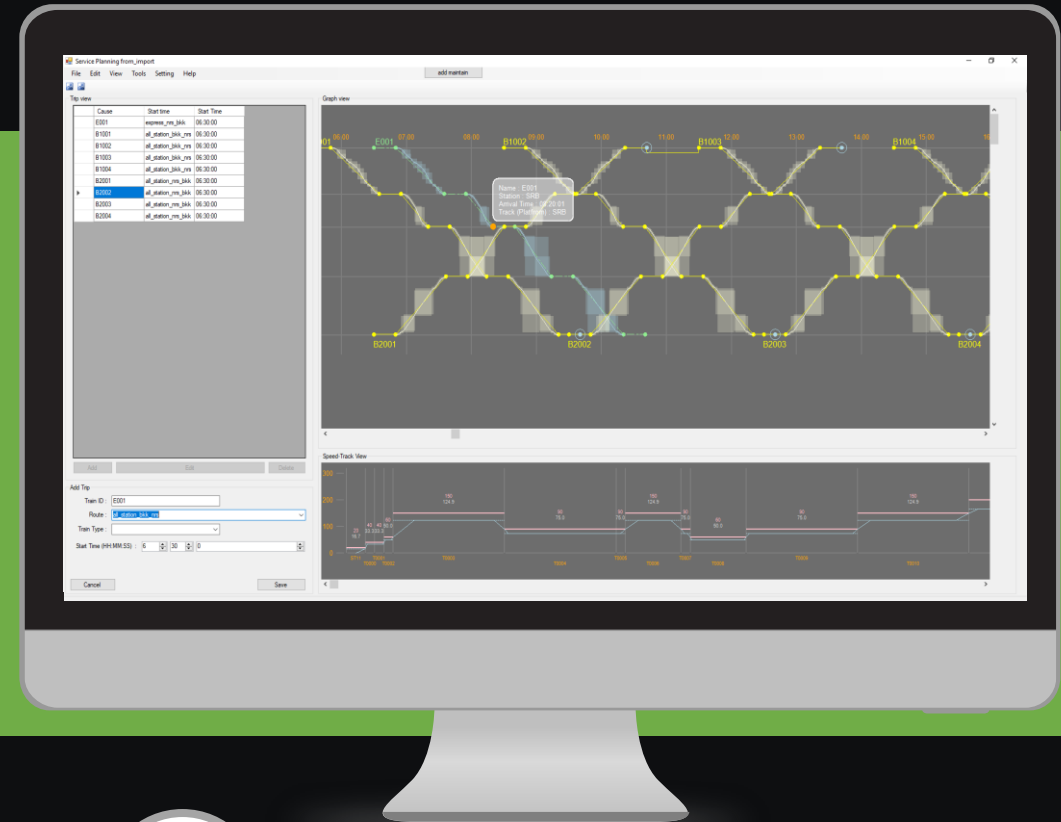
Service Planning
and Train Service
Management

TRAIN TIMETABLING SYSTEM

ระบบการจัดตารางการเดินทาง

MAIN FEATURES

- ✓ Manage train timetable and display in graphics user-interface and train graph.
- ✓ Manage headway and conflict checking in the train timetabling system.
- ✓ Drag & Drop Train graph for scheduling
- ✓ Management with maintenance track and scheduling



