Multi-Enterprise Delivery Management Through Earned Value

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Manager of Programme/Project Controls

London Underground

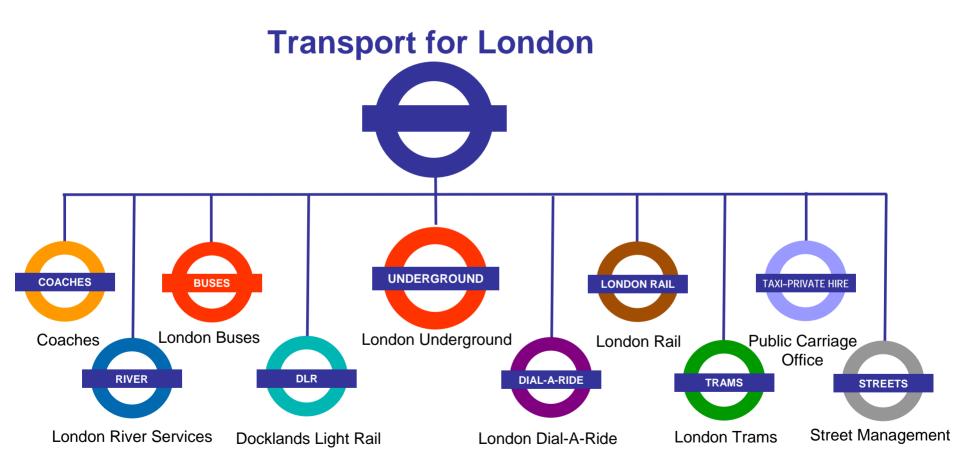
Personal Introduction

- > Project Controls Manager for the past 16 years, mostly on mega public infrastructure projects, including power plants, airports, motorways/toll-roads, telecommunication networks and railways.
- > Always using Earned Value methodology
- > Currently incorporating project data from multiple Primavera Enterprise systems into a single Master Database
- > Past 8 years with PB, 3+ years in the UK

Presentation Overview

- > Coordinated delivery for multiple Enterprises
- > MPD Philosophy
- > Development Principles
- > Implementation (two part story)
- > System Features
- > Master Project Programme
- > Current Status
- > Questions

TfL Organisation



LU Organisation

Managing Director

Chief Operating Officer

Service Director BCV
Service Director JNP
Service Director SSR
Director of Strategy and Service
Development
Head of Communications
Head of Operational Support
Head of Service Development
Head of Strategy & Planning
Head of System Upgrades

Head of Legal Services
Director of Engineering
Director of Finance
Director of Safety
Director of Human Resources
Director of Employee Relations

Chief Programmes Officer

Contract Director JNP
Contract Director BCV
Contract Director SSL
Director of Contract Services
(PFI Contracts – Acting)
Director of Programme
Assurance Office

Operations

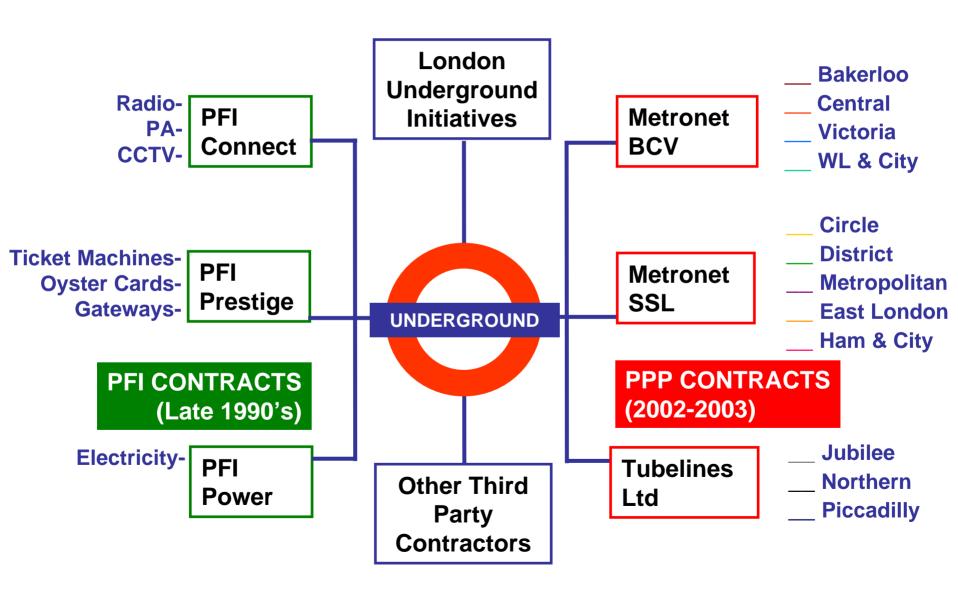
Business

Projects

LU Facts

- > 3 million passenger journeys each day
- > 12 thousand operational staff
- > 500 trains on network at peak periods
- > 275 stations served
- > 253 route miles, on 12 lines
- > 221 feet below street surface (max depth)
- > Vast engineering and commercial assets

