Turnkey Solutions
Alstom Transport

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21 October 2008

We are shaping the future | ALSTOM

Agenda

The Group
Two main activities, three sectors

Equipment & services for power generation

- **Alstom Power Systems**
- **Alstom Power Service**

- **Alstom Transport**

Equipment & services for rail transport

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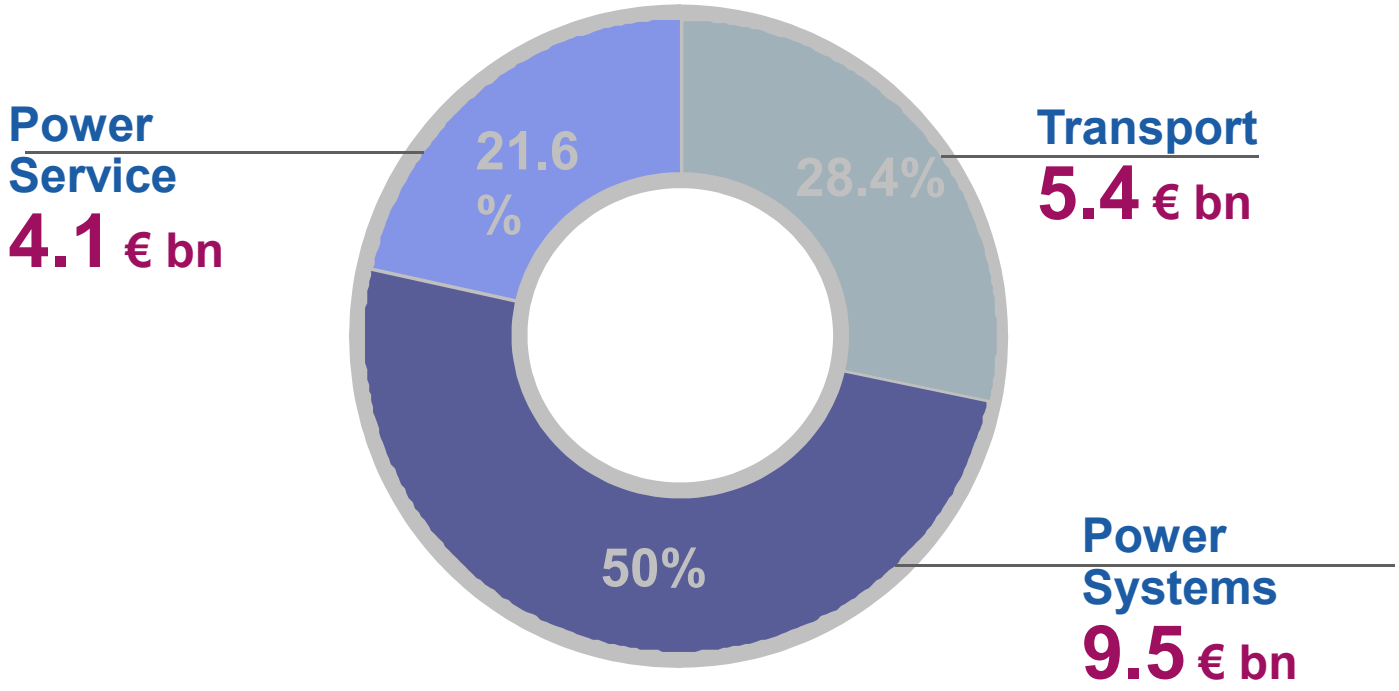
The Group
Two main activities, three sectors



Total orders 2006/07 :
€19 bn

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The Group
Two main activities, three sectors

N°1 worldwide in rail transport sales

Alstom makes 1 metro in 4 and 1 tram in 3

N°1 worldwide
in high speed
and very high speed

N°2 worldwide
in urban transport
(metro and trams)

N°3 worldwide in power generation

Alstom supplies a major equipment in 25% of the worldwide installed power generation

N°1 worldwide
in integrated
power plants

N°1 worldwide
in hydro power*

N°1 worldwide
in air quality
control systems

N°1 worldwide
in services for
electricity utilities

* through Alstom Hydro, a 50/50 joint venture between Alstom and Bouygues set up in 2006

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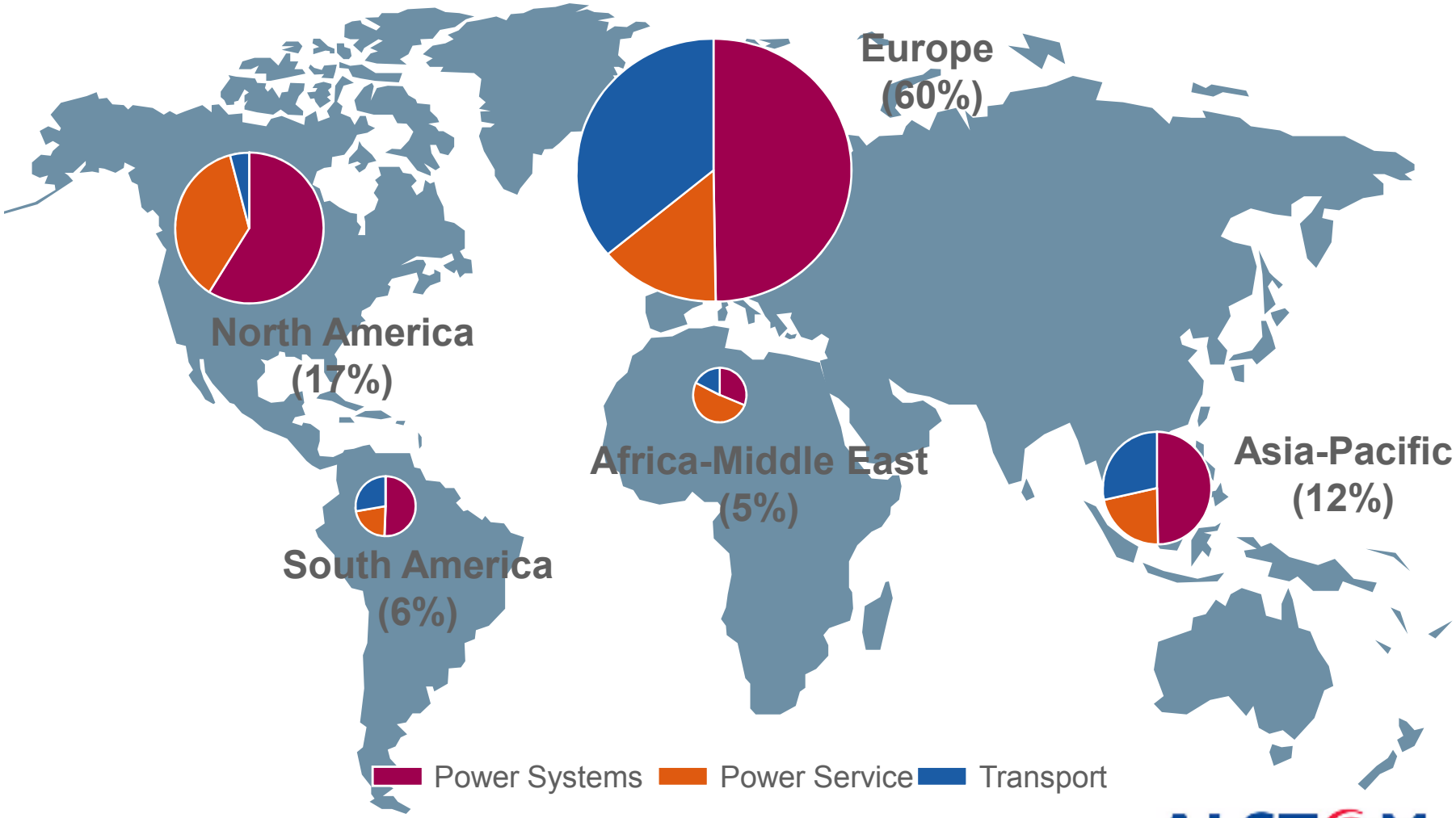
The Group
A major international presence

