



Concept Technology Inc.

Supply Chain And Refinery Optimization

ERTC Assets Maximization Conference

Vienna, Austria

8-10 May, 2006

Reference SCM/BIP Studies

- ★ Chevron, ChevronTexaco and Texaco (3) ★ Total (4) ★ Sun Oil (3)
- ★ Hanwha Energy ★ Crown Central Petroleum ★ BayernOil
- ★ ENI (Agip Petroli) (11) ★ PREEM (SCANRAFF) ★ SAMIR ★ TAMOIL
- ★ PetroKazakhstan ★ BP-TNK ★ BOROUGE (Borealis/ADNOC
- ★ ADNOC (Takreer) ★ NATREF ★ Ecopetrol ★ PetroSA (MOSSGAS)
- ★ KNPC ★ IOC ★ MRPL ★ ConocoPhillips (2) ★ PEMEX (5)
- ★ CALTEX (2) ★ Veba Oel (2) ★ Yukong ★ Raffineria Di Roma
- ★ Praoil (2) ★ World Bank (2) ★ Lukoil (Petrotel)

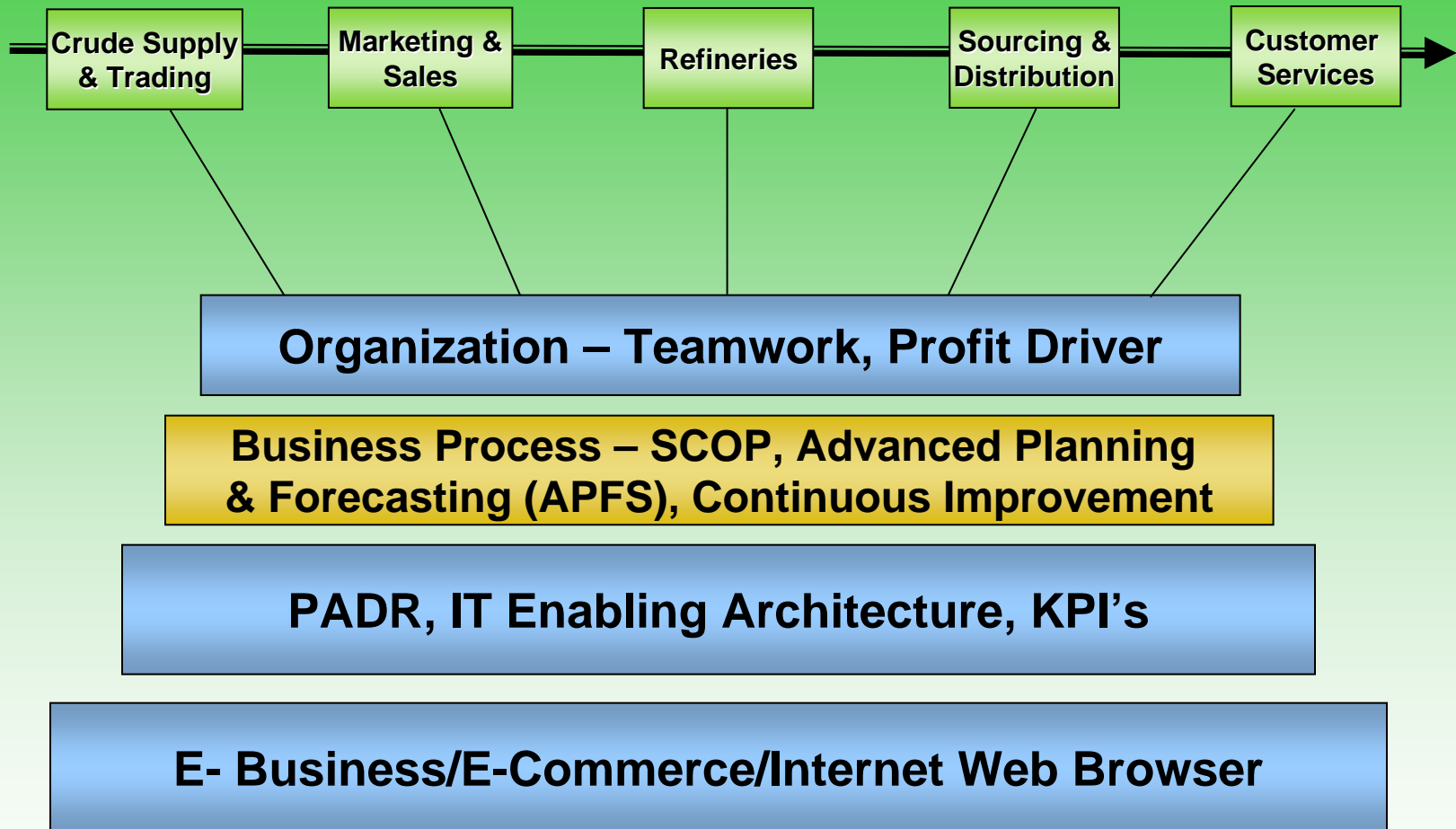
Agenda

- ★ Typical SCM and Refinery Optimization Study Project Frame
- ★ Benchmarking Methodology
- ★ Benchmarking Results
- ★ Foundation for Success
- ★ Road Map
 - ◆ Size of the Prize
 - ◆ Project Descriptions
 - ◆ Projects Plan and Resourcing

SCM and Refinery Optimization Focus

1. Pacesetter approach to an Integrated Supply Chain Management (SCM) and Refinery Information System (IRIS)
2. Importance of consistent and reliable data based on a data-centric Reference Data Model plus best practice SCM business processes
3. Use of Advanced Planning, Scheduling and Forecasting Tools (AFPS), and the extension of Refinery Planning (LP) System to a Supply Area Model - refineries, terminals, supply transportation and system inventory management
4. Road Map Development Approach and Business Case Studies
5. Successful implementation together with typical costs and benefits

The Supply-Demand Value Chain



Project Frame for SCMO Study

In the Frame

- Crude decision and acquisition process
- Refinery LP's, trading system tie into pricing, Supply Plan and SCOP
- Sales forecast and demand aggregation
- Refinery make/buy decisions, all Supply optimisation work
- Product optimisations and scheduling
- Supply Planning role in financial improvements
- Inventory management
- Channel management and marginal barrel management
- Trading and Risk/Arbitrage management
- Organizational effectiveness
- Change management

Out of the Frame

- Retail Strategy
- Upstream/Production
- Credit, HR
- Operations
- Products – LPG, Chemicals, Asphalt, Lubes, Coke, Sulphur,