Project Delivery Organisations



Private Finance Initiatives (PFI's)

> PFI's existed prior to the PPP providing services throughout the Underground Network

- > PFI Prestige 1998 (ticketing)
- > PFI Power 1999 (AC/DC)
- > PFI Connect 1999 (communication)

> PFI services are system based

Public Private Partnership (PPP)

- Private consortia organisations known as Infracos working in partnership with London Underground to maintain and upgrade the Underground Network
- > Introduced in 1999 as shadow organisations
- > Contracts signed in late 2002 and early 2003
- > Infracos are Line based

LU Projects

- > TfL Capital Investment Programme
- > Underground Improvement Projects
- > Olympic Projects
- > Third Party Delivery Organisations
- > Additional Works not in PPP/PFI Schemes

Master Projects Database (MPD)

The PPP contract required LU to develop, maintain and provide access to a database, the Master Projects Database

to facilitate the co-ordination of work, all projects and programmes on the Underground Network.

The MPD is:

- > A multi-enterprise project data collection, repository and reporting system
- Used as an Interface Management tool by all organisations working on the Underground Network

MPD Philosophy

- > One Solution
- > One Language
- > One Metric
- > One Programme

One Solution = Primavera Enterprise

- > Primavera (P3) systems were already in place with the PPP Infracos, the PFI's and LU
- > Primavera Enterprise (P3e, P3e/c) was a new product and not embedded in the various organisations
- > Primavera Enterprise was the obvious choice for building this multi-Primavera Enterprise system.

One Language = Global Codes

- > Standardised Location codes
 - Existing LU Category 1 Standard
- > Specified Project Lifecycle codes
 - Feasibility, Design, Implementation, Integration and Commissioning
- > Hierarchical Responsibility codes
 - Director, Delivery Manager, Project Manager, etc...
- > Planning Package or Control Account codes
 - More on this later

One Metric = Earned Value (EV)

- > One Metric for all Delivery Measurement
- > Incorporates **Best Practice** Principles in Planning
- Independent from Critical Path or Milestone Methods
 - Validates, or assures these methods correctly represent 'true progress'
- > Indicative reports that promote quick analysis
- > Suits large complex Capital Works Programmes
- > Transparency of Cost & Schedule Performance

One Programme = No Duplicity

- > Electronic submittals directly from data suppliers' Primavera Enterprise Controls Systems
- > Project programmes are 'as accepted' History which remain static and cannot be altered
- > Project programmes can be resubmitted as often as necessary during each submittal period
- > Mutually exclusive and collectively exhaustive

MPD Development Principles

- > Leverage Primavera functionality, don't duplicate it
- > Request the minimum, to deliver the Required
- > Promote use of hierarchical global Structures, not ad-hoc Activity Codes
- Control the data transfer, keep requirements simple
- > Add value for the data suppliers
- > Fast, friendly, flexible and future-proof

Structured Information

- > Primavera Enterprise's core strength (over P3) is its use of multiple hierarchical structures.
 - Structure are easily understood and very manageable
 - Codes require dictionaries and can be difficult to interrupt or associate
- Specific project or activity attributes can be defined by global activity codes
- > The MPD removes non-specific external codes

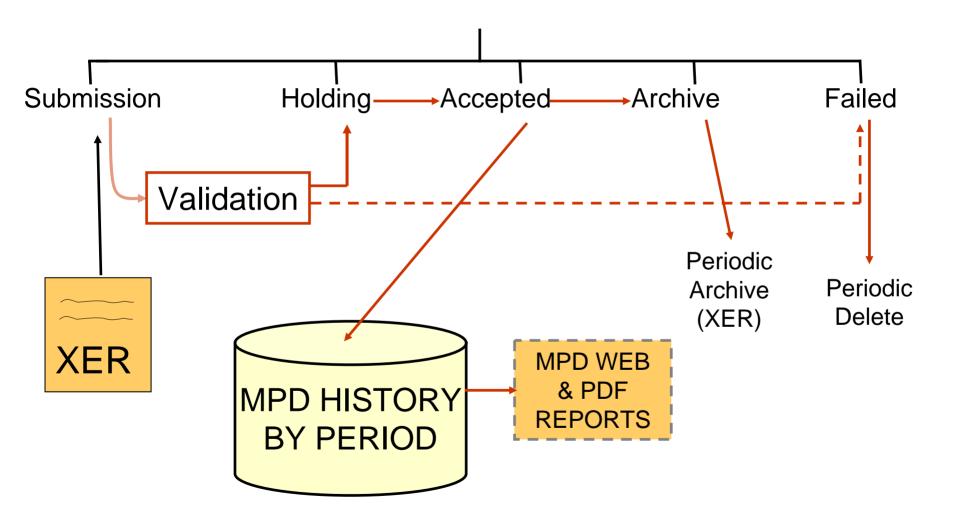
Master Project List (MPL)