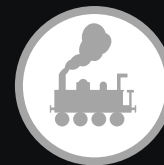
**Timetable
Scheduling**



Train Graph Display



Conflict Checking



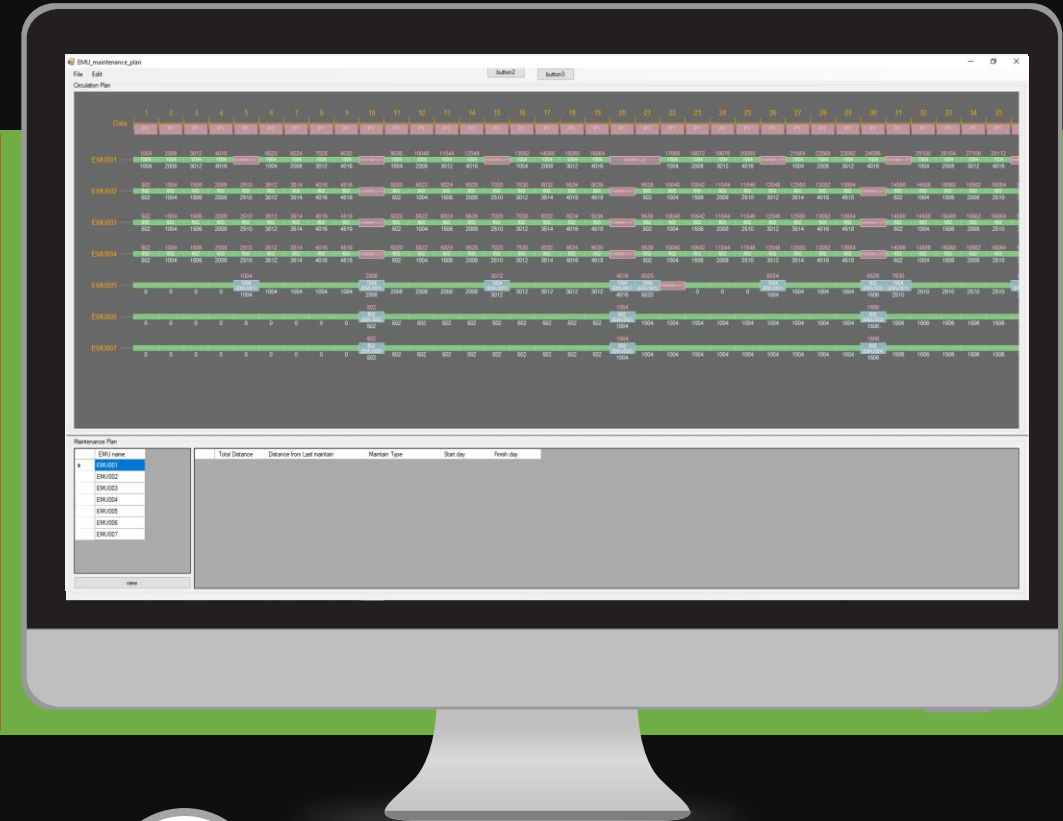
**Train Timetable
Management**

EMU UTILIZATION SYSTEM

ระบบวางแผนการหมุนเวียนและซ่อมบำรุงขบวนรถ

MAIN FEATURES

- ✓ Select EMU for each train trips for EMU circulation planning.
- ✓ EMU planning and circulation for maintenance management system.
- ✓ Compatible with graphics user-interface and train graph that easy to use.