On the frame

- SAP
- TMS
- CMMS



Study Frame Benchmark Business Areas

Functions / Applications



Technology

Organization

Business Processes

Business Incentives

Strategic Framework / Planning

Tactical Plan / SCM Optimisation

Operations Planning

Scheduling

Operations Execution

Performance Accounting & Metrics

Continuous Improvement & Follow-up

1. Business Development
2. Strategic Planning
3. Supply Chain – Tactical & Integrated Operations Planning
4. Refining
5. Trading (Crude / Products)
6. Product / Crude Transport
7. Primary Supply / Inventory Management
8. Terminals & Product Distribution
9. Marketing
10. Sales
11. Financial & Control
12. Information Technology & Decision Support Systems



Comcept Benchmarking Approach and Methodology

Benchmark vs. Best-in-Class:

1. Determine "As Is":

- Obtain current state
 - » Business process
 - » How it functions
 - » Organization interaction
- Compare against Comcept's Best-In-Class knowledge-base

2. Provide "To Be" Roadmap:

- Create action plans to attain objectives and benefits of Supply Optimization Group (SOG) - close gap between current state and best-in-class performance
- Calculate Benefits



Benchmark – Organizational Areas

Evaluation of the organization considers the following factors:

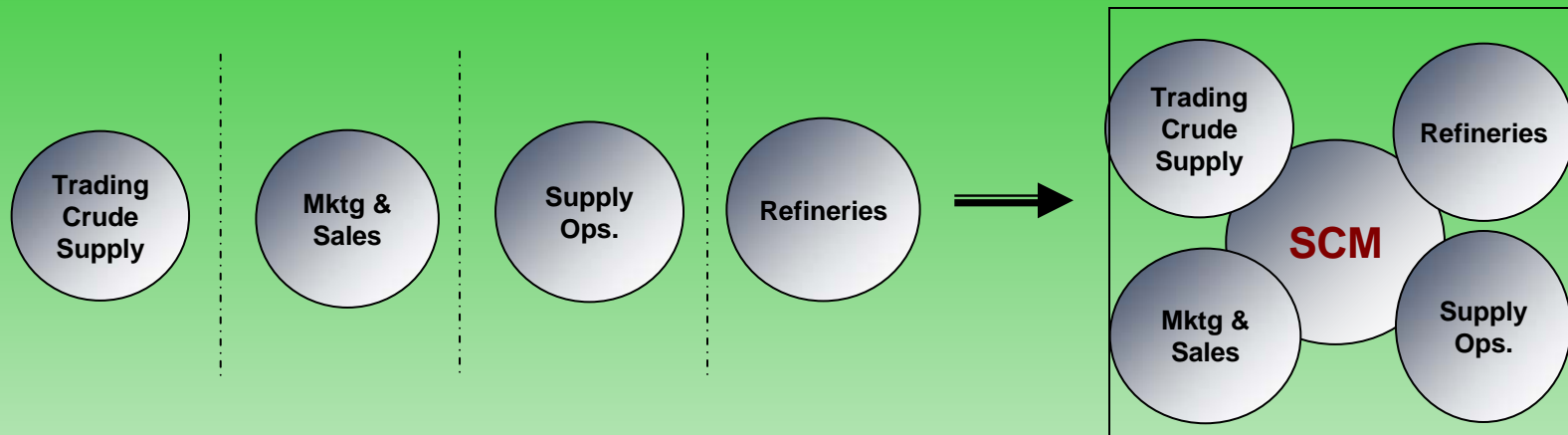
★ To assess performance

- ◆ do people know what to do?
- ◆ are they capable of doing it (skills)?
- ◆ are they equipped to do it (tools, people, resources)?
- ◆ are they willing to do it?

★ To assess effectiveness

- ◆ are the efforts in the organization aligned?
- ◆ are people empowered?
- ◆ are efforts integrated?
- ◆ are processes in control?
- ◆ are people sharing the same values (one version of truth)?

SCM SCOP Organization Transformation



Quantum Leap In Business Processes

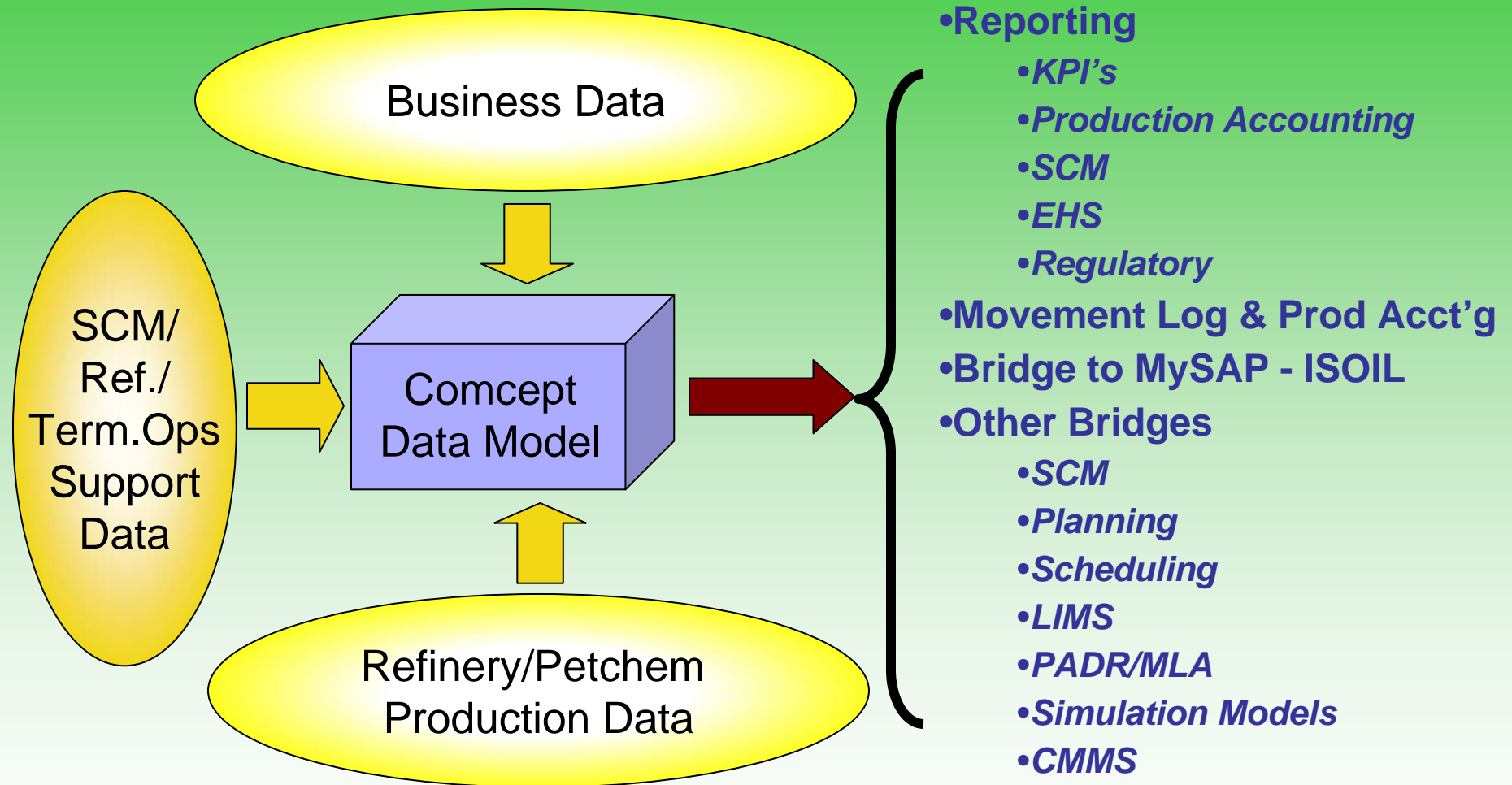
- Regional / Functional / Silos Focus
- Sharing and Teamwork Barriers
- Cost / Volumetrics / Market Share Drivers
- Operations Execution Excellence – Reactive
- Basic Planning and Info. Decision Support
- Rewards and Mgmt by Functional Objectives