- Single list of Project IDs for each data supplier organisation.
- MPL represents current agreed scope of project submission
- > Project level codes, groupings and other specific attributes are held/linked through MPL functionality

Primavera Controlled Processes

- Data submission limited to specific user logons, controlled by P3e licenses
- System control of projects submittals and project baselines/re-baselines
- > Enforced project data date for all periodic updates to system.
- > Timetabled access to submissions node of MPD EPS

Enterprise Project Structure (EPS) in the MPD



Project Submission Control

- > Primavera Enterprise licences enabled at the close of each LU period and disabled after the two week submissions period
- > Reports are generated from valid submissions
- > Projects failing validation are removed and not used for reporting*

^{*}replaced by previously accepted past period data

Project Validation

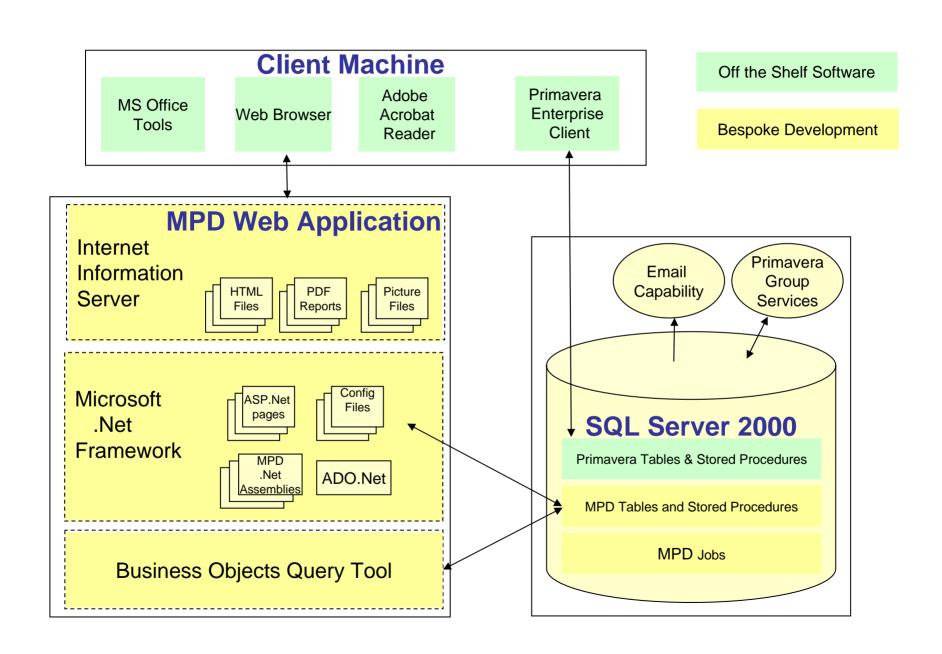
- > Project programmes checked for planning logic and updated status (to MPD Data Date)
- > Presence of MPD Global Codes, activities, milestones and WBS verified
- > Warnings raised for non-critical project anomalies
- Validation results posted on web, updated every 15 minutes

MPD Accepted Area

- Latest accepted project submission held in MPD EPS area, accessible to Primavera Enterprise planners and MPD web application
- > Primavera Enterprise Planners have 'nonfinancial' view of accepted projects for all organisations

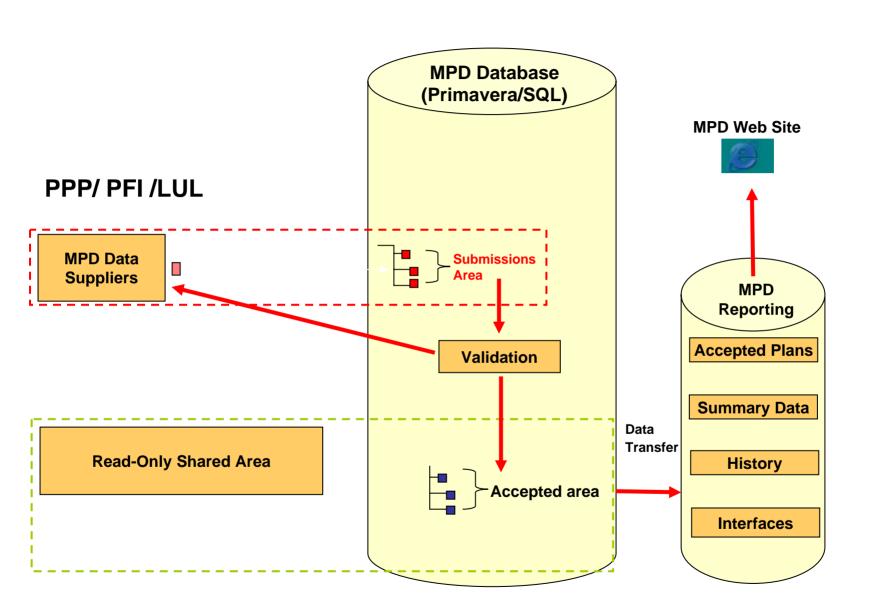
MPD System Tools

- > Primavera Enterprise (programming works)
- > Microsoft SQL Server (database server)
- Internet IIS Server (intranet server)
- > Crystal Reports (batch reporter)
- > Visual Studio NET/ASP.NET (web interface)
- > Business Objects (web based data queries)