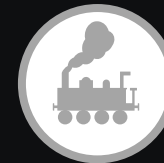
Train Circulation Management



Train Maintenance Planning



Depot Management



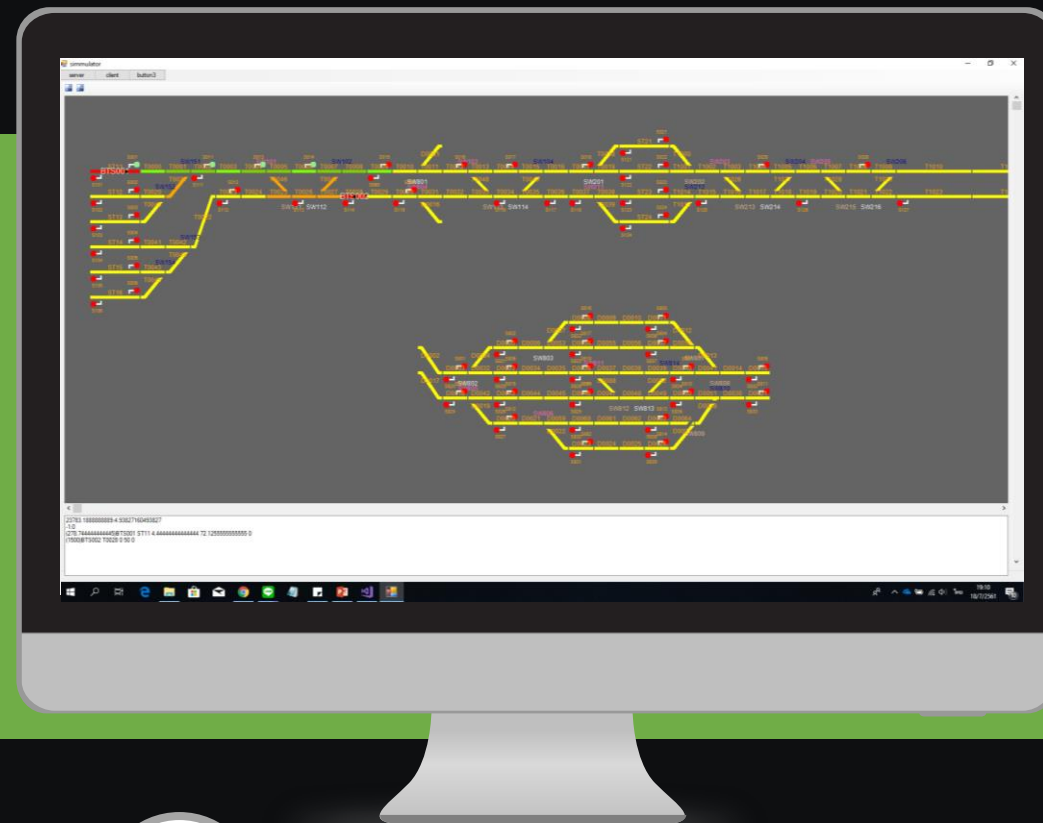
Train Circulation and Maintenance Management

TRAIN OPERATION AND CONTROL SYSTEM

ระบบบริหารและควบคุมการเดินรถไฟ

MAIN FEATURES

- ✓ Simulation of railway signaling and operation with train timetable.
- ✓ Simulation of train points, signal and another railway signaling system and equipment.
- ✓ Simulation or interlocking system with train safety and Automatic Train Operation and Automatic Train Protection
- ✓ Select route for train operation, reserve route, route from timetable and monitor all train in the system,
- ✓ Event generator for simulation of accident case for training about railway operation system.