VS.

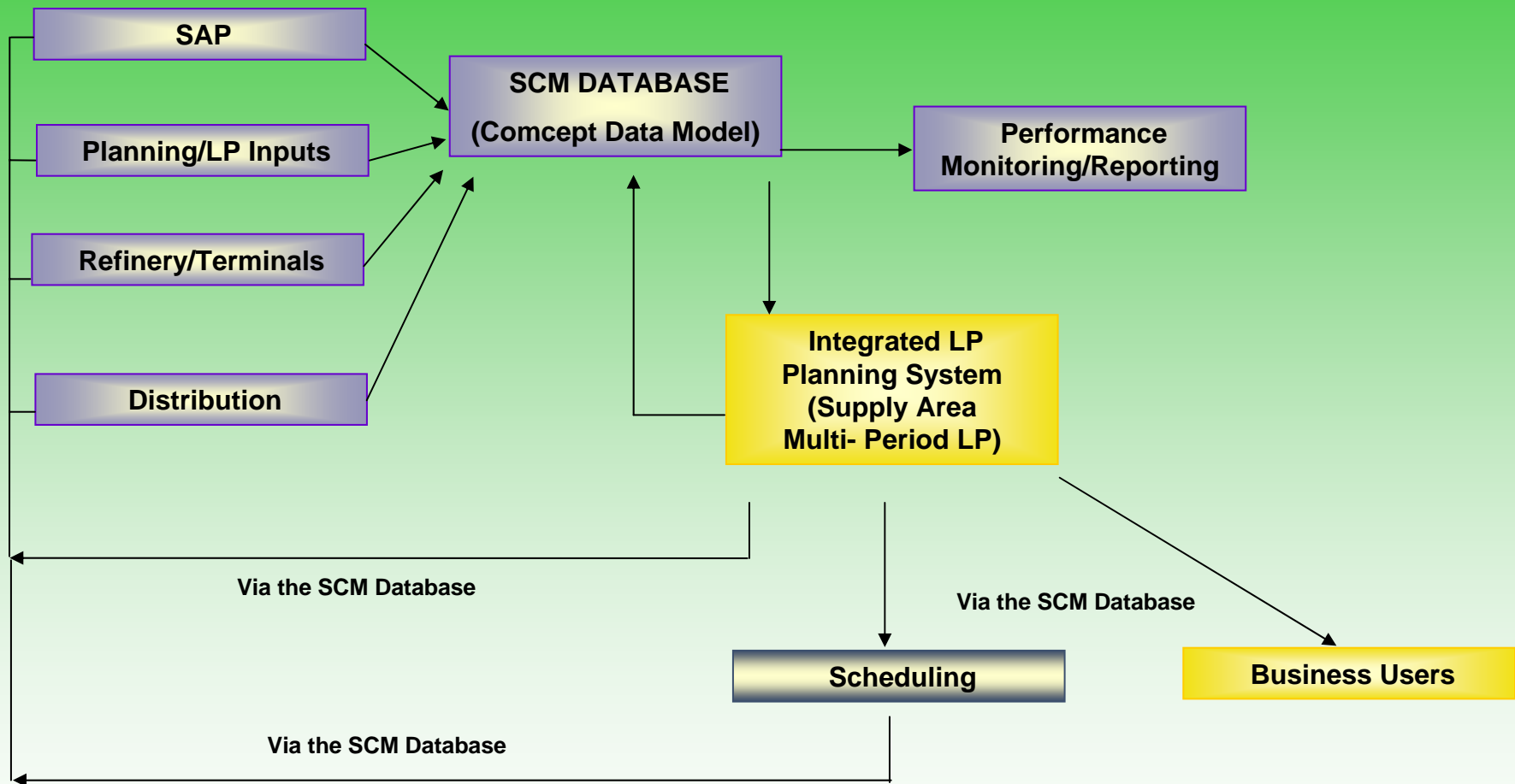
- Integrated Business / Regions Focus
- Catalyst for Teamwork / Sharing
- Value Added / Contribution To Profit Driver
- Management by Tactical Strategies–Proactive
- Advanced Planning & Technology Tools
- Embedded CI Process & Reward System Tied to Contribution to Profit