System Configuration (recap)

- > Fixed EPS based on MPD function
- Controlled XER import from data suppliers
- > SQL Server tables holds periodic copies of Primavera Enterprise Accepted Data
- MPD Web allows viewing and extraction of Primavera Enterprise Project data and MPD Reports



System Security

- > Primavera Enterprise OBS controls 'responsible manager' for all projects in system. OBS also linked by submitting organisation
 - OBS mirrors EPS configuration to ensure MPD areas visible as appropriate
- > All 'planner' level access is read only, financial data hidden for other submitting organisations

Implementation (Spring 2004)

- > Presentations to all Data Suppliers
- > Weekly workshops, issues resolution
- > Pilot programmes
- > Mixed levels of co-operation
- > Anxiety over misuse of information
- > Resistance to move program forward with specified level of detail

Assessments and Negotiations (Winter 04/05)

- > External 'expert' review of system and approach
- Internal legal assessment on Contractual rights to information specified
- Independent review with external Legal Firm
- Negotiations with Data Suppliers

Agreement on the Provision of Data (Spring 2005)

- > All Capital Projects
- Introduction of Planning Packages for Earned Value (EV) data
- No greater detail than what is required for data providers' own management purposes
- Sufficient detail for Interface Management on an exception basis
- > No implied extra-contractual rights

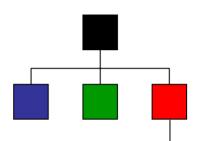
Planning Packages

- > Work Package or Control Account
- > Combination of WBS, Location & Lifecycle
- > Budget, Actual Cost and Physical % Complete provided each update period (4 weeks)
- > Activity Code provided to increase user flexibility with Planning Packages
- Strict named Parent relationship with Children Activities for each Planning Package
- > Basis of all MPD Earned Value Measurement

Project

Planning Package

(simple illustration)



Planning Package

- WBS/Lifecycle

Related Activities

- Location
- Responsibility
- PP Code

Parent = Delivery Item

Child = Work Activities

Implementation (Summer 2005)

- > MPD System 'goes live' date set (June 2005)
 - Implementation Programme developed to track agreements/timeframes with data suppliers
 - Planning Package concept created additional validation requirements
- Sood co-operation from planning teams within data supplier organisations
- > Revised/reissued MPD Desk Reference

MPD Desk Reference, 2nd Version

- > User Guide for the MPD System
 - Section 1: Primavera Enterprise Tool
 - Section 2: Database System Functionality
 - Section 3: MPD Web Application
- > 3rd Version will be issued June 2006
 - Section 4: Reports and Trend Analysis (to be included)

MPD Web Application (primary user interface)

- > Mouse driven
- > Three clicks to anywhere
- > Multiple navigational routes
- > High performance, Intuitive functionality
- Integrated help facility
- > MyMPD, custom user preferences

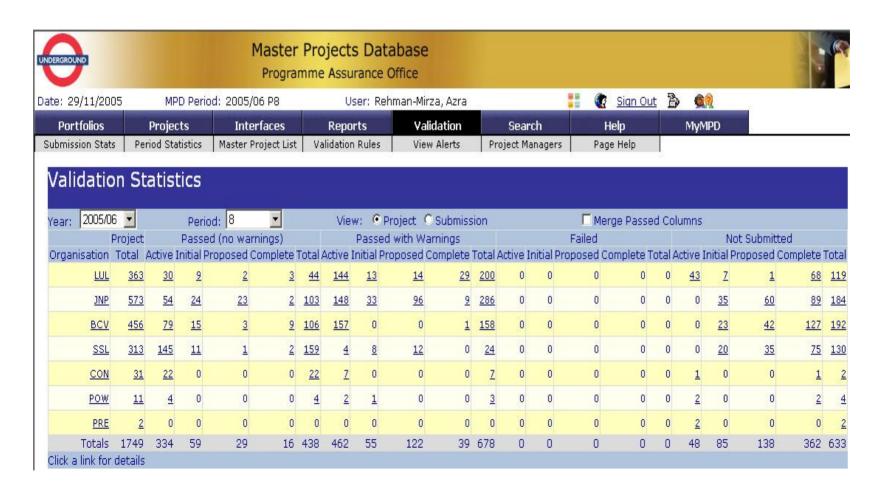
MPD Web Application (1st tier functions)

- > Projects
- > Portfolios
- > Interfaces
- > Reports
- > Commentary
- > Validation
- > Search
- > MyMPD