Simulation of
Railway Signaling



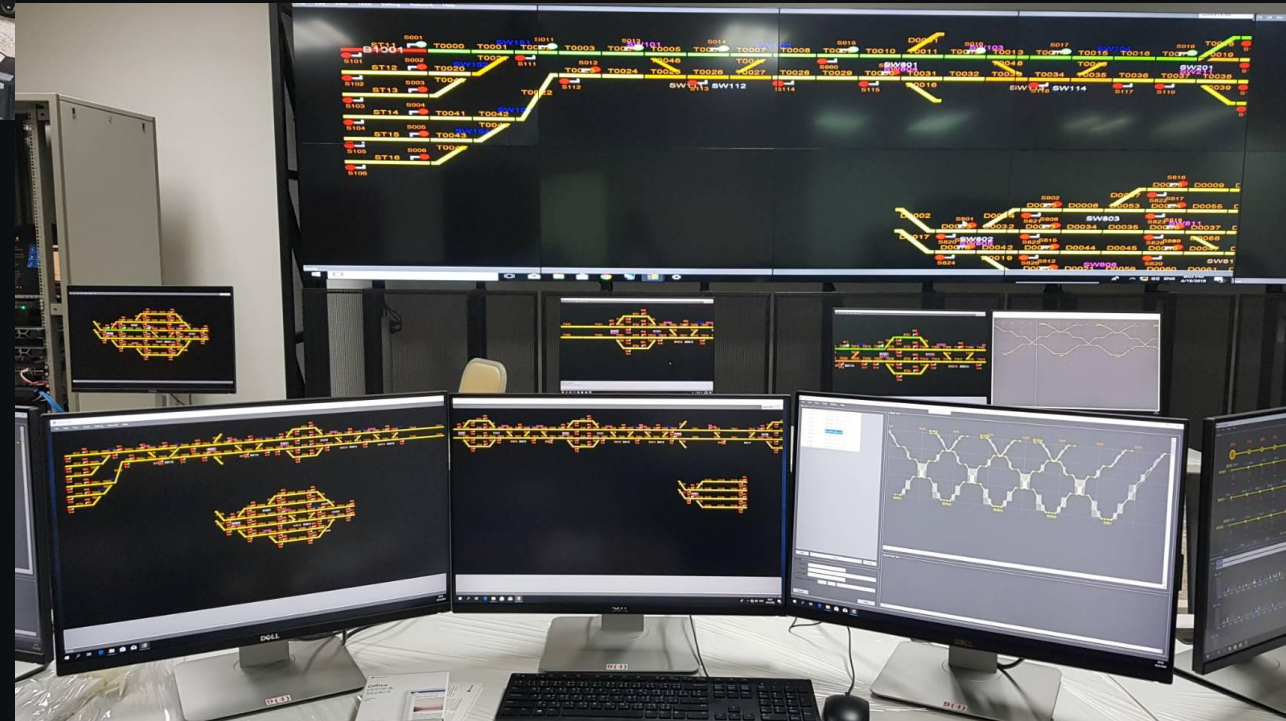
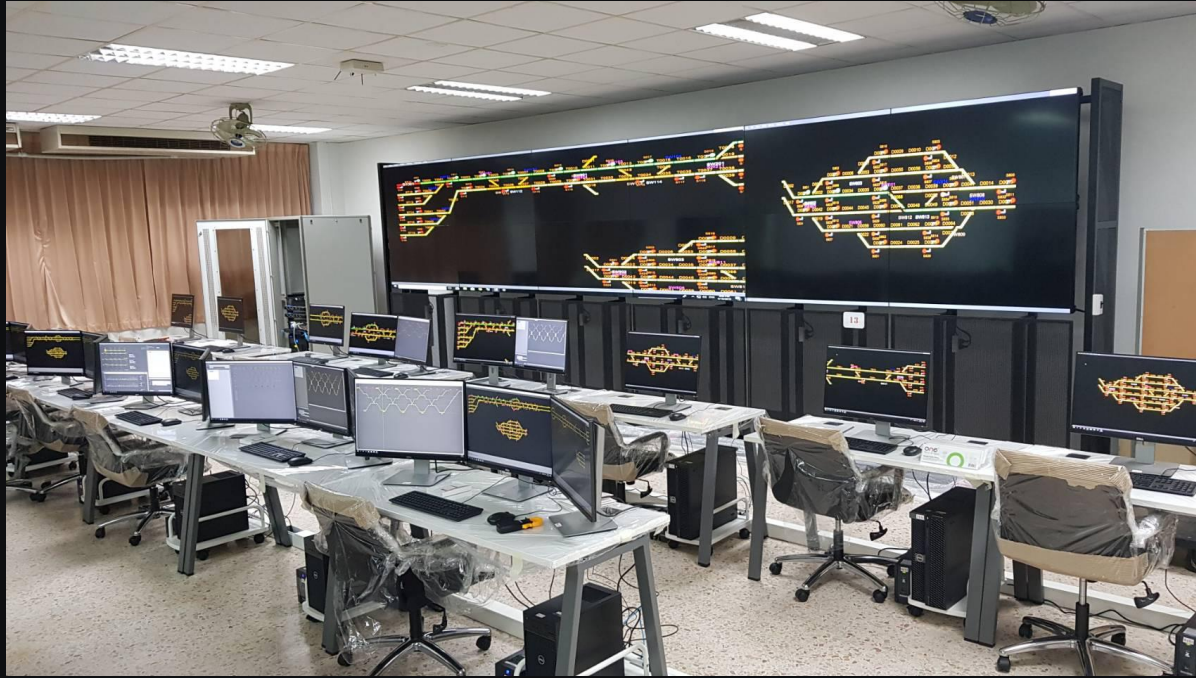
Event Generator



Station Dispatching



Compatible with
Train models





2nd Year Project

Teaching Platform

- ✓ Develop completed software (Final Version).
- ✓ Develop a training document and multimedia
- ✓ Seminar & Training about the project
- ✓ Develop train models and software for working with teaching platform software.