Orders by region



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ALSTOM Transport - Global Leader in Rail Solutions

- **N° 1 in high speed and tilting trains**
- N° 2 in urban transport
- 1 of 4 metro in service around the world is ALSTOM-built
- More than 1000 CITADIS™ **ordered by 25 cities**
- 8500 kilometres of electrified railway
- Worldwide leader in Urban and Mainline Turnkey System integration
- Infrastructure - > 200 000 km of track installed and controlled by ALSTOM

More than 100 production and maintenance sites
Present all over the world to be closer to our customers

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Alstom presence in Asia Pacific

● *Main current projects*

Some key Projects

- Korea High Speed Train 1.4 bn€
- China EMU 625 m€
- Circle Line (Singapore) 550 m€
- China - 180 freight locomotives 375 m€
- 1500 metro cars - Shanghai
- Incheon International Raillink (Korea) 210 m €

Some key Customers

- Korea: Korea High Speed Rail Corporation (KHRC)
- China: MOR in China and Shanghai Shentong
- Singapore: Land Transport Authority (LTA)
- Taiwan: DORTS
- Hong- Kong: MTRC
- India: Delhi Metro Rail Corporation

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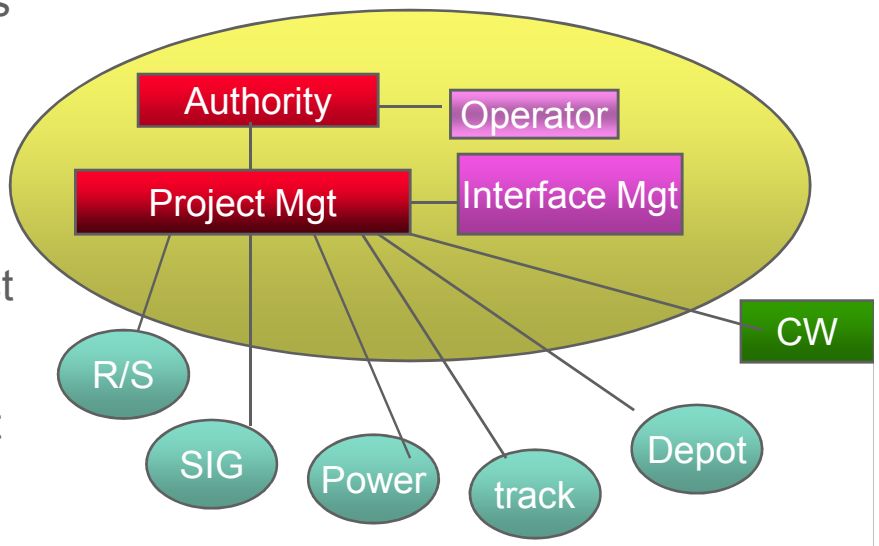
Agenda

Procurement Approaches : Separate Lots

- **Key Characteristics**
  - Procurement based on detailed sub systems specifications
  - Specifications prepared either by existing operators or by consultant(prescription strategy)
  - Strong competition based on production cost
  - Risk limited to sub system competencies
  - Scheduling & interfaces contract variance at Authority risk

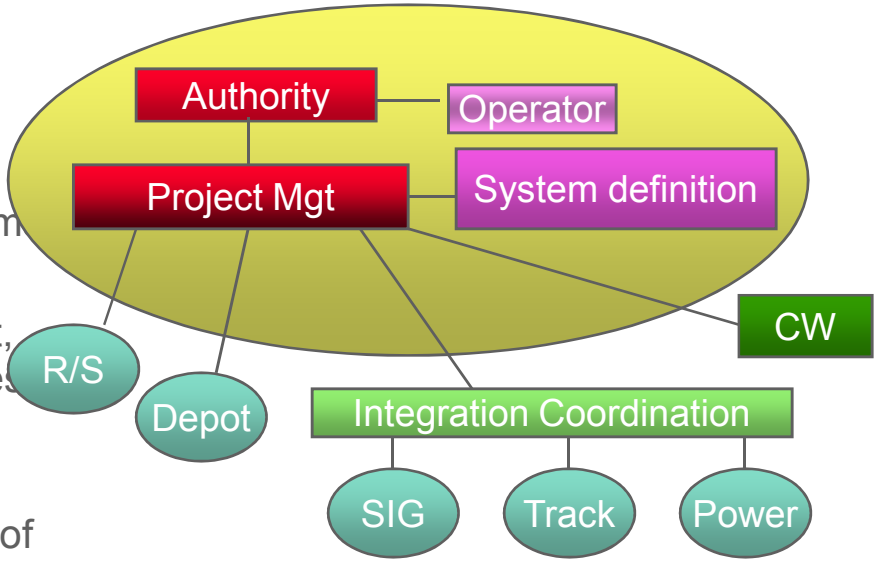


- **Application**
  - mature transportation organizations with in-house engineering, PM and integration skills/resources
  - non-mature organizations helped by Consultants
  - extensions projects

Detailed procurement Specs – Production Cost based competition

Procurement Approaches : Integration

- **Key Characteristics**
  - Procurement based on detailed sub-systems specifications
  - Specifications prepared either by existing operators or by consultant
  - RFP requirement to allocate some sub system to one entity
  - Competition mainly based on production cost, but allows sub-systems synergy and requires extended product range
  - Risk moving from sub-sys. competencies to inter-Platforms competencies with a 1st layer of integration performance