Projects

- > Simple Search function Org, type, Id, name...
- > Submission Statistics pass, fail, warnings...
- > Master Projects List full listing of all Projects
- Validation Rules detailed rules, settings and results
 - All are bidirectional navigation routes to the Project Summary Page
- Project summary page contains all Period Reports,
 Commentary, the full Project history

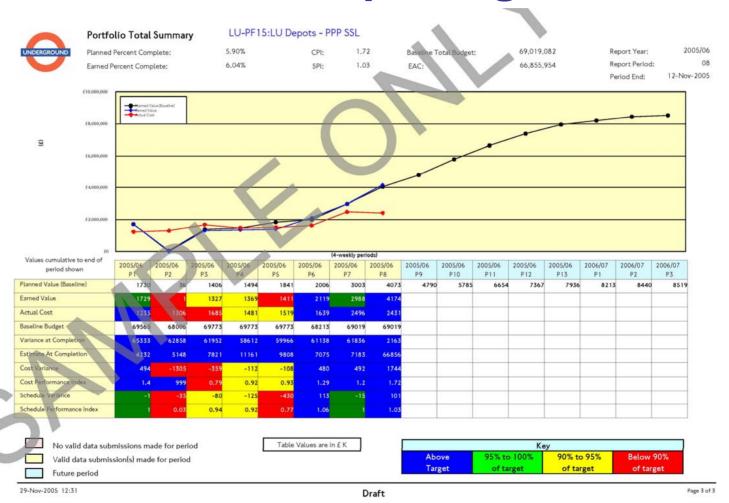
Validation Results



Portfolios

- > Can be User-Defined or MPD Generated
- > Multiple Projects or Portfolios
- > Portfolio Manager assign viewers...maintains confidentiality
- > Reports and Commentary facilities at all levels of Portfolio hierarchy

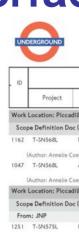
Project / Portfolio Reporting



Interfaces

- > Logic between external Project Activities or Milestones
- > No organisational restrictions
- > Web application has search, filter, forms and reporting functions
- > Access restrictions and identity/date records maintain integrity and security

Interface Reporting



Interface Status Summary - Connected Organisation: Tube Lines Ltd (JNP)

Report Year: Report Period: Period End Date:

2005/06 12-Nov-2005

| ID | From Interface (Predecessor) | | | | | | Variance Histo (days) | | |
|-----------|------------------------------|---|-------------------------|--------|---------------|---|---|-----------|--------|
| | Project | Activity Details (ID: Description) | Date | (days) | Project | Activity Details (ID: Description) | Date | P06 | PO |
| ork l | ocation: Picca | dilly Line.Finsbury Park Stn.Station (Infrastructure) | | | | 4 | 1 | 1 | |
| Scop | e Definition D | oc (Variation Order Ref): SN568C. (Description): FINSBURY PARK STN | MODERN CONNECT | | | | Ac | tion With | n: CON |
| 62 | T-5N568L | MSS00: TLL Agreement of Connect Implementation Plan | 18-Jan-07 | 133 | CON_PF19_AllB | AllB_03_97_\$4293: A2 TRIGGER DATE (Authority Notice Placed) | 31-May-07 | 133 | 12 |
| 6 | Author: Annelie | Coetzeri Note text: Action with: No further action required. Note Create Date | e: 01-Nov-2005 15:35 | | | | | | |
| 47 | T-SN568L | A590: Connect PFI Works | 16-Apr-07 | 165 | CON_PF19_AIIB | AllB_03_98_54295: Start on site | 28-Sep-07 | 165 | 16 |
| 0 | Author: Annelie | Coetzerl Note text: Action with: No further action required. Note Create Date | e: 01-Nov-2005 15:33 | | | | | | |
| makes | | adilly Line.Leicester Square Stn.Station (Infrastructure) | | | | | | | |
| Scop | e Definition D | oc (Variation Order Ref): SN575C. (Description): LEICESTER SQUARE | STN MODERN CONNECT | | | | Ac | tion With | h: CON |
| | : JNP | | | | To: CON | | | | |
| 51 | T-5N575L | MS180: Place order for request of Connect services | 3-Apr-06 | 141 | CON_PF19_AllB | AIIB_03_96_54261: IPM submits a written Brief (Incl Connect Order | 13-Nov-05 | 184 | 1. |
| | | | | | | | | | |
| 36 | T-5N575L | MS500: TLL Agreement of Connect Implementation Plan | 4-Aug-06 | -11 | CON_PF19_AIIB | AllB_03_97_54263: A2 TRIGGER DATE (Authority Notice Placed) | 24-Jul-06 | 56 | 2 |
| - 6 | Author Appelle | Coetzer) Note text: Action with: No further actions required. Note Create Da | re: 01-Nov-2005 15-43 | | | | | | |
| 1 | T-5N575L | A590: Connect PFI Works | 30-Oct-06 | 23 | CON_PF19_AllB | AllB_03\$4266: Modernisation | 22-Nov-06 | 20 | |
| 70 774 | Author Appella | Coetzerl Note text: Action with: No further question required. Note Create D | ober 01 Nov. 2005 15.42 | | | | | | |
| | | oc (Variation Order Ref): SN575P. (Description): LEICESTER SQR STN | | | - | | A | ction Wit | th: PR |
| | : JNP | | | | To: PRE | | | | |
| | T-5N575L | MS190: Place order for request of Prestige Services | 3-Apr-06 | 381 | PRE_PF19_AllC | AIIC_01_96_307650: IPM submits a written Brief (Incl Prestige Order | 18-Mar-05 | 368 | 36 |
| | | | | | | | | | |
| 40 | T-SN575L | MS490: TLL Agreement of Prestige Implementation Plan | 4-Aug-06 | 377 | PRE_PF19_AllC | AliC_01_97_307670: A2 TRIGGER DATE (Authority Notice Placed) | 23-Jul-05 | 366 | 36 |
| 1 | Author Annalia | Coetzerl Note text: Action with: No further action required. Note Create Dat | n 01 Nov 2005 15:46 | | | | | | |
| 5 | T-SN575L | A580: Prestige PFI Works | 30-Oct-06 | 407 | PRE_PF19_AllC | AlIC_01_98_307690: Gate Relocations for | 18-Sep-05 | 394 | 3 |
| 17 | | | | - | | Modernisation/Refurbishment | 0.0000000000000000000000000000000000000 | | |
| _ | | Coetzer] Note text: Action with: No further action required. Note Create Date adilly Line. Oakwood Stn. Station (Infrastructure) | e: 01-rvov-2005 15:45 | | | | | | |
| | | oc (Variation Order Ref): SN577P. (Description): OAKWOOD STN MO | | | | | | ction Wit | |