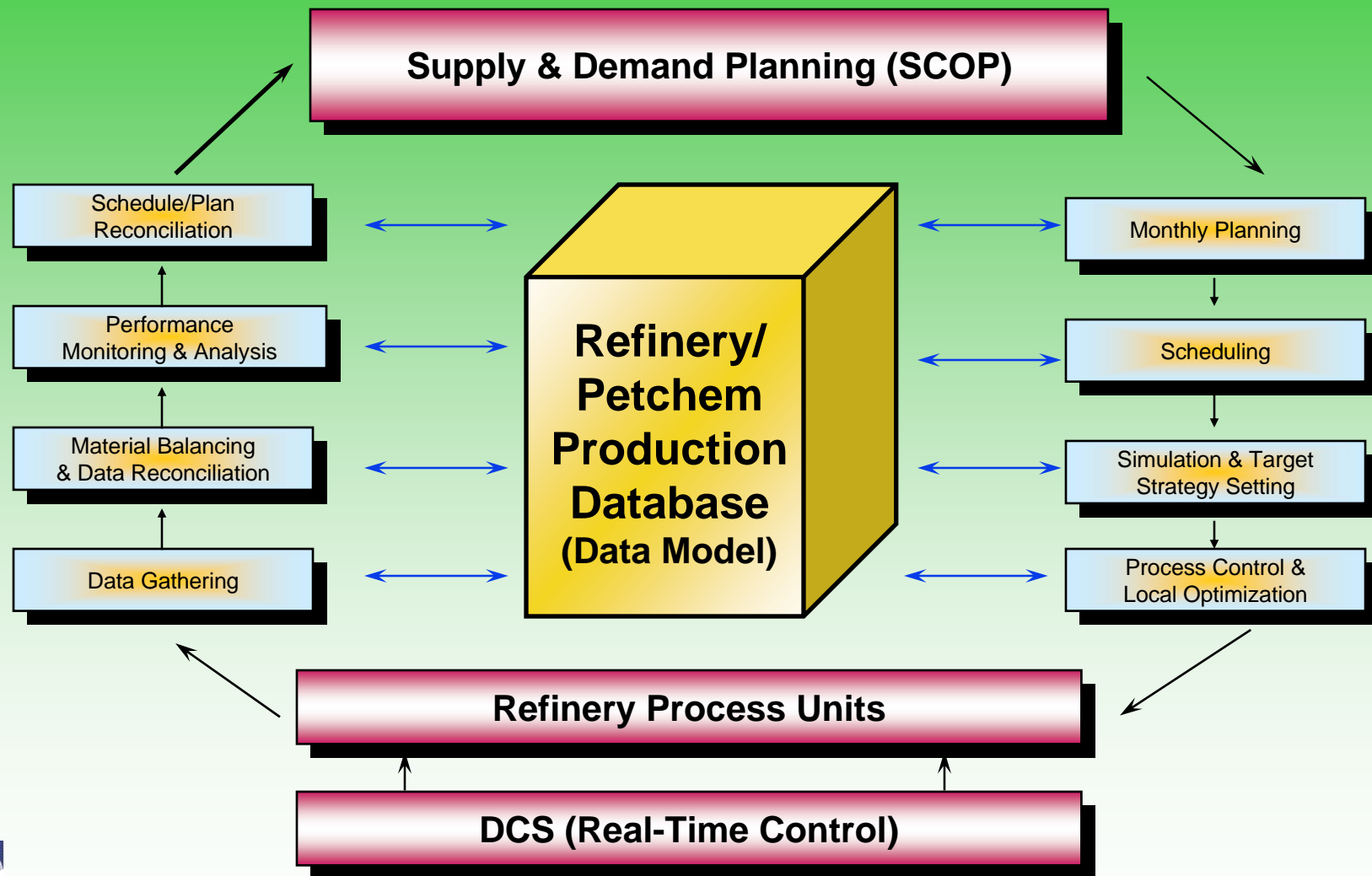
Business & Production Process Integration Value Chain



Supply Area Planning - SCMO and Refinery Integration



Data Centric Architecture (POMAI Loop)



Refinery & SCM Vertical Integration Architecture

Business Information System

CORPORATE PLANNING

SCM

CORPORATE ACCOUNTING

Maintenance Planning

Asset Utilization

Production Planning

Profitability

Scheduling

KPIs

Production Management System (IRIS)