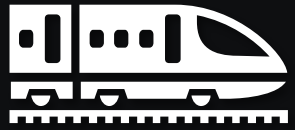


1 May
2019



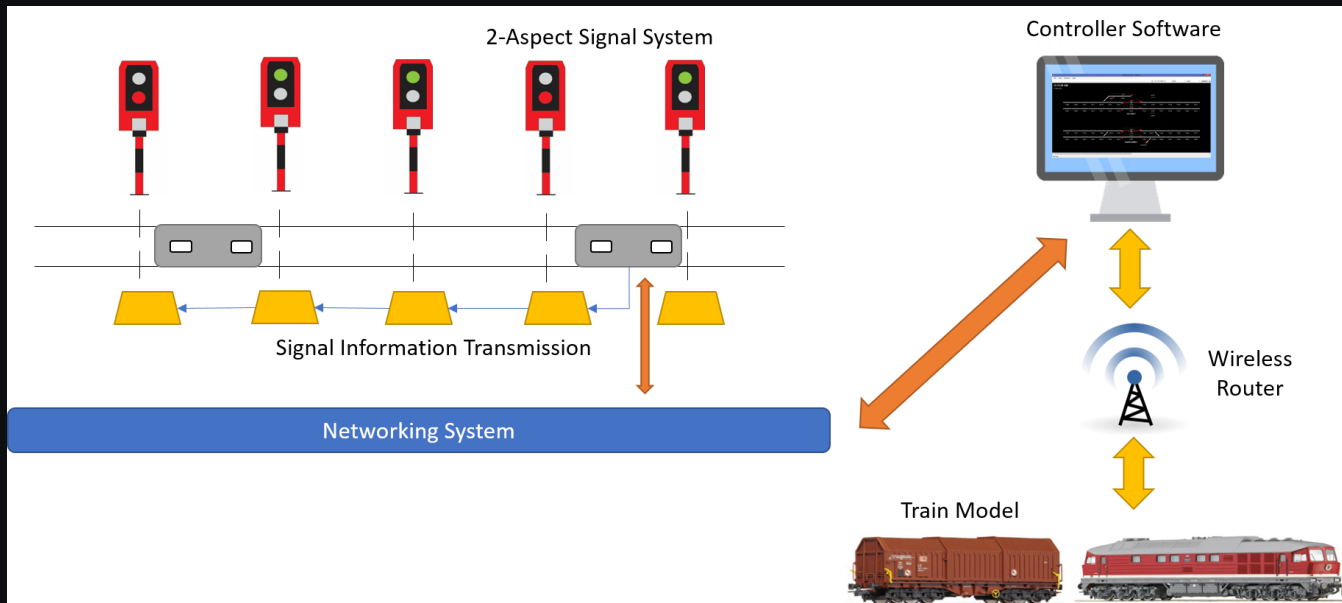
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2020

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Train Model Design (2nd Year Project)

- Train Model in HO Scale (1:87)
- Distance long 40 meter with infrastructure layout like as the project
- Train model operate simultaneously with Train Operation System



PROJECT OUTPUT

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM

Teaching Platform Software

- ❖ Train service planning
- ❖ Train timetabling
- ❖ EMU Utilization
- ❖ Train Operation and Control

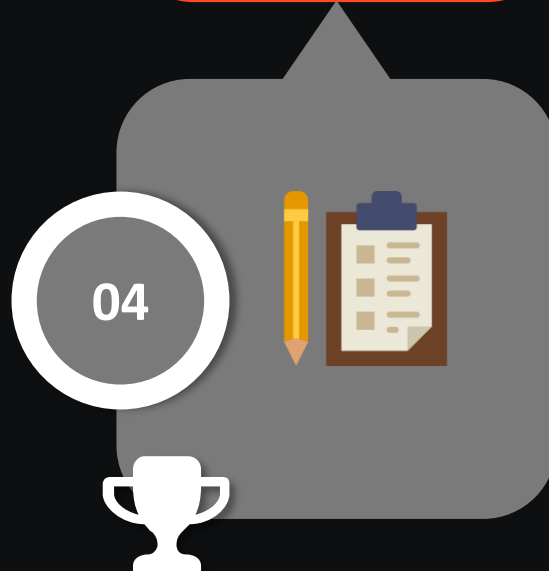


Training Center

- ❖ Central Control Room
- ❖ Train models in HO-Scale controllable by teaching platform software