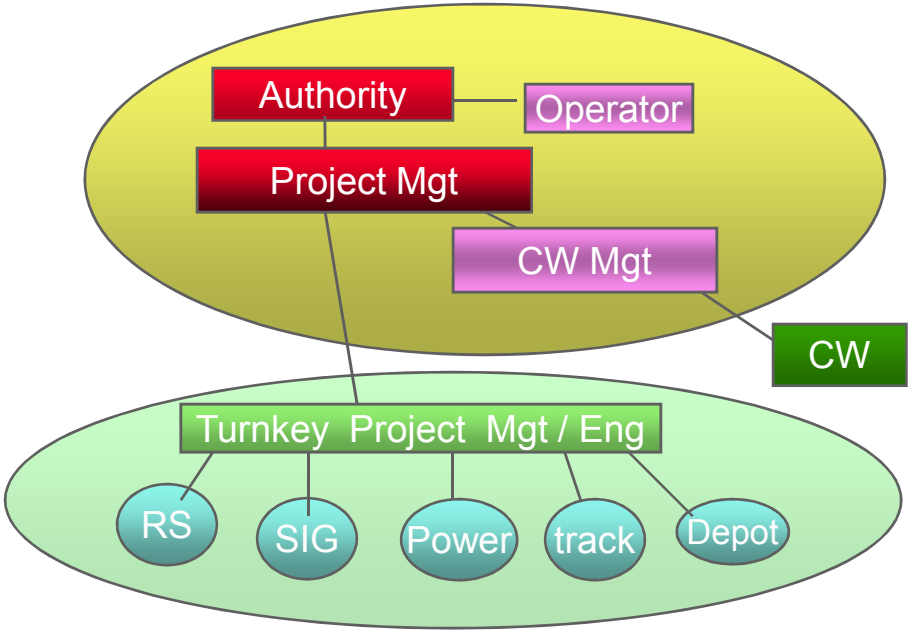


- **Application**
  - When RFP features requires an allocation of some system performance to 1 entity
  - Less mature transportation organizations or Mature transportation organizations with binary vision RS + fixed Infrastructures
  - Upgrading projects of infrastructures only

Detailed Specs – Cost synergies and Coordination capabilities

Procurement Approaches :
Turnkey Mechanical & Electrical

- **Key Characteristics**
  - Procurement of M&E system based on performance specification
  - M&E Contractor is fully responsible for providing an integrated solution that optimizes costs within the general constraints the specified performance
  - Civil works contracted separately

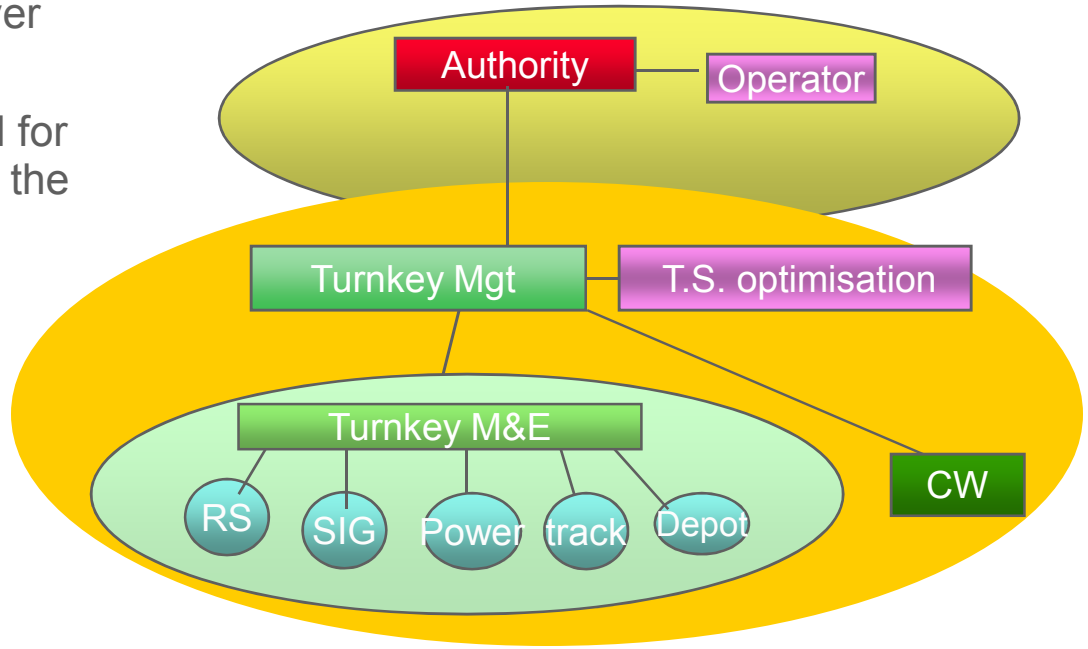


- **Application**
  - Mature organization willing to focus on core activities and/or willing to transfer risk.
  - Organizations implementing first projects
  - Fast-track implementation of investment decision
  - BOT/PFI projects

Performance Spec – Optimization flexibility – Integration capability

Procurement Approaches :
Full Turnkey (M&E + Civil Works)

- **Key Characteristics**
  - Same as Turnkey M&E over extended scale
  - Extended flexibility offered for the Contractor to optimize the solution
  - Extended transfer of risk
  - Allows funding options PPP/PFI



- **Application**
  - Same as Turnkey M&E over extended scale

Extended flexibility to optimize – Extended transfer of risk

TurnKey benefits

TurnKey

=

Fast development & construction

+ Guaranteed global Performance

+ On time delivery & Secured Budget

+ Smooth start of Passenger Service

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Guaranteed global Performance

- Total performance commitment e.g
  - Safe, reliable transport solution with right capacity, speed and comfort
- Interface risks transferred to the contractor e.g
  - Power simulation
  - Rail/Wheel interface
- Commissioning e.g
  - Integrated tests and speed runs coordination
  - Preparation of documentation for Permit to use

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On time Delivery & Secured Budget

- Single integrated programme management e.g
  - Reactivity to mitigate unexpected events
  - Possible adjustments without contractual issues
- Accurate delivery progress follow-up e.g
  - One Project Director accountable for progress, one reporting
- Time schedule and costs commitment e.g
  - Clear & single delivery respons