Process Simulation

Yield Accounting

Consistent Economics & Process Models & Data

Quality Assurance

Operations Orders

Material Balance

Target Setting

Process / Equipment Monitoring

Data Reconciliation

SCM

Real Time System

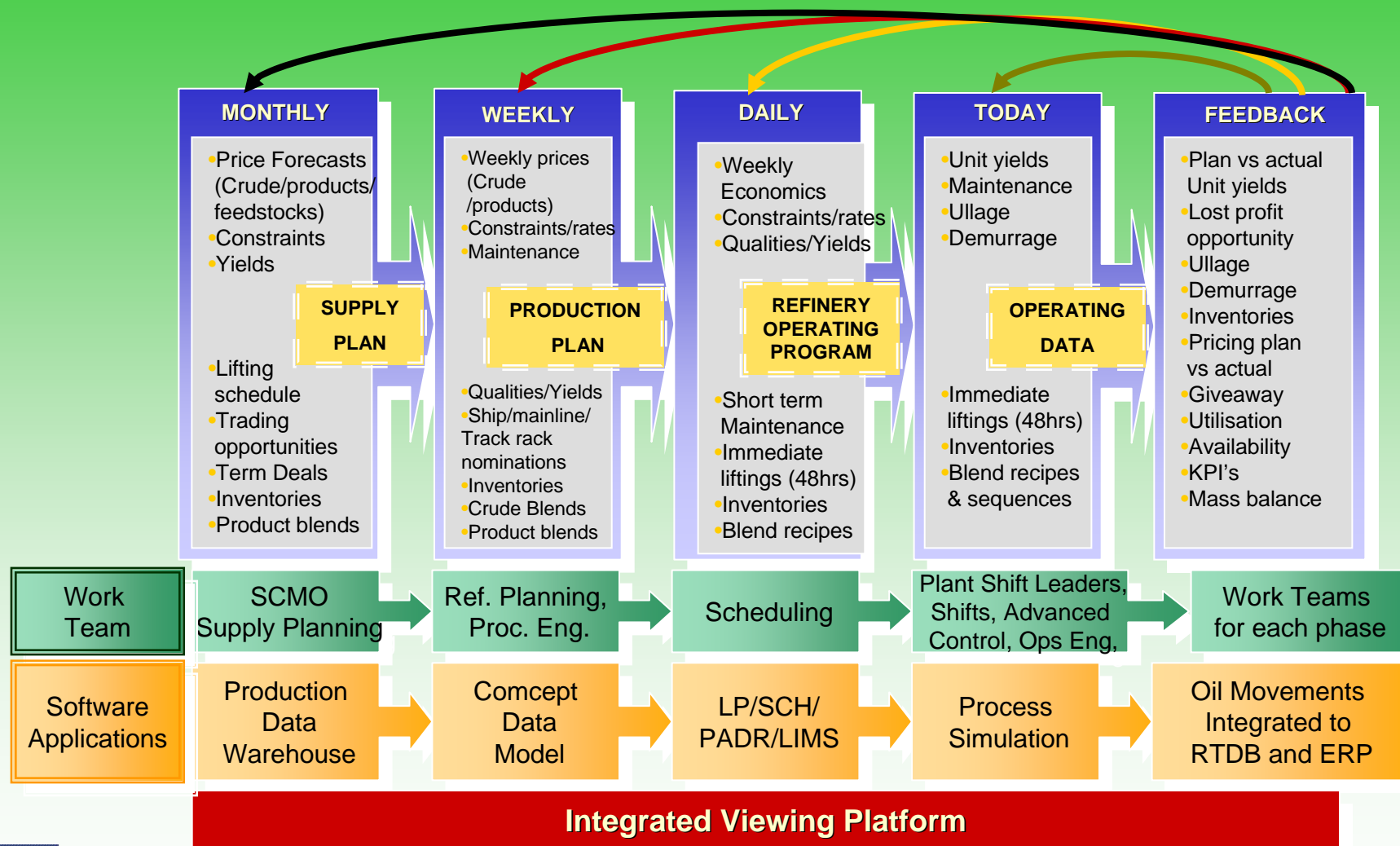
ADVANCED PROCESS CONTROL

DCS

OMS/PRODUCTHANDLING /STORAGE CONTROL



SCOP and IRIS Continuous Improvement Loop



Road Map Development Methodology

Benchmark to Best-in-Class identifies business improvement opportunities with benefit estimates

- ★ Identify specific projects relating to business process, organization, and decision support tools/systems
- ★ Provide project description details, business case (benefit/cost), resources, schedule and dependencies
- ★ Identify Company Opportunities and develop Final Recommended Road Map



SCM Benchmark Scores - Expected Benefits

Benchmark Areas	Q4	Q3	Q2	Q1	Key Gaps (Opportunity Areas) 000's \$
Organization Productivity	Red	Orange	Yellow	Green	
KPI's Reporting and CI	Red	Orange	Yellow	Green	
Supply-Demand Balancing/Flexing Optimization	Red	Orange	Yellow	Green	
Forecasting (Demand, Pricing)	Red	Orange	Yellow	Green	
Supply Planning Core Processes	Red	Orange	Yellow	Green	
Refinery Utilization and Product Mix Optimization	Red	Orange	Yellow	Green	
Trading and Risk Management	Red	Orange	Yellow	Green	
RMO - Crude Selection and Allocation	Red	Orange	Yellow	Green	
Inventory Management	Red	Orange	Yellow	Green	
Contracts/Partners Management	Red	Orange	Yellow	Green	
REGION 1	REGION 2	REGION 3			Total Identified benefits



Road Map Development Methodology

Benchmark to Best-in-Class identifies business improvement opportunities with benefit estimates

- ★ Each opportunity area is supported by a gap analysis and discussion
 - ◆ Specific projects are identified, related to:
 - *Business process,*
 - *Organization*
 - *Decision support tools/systems*
- ★ Project information is used to develop final recommended roadmap
- ★ "As Is", gap analysis to Best Practice and discussion provided



Action Plan and Roadmap

Project Ranking: Selected and designed as: quick-wins, enablers, or long term solutions and processes. Quick-wins are often 1st phase of longer-term solution

Time to Delivery of Value: The project road map and proposed schedule are based on priorities in terms of: early and high benefit/cost ROI, dependencies, prerequisites, and logical order/sequencing

Resource Allocation: Resource estimates (Internal & external) are provided for recommended projects

Cost Considerations: Cost estimates for software/technology, business and IT consulting, business engineering, development, and implementation

Benefits-cost plus cash flow profiles are provided for each proposed action plan/schedule



Case Study - Building the Business Case

What do we need to do to improve?

- ★ Must look at the big picture
- ★ Balance opportunities over the following to optimize:

	Business	Division	Sites	Units
Feedstock selection	Very High	High	Medium	Low
Production Management	Very High	High	Medium	Low
Marketing (Products/Customers)	Very High	High	NA	NA
Logistics	Very High	High	Medium	NA
Inventory Management	Very High	High	Medium	Low



Highest to lowest level of complexity and return



Case Study - Building the Business Case

What are we doing wrong?

- ★ ERP gives me all the advantage I need
- ★ Lack of information integration >> building silos
- ★ Weak forecasting, planning and coordination
- ★ Data quality and clean economics (SC – NB) issues
- ★ Planning tools not used effectively
- ★ Metrics not always available (KPI'S Dashboards)
- ★ Local not global optima sustained



Case Study - Building the Business Case

★ **Need Appropriate Tools for Effective Optimization?**

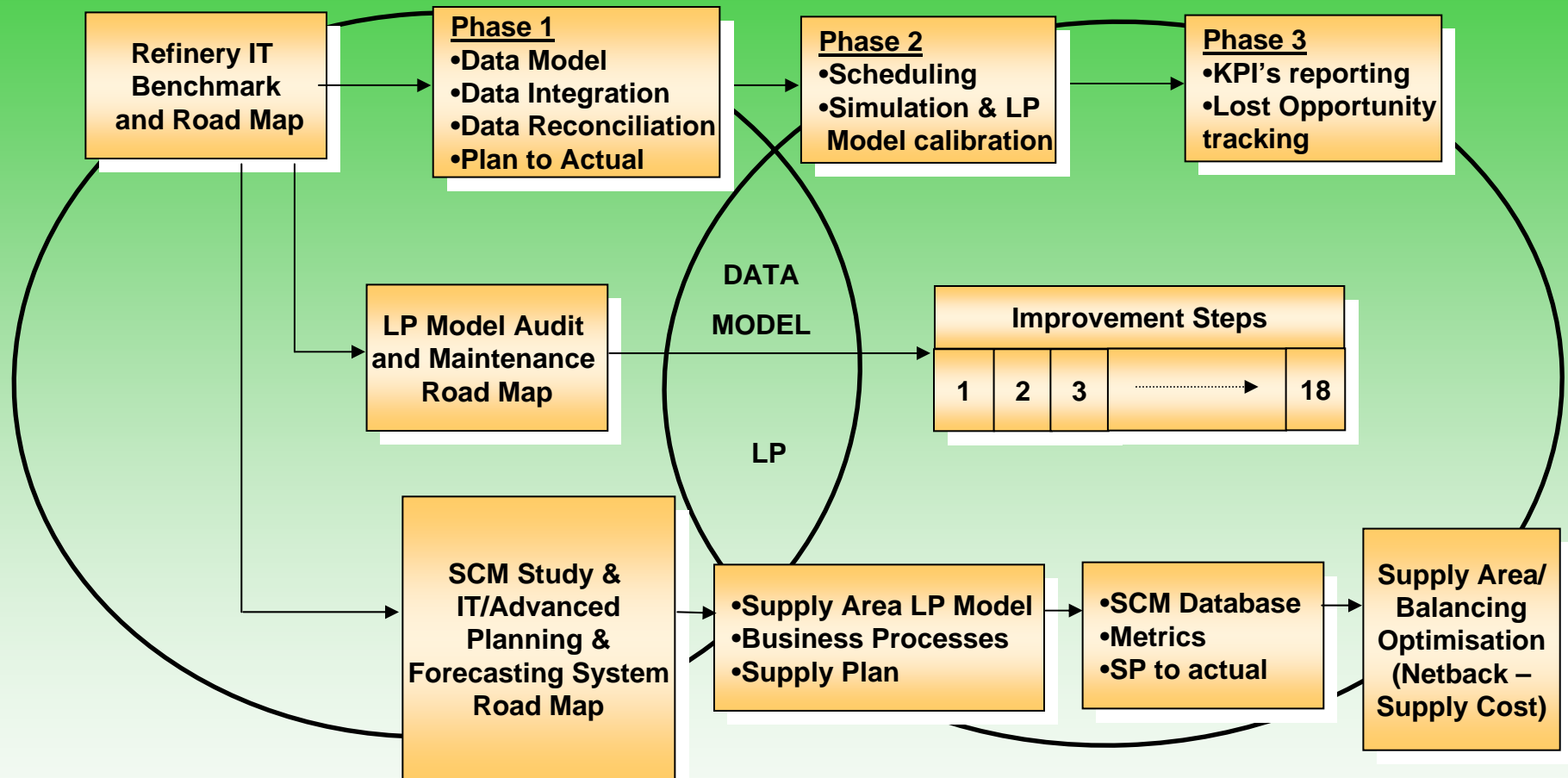
- State-of-art LP business model
- Extension into the supply chain
- Appropriate levels of ownership of separate unit models
- Two pronged approach to model maintenance

