1. Introduction and Background

2. Project Delivery Cycle:
   - Plan
   - Design
   - Implement
   - Feedback

3. Summary and Conclusions
Introduction and Background
Introduction and Background - 1

The Challenge......

How to deliver the best possible railway?
What should we value in a railway?

- Safety and reliability: safety first always
- Maximum transport benefits
- Maximum economic benefits
- High level of service
- Sustainable transport solution
Importance of Strategic Planning:

- Establish existing travel demand patterns - baseline
- Determine future demand based on land use planning
- Consider how best to meet travel demand
- Consider when to meet demand
Railways are expensive! Maximise benefits by:

- Structured approach to optimising scheme
- Integrated transport solutions
- Optimising station locations
- Enabling network flexibility

Value Engineering
Challenges for Malaysia:

- Planning in Kuala Lumpur: more focused on road transport systems
- Complex land issues: integrated planning more difficult
- Existing rail interchanges: could be more convenient
- Higher capacity needed: to meet increasing demand

Opportunity: new systems can address these historic issues, provide model for future schemes
Project Delivery Cycles
What is the Project Delivery Cycle?

1. Planning the Project
2. Designing the Project
3. Implementing the Project
4. Feedback for future Projects
Project Delivery Cycles: Plan, Design, Implement

1. Planning the project:
   - organisational planning
   - establish project management team structure
   - transport planning → scheme selection
   - identify operator
   - funding arrangements
   - procurement model
   - packaging and interfaces
   - scheme optimisation
   - change control
   - risk management
2. Designing the project:
   - define objectives and fix scheme
   - procure design services
   - integration and coordination
   - change control
   - risk management
3. Implementing the project:
   - construction procurement
   - construction management
   - testing and commissioning
   - operation and maintenance
   - change control
   - risk management

4. Feedback for future projects
Project Delivery: Planning the Project
Organisational Planning:

- **Establish Clear Structure** with responsibilities defined
- **Planning Cycle**: establish regular cycle for strategic planning reviews
- **Approval Process**: typically including public consultation and statutory or administrative processes including EIA
Case Study – Project Organisation: Dubai Metro

Client:
- Strategy Funding

PM Support

Operator
- Client’s Engineer

Contractors:
- D&B Contract

Designers
Case Study – Organisation for Rail Project Planning and Implementation – Hong Kong

- Transport Strategy
- Funding Arrangements
  - Hong Kong Government Transport Bureau

- Railway Development Strategy
- Invite Project Proposals
  - Hong Kong Government Railway Development Office

- Project Delivery
- Project Management
- Railway Operations
  - MTR Corporation Ltd

- Preliminary & Detailed Design
- Value Engineering
  - Design Consultancies

- Civil Construction
- Railway Systems
  - Contractors / Suppliers
Case Study – Planning Cycles: Hong Kong

Hong Kong

Transport policy objective:

“To plan for and implement the construction and improvement of our transport infrastructure, with emphasis on railways”

Railway Development Strategy Review – 10 year cycle

- Uses territory wide transport model including land use planning data
- Identifies priorities for investment in railways based on transport benefits
- Design development taken forward in tranches
Project Management Team establishment:

- Responsible for Planning, Design and Implementation
  - meeting all objectives including time, cost, quality

- Structure depends upon skills available locally:
  - outsourcing successful but should include key in-house individuals for quick decision making
  - must include staff with strong relevant experience (learning curve)
  - must include local staff for understanding local practice
  - should promote skills transfer to local staff

- Establish Project Objectives and Team Unity early
  - Understanding and alignment of objectives essential
  - Co-location within Project Office beneficial

26 July 2012
Project Delivery Cycles: Planning - 3

Transport Master Plans:

- **Strategic Land Use Planning** underpins everything (population, employment, industrial strategy, etc)

- **Establish Transport Needs** to support land use plans
  - Plan network of high capacity corridors (rail based)
  - Lower capacity feeder services (light rail or bus)

- **Optimise Integration** with existing road and rail facilities
  - Ease of interchange
  - Modal transfer – PTIs, Park and Ride, taxi stands

- **Opportunities for Synergies** with existing or planned developments
  - Funding from TOD or developers
  - Enhanced fare box revenue
Case Study - planning of intermodal transfer facilities - Dubai Metro

- Air-conditioned travelators / foot bridge connections
- Bicycle parking provided at each station entrance
- Park-and-ride facilities
- Bus stations and taxi waiting areas integrated into station entrances