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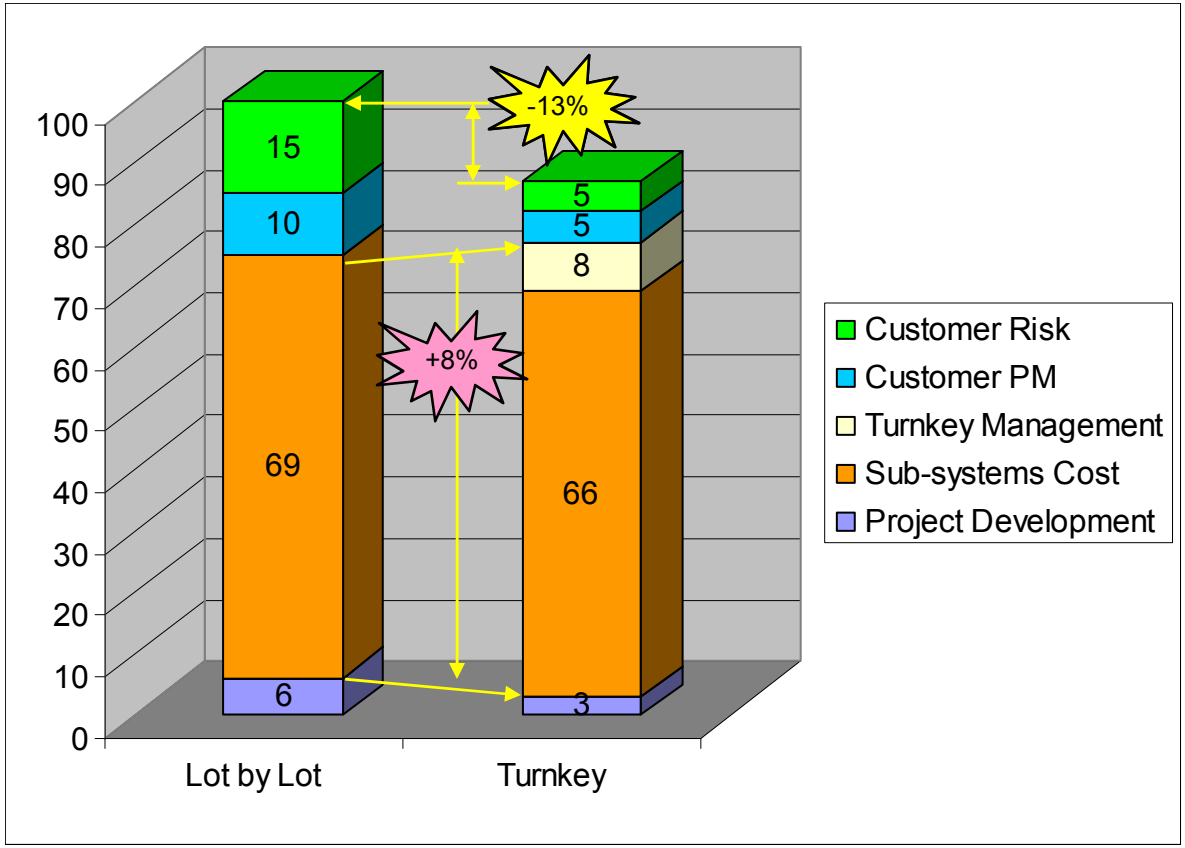
Optimised Cost for the Customer

In a **Turnkey** contract, for the client :

- **Limited cost** linked to the technical interfaces risk and schedule risk
- **Less** technical management and site coordination **responsibilities**
- **Less** general consultant **tasks** to perform
- **Benefits** from an **optimized** architecture and **reduced** overall schedule, which reduces its own supervision **cost**

Financing can be easier to organize



Fast development & construction

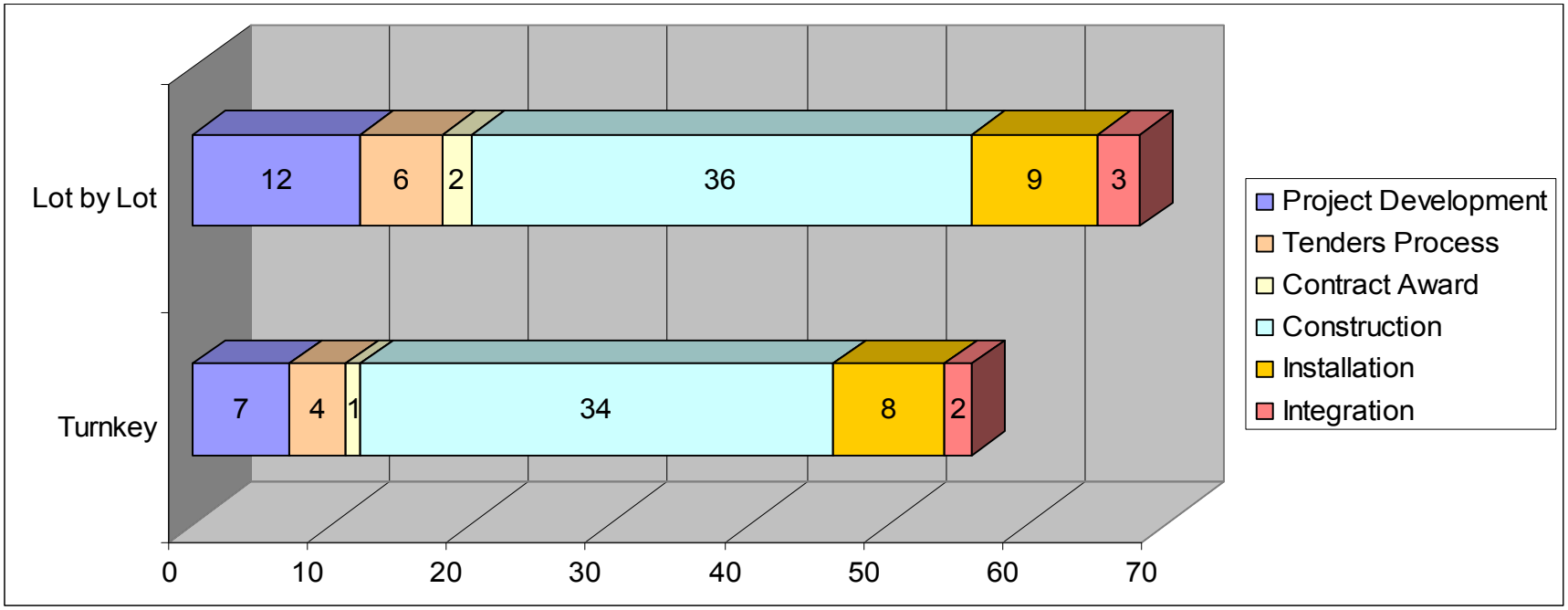
- Avoid long tender preparation and co-ordination phase e.g
  - Detailed technical specification not required
  - One negotiation process only
- Use of standard customised solutions e.g
  - Focus Rolling Stock development effort on specific requirements
  - Availability from Day 1
- Site Construction optimization e.g
  - No numerous individual programmes with individual built-in float margins

Optimised Delivery Time for the Customer

In a **Turnkey** contract, the client can expect the following tasks to be unnecessary or to have a **shorter** duration :