★ **Need Effective Data Gathering and Management System?**

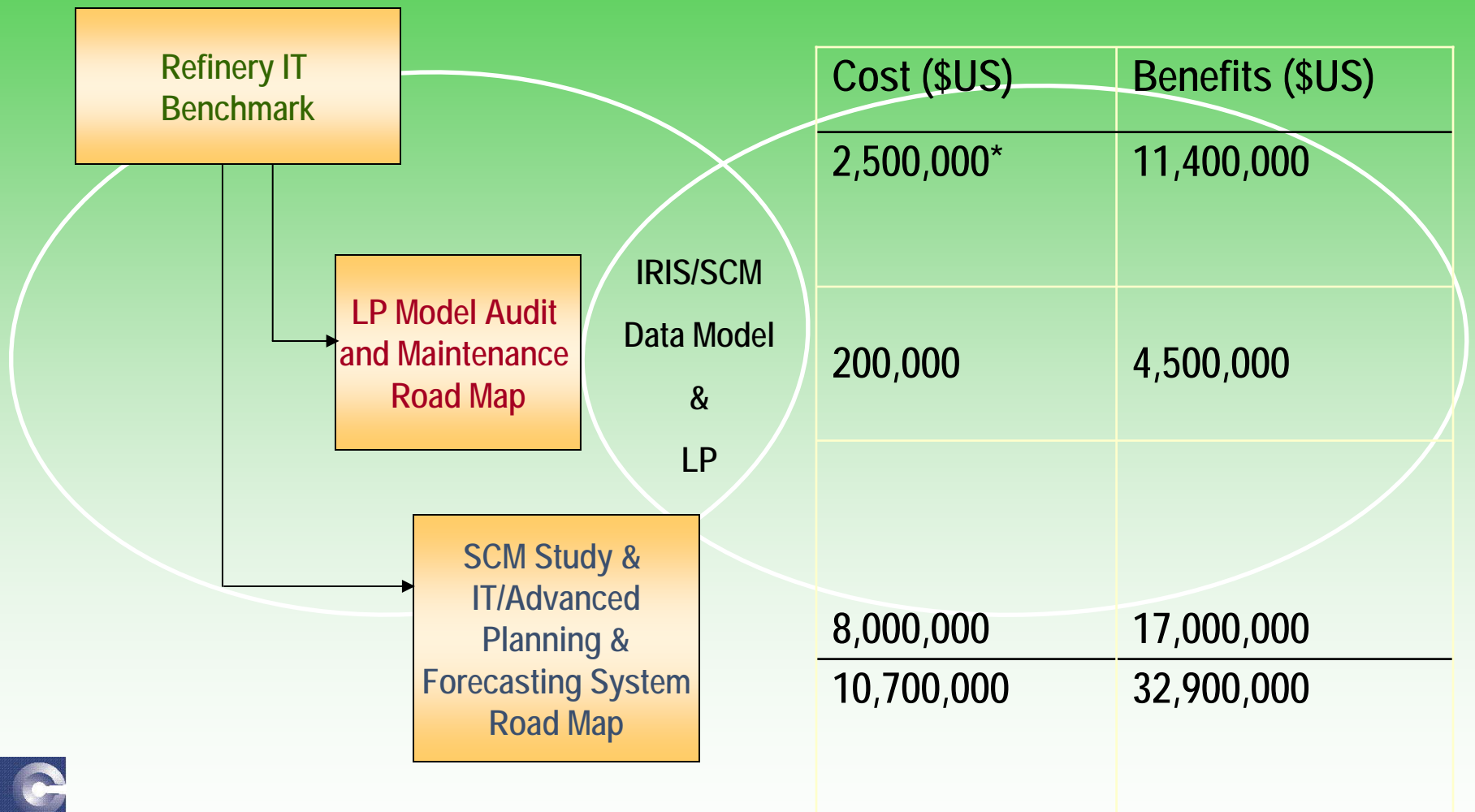
- Many companies favor Comcept's Data Centric Approach
- Use Business Data Models
- Reporting focused on Plan to Actuals and KPI's