Training Materials

- ❖ Computer-Based Training
- ❖ Multimedia contents
- ❖ Training documents
- ❖ Instructor Manuals



Training Courses & Seminar

- ❖ Training courses on railway operation and control

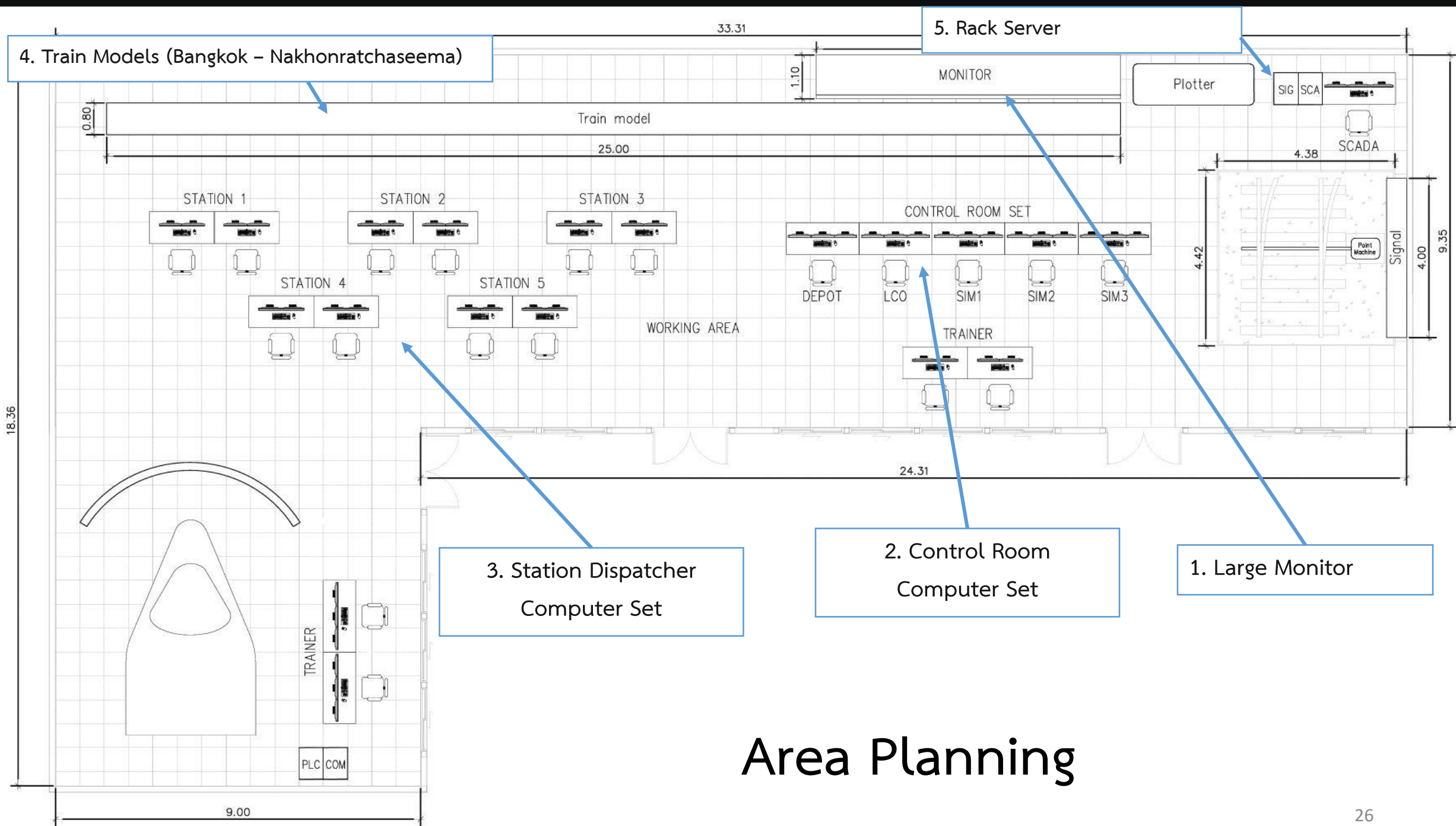


- Co-Operation with State Railway of Thailand Training Center
- Building 8



โครงการ : อาคารฝึกอบรมควบคุมระบบการเดินรถ
ศูนย์ฝึกอบรม การรถไฟแห่งประเทศไทย
ผู้ออกแบบ : กองสถาปัตยกรรม