- General consultant **contract definition**
- Definition of the **project specifications** for each separate lot by the General Consultant
- Contract definition and **award** for each separate lot
- Definition and **integration** of all subsystems
- Subsystem **installation**
- Testing and **commissioning**

E.g. : 4 months less on realization and 12 months on global process



Smooth start of Passenger Service

- Operator ready for operation e.g
  - Operation modes definition as part of the design process
  - Operator associated to early test and commissioning activities
- Guaranteed equipment availability e.g
  - Turnkey contract can include maintenance with
    nt

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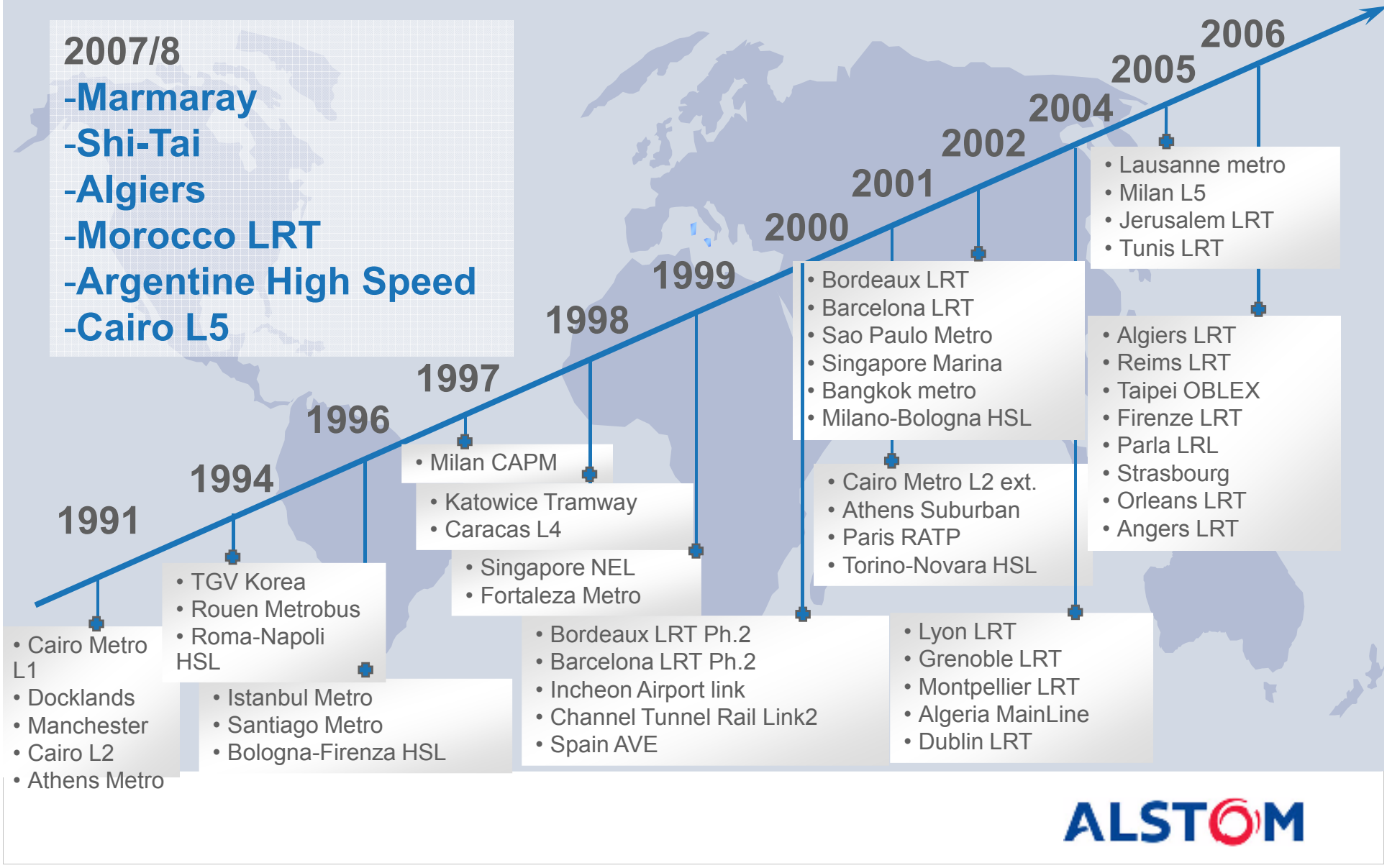
Agenda

More than two decades of experience in Turnkey projects



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Turnkey Transport solutions

For each Market Segment an adapted transport Global Solution

1- Main Line :

Regional and Main Line (including High Speed)

Suburban : dedicated way, average distance between stations > 2 km, maximum speed 160 kph

2- Metro :

Heavy and light : in-City operation, dedicated way, average distance between stations < 1,5 km, maximum speed < 100 k

P/H/D: 6000/50000

3- Tramway :

In-City operation, partially on protected way with road intersection.

P/H/D: 2300/7000/12000*

- Track work
- Signaling and Train Control
- Control Center and Communications
- Power Supply
- Depot and Workshop
- Station Utilities
- System Engineering and Project Management
- Testing and Commissioning
- Civil Works
- Maintenance

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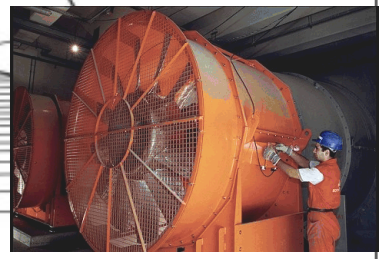
Turnkey Metro Solutions

Signaling and Control Systems

Depot and Maintenance Facilitie

Trackwork

Catenaries / 3rd rail



Station Equipment

Test and Commissioning

Power Supply

System Engineering and Project Management

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System expertise

From an assembly of components...

… To a fully Operable and Integrated System

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Turnkey solution Engineering methodology

Alstom Turnkey solution approach

A specific tailor-made organization for :

- Engineering
- Project Management
- Quality and RAMS (Reliability-Availability-Maintainability-Safety)
- Risk Management
- Cost and scheduling
- Documentation
- Training
- Site Supervision
- Testing and Commissioning

During tenders and projects, in order to :

- perform a widespread validation of the system
- define the optimal architecture for the transport system
- guarantee the satisfaction of the Customer's needs