Transport linkages
Case Study - planning of intermodal transfer facilities - Dubai Metro
Case Study - planning of intermodal transfer facilities - Dubai Metro
Operator Involvement:

- **Identify Operator:** Appropriate experience essential
- **Safety Culture Paramount:** no compromise acceptable in this area
- **Early Operator Involvement Beneficial:**
  - Establish operational needs (e.g. depot, fleet size, maintenance facilities, staffing levels, degree of automation, etc)
  - Ensure operator “buy-in” to design solutions
  - Allows operator to contribute to cost effectiveness through participation in Value Engineering, design coordination, etc
  - Allows early planning of Testing and Commissioning: important for timely opening
- **Asset Ownership:** Government or Private Sector? Operator or InfraCo?
Funding Arrangements:

- **Property Development / TOD Funding**: Historically successful in Hong Kong and London but depends on high land values and political support.

- **Government Funding**: simplest but requires political will for large investments over lengthy period.

- **PPP: Public-Private Partnership**: Popular in Europe and Australia but costs often higher due to higher cost of capital.

- **Private Sector Funding**: e.g. BOOT schemes: main issue is high risk of fare box revenue forecasts.
Case Studies – Funding in Kuwait and Hong Kong

Kuwait Metro: PPP
- PPP model, but not due to need for money
- Legal requirement for private sector involvement in operation and maintenance
- Ensures international expertise available to manage Gov’t assets

MTRC in Hong Kong: Property and Public Funds
- Traditionally fully funded through property development
- More recently either government or hybrid funding (part property)
Case Studies – Funding for Crossrail, London

Crossrail Funding: Complex model  >90% public funding

Underwritten by Transport for London (Local Transport Authority)
- GLA £3.5bn
- TfL core contribution £2.7bn
- London Underground ‘interface savings’ £0.4bn
- Sale of surplus land and property £0.5bn
- Developer contributions £0.3bn
- London Planning Charge £0.3bn

Underwritten by Dept for Transport (National Transport Authority)
- DfT grant £5.1bn
- BAA/City of London Corp £0.5bn
- Network Rail £2.3bn
- Depot operating lease £0.5bn
- Additional City of London £0.1bn
- Less residual costs £0.4 bn

Total £15.9bn
Procurement Models:

- **Turnkey Contract**: single contract for all aspects of the project including design, civil construction, systems.

- **Project Delivery Partner or Management Contractor**: all aspects of project passed to experienced organisation who subcontracts the works and is responsible for budget, programme and quality.

- **Design & Build Contract**: Design and construction within single contract, based on reference design.

- **Full Engineer’s Design**: complete detailed design by Client’s engineer.
Successful interface management is essential to successful project delivery

**Success:**
Costs and Programme Risks Minimised

**Failure:**
Costs and Programme Overruns

- Identify
- Eliminate
- Simplify
- Specify
- Manage
Scheme Optimisation:

Improved:
Constructability / Cost / Programme / Patronage ??

- Scheme Review at key stages
- Design Development
- External review
- Value Engineering
Case Study: Value Engineering in Hong Kong

- Structured approach
- Involved all key stakeholders including Operator
- Key tool for briefing team on project / understanding project

TSUEN WAN WEST STATION, West Rail Line

Cost saving - HK$1.3billion

Structured Approach to Ensure Best Schemes Identified
Change Control: Change is inevitable – be prepared!

- Process for approval of changes essential throughout project life
- Cost, programme or risk impacts of any change to be identified
- Approval process may depend on degree of impact
- The later the change, the higher the impact on cost/programme
Risk Management:

Tackle risks early, and keep under constant review throughout project

Structured approach:
- Identify
- Quantify
- Mitigate
- Manage
Feedback for future projects:

- Identify lessons learned during each stage of project: don’t reinvent the wheel for each project!

- Document lessons learned: develop procedures and guidance notes, knowledge stays in organisation

- Skills Transfer: retain skills locally for next project

- Review forecast vs actual patronage

Build on successes, cut out failures
Summary and Conclusions
The Challenge……

How to deliver the best possible railway?
How to meet the challenge:

- Integrated Land Use and Transport Planning
- Planning cycles to allow integrated transport solutions
- Select procurement approach to suit objectives and environment
- Structured approach to scheme optimisation
- Operator involvement from early stage beneficial
- Strong Change Control and Risk Management
- Document lessons learned and transfer skills to allow next generation to take over and do it better!
Copenhagen Metro, Denmark

Rail engineering, Intelligent Transport Systems and transport planning
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