a). There are three types of Interface Activity Status as follows:

b). All dates shown in this report are from the current project.

* Pending - The activity has been assigned the correct responsibility code, verified the interface and process initiated.

* Broken - Predecessor and/or successor activities of a previously pending or connected Interface no longer exist (action required).

* Connected - Predecessor and successor activities have been connected to form an interface link.

Interface Variance Key

Less than

30 days

Greater than

30 days

Less than

15 days

.PDF Printing Press

- > Controlled Automated Reporting
- Light and easy to distribute via email
- > Quick loading on Web Application
- > Construct once, reliability ensured
- > Report Viewer becomes comfortable with known report titles, versions and data
- > Change (style, format, data) easily implemented upon approved request

Commentary



Project Manager's Progress

Organisation: London Underground

Investment Programme (CIP): Asset Management Plan LU Managed Power PFI Enhancements (LU-PF49)

Power (AMP9)

Report Year: Report Period: Period End 2005/06 08 12-Nov-2005

Project Name: Power Upgrade Component of Connect Rescoped

| Programme Manager/Owner: | Project ID: UIP8307 | % (0 | % (of Budget) to Date | | | E (K) to Date | | | £ (K) at Completion | | ices | Submission Data | | | |
|--------------------------|---------------------------|-----------|-----------------------|-----------|----------|---------------|-----------|---------------|---------------------|---------|---------|-----------------|-------------|---------------|-------------|
| Delivery Manager; | | Planned | Actual | Earned | Baseline | Actual | Earned | Budget | EAC | (3)/(2) | (3)/(1) | Baseline | 05/06 - P05 | Last Accepted | 05/06 - P08 |
| - Project Manager; | Project Status: Active | Value (1) | Cost (2) | Value (3) | Plan (1) | Cost (2) | Value (3) | . 18.00.000.0 | (MPD Forecast) | CPI | SPI | Start | Finish | Start | Finish |
| Rushton, Dave | | 69.65 | 70.54 | 70.79 | 23,317 | 23,615 | 23,697 | 33,473 | 32,900 | 1.00 | 1.02 | 01-Jan-2002 | 27-Mar-2007 | 1-Jan-2002 | 27-Mar-2007 |

| Values cumulative to end of period shown | Previous Years | 2005/06 P1 | 2005/06 P2* | 2005/06 P3* | 2005/06 P4* | 2005/06 P5* | 2005/06 P6 | 2005/06 P7 | 2005/06 P8 | 2005/06 P9 | 2005/06 P10 | 2005/06 P11 | 2005/06 P12 | 2005/06 P13 | Future Years |
|---|-------------------|---------------|----------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|-----------------|
| Planned Value (Baseline) | 20797 | 21823 | 22413 | 20147 | 20237 | 2 1063 | 21516 | 22873 | 23317 | 23763 | 24129 | 24719 | 26204 | 26449 | 33473 |
| Earned Value | 16257 | 17198 | 18447 | 19284 | 20301 | 19750 | 25971 | 23697 | 23697 | | | | | | |
| Actual Cost | 16224 | | | | 20333 | 21148 | | | | | | - | | | |
| Forecast | | | | | | | | | 23697 | 24224 | 24701 | 25102 | 25502 | 25889 | 27099 |
| CPI | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.93 | 1,18 | 1.01 | 1.00 | | | | | | |
| SPI | 0.78 | | | | 1.00 | 0.94 | | | | | | | | | |

PM Comments: Progress Issues and Risks

(Author: Khalid Sethi). Date added: 22/11/2005 10:06:51.