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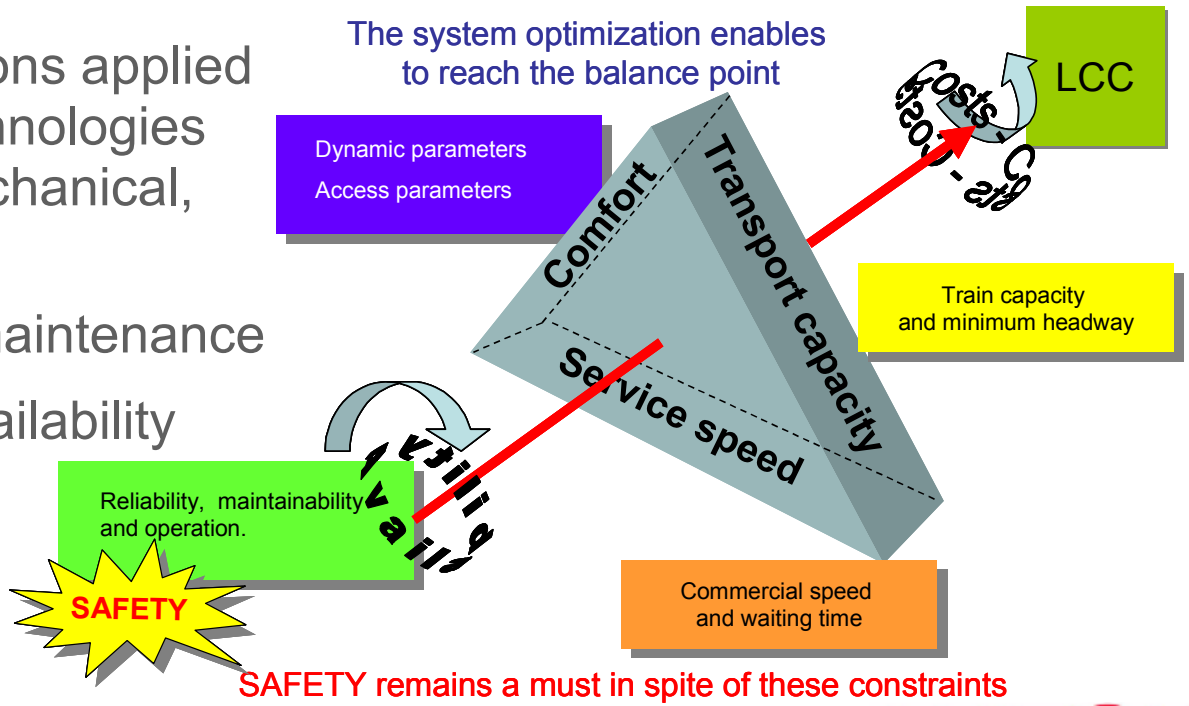
Turnkey solution Engineering methodology

System Engineering Objectives

- System Engineering approach takes into account:
  - Transport performances
  - System functions applied to various technologies (software, mechanical, electrical...)
  - Operation & maintenance
  - Safety and availability



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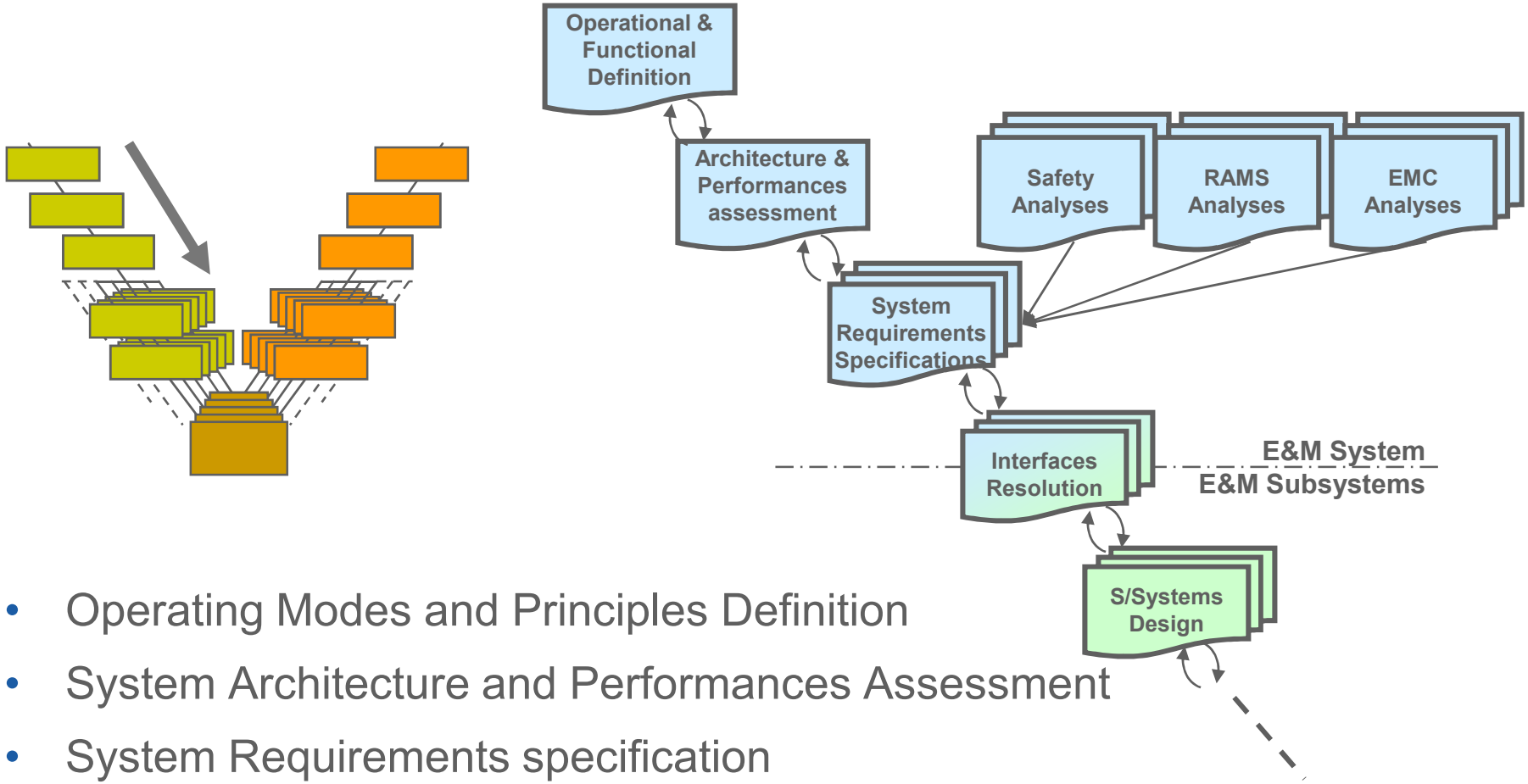
Turnkey solution Engineering methodology

System Definition



- Operating Modes and Principles Definition
- System Architecture and Performances Assessment
- System Requirements specification
- System Interfaces resolution