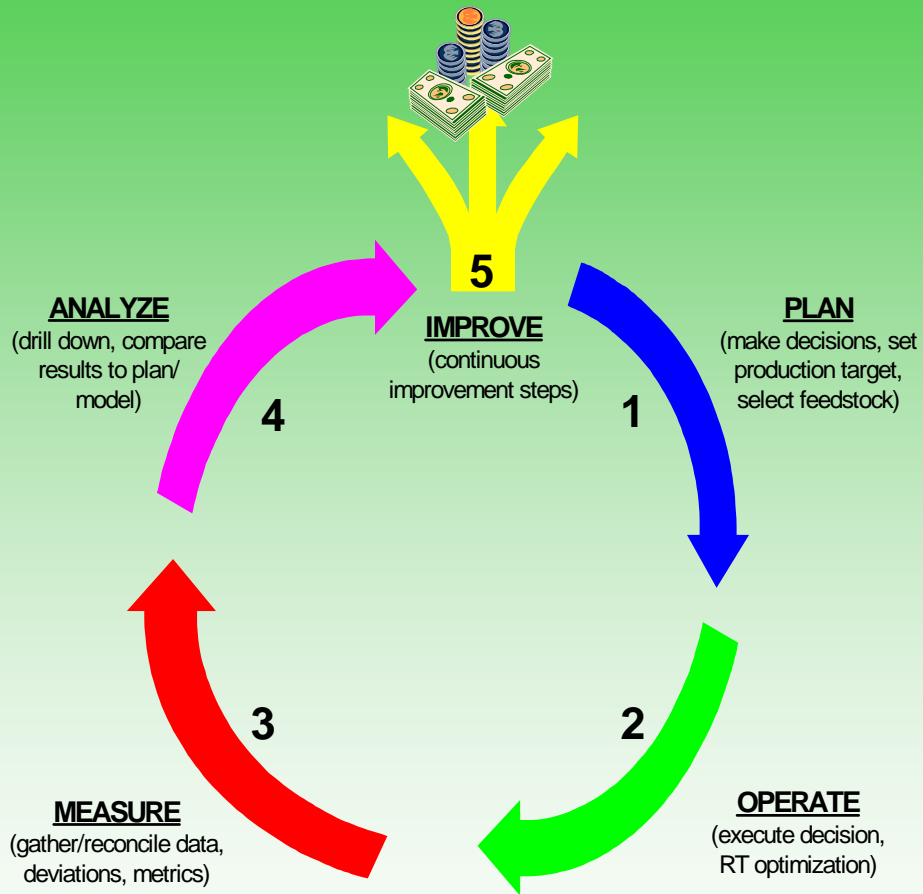
Case Study - Building the Business Case



Case Study - Building the Business Case (15 MMT/Yr)



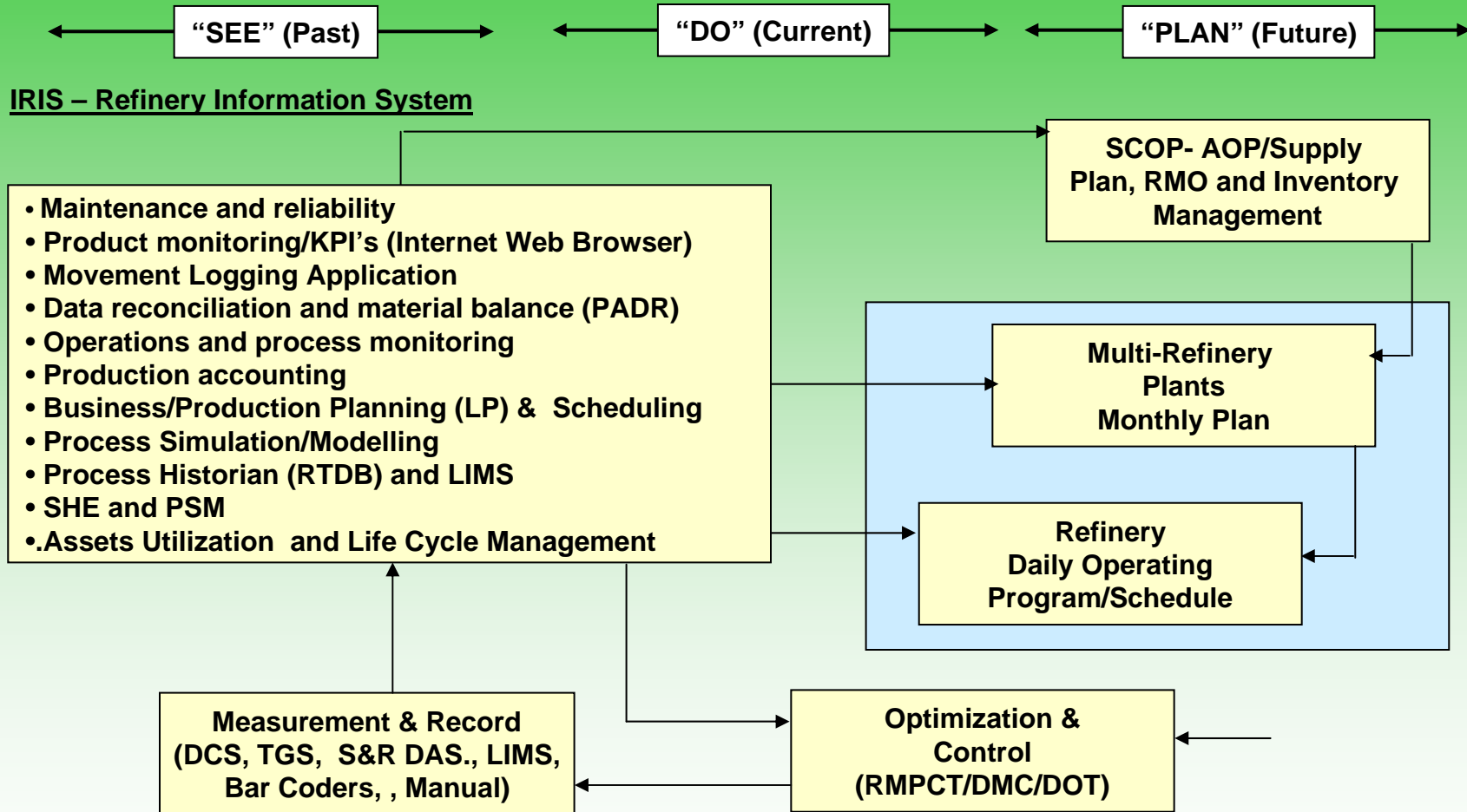
SCOP and Refinery Benefits Categories



- Maintenance of Business (e.g. ERP)
- Risk/Safety/Compliance
- New Functionality - Business Improvement Applications/Systems Integration



SCM/Refining Pacesetter Optimization Solution



IRIS/SCM Benefit Summary (24,750,000 \$/Year)

Project	Basis	Benefit Estimate (KUS\$/yr)
Throughput	1%(excluding CDU) 50 M bbls * \$2/bbl VA	1,000
Saleable yield	0.2% * 100 M bbl/y * \$20/bbl upgrade	4,000
Energy Intensity Index	1 EII * \$2 M/EII	2,000
Hydrocarbon Loss	0.05% * 100 M bbls/y * \$40/bbl	400
Quality Giveaway	Component utilization versus final quality	1,500
Lost Opportunities	Planning/Scheduling/Crude Trading \$2500 k Product trading \$800 k	3,300
Downgrading Incidents	Unit monitoring and scheduling improvements reduce Jetty demurrage by 5%	550
Refinery Margins	Actual to Assay/Prediction Actual to Plan/Scheduling. > better planning – Utilization and Product Mix Optimization, Fewer LPO's, Continuous Improvement (POMAI) \$0.12/bbl * 100 M bbl/y	12,000