The overall Project Completion is on plan for completion in July 06. The key deliverable of this project is to deliver Power for Connect which should be available by December 2005.

PM Comments: Financial Issues and Risks

(Author: Khalid Sethi). Date added: 22/11/2005 10:04:58.

Spend is as previously forecast and is on track for the period, year to date, year end and for the project in total. No corrective action is currently required nor is any specific problem foreseen. The Variance between the Year Budget and the Year End Forecast is due to scope of works being reduced.

Note

a). '-' Indicates value is <= 0.2 or >5

b). Table values are in £K

c). Where a valid submission has not been made for the reporting period the latest previously accepted submission data will be rolled forward.

d). Only the most recently added comments are shown.

No valid data submission made for period

Valid data submission made for period

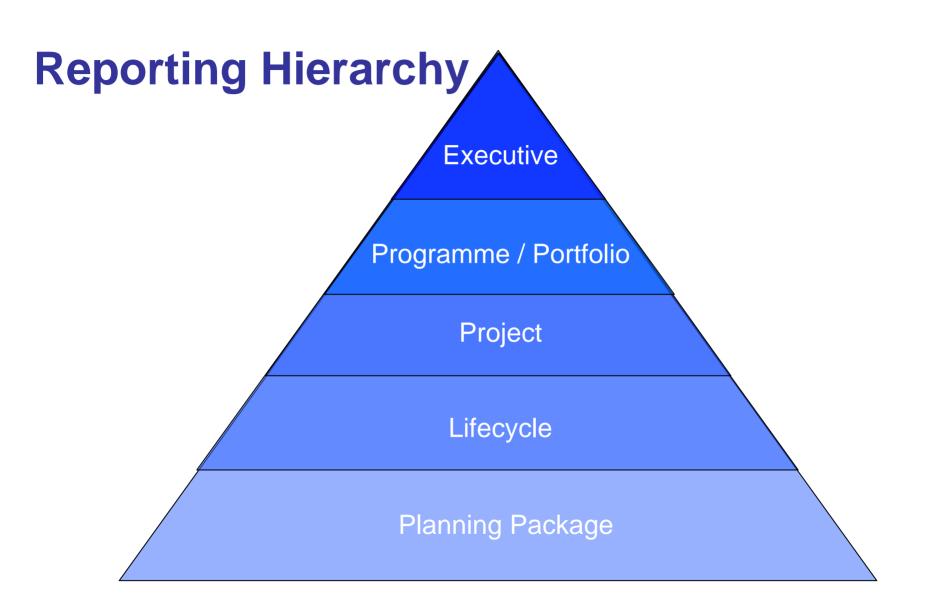
Future period

* Project Rebaselined

| Key | Above | 95% to 100% | 90% to 95% | Below 90% | | Farget | Of target |

Project/Portfolio Reporting

- Strict Adherence to MPD "Brand" (style/format)
- > All standard reports are date stamped .PDF format
- Large selection of standard reports produced each period for every project and portfolio, meeting all known user requirements



Preliminary Reports (added value)

- MPD recalculates every night during the two week submissions period
- Each morning specific preliminary reports are posted to the Web application for all accepted Project
- Data providers may review preliminary reports and are able to resubmit programmes at any time during the submissions period

Project search and data extraction facility

- > Simple to very detailed search facility
- > Organisation, Project Name or ID
- > Location, Lifecycle, Responsibility
- > Date Range or Period
- > Results by Activity, EPS Node, Obligation
- > Business Objects interface for data analysis and special reports as required by internal departments of all organisations

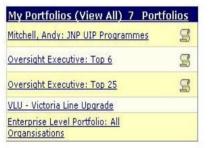
MyMPD



Welcome to MyMPD

Page help ...