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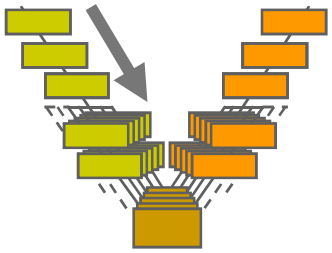
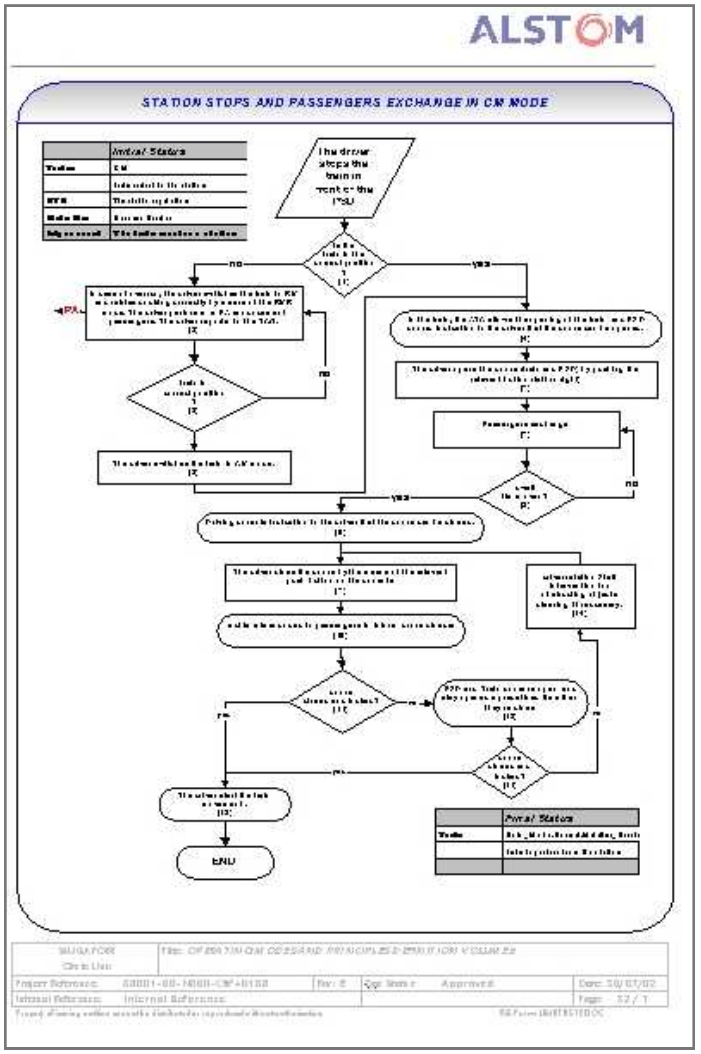
Turnkey solution Engineering methodology

Operating Modes and Principles Definition

- Establishes the coherence between
  - Each Sub-system design, and
  - System Operation Requirements

- Takes into account all operation modes
  - Normal mode
  - Degraded Modes, and
  - Emergency modes





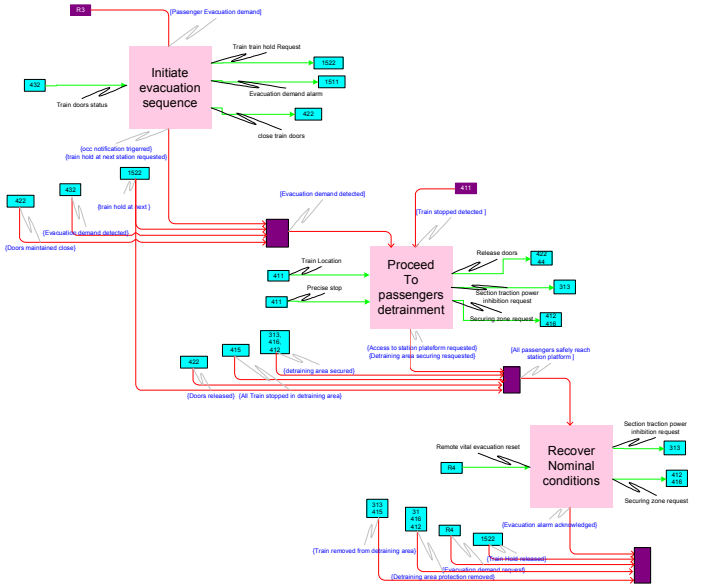
Turnkey solution Engineering methodology

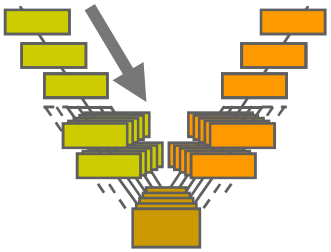
System requirements specification

- Gather and complete all the requirements following 3 views :
  - Functional (breakdown structure)
  - System Operation Requirements
  - Architectural

- Allocate the function and the RAMS performances to each subsystem (14 subsystems)

- Identify the transverse processes





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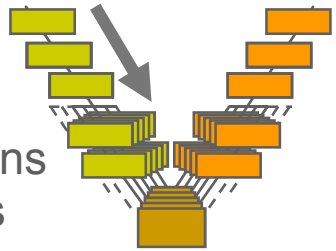
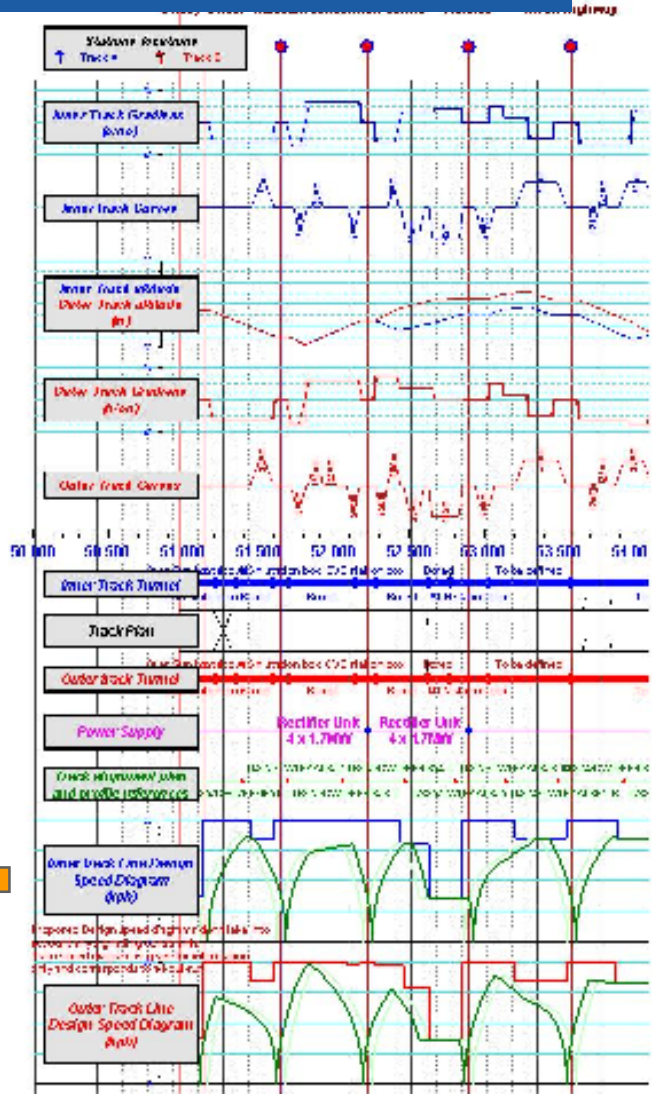
Turnkey solution Engineering methodology