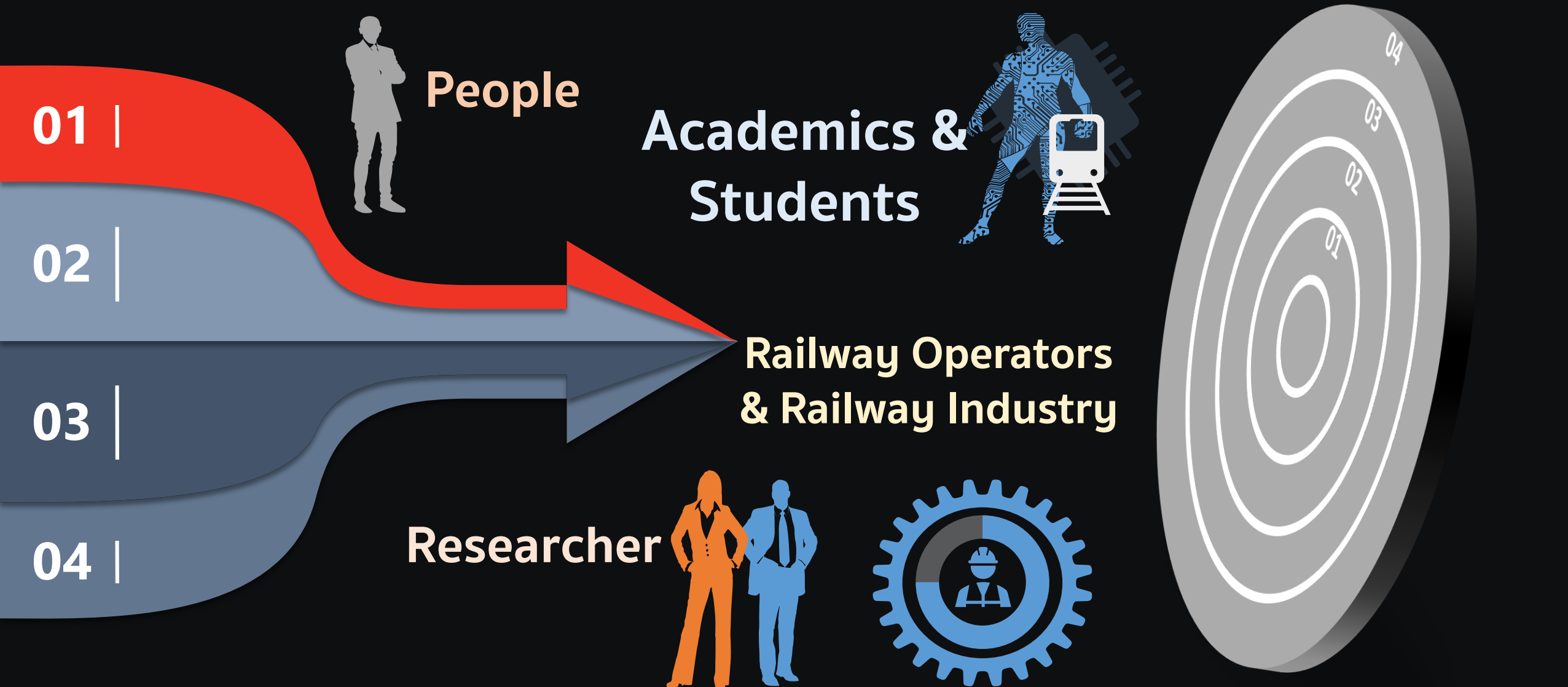




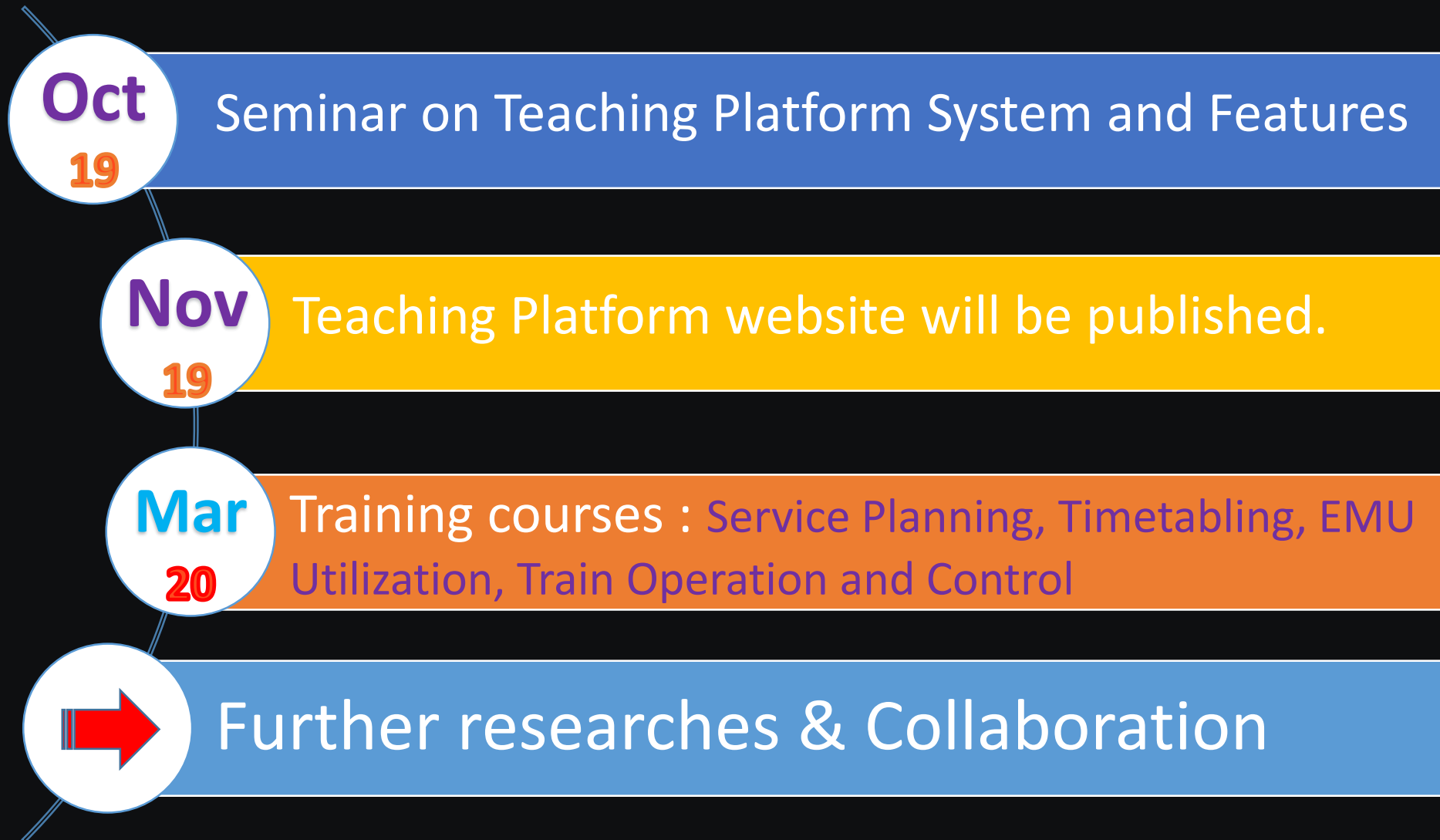
Area Planning

Project Benefits & Outcomes

TEACHING PLATFORM OF OPERATION AND CONTROL FOR RAILWAY SYSTEM



Draft of Activities Timetable



Teaching Platform : next steps PHASE II

- ❖ Develop Moving block signaling system.
- ❖ Develop an algorithm to maximize EMU utilization.
- ❖ Research for the possible minimum headway of a train service scheme.
- ❖ Research for an optimum train service plan generator.
- ❖ Develop a dynamic timetable rescheduling algorithm to minimize the overall delay caused by any accident.



Questions? / Answers & Suggestions



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THANK YOU