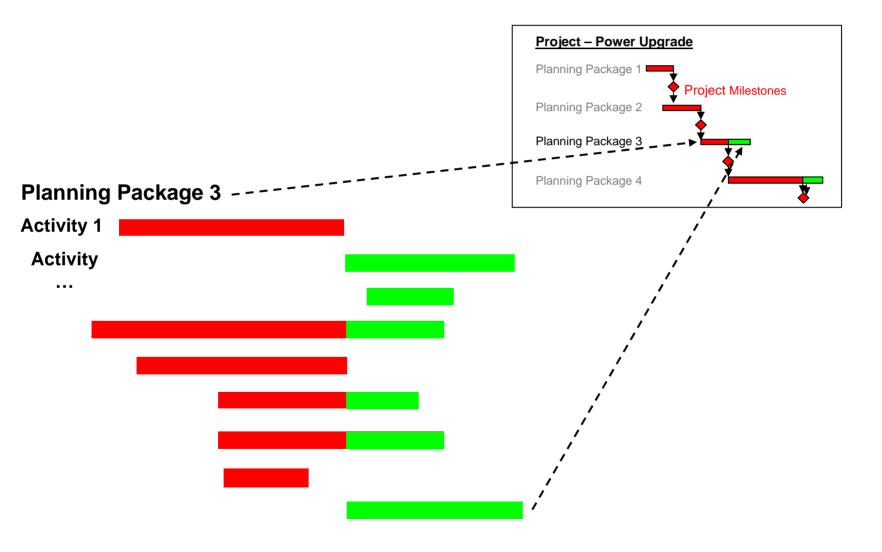
My Notices (View All) 1 Notices UIP8732; KINGS CROSS REDEVELOPMENT PROJECT2005.11.21 has been rebaselined to 2005 P8 21/11/2005 14:24:36

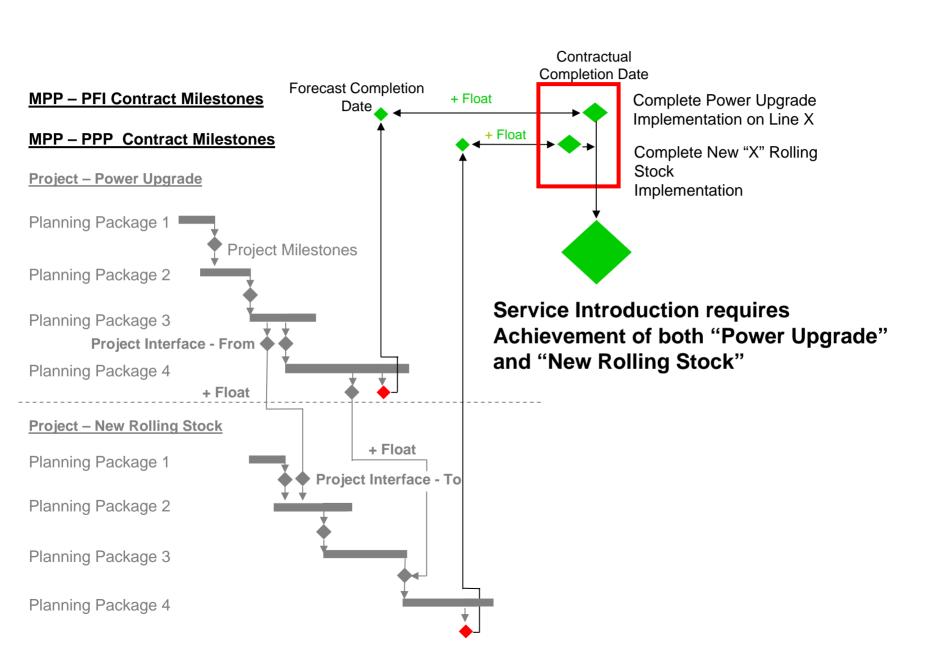
| ID | Project From | Project To | Interfaces | |
|-----|--------------|-----------------------|-----------------------------|---------------------|
| 40 | UIP1030 | LU-TfLMS | M&P Initatives | |
| 30 | UIP8906 | LU-TfLMS | Customer Service Initiative | es |
| 33 | UIP8906 | LU-TfLMS | Customer Service Initiative | |
| | | tull. | Key | |
| Abo | ve Target | 95% to 100% of target | 90% to 95% of target | Below 90% of target |

Master Project Programme

- > Periodic MPD Project Submissions provide a single source of data
- > Automated updates compiled electronically each period
- > Planning Packages become activities with all Earned Value attributes
- > Logic is based on Interfaces and Delivery Milestones
- > Allows full use of Primavera Enterprise functionality
- > Provides an integrated summary view of the entire Capital Projects portfolio

Activities into Planning Packages





Master Project Programme - Benefits

- > Integrated strategic view of interrelated Capital Projects
- > Prioritisation of projects, Critical Path Method
- > Analyse implications of accelerated, delayed or deferred projects
- > Strategic opportunities to introduce new scope
- > Predictable Delivery of Major Milestones
- > Optimise Access Business Case for Closures

MPD Statistics (current)

- > 8 Enterprise Organisations
- > 400 Primavera Enterprise Users (est)
- > 1,438 website user accounts
- > 1,819 Project Programmes
- > 15,247 Planning Packages
- > 285,586 Project Activities
- > £20,000,000,000+ in Capital Works

Added Value

- > Validation feedback
- > Preliminary Reports
- > Single source of truth
- > Available to all parties
- > Intuitive web tool set
 - Information is for everyone

Lessons Learned

- > Don't underestimate the time and training required to successfully introduce change
- Never lose momentum, even if it's not always in the favoured direction
- > Know your audience, many of the principles can be difficult and/or distracting if your area of expertise is normally outside of the project controls discipline

Questions?