System Architecture and Performance Assessment

- **Production of simulations and analysis of System operational performance**
  - and validation of operational performance allocation for each of the sub-systems.
- **Simulations are performed to evaluate and verify the following criteria:**
  - commercial speed,
  - headway,
  - power consumption and ultimately:
  - system transport capacity
- **Taking into account all parameters namely:**
  - the exact track alignment including the cant for each curve,
  - the “passenger comfort” criteria
  - Traction power capacity and Trains and ATO dynamic characteristics

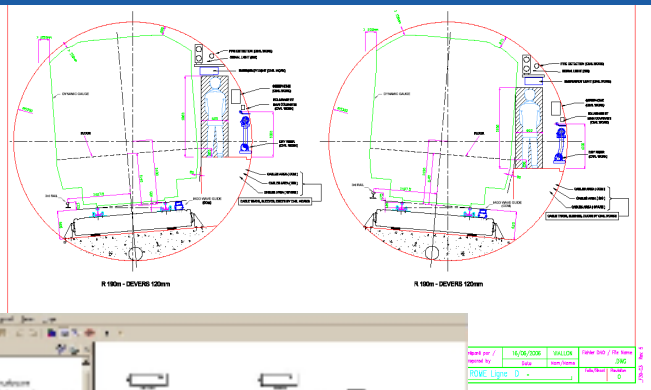


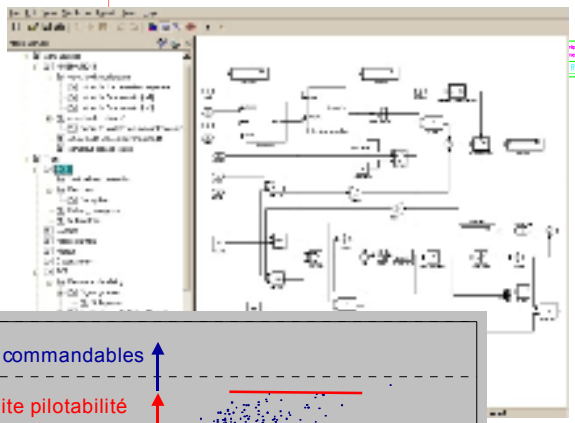


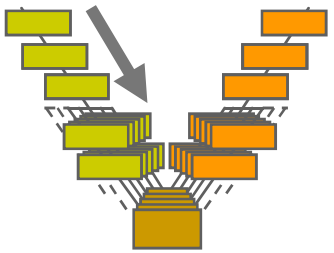
Turnkey solution Engineering methodology

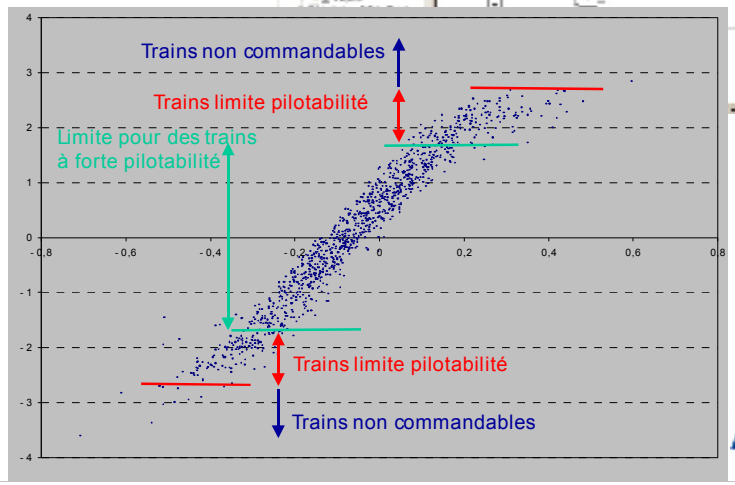
Interfaces resolution

- Interfaces resolution process covers:
  - All Civil interface/external E&M interfaces
  - All internal E&M interfaces
  - Includes EMI / EMC compatibility
  - All types of interfaces are Covered
    - Physical : mechanical, electrical
    - Functional & datas
    - Environmental









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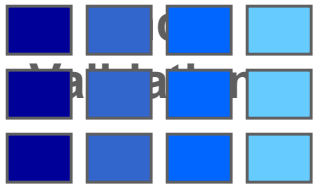
Turnkey solution Engineering methodology

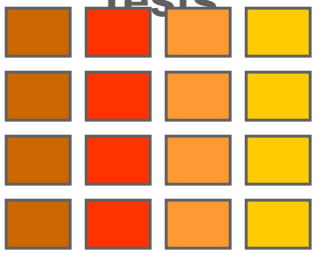
Test and Commissioning Principle

Sub-system testing



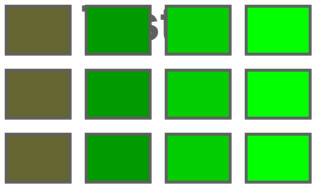
Intra Sub-System tests

Integration Tests



Pair-wise Interface tests

System Integrated

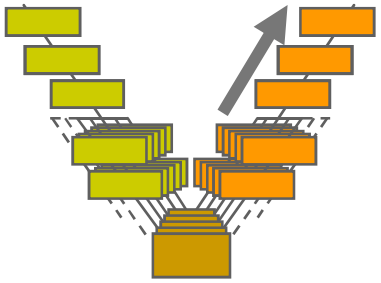


Functional, Safety-related and Operational tests

Tests are performed on dedicated platforms

Factory
Laboratories
Supplier ’s place

At works



passenger vehicles integration
TIMS Integration Platform
Integrated FAT Platform
Signalling Integration Platform
Valenciennes Test Track

Off-shore test

Subsystems Test & Commissioning
Integration tests
Integrated Tests
Test Running

On-shore

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Conclusion

- Turnkey Projects offer:
  - Single point responsibility to deliver transport performance
  - Budget and performance guarantees
  - Reduced project cost
  - Faster project implementation
  - Possibilities of BOT/PFI financing schemes

- Alstom offers:
  - Complete turnkey capability
  - Widest portfolio of sub-system technology in house
  - More than 25 yrs of Turnkey experience

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