Production Accounting & Data Reconciliation (PADR)

Reduce HC Loss by 0.1%:

Prize = $\$45/B \times 0.001 \times 350\text{days} \times 200,000B/\text{day} > \$3,150,000/\text{year}$

Must find daily discrepancies/data problems that cause imbalance

PADR (Sgmagine, Advisor, etc.) must achieve plant wide balance

Plant Wide Balance Actual versus Plan:

Dec. 11, 2005

Material	Measured	Reconciled	Plan	Delta	Economics (k\$)
WTI	2 287	2 265	2 300	-35	382
FED					
Total Feed-					
FUEL GAS					
PLI					
LIUSD					
Production					
Gain/Loss					

KPI's reports:

- Actual Unit Balance versus Plan
- Energy Intensity Index
- Saleable Yield Growth
- Crude Receipt Quality Tracking
- Unit Constraint Cost Versus Plan
- Qualities Give-away Cost
- ETC.



Business Case – Potential and Achieved Benefits

LEGEND (Cents/BBL)

Profitability Improvements, Operations, Maintenance, Reliability, Small Capital Projects (Process and Energy)

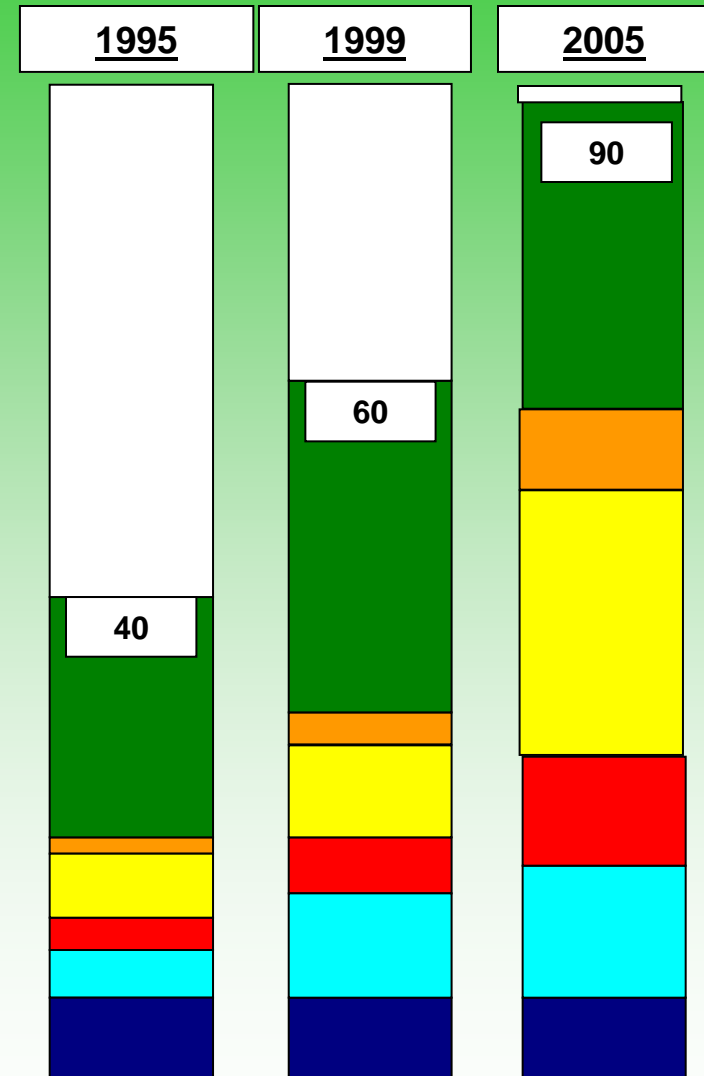
SCM / Integrated Supply Planning/Inventory Management (LP Models and Maintenance Process)

Information Technology (P & S, PADR, Performance (KPI's))

Advanced / Multi-Variable Control (Units, Power, Blending)

Process Data Management, Monitoring/Simulation

Infrastructure (DCS, LIMS, TGS, TMS, Network, CCC)



Expected Benefits

Benefit Area	Depends On	2.5 MMT	30 MMT	¢/BBL
Crude selection	Crude cost, refinery capability, Product Mix Optimization, RMO/Plan LP	1,400,000	15,000,000	7.5
Sales decisions	Total sales, SCOP, customer selection, export sales, NB's – SC's. LP Prod. Clearance	1,000,000	12,000,000	6.0
Logistical costs	Distribution costs	500,000	4,000,000	2.0
Inventory	Optimising levels vs. run outs, carrying cost, AFPS, IT	600,000	5,000,000	2.5
Balancing decisions (flex demand/supply, make or buy)	Optimum supply/demand balance, tactical planning, sourcing (LP Make or Buy)	2,000,000	16,000,000	8.0
Productivity	Integration, manual effort, IT	300,000	1,400,000	0.7
Information timing, integrity and accessibility	SCMS database, KPI's visual., applications and integration	1,000,000	12,000,000	6.0
Customer satisfaction	Service, product, supply, JIT, SCOP, reliability			
TOTAL	SCOP, AFPS, Org. Capab., SCM/IRIS/TMS IT Solution	\$6,800,000	\$65,000,000	32.7

* MMT – million metric tonnes Reference Crude oil \$25/BBL



Expected Investment Costs

- ★ IRIS/SCM system (Application and Infrastructure): \$5 - \$20 MM US
- ★ Typical ROI < 1 year
- ★ Project Approach: 2 - 3 phases – Duration: 18 to 30 months
- ★ First Step: Identify Opportunities and Qualify Benefits
 - Benchmark & Profit Improvement Plan
 - Cost: \$150 – 350 K US
 - Duration: 4-6 Months



Summary

- ★ Focus on data quality (PADR) to support Plan to Actual Tracking - only way to optimize refinery utilization and product mix within Supply Chain Optimization Process (SCOP)
- ★ A data model that matches your business rules with your process/business data and NOT a data warehouse is the right technology choice
- ★ A World Class LP extended from the Refinery to the entire supply area provides a supply value chain business model and supply planning technology to utilize as the core of SCM Optimization Hub/Region
- ★ Spend the time and money to effectively maintain your planning and business models)MOC)>> don't react to noise – use accurate data
- ★ SCOP and the supporting AFPS tools and SCM/IRIS enabling architecture are the most effective way to gain organization transformation or merger